

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



AbstractBook



2023 BARCELONA

May 4-7, 2023

Barcelona | Spain  
CCIB Congress Center



WORLD'S LEADING CLINICAL CONFERENCE ON BONE, JOINT AND MUSCLE HEALTH  
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# Free professional development – 10 minutes at a time



## ABOUT ESCEO

**The European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO)** is a not-for-profit organization, dedicated to a close interaction between clinical scientists dealing with bone, joint and muscle disorder, pharmaceutical industry developing new compounds in this field, regulators responsible for the registration of such drugs and health policy makers, to integrate the management of Osteoporosis and Osteoarthritis within the comprehensive perspective of health resources utilization.

**The objective of ESCEO** is to provide practitioners with the latest clinical and economic information, allowing them to organize their daily practice, in an evidence-based medicine perspective, with a cost-conscious perception.

[www.esceo.org](http://www.esceo.org)



## ABOUT IOF

The International Osteoporosis Foundation (IOF) is a non-profit, non-governmental organization dedicated to the worldwide fight against osteoporosis, the disease known as “the silent epidemic”. IOF's members – committees of scientific researchers, patient, medical and research societies and industry representatives from around the world – share a common vision of a world without osteoporotic fractures. IOF now represents 321 societies in 102 locations around the world.

[www.iofbonehealth.org](http://www.iofbonehealth.org)

### Mission

- | Increase awareness and understanding of osteoporosis.
- | Motivate people to take action to prevent, diagnose and treat osteoporosis.
- | Support national osteoporosis societies in order to maximize their effectiveness



## DEAR COLLEAGUES,

**It is with great pleasure that we welcome you the 2023 IOF-ESCEO World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases in Barcelona.**

The Congress' scientific programme has been developed by a team comprising members of the Committee of Scientific Advisors of the International Osteoporosis Foundation (IOF) and the Scientific Advisory Board of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO). We would like to thank the respective Scientific Chairs, Professors Nicholas Harvey and René Rizzoli, for taking the lead in setting up an exciting and comprehensive programme that brings together the world's best in the field of musculoskeletal health and disease and takes advantage of the synergies and combined expertise of our two organisations.

We are all meeting with a common aim - to gather new knowledge, skills and tools in the prevention and treatment of osteoporosis and osteoarthritis, the two most disabling conditions in elderly people. An important addition is a focus on sarcopenia because of its intimate relation to bone and joint disease. It is our hope that this Congress will move the field one step forward on all fronts; from new understanding of bone metabolism and pathology, to new strategies and options in prevention, diagnosis and treatment.

The core scientific programme consists of **10** plenary lectures by renowned speakers and **38** oral communications selected from the very best of hundreds of submitted abstracts, and **20** oral presentations of selected posters. In addition, participants can choose among **15** different Meet-The-Expert

sessions and **13** special sessions and symposia on issues of clinical importance. We also encourage you to visit many of the scheduled poster sessions and industry sponsored satellite symposia and to visit the large commercial exhibition presented by the leading companies in the bone field.

The past 3 years has been a difficult time for scientific communication. For this meeting, we emerge from the shadow of Covid-19 and return to the face-to-face format of previous times. We are especially thankful for your support and participation during these unprecedented times. We will do our best to ensure that this meeting a memorable, enriching experience for all.

As the situation eases, we look forward to meeting in person with the undoubted advantages of direct rather than virtual contact. **Welcome to Barcelona.**



**John A. Kanis**

**Jean-Yves Reginster**

## EVENT

## WCO-IOF-ESCEO

May 4-7, 2023

WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

## CONGRESS CHAIRMEN

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ESCEO President

**John A. KANIS**

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WORLD CONGRESS ON  
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2024 LONDON

April 11-14, 2024  
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## Auditorium B

16:20 - 16:50

**World Health Organization five-year project to improve the management of osteoporosis around the globe: A partnership with ESCEO, under the auspices of the World Health Organization Collaborating Center for Epidemiology of Musculoskeletal Health and Aging (Jointly organized by the WHO CC and by ESCEO. This session is organized independently of the WCO 2023)**

**Chairpersons : Jean-Yves Reginster & René Rizzoli**

**Presentation of the Islene Araujo de Carvalho-ESCEO 2023 Prize**

▶ *Doctor Jothees Amuthavalli Thiyagarajan (WHO, Geneva)*

**WHO Bone Health Expert Working Group: A WHO initiative to provide scientific guidance on the screening, diagnosis and management of osteoporosis around the globe.**

▶ *Doctor Jothees Amuthavalli Thiyagarajan (WHO, Geneva)*

**The five-year partnership between ESCEO and WHO: Unique opportunity to improve the well-being of osteoporotic patients.**

▶ *Doctor Jothees Amuthavalli Thiyagarajan (WHO, Geneva)*

**The five-year partnership between ESCEO and WHO: How can a scientific society help WHO in its goals and missions to improve healthy aging.**

▶ *Professor Jean-Yves Reginster: President ESCEO*

## Auditorium B

17:00 - 19:30

**WCO-IOF-ESCEO - OPENING CEREMONY**

**Chairpersons : Stefania Maggi & Cyrus Cooper**

17:00

Auditorium B

**Opening of the meeting**

▶ *Cyrus Cooper*

17:15

Auditorium B

**Best clinical papers published in 2022**

▶ *René Rizzoli*

18:00

Auditorium B

**Can we walk after a medullary section?**

▶ *Grégoire Courtine & Jocelyne Bloch*

18:30

Auditorium B

**An update on FRAX and potential clinical adjustments**

▶ *Eugene McCloskey*

18:45

Auditorium B

**Presentation of the IOF President's Award**

▶ *Cyrus Cooper & Philippe Halbout*

19:00

Auditorium B

**Touching the stars: a warm welcome from ESA Astronaut Samantha Cristoforetti**

19:10

Auditorium B

**Presentation of the 2023 ESCEO Medal of Excellence**

▶ *Jean-Yves Reginster*

19:20

Auditorium B

**Presentation of the 2023 IOF CSA Medal of Achievement**

▶ *Nicholas Harvey*

Banquet Hall

19:30 - 20:30

**Welcome Cocktail offered by ESCEO and IOF**

08:00 - 09:00

**Non-Sponsored Symposia**

08:00

Room 130

**Non-sponsored symposium of the GRIIP - "PRP in the management of musculoskeletal diseases"****Chairperson : Jean-François Kaux****Efficacy of PRP in tendinopathies**▸ *Jean-François Kaux***Standardisation of PRP in the management of knee and hip osteoarthritis**▸ *Martin Lamontagne***Future perspectives for the use of PRP in the management of musculoskeletal disorders**▸ *Mikel Sanchez*

08:00

Room 122

**Osteoporosis and life: from childhood to aging****Chairperson : Juan Jose Scali****Introduction to Symposium**▸ *Juan Jose Scali***Osteoporosis in childhood and teenagers**▸ *Bruno Muzzi Camargos***Osteoporosis in reproductive life**▸ *Jose Luis Neyro Bilbao***Osteoporosis in aged: What we know and what we need to know?**▸ *Geraldine Altamar Canales***Questions and comments from the audience**▸ *Juan Jose Scali*

08:00

Room 120

**Challenging decisions in Osteoporosis Management****Chairpersons : Yasser El Miedany & Naglaa Gadallah****Osteoporosis case ascertainment strategies: North Africa Experience**▸ *Ahmed Magdy Rabea***DXA scan: Beyond BMD measurement**▸ *Mohamed Hassan***Management of osteoporosis before the age of 50**▸ *Saoussen Miladi, Yasmine Makhoulouf*

08:00

Room 118

**Diabetes, Obesity bone and fractures. Myths and Pearls.****Chairpersons : Peter Ebeling , Sonia Cerdas Perez & Jose Luis Neyro Bilbao****Diabetes and bone metabolism**▸ *Sonia Cerdas Perez***Obesity, bone metabolism, osteoporosis and fractures**▸ *Oswaldo Daniel Messina*

08:00

Room 133-134

**Accelerating musculoskeletal healthcare into the 21st century: Insights to real-world implementation of digital health technologies for osteoporosis, sarcopenia, falls and fractures.**  
**Chairperson : Mylene Aubertin-Leheudre****Going digital – The role of digital health technologies for geriatric assessments and the remote delivery and monitoring of exercise and lifestyle interventions for older adults**▸ *Robin Daly***Digital voice assistants: A novel technological approach to supporting older adults to self-manage musculoskeletal conditions**▸ *David Scott***Social disadvantage and musculoskeletal health: Ensuring that the 'digital divide' does not impact on the equitable delivery of care**▸ *Jason Talevski*

08:00

Room 121

**Physical activity and exercise in mild cognitive impairment and dementia: guidelines from European societies****Chairperson : Olivier Bruyère****Physical activity and exercise for the prevention of dementia**▸ *Olivier Bruyère***Importance of physical activity and exercise in mild cognitive impairment**▸ *Daniel Pinto***Physical activity and exercise in mild cognitive impairment and dementia: guidelines from European societies**▸ *Nicola Veronese*

**08:00**

Room 119

**The influence of exercise on the chronic low-grade inflammatory profile**  
**Chairperson : Ivan Bautmans**

**Strength training alters lps-induced immune responses in peripheral mononuclear blood cells of older persons**

► *Ivan Bautmans*

**Three months of resistance training alters the expression of inflammation related genes in PBMCS with a LPS challenge**

► *Lene Salimans*

**Is physical activity associated with pre-frailty, T-cell phenotypes and inflammation in the oldest old?**

► *Emelyn Mathot*

**Effects of daily immunonutrient intake on inflammation and sarcopenia: Role of physical activity**

► *Andreas Delaere*

**Intra-articular biomarkers and characteristics of pain sensitization: How are they related to each other in knee osteoarthritis patients?**

► *Rose Njemini*

**Can exercise therapy influence inflammatory markers and BDNF in patients with knee osteoarthritis? A systematic review with meta-analysis**

► *Sofia Puts*

**Discussion**

► *Ivan Bautmans*

**08:00**

Room 123

**Capture the Fracture® - Advocating for effective and sustainable strategies for secondary fracture prevention**  
**Chairperson : Nicholas Harvey**

**The role of orthopaedic surgeon in the FLS**

► *Wolfgang Böcker*

**20 years of experiences with an FLS**

► *Serge Ferrari*

**Running an FLS is cost-effective**

► *Rafael Pinedo-Villanueva*

**Running an FLS is not only reducing fractures, but also reduces mortality**

► *Willem Lems*

**Panel discussion**

► *All*

**08:00**

Room 129

**Capture the Fracture mentorship – global delivery and what we have learnt**  
**Chairperson : Kassim Javaid**

**Overview and progress**

► *Kassim Javaid*

**The Role of the IOF Coordinator**

► *Philippe Halbout*

**Country specific outcomes / resources/ events : LATAM**

► *Adriana Medina*

**Country specific outcomes / resources/ events : Europe**

► *Antonio Naranjo*

**Country specific outcomes / resources/ events : APAC**

► *Jae-young Lim*

**Panel Discussion – How to improve mentorship for the future**

► *All*

**Auditorium B**  
**08:00 - 09:00**

**Sponsored Breakfast Satellite Symposium**

\* See details on the Sponsored Satellite Symposia page

**Auditorium A**  
**09:00 - 10:30**

**Scientific Session I**

**Chairpersons : Bess Dawson-Hughes & Philippe Halbout**

**09:00**

Auditorium A

**Plenary Lecture 1**

**To treat or not to treat: Continuous or intermittent therapies in osteoporosis**

► *Michael McClung*

**09:30**

Auditorium A

**Oral communication selected from abstracts**  
**OC1: ONE YEAR OF ROMOSUZUMAB FOLLOWED BY ONE YEAR OF DENOSUMAB VERSUS TWO YEARS OF DENOSUMAB: BMD AND FRACTURE RESULTS FROM THE FRAME AND FRAME EXTENSION STUDIES**

**Presenting author: S. L. Ferrari**

**Author: F. Cosman, M. Oates, D. Betah, J. Timoshanko, Z. Wang and M. R. McClung**

09:40

Auditorium A

Oral communication selected from abstracts  
**OC2: EFFECTIVENESS OF ASFOTASE ALFA FOR TREATMENT OF ADULTS WITH HYPOPHOSPHATASIA: RESULTS FROM A GLOBAL REGISTRY**

**Presenting author:** *K. Dahir*

**Author:** *P. Kishnani, G. Martos-Moreno, A. Linglart, A. Petryk, A. Messali, S. Fang, C. Rockman-Greenberg, K. Ozono, W. Höglér and L. Seefried*

09:50

Auditorium A

Oral communication selected from abstracts  
**OC3: PRE-TREATMENT LEVEL OF BONE TURNOVER DOES NOT INFLUENCE THE RESPONSE TO ALENDRONATE IN POSTMENOPAUSAL OSTEOPOROSIS. A LARGE HISTOMORPHOMETRIC STUDY**

**Presenting author:** *P. Chavassieux*

**Author:** *J. P. Roux and R. Chapurlat*

10:00

Auditorium A

Oral communication selected from abstracts  
**OC4: EFFICACY AND SAFETY OF PROPOSED DENOSUMAB BIOSIMILAR AND REFERENCE DENOSUMAB IN POSTMENOPAUSAL OSTEOPOROSIS AT 52 WEEKS: THE ROSALIA STUDY**

**Presenting author:** *P. Zuchowski*

**Author:** *S. Jeka, E. Dokoupilová, A. Kivitz, S. Sekhar, S. Banerjee, N. Krivtsova, A. Schwebig, J.-J. Body and R. Eastell*

10:10

Auditorium A

Oral communication selected from abstracts  
**OC5: COST-EFFECTIVENESS OF ABALOPARATIDE FOLLOWED BY ALENDRONATE IN US WOMEN AND MEN AT HIGH RISK OF OSTEOPOROTIC FRACTURES**

**Presenting author:** *M. Hiligsmann*

**Author:** *S. Silverman, A. J. Singer, L. Pearman, Y. Wang, J. Caminis and J.-Y. Reginster*

10:20

Auditorium A

Oral communication selected from abstracts  
**OC6: COMPARATIVE EFFECTIVENESS OF DENOSUMAB VERSUS ALENDRONATE AMONG POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS IN THE U.S. MEDICARE PROGRAM**

**Presenting author:** *T.-C. Lin*

**Author:** *J. R. Curtis, T. Arora, Y. Liu, L. Spangler, V. C. Brunetti, R.K. Stad, M. McDermott, B. D. Bradbury and M. Kim*

Auditorium A

10:30 - 12:10

Scientific Session II

**Chairpersons : John A. Kanis & Charlotte Beaudart**

10:30

Auditorium A

**Presentation of the ESCEO-IOF Herbert Fleisch Medal**

► *John A. Kanis*

10:40

Auditorium A

Plenary Lecture 2

**Should the punishment fit the crime? Osteoporosis treatment in relation to fracture risk**

► *Eugene McCloskey*

11:20

Auditorium A

Oral communication selected from abstracts  
**OC7: SINGLE WOMEN SHOW HIGHER FRACTURE RATES AND DIFFERENT ANTHROPOMETRIC, SOCIOECONOMIC AND LIFESTYLE PROFILES RELATIVE TO THEIR COUNTERPARTS IN RELATIONSHIPS: FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY**

**Presenting author:** *L. D. Westbury*

**Author:** *C. Pearce, N. R. Fuggle, K. A. Ward, C. Cooper and E. Dennison*

11:30

Auditorium A

Oral communication selected from abstracts  
**OC8: ADJUSTING CONVENTIONAL FRAX ESTIMATES OF FRACTURE PROBABILITY ACCORDING TO THE NUMBER OF PRIOR FRACTURES**

**Presenting author:** *H. Johansson*

**Author:** *M. Schini, J. A. Kanis, N. Harvey, V. Gudnason, G. Sigurdsson, K. Siggeirsdottir, M. Lorentzon, E. Liu, L. Vandenput and E. McCloskey*

**11:40**

Auditorium A

**Oral communication selected from abstracts**  
**OC9: FRACTURE PATTERNS IN T1D AND THEIR ASSOCIATED RISK FACTORS – A RETROSPECTIVE COHORT STUDY**

**Presenting author:** *N. H. R. Højgaard-Hessellund Rasmussen*

**Author:** *J. D. H. M. Driessen, A. V. K. Vestergaard Kvist, P. S. C. Souverein, J. V. D. van den Bergh and P. V. Vestergaard*

**11:50**

Auditorium A

**Oral communication selected from abstracts**  
**OC10: TYPE 1 AND 2 DIABETES MELLITUS AND INCIDENT FRACTURE RISK IN UK BIOBANK: IMPACT OF DISEASE TYPE, DURATION AND MICROVASCULAR COMPLICATIONS**

**Presenting author:** *E. M. Curtis*

**Author:** *R. J. Moon, S. D'Angelo, Z. Raisi-Estabragh, N. C. Harvey and C. Cooper*

**12:00**

Auditorium A

**Presentation of the ESCEO-AgNovos Healthcare Young Investigator Awards**

► *Jean-Yves Reginster & James Howe*

Auditorium A

**12:15 - 13:45****Sponsored Lunch Satellite Symposium**

\* See details on the Sponsored Satellite Symposia page

Auditorium B

**12:15 - 13:45****Sponsored Lunch Satellite Symposium**

\* See details on the Sponsored Satellite Symposia page

Podium

**13:45 - 14:00**

**IOF Young Investigator Nutrition Research Grants Ceremony**

► *Nicholas Harvey*

**14:00 - 15:00****Meet-The-Expert Session****14:00**

Room 121

**Disorders of phosphate homeostasis**

► *Manju Chandran*

**14:00**

Room 120

**Sport : how much is too much?**

► *Olivier Bruyère & Jean-François Kaux*

**14:00**

Room 119

**Post-fracture management**

► *Toshitaka Nakamura*

**14:00**

Room 133-134

**New guidelines on the management of primary hyperparathyroidism**

► *Aliya Khan*

Poster Area

**14:00 - 15:00****Poster Viewing Session I**

Podium

**14:00 - 15:10****Oral presentation of selected posters**

**Chairperson : Elaine Dennison**

**14:00**

Podium

**P506**

**HAND GRIP STRENGTH TEST AND SHORT PHYSICAL PERFORMANCE BATTERY VERSUS FRAX®: WHICH CORRELATION IN THE FRACTURE RISK? A MACHINE LEARNING STUDY**

**Presenting author:** *E. Prestifilippo*

**Author:** *N. Marotta, R.-I. De Socio, T. Giroladini, D. Badolato, C. Covelli, L. Muraca, K. Mezian, A. De Sire and A. Ammendolia*

14:07

Podium

P168

**DIGITAL VOICE ASSISTANTS FOR DELIVERING EXERCISE, NUTRITION AND MEDICATION INFORMATION TO POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS: A 24-WEEK PILOT RANDOMISED CONTROLLED TRIAL**

**Presenting author:** *D. Scott*

**Author:** *P. Jansons, B. De Ross, E. Gvozdenko, N. Kiss, P. R. Ebeling and R. M. Daly*

14:14

Podium

P220

**TREATMENT GAP AFTER OSTEOPOROTIC FRAGILITY FRACTURES - A REGIONAL ANALYSIS IN GERMANY**

**Presenting author:** *A. Kurth*

**Author:** *M. Salzmann, B. Habermann and C. Eberhardt*

14:21

Podium

P258

**ZOLEDRONIC ACID AFTER SPINAL CORD INJURY MITIGATES LOSSES IN PROXIMAL FEMORAL STRENGTH: A POST-HOC ANALYSIS OF A RANDOMIZED CONTROLLED TRIAL**

**Presenting author:** *L. E. Crack*

**Author:** *I. T. Haider, N. Simonian, J. Barroso, L. Gabel, T. J. Schnitzer and W. B. Edwards*

14:28

Podium

P264

**A PHASE 1, OPEN-LABEL, DOSE-ESCALATING STUDY TO EVALUATE THE SAFETY, TOLERABILITY, PHARMACOKINETICS, AND PHARMACODYNAMICS OF ALXN1850 IN ADULTS WITH HYPOPHOSPHATASIA**

**Presenting author:** *K. Dahir*

**Author:** *D. Dunn, S. Mitter, J. Hasan, A. Shannone and W. Pan*

14:35

Podium

P290

**EXECUTIVE FUNCTION AND INTELLIGENCE: ASSOCIATIONS WITH BONE SIZE AND MINERAL DENSITY IN CHILDHOOD**

**Presenting author:** *S. D'Angelo*

**Author:** *R. J. Moon, S. R. Crozier, M. Fernandes, C. Fall, C. Gale, K. M. Godfrey, J. H. Davies, C. Cooper and N. C. Harvey*

14:42

Podium

P403

**A PROSPECTIVE STUDY TO EVALUATE PATIENT-REPORTED QUALITY OF LIFE PRIOR TO AND AFTER ASFOTASE ALFA TREATMENT IN ADULTS WITH PEDIATRIC-ONSET HYPOPHOSPHATASIA**

**Presenting author:** *K. Dahir*

**Author:** *S. Ing, C. Deal, A. Messali, T. Bates and E. Rush*

14:49

Podium

P416

**MOBILITY AND HEALTH-RELATED QUALITY OF LIFE IN ADULTS WITH PAEDIATRIC-ONSET HYPOPHOSPHATASIA TREATED WITH ASFOTASE ALFA: INTERIM ANALYSIS FROM THE UK MANAGED ACCESS AGREEMENT**

**Presenting author:** *R. Keen*

**Author:** *K. Moss, S. Fang, A. Zygouras, M. Javaid, T. Geberhiwot, K. Poole, P. Selby, J. Walsh and J. Bubbear*

14:56

Podium

P511

**ISCHEMIC STROKE IS ASSOCIATED WITH REDUCED SCLEROSTIN EXPRESSION IN HUMAN ATHEROSCLEROTIC PLAQUES**

**Presenting author:** *S. L. Ferrari*

**Author:** *F. Burger, A. Roth, F. Mach, C. Thouverey and K. Miteva*

15:03

Podium

P609

**EFFECTS OF PARATHYROIDECTOMY ON RISK OF FRACTURE BY SEVERITY OF PRIMARY HYPERPARATHYROIDISM: A DANISH REGISTER STUDY**

**Presenting author:** *L. Vandenput*

**Author:** *M. Lorentzon, N. C. Harvey, E. Liu, E. McCloskey, J. A. Kanis, B. Abrahamsen, L. Rejnmark and H. Johansson*

Room 131-132

14:00 - 15:00

**Special Educational Lecture****Assessment of quality of life: state of the art**▶ *Charlotte Beaudart*

Room 118

14:00 - 15:00

**ESCEO-OARSI Symposium - Why or why not osteoporosis medications work for osteoarthritis?**  
**Chairpersons : Jean-Yves Reginster & Gun-il Im**

#### Introduction

**Impact of anti-osteoporosis medications on pre-clinical models of osteoarthritis**

► *Roland Chapurlat*

**Outcomes of clinical trials having assessed anti-osteoporosis drugs in osteoarthritis**

► *Jean-Yves Reginster*

**Why did the studies assessing anti-osteoporosis drugs in osteoarthritis fail?**

► *Nancy Lane*

**Subchondral bone as a target for anti-osteoarthritis medications: how can we identify the most appropriate patients to be included in clinical trials?**

► *Martin Englund*

Room 130

14:00 - 15:00

**ESCEO SYMPOSIUM - Recommendations for the selection of biochemical markers of musculoskeletal health and aging to be assessed in clinical trials of drugs aiming at the management of sarcopenia**  
**Chairpersons : Etienne Cavalier & René Rizzoli**

#### Introduction

► *Etienne Cavalier*

**Why do we need biomarkers in sarcopenia research?**

► *Alfonso J. Cruz-Jentoft*

**Which biomarkers for which studies**

► *Etienne Cavalier*

Room 123

14:00 - 15:00

**Sponsored Meet-The-Expert Session**

\* See details on the Sponsored Satellite Symposia page

Room 122

14:00 - 15:00

**Update on the use of TBS in the management of osteoporosis: Working Group organized by ESCEO and IOF under the auspices of the WHO Collaborating Center for Epidemiology of Musculoskeletal Health and Aging**

**Chairpersons : Olivier Lamy & Nicholas Harvey**

**New insight on the use of TBS in clinical practice**

► *Eugene McCloskey*

**Role of TBS in the management of osteoporosis**

► *Enisa Shevroja*

**Discussion - Doctor Sansin Tuzun (Leader)**

Auditorium A

15:00 - 17:00

**Scientific Session III**

**Chairpersons : Nicholas Harvey & Ngozi Njeze**

15:00

Auditorium A

**Plenary Lecture 3**

**Obesity, weight loss and bone health: what risk and which fractures?**

► *Peter Ebeling*

15:30

Auditorium A

**Oral communication selected from abstracts  
 OC11: HEALTH-RELATED QUALITY OF LIFE IN SARCOPENIA: A SYSTEMATIC REVIEW AND META-ANALYSIS**

**Presenting author: C. Beaudart**

**Author: C. Demonceau, J.-Y. Reginster, M. Locquet, M. Cesari, A. J. Cruz-Jentoft and O. Bruyère**

15:40

Auditorium A

**Oral communication selected from abstracts  
 OC12: DYNAPENIC ABDOMINAL OBESITY AND SUSCEPTIBILITY TO FALL: A PROSPECTIVE ANALYSIS OF THE OSTEOARTHRITIS INITIATIVE**

**Presenting author: N. Veronese**

**Author: P. Soysal, L. Dominguez, M. Barbagallo, S. Sabico, N. Al-Daghri and L. Smith**



15:50

Auditorium A

Oral communication selected from abstracts  
**OC13: SARCOPENIA DEFINITIONS AND THEIR ASSOCIATION WITH FRACTURE RISK IN OLDER SWEDISH WOMEN. THE SAHLGRENKA UNIVERSITY HOSPITAL PROSPECTIVE EVALUATION OF RISK OF BONE FRACTURES (SUPERB) STUDY**

Presenting author: *M. Lorentzon*

Author: *A. Gandham, G. Gregori, L. Johansson, H. Johansson, C. Harvey, L. Vandenput, E. McCloskey, J. A. Kanis, H. Litsne and K. Axelsson*

16:00

Auditorium A

Oral communication selected from abstracts  
**OC14: PREDICTORS OF 8-YEAR SURVIVAL IN NURSING HOMES: RESULTS FROM THE SENIOR COHORT.**

Presenting author: *C. Demonceau*

Author: *F. Buckinx, J.-Y. Reginster and O. Bruyère*

16:10

Auditorium A

Oral communication selected from abstracts  
**OC15: THE ASSOCIATIONS BETWEEN OSTEOSARCOPENIA AND FALLS, FRACTURES, AND FRAILTY IN OLDER ADULTS: RESULTS FROM THE CANADIAN LONGITUDINAL STUDY ON AGING (CLSA)**

Presenting author: *C. McArthur*

Author: *A. Lee, G. Ioannidis, G. Duque, J. D. Adachi, L. E. Griffith, L. Thabane and A. Papaioannou*

16:20

Auditorium A

Oral communication selected from abstracts  
**OC16: MUSCLE SIZE AND DENSITY ARE INDEPENDENTLY ASSOCIATED WITH DEATH AFTER HIP FRACTURE: A PROSPECTIVE COHORT STUDY**

Presenting author: *K. Engelke*

Author: *L. Wang, X. Cheng, X. Wu, A. Vlug and M. Yang*

16:30

Auditorium A

#### Plenary Lecture 4

**Bone: an affair of the heart or of the brain?**

► *Nicholas Harvey*

Room 131-132

15:00 - 16:45

#### Committee of National Societies Special Plenary Session

Progress in osteoporosis and fragility fracture management around the world

Chairpersons : *Jean-Yves Reginster & Famida Jiwa*

15:03

Room 131-132

**OCs1: APPLICATION OF DEEP LEARNING ALGORITHM TO DETECT AND VISUALIZE VERTEBRAL FRACTURES ON PLAIN FRONTAL RADIOGRAPHS**

Presenting author: *H.-Y. Chen*

Author: *C. Soong, F.-H. Lin, T.-H. Yang and R.-S. Yang*

15:11

Room 131-132

**OCs2: ASSESSMENT OF MACHINE LEARNING MODELS FOR FRACTURE RISK PREDICTION**

Presenting author: *R. Jain*

Author: *E. Sykes, N. Sano, H. N. Moon, J. Weldon, R. Shanker, V. Voytenko, J. Sullivan and D. Sauer*

15:19

Room 131-132

**OCs3: SCREENING FOR SARCOPENIA IN OLDER COMMUNITY-DWELLING ADULTS: FINDINGS FROM SOUTHAMPTON LONGITUDINAL STUDY OF AGEING (SALSA)**

Presenting author: *F. Laskou*

Author: *L. D. Westbury, G. Bevilacqua, C. Cooper, P. Aggarwal, H. P. Patel and E. Dennison*

15:27

Room 131-132

**OCs4: PATIENTS' PREFERENCES FOR COMMUNICATING FRACTURE RISK: THE RISK COMMUNICATION IN OSTEOPOROSIS (RICO) STUDY**

Presenting author: *M. Hiligsmann*

Author: *C. Beaudart, M. Sharma and S. Silverman*

15:35

Room 131-132

**OCs5: SHORT-TERM (2-YEARS) FRACTURE RISK PREDICTION: A MACHINE LEARNING APPROACH**

Presenting author: *G. Adami*

Author: *E. Grisan, O. Viapiana, A. Fassio, D. Bertelle, C. Benini, D. Gatti and M. Rossini*

**15:45**

Room 131-132

**Presentation of the IOF Committee of National Societies Medal**▶ *Jean-Yves Reginster***15:50**

Room 131-132

**Presentation of the ESCEO-Aging Clinical and Experimental Research, Stefania Maggi Prize**▶ *Famida Jiwa, Jean-Yves Reginster & Stefania Maggi***15:55**

Room 131-132

**OCs6: APPENDICULAR LEAN MASS AND FAT PERCENTAGES CUTOFF VALUES TO DEFINE SARCOPENIC OBESITY IN UKRAINE COMMUNITY-DWELLING OLDER ADULTS****Presenting author:** *N. Grygorieva***Author:** *M. Bystrytska and A. Musiienko***16:03**

Room 131-132

**OCs7: THE CONCEPT OF 'TIME TO FIRST FRACTURE' IN THE FRISBEE COHORT: ANALYSIS OF RISK FACTORS AND ASSOCIATION WITH 'IMMINENT FRACTURES'****Presenting author:** *J. M. K. De Filette***Author:** *A. Charles, L. Iconaru, F. Baleanu, M. Surquin, P. Bergmann and J.-J. Body***16:11**

Room 131-132

**OCs8: APPLICATION OF TOMOSYNTHESIS FOR VERTEBRAL COMPRESSION FRACTURE DIAGNOSIS AND BONE HEALING ASSESSMENT IN FRACTURE LIAISON SERVICES****Presenting author:** *H. Y. C. Chen***Author:** *C. S. Soong, L. F. H. Lin, Y. T. H. Yang and Y. R. S. Yang***16:19**

Room 131-132

**OCs9: THE ASSOCIATION OF REGIONAL BODY MUSCLE MASS AND FATTY LIVER INDEX IN OLDER PEOPLE: BUSHEHR ELDERLY HEALTH (BEH) PROGRAM****Presenting author:** *G. Shafiee***Author:** *R. Heshmat, F. Razi, A. Ostovar, N. Fahimfar, I. Nabipour and B. Larijani***16:27**

Room 131-132

**OCs10: ASSOCIATIONS BETWEEN HEALTH LITERACY AND BONE, MUSCLE, AND PHYSICAL FUNCTION OUTCOMES IN COMMUNITY-DWELLING OLDER ADULTS****Presenting author:** *J. Talevski***Author:** *S. Brennan-Olsen, A. Beauchamp, S. Vogrin and S. Bird***16:35**

Room 131-132

**OCs11: A SYSTEMATIC REVIEW AND CRITICAL APPRAISAL OF QUALITY INDICATORS TO ASSESS OPTIMAL CARE FOR FRAGILITY HIP FRACTURE****Presenting author:** *A. Olascoaga-Gómez de León***Author:** *J. C. Viveros-García and J. F. Torres-Naranjo***Auditorium A  
17:00 - 18:30****Sponsored Satellite Symposium**

\* See details on the Sponsored Satellite Symposia page

Room 131-132

08:00 - 09:00

**ESCEO SYMPOSIUM****Update on the role of Vitamin D supplementation in the management of musculoskeletal diseases****Chairperson : René Rizzoli****Epidemiology of Vitamin D deficiency**▶ *Kevin Cashman***Vitamin D and musculoskeletal diseases (effects in depleted and repleted populations)**▶ *Thierry Chevalley***Discussion**▶ *Stefania Maggi*

Room 118

08:00 - 09:00

**EUGMS-ESCEO Symposium****The 1st World Falls Guidelines: falls and fracture prevention are intertwined****Chairpersons : Hubert Blain & Jesper Ryg****Risk stratification and Exercise to reduce falls and fracture risk: what are the recommendations of the World Falls Guidelines**▶ *Tahir Masud***Falls prevention at a fracture liaison service: what's new from the World Falls Guidelines**▶ *Nathalie van der Velde***Interactive discussion**▶ *Hubert Blain*

08:00 - 09:00

**Non-Sponsored Symposia**

08:00

Room 130

**Skeletal muscle regeneration, fibrosis, and systemic vascular calcifications in Chronic Kidney Disease****Chairpersons : Maria Coco & Kwang Chun****The Role of calciprotein particles in bone function and vascular calcification**▶ *Wei Chen***Skeletal muscle dysfunction and sarcopenia in chronic kidney disease**▶ *Thomas J Wilkinson*

08:00

Room 121

**Frailty as a cause and a consequence of hip fractures****Chairpersons : Gustavo Duque & Carmen Castillo-Gallego****Identification of frailty in hip fracture patients**▶ *Gustavo Duque***Forestalling progression of frailty perioperatively in hip fracture patients: A review of systemic and individualized approaches**▶ *Lynn McNicoll***Frailty in post-hip fracture patients: what should we do?**▶ *Cristina Alonso-Bouzon*

08:00

Room 122

**Antiosteoporosis Medications and Fracture Healing. A review of the evidence and some recommendations****Chairpersons : Stuart Silverman & Kristina Akesson****A brief introduction**▶ *Stuart Silverman***Basics of fracture healing**▶ *Kristina Akesson***Bisphosphonates and fracture healing**▶ *Manju Chandran***Other Antiosteoporosis agents and fracture healing**▶ *Kassim Javaid***Conclusion**▶ *Nicholas Harvey***Question and Answer Session**▶ *All*

**08:00**

Room 129

**How to build the case for effective policy change to address the current and future burden of osteoporosis and fragility fractures**  
**Chairperson : Thierry Thomas**

**Opening remarks**

▸ *Thierry Thomas*

**Challenges in current policy and post-fracture care landscape, and the importance of health economics to generate and leverage evidence based data to build the case for policy change**

▸ *Mickaël Hiligsmann*

**The Capture the Fracture® initiative : designing policy tools for effective engagement with policymakers**

▸ *Nicholas Fuggle*

**Panel discussion**

▸ *Manuel Naves Díaz, Maria Luisa Brandi, Sansin Tüzün, Patricia Clark, Famida Jiwa*

**08:00**

Room 133-134

**The Brussels study on the early predictors of frailty: results and future perspectives**  
**Chairperson : Ivan Bautmans**

**Introduction Concept Butterfly**

▸ *Ivan Bautmans*

**Muscle endurance & self-perceived fatigue predict decline in gait speed and activities of Daily Living after one year follow-up: results from the BUTTERFLY Study**

▸ *Veerle Knoop*

**The effect of medication causing autonomic dysfunction on incidence frailty in octogenarians**

▸ *Aziz Debain*

**Impact of Covid-19 on physical activity, fatigue and frailty in community dwelling older adults: a cross sectional study**

▸ *Veerle Knoop*

**The impact of covid-19 lockdown on the Quality of life, meaningful activities, and frailty in community-dwelling octogenarians: A study in Belgium**

▸ *Stijn De Baets*

**Future perspective: Healthy Ageing Centers**

▸ *Nico de Witte*

**Discussion**

▸ *Ivan Bautmans*

**08:00**

Room 120

**Building Communities of Good Practice Globally: The Impact of Bone Health ECHO, Now and Beyond**  
**Chairperson : Michael Lewiecki**

**Introduction and global overview**

▸ *Michael Lewiecki*

**Fracture Liaison Service ECHO in the U.S.A.**

▸ *Claire Gill*

**National University of Ireland Galway Bone Health TeleECHO**

▸ *John Carey*

**Bone Health TeleECHO at the American University of Beirut, Lebanon**

▸ *Marlene Chakhtoura*

**Seeking Answers to the challenges in implementing Bone Health TeleECHO in the Asia Pacific**

▸ *Manju Chandran*

**Q & A - Panel discussion**

▸ *All*

**08:00**

Room 119

**Implementing Physical activity for older adults at risk in various and specific situations**  
**Chairperson : Olivier Bruyère**

**Implementing physical activity as a care for older adults following in geriatric outpatient clinics**

▸ *Mylene Aubertin-Leheudre*

**Implementing physical activity for community-dwelling seniors during isolation periods (e.g. Covid 19 pandemic)**

▸ *Fanny Buckinx*

**Implementing physical activity for older adults in nursing homes**

▸ *Olivier Bruyère*

## Auditorium B

08:00 - 09:00

**Breakfast Symposium****Breakfast Symposium - Bone status assessment with REMS: an update on fracture risk prediction****Chairperson : Giuseppe Guglielmi****Introduction**▸ *Giuseppe Guglielmi***Fracture risk assessment by REMS in primary and secondary osteoporosis**▸ *Carmelo Messina***REMS for the evaluation of bone Quantity and Quality**▸ *Giovanni Adami***Precision. Repeatability and Diagnostic Accuracy of REMS technology**▸ *Adolfo Diez-Perez***REMS employment in clinical routine: the Polish experience**▸ *Piotr Leszczynski***Take Home Message**▸ *Giuseppe Guglielmi*

## Auditorium A

09:00 - 10:30

**Scientific Session IV****Chairpersons : Olivier Bruyère & Claudia Campusano**

09:00

Auditorium A

**Plenary Lecture 5****Towards a global definition of sarcopenia: Muscle mass, performance and relevant clinical outcomes**▸ *Roger Fielding*

09:30

Auditorium A

**Oral communication selected from abstracts****OC17: A PHASE 2, 104-WEEK STUDY OF REPEAT LORECVIVINT INJECTIONS EVALUATING SAFETY, EFFICACY, AND BONE HEALTH UTILIZING QUANTITATIVE COMPUTED TOMOGRAPHY (QCT) IN KNEE OSTEOARTHRITIS (OA-06)****Presenting author:** *J. Tambiah***Author:** *Y. Yazici, C. Swearingen, H. Ghandehari, J. Britt, I. Simsek, M. Fineman, S. Kennedy and N. Lane*

09:40

Auditorium A

**Oral communication selected from abstracts**  
**OC18: PREDICTION OF KNEE OSTEOARTHRITIS CARTILAGE VOLUME LOSS OVER TIME WITH BASELINE BONE CURVATURE REGIONS AS THE BIOMARKERS. USAGE OF MACHINE LEARNING****Presenting author:** *J. Martel-Pelletier***Author:** *H. Bonakdari, F. Abram and J.-P. Pelletier*

09:50

Auditorium A

**Oral communication selected from abstracts**  
**OC19: NEW BIOMARKERS IN HAND OSTEOARTHRITIS: THE MICRO-RNAS****Presenting author:** *M. A. Auroux***Author:** *M. Millet, B. Merle, E. Fontagne, F. Duvet, E. Gineyts, J. C. Rousseau, O. Borel, A. Mercier, E. Lespessailles and R. Chapurlat*

10:00

Auditorium A

**Oral communication selected from abstracts**  
**OC20: BURDEN OF OSTEOARTHRITIS IN CHINA FROM 1990 TO 2019 AND PREDICTIONS OF THE BURDEN IN FUTURE 25 YEARS: FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY 2019****Presenting author:** *H. Chen***Author:** *Z. Zhou, X. Fang, D. Hunter, C. Ding and Z. Zhu*

10:10

Auditorium A

**Oral communication selected from abstracts**  
**OC21: FUNCTIONAL PERFORMANCE OUTCOMES AT 1-YEAR FOLLOW-UP AFTER TREATMENT OF KNEE OSTEOARTHRITIS: COMPARISON BETWEEN PLATELET-RICH PLASMA INJECTION AND ORAL PATENTED CRYSTALLINE GLUCOSAMINE SULFATE: PROPENSITY SCORE MATCH PAIR ANALYSIS****Presenting author:** *C. Amarase***Author:** *S. Ngarmukos, A. Tanavalee, S. C. Tantavisut, C. Tanavalee and N. Jaruthien*

10:20

Auditorium A

**Presentation of the ESCEO-IOF Pierre Meunier Young Scientist Award**▸ *René Rizzoli*

**Auditorium A**  
**10:30 - 12:10**  
**Scientific Session V**  
**Chairpersons : Etienne Cavalier & Maria Luisa Brandi**

**10:30**  
**Auditorium A**  
**Presentation of the IOF Olof Johnell Science Award**  
 ▶ *Cyrus Cooper & René Rizzoli*

**10:40**  
**Auditorium A**  
**Plenary Lecture 6**  
**How do we predict and prevent falls in older people?**  
 ▶ *Bess Dawson-Hughes*

**11:10**  
**Auditorium A**  
**Oral communication selected from abstracts**  
**OC22: DIFFERENTIAL EFFECTS ON RISK OF FRACTURE AND DEATH BY SEVERITY OF PRIMARY HYPERPARATHYROIDISM: A DANISH REGISTER STUDY**  
**Presenting author:** *N. C. Harvey*  
**Author:** *E. Liu, L. Vandenput, M. Lorentzon, E. McCloskey, J. A. Kanis, B. Abrahamsen, L. Rejnmark and H. Johansson*

**11:20**  
**Auditorium A**  
**Oral communication selected from abstracts**  
**OC23: THE IMPORTANCE OF RECENT PREVALENT FRACTURE SITE FOR IMMINENT RISK OF FRACTURE – A RETROSPECTIVE, NATIONWIDE COHORT STUDY OF OLDER SWEDISH MEN AND WOMEN**  
**Presenting author:** *K. Axelsson*  
**Author:** *H. Litsne and M. Lorentzon*

**11:30**  
**Auditorium A**  
**Oral communication selected from abstracts**  
**OC24: GEOGRAPHICAL VARIATION IN OSTEOPOROSIS CARE: A LONGITUDINAL ANALYSIS OVER 23 YEARS**  
**Presenting author:** *A. R. Jones*  
**Author:** *P. R. Ebeling, C. Haigh, G. Mishra, H. Teede, J. Enticott and A. J. Vincent*

**11:40**  
**Auditorium A**  
**Oral communication selected from abstracts**  
**OC25: NUMBER OF PRIOR FALLS AND FRACTURE RISK – POTENTIAL ADJUSTMENT OF CONVENTIONAL FRAX PROBABILITIES**  
**Presenting author:** *E. McCloskey*  
**Author:** *H. Johansson, N. Harvey, M. Lorentzon, S. Morin, W. Leslie and J. A. Kanis*

**11:50**  
**Auditorium A**  
**Oral communication selected from abstracts**  
**OC26: PAIN INCREASES THE RISK FOR SARCOPENIA IN COMMUNITY-DWELLING ADULTS: RESULTS FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING**  
**Presenting author:** *N. Veronese*  
**Author:** *M. Barbagallo, L. Dominguez, S. Maggi, P. Soysal and L. Smith*

**12:00**  
**Auditorium A**  
**Oral communication selected from abstracts**  
**OC27: POCOSTEO: RAPID, COST-EFFECTIVE AND EASY-TO-USE POINT-OF-CARE (POC) DEVICE FOR EARLY DETECTION AND MONITORING OF OSTEOPOROSIS**  
**Presenting author:** *P. K. Khashayar*  
**Author:** *J. V. Vanfleteren, P. R. Ragaert, A. V. Vermeulen, R. H. Hoogenboom, F. L. Leys, G. S. Schols, C. O. S. O'Sullivan, M. O. Ortiz, M. J. R. Rubio, P. B. Biggs, D. L. Lenartowicz, K. S. Sasidharan, R. G. Gransee, D. L. Latta, I. E. Etxebarria, N. F. Fahimfar, S. G. H. Gharibzadeh, A. O. Ostovar, F. R. Razi, B. L. Larijani, I. N. Nabipour, B. L. Luegger, B. O. P. Obermayer-Pietsch and H. P. Dimai*

**Auditorium A**  
**12:15 - 13:45**  
**Sponsored Lunch Satellite Symposium**  
 \* See details on the Sponsored Satellite Symposia page

**Auditorium B**  
**12:15 - 13:45**  
**Sponsored Lunch Satellite Symposium**  
 \* See details on the Sponsored Satellite Symposia page

**14:00 - 15:00**  
**Meet-The-Expert Session**

**14:00**

Room 121

**Management of hypoparathyroidism**

▸ *Maria Luisa Brandi*

**14:00**

Room 133-134

**Osteoporosis treatments and material level properties of bone**

▸ *Xavier Nogues*

**14:00**

Room 120

**Changing the bone paradigm in kidney transplant recipients**

▸ *Jorge Cannata-Andia*

**14:00**

Room 119

**Treatments of endometriosis and bone health**

▸ *Santiago Palacios*

Room 122

**14:00 - 15:00**

**Evidence-based and patient-centered recommendations for the treatment of osteoporosis in men: Outcomes of an ESCEO Working Group organized under the auspices of the World Health Organization Collaborating Center for Epidemiology of Musculoskeletal Health**  
Chairpersons : Jean-Marc Kaufman & René Rizzoli

**Screening, diagnosis and identification of patients to be treated**

▸ *John A. Kanis*

**Outcomes of a new meta-analysis assessing pharmacological treatments in osteoporosis in men**

▸ *Charlotte Beaudart*

**Recommendations from ESCEO: GRADE assessment**

▸ *Nick Fuggle*

Room 118

**14:00 - 15:00**

**ESCEO and IOF guidance for the conduct and reporting of Real-World Evidence studies in osteoporosis**

Chairpersons : Nicholas Harvey & Andrea Laslop

**Real World Evidence: a critical new approach for pharmaceutical regulation**

▸ *Andrea Laslop*

**State-of-the-art epidemiology for Real World Evidence**

▸ *Daniel Prieto-Alhambra*

**Real World Evidence: the future of research in osteoporosis?**

▸ *Peyman Hadji*

**Q/A-Panel discussion: René Rizzoli (leader), Andrea Laslop, Daniel Prieto Alhambra, Peyman Hadji, Nicholas Harvey**

Room 130

**14:00 - 15:00**

**Sponsored Meet-The-Expert Session**

\* See details on the Sponsored Satellite Symposia page

Poster Area

**14:00 - 15:00**

**Poster Viewing Session II**

Podium

**14:00 - 15:10**

**Oral presentation of selected posters**

Chairperson : Elaine Dennison

**14:00**

Podium

**P687**

**ASSOCIATIONS BETWEEN GUT MICROBIOTA AND SARCOPENIA OR ITS DEFINING PARAMETERS: A SYSTEMATIC REVIEW**

Presenting author: *L. Lapauw*

Author: *A. Rutten, J. Dupont, L. Dedeyn, N. Amini, L. Vercauteren, J. Raes and E. Gielen*

**14:07**

Podium

**P709****PRELIMINARY RESULTS OF THE INVOLVEMENT OF THE ENDOCANNABINOID SYSTEM IN FIBROUS BONE DYSPLASIA****Presenting author:** *I. Falsetti***Author:** *G. Palmi, C. Aurilia, S. Donati, F. Marini, G. Galli, R. Zonefrati, T. Iantomasi and M. L. Brandi***14:14**

Podium

**P1030****A NEW TOOL FOR INCIDENT FRACTURE RISK IDENTIFICATION IN MEN: THE REMS-BASED FRAGILITY SCORE (FS)****Presenting author:** *P. Pisani***Author:** *F. Conversano, M. Muratore, G. Adami, M. L. Brandi, C. Caffarelli, E. Casciaro, M. Di Paola, R. Franchini, D. Gatti, S. Gonnelli, G. Guglielmi, F. A. Lombardi, A. Natale, V. Testini and S. Casciaro***14:21**

Podium

**P1033****EFFECT OF VITAMIN D3, OMEGA-3S AND A SIMPLE HOME EXERCISE PROGRAM ON BMD IN EUROPEAN OLDER ADULTS: THE DO-HEALTH RANDOMIZED CONTROLLED TRIAL****Presenting author:** *M. Kistler-Fischbacher***Author:** *G. Armbrecht, S. Gängler, W. Lang, J. A. Kanis, B. Dawson-Hughes, R. Rizzoli, G. A. Wanner and H. A. Bischoff-Ferrari***14:28**

Podium

**P340****A PLACEBO-CONTROLLED, SINGLE BLIND EXTENSION STUDY (OA-07) EVALUATING THE SAFETY AND EFFICACY OF LORECEVIVINT IN SUBJECTS WITH SEVERE OSTEOARTHRITIS OF THE KNEE: RADIOGRAPHIC AND PAIN OUTCOMES AT 24 AND 30 MONTHS****Presenting author:** *J. Tambiah***Author:** *Y. Yazici, C. Swearingen, V. Lopez, J. Britt, S. Kennedy and T. McAlindon***14:35**

Podium

**P253****DYNAPENIA, LOW MUSCLE MASS OR SARCOPENIA: WHICH BEST PREDICTS MOBILITY DECLINE IN OLDER WOMEN WITH NORMAL GAIT SPEED?****Presenting author:** *T. S. Alexandre***Author:** *I. Souza, D. C. Oliveira, T. B. Souza, P. C. Ramirez, N. C. Soares, M. M. Luiz, M. L. B. Delinocente, A. Steptoe and C. Oliveira***14:42**

Podium

**P381****SARCOPENIA PREVALENCE, INCIDENCE, AND ASSOCIATION WITH 6 YEARS INCIDENT FRAGILITY FRACTURES IN SWISS POSTMENOPAUSAL WOMEN****Presenting author:** *C. Vendrami***Author:** *E. Shevroja, E. Gonzalez Rodriguez, G. Waeber, P. Vollenweider, P. Marques-Vidal, D. Hans and O. Lamy***14:49**

Podium

**P460****ASSOCIATION BETWEEN POLLUTION AND FRAILTY IN OLDER PEOPLE: A CROSS-SECTIONAL ANALYSIS OF THE UK BIOBANK****Presenting author:** *N. Veronese***Author:** *L. Maniscalco, D. Matranga, G. Lacca, L. Dominguez and M. Barbagallo***14:56**

Podium

**P453****DEVELOPMENT OF TWO INNOVANT PERFORMANCE-BASED OBJECTIVE MEASURES IN FELINE OSTEOARTHRITIS: THEIR RELIABILITY AND RESPONSIVENESS TO ANALGESIC TREATMENT****Presenting author:** *J.-P. Pelletier***Author:** *A. Delsart, M. Moreau, C. Otis, M. Frezier, B. Lussier, J. Martel-Pelletier and E. Troncy***15:03**

Podium

**P498****DEVELOPMENT AND VALIDATION OF NEW EXERCISES TO PROMOTE PHYSICAL ACTIVITY IN NURSING HOME SETTINGS, THROUGH QUALITATIVE METHOD****Presenting author:** *F. Buckinx***Author:** *L. Maton, V. Dalimier, A. Mouton, L. Lengelé, J.-Y. Reginster and O. Bruyère*



Room 131-132  
**14:00 - 15:00**  
**Special Educational Lecture**  
**Osteoporosis - personalized management**  
 ▶ *Adolfo Diez-Perez*

Room 131-132  
**15:00 - 16:45**  
**Committee of Scientific Advisors Special Session**  
**Osteoporosis state-of-the-art from the IOF**  
**Committee of Scientific Advisors**  
**Chairpersons : Nicholas Harvey & Serge Ferrari**

**Advances in HRpQCT – from novel phenotypes to improved fracture risk prediction**  
 ▶ *Mattias Lorentzon*

**Antiresorptives and dental implant healing-a global consensus statement**  
 ▶ *Aliya Khan*

**Musculoskeletal ageing-a global perspective**  
 ▶ *Kate Ward*

**Auditorium A**  
**15:00 - 17:00**  
**Scientific Session VI**  
**Chairpersons : Nicola Veronese & Manju Chandran**

**15:00**  
 Auditorium A  
**Plenary Lecture 7**  
**Pharmacoepidemiology and big data in the post-COVID era**  
 ▶ *Daniel Prieto-Alhambra*

**15:30**  
 Auditorium A  
**Oral communication selected from abstracts**  
**OC28: MUSCULOSKELETAL FUNCTIONAL ABILITY AND STRENGTH IN SUB-SAHARAN AFRICA (THE MUFASSA STUDY): DETERMINING SARCOPENIA PREVALENCE IN SOUTH AFRICA, THE GAMBIA AND ZIMBABWE**  
**Presenting author: K. A. Ward**  
**Author: L. Micklesfield, T. Manyanga, M. K. Jallow, B. Cassim, L. Gates, C. Pearce, C. Cooper, A. J. Burton, H. Wilson, R. Ferrand, M. Jobe and C. L. Gregson**

**15:40**  
 Auditorium A  
**Oral communication selected from abstracts**  
**OC29: TREATMENT PERSISTENCE OF JANUS-KINASE (JAK) INHIBITORS IN RHEUMATOID ARTHRITIS AND THE EFFECT ON GLUCOCORTICOIDS USAGE AND THE IMPACT OF COMEDICATION OF CONVENTIONAL DMARDS ON TREATMENT PERSISTENCE: RETROSPECTIVE STUDY IN THE AUSTRALIAN POPULATION**  
**Presenting author: L. Scheepers**  
**Author: Y. Yang, Y. Chen and G. Jones**

**15:50**  
 Auditorium A  
**Oral communication selected from abstracts**  
**OC30: INTEGRATING POST-FRACTURE CARE INTO THE PRIMARY CARE SETTING (INTERFRACT): A MIXED-METHODS STUDY TO CO-DESIGN A CARE PROGRAM TO IMPROVE RATES OF OSTEOPOROSIS AND FRACTURE TREATMENT**  
**Presenting author: J. Talevski**  
**Author: A. Beauchamp, S. Bird and R. Daly**

**16:00**  
 Auditorium A  
**Oral communication selected from abstracts**  
**OC31: A DEEP LEARNING, COMPUTER VISION APPROACH TO SEGMENTATION OF BONE MICROARCHITECTURE HIGHLIGHTS THE ROLE OF THE TRABECULAR COMPARTMENT IN FRACTURE DISCRIMINATION**  
**Presenting author: N. Fuggle**  
**Author: S. Lu, M. Ó Breasail, L. Westbury, K. Ward, E. Dennison, S. Mahmoodi and C. Cooper**

**16:10**  
 Auditorium A  
**Oral communication selected from abstracts**  
**OC32: EVALUATING THE DIAGNOSTIC VALUE OF AN AUTOMATIC IMAGE ANALYSES SYSTEM FOR OSTEOPOROSIS AND SARCOPENIA IN OLDER MEN: MROS STUDY**  
**Presenting author: M. Imani**  
**Author: T. Ngoc Quoc Dao, E. Meijering, S. Vogrin, E. S. Orwoll, P. Cawthon and G. Duque**

**16:20**

Auditorium A

**Oral communication selected from abstracts  
OC33: DISORGANIZED BONE COMPONENTS: A  
NOVEL BIOMARKER UNRELATED TO BONE  
DENSITY AND STRUCTURE THAT MAY HOLD  
THE KEY TO THE DIAGNOSIS OF ATYPICAL OR  
STRESS FRACTURES**

**Presenting author:** *R. Zebaze*

**Author:** *C. S.-L. Shore-Lorenti, C. Chiang, N. Nguyen, D.  
Djopseu, T. Makebeh, Z. Zhang, M. Milat and P. R. Ebeling*

**16:30**

Auditorium A

**Plenary Lecture 8  
Hopes and disappointments of new and  
emerging OA therapies**

▸ *Francis Berenbaum*

Room 131-132

08:00 - 09:00

**ESCEO SYMPOSIUM****Update on the role of oral Bisphosphonates in the treatment of osteoporosis****Chairpersons : Jean-Marc Kaufman & René Rizzoli**

Risk/benefit ratio of oral Bisphosphonates in the treatment of osteoporosis (fracture reduction, GI, CV, AFF, ONJ,...)

▶ *Nicholas Harvey***New formulation of oral Bisphosphonates: Impact on the reduction of osteoporosis treatment gap**▶ *Nick Fuggle***Discussion**▶ *Friederike Thomasius*

Room 118

08:00 - 09:00

**SICOT-ESCEO-IOF Symposium****Standards in Management of Osteoporotic Fractures****Chairperson : Ilir Hasani****Management of Osteoporotic Spinal Fractures**▶ *Ilir Hasani***Treatment of unstable osteoporotic bimalleolar ankle fractures**▶ *Karhao Teoh***Management of Acetabular fractures in elderly**▶ *Eftychios Bolierakis***Proximal femur fractures in elderly**▶ *Mario Staesinic*

08:00 - 09:00

**Non-Sponsored Symposia**

08:00

Room 130

**Psoriatic disease. New therapeutic horizons and the effect on the musculoskeletal system in the era of COVID-19****Chairperson : Athanassiou Panagiotis****Psoriatic disease in the era of COVID-19**▶ *Athanassiou Lambros***Psoriatic disease. Comorbidities**▶ *Pavlos Tsakiridis***Psoriatic disease and rehabilitation**▶ *Yannis Dionyssiotis***Psoriatic disease. New therapeutic horizons. Small molecule inhibitors, biologic agents and JAK inhibitors**▶ *Athanassiou Panagiotis*

08:00

Room 129

**Tobacco harm reduction and bone health****Chairpersons : Maria Luisa Brandi & Umberto Tarantino****Cigarette smoke and bone disorders**▶ *Chiara Gregg***Health lifestyles and bone health: the Case of Tobacco Harm Reduction**▶ *Riccardo Polosa***Role of cigarette smoke and tobacco heated products on bone remodeling**▶ *Giovanni Li Volti*

08:00

Room 123

**Fracture Liaison Service: From Zero to Hero – National experience****Chairpersons : Yasser El Miedany & Mathias Toth****Closing the treatment gap**▶ *Naglaa Gadallah***How pharmaceutical industry can support national FLS**▶ *Yasser El Miedany***Falls: raising awareness through HCP education**▶ *Susan Plummer*

**08:00**

Room 121

**Evidence based Latin American guidelines about prevention, diagnosis and treatment of glucocorticoid induced osteoporosis. An update**  
**Chairpersons : Osvaldo Daniel Messina & Claudia Campusano**

**Guidelines methodology**

▸ *Patricia Clark*

**Results**

▸ *Jorge A Morales Torres*

**Panel proposal for pharmacological therapies according to fracture risk stratification**

▸ *Osvaldo Daniel Messina*

**08:00**

Room 119

**Osteoimmunology in the era of COVID-19**  
**Chairperson : Kostoglou-Athanassiou Ifigenia**

**Pandemics through the ages. The role of stress trauma and frailty**

▸ *Yannis Athanassiou*

**Menopause and osteoimmunology**

▸ *Yannis Dionyssiotis*

**Osteoimmunology and current treatment of osteoporosis**

▸ *Athanassiou Panagiotis*

**Osteoimmunology. The connection between bone and the immune system**

▸ *Kostoglou-Athanassiou Ifigenia*

**08:00**

Room 120

**The Current and Future Approaches in the Diagnosis and Management of Sarcopenia**  
**Chairpersons : Pınar Borman & Belgin Karaoglan**

**What is sarcopenia? How is it diagnosed?**

▸ *Burcu Duyur Çakit*

**Sarcopenia and New Biomarkers.**

▸ *Aylin Sepici Dinçel*

**The Management of Sarcopenia**

▸ *Pınar Borman*

**08:00**

Room 122

**Update in Musculoskeletal Conditions with Hand involvement**  
**Chairpersons : Fitnat Dincer & Andreas Winkelmann**

**Degenerative joint disease of Hand, Osteoarthritic Hand**

▸ *Fitnat Dincer*

**Hand involvement in Complex Regional Pain Syndrome-CRPS (Sudeck atrophy, osteoporosis in hand)**

▸ *Raquel Valero Alcaide*

**Soft tissue lesions / non articular involvement of Hand**

▸ *Andreas Winkelmann*

**09:00 - 10:00****Meet-The-Expert Session****09:00**

Room 123

**High bone mass: what should we do?**

▸ *Celia Gregson*

**09:00**

Room 119

**Transgender medicine and bone**

▸ *Jean-Marc Kaufman*

**09:00**

Room 120

**Dietary patterns and bone health**

▸ *Nicola Veronese*

**09:00**

Room 122

**Complex cases – questions and answers**

▸ *Elaine Dennison*

Room 130  
09:00 - 10:00  
**Educational Lecture organized by OAFI**  
**The beneficial effects of pharmaceutical-grade chondroitin sulfate on cardiovascular system in patients with osteoarthritis**  
► *Francisco J. de Abajo*

Room 118  
09:00 - 10:00  
**Sponsored Meet-The-Expert Session**  
\* See details on the Sponsored Satellite Symposia page

Poster Area  
09:00 - 10:00  
**Poster Viewing Session III**

Auditorium A  
10:00 - 12:00  
**Scientific Session VII**  
**Chairpersons : Adolfo Diez-Perez & Radmila Matijevic**

10:00  
Auditorium A  
**Plenary Lecture 9**  
**Do high and very high fracture risk really matter?**  
► *Kassim Javaid*

10:30  
Auditorium A  
**Presentation of the ESCEO-IOF Young Investigator Awards**  
► *Nicholas Harvey & René Rizzoli*

10:40  
Auditorium A  
**Oral communication selected from abstracts**  
**OC34: LONG-TERM SAFETY OF BUROSUMAB IN ADULTS WITH X-LINKED HYPOPHOSPHATAEMIA (XLH) IN A PHASE 3B OPEN-LABEL STUDY**  
**Presenting author:** *M. K. Javaid*  
**Author:** *P. Kamenicky, C. Roux, R. Lachman, M. L. Brandi, M. Cohen-Solal, R. Crowley, S. Ralston, R. Keen, J. Bowler, L. Henderson, W. Sun, A. Tudor and E. Quattrocchi*

10:50  
Auditorium A  
**Oral communication selected from abstracts**  
**OC35: HEALTHCARE RESOURCE UTILIZATION ASSOCIATED WITH TUMOR-INDUCED OSTEOMALACIA: REVIEW OF PATIENT HISTORIES PRIOR TO ENTRY IN CLINICAL TRIAL UX023T-CL201**  
**Presenting author:** *B. Johnson*  
**Author:** *S. M. Jan de Beur, T. O. Carpenter, K. Dahir, E. A. Imel, M. B. Zanchetta, A. Williams, Z. Li and M. Sharp*

11:00  
Auditorium A  
**Oral communication selected from abstracts**  
**OC36: A DIETARY PLUS EXERCISE INTERVENTION IMPROVES BONE TURNOVER IN PATIENTS WITH METABOLIC SYNDROME AND TYPE 2 DIABETES**  
**Presenting author:** *M. Gerbaix*  
**Author:** *D. Courteix, G. Lac, B. Lesourd, R. Chapier, A. Vinet, G. Walther, P. Obert, F. Dutheil and S. L. Ferrari*

11:10  
Auditorium A  
**Oral communication selected from abstracts**  
**OC37: INTEGRATED LONG-TERM BONE MINERAL DENSITY OUTCOMES IN WOMEN RECEIVING RELUGOLIX COMBINATION THERAPY IN LIBERTY AND SPIRIT STUDIES VS NON-TREATED WOMEN**  
**Presenting author:** *M. R. McClung*  
**Author:** *A. Al-Hendy, N. Johnson, S. R. Cummings, S. L. Ferrari, A. C. Santora, J. C. Arjona Ferreira, R. B. Wagman and Y. Li*

11:20  
Auditorium A  
**Oral communication selected from abstracts**  
**OC38: ZOLEDRONATE AS A PREVENTATIVE MEASURE FOR BONE LOSS FOLLOWING DENOSUMAB DISCONTINUATION: RESULTS FROM A MULTI-INSTITUTIONAL RANDOMIZED CONTROLLED TRIAL**  
**Presenting author:** *S.-H. Fu*  
**Author:** *C.-C. Lee, C.-C. Hung, C.-Y. Li and C.-Y. Wang*

11:30  
Auditorium A  
**Plenary Lecture 10**  
**Management of premenopausal osteoporosis**  
► *Peyman Hadji*

12:00 - 13:00

## Non-Sponsored Symposia

12:00

Room 122

**Perioperative bone optimization in the arthroplasty candidate****Chairperson : Roberto Enrique Lopez Cervantes**

State of the art. What do we know about bone density after arthroplasty?

► *Iñigo Etxebarria Foronda*

The Effect of Antiresorptive on Bone Loss After Arthroplasty. Literature Review and Meta-Analysis of Randomized Controlled Trials

► *Francisco Torres Naranjo*

Periprosthetic BMD loss and its implication in the revision and complication rates

► *Francisco Linares Restrepo*

Statement position proposal of how to do "bone optimization in the arthroplasty candidate"

► *Roberto Enrique Lopez Cervantes*

12:00

Room 123

**Link between diabetes, osteoporosis and bone health - rheumatologist, endocrinologist and registered dietitian point of view****Chairperson : Mislav Radić**

Osteoporosis and bone health in diabetes mellitus

► *Josipa Radić*

Nutrition and bone health in diabetes-induced osteoporosis

► *Dora Bučan Nenadić*

Bone health and osteoporosis treatment in diabetes mellitus

► *Mislav Radić*

12:00

Room 120

**Bone health and cancer: A dicey duo****Chairpersons: El Miedany Yasser & Naglaa Gadallah****Chairpersons : Yasser El Miedany & Naglaa Gadallah**

Addressing Bone Loss in Cancer patients: A step forward

► *Walaa Elwakil*

What Treating Doctors and Breast Cancer Survivors Need to Know About Osteoporosis

► *Mervat Eissa*

Optimal bone health management strategies in patients with prostate cancer

► *Mathias Toth*

Bone health in childhood cancer

► *Waleed Hassan*

12:00

Room 130

**Prevention of osteoporotic fractures: the role of exercise and of FRID (falls risk increasing drugs) avoidance****Chairperson : Ana Paula Barbosa**

The role of post-fracture exercise in women's physical function and quality of life

► *Anabela Barcelos*

The role of FRID (Falls Risk Increasing Drugs) avoidance

► *Anabela Pereira*

Q&amp;A

► *All*

**12:00**

Room 129

**Sarcopenia and rheumatoid arthritis****Chairpersons : Kostoglou-Athanassiou Ifigenia & Yannis Dionyssiotis****Rheumatoid arthritis and muscular involvement**▶ *Athanassiou Panagiotis***Sarcopenia and rheumatoid arthritis**▶ *Yannis Dionyssiotis***Treatment of sarcopenia in rheumatoid arthritis**▶ *Kostoglou-Athanassiou Ifigenia***12:00**

Room 119

**Musculoskeletal Functional Capacity in Sub-Saharan Africa****Chairperson : Ayse Zengin****Co-morbidities of muscle function in older adults from The Gambia**▶ *Ayse Zengin***Impact of HIV on midlife musculoskeletal health in sub-Saharan Africa**▶ *Celia Gregson***Markers of low muscle mass and function: insights from proteomics in middle-aged South Africans**▶ *Lise Micklesfield***Muscle and functional ability in sub-Saharan Africa: The MUFASSA study**▶ *Kate Ward***12:00**

Room 121

**Rare Bone Diseases: A view from LATAM****Chairperson : Alejandro Román-González****Welcome and general overview of rare bone diseases in Latin America**▶ *Alejandro Román-González***X-LINKED hypophosphatemia (XLH): Diagnosis and treatment in adults**▶ *Adriana Medina***Transition of care: From childhood to adulthood. How can we improve the care of our patients with endocrine disorders?**▶ *Sofia Kastelic***Tumor-induced osteomalacia and fibrodysplasia ossificans progressiva in Colombia and Latin America**▶ *Alejandro Román-González***Questions and wrap-up**▶ *All*

08:00 - 09:00

Auditorium B

**AgNovos Healthcare Sponsored Breakfast Satellite Symposium - Addressing Local Bone Loss Through Targeted Bone Formation – From Theory to Clinical Practice**

Chairperson : Maria Luisa Brandi

**Welcome & Introductions**

▸ *Maria Luisa Brandi*

**The Historical Role of Biomaterials to Form New Bone: What Have We Learned?**

▸ *Maria Luisa Brandi*

**Evidence Supporting the Role of a Surgical Approaches to Build Bone**

▸ *Andreas Kurth*

**Building a Multidisciplinary Care Pathway to Study a Surgical - Approach for Building New Bone in the Proximal Femur**

▸ *Ernesto Guerra Farfán*

**Adding a Surgical Treatment to a Clinical Practice in the Real-World**

▸ *Antoni Fraguas*

**Roundtable Discussion**

▸ *All*

**Open Q&A**

▸ *All*

12:15 - 13:45

Auditorium A

**UCB Sponsored Lunch Satellite Symposium - The fast path in osteoporosis treatment: Correcting the course**  
Chairpersons : Maria Luisa Brandi & Laia Gifre

**Welcome and introduction**

▸ *Laia Gifre, Maria Luisa Brandi*

**Bone-forming agents first: Embracing change in the treatment paradigm**

▸ *Erik Eriksen*

**Romosozumab first for patients at very high risk of fracture: Standing out from the crowd**

▸ *Serge Ferrari*

**Romosozumab first in practice: Clinical conundrums**

▸ *Erik Eriksen, Serge Ferrari*

**Q&A/discussion**

▸ *All*

**Conclusions and closing remarks**

▸ *Maria Luisa Brandi, Laia Gifre*

12:15 - 13:45

Auditorium B

**Viatrix Sponsored Lunch Satellite Symposium - The importance of an early diagnosis and a holistic approach to treatment for the management of OA**  
Chairperson : Jean-Yves Reginster

**Welcome & Introduction**

▸ *Jean-Yves Reginster*

**The decade of healthy ageing, early diagnosis and early treatment**

▸ *Stefania Maggi*

**Why early treatment provides better opportunity to long term treatment success**

▸ *Nicholas Fuggle*

**Management of chronic pain in rheumatic diseases**

▸ *Frank Buttgerit*

**Q&A Session**

▸ *All*



14:00 - 15:00

Room 123

**IBSA Sponsored Meet-The-Expert Session - The economic burden of OA and the importance of cost-effective Treatments**

Chairperson : Olivier Bruyère

**How can Health Economics help to optimize patient care in OA**

▸ *Mickaël Hiligsmann*

**An example of Health Economics evaluation: The case of I.A. HL-HA formulation**

▸ *Olivier Bruyère*

**Q&A session**

17:00 - 18:30

Auditorium A

**Theramex Sponsored Satellite Symposium - Abaloparatide, an innovative anabolic agent for the treatment of osteoporosis with increased risk of fracture**

Chairpersons : Jean-Yves Reginster & Cyrus Cooper

**Welcome and Introduction**

▸ *Jean-Yves Reginster*

**Efficacy and tolerability of abaloparatide in postmenopausal women at risk of osteoporosis fracture**

▸ *Nicholas Harvey*

**Comparative effectiveness and cardiovascular safety of abaloparatide and teriparatide in postmenopausal women with osteoporosis in real world use**

▸ *Eugene McCloskey*

**Anabolic agents in the sequential treatment of osteoporosis**

▸ *Maria Luisa Brandi*

**Questions and Answers**

12:15 - 13:45

Auditorium A

**Alexion Sponsored Lunch Satellite Symposium -  
Spotlight on hypophosphatasia: shining a light on  
your adult patients**

Chairperson : Kathryn Dahir

**Spotlight on diagnosis and disease manifestations:  
what does HPP look like? - Shining a light on low  
alkaline phosphatase activity and genetic testing:  
how do they fit into the diagnosis?**▶ *Carolina Tornero***Spotlight on diagnosis and disease manifestations:  
what does HPP look like? - How HPP may present  
in adult patients, and how to assess them?**▶ *Kathryn Dahir***Spotlight on our clinics: what can we do about  
pediatric-onset HPP in adults? - Enzyme  
replacement therapy: experience from the UK**▶ *Richard Keen***Spotlight on our clinics: what can we do about  
pediatric-onset HPP in adults? - Enzyme  
replacement therapy: what does it mean in the daily  
life of an adult patient with pediatric-onset HPP?**▶ *Kathryn Dahir***Panel discussion**▶ *All***Question and answer session**▶ *All***Meeting close**▶ *Kathryn Dahir*

12:15 - 13:45

Auditorium B

**AMGEN Sponsored Lunch Satellite Symposium -  
Addressing a data gap in osteoporosis: comparing  
clinical effectiveness of bisphosphonates and  
denosumab**

Chairperson : Xavier Nogues

**Chair's Welcome**▶ *Xavier Nogues***The Impact and Societal Burden of Nonvertebral  
Fractures**▶ *Mattias Lorentzon***Clinical effectiveness of anti-resorptives for fracture  
risk reduction using the Medicare database**▶ *Tzu-Chieh Lin***Short or long-term denosumab therapy to optimize  
fracture risk reduction**▶ *Serge Ferrari***Panel discussion**▶ *All*

14:00 - 15:00

Room 130

**Kyowa Kirin Sponsored Meet-The-Expert Session -  
Challenging the status quo: Management of adults  
with XLH****This event is intended for healthcare professionals who are  
registered for WCO-IOF-ESCEO 2023 only****Welcome, introduction and objectives**▶ *Richard Keen***XLH - a multisystem disease: The importance of long-  
term integrated care**▶ *Richard Keen***Ask the expert: Q&A on long-term integrated care**▶ *Richard Keen***Real-world case studies of adults with XLH**▶ *Richard Keen***Ask the expert: Q&A on real-world patient  
management**▶ *Richard Keen***Summary and close**▶ *Richard Keen*

09:00 - 10:00

Room 118

**UCB Sponsored Meet-The-Expert Session -  
Identifying very high fracture risk patients in real-  
world clinical practice: Innovations and implications**

Chairperson : Maria Talla

**Current post-fracture care pathway at NHS Greater  
Glasgow and Clyde (NHSGCC)**

**Optimising identification of very high fracture risk  
patients in the clinic**

**Innovations in fracture-risk evaluation**



World Health  
Organization



# 5-year collaborative agreement

to benefit global osteoporosis and fracture prevention



On February 23<sup>rd</sup>, 2023 the World Health Organization (WHO) and the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO) announced a collaborative 5-year agreement to develop a strategic roadmap on bone health and ageing, and advocate for a public health strategy to prevent fractures among older people.



IOF has been selected by its sister society, ESCEO, as the sole scientific partner to achieve the goals and missions of this important partnership.

”

The initiative will serve to promote action on musculoskeletal conditions, in keeping with the goals of the Decade of Healthy Ageing 2020-2030 for concerted, sustained collaboration to improve the lives of the world's older population. We look forward to a productive collaboration in the years ahead.

Dr Anshu Banerjee, Director, Department of Maternal, Newborn,  
Child and Adolescent Health and Ageing

”

Learn more



# WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

WCO  
IOF-ESCEO

2023 BARCELONA

Abstract Book

**Educational Lectures Abstracts**

## EL1 QUALITY OF LIFE IN SARCOPENIA : STATE OF THE ART

C. Beudart<sup>1</sup>

<sup>1</sup>WHO Collaborating Center for Public Health aspects of musculo-skeletal health and ageing, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium

Patient-reported outcome measures (PROMs) aim to assess patient experiences such as pain, quality of life, or satisfaction with care. Currently, there is an increasing emphasis on patient-centered research, and patient perspectives are now recognized as a key element in the evaluation of health care interventions. Indeed, the use of a PROM will allow important aspects of patient-relevant treatment effectiveness to be captured. Health-related quality of life (HRQoL), which is one of the most commonly measured PROMs, can be measured using generic HRQoL questionnaires, such as the SF-36 or the EQ5D, as well as specific instruments. Until 2015, HRQoL in sarcopenic patients was only measured using generic instruments. Some studies reported reduced HRQoL in sarcopenic patients, but this was mainly observed for specific domains of HRQoL. These findings suggest that the HRQoL of people with sarcopenia may be affected in specific domains that are directly related to the disease and therefore to muscle function. To complement the information provided by these generic tools and to obtain a more specific measure of HRQoL in this population, a group of experts decided in 2015 to develop the first sarcopenia-specific HRQoL questionnaire, the Sarcopenia & Quality of Life (SarQoL) questionnaire. To date, the SarQoL questionnaire (<http://www.sarqol.org>) is the only sarcopenia-specific validated HRQoL instrument available in the scientific literature. This educational lecture will summarize the evidence on the relationship between primary sarcopenia and HRQoL and provide insight into the psychometric properties of the SarQoL questionnaire.

## EL2 OSTEOPOROSIS - PERSONALIZED MANAGEMENT

A. Diez-Perez<sup>1</sup>

<sup>1</sup>Institut Hospital del Mar d'Investigacions Mèdiques, Barcelona, Spain

Personalized medicine refers to a medical approach that considers an individual's unique genetic, environmental, and lifestyle factors when developing a treatment plan. This approach aims to provide more targeted and effective treatments for diseases, such as osteoporosis.

Osteoporosis is a disease characterized by low bone density and structural deterioration of bone tissue, leading to increased risk of fractures. It is estimated that millions of people worldwide suffer from osteoporosis, particularly postmenopausal women and older adults.

Personalized medicine can be applied to the treatment of osteoporosis by using genetic information to predict an individual's risk of developing the disease, as well as to determine the most effective treatment. For example, individuals with certain genetic variations may respond better to specific medications for osteoporosis. Personalized medicine can also help to identify lifestyle modifications that may reduce an individual's risk of osteoporosis, such as diet and exercise programs.

In conclusion, personalized medicine has the potential to improve the diagnosis and treatment of osteoporosis by providing a more individualized approach. This approach may result in more effective and efficient treatments, ultimately improving the quality of life for those affected by osteoporosis.

Abstract created by using the LLM (large-scale language model) ChatGPT (<https://chat.openai.com>) as an example of the rapid expansion of AI tools in the field (also) of medicine. The question asked to the chat was "Osteoporosis and personalized management". The content has been reviewed but deliberately kept unmodified in spite of several pitfalls and inaccuracies.

## EL3

### THE BENEFICIAL EFFECTS OF PHARMACEUTICAL-GRADE CHONDROITIN SULFATE ON CARDIOVASCULAR SYSTEM IN PATIENTS WITH OSTEOARTHRITIS

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**Objectives:** In Spain, chondroitin sulfate (CS) is available as a prescription-only medicine reimbursed through the National Health System. To test the hypothesis that the use of such a pharmaceutical-grade CS reduces the risk of acute myocardial infarction (AMI) and ischemic stroke (IS).

**Methods:** Two case-control studies (one for IS and another for AMI) nested in two corresponding open cohorts of patients aged 40 to 99 years registered in a Spanish primary healthcare database (BIFAP) during the 2002-2015 study period. From these cohorts, incident cases of AMI and IS were identified and randomly sampled five controls per case, matched by exact age, gender and index date. Adjusted odds ratios (AORs) and 95% confidence intervals (95%CI) were computed through conditional logistic regression. Only new users of pharmaceutical-grade CS were considered.

**Results:** A total of 23.585 incident cases of AMI and 117.405 controls; and 13.952 incident cases of IS and 69.199 controls were included. The reduced risk of AMI among current users of CS was observed in both short-term and long-term, in both sexes, in individuals over or under 70 years of age, and in individuals at intermediate and high cardiovascular risk. Similarly, the reduced risk of IS was observed in both sexes, in individuals over or under 70 years of age, in individuals with vascular risk, and among current/recent users of nonsteroidal anti-inflammatory drugs. Regarding duration, the reduced risk of IS was observed in short-term CS users (<365 days), while faded and became non-significant in long-term users (>364 days). Overall, the current use of CS was associated with a 43% reduction in the risk of AMI (AOR: 0.57; 95% CI: 0.46-0.72) and 23% (AOR: 0.77; 95% CI: 0.60-0.99) in the risk of IS.

**Conclusions:** The results support a protective effect of pharmaceutical-grade CS on both AMI and IS, which was observed in all subgroups of patients, even in patients at vascular risk.

**Acknowledgments:** The IS study was partially funded by an unrestricted research grant from OAFI to the University of Alcalá. BIFAP is a database managed by the Spanish Agency of Medicines and Medical Devices (AEMPS), which makes it available to researchers from the public sector. The views are from the authors and do not necessarily represent the ones of the AEMPS, or their respective institutions.

**Disclosures:** None to declare.

# WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

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## Plenary Lectures Abstracts



**PL1  
TO TREAT OR NOT TO TREAT: CONTINUOUS OR  
INTERMITTENT THERAPIES IN OSTEOPOROSIS**

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Osteoporosis is a chronic disorder characterized by skeletal fragility and increased risk of fracture. While several drugs with varied mechanisms of action strengthen the skeleton and reduce fracture risk, none of our current therapies cure osteoporosis, and the skeletal benefits of all therapies, including bisphosphonates, wane, at varying rates, when treatment is stopped. As a result, long-term if not lifelong management is required. Persistence with osteoporosis therapies is notoriously poor, in part due to concerns about rare risks of long-term therapy with anti-remodeling drugs. Consequently, osteoporosis therapy is often “intermittent” even if not recommended by the patient’s physician. Some osteoporosis guidelines have recommended treatment for postmenopausal osteoporosis for only 5 years while others have endorsed the concept of a “drug holiday”, at least for bisphosphonate therapy. Arguments both for and against these recommendations can be made and will be discussed in this presentation. A rationale for a treatment plan involving the use of multiple drugs in various sequences, with any specific drug being used only intermittently, will be presented.

**PL2  
SHOULD THE PUNISHMENT FIT THE CRIME?  
OSTEOPOROSIS TREATMENT IN RELATION TO  
FRACTURE RISK**

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The concept of the punishment fitting the crime has been established in criminal justice for at least 250 years and is now being embraced within guidelines for the management of osteoporosis. The analogy is not quite accurate in that the perpetrator (the patient) is clearly not guilty of the crime (increased fracture risk) in the overwhelming majority of cases and, of course, the treatment prescribed in osteoporosis is a benefit rather than a punishment. Nonetheless, the principles laid out by Beccaria in his 1764 treatise did reflect good practice that is easily translated to the realm of modern osteoporosis management. For example, he believed that judges (health care professionals, predominantly doctors, in the osteoporosis setting) should be allowed to decide if a person required punishment, but that the punishment itself should be picked from a pre-approved list (i.e. guidance should be provided about the choice). Until recently, osteoporosis guidelines have certainly provided lists of approved medications alongside general management advice, but have largely focussed on the finding of guilt (diagnosis) using the BMD T-score -2.5 threshold or prior fracture. However, most haven't

given much specific information about which option to choose, meaning that the chosen treatment might not be appropriate for the level of fracture risk as the latter hasn't been considered. This was perhaps not such a big problem when approved medications mostly had similar mechanisms of action (anti-resorptive) and there were no comparative studies to know if one was more effective than another in preventing fractures (re-offending?). This situation has now changed with head-to-head trials showing superiority of certain treatments (largely bone-forming therapies) to others, alongside the recognition that the seriousness of the crime (fracture risk) can be assessed and should allow better selection of the appropriate punishment.

Over the last 20 years, much has improved in our assessment of the seriousness of the ‘crime’ through the development of fracture risk assessment tools, the most commonly and widely used being the FRAX tool. Of course, seriousness can also be recognised in other ways, including the presence of certain clinical factors (e.g. multiple fractures, particularly vertebral fractures; markedly reduced BMD etc), but the ability to combine these with other factors in fracture risk assessment tools provides a more objective and comparative value of fracture risk. It also allows the conviction to treat those with combinations of risk factors rather than a single qualifying factor by recognising that those with highest risk, however achieved, are also at short term or imminent risk of fracture. This has been enhanced by the inclusion of, and adjustment for, factors that directly influence the imminent risk of fracture, for example the recency of fractures. This has led to the classification of very high fracture risk in addition to high risk and the rationale for this more refined characterisation is to direct appropriate treatment. Thus, women at very high risk might be more suitably treated with a bone-forming treatment followed thereafter by an inhibitor of bone resorption.

**PL3  
OBESITY, WEIGHT LOSS AND BONE HEALTH: WHAT  
RISK AND WHICH FRACTURES?**

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Previously, one of the proposed benefits of obesity was a reduced risk for osteoporotic fractures, accompanied by a higher bone mineral density (BMD). However, recent literature has instead identified a more complex relationship. While obesity defined by body mass index (BMI) is generally associated with a lower fracture incidence, fracture risk at specific sites may instead be increased. In the Global Longitudinal Osteoporosis in Women (GLOW) study, fracture prevalence and incidence were similar for obese and non-obese women, however, incident ankle and upper leg fractures were significantly higher in obese. BMI is a better indicator of lean than fat mass and in over 43,000 older Canadian adults, higher lean mass was associated with femoral neck (FN) bone mineral density (BMD), whereas fat mass had no effect on

BMD and adversely affected femoral strength index. Thus, higher lean mass, not fat mass, likely explains positive associations between higher BMI with BMD.

Body fat distribution may be more predictive of osteoporotic fractures than BMI. Men with higher levels of visceral adipose tissue have poorer bone mechanical properties, despite having similar BMD compared with those having low visceral adipose tissue. A meta-analysis demonstrated high waist circumference, a measure of abdominal adiposity, was associated with an almost 60% increased relative risk of hip fracture. While men in the underweight category have the highest incidence of hip fracture, most hip fractures occur in overweight or obese men. Metabolic and endocrine factors associated with an increased fracture risk in obesity include a higher risk of type 2 diabetes mellitus (T2DM) and associated bone fragility, lower vitamin D and testosterone levels in men, and higher fall risk.

Obesity can also be related to abnormalities in muscle mass and function, including intra- and inter-muscular adipose tissue infiltration, resulting in sarcopenic obesity (SO) or dynapenic obesity, when strength alone is considered. Sarcopenic obese older adults have an increased risk of osteoporosis and non-vertebral fracture relative to sarcopenic counterparts, and a higher risk for falls than controls or obese alone individuals. SO is increased in pre-diabetes, T2DM, NAFLD with fibrosis, and post-bariatric surgery. Sarcopenic obese individuals therefore potentially represent a significant subset of the obese older adult population who require closer monitoring of bone health during ageing.

Medical or surgical weight loss in obesity results in further declines in muscle and FN and hip BMD that may increase falls and fracture risk. Incorporating exercise, particularly resistance training, into weight loss programs significantly reduces the loss of muscle and FN BMD and is therefore strongly recommended for obese older adults. After bariatric surgery (including sleeve gastrectomy), active calcium absorption is reduced, and vitamin D deficiency is increased. Bariatric surgery is associated with a 21-44% higher risk of all fractures, including non-vertebral fractures, resulting from high bone remodelling and microarchitectural deterioration. Hip and upper limb fractures are increased, while ankle fracture, a fracture associated with obesity, is reduced. Bone loss from the hip and femoral neck is greater than at the spine. In trials, exercise attenuated bone loss at the spine, femoral neck, total hip, and distal radius in women with severe obesity after bariatric surgery. Adequate calcium and vitamin D combined with exercise is important to prevent bone loss post-bariatric surgery and in those with a high fracture risk, parenteral anti-osteoporosis medications, such as intravenous zoledronic acid, should be considered.

## PL4

### **BONE: AN AFFAIR OF THE HEART OR OF THE BRAIN?**

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Critical interactions between organ systems are increasingly recognised as of major importance in the pathogenesis of age related noncommunicable disorders such as osteoporosis, cardiovascular disease and dementia. Despite these cross-disease links, the care of these conditions is generally undertaken in separate services, with risk assessment algorithms specific to individual diseases and outcomes. Better understanding of the associations, and causal links, between such conditions would lead to more efficient approaches to risk assessment, improved understanding of mechanisms, and the potential for cross-disease/cross-outcome therapeutic interventions. In this presentation, I will describe the epidemiological findings relating to osteoporosis, cardiovascular disease and dementia, with a focus on relationships across conditions. Secondly, I will explore mechanistic links between diseases and thirdly, elucidate potential opportunities for improvements to risk assessment and therapeutic intervention. Through resulting innovative approaches, it may be possible to establish new, more effective, ways to manage non-communicable chronic diseases of ageing across organ systems.

## PL5

### **TOWARDS A GLOBAL DEFINITION OF SARCOPENIA: MUSCLE MASS, PERFORMANCE AND RELEVANT CLINICAL OUTCOMES**

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<sup>1</sup>PhD, Nutrition, Exercise Physiology, and Sarcopenia Laboratory, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, United States

Sarcopenia, the age-associated decline in muscle mass and function, is an emerging geriatric syndrome that is a risk factor for important clinically relevant outcomes including falls, fractures, disability, and mortality. Over the past twenty years, multiple organizations and medical societies have developed and published statements and definitions of sarcopenia. Current definitions of sarcopenia have all included a measure of muscle size or mass, muscle performance, and physical functioning. Many of these definitions have been based on consensus expert opinion and some have relied on evidence-based associations with discrete clinically meaningful endpoints such as falls, fractures, and/or mortality. In this plenary lecture, I will review the evolution of sarcopenia definitions worldwide. In particular, I will highlight differences in sarcopenia definitions as a consequence of expert consensus vs. evidence-based approaches. I will additionally highlight the need

additional evidence-based support for a definition of sarcopenia. Finally, I will provide an update on the Global Leadership Initiative on Sarcopenia (GLIS) which seeks to develop an internationally accepted definition of sarcopenia.

**PL6**  
**HOW DO WE PREDICT AND PREVENT FALLS IN OLDER PEOPLE?**

**B. Dawson-Hughes<sup>1</sup>**

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Falls are common events particularly in older adults. The WHO estimates that 37.3 million falls occur each year and that 684,000 persons die each year as a result of a fall. In the US alone, the health care cost related to falls is estimated to exceed \$55 billion per year. The medical and societal costs related to falls is expected to grow substantially in coming years, with the greatest increases anticipated in countries with rapidly aging populations. Fall prevention is an important component of good geriatric care. Major risk factors for falls have been identified, but effective strategies to reverse risk factors are not being undertaken by health care providers on a consistent basis. The objectives of this presentation are: to describe and rank order common risk factors for falls, to consider which risk factors are reversible, and to present an approach to evaluating and managing high-risk older adults in order to reduce the prevalence of falls.

Exercise and balance training are known to be effective in lowering fall risk, and despite this, it is difficult to motivate older adults to engage in safe exercises on an ongoing basis. An extensive body of research recently focused on defining the role that vitamin D may play as a risk factor for falling. Several recent mega-studies have raised the question of whether vitamin D plays any role at all. We will examine the evidence and consider that the effect of vitamin D on fall risk may be nonlinear and even biphasic. Correcting vitamin D deficiency appears to lower risk of falling whereas treating replete older adults with high dose of vitamin D may increase their risk of falling.

In conclusion, a systematic, evidence-based approach is needed to mitigate fall risk in the rapidly growing population of older adults.

**PL7**  
**PHARMACOEPIDEMIOLOGY AND BIG DATA IN THE POST-COVID ERA**

**D. Prieto Alhambra<sup>1</sup>**

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**Background**

Clinical trials remain first line best evidence to understand the causal effects of novel therapies. However, limited external validity, sample size, follow-up, and costs limit the generation of new clinical trial data. This, combined with a continuous increase in

the availability and quality of large routinely collected health data, have led to an increase in the number of observational studies published on the effect/s of medicines in the post-COVID era.

**Aims and Learning Goals**

I will discuss the types of pharmacoepidemiology studies, data available, and methodology used for the generation of reliable information the use and risk-benefit of osteoporosis therapies. I will also discuss the limitations of pharmacoepidemiological studies, and opportunities arising in the field of real world evidence in the fields of osteoporosis, osteoarthritis, and musculoskeletal disease.

By the end of the session, you should have learned on sources of real world data, study designs, analytical methods, and tips to identify unreliable pharmacoepidemiological studies.

**PL8**  
**HOPES AND DISAPPOINTMENTS OF NEW AND EMERGING OA THERAPIES**

**F. Berenbaum<sup>1</sup>**

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Despite major advances in the understanding of the pathophysiology of osteoarthritis, no disease-modifying or even symptomatic treatment has yet been brought to market, even though the unmet needs are dramatically high. Despite the numerous failures in recent years of clinical trials carried out in this indication (anti-NGF, cathepsin K inhibitor, ADAMTS-5 inhibitor, senolytics, bisphosphonates, anti-cytokines) and disappointments for molecules still in development (sprifermin, lorecivivint), new targets have been identified for symptoms and structure and are now leading to clinical development. This presentation will highlight these hopes to finally find solutions for our patients so disabled by this chronic disease.

**PL9**  
**DO HIGH AND VERY HIGH FRACTURE RISK MATTER?**

**K. Javaid<sup>1</sup>**

<sup>1</sup>NDORMS, University of Oxford, Oxford, United Kingdom

Since the development of DXA, the osteoporosis community has used tools to establish fracture risk at the individual level. Initially, the focus was identifying those who would or would not benefit from anti-osteoporosis medications (AOMs), as a binary treatment decision. As additional AOMs were developed, fracture risk assessment moved to identify those at higher risk, within the treatment eligible cohort, who would benefit more from more potent anti-osteoporosis medication from clinical and cost-effectiveness perspectives. Historically, prior AOM use, tolerability, co-morbidities, and lack of effectiveness (based on DXA, bone turnover markers or fracture while on treatment) influenced treatment choice. DXA and FRAX introduce a scaled risk assessment

independent of treatment history to identify a scale of fracture risk. The critical step was to link fracture risk ranges to targeting different intervention levels – lifestyle, anti-resorptive and anabolic. This is important as each AOM has distinct effects on the scale of fracture reduction and time to achieve this for vertebral, hip and other non-vertebral fracture sites.

This approach matters to patients, clinicians and healthcare decision-makers. For patients, identifying high vs very high risk informs co-decision making, how patients are motivated to take treatment, bear the burden of additional administrative requirements and risk unwanted effects. This requires the development of supporting resources for patients and families. For clinicians, this approach requires modifying and implementing patient pathways that reflect the urgency of identifying and initiating AOMs based on fracture risk. For decision-makers, this involves assessment of the clinical and cost-effectiveness of patients at different baseline fracture risks, and so potential benefits from different AOMs.

There are no internationally agreed definitions of high and very high fracture risk. FRAX has developed a model that describes the high and very high fracture risk for the UK using the National Osteoporosis Guideline Group. National guidelines have identified the specific criteria for very high risk based on previous fractures, DXA and FRAX scores. Finally, newer artificial intelligence has been used to predict those at imminent fracture risk.

To maximize the benefit for patients, clinicians and decision makers requires an appreciation of high vs very high fracture risk to personalise osteoporosis treatment.

indicate that the use of oral contraception including ethinylestradiol or 17- $\beta$  estradiol does not lead to an increased fracture risk. This includes progestin only pills (POPs) while the use of DMPA significantly increases fracture risk in premenopausal women. Besides Diabetes mellitus type I or the use of glucocorticoids and chemotherapy (CHT) can have a detrimental effect on bone. In premenopausal women with ER/PR neg. breast cancer, CHT including alongside glucocorticoid treatment may lead to a permanent secondary amenorrhea with an increased risk of bone loss and fracture risk. In ER/PR pos. premenopausal women with breast cancer, endocrine treatment with Tamoxifen +/- GnRH analogues or even GnRH analogues + aromatase inhibitors (AI) is the guideline recommended treatment also increasing fracture risk. The presentation will cover these aspects of premenopausal osteoporosis and will discuss preventative measures as well as possible treatment options.

## PL10

### MANAGEMENT OF PREMENOPAUSAL OSTEOPOROSIS

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Osteoporosis is one of the most frequent diseases in postmenopausal women leading to significant increase of fracture incidence, morbidity and mortality. Hereby, many fracture related risk factors have been identified and incorporated into national as well as international guidelines. These guidelines are restricted to postmenopausal women and men only. International guidelines in premenopausal women are missing.

Premenopausal bone development is dependent on genetic factors (including polymorphism in VDR; ER), Lifestyle variables (nutrition, exercise, tobacco use and alcohol), static factors (height and body mass), endocrine factors, muscle strength and dynamic loads. Herby, recent studies indicate, that pre-pubertal active exercise leads to higher BMD increase and higher BMD even after menopause. With the onset of menarche, estrogen plays a predominant role in bone development. Any form of long-term secondary amenorrhea (as with anorexia nervosa, chemotherapy, GnRH analogue) can lead to an increase of bone turnover, microarchitectural deterioration and bone loss. Recent studies

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**Oral Presentations Abstracts**

## OP1 - P506 HAND GRIP STRENGTH TEST AND SHORT PHYSICAL PERFORMANCE BATTERY VS. FRAX®: WHICH CORRELATION IN THE FRACTURE RISK? A MACHINE LEARNING STUDY

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**Objective:** FRAX is an algorithm for fracture risk assessment useful for the primary prevention of osteoporosis, albeit it might present some limitations. It should be considered that the hand grip strength test (HGS) might be an important prognostic factor in case of hip fracture in postmenopausal women. Furthermore, the physical performance assessment through the short physical performance battery (SPPB) plays a key role in predicting falls, disability, and hospitalization. There is still no agreement on the role as predicting factors of these functional outcomes. Therefore, aim of our study was to evaluate the role of HGS and SPPB in correlation with FRAX to predict fragility fractures in naïve postmenopausal women.

**Methods:** In this cross-sectional study we included postmenopausal women aged >50 years never treated with anti-osteoporotic drugs. Outcomes measures were: HGS, for muscle strength, SPPB for performance, FRAX major and hip, for the risk of fracture. A correlation analysis with Pearson's  $r$  and odds ratios (OR) was performed to correlate HGS<16 kg, SPPB ≤8, and the combination of them with FRAX major ≥20 and/or hip ≥3. This latter index was then compared to HGS<16 kg, SPPB ≤8 with a decision boundaries plot using a machine learning approach with a Decision Tree model.

**Results:** Out of 33 women included (mean aged 63.8±10.7 years), 47.0% with HGS<16 kg, 44.1% with SPPB≤8 and 29.4% with HGS<16kg and SPPB≤8. SPPB was negatively correlated with FRAX major ( $r=-0.40$ ;  $p<0.001$ ) and hip ( $r=-0.49$ ;  $p<0.001$ ). Concerning the fracture risk (FRAX major ≥20 and/or hip ≥3), women with HGS<16 kg had OR=1.76 ( $p=0.017$ ), SPPB≤8 had OR=2.69 ( $p=0.001$ ), and with a combination of the two conditions had OR of 3.53 ( $p=0.001$ ). Furthermore, the Decision Tree model with an accuracy of 0.667, a F1 score of 0.748, and a Matthews correlation coefficient of 0.447 provided a decision boundary map relating SPPB and HGS values to the presence or no risk of fracture.

**Conclusion:** Therefore, the assessment of HGS and SPPB might help in the screening of postmenopausal women providing important information on the potential risk of fracture. Further prospective studies might provide additional data.

## OP2 - P168 DIGITAL VOICE ASSISTANTS FOR DELIVERING EXERCISE, NUTRITION AND MEDICATION INFORMATION TO POSTMENOPAUSAL WOMEN

## WITH OSTEOPOROSIS: A 24-WEEK PILOT RANDOMISED CONTROLLED TRIAL

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**Objective:** To determine the feasibility and preliminary effectiveness of a 24-week digital voice assistant-delivered intervention for improving osteoporosis-related health behaviours, knowledge, and attitudes in postmenopausal women with osteoporosis.

**Methods:** 50 postmenopausal women currently prescribed anti-osteoporosis medications were randomised to 24 weeks of automated osteoporosis education content (video/audio/text) on medication, nutrition, and exercise (including 3 sessions/week home-based strength, balance and impact exercise) broadcast via a supplied Amazon Alexa Echo Show device located in their home (Alexa; see Figure), or monthly educational emails (control). Outcomes included changes in accelerometer-determined moderate-to-vigorous physical activity (MVPA) and sedentary behaviour, dietary calcium intakes (via 3-day food records), and scores for the Modified Falls Efficacy Scale, Osteoporosis Knowledge Assessment Tool, and Adherence Evaluation of Osteoporosis Treatment Questionnaire.



**Results:** Forty-eight (96%) women (mean±SD age 64.3±6.1 years) completed follow-up (24 Alexa group; 24 control group). Alexa group participants engaged with 57±18 of 72 (mean adherence=80%) prescribed education and exercise sessions with no adverse events. Over 24 weeks, MVPA time significantly increased (+17.9±28.8 min/d  $P=0.008$ ) and sedentary time significantly decreased (-40.2±71.7 min/d;  $P=0.016$ ) for Alexa only, but these changes did not differ to controls (both  $P>0.05$ ). Calcium intakes similarly increased in Alexa and decreased in controls (+84±372 vs. -91±393 mg/d) with no significant group differences ( $P=0.127$ ) whereas scores for falls efficacy ( $P=0.032$ ) and osteoporosis knowledge ( $P=0.038$ ) significantly increased for Alexa compared with controls. Changes in attitudes to osteoporosis medication adherence did not differ between groups ( $P=0.114$ ) but scores improved within the Alexa group only (baseline 18.7±3.3 vs. follow-up 19.9±2.0;  $P=0.041$ ).

**Conclusion:** This pilot 24-week digital voice assistant-delivered

multifaceted exercise and education intervention demonstrated excellent adherence and safety in postmenopausal women with osteoporosis, but larger trials are needed to confirm its effectiveness for improving osteoporosis-related health behaviours, knowledge and attitudes, and clinical outcomes such as BMD.

### OP3 - P220

#### TREATMENT GAP AFTER OSTEOPOROTIC FRAGILITY FRACTURES: A REGIONAL ANALYSIS IN GERMANY

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**Objective:** Analysis conducted regarding the care situation of patients with osteoporotic fractures in Germany are mostly based on health insurance data. The aim of the study was to record the unreported number of non-diagnosed osteoporotic patients and to analyze the initiation of diagnosis and treatment after fragility fractures.

**Methods:** A retrospective observational study in ortho & trauma surgery departments in the Rhine-Main area was conducted. Included were patients aged >50 years with an ICD encoded fractures. The information in the medical records were evaluated with a questionnaire for prevalent fractures, for underlying bone diseases, for bone compromising underlying diseases, a known osteoporosis, performed diagnostics to back up or rule out osteoporosis, initiated therapy or recommendations.

**Results:** A total of 2142 patients <50 years with a fracture were evaluated (72.1% female and 27.9% male). Of these, in 1460 (68.2%) the fractures were considered to be osteoporotic. 80.3% of patients with osteoporotic fracture were older than 70 years. The hip fracture (55.2%) was the most common localization, followed by the vertebral fracture (14%). A prevalent fracture was reported in 14% in the medical history. Overall, only 29.9% of patients were diagnosed with osteoporosis as the cause of the fracture. Osteoporosis was detected in 67.2% of osteoporotic vertebral fractures, but only in 16.3% of hip fractures. At the time of discharge, 6.6% of patients were treated with an anti-osteoporotic medication and 5.1% were given recommendation in the discharge letter. The results of this study indicate that 70% of patients failed to diagnose osteoporosis and that 88.3% of patients were discharged without specific anti-osteoporotic therapy or recommendation.

**Conclusion:** There is a clear gap between guideline-based recommendations and everyday practice in osteoporosis. Fractures in the elderly rarely lead to a diagnosis or therapy for osteoporosis. Given the high prevalence of osteoporosis and the increase in the incidence of osteoporotic fractures, concepts are needed to better care for these high-risk patients. The Fracture Liaison Services concept shows in studies that it is effective to achieve optimal osteoporosis management after a fragility fracture and

to prevent secondary fractures. Thus, it needs to be implemented in Germany.

### OP4 - P258

#### ZOLEDRONIC ACID AFTER SPINAL CORD INJURY MITIGATES LOSSES IN PROXIMAL FEMORAL STRENGTH: A POST HOC ANALYSIS OF A RANDOMIZED CONTROLLED TRIAL

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**Objective:** Rapid and profound bone loss below the level of neurological lesion is a well-known complication of spinal cord injury. The clinical consequence of this bone loss is an increased risk of fracture, and effective methods for bone loss prevention remains an active area of research. Zoledronic acid has demonstrated efficacy for attenuating bone loss at the hip after spinal cord injury, but these studies were limited to areal BMD assessments. The purpose of this study was to evaluate changes in 3-dimensional bone mineral and proximal femoral strength in individuals receiving zoledronic acid in the acute stage of spinal cord injury.

**Methods:** Clinical trial (NCT02325414) participants randomized to either zoledronic acid (n=29) or placebo (n=30) treatment received computed tomography (CT) scans at baseline, 6 and 12 months following drug infusion. CT-based finite element modeling was used to predict changes in proximal femoral stiffness and strength in a fall-type loading scenario for participants in each of the treatment groups. Longitudinal mixed-effects models were employed to evaluate the effects of treatment group and time from infusion on the measurements of bone stiffness, strength, and CT-derived measurements of bone mineral.

**Results:** After 12 months, finite element-predicted bone stiffness and strength reduced by a mean (SD) of 6.5 (9.4)% and 9.6 (17.9)%, respectively in the zoledronic acid group. The placebo group experienced significantly greater losses in bone stiffness and strength of 18.3 (16.1)% and 24.6 (24.5)%, respectively (p<0.007). The differences in stiffness and strength were well explained by corresponding differences in trabecular BMD (p<0.001) and cortical bone mineral content and volume (p<0.024) at both the femoral neck and trochanteric regions.

**Conclusion:** These findings demonstrate that treatment with zoledronic acid in acute spinal cord injury attenuates losses in trabecular and cortical bone mineral, and in turn, mitigates losses in proximal femoral stiffness and strength. Therefore, a single infusion of zoledronic acid following spinal cord injury may reduce the risk of hip fractures in this population, at least for the first year after injury.

OP5 - P264

**A PHASE 1, OPEN-LABEL, DOSE-ESCALATING STUDY TO EVALUATE THE SAFETY, TOLERABILITY, PHARMACOKINETICS, AND PHARMACODYNAMICS OF ALXN1850 IN ADULTS WITH HYPOPHOSPHATASIA**

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**Objective:** Hypophosphatasia (HPP) is a rare, inherited disorder associated with recurrent fractures/pseudofractures, orthopedic/dental burden, pain, mobility impairments, and diminished quality of life. ALXN1850 is an investigational enzyme replacement therapy being developed for the treatment of HPP.<sup>1-3</sup> The primary objective is to assess the safety and tolerability of ALXN1850 given weekly intravenously (IV) as 1 dose and subcutaneously (SC) for 3 weeks. Secondary objectives include pharmacokinetics (PK) of 1 IV and multiple SC doses, absolute bioavailability of SC, pharmacodynamic (PD) effects of 1 IV and 3 SC doses, and immunogenicity potential of ALXN1850.

**Methods:** 3 Cohorts received ALXN1850 15, 45, or 90 mg as 1 IV dose weekly and SC for 3 weeks.

**Results:** Of 23 patients with HPP who signed informed consent, 15 were dosed (5 per cohort); 3 missed doses due to COVID-19 but did not discontinue the study. Following IV and SC doses, peak and total exposure of ALXN1850 increased dose-dependently (15–90 mg). Effective  $t_{1/2}$  was estimated at 3-6 days. Mean bioavailability of SC doses was ~43% (range: 6-75%). ALXN1850 achieved maximal lowering (nadir) of plasma inorganic pyrophosphate (PPI) in 7 days; ~40% post-dose PPI concentrations were below the limit of quantification (0.75  $\mu$ M). Mean PPI concentration was reduced for 3–4 weeks post-dose. There was no apparent impact of immunogenicity on ALXN1850 PK/PD.

**Table 1.** Safety overview

Safety finding, n (%)	Description (N = 16) 4 weeks treatment with ALXN1850
<b>Any TEAE</b>	12 (80.0%); 46 events
<b>Related TEAE</b>	10 (66.7%); 29 events
<b>Injection Site Reactions (ISRs)</b>	8 (53.3%); 10/41 (24.4%) SC injections led to an ISR* <ul style="list-style-type: none"> <li>• Four patients with 1 ISR (erythema)</li> <li>• One patient with 1 ISR (soreness, swelling, and redness)</li> <li>• One patient with 1 ISR (erythema and bruising)</li> <li>• One patient with 3 ISRs, 1 per each SC administration (erythema and pruritus; erythema and ecchymosis; erythema)</li> <li>• One patient with 1 ISR (bruise)</li> </ul> Four patients had 1 ISR each of injection-site erythema not reported as TEAEs but included in this ISR total. One single case of induration in a patient following the IV dose is not included in this ISR total
<b>Injection Associated Reactions - Systemic reactions</b>	1 (6.7%) Headache (grade 1), considered related to study drug***, occurred following the start of the IV dose and resolved the same day following medical intervention
<b>TESAE</b>	1 (6.7%) Atrial fibrillation (grade 3) considered not drug related***
<b>TEAE/TESAE leading to Study Drug Withdrawal</b>	0
<b>Immunogenicity (ADA+)**</b>	4 (26.7%) Only 1 (6.7%) was treatment emergent. ADAs persisted to the end of the study. Per protocol, patient was offered follow-up via the HPP registry. No patients tested Nab+

\*Most cases of erythema resolved in fewer than 2 hours following the SC dose. There was no pattern observed in the timing of subcutaneous administration (ie, first, second, or third dose) and the occurrence of erythema.

\*\*Assays for measuring anti-ALXN1850 antibodies and those with neutralizing characteristics (NAb) were fully validated for precision, specificity, selectivity, sensitivity, robustness, and drug tolerance following the current 2019 FDA Guidance on ADA method validation.

\*\*\*By the investigator

ADA, antidrug antibody; AE, adverse event; HPP, hypophosphatasia; IV, intravenous; Nab, neutralizing antibodies; SC, subcutaneous; TEAE, treatment-emergent AE; TESAE, treatment-emergent serious AE

**Conclusion:** ALXN1850 has acceptable safety, tolerability, and PK profiles; it achieved a sustained reduction in PPI concentrations in adults with HPP (~40% post-dose PPI concentrations were below the limit of quantification). These results will support the selection of an appropriate therapeutic dose in future studies.

**References:**

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**Disclosures:** Dr Dahir is a clinical trial investigator and consultant for Alexion, AstraZeneca Rare Disease and as such her institution received funding. Additionally, she is on the Alexion, AstraZeneca Rare Disease scientific advisory board. Derek Dunn, Sanjay Mitter, Jawad Hasan, Amy Shannon, and Wei-jian Pan are employees of Alexion, AstraZeneca Rare Disease.

OP6 - P290

**EXECUTIVE FUNCTION AND INTELLIGENCE: ASSOCIATIONS WITH BONE SIZE AND MINERAL DENSITY IN CHILDHOOD**

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**Objective:** Osteoporosis and poor cognitive function commonly co-exist. This is often attributed to postmenopausal loss of estrogen. However, a common early life origin for these conditions has not been explored. We assessed the relationships between cognitive function and bone mineralization in childhood.

**Methods:** Children participating in the Southampton Women's Survey birth cohort were assessed at age 6-7 years. Occipitofrontal circumference (OFC, proxy for brain volume), intelligence quotient (IQ) [Wechsler Abbreviated Scale of Intelligence] and visual-spatial working memory [CANTAB® Delayed Matching to Sample (DMS)] were assessed and adjusted for age and sex. Whole-body-less-head (WBLH) and lumbar spine DXA [Hologic Discovery] were performed. Bone area (BA), bone mineral content (BMC), BMD were adjusted for age and sex and associations assessed using linear regression for standardized variables ( $\beta$  represents standard deviation (SD) difference per SD of cognitive function).

**Results:** DXA was performed in 1331 children (mean age 6.8 years (SD 0.33 years), 51.5% male). OFC, IQ and DMS was assessed in 1250, 551 and 490 of these children, respectively. OFC ( $\beta=0.25$  SD/SD, 95%CI 0.20,0.30), IQ ( $\beta=0.11$  SD/SD, 95%CI 0.02,0.19),



and DMS ( $\beta=0.11$ , SD/SD, 95%CI 0.01,0.20) were positively associated with WBLH BA, with similar associations for lumbar spine. Positive associations were also observed between OFC, IQ and DMS and WBLH BMC, but only OFC was associated with BMD (WBLH:  $\beta=0.38$  SD/SD, 95%CI 0.33,0.43; LS:  $\beta=0.19$  SD/SD, 95%CI 0.13,0.24).

**Conclusion:** Childhood OFC was positively associated with measures of bone size and mineralization, whereas IQ and visual-spatial working memory were associated only with skeletal size. These findings suggest that a common early life determinant for skeletal growth and mineralization and executive function should be explored.

OP7 – P403

**A PROSPECTIVE STUDY TO EVALUATE PATIENT-REPORTED QUALITY OF LIFE PRIOR TO AND AFTER ASFOTASE ALFA TREATMENT IN ADULTS WITH PEDIATRIC-ONSET HYPOPHOSPHATASIA**

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**Objective:** To evaluate the impact of asfotase alfa (AA) on patient-reported outcomes (PROs) in adults with pediatric onset hypophosphatasia (HPP).

**Methods:** A longitudinal telephone-based survey was administered to adults with pediatric onset HPP at baseline (BL, prior to AA initiation) and follow-up (3 [3M] and 6 months [6M] post-initiation). Demographics and PROs (Patient Health Questionnaire-9 [PHQ-9], Patient-Reported Outcomes Measurement Information System [PROMIS-29], Routine Assessment of Patient Index Data 3 [RAPID3], and Work Productivity and Activity Impairment - Specific Health Problem [WPAI-SHP]) were assessed. McNemar’s or Cochran–Mantel–Haenszel tests or paired t-test were performed, as appropriate.

**Results:** Among 50 enrolled patients, 40 were evaluable at 6M. Mean age at BL was 46 ( $\pm 15.4$ ) years; 80% were female. At 6M, there was a statistically significant improvement from BL for PHQ-9 total score (10.6 at BL vs. 4.7 at 6M,  $p < 0.0001$ ), PROMIS-29 domain scores (physical functioning: 38.0 vs. 44.6,  $p < 0.0001$ ; anxiety: 57.5 vs. 49.4,  $p < 0.0001$ ; depression: 52.6 vs. 46.6,  $p = 0.0005$ ; fatigue: 63.3 vs. 51.9,  $p < 0.0001$ ; sleep disturbance: 58.8 vs. 52.3,  $p = 0.0002$ ; social roles and activities: 42.6 vs. 50.4,  $p < 0.0001$ ; pain interference: 63.8 vs. 56.7,  $p < 0.0001$ ), and RAPID3 domain scores (functional status: 2.7 vs. 1.6,  $p = 0.001$ ; pain tolerance: 6.0 vs. 3.6,  $p < 0.0001$ ; global health estimate: 5.1 vs. 3.1,  $p < 0.0001$ ). WPAI-SHP domains showed significant improvement at 6M in absenteeism (4.7% vs. 0%,  $p = 0.025$ ), presenteeism (39.6% vs. 14.1%,  $p < 0.0001$ ), activity impairment (64% vs. 28.1%,  $p < 0.0001$ ), and work productivity loss (41.9% vs. 14.1%,  $p < 0.0001$ ). Most patients (84.1%) remained on AA at 6M.

**Conclusion:** These data illustrated the benefits of AA in reducing

patient burden and relevance of PROs in practice.

Overview of Patient-Reported Outcomes Questionnaires Collected in the Study				
Information	Patient Health Questionnaire-9 (PHQ-9)	Patient-Reported Outcomes Measurement Information System (PROMIS-29)	Routine Assessment of Patient Index Data 3 (RAPID3)	Work Productivity and Activity Impairment - Specific Health Problem (WPAI-SHP)
Concept of Interest	Depression	Health-related quality of life	Disease activity	Work productivity and activity impairment
Recall period	Last 2 weeks	Pain T score Range: Physical Functioning which does not have a specified timeframe	Pain T score Over the last week the Physical Function and Pain At this time for Patient Global Estimate	Pain 7 days
Domains covered	Unhappiness	Physical Function (9 items) Anxiety (8 items) Depression (8 items) Fatigue (8 items) Sleep Disturbance (8 items) Ability to participate in Social Roles and Activities (8 items) Pain Interference (8 items) Pain Tolerance (1 item)	Physical Function (13 items) Pain (1 item) Patient Global Estimate (1 item)	Work Productivity (5 items) Daily Activities (3 items)
Score range	Range: 0-27 PHQ-9 severity categories: minimal (0-4), mild-to-moderate (5-9), moderately severe (10-14), severe (15-27)	Standardized T-score with a mean of 50 and a standard deviation of 10	Range: 0-10 RAPID3 qualitative description categories: none/minimal (0-4), low severity (1-2), 0, moderate (2.5-4.0), high (4.7-10.0)	Scores are multiplied by 100 to be expressed as impairment percentages
Eligibility	Adults with pediatric-onset hypophosphatasia	Adults with pediatric-onset hypophosphatasia	Adults with pediatric-onset hypophosphatasia	Adults with pediatric-onset hypophosphatasia

**Acknowledgment:** Funding from Alexion, AstraZeneca Rare Disease, Boston, MA, USA.

**Disclosures:** KD is a clinical trial investigator and consultant for Alexion, AstraZeneca Rare Disease. SI had grant funding and participated on ad hoc advisory boards from Alexion AstraZeneca Rare Disease. CD collaborates with Alexion, AstraZeneca Rare Disease. AM and TB are employees of Alexion AstraZeneca Rare Disease and may own stock/stock options in the company. ER receives research support from Alexion AstraZeneca Rare Disease.

OP8 - P416

**MOBILITY AND HEALTH-RELATED QUALITY OF LIFE IN ADULTS WITH PAEDIATRIC-ONSET HYPOPHOSPHATASIA TREATED WITH ASFOTASE ALFA: INTERIM ANALYSIS FROM THE UK MANAGED ACCESS AGREEMENT**

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**Objective:** To describe effects of asfotase alfa on mobility, pain, and HRQoL in adults with hypophosphatasia.

**Methods:** This analysis used data from the UK Managed Access Agreement to assess mobility and HRQoL in adults with paediatric-onset HPP treated with asfotase alfa. Data were collected at enrolment, 3 and 6 months after enrolment, and every 6 months thereafter. Asfotase alfa was initiated after enrolment. Interim results are presented as median (min, max; n); change from baseline to Month 24 is reported as median (95%CI).

**Results:** Of 25 adults enrolled, 17 with >6 months of exposure were included in the study population (12 women, 5 men); 21 who received  $\geq 1$  dose of asfotase alfa were evaluated for safety. Age at enrolment was 44.0 (22.0, 60.0) years. Treatment duration was 1.5 (0.5, 3.2) years. Bleck score improved from a baseline of 6.0 (2.0, 9.0; n=17) by 2.0 (1.3, 2.7; n=8). The 6MWT distance walked

improved from a baseline of 130.0 (28.0, 360.0; n=10) by 160.0 (2.5, 290.9; n=5) m. Pain severity score improved from a baseline of 8.0 (4.3, 10.0; n=16) by -3.2 (-5.6, 0.9; n=7). EQ-5D-3L utility score improved from a baseline of 0.1 (-0.3, 0.5; n=17) by 0.3 (0.1, 0.5; n=8). Of 13 adults prescribed opioids, 2 stopped and 5 reduced use after starting asfotase alfa. One vertebral (1 patient) and 2 metatarsal (1 patient) fractures occurred 1 week and 13.5 months, respectively, after initiating asfotase alfa. Serious AEs were infrequent (n=3, 4 events), with 2 AEs related to asfotase alfa (injection site reaction, dysaesthesia). No patients discontinued asfotase alfa.

**Conclusion:** Asfotase alfa improved mobility, pain, and HRQoL in adults with paediatric-onset HPP, with a favourable benefit/risk profile.

**Acknowledgment:** Funding from Alexion, AstraZeneca Rare Disease, Boston, MA.

**Disclosures:** KEM and RK received compensation for advisory board participation and/or presentation from Alexion, AstraZeneca Rare Disease. AZ and SF are employees of and may own stock/options in Alexion, AstraZeneca Rare Disease.

### OP9 - P511 ISCHEMIC STROKE IS ASSOCIATED WITH REDUCED SCLEROSTIN EXPRESSION IN HUMAN ATHEROSCLEROTIC PLAQUES

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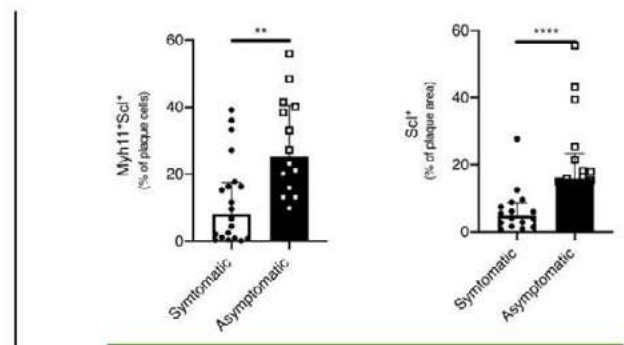
**Objective:** Sclerostin (Scl) expression levels have been linked to vascular calcification (VC) of atherosclerotic plaques. In osteoporotic women, Scl inhibition with romosozumab has been associated with a higher incidence of major adverse cardiovascular events (MACE) compared to alendronate. This increases in MACE call into question the safety of romosozumab use, particularly in patients with cerebrovascular and cardiovascular history or at high cardiovascular risk. However, whether sclerostin expression levels in VC or atherosclerotic plaques are associated with clinical ischemic events remains unknown. Here we explored the association between Scl expression in human atherosclerosis plaques and the extend of VC, vascular smooth muscle cells (VSMCs) phenotypic switch to osteoblast-like cells (OBL), and its correlation to clinical cerebrovascular events.

**Methods:** Carotid plaque specimens of symptomatic (ischemic stroke) and asymptomatic patients undergoing endarterectomy for severe carotid stenosis were co-stained with VSMCs specific marker (Myh11), OBL marker (RUNX2), microcalcification sensitive fluorescent imaging probes (OsteoSense) and Scl and used for quantification analyses.

**Results:** Carotid plaque specimens from asymptomatic patients exhibited a significantly higher percentage of VSMCs expressing Scl (Myh11+Scl<sup>+</sup>) in parallel with a greater Scl<sup>+</sup> area vs. symptom-

atic patients. A negative correlation was observed between the percentage of Myh11+Scl<sup>+</sup> cells and the extent of microcalcification (OsteoSense) as well as between the percentage of total Scl<sup>+</sup> cells and induction of VSMCs phenotype switch to osteoblast-like cells (quantified as RUNX positive area).

**Conclusion:** In atherosclerotic plaques of patients with ischemic stroke, total and VSMCs -specific Scl expression levels were reduced as compared to asymptomatic patients. Furthermore, reduction in Scl levels was positively associated with the extent of microcalcification, and VMSCs phenotypic switch to OBL. The presented findings suggest that sclerostin expression in human atherosclerotic plaques could contribute to plaque stabilization and be protective against ischemic stroke.



### OP10 - P609 EFFECTS OF PARATHYROIDECTOMY ON RISK OF FRACTURE BY SEVERITY OF PRIMARY HYPERPARATHYROIDISM: A DANISH REGISTER STUDY

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**Objective:** We have previously demonstrated that the risk of fracture is increased in primary hyperparathyroidism (PHPT) compared with matched controls. Here we investigated the effects of parathyroidectomy (PTX) on fracture risk according to severity of disease.

**Methods:** Using Danish hospital records, we identified patients diagnosed with PHPT between 1997 and June 2015. The severity of disease was based on serum calcium [ionised calcium con-

centration (mild: 1.33-1.44 mmol/L; moderate: 1.45-1.64 mmol/L; severe:  $\geq 1.65$  mmol/L) or total calcium concentration (mild: upper limit normal (ULN) range to 2.76 mmol/L; moderate: 2.77-3.02 mmol/L; severe:  $\geq 3.03$  mmol/L)] and PTH levels (mild:  $< 2 \times \text{ULN}$ ; moderate:  $2-3 \times \text{ULN}$ ; severe:  $> 3 \times \text{ULN}$ ). All individuals were followed from index date to death, emigration, or 29/11/2017. Incident hip and major osteoporotic fractures were identified via ICD codes. An extended Poisson regression model was used to calculate the hazard ratio for fracture for PHPT patients prior to and after PTX and by category of disease severity.

**Results:** Of the 6884 PHPT patients, 4186 (60.8%, mean age 60.6 years, 78% female) underwent PTX. After adjustment for sex, current age, and time since index/PTX date, the risk of hip fracture (HR: 0.35; 95%CI: 0.21-0.60) and major osteoporotic fracture (HR: 0.67; 95%CI: 0.50-0.90) was decreased after PTX compared to prior to PTX. When assessed according to disease severity (mild, moderate, or severe), PHPT patients with mild disease (mild hypercalcemia and mild PTH levels) had decreased risk of both hip (HR: 0.32; 95%CI: 0.14-0.70) and major osteoporotic fracture (HR: 0.63; 95%CI: 0.42-0.95) following PTX compared to prior to PTX. Similar results were seen for PHPT patients with severe disease (severe hypercalcemia or severe PTH levels) (HR: 0.27; 95%CI: 0.08-0.87 and HR: 0.39; 95%CI: 0.19-0.80, respectively).

**Conclusion:** Fracture risk is decreased following PTX even in patients with mild disease, suggesting a clinically meaningful benefit of PTX in this patient group.

## OP11 - P687

### ASSOCIATIONS BETWEEN GUT MICROBIOTA AND SARCOPENIA OR ITS DEFINING PARAMETERS: A SYSTEMATIC REVIEW

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**Objective:** Ageing is associated with unbalanced gut microbiota (GM). While previous research has suggested that GM dysbiosis contributes to adverse health outcomes such as depression and Morbus Parkinson, more research is needed to determine the role of the gut-muscle axis in humans. Therefore, this systematic review aimed to clarify the associations between sarcopenia and its defining parameters (muscle mass, muscle strength, physical performance) and GM in older adults.

**Methods:** A systematic search was conducted according to the PRISMA guidelines in PubMed, Embase, Web of Science and Cochrane Library after registration on PROSPERO (CRD42021259597). Studies reporting on the construct sarcopenia or at least one defining parameter and GM were screened from inception until 19 July 2022. Observational (cross-sectional, cohort, case-control) studies with subjects  $\geq 50$  years were included. **Results:** 25 studies with 5400 subjects (52% women) were included (18 cross-sectional, 4 case-controls, 3 cohort). The majority

of studies comprised community-dwelling (n=21) and Caucasian (n=15) older persons. 12 studies adjusted for putative confounders. 8 studies had the construct sarcopenia (by varying definitions) as one of the outcomes, with prevalence ranging from 11% to 51%. In 9 studies at least 1  $\alpha$ -(within sample) GM diversity index and in 11 studies at least 1  $\beta$ -(between sample) GM dissimilarity index was different in older persons with preserved vs. low muscle function. Four studies reported differences in Firmicutes/Bacteroides ratio, which was increased in normal vs. low muscle mass groups in 3 of these. Multiple studies reported associations between bacterial taxa at multiple levels (phylum, family, genus and species) and muscle mass (n=10), muscle strength (n=7) and physical performance (n=3). The construct sarcopenia was associated with higher abundance of specific bacterial taxa (5 out of 8 studies). All mentioned results were significant ( $p \leq 0.05$ ).

**Conclusion:** This review suggests significant associations between GM and sarcopenia or at least one defining parameter. However, results were highly heterogeneous, and no conclusions about causality could be made. Therefore, additional longitudinal research with larger sample sizes is needed to unravel the gut-muscle axis in older persons with sarcopenia.

## OP12 - P709

### PRELIMINARY RESULTS OF THE INVOLVEMENT OF THE ENDOCANNABINOID SYSTEM IN FIBROUS BONE DYSPLASIA

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**Objective:** Fibrous bone dysplasia (FBD) is a rare disease characterized by an alteration of the bone mineralization process leading to an increase of bone fragility and deformities. Since in the last years several studies reported an involvement of the endocannabinoid system (ES) in bone mineralization process, the aim of this study is to evaluate the role of the ES in FBD.

**Methods:** The study was conducted on the primary cell line of mandibular fibrous bone dysplasia, marked as FD-1. For first, the established FD-1 line has been characterized by different cellular and molecular biology analyses. Then we performed an osteogenic differentiation assay up to 14 d evaluating the gene expression levels of the osteogenic marker genes and of the components of the ES.

**Results:** We have phenotypically characterized the FD-1 line as a primary mesenchymal stem cell line through the evaluation of the positive expression of the mesenchymal stem cell markers. We have also reported the positive expression of ADAMTS2 gene, a specific FBD marker gene, and of the pre-osteoblastic marker genes. Preliminary data obtained showed the presence of the components of the ES not only in FD-1 line, cultured in normal conditions, but also during the osteogenic differentiation process. We have observed a modulation of the expression levels of the components of the ES during osteogenic differentiation.

**Conclusion:** For the first time we have not only established a pre-osteoblastic cell line of FBD, but also demonstrated the presence of ES components in FBD, observing a modulation of the ES during the osteogenic differentiation, demonstrating that the ES is involved in bone mineralization. Preliminary data obtained could represent the starting point to evaluate how the ES could be related to FBD progression to identify new therapeutic targets and strategies to treat the bone alterations which characterized the FBD.

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## OP13 - P1030

### A NEW TOOL FOR INCIDENT FRACTURE RISK IDENTIFICATION IN MEN: THE REMS-BASED FRAGILITY SCORE (FS)

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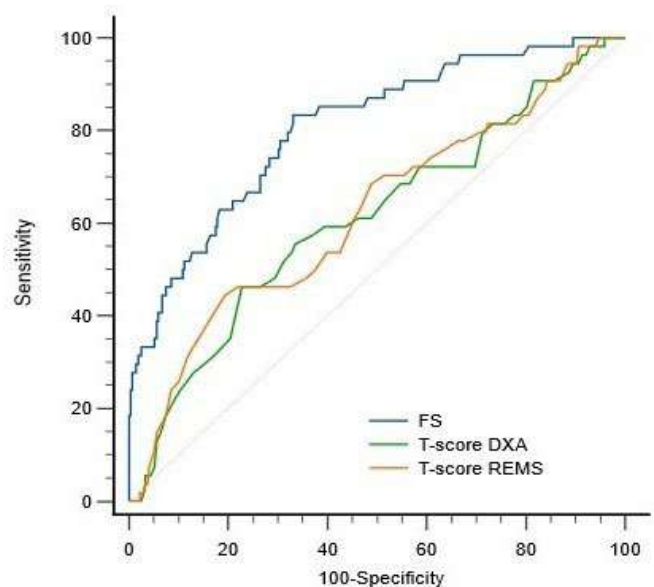
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**Objective:** Through a simple echographic scan of the reference anatomical sites (femur and/or spine), radiofrequency echographic multispectrometry (REMS) allows the assessment of the quality of bone microarchitecture thanks to the fragility score (FS). FS is obtained from the comparison between the patient spectral profiles with reference spectral models of fractured and non-fractured patients. Aim to evaluate the capability of the FS in identifying frail patients, more susceptible to incident fragility fractures, by comparing the discriminative performance of DXA and REMS T-scores with FS ones.

**Methods:** A cohort of 322 Caucasian men (above 55 years) underwent lumbar spine scans with both REMS and DXA. The occurrence of incident fragility fractures was then monitored during a 5-year follow-up. The ability of the FS to correctly discern patients with and without incident osteoporotic fractures was evaluated in comparison with DXA and REMS T-score by means of receiver operating characteristic (ROC) curve analysis.

**Results:** Of 322 patients, 54 had sustained an incident fracture during the follow-up period. The median T-score values measured by REMS and DXA were significantly lower in fractured patients than in non-fractured ones. On the contrary, the FS values was significantly higher in fractured subjects, confirming their compromised bone status. The FS yielded a value of the ROC area

under the curve (AUC) equal to 0.81. This value was significantly higher than the AUC obtained by the REMS T-score (0.62) and DXA T-score (0.61) ( $p < 0.001$ ). ROC curves are shown in Figure 1.



**Figure 1.** Evaluation of the capability of the FS, REMS and DXA T-score values in discriminating between patients with or without incident fragility fractures using ROC analysis.

**Conclusion:** The study demonstrated the superior performance of the FS compared either T-scores obtained by REMS and DXA in the identification of incident fractures. This parameter represents a valuable diagnostic method for the identification of frail and non-frail patients and a useful tool for fracture risk prevention.

## OP14 - P1033

### EFFECT OF VITAMIN D3, OMEGA-3S AND A SIMPLE HOME EXERCISE PROGRAM ON BMD IN EUROPEAN OLDER ADULTS: THE DO-HEALTH RANDOMIZED CONTROLLED TRIAL

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**Objective:** Vitamin D, omega-3s and exercise are the most promising non-pharmacological interventions to improve bone health and prevent osteoporotic fractures, however, their combined effects on areal BMD (aBMD) remain unclear. We therefore examined whether vitamin D3, omega-3s, or a strength-training exercise program (SHEP), alone or in combination, improve lumbar spine (LS), femoral neck (FN) or total hip (TH) aBMD among European generally healthy community-dwelling older adults.

**Methods:** This is a secondary analysis of DO-HEALTH, a 3-year multicenter, double-blind, randomized 2x2x2 factorial design trial in generally healthy older adults (age  $\geq 70$  years). Participants from 4 out of 7 DO-HEALTH study centers, which were equipped with DXA machines, were included in the present analysis. The study interventions were 2000 IU/d of vitamin D<sub>3</sub>, 1 g/d of marine omega-3s, and a SHEP (3x30 min/wk), applied alone or in combination. Change in LS, FN, and TH aBMD was assessed by DXA at BL and year 1, 2 and 3. Mixed effect models were used. All analyses were based on the intention-to-treat principle and adjusted for age, sex, BMI, prior fall, study site and baseline level of the outcome.

**Results:** DXA scans were available for 1486 participants (75 $\pm$ 4 years, 63% women, FN T-score -1.4 $\pm$ 1.0). Preliminary results show a significant difference in mean change in TH aBMD for vitamin D3 vs. no vitamin D3 ( $\Delta$  in least square means [LSMs]: 0.0035 [95%CI 0.0011, 0.0059] g/cm<sup>2</sup>) and vitamin D3+omega-3s vs. no vitamin D3 and no omega-3s ( $\Delta$ LSM: 0.0038 [95%CI 0.003, 0.0072] g/cm<sup>2</sup>) across the 3-year follow-up. Subgroup analyses revealed a significant interaction between sex and the vitamin D3 group (P=0.003) for LS aBMD. Vitamin D3 significantly increased LS aBMD compared to no vitamin D3 ( $\Delta$ LSM: 0.0083 [95%CI 0.0016, 0.0157] g/cm<sup>2</sup>) in men over 3 years, but not in women.

**Conclusion:** Among generally healthy and active older adults, daily vitamin D3 supplementation, alone or in combination with omega-3s supplementation, showed a small benefit for total hip aBMD. Furthermore, vitamin D3 had beneficial effects on LS aBMD in men but not in women.

**Disclosures:** As part of the DO-HEALTH independent and investigator-initiated clinical trial, HAB-F reports as the PI of the DO-HEALTH trial, grants from the European Commission (Grant Agreement No. 176;278588) and within this framework also from the University of Zurich, from NESTEC, from PFIZER Consumer Healthcare, from Streuli Pharma, plus non-financial support from DSM Nutritional Products and from Roche Diagnostics.

## OP15 - P340

### A PLACEBO-CONTROLLED, SINGLE BLIND EXTENSION STUDY (OA-07) EVALUATING THE SAFETY AND EFFICACY OF LORECIVIVINT IN SUBJECTS WITH SEVERE OSTEOARTHRITIS OF THE KNEE: RADIOGRAPHIC AND PAIN OUTCOMES AT 24 AND 30 MONTHS

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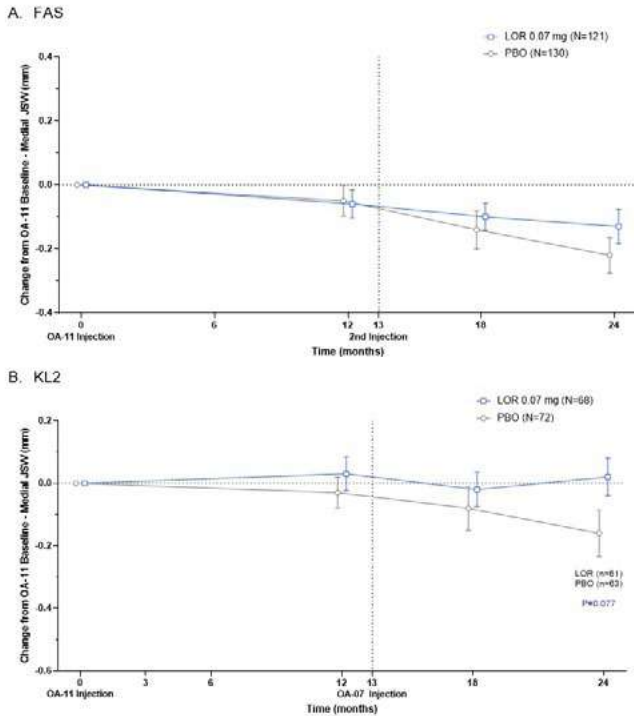
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**Objective:** Knee osteoarthritis (OA) is the most common joint disorder with unmet need for safe and efficacious symptomatic and disease modifying treatments. Lorecivivint (LOR), a novel intra-articular (IA) CLK/DYRK inhibitor thought to modulate Wnt and inflammatory pathways, has previously appeared safe, demonstrated patient-reported outcome (PRO) improvements compared with placebo (PBO), and maintenance of radiographic medial joint space width (mJSW). Interim results from OA-07 (NCT04520607), an ongoing 4-year extension study from a parent, Phase 3 study (OA-11) of LOR safety and efficacy, are presented.

**Methods:** Participants who completed the parent 13 month OA-11 LOR trial were enrolled into the extension. At the beginning of the single-blind Year 1 of the extension, participants received a repeat injection according to the randomized treatment received initially (LOR or PBO). In Year 2 and annually thereafter, all subjects (LOR and PBO) received an open-label 0.07 mg, IA LOR injection. The extension trial commenced in July 2020 and is planned to continue over a 4-year period with clinic visits every six months capturing mJSW (mm) and PROs.

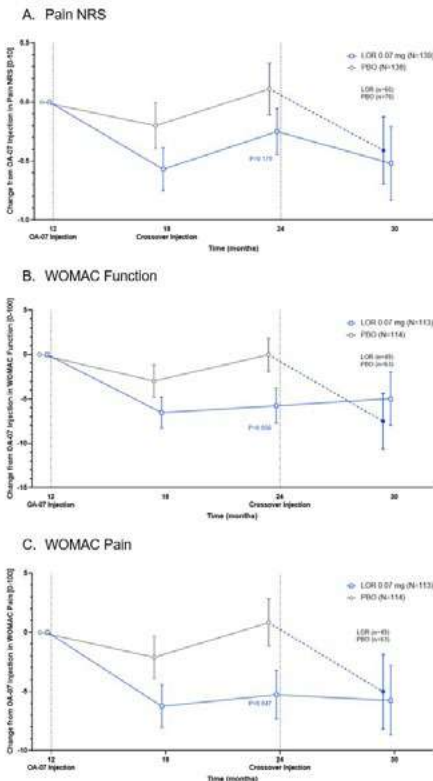
**Results:** 277 subjects (mean age 61.0 $\pm$ 8.2 years, BMI 31.8 $\pm$ 4.9 kg/m<sup>2</sup>, female 62.8%, KL3 45.5%, 67.1% bilaterally symptomatic, mean baseline mJSW 2.63 $\pm$ 0.69 mm, 68.6% mJSW <3 mm) were enrolled. LOR appears safe and well-tolerated, consistent with its previously observed safety profile. At 24 months, the LOR treatment arm shows reduced mJSW loss compared to placebo for FAS and KL2 (Fig. 1). Average change from extension baseline to 24 months in PROs were seen in Pain NRS, WOMAC Function, and WOMAC Pain (Fig. 2), with additional improvement seen at 30 months for PBO participants receiving unblinded IA injection of LOR. Larger improvements in PROs were observed in the KL2 subgroup.

**Figure 1: Change in Medial Joint Space Width in OA-07 from OA-11 Baseline**



P-value reported from OA-11 injection-adjusted ANCOVA at timepoint. Observed mean change from baseline ± standard error shown. Data from open database. FAS: Full Analysis Set; LOR: Lorecivivint; PBO: Placebo; JSW: Joint Space Width; KL2: Kellgren-Lawrence Grade 2

**Figure 2: Change in PROs from OA-07 LOR Injection from OA-07 Baseline**



P-value reported from OA-07 injection-adjusted ANCOVA at timepoint. Observed mean change from baseline ± standard error shown. Data from gpepi database. FAS: Full Analysis Set; LOR: Lorecivivint; PBO: Placebo; NRS: Numerical Rating Scale

**Conclusion:** LOR continues to appear safe and well tolerated. A potential benefit of LOR 0.07 mg compared with PBO in mJSW is observed 12 months after the extension baseline (second overall) injection. Potential LOR benefit compared to PBO is also seen across PROs. Within this structurally advanced knee OA cohort, both mJSW and PROs treatment effects appear enhanced in earlier/less advanced KL2 knee OA subjects relative to those with more advanced KL3 graded knees. This study is ongoing.

**OP16 - P253**

**DYNAPENIA, LOW MUSCLE MASS OR SARCOPENIA: WHICH BEST PREDICTS MOBILITY DECLINE IN OLDER WOMEN WITH NORMAL GAIT SPEED?**

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**Objective:** To identify the best predictor of gait speed (GS) decline overtime, between dynapenia, low muscle mass (LMM) and sarcopenia. For this purpose, the EWGSOP2 definition, using different cut-offs for handgrip strength (HGS), was used.

**Methods:** A 8-year follow-up analysis was conducted using data from 1,382 women aged 60 years or older and free of mobility limitation (GS >0.8 m/s) at baseline who participated in the English Longitudinal Study of Aging. Dynapenia was defined by HGS (<23, <21, <20 and <16 kg). LMM was defined by the 20<sup>th</sup> percentile of the appendicular skeletal muscle mass index (ASM-MI) sample distribution (<6.52 kg/m<sup>2</sup>). Sarcopenia was defined using the EWGSOP2 criteria with the different HGS cut-off points mentioned above. Generalized linear mixed models adjusted by socioeconomic, behavioural and clinical conditions were used to analyse the decline in GS (m/s) as a function of dynapenia, LMM and sarcopenia.

**Results:** Over time, women with dynapenia defined by HGS <16 kg (-0.006 m/s per year, 95%CI -0.010 – -0.001) and <20kg (-0.008 m/s per year, 95%CI -0.010 – -0.001) had a greater decline in GS than women without dynapenia. In addition, pre-sarcopenic (-0.008 m/s per year, 95%CI -0.010 – -0.001) and sarcopenic (-0.009 m/s per year, 95%CI -0.020 – -0.001) women, defined by the EWGSOP2 with HGS <20 kg, and sarcopenic women (-0.008 m/s per year, 95%CI -0.020 – -0.001), defined by EWGSOP2 with HGS <23 kg, showed a greater decline in GS than non-sarcopenic women. LMM, cut-off points >20 kg to define dynapenia as well as cut-off points for HGS <16, <20 and <21 kg to define sarcopenia did not predict mobility decline overtime.

**Conclusion:** A HGS <20 kg was the best cut-off to define dynap-

enia or sarcopenia and to identify mobility decline risk in older women.

**Acknowledgments:** The authors are grateful to all collaborators and participants of the English Longitudinal Study of Ageing. The English Longitudinal Study of Aging was approved by the National Service for Research Ethics [London Multicentre Research Ethics Committee (MREC/01/2/91)] and an informed consent form was signed by all participants. This study was carried out with the support of the Coordination for the Improvement of Higher Education Personnel – CAPES (code 001 and process number 88887.613295/2021-00), the National Council for Scientific and Technological Development of Brazil – CNPQ (numbers 303577/2020-7 and 303981/2017-2) and the State of São Paulo Research Foundation – FAPESP (processes 2021/11505-2 and 2018/13917-3). The Economic and Social Research Council [grant number 56 ES/T008822/1] supported this work. ELSA is funded by the National Institute on Aging USA (grant number R01AG017644) and by UK Government Departments coordinated by the National Institute for Health and Care Research (NIHR).

**OP17 - P381**  
**SARCOPENIA PREVALENCE, INCIDENCE, AND ASSOCIATION WITH 6 YEARS INCIDENT FRAGILITY FRACTURES IN SWISS POSTMENOPAUSAL WOMEN**

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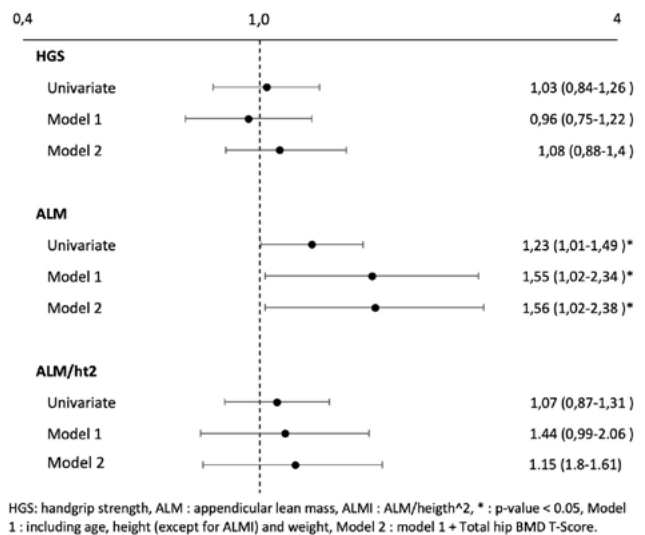
**Objective:** Sarcopenia is a progressive and age-related generalized loss of skeletal muscle mass, strength and function, leading to falls and fractures. We aimed to assess the prevalence and incidence of sarcopenia as based on its different definitions and the association of its components with 6 years incident fragility fractures.

**Methods:** Postmenopausal women from the OsteoLaus cohort (Lausanne, Switzerland) underwent body composition (Lunar iDXA) and handgrip strength (HGS) assessment at baseline. Sarcopenia was defined based on HGS and appendicular lean mass (ALM)/height<sup>2</sup> (EWGSOP-ALMI-2019/2009); HGS and ALM (EWGSOP-ALM-2019, FNIH-ALM-2017); HGS and ALM/BMI (FNIH-BMI-2017/2014); ALM/height<sup>2</sup> (IWG); or HGS (EWGSOP-HGS-2019). Incident major osteoporotic fractures (MOF) that occurred between the baseline and the 6 years follow-up were assessed. We created univariate and multiple logistic regression adjusted for age, weight, height (except for ALMI) and BMD to study the incident MOF association with one standard deviation increase of ALM, ALMI or HGS.

**Results:** We included 1179 participants with both DXA and HGS measures (mean±SD: age 69.13±8.64 years, BMI 26.07±4.21 kg/height<sup>2</sup>, HGS 24.16±5.68 kg, ALM 16.89±2.56 kg, ALMI 6.52±0.73

kg). As based on the EWGSOP-ALMI-2019, EWGSOP-ALMI-2009, EWGSOP-ALM-2019, FNIH-ALM-2017, FNIH-BMI-2017, FNIH-BMI-2014, IWG and EWGSOP-HGS-2019 definitions: 17(1.4%), 34(2.9%), 46(3.9%), 67(5.7%), 103(8.7%), 15(1.3%), 168(14.2%) and 107(9.1%) women were sarcopenic. After the follow-up (5.9±0.5 years), from the 880 remaining participants, 99(11.3%) had an incident MOF. Incidence rates of sarcopenia were 0.3, 0.7, 0.9, 1.1, 1.9, 0.2, 0.8 and 1.8 per 100 person-years, as based on the same definitions. In the adjusted models, the odds ratios for a MOF (95%CI) for 1 standard deviation increase of: HGS was 1.08(0.88-1.4), ALM 1.56(1.02-2.38) and ALMI 1.15(1.8-1.61).

**Conclusion:** Up to 5-fold variations were seen in both prevalence and incidence rates of sarcopenia as diagnosed by the various definitions. The explanatory models show contra-intuitive results since a higher muscle mass was associated with a higher risk of MOF. The lack of a robust sarcopenia definition is at the center of the debate and the association with fractures should be further studied.



**Figure 1.** Odds ratios for incident major osteoporotic fractures for 1 standard deviation increase in strength or lean mass.

**OP18 - P460**  
**ASSOCIATION BETWEEN POLLUTION AND FRAILITY IN OLDER PEOPLE: A CROSS-SECTIONAL ANALYSIS OF THE UK BIOBANK**

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**Objective:** Frailty is a relevant issue in older people being associated with several negative outcomes. Increasing literature is reporting that pollution (particularly air pollution) can increase the risk of frailty, but the research is still limited. We aimed to investigate the potential association between pollution (air, noise) with frailty and pre-frailty among 60 years old and over participants of

the UK Biobank study.

**Methods:** Frailty presence was ascertained using a model including five indicators (weakness, slowness, weight loss, low physical activity, and exhaustion). Air pollution was measured through residential exposures to nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM<sub>2.5</sub>, PM<sub>2.5-10</sub>, PM<sub>10</sub>). The average residential sound level during the daytime, the evening and night was used as an index for noise pollution.

**Results:** A total of 220,079 subjects, aged 60 years old and over, was included. The partial proportional odds model, adjusted for several confounders, showed that the increment in the exposure to NO<sub>x</sub> was associated with a higher probability of being in both the pre-frail and frail category (odds ratio, OR=1.003, 95%CI=1.001-1.004). Similarly, the increase in the exposure to PM<sub>2.5-10</sub> was associated with a higher probability of being pre-frail and frail (OR=1.014, 95%CI=1.001-1.036), such as the increment in the exposure to PM<sub>2.5</sub> that was associated with a higher probability of being frail (OR=1.018, 95%CI=1.001-1.037).

**Conclusion:** Our study indicates that the exposure to air pollutants as PM<sub>2.5</sub>, PM<sub>2.5-10</sub> or NO<sub>x</sub> might be associated with frailty and pre-frailty, suggesting that air pollution can contribute to frailty and indicating that the frailty prevention and intervention strategies should take into account the dangerous impact of air pollutants.

**Acknowledgment:** This work was supported by an unrestricted grant of the University of Palermo, Premio Angelo Ferrante.

## OP19 - P453

### DEVELOPMENT OF TWO INNOVANT PERFORMANCE-BASED OBJECTIVE MEASURES IN FELINE OSTEOARTHRITIS: THEIR RELIABILITY AND RESPONSIVENESS TO ANALGESIC TREATMENT

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No gold standard to objectively evaluate osteoarthritis (OA) cat's physical functioning has been validated. Feline podobarometric gait analysis (PGA) has been developed<sup>[1]</sup>. We designed the innovant PGA-Effort Path (EP), as well as a Stairs Assay Compliance (SAC) to trigger the fatigue usually associated to the OA condition in cats.

Neutered geriatric cats with naturally occurring OA (n=32) were randomly distributed in 4 groups according to Firocoxib dosage (Gr. A: 0.40, B: 0.25, C: 0.15 and D: 0.00 mg/kg). After acclimation, cats were evaluated twice during each 3-weeks period, i.e., baseline (BSL), treatment with daily oral administration (Tx), and recovery (Ry). The PGA-EP consisted of an initial trotting ramp, a jump down and a passage over a pressure-sensitive mattress, before a jump up on a second ramp. Analysis included velocity and peak vertical force (PVF). For SAC, over a 4-minute period, cats were encouraged to climb up and down a 16-steps staircase: the

median value of up or down passages for the whole colony was calculated during BSL, and the percentage of cats reaching this value (defined as "finish line") was assessed under Tx and Ry. Degree of reliability between BSL measurements was acquired using the intraclass coefficient correlation (ICC), and the within-time and comparative analysis used a generalized linear mixed model. During BSL, ICC was very good to moderate for summated fore- and hind-limbs values, respectively [PVF: 0.82 (95%CI 0.66-0.91) and 0.55 (95%CI 0.25-0.75)]. The sum of hind-limbs PVF was stable over time for Gr. D (P=0.931), but significantly changed for the pooled Tx (P=0.033). Interestingly, the PVF increase waned during Ry for the Gr. C, but was sustained for both Gr. A and B. Furthermore, the velocity, before and over the pressure-sensitive mattress, was stable over time for Gr. D (P=0.204, and P=0.833, respectively), whereas it improved for treated cats under Tx, before coming back to initial level during Ry (P<0.001, and P=0.005, respectively), except for Gr. A maintaining its increased velocity during Ry. The percentage of cats crossing the finish line was stable for Gr. D (25-38%), responsive to treatment from BSL (38%) to Tx (71%; P=0.017, and different to Placebo P=0.014), and maintained during Ry (67%; P=0.038).

The PGA-EP and SAC are promising outcomes (being reliable, sensitive and responsive to treatment) to better diagnose feline OA pain and precisely detect analgesic effect.

Reference: 1. Moreau M et al. Res Veterinary Sci 2013;95:219.

## OP20 - P498

### DEVELOPMENT AND VALIDATION OF NEW EXERCISES TO PROMOTE PHYSICAL ACTIVITY IN NURSING HOME SETTINGS, THROUGH QUALITATIVE METHOD

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**Objective:** The GAMotion is a giant physical activity boardgame intended to improve the level of physical activity and a broader array of physical and psychological outcomes among nursing home residents. The aim of the present study is to develop and validate new balance, flexibility, muscle strength and walking exercises to be included in the GAMotion.

**Methods:** A two-steps qualitative study combining Focus group and Delphi method was conducted among healthcare professionals divided into two independent samples of experts. The first sample was asked to develop exercises during a focus group. The second sample participated in a two-round Delphi method. During the first round, participants were asked to rate the exercises developed during the focus group on a 4-point Likert scale (from 1:



not adapted at all to 4: very adapted). The exercises that did not reach consensus were removed (consensus established: median  $\geq 3$  in the Likert scale and at least 75% of experts rating the exercises as « adapted » or « very adapted »). During the second round, it was asked to rank the exercises selected at the end of the first round from most suitable to least suitable.

**Results:** The Focus group developed 9 balance, 12 flexibility, 12 strength and 9 walking exercises. Following the first round of the Delphi method, 2 exercises in each category did not reach the consensus and were then removed. In the second round, the remaining 7 balance, 10 flexibility, 10 strength and 7 walking exercises were ranked by the experts and this classification allowed us determined the 4 most suitable exercises from each category to be included in the GAMotion.

**Conclusion:** A consensus based approach among healthcare professionals allowed us to contribute to the development of new exercises to promote physical activity in nursing homes. These validated exercises can be included in the GAMotion boardgame.

# WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

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Abstract Book

## Oral Communications Abstracts

OC1

**ONE YEAR OF ROMOSUZUMAB FOLLOWED BY ONE YEAR OF DENOSUMAB VERSUS TWO YEARS OF DENOSUMAB: BMD AND FRACTURE RESULTS FROM THE FRAME AND FRAME EXTENSION STUDIES**

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**Objective:** To prevent fractures in women with osteoporosis, a treatment sequence with a bone-forming agent first followed by an antiresorptive may be superior to antiresorptive treatment alone. However, direct data comparing the two regimens are limited. Here, we assessed BMD and fracture incidence in patients treated with Romosozumab (Romo) followed by denosumab (Dmab) versus Dmab alone over 24 months (M) in the FRAME and FRAME Extension studies.

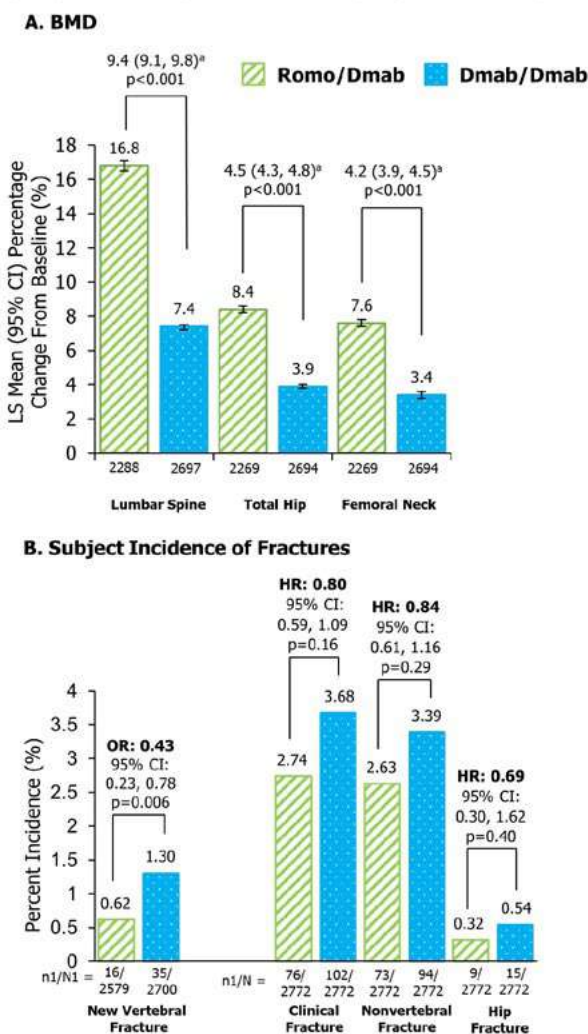
**Methods:** In FRAME, postmenopausal women with osteoporosis aged ≥55 years were randomised 1:1 to Romo 210 mg monthly or placebo for 12M; both treatment groups then received Dmab 60 mg every 6M for 12M, followed by a further 12M in the FRAME Extension. Here, we compared BMD percentage change from baseline and fracture incidence in patients receiving Romo for 1 year followed by Dmab for 1 year (Romo/Dmab; 0–24M) with patients who received Dmab for 1 year in FRAME and 1 year in the FRAME Extension (Dmab/Dmab; 12–36M). To account for different baseline time points, Romo/Dmab and Dmab/Dmab patients were matched 1:1 through propensity score calculated by logistic regression modelling with baseline covariates.

**Results:** Over 2 years, treatment with Romo/Dmab produced significantly greater increases in BMD compared with Dmab/Dmab at the lumbar spine, total hip and femoral neck (mean differences of 9.4%, 4.5% and 4.2% respectively, all p<0.001; Fig. A). In patients treated with Romo/Dmab vs Dmab/Dmab, new vertebral fractures were significantly reduced (0.62% vs 1.30% [OR: 0.43; p=0.006]; Fig. B), while lower fracture incidence was observed for clinical, nonvertebral and hip fractures (not significant).

**Conclusion:** A sequence of 1 year of Romo followed by 1 year of Dmab resulted in significantly greater BMD gains, significantly reduced new vertebral fracture incidence, and lower incidence of clinical, nonvertebral and hip fractures (not significant) compared with 2 years of Dmab alone.

**Funding:** UCB Pharma, Amgen Inc.

**Figure:** Two-year percentage change from baseline in BMD and subject incidence of fracture for patients receiving Romo/Dmab (study months 0–24) and Dmab/Dmab (study months 12–36)



\*Mean difference (95% CI) in percentage BMD change between Romo/Dmab vs Dmab/Dmab. A generalised estimating equation was used to estimate the treatment effect of BMD percentage change from baseline. Conditional logistic regression was used to assess the difference of new vertebral fracture incidence between the cohorts. Cox proportional hazard model was used to evaluate the treatment effects of other fractures. For BMD and new vertebral fracture missing values were imputed by carrying forward the last non-missing post-baseline value prior to the missing value. n=Number of subjects who were propensity score matched with evaluable data at the time point of interest; n1=Number of subjects with a fracture; N=Number of subjects who were propensity score matched; N1=Number of subjects in the propensity score matched subset for new vertebral fractures analysis. BMD: bone mineral density; CI: confidence interval; Dmab: denosumab; HR: hazard ratio; LS: least squares; OR: odds ratio; Romo: romosozumab.

OC2

**EFFECTIVENESS OF ASFOTASE ALFA FOR TREATMENT OF ADULTS WITH HYPOPHOSPHATASIA: RESULTS FROM A GLOBAL REGISTRY**

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**Objectives:** To assess asfotase alfa's effectiveness on mobility, functional status, quality of life (QOL), and pain in adults with hypophosphatasia (HPP).

**Methods:** Patients enrolled in the Global HPP Registry (NCT02306720; EUPAS13514) who had an alkaline phosphatase below the LLN for age and sex and/or a documented *ALPL* gene variant, initiated asfotase alfa at age ≥18 years, and been treated for ≥6 months (M) at last follow-up were included. Outcomes were evaluated as mean change from mean baseline (BL) value through M36; assessments were not performed at all timepoints for all patients.

**Results:** Among included patients (n=190), median age at treatment start was 45.5 years; 91.1% were characterized as having pediatric-onset HPP. 6MWT distance was 404 m (n=31) at BL and improved over time vs BL (change: 93 m at M12 [95%CI: 47, 138; n=18], 62 m at M24 [95%CI: 0, 124; n=15], and 45 m at M36 [95%CI: -83, 172; n=7]). The SF36v2 Physical Component Summary score was 35.7 (n=48) at BL and improved over time (change: 4.68 at M6 [95%CI: 0.16, 9.21; n=34], 4.61 at M12 [95%CI: 1.02, 8.19; n=28], 4.94 at M24 [95%CI: -2.23, 12.11; n=22], and 5.13 at M36 [95%CI: -0.96, 11.21; n=21]). SF36v2 Mental Component Summary score improvements were not statistically significant at all timepoints. Health Assessment Questionnaire-Disability Index scores were generally unchanged over time. Self-reported Brief Pain Inventory Short Form scores improved at all timepoints from a BL of 4.86 (change: -0.72 at M6 [95%CI: -1.23, -0.21; n=38], -1.07 at M12 [95%CI: -1.62, -0.52; n=31], -1.13 at M24 [95%CI: -1.76, -0.51; n=26], and -0.97 at M36 [95%CI: -1.70, -0.24; n=23]). The most common AEs were injection site reactions and injection-associated reactions, occurring in 29 (13.4%) and 13 (6.0%) patients, respectively. Eleven serious AEs related to asfotase alfa were reported in 7 patients.

**Conclusion:** Adults with HPP who received asfotase alfa for ≥6 M experienced improvements in mobility, physical function, QOL, and pain, which were maintained over 3 years of follow-up.

**Funding:** Alexion, AstraZeneca Rare Disease, Boston, MA.

**Disclosures:** PSK, GAMM, AL, CRG, KO, WH, LS and KMD consult

for/have received research funding/honoraria from Alexion, AstraZeneca Rare Disease. AP, AM, and SF are employees of and may own stock/options in Alexion, AstraZeneca Rare Disease.

OC3

**PRE-TREATMENT LEVEL OF BONE TURNOVER DOES NOT INFLUENCE THE RESPONSE TO ALENDRONATE IN POSTMENOPAUSAL OSTEOPOROSIS. A LARGE HISTOMORPHOMETRIC STUDY**

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**Background:** As a consequence of the reduction of bone resorption, bisphosphonate treatment also results in decreases of bone turnover and formation. The level of bone turnover in untreated postmenopausal osteoporosis is variable. The efficacy of antiresorptive such as bisphosphonates in those women with low bone turnover has been questioned (Malluche et al, 2022).

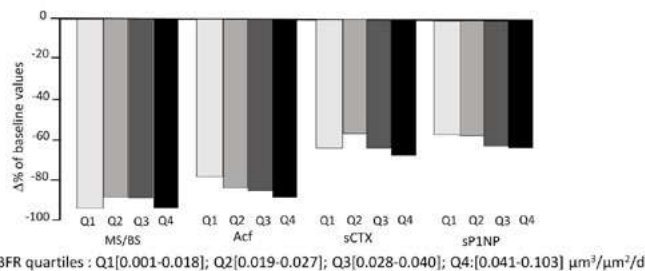
**Purpose:** This post-hoc analysis investigated the changes of histomorphometric parameters of bone turnover after treatment with alendronate, as a function of their pre-treatment levels.

**Materials and methods:** Ninety postmenopausal women enrolled in a randomized trial underwent paired transiliac bone biopsies before and after 6 (n=44) or 12 (n=46) months of treatment with ALN (70 mg/week). The dynamic parameters reflecting the bone formation and bone turnover were measured on unstained sections: mineralizing surface (MS/BS, %), bone formation rate (BFR/BS,  $\mu\text{m}^3/\mu\text{m}^2/\text{d}$ ) and activation frequency (Ac.f, /yr). Serum N-terminal propeptide (s-PINP) and the C-terminal telopeptide (s-CTX) of type I collagen were assessed before treatment and every 3 months. Subjects were divided into quartiles based on the baseline values of BFR/BS.

**Results:** At baseline, MS/BS and Ac.f were significantly different ( $p < 0.0001$ ) between the BFR quartiles. sCTX and sPINP tended to increase across those quartiles but the difference was not significant. After ALN treatment, MS/BS was not significantly different between initial BFR quartiles, but Ac.f remained significantly lower in the first quartile compared to the third and fourth ones ( $p < 0.03$ ). When the variation between pre- and post-treatment was expressed in percent of the baseline value (D%), the magnitude of the diminutions of MS/BS, Ac.f, sCTX and sPINP were similar in the four quartiles (Figure).

**Conclusion:** The magnitude of the response to ALN appeared independent of the baseline level of bone turnover.

**Reference:** Malluche et al. PLOS One 2022,17(7):e027155



OC4

**EFFICACY AND SAFETY OF PROPOSED DENOSUMAB BIOSIMILAR AND REFERENCE DENOSUMAB IN POSTMENOPAUSAL OSTEOPOROSIS AT 52 WEEKS: THE ROSALIA STUDY**

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**Objective**

To demonstrate similar efficacy and comparable safety of GP2411, a proposed Sandoz denosumab biosimilar, and reference denosumab in postmenopausal women with osteoporosis.

**Materials and Methods**

The ROSALIA (NCT03974100) international, double-blind, parallel-group integrated Phase I/III study randomised subjects (1:1) to receive 60 mg s.c. of GP2411 or EU-authorized reference denosumab every 26 weeks. The study enrolled 527 postmenopausal women with osteoporosis, aged 55–80 years, with a lumbar spine bone mineral density (LS-BMD) T-score  $\leq -2.5$  to  $\geq -4.0$ . The primary efficacy endpoint was the percentage change from baseline (%CfB) in LS-BMD at Week 52. Secondary efficacy endpoints were %CfB in LS-BMD (Week 26) and in BMD at femoral neck and total hip (both at Week 26 and 52). Safety and immunogenicity were monitored throughout the study.

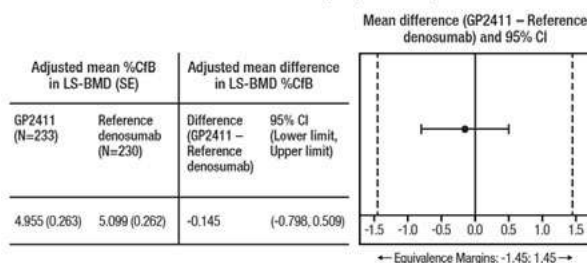
**Results**

The results of the primary efficacy analysis at Week 52 demonstrated similar efficacy between GP2411 and reference denosumab. In the per-protocol set (GP2411, n=233; reference denosumab, n=230), mean %CfB in LS-BMD was 4.955 (GP2411) and 5.099 (reference denosumab). The 95% CIs of the difference in %CfB in LS-BMD between treatment groups were fully contained within the prespecified equivalence margins [-1.45%, 1.45%]: -0.145 [95% CI: -0.798, 0.509] in the per-protocol set (Figure) and -0.177 [95% CI: -0.830, 0.475] in the full analysis set. There were no clinically meaningful differences between groups in either the secondary efficacy endpoints or the rate of new vertebral fractures (GP2411: 5.7%; reference denosumab: 9.1%). The incidence rate of adverse events (GP2411: 59.7%; reference denosumab: 68.6%) and serious adverse events (GP2411: 4.6%; reference denosumab: 3.0%) were comparable between the two groups. Most adverse events were of Grade 1 or 2 and not related to study drugs. Immunogenicity in terms of anti-drug antibodies was similar in both treatment groups.

**Conclusion**

The ROSALIA study demonstrated similar efficacy and comparable safety and immunogenicity between GP2411, a proposed Sandoz denosumab biosimilar, and reference denosumab in postmenopausal women with osteoporosis.

Figure 1. Mean %CfB in LS-BMD and mean difference in %CfB in LS-BMD between proposed denosumab biosimilar and reference denosumab at Week 52 (per-protocol set).



**Disclosures**

SK and ED report no conflict of interest. AK reports study funding, medical writing support, and article processing charges from Amgen; consulting fees from AXDEV Group, Pfizer, Janssen, Boehringer Ingelheim, AbbVie, Flexion, Gilead, Grunenthal, Orion, Regeneron, Sun Pharma Advance Research, and ECOR1; payment or honoraria for lectures, presentations, speakers' bureaus, manuscript writing or educational events from Merck & Co, Eli Lilly, Novartis, Pfizer, Flexion, AbbVie, Amgen, Genentech, Regeneron, UCB, Horizon, and GSK. AK has participated in a data safety monitoring board for AbbVie and Amgen. He has been part of a board or advisory board for AbbVie, Bendcare, Boehringer Ingelheim, ChemoCentryx, Flexion, Gilead, Grunenthal, Horizon, Eli Lilly, Janssen, Pfizer, Regeneron, UCB, and Novartis. AK has stock or stock options in Pfizer, GSK, Gilead, Novartis, and Amgen. JJB reports consulting fees from Cole Biopharma, Sandoz, and UCB. RE reports consulting fees from Sandoz, Samsung Bioepis, Biocon Pharma Limited, and Amgen. SS, SB, NK, and AS are employees of Sandoz Biopharmaceuticals.

**Keywords**

GP2411; denosumab; biosimilar; efficacy; safety.

## OC5

**COST-EFFECTIVENESS OF ABALOPARATIDE FOLLOWED BY ALENDRONATE IN US WOMEN AND MEN AT HIGH RISK OF OSTEOPOROTIC FRACTURES**

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**Objective:** Clinical evidence supports the use of an anabolic agent followed by an antiresorptive in patients at very high fracture risk to substantially reduce subsequent fractures. Despite increasing evidence suggesting the usefulness of this strategy, there is limited information on the comparison of the cost-effectiveness between women and men, as well as on the effects of initial fracture site. Therefore, we estimated the cost-effectiveness of sequential abaloparatide therapy followed by alendronate (ABL/ALN) in US women and men at high fracture risk, according to initial fracture site.

**Methods:** Lifetime healthcare costs and quality-adjusted life years (QALYs) were estimated by a microsimulation-based Markov model in US women and men aged 50 to 80 years at high risk of fracture defined as having densitometry osteoporosis (bone mineral density T-score  $\leq -2.5$ ) and a recent fracture. Analyses were conducted for any initial fracture, and specifically for initial hip or vertebral fracture. The cost (expressed in US\$2022) per QALY gained of ABL/ALN was estimated compared to sequential therapy with unbranded teriparatide (TPTD) followed by ALN, generic ALN monotherapy, and no treatment.

**Results:** In both sexes and regardless of the initial fracture site, ABL/ALN produced more QALYs for lower healthcare costs compared with unbranded TPTD/ALN. In patients with an initial hip or vertebral fracture, ABL/ALN resulted in favorable cost-effectiveness (at the US threshold of \$150,000 per QALY gained) vs no treatment and generic ALN monotherapy in women  $\geq 55$  years and men  $\geq 50$  years. Cost-effectiveness vs no treatment and generic ALN monotherapy was also reached in men  $\geq 55$  years and women  $\geq 65$  years following any fracture type.

**Conclusion:** Sequential ABL/ALN was dominant (more QALYs for less costs) compared to unbranded TPTD/ALN, and cost-effective compared to generic ALN monotherapy and no treatment in both US women and men at high fracture risk. Even more favorable cost-effectiveness was shown in patients with an initial hip or vertebral fracture and in men compared to women for similar age and fracture site.

**Acknowledgement:** This study was funded by Radius Health, Inc. (Radius), Boston, MA.

**Author disclosures:** MH, SS, AS, JYR: institutional research grants from Radius; AS: Radius speaker; YW, LP, JC: Radius employee.

## OC6

**COMPARATIVE EFFECTIVENESS OF DENOSUMAB VERSUS ALENDRONATE AMONG POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS IN THE U.S. MEDICARE PROGRAM**

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**Objectives**

Although clinical trials have shown that denosumab (Dmab) significantly increases bone mineral density at key skeletal sites more than oral bisphosphonates, evidence is lacking from head-to-head randomized trials evaluating fracture outcomes. This retrospective observational study evaluated the comparative effectiveness of Dmab versus alendronate (Aln) in reducing fracture risk among postmenopausal women with osteoporosis (PMO) in the U.S.

**Methods**

Female Medicare fee-for-service beneficiaries  $\geq 66$  years of age who newly initiated Dmab (n=89,115) or Aln (n=389,536) between January 1, 2012 to December 31, 2018 with no prior history of osteoporosis treatment, were followed from treatment initiation until the first instance of a specific fracture outcome, treatment discontinuation (defined as the end of treatment supply + 60-day allowable gap) or switch, Medicare disenrollment, death, or end of available data (December 31, 2019). A doubly robust inverse-probability of treatment (weights estimated from multivariate logistic regression models) and censoring (weights estimated from multivariate Cox Proportional Hazards regression models) weighted function was used to estimate the relative risk (RR) associated with the use of Dmab compared with Aln for hip, nonvertebral (NV; includes hip, humerus, pelvis, radius/ulna, other femur), non-hip, nonvertebral (NHNV), hospitalized vertebral (HV), and major osteoporotic (MOP; nonvertebral and hospitalized vertebral) fractures.

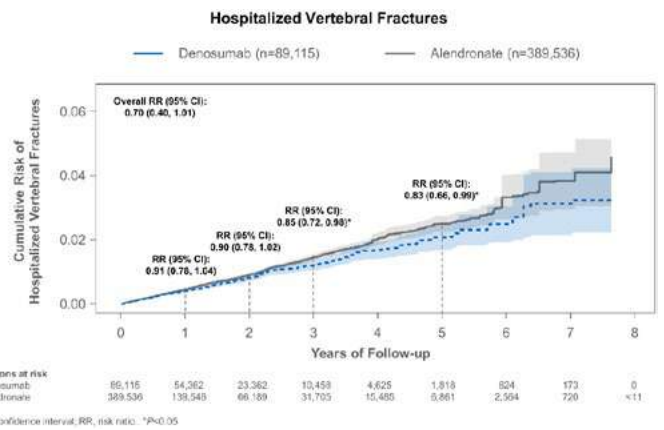
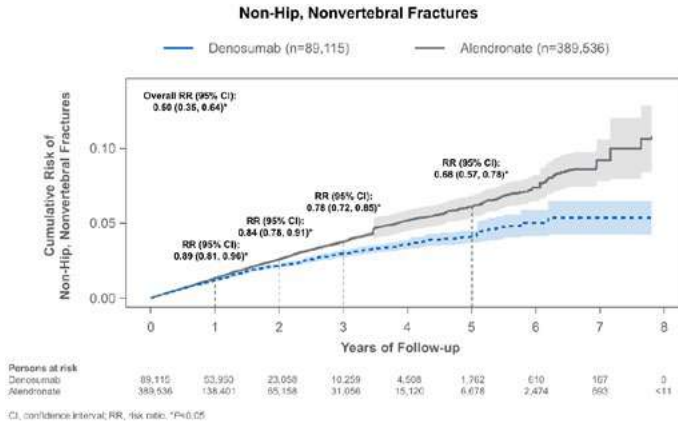
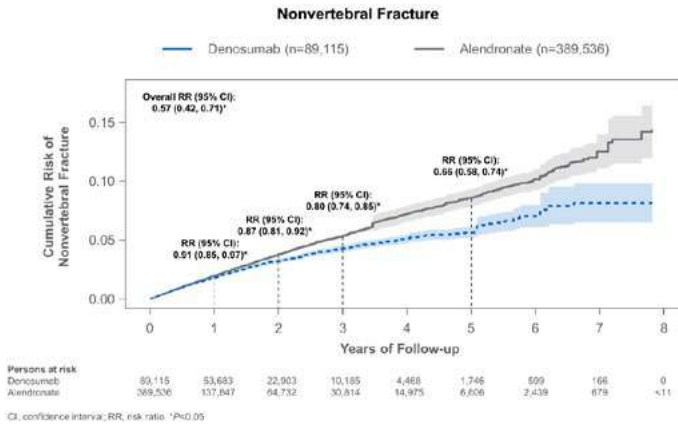
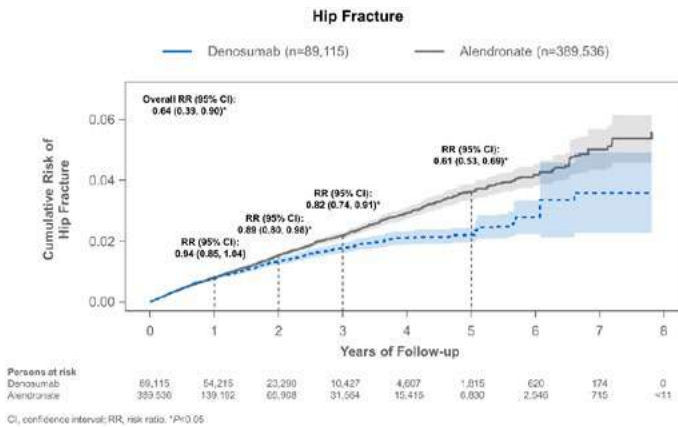
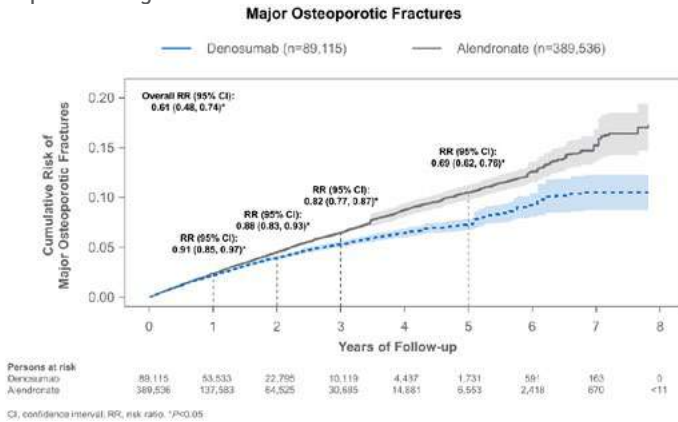
**Results**

Overall, Dmab reduced the risk of MOP by 39% (RR=0.61; 95% CI: 0.48-0.74), hip by 36% (0.64; 0.39-0.90), NV by 43% (0.57; 0.42-0.71), NHNV by 50% (0.50; 0.35-0.64), and HV fractures by 30% (0.70; 0.40-1.01) compared with Aln. Dmab reduced the risk of MOP fractures by 9% (0.91; 0.85-0.97) at year 1, 12% (0.88; 0.83-0.93) at year 2, 18% (0.82; 0.77-0.87) at year 3, and 31% (0.69; 0.62-0.76) at year 5. An increase in the magnitude of fracture risk reduction with increasing duration of exposure was also observed for other NV outcomes (Figure).

**Conclusion**

In a cohort of almost a half million, treatment-naïve PMO, we observed robust and significant reductions in the risk of MOP, hip,

NV, NHHV, and HV fractures for patients on Dmab compared to Aln. Patients who remained on Dmab for longer periods of time experienced greater reductions in fracture risk.



**OC7**  
**SINGLE WOMEN SHOW HIGHER FRACTURE RATES AND DIFFERENT ANTHROPOMETRIC, SOCIOECONOMIC AND LIFESTYLE PROFILES RELATIVE TO THEIR COUNTERPARTS IN RELATIONSHIPS: FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY**  
 L. D. Westbury<sup>1</sup>, C. Pearce<sup>1</sup>, N. R. Fuggle<sup>1</sup>, K. A. Ward<sup>1</sup>, C. Cooper<sup>1</sup>, E. M. Dennison<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Centre, University of Southampton, Southampton, United Kingdom

**Objectives**

To examine associations between relationship status and incident fracture in the Hertfordshire Cohort Study, a community-dwelling cohort of older adults, and explore associations between anthropometric, socioeconomic and lifestyle factors relevant to bone health and relationship status.

**Material and methods**

2,997 participants (1,418 women) completed a baseline questionnaire and clinic visit to ascertain their socioeconomic, anthropometric and lifestyle factors. Participants were followed up for a mean of 15 years using UK Hospital Episode Statistics, that report clinical outcomes using ICD-10 coding; ICD-10 diagnosis codes were used to ascertain incident fractures. Relationship status (single vs currently married/cohabiting) at baseline was examined in relation to incident fracture using time-to-first-event Cox regression with adjustment for age. Baseline characteristics in relation to current relationship status were examined using logistic regression. Analyses were stratified by sex.

**Results**

At baseline, mean (SD) age of participants was 66.2 (2.8) years; 14% of men and 27% of women were currently single. Over follow-up, 15% of women sustained a fracture and 5% sustained a hip fracture; corresponding figures in men were 7% and 2%. Single women had increased risk of incident fracture compared to women who were married/cohabiting (age-adjusted hazard ratio [95% CI]: 1.36 [1.02, 1.81], p=0.034). Compared to their married/

cohabiting counterparts, single women had: higher mean age [67.1 vs 66.5 years,  $p < 0.001$ ]; higher mean BMI [28.1 vs 27.4 kg/m<sup>2</sup>,  $p = 0.016$ ]; greater prevalence of current smoking [14% vs 8%,  $p = 0.004$ ]; and were less physically active ( $p = 0.003$ ). However, differences in diet quality and alcohol consumption between these two groups of women were not statistically significant. Single women were more likely to have left school before the age of 15 years ( $p = 0.037$ ) and to not own-occupy their home ( $p < 0.001$ ). We did not observe significant differences in fracture risk according to relationship status in men (age-adjusted hazard ratio for single men compared to those married/cohabiting: 1.56 [0.97, 2.51],  $p = 0.068$ ) or among either sex regarding risk of hip fracture.

**Conclusions**

These results highlight the differing risk of fracture and modifiable fracture risk factors among single women relative to their married/cohabiting counterparts. Such associations between marital status and fracture were not identified in men.

**OC8**

**ADJUSTING CONVENTIONAL FRAX ESTIMATES OF FRACTURE PROBABILITY ACCORDING TO THE NUMBER OF PRIOR FRACTURES**

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**Objectives**

Prior fragility fracture is a well-known risk factor for further fractures and is already incorporated into FRAX<sup>®</sup>. However, the tool does not currently consider the number of fractures, a factor known to influence future fracture risk. The aim of this study was to establish the effect of the number of prior fractures on the 10-year probability of fracture estimated by FRAX.

**Material and Methods**

We used data from the Reykjavik Study fracture register, which documented all incident fractures in a large population in Iceland. Using the hazards of death and fracture, we calculated the ten-year probabilities of hip fracture (HF) and major osteoporotic fracture (MOF) according to the number of prior osteoporotic fractures. These were compared to the 10-year probability irrespective of the number of previous fractures (i.e. FRAX "Previous fracture" option selected as "yes"). The ratio of these two probabilities resulted in adjustments to the conventional FRAX estimates. The time since the previous fracture was not included in this model.

**Results**

The mean probability ratios were very similar in men and women. As expected, the probability ratios increased progressively with the number of fractures but decreased with age in both genders (shown for MOF in women in the figure). The mean probability ratios according to the number of prior fractures for all scenarios were 0.95, 1.08, 1.21 and 1.35, for 1, 2, 3 and 4 or more prior fractures, respectively. A simple solution would be to lower the FRAX-based fracture probability by 5% in the presence of a single prior fracture and to elevate the probabilities by 10, 20 and 30% with a history of 2, 3 and 4 or more prior fractures, respectively, but more refined adjustments can be incorporated in web-based software.

**Conclusions**

This study provides adjustments to the conventional FRAX-based fracture probabilities after considering the number of prior fractures. These adjustments can inform the clinical management of patients.

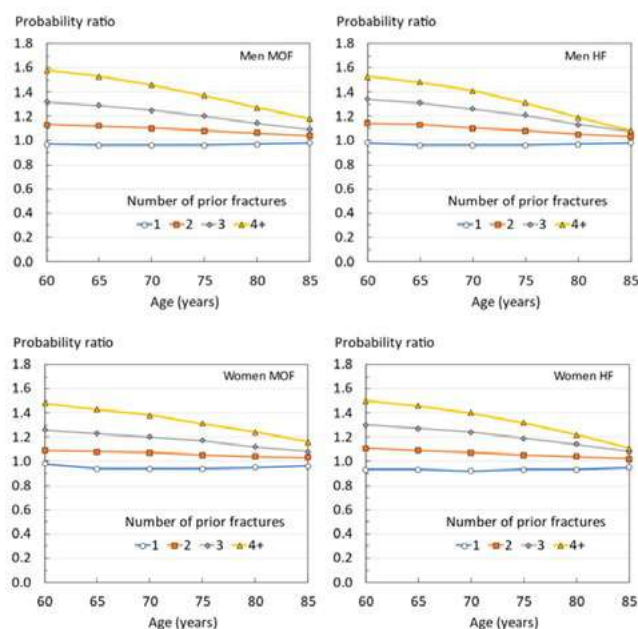


Figure: Probability ratios for a major osteoporotic fracture (MOF) and hip fracture (HF) according to the number of prior fractures. Top graphs are for men and bottom ones for women.



## OC9

**FRACTURE PATTERNS IN T1D AND THEIR ASSOCIATED RISK FACTORS – A RETROSPECTIVE COHORT STUDY**

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**Purpose:** People with type 1 diabetes (T1DM) have a higher fracture risk at several sites compared to the general population. Therefore, we assessed the hazard ratios (HR) of various fracture sites and determined the related risk factors among people with newly diagnosed T1DM.

**Methods:** All people from the UK Clinical Practice Research Datalink GOLD (1987-2017), above 20 years of age with a T1DM diagnosis code (n=3,281) and a new insulin prescription, were included and matched by sex and age to controls without diabetes (n=3,281). Cox regression was used to estimate HRs of any, major osteoporotic fractures (MOFs) and peripheral fractures (arms and lower-legs) for people with T1DM compared to controls. The analyses were adjusted for sex, age, diabetic complications, medication (glucocorticoids, anti-depressants, anxiolytics, bone medication, anti-convulsives), Charlson comorbidity score, hypoglycemia, falls and alcohol. T1DM was further stratified by diabetes duration and presence of diabetic microvascular complications (retinopathy, nephropathy, and neuropathy).

**Results:** HRs were increased with T1DM for any (HR:1.43, CI95%:1.17-1.74), MOF (HR:1.46, CI95%:1.04-2.05), arm (HR:1.19, CI95%:0.82-1.74), and lower-leg (HR:1.37, CI95%:1.01-1.85) fractures compared with controls. Risk factors were previous fractures and falls (including lower-legs and arms). Furthermore, the fracture risk increased as the number of complications increased in T1DM (0-complications: HR:1.45, CI95%:1.19-1.77, 1-complication: HR:1.58, CI95%:1.22-2.04 and ≥2-complications: HR:1.62, CI95%:1.13-2.33). Similar results were seen for MOFs (HR:2.02, CI95%:1.35-3.03), arms (HR:1.33, CI95%:1.16-2.48) and lower-leg fractures (HR:1.56, CI95%:0.97-2.50). With longer diabetes duration, the risk of any fracture decreased comparing T1DM with

controls (0-4years: HR:1.52, CI95%:1.23-1.87. 5-9years: HR:1.30, CI95%:0.99-1.71. <10years: HR:1.07, CI95%:0.74-1.55). The ranked initial risk (0-4 years) was MOFs (HR:1.59, CI95%:1.10-2.30), arm (HR:1.54, CI95%:1.12-2.11) and lower-leg fractures (HR:1.18, CI95%:0.78-1.78).

**Conclusion:** The HRs of any fractures were increased with T1DM compared to controls and associated with common risk factors. The presence of micro-vascular complications increased the risk of fractures but also at peripheral sites. The findings indicated a higher fracture risk at the onset of T1DM but a decrease with longer duration.

## OC10

**TYPE 1 AND 2 DIABETES MELLITUS AND INCIDENT FRACTURE RISK IN UK BIOBANK: IMPACT OF DISEASE TYPE, DURATION AND MICROVASCULAR COMPLICATIONS**

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**Objectives**

To investigate associations between diabetes mellitus (DM) and incident fracture, stratified by subtype (type 1, DM1 or type 2, DM2), disease duration and presence/absence of diabetic complications.

**Methods**

In UK Biobank, we used Poisson regression to calculate incidence rate ratios (IRRs) for osteoporotic fracture to investigate: a) prospective relationships between DM and fracture risk by subtype of DM (ascertained from self-report and/or hospital records), independent of traditional clinical risk factors, BMD, adiposity and CRP; b) the impact of diabetic microvascular complications; c) interaction with duration of DM (diagnosis within 5 years, or 5 years or more before baseline).

**Results**

There were 502,221 participants (273,136 women, mean age 57 years; 229,085 men, 58 years). DM1 was recorded in 0.3% of women and 0.4% of men, and DM2 in 3.2% and 6.5% respectively. Both types were associated with increased risk of fracture, independent of covariates [DM1, IRR: 2.80(95%CI:1.89,4.15); DM2: 1.31(1.09,1.57)]. Associations were similar by sex. The fracture association for DM2 differed according to duration of disease, with duration of five years or more being a risk factor [IRR: 2.75(1.10,6.87)] but duration of less than five years appearing possibly protective [0.42(0.16,1.09)]. The presence of microvascular DM complications was predictive of greater fracture risk [DM with complications vs without complications, IRR 2.31(1.91,2.79)]. This association was similar by diabetes type, and demonstrated a dose effect by number of complications.

**Conclusions**

Diabetes mellitus is associated with increased risk of fracture, with the quantum of effect being greater for type 1 than type 2 DM. Associations were at least partly independent of traditional risk factors, adiposity, BMD and CRP. Type 2 DM appeared protective in early disease, but a risk factor for fracture with longer disease duration, with diabetic complications in both types associated with increased fracture risk. This work was undertaken using the UK Biobank resource under approved application 3593.

## OC11 HEALTH-RELATED QUALITY OF LIFE IN SARCOPENIA: A SYSTEMATIC REVIEW AND META- ANALYSIS

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### Background

The decrease of physical abilities and functional decline that can be caused by musculoskeletal disorders as sarcopenia, can lead to a higher level of dependence and disabilities. Therefore, it may influence patient reported outcome measures (PROM), such as the health-related quality of life (HRQoL). The purpose of this systematic review and meta-analysis is to provide an exhaustive view on the relationship between sarcopenia and HRQoL.

### Methods

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were followed through the whole process of this work. A protocol was previously published on PROSPERO. The electronic databases MEDLINE, Scopus, Allied and Complementary Medicine (AMED), EMB Review – ACP Journal Club, EBM Review- Cochrane Central of Register of Controlled Trials and APA PsychInfo were searched up to October 2022 for observational studies reporting a HRQoL assessment in both sarcopenic and non-sarcopenic individuals. Study selection and data extraction were carried out by two independent researchers. Meta-analysis was performed with a random effect model giving an overall standardized mean difference (SMD) and its 95% confidence interval (CI) between sarcopenic and non-sarcopenic. Quality of individual studies was measured using the Newcastle Ottawa Scale and strength of evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) tool.

### Results

The search strategy identified 3,725 references from which 43 observational studies were eligible and included in this meta-synthesis study. A significant lower HRQoL was observed for sarcopenic individuals compared to non-sarcopenic (SMD -0.76; 95%CI -0.95; -0.57). Significant heterogeneity was associated with the

model ( $I^2=93%$ , Q test  $<0.01$ ). Subgroups analysis showed that the specific questionnaire SarQoL discriminates better sarcopenia in regards of HRQoL (SMD -1.09; 95%CI -1.44; -0.74 versus -0.49; 95%CI -0.63; -0.36 with generic tools; p-value for interaction  $<0.01$ ). A higher difference of HRQoL between sarcopenic and non-sarcopenic was found for individuals residing in living home cares compared to community-dwelling individuals (p-value for interaction  $<0.001$ ). No differences between age, diagnostic techniques, and continents/regions were found. Level of evidence was rated as moderate using GRADE assessment.

### Conclusions

This systematic review and meta-analysis combining 43 observational studies demonstrates that HRQoL is significantly reduced in sarcopenic patients. Using disease-specific HRQoL instruments may better discriminate sarcopenic patients in regards of their quality of life.

## OC12 DYNAPENIC ABDOMINAL OBESITY AND SUSCEPTIBILITY TO FALL: A PROSPECTIVE ANALYSIS OF THE OSTEOARTHRITIS INITIATIVE

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**Objectives:** The prediction of the risk of falling remains a challenge in geriatric medicine and the identification of new potential reversible risk factors is a public health priority. In this study, we aim to investigate the association between DAO (dynapenic abdominal obesity) and incident falls in a large sample of older people with knee OA (osteoarthritis) or at high risk for this condition, over eight years of follow-up.

**Material and methods:** DAO was defined using a waist circumference more than 102 cm in men and 88 cm in women and a concomitant presence of dynapenia, defined as a time over 15 second in the five times chair stands time. Falls, during follow-up, were recorded using self-reported information in the previous year. A logistic binary regression analysis was run, adjusted for potential confounders at the baseline, reporting the data as odds ratios (ORs) with their 95% confidence intervals (CIs).

**Results:** Overall, 3,844 subjects were included, majority of whom had abdominal obesity. Across the 8 years of follow-up, 2,695 participants fell vs. 1,149 not reporting any fall. Taking those without DAO as reference, the presence of only dynapenia was not associated with risk of falls (OR=1.18; 95%CI: 0.73-1.91; p=0.50), whilst the presence of abdominal obesity (OR=1.30; 95%CI: 1.09-1.56; p=0.004) and DAO (OR=1.31; 95%CI: 1.01-1.73; p=0.04) were significantly associated with a higher risk of incident falls.

**Conclusions:** DAO significantly increased risk of falls as well as the presence of abdominal obesity.

## OC13

**SARCOPENIA DEFINITIONS AND THEIR ASSOCIATION WITH FRACTURE RISK IN OLDER SWEDISH WOMEN. THE SAHLGRENKA UNIVERSITY HOSPITAL PROSPECTIVE EVALUATION OF RISK OF BONE FRACTURES (SUPERB) STUDY**

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**Objective**

To investigate the prevalence and predictive value of three sarcopenia definitions for fracture risk over and above that provided by FRAX clinical risk factors (CRFs), including femoral neck (FN) BMD T-score, in a population of older Swedish women.

**Material and Methods**

Overall, 3028 women 75-80 years old were included in the SUPERB cohort. Complete data on sarcopenia components were available in 2883 women. Sarcopenia was defined based on the Sarcopenia Definitions and Outcomes Consortium (SDOC) (low handgrip strength and gait speed), the revised European Working Group on Sarcopenia in Older People (EWGSOP2), and the Asian Working Group for Sarcopenia (AWGS) (low appendicular lean mass index (ALMI) and hand grip strength). Femoral neck BMD T-score was obtained from dual-energy X-ray absorptiometry. All fractures confirmed by X-ray or medical record review were subsequently categorized as major osteoporotic fractures (MOF) and hip fractures and deaths were verified through regional registers. Cox regression (hazard ratios (HR) and 95% confidence intervals (CI)) analyses were performed with adjustment for age, fracture risk assessment (FRAX) variables, and FN BMD T-score.

**Results**

The prevalence of sarcopenia was 12% (n=360) according to EWGSOP2, 10% (n=296) for AWGS, and 4% (n=129) defined by SDOC. Sarcopenia according to EWGSOP2 and AWGS was not associated with an increased fracture risk or mortality in models adjusted for FRAX CRFs and FN T-score. Individuals with sarcopenia defined by SDOC had a higher mortality risk (HR 3.41; 95% CI: 2.51, 4.62) and a higher risk for any fractures (HR 1.48; 95% CI: 1.10, 1.99) and MOF (HR 1.42; 95% CI: 1.03, 1.98) but not for hip fractures (HR 1.51; 95% CI: 0.83, 2.76) compared with individuals without sarcopenia after adjusting for FRAX CRFs and FN T-score.

**Conclusion**

These findings suggest that incorporating sarcopenia defined by SDOC improves fracture prediction, but its low prevalence limits its clinical utility.

## OC14

**PREDICTORS OF 8-YEAR SURVIVAL IN NURSING HOMES: RESULTS FROM THE SENIOR COHORT.**

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**Objective:** Although some studies have investigated risk factors for death in nursing homes, they have tended to be limited to short-term observations and focused on a few risk factors. The aim of this study is to identify factors which are predictive of 8-year survival in nursing homes.

**Methods:** The study used the baseline measurements from the SENIOR (Sample of Elderly Nursing home Individuals: An Observational Research) cohort collected in 2013-2014, which included clinical assessments (i.e., body composition, nutritional status, physical performance, level of dependence and cognition, frailty status). Demographic information, number of medications and medical history were collected from the patients' medical records. Mortality data were collected annually for 8 years, with a final collection in 2022. Potential predictive factors for survival were first assessed in univariate analyses and significant variables were then entered into a stepwise proportional hazards regression model.

**Results:** Of the 662 participants enrolled in the cohort, 58 (8.8%) were lost to follow-up due to the withdrawal of 2 nursing homes and 71 (10.7%) had no mortality data available (i.e., relocation, refusal to continue the study). Among the 533 patients included in the study, 422 (79.2%) died and 111 (20.8%) were still alive in 2022. Median survival time from enrolment in the cohort was 4 years (1.93-6.94). Multivariate regression showed that younger age (HR =1.04 (1.03-1.06)), higher BMI (HR =0.96 (0.94-0.98)), higher MMSE score (HR =0.97 (0.94-0.99)) and higher SPPB score (HR =0.93 (0.90-0.97)) were protective factors against mortality. **Conclusion:** In addition to age, which is a non-modifiable risk factor, our study shows that certain modifiable factors related to physical or mental health contribute to increased survival in nursing homes. Acting on these factors therefore appears to be a public health priority.

## OC15

### THE ASSOCIATIONS BETWEEN OSTEOSARCOPENIA AND FALLS, FRACTURES, AND FRAILITY IN OLDER ADULTS: RESULTS FROM THE CANADIAN LONGITUDINAL STUDY ON AGING (CLSA)

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**Objective:** To explore if older adults with osteosarcopenia are at greater risk for falls, fractures, frailty, and worsening satisfaction with life, activities of daily living (ADL) and physical function compared to those with normal bone mineral density (BMD) and without sarcopenia.

**Material and Methods:** Among Caucasian participants aged 65 years or older at the Canadian Longitudinal Study on Aging (CLSA) 2015 baseline comprehensive interview, those who completed the physical measurements at baseline and a 3-year follow-up were included for analysis. Osteopenia/osteoporosis was defined as BMD T-score below -1 standard deviation (SD) according to the World Health Organization definition, and sarcopenia was defined as low grip strength and/or low gait speed according to the definition of Sarcopenia Definition Outcomes Consortium. Osteosarcopenia was when osteopenia/osteoporosis and sarcopenia co-existed. Self-reported incident falls and fractures were measured as any in the last 12 months before 3-year follow-up. Frailty was measured through the Rockwood Frailty Index (FI); satisfaction with life through the satisfaction with life scale (SWLS); ADL through the Older American Resources and Services (OARS) modules; physical function through Timed up and Go (TUG), chair rise, and standing balance test. Multivariable logistic and linear regression, including subgroup analyses by sex, were conducted.

**Results:** The sample of 8,888 participants (49% females) had a mean age (SD) of 72.7 years (5.6). At baseline, neither osteopenia/osteoporosis nor sarcopenia was present in 30.1%, sarcopenia in 18.4%, osteopenia/osteoporosis in 29.2%, and osteosarcopenia in 22.3%. Osteosarcopenia was not significantly associated with self-reported incident falls and fractures in all participants, while males had a higher adjusted odds of self-reported incident falls and fractures (adjusted OR 1.79, 95% CI 1.08-2.97; adjusted OR 2.77, 95% CI 1.15-6.68, respectively). Participants with osteosarcopenia had worsening in their FI and ADL of 0.133 and 0.153, respectively, per one SD increment after adjustment. In addition, they experienced a decrease in their SWLS score by 0.148 per one SD increment and balance test time by 1.089 seconds. Results for the TUG and chair rise test were not significant across all four groups.

**Conclusions:** Osteosarcopenia was associated with self-reported incident falls and fractures in males, and worse frailty, ADLs, satisfaction with life and standing balance in all participants.

## OC16

### MUSCLE SIZE AND DENSITY ARE INDEPENDENTLY ASSOCIATED WITH DEATH AFTER HIP FRACTURE: A PROSPECTIVE COHORT STUDY

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**Objective:** Mortality following hip fracture is high and incompletely understood. This study aims to investigate the associations of hip muscle area and density from hip CT with death following hip fracture as well as to assess the dependence of this association on time after hip fracture.

**Materials and Methods:** In this secondary analysis of the prospectively collected CT images and data from The Chinese Second Hip Fracture Evaluation, 459 patients were enrolled between May 2015 and June 2016, and followed up for a median time of 4.5 years. Muscle cross-sectional area and density were measured of the gluteus maximus (G.MaxM) and gluteus medius and minimus (G.Med/MinM) and aBMD of the proximal femur. Goutallier classification (GC) was used for qualitatively assessing muscle fat infiltration. Separate Cox models were used to predict mortality risk adjusted for covariates.

**Results:** At the end of the follow-up, 81 patients (64% women) had died and 293 survived (71% women). The mean age of non-surviving patients at death (82.0±8.1 years) was higher than that of the surviving patients (74.4±9.9 years). The cumulative survival was significantly lower for patients with low G.MaxM area and density, and low G.Med/MinM density independent of age and clinical risk scores. The GC grades were not associated with the mortality after hip fracture. Muscle density of both G.MaxM (adj. HR 1.83; 95% CI, 1.06-3.17) and G.Med/MinM (adj. HR 1.98; 95% CI, 1.14-3.46) were associated with mortality in the 1st year after hip fracture. G.MaxM area (adj. HR 2.11; 95% CI, 1.08-4.14) was associated with mortality in the 2nd and later years after hip fracture. **Conclusion:** Our results for the first time show that hip muscle size and density are associated with mortality in older hip fracture patients independent of age and clinical risk scores. This is an important finding to better understand the factors contributing to the high mortality in older hip fracture patient and to develop better future risk prediction scores that include muscle parameters.

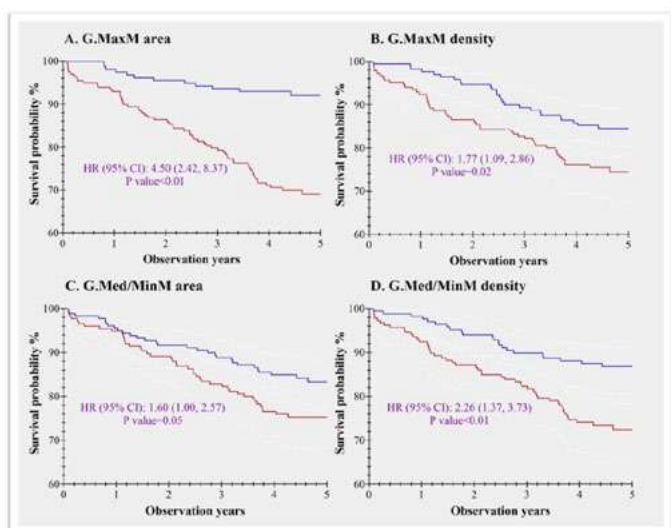


Fig. 1 Kaplan–Meier curves for probability of death by low (red line) vs. high (blue line) parameter values using median as cut-points. (A) G.MaxM area, (B) G.MaxM density, (C) G.Med/MinM area, (D) G.Med/MinM density. CI, confidence interval; HR, hazard ratio.

OC17

**A PHASE 2, 104-WEEK STUDY OF REPEAT LORECIVINT INJECTIONS EVALUATING SAFETY, EFFICACY, AND BONE HEALTH UTILIZING QUANTITATIVE COMPUTED TOMOGRAPHY (QCT) IN KNEE OSTEOARTHRITIS (OA-06)**

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**Background/Purpose:** Knee osteoarthritis (OA) is a common painful joint disorder. Lorecivint (LOR), an intra-articular (IA) CLK/DYRK inhibitor thought to modulate Wnt and inflammatory pathways, is a potential knee OA treatment. The primary objective of this 104-week trial was to assess the safety of repeat 6-month LOR dosing (OA-06, NCT03727022) while characterizing juxta-articular and regional bone health.

**Methods:** Participants with ACR-defined OA, aged 40-80, and Kellgren-Lawrence (KL) grades 2-3 were randomized 1:1 to receive 2mL IA injections 0.07 mg LOR or placebo (PBO) at 6-month intervals (4 injections total). The trial was conducted in two 52-week phases, part A (week 0 - 52) and part B (week 53 - 104). General safety was assessed by physical examinations, clinical laboratory tests, collection of adverse events (AEs), and serious AEs (SAEs). Bone safety was assessed by quantitative computed tomography (qCT) with phantom calibration to assess BMD in target and non-target knees, bone and cartilage biomarkers, and dual energy x-ray absorptiometry (DXA) to assess spine and hip BMD. Exploratory efficacy was assessed by patient-reported outcomes

(PROs). For bone imaging endpoints, change from baseline was estimated using baseline-adjusted ANCOVA.

**Results:** 101 participants (mean 60.9±9.1 years, BMI 28.6±3.7 kg/m<sup>2</sup>, female 59.4%, KL2 52.5%) enrolled. Baseline imbalances existed in sex (PBO 68.0% vs. LOR 51.0% female), KL grade (PBO 62.0% vs LOR 42.1% KL 2), and site randomization. 77 participants completed part A and 53 completed part B. AE rates were similar between PBO and LOR, and no SAEs were deemed treatment related. There were no bone health clinical signals, with no fractures, accelerated OA, or osteoporosis. Observed target knee qCT BMD values were similar between LOR and PBO (Fig. 1). Repeated injection did not appear to affect BMD rate of change. No meaningful differences were seen in target knee BMD in female and age [65-80], nor in total hip or spine BMD between the LOR and PBO treatment. There were no meaningful differences in PRO between LOR and PBO.

**Conclusions:** The incidence of AEs was similar between treatment groups and not affected by repeated injections of LOR. Multiple injections of LOR over 2 years did not appear to lead to any bone health adverse effects locally around the knee or regionally at spine or hip.

Figure 1. Total Target Knee BMD over 104 weeks

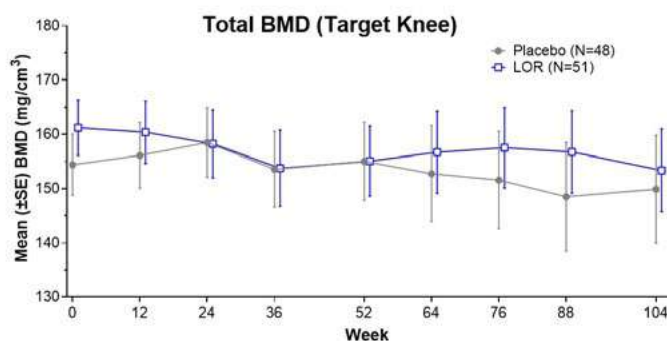


Table 1A and 1B.

	Phase A		Phase B		
	#Events/ #Subjects Reporting	LOR (N=50)	PBO (N=51)	LOR (N=33)	PBO (N=32)
Adverse Events	52/25	52/24	19/8	15/11	
SAEs	5/2	3/2	2/2	0/0	
Target-Knee AEs	7/6	4/3	2/1	0/0	

## OC18

### PREDICTION OF KNEE OSTEOARTHRITIS CARTILAGE VOLUME LOSS OVER TIME WITH BASELINE BONE CURVATURE REGIONS AS THE BIOMARKERS. USAGE OF MACHINE LEARNING

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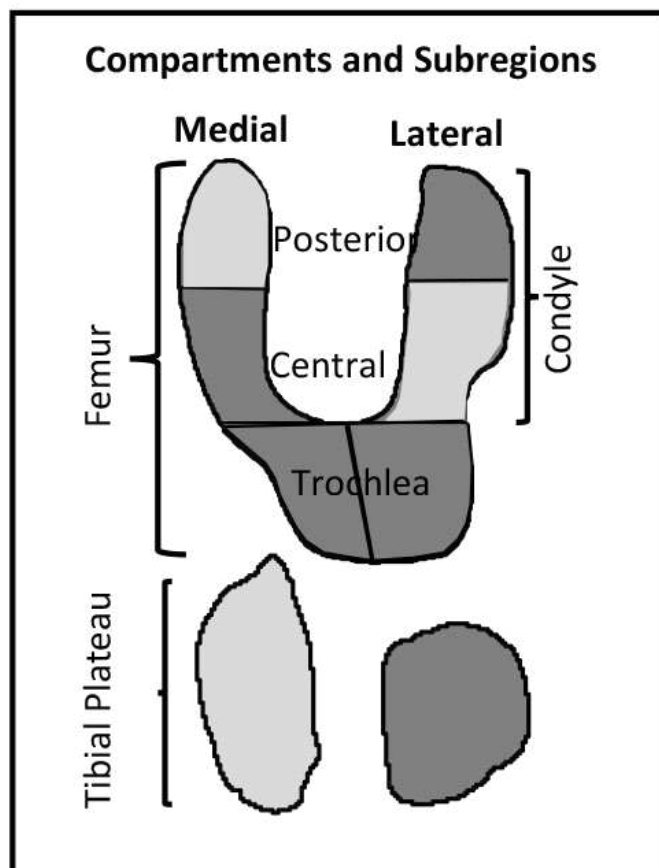
**Objective:** Osteoarthritis (OA) is the most prevalent musculoskeletal disease. Its diagnosis often occurs late: when the destruction of articular tissues has reached a late stage. To combat the rise of OA, there is a critical need to identify, at an early stage, individuals at risk of having a structurally progressive disease, i.e., rapid degradation of cartilage. This study aimed to develop, using machine learning, an automated and gender-based model using knee bone curvature values at baseline to predict an individual's cartilage volume loss at one year.

**Methods:** Participants were from the Osteoarthritis Initiative cohort (n=1246). Bone curvature and cartilage volume assessments were performed using automated magnetic resonance imaging systems. Variables included age, body mass index, and baseline values of eight bone curvature regions. The outcome consisted of cartilage volume loss at one year in 12 global/regional regions. Five machine learning were assessed; ANFIS was chosen for model development. The best variable combination was selected using a systematic controllability variable reduction. Performance evaluation uses three statistical indices: correlation coefficient (R), root mean square error, and mean absolute error. Validation was performed using OA patients from a clinical trial.

**Results:** Data revealed that knee cartilage volume loss at one year could be predicted in the 12 cartilage regions studied using five baseline bone curvature region values, including the lateral tibial plateau, medial central condyle, lateral posterior condyle, and lateral and medial trochlea (Figure 1), with very good accuracy for both genders (R, 0.92-0.79). Validation demonstrated that generalization was attained for both genders in all studied cartilage regions (R, 0.96-0.78), except in the medial tibial plateau for women.

**Conclusion:** We demonstrated, for the first time, a reliable and generalizable gender-based machine learning model to predict, in OA patients, global and regional cartilage volume loss at one year based on five bone curvature regions at baseline. This study offers a novel system for forecasting knee OA cartilage degradation as a major step toward precision medicine. Such a model will significantly improve clinical prognosis with real-time patient monitoring.

**Figure 1.** Representation of the knee bone curvature regions (dark) for the best prediction model



## OC19

### NEW BIOMARKERS IN HAND OSTEOARTHRITIS: THE MICRO-RNAS

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**Objectives:** Hand osteoarthritis (HOA) is a highly prevalent disease, associated with important disability and socio-economic burden. Erosive HOA, almost exclusively found in women, induces more disability, but the pathophysiology is poorly known. Susceptibility genes identified to date only explain a minor proportion of the risk. We have hypothesized that epigenetic processes could play a role and we focused on micro-RNAs, which are small non-coding RNAs interfering with messenger RNAs, leading to their repression or destruction, as potential regulators involved in the pathophysiology of HOA.

**Material And Methods:** We have assessed HOA status according to ACR criteria for HOA in 1189 post-menopausal women (the QUALYOR Study). We have studied the micro-RNA signature in two steps. First, in the screening phase, we have measured in blood samples the 768 most-described micro-RNAs using Taqman Low

Density Array cards (TLDA) after RNA extraction, micro-RNAs reverse transcription and pre-amplification, in 3 different groups: 10 patients with erosive HOA (at least 3 erosive joints), 10 patients with symptomatic HOA without erosions and 10 controls without HOA matched for age and BMI. We have pairwise compared each micro-RNA expression level between HOA groups using Wilcoxon test. The p-values were corrected for false discovery rate (FDR) with the Benjamini-Hochberg method and were considered significant for values <0.05. In a second step, we have validated the micro-RNAs identified at the screening phase in larger samples (60 patients with erosive HOA and 60 patients without HOA).

**Results:** We have first compared micro-RNAs expression levels between the erosive HOA group and controls. After exclusion of micro-RNAs weakly expressed and those that do not segregate clearly between groups, we have identified 15 down-regulated micro-RNAs and 4 up-regulated micro-RNAs. Among these, 7 micro-RNAs (miR 373-3p, miR 558, miR 607 and miR 653-5p and miR 142-3p, miR 144-3p and miR 34a-5p) were previously described in chondrocytes homeostasis or osteoarthritis. We have then compared micro-RNAs expression level between erosive HOA and non-erosive HOA but did not find any significant difference, possibly suggesting that even if these two HOA phenotypes are clinically different, some of the pathophysiological mechanisms might be shared. In the validation phase, we have confirmed that microRNA 196-5p (down regulated) identified at the screening phase was significantly down-regulated in patients with erosive HOA compared to patients without HOA.

**Conclusion:** We have evaluated for the first time in HOA the micro-RNA signature. Micro-RNA 196a-5p has been implicated in osteoblast differentiation. Down regulation of this micro-RNA could be involved in the decrease bone turnover we observe in late stage osteoarthritis. In conclusion, this micro-RNA signature could become a biomarker of interest and could help better understanding the pathophysiology.

## OC20

### BURDEN OF OSTEOARTHRITIS IN CHINA FROM 1990 TO 2019 AND PREDICTIONS OF THE BURDEN IN FUTURE 25 YEARS: FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY 2019

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**Objective:** China has the world's largest population and highest prevalence of osteoarthritis (OA), accompanying by a rapidly ageing and increasingly obese population<sup>1-3</sup>. However, the disease burden and secular trend of OA in China have not been well described nor predicted.

**Material and Methods:** Data from the Global Burden of Disease

(GBD) Study 2019 were used to estimate the incidence, prevalence, disability-adjusted life years (DALYs) and the related age-standardized rates (ASRs) of OA, as well as the burden of OA due to a high body mass index (BMI). The estimated annual percentage change (EAPC) and Norpred age-period-cohort model were used to describe the temporal trend changes and predict the future disease burden.

**Results:** The prevalence of OA in China increased from 51.76 million in 1990 to 132.81 million in 2019. From 1990 to 2019, the ASR of OA incidence increased from 472.53/100,000 to 509.84/100,000, with an EAPC of 0.36 (0.29-0.44); the ASR of OA prevalence increased from 5880.58/100,000 to 6330.06/100,000, with an EAPC of 0.35 (0.28-0.42), and the ASR of OA DALYs increased from 206.38/100,000 to 224.78/100,000, with an EAPC of 0.40 (0.32-0.48). The ASR of OA DALYs attributed to high BMI increased rapidly from 1990 to 2019, especially in males and hip OA patients (Table). The projections suggested that there will be an increasing trend in the incidence (male 27.92%; female 15.51%), prevalence (male 71.08%; female 50.30%) and DALYs (male 71.93%; female 50.02%) of OA from 2020 to 2044, and the prevalence and DALYs of OA in China would increase by approximately 1.5 times in future 25 years (Figure).

**Conclusions:** The disease burden of OA has increased in China in the past 30 years and will continue to rise over the next 25 years. Therefore, prevention and early intervention are pivotal to mitigating the growing burden of OA.

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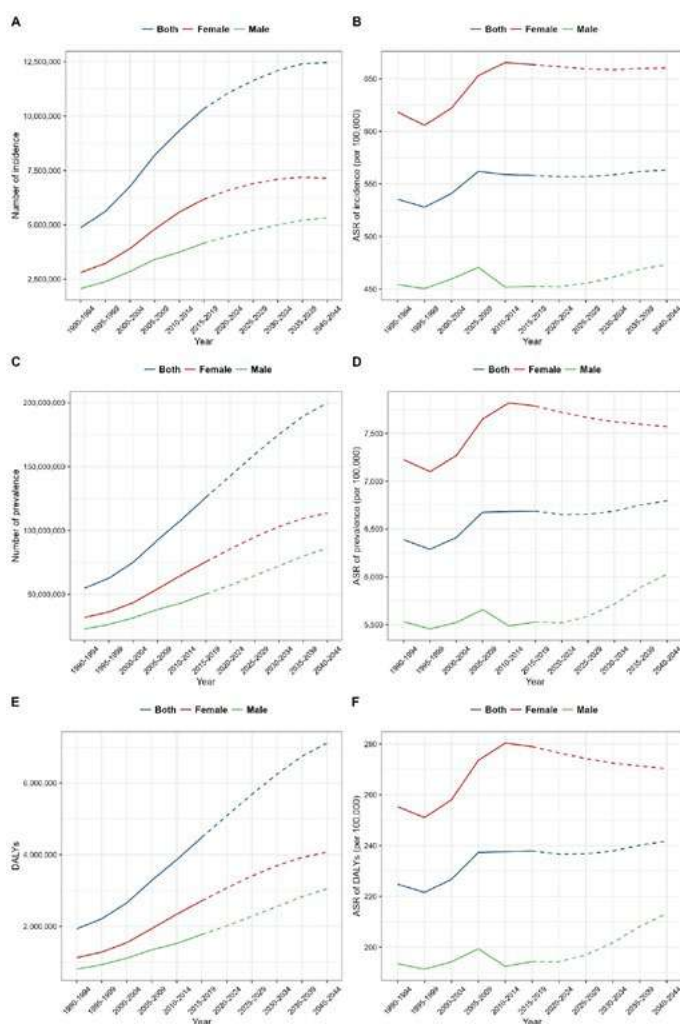
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**Disclosure of Interests:** None declared.

**Table.** DALYs for all age and ASR due to a high BMI for OA in 1990 and 2019 and the percentage change as well as EAPC from 1990 to 2019 for China.

Site of OA	Sex	DALYs due to a high BMI						
		1990 (95% UI)		2019 (95% UI)		Percentage change		EAPC (95% CI)
		All age	ASR (per 100,000)	All age	ASR (per 100,000)	Count	ASR	
All OA	Both	99196.59 (16850.73, 280351.94)	10.94 (1.84, 30.78)	557902.37 (165070.11, 1343750.30)	25.99 (7.67, 62.55)	462.42	137.65	3.40 (3.26-3.54)
	Male	33196.90 (4882.35, 105084.82)	7.18 (1.05, 22.89)	193070.45 (51904.58, 471633.14)	18.18 (4.89, 44.53)	481.59	153.04	3.60 (3.42-3.78)
	Female	65999.69 (10513.94, 189125.01)	14.64 (2.32, 42.05)	364831.92 (94116.42, 879733.35)	33.52 (8.69, 80.82)	452.78	128.94	3.28 (3.14-3.41)
Knee OA	Both	98081.84 (16592.36, 275584.20)	10.81 (1.81, 30.43)	549963.53 (162522.40, 1325608.31)	25.61 (7.54, 61.65)	460.72	136.87	3.39 (3.24-3.53)
	Male	32655.59 (4805.87, 103252.26)	7.06 (1.03, 22.42)	189048.55 (50146.92, 463413.06)	17.79 (4.73, 43.87)	478.92	151.81	3.58 (3.4-3.76)
	Female	65426.25 (10373.35, 187931.73)	14.51 (2.29, 41.79)	360914.98 (93113.14, 869492.52)	33.15 (8.55, 79.85)	451.64	128.42	3.27 (3.14-3.4)
Hip OA	Both	1114.76 (179.91, 3521.08)	0.12 (0.02, 0.39)	7938.84 (2173.03, 21603.45)	0.38 (0.11, 1.03)	612.16	205.59	4.14 (4.02-4.26)
	Male	541.32 (78.08, 1832.14)	0.12 (0.02, 0.40)	4021.90 (996.68, 10699.58)	0.39 (0.10, 1.04)	642.98	224.98	4.32 (4.21-4.44)
	Female	573.44 (92.00, 1727.13)	0.13 (0.02, 0.39)	3916.94 (1045.57, 10410.57)	0.37 (0.10, 0.98)	583.06	187.39	3.95 (3.84-4.07)

DALYs, disability-adjusted life years; ASR, age-standardized rate; BMI, body mass index; OA, osteoarthritis; 95% UI, 95% uncertainty interval; EAPC, estimated annual percentage change; 95% CI, 95% confidence interval.



**Figure.** Prediction of number (A) and ASR (B) of incidence, number (C) and ASR (D) of prevalence, number (E) and ASR (F) of DALYs in OA by sex in China from 1990 to 2044. The solid lines indicate the observed values (1990 to 2019), and the dashed lines are the predicted values (2020 to 2044). ASR, age-standardized rate; DALYs, disability-adjusted life years; OA, osteoarthritis.



## OC21

### FUNCTIONAL PERFORMANCE OUTCOMES AT 1-YEAR FOLLOW-UP AFTER TREATMENT OF KNEE OSTEOARTHRITIS: COMPARISON BETWEEN PLATELET-RICH PLASMA INJECTION AND ORAL PATENTED CRYSTALLINE GLUCOSAMINE SULFATE: PROPENSITY SCORE MATCH PAIR ANALYSIS

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**Objectives:** The objective of this study compares the functional performance outcomes at 1-year follow-up between Platelet-Rich Plasma (PRP) Injection and Oral Patented crystalline glucosamine sulfate (pCGS) treatment in Knee Osteoarthritis (OA).

**Material and Methods:** Knee OA patients who treated with PRP injection or oral pCGS at the Orthopaedics clinic was collected the functional performance outcomes including Five-time sit-to-stand test (5xSST), time up and go test (TUGT), and 3-minute walk distance test (3MWD). The propensity score match pair was analyzed with a ratio of 2:1 (pCGS: PRP). Match pair parameters are age, gender, height, weight, BMI, and Kellgren and Lawrence (KL) classification. The functional performance outcomes were compared between the two groups at baseline (pretreatment), 6 weeks, 12 weeks, 24 weeks, and 1-year follow-up.

**Results:** There were 102 patients in the PRP group and 204 patients in the pCGS group. Comparing both groups, all functional performance outcomes were improved at 1-year follow-up in both groups (PRP: 5xSST: 19.3 vs 14.8 sec,  $p < 0.001$ , TUGT: 9.0 vs 7.4 sec,  $p < 0.001$ , 3MWD: 159.6 vs 179.7 m,  $p < 0.001$ , and pCGS: 5xSST: 17.0 vs 14.6 sec,  $p < 0.001$ , TUGT: 8.3 vs 7.2 sec,  $p < 0.001$ , 3MWD: 178.9 vs 186.9 m,  $p < 0.001$ , baseline vs 1-year follow-up). At 1-year follow-up, 5xSST and 3MWD were significantly improved in the pCGS group compared to the PRP group (14.6 vs 14.8 sec,  $p 0.002$ , 186.9 vs 179.7 m,  $p 0.001$ ) meanwhile The TUGT was no significant difference (7.2 vs 7.4 sec,  $p 0.13$ ).

**Conclusions:** This study showed that PRP and pCGS have good efficacy in the treatment of knee OA. All the functional performance outcomes are improved in both methods although it is more improved in the pCGS group than the PRP group.

## OC22

### DIFFERENTIAL EFFECTS ON RISK OF FRACTURE AND DEATH BY SEVERITY OF PRIMARY HYPERPARATHYROIDISM: A DANISH REGISTER STUDY

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#### Objective

We have previously demonstrated that primary hyperparathyroidism is associated with increased risk of fracture and death compared with matched controls. Here we investigated whether these outcomes were associated with severity of disease.

#### Material and Methods

We used Danish hospital records, defining cases as those patients diagnosed with primary hyperparathyroidism (1997-2015). For this analysis, those with parathyroidectomy before or during follow-up were excluded. Severity of hyperparathyroidism was based on 1) ionised calcium concentration (mild: 1.33-1.44mmol/L; moderate: 1.45-1.64mmol/L; severe:  $\geq 1.65$  mmol/L; or total calcium concentration (mild: upper limit normal (ULN) range to 2.76mmol/L; moderate: 2.77-3.02 mmol/L; severe:  $\geq 3.03$  mmol/L); or 2) plasma parathyroid hormone (PTH) concentration (mild:  $< 2 \times \text{ULN}$ ; moderate: 2-3xULN; severe:  $> 3 \times \text{ULN}$ ). All were followed from index date to death, emigration or 29/11/2017. Incident major osteoporotic fractures were identified via ICD codes. An extended Poisson regression method was used to calculate the hazard ratio for fracture or death (and corresponding 10-year fracture probability) by category of disease severity.

#### Results

After adjustment for sex, current age, current time since index date and calendar year, amongst the 2698 conservatively treated cases (mean age 72.3 years; 19.3% male), there was no association between either measure of disease severity and fracture risk. Conversely, there was a significant increase in the risk of death for each higher category of hypercalcaemia (HR: 1.31; 95%CI:1.20,1.45) and for each higher category of PTH (HR: 1.27; 95%CI:1.17,1.37). As a result of this disparity, 10-year fracture probability tended to decrease with increasing severity of disease. For example, for a woman with primary hyperparathyroidism at the age of 70 years, the 10-year probability of a major osteoporotic fracture in the highest thirds of PTH and calcium concentration was 12.8%; whereas in the lowest third of both it was 17.3%.

#### Conclusions

Risk of fracture is increased in primary hyperparathyroidism, regardless of severity, suggesting that parathyroidectomy in mild cases may warrant further consideration. The impact of mortality on fracture probability has important implications for FRAX.

OC23

**THE IMPORTANCE OF RECENT PREVALENT FRACTURE SITE FOR IMMINENT RISK OF FRACTURE – A RETROSPECTIVE, NATIONWIDE COHORT STUDY OF OLDER SWEDISH MEN AND WOMEN**

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**Background**

There is limited evidence regarding which fracture types confers the highest risk for subsequent fracture. The aim of the present study was to investigate how the risk of imminent fracture depends on index fracture site.

**Methods**

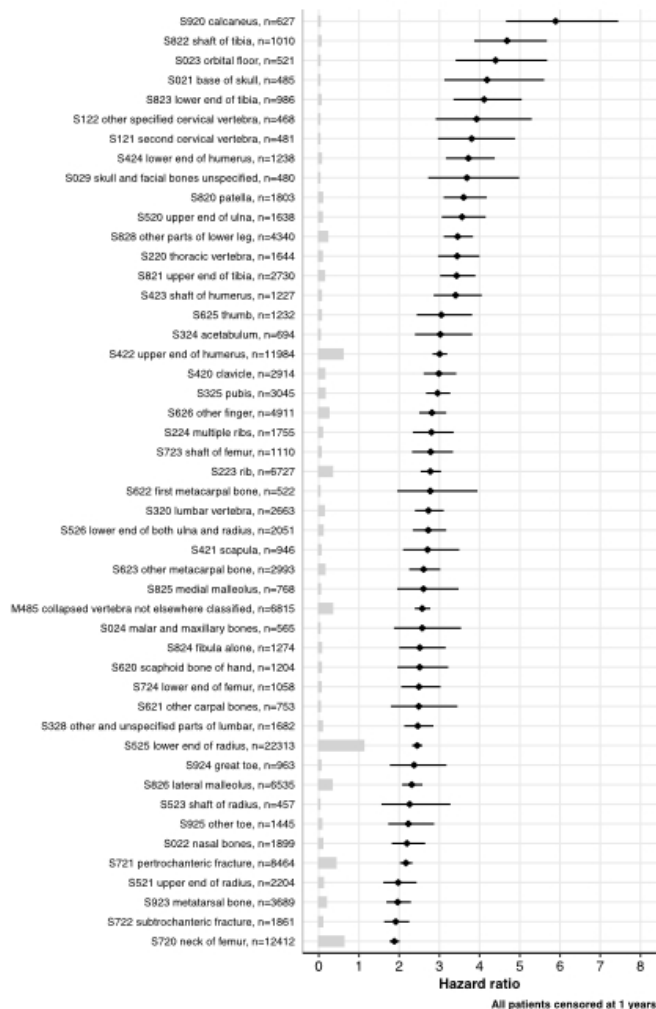
This nation-wide retrospective cohort study utilized national registers in Sweden to determine the risk of fracture according to recent ( $\leq 2$  years) index fracture site, and according to an old ( $> 2$  years) prevalent fracture, compared to the risk observed in controls a without fracture. All Swedes 50 years or older between 2007-2010 were included in the study. Patients with a recent fracture were designated a specific fracture group depending on type of previous fracture. Recent fractures were classified as major osteoporotic fracture (MOF, including fractured hip, vertebra, proximal humerus, wrist) or non-MOF. Patients were followed until 2017-12-31, censored for death and migration, and the risk of any fracture and hip fracture was assessed.

**Results**

A total of 3,423,320 persons were included in the study, 70,254 with a recent MOF, 75,526 with a recent non-MOF, 293,051 with an old fracture and 2,984,489 persons with no previous fracture. The median time of follow-up for the four groups was 6.1 (IQR 3.0-8.8), 7.2 (5.6-9.4), 7.1 (5.8-9.2) and 8.1 years (7.4-9.7), respectively. Patients with a recent MOF, recent non-MOF and old fracture had a substantially increased risk of any fracture (hazard ratio (HR) adjusted for age and sex 2.11 (95% confidence interval [CI]), 2.08-2.14), HR 2.24 (2.21-2.27), and 1.77 (1.76-1.78), respectively) compared to controls, associations that were only marginally affected by multivariable adjustment. For all specific fracture diagnoses (ICD-10 four characters), the risk was consistently increased and with follow-up limited to one year, the risk was increased two to six-fold (Figure).

**Conclusion and Relevance**

All recent fractures, MOFs and non-MOFs, as well as older fractures increase the risk of subsequent fracture, suggesting that all recent fractures should be included in fracture liaison services and that case finding strategies for those with older fractures may be warranted in order to prevent subsequent fractures.



OC24

**GEOGRAPHICAL VARIATION IN OSTEOPOROSIS CARE: A LONGITUDINAL ANALYSIS OVER 23 YEARS**

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**Objective**

To determine whether osteoporosis screening, diagnosis and treatment differs between Australian rural areas and cities.

**Material and Methods**

The Australian Longitudinal Study on Women's Health prospectively surveyed women born between 1946–1951, nine times between 1996–2019. Geographic location was classified: major city, inner regional, outer regional or remote. Data from Australian administrative health records were linked to survey data. Generalised estimating equations (GEE) explored longitudinal outcomes of dual X-ray absorptiometry (DXA) rates, osteoporosis, fractures, and osteoporosis treatment (in women with osteoporosis/frac-

ture). Univariable regression and multivariable analysis (variables retained where  $p < 0.2$ ) was performed, and bootstrapping with 100 repetitions at 95% sampling of the original dataset to ensure robust results.

#### Results

13,712 women were included: 5,000 (36.5%) living in a major city, 5,214 (38.0%) inner regional, 2,798 (20.41%) outer regional and 700 (5.1%) remote. Baseline age 47.6(1.46) years [mean(SD)] was similar; but education, marital status, birthplace, smoking, BMI and co-morbidities varied with location ( $p < 0.05$ ). Over 23 years, 8,151 (59.4%) women had DXA, 2,956 (21.6%) were diagnosed with osteoporosis, 3,212 (23.4%) had a fracture, and only 1,638 (32.7%) of those with osteoporosis/fracture had treatment. Using the multivariable model, women in inner regional (OR 0.76; 95%CI 0.70,0.82) and outer regional (OR 0.73; 0.66,0.81) areas were less likely to have DXA than those in major cities. However, rates of osteoporosis, fractures and osteoporosis treatment did not differ by geographic location.

#### Conclusion

DXA screening is lower in regional Australia. Large osteoporosis treatment gaps exist but do not vary by geographic location.

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## OC25

### NUMBER OF PRIOR FALLS AND FRACTURE RISK – POTENTIAL ADJUSTMENT OF CONVENTIONAL FRAX PROBABILITIES

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#### Objectives

Prior falls are known to be associated with increased fracture risk but are not currently directly included in the FRAX® tool. This analysis provides adjustments to FRAX-based 10-year fracture probabilities accounting for the number of prior falls in the previous year.

#### Material & Methods

We studied 21,116 women and men age 40 years or older (mean age  $65.7 \pm 10.1$  years) within the Manitoba BMD clinical registry. All had FRAX probability assessments as well as self-reported falls within the previous year, with complementary information on subsequent fracture and mortality outcomes. The risks of death, hip fracture, and non-hip major osteoporotic frac-

ture (MOF-NH) were determined by Cox proportional hazards regression for fall number category versus the whole population (i.e., an average number of falls). Ten-year probabilities of hip fracture and major osteoporotic fracture (MOF) were determined according to the number of falls from the hazards of death and fracture incorporated into the FRAX model for the UK and used to derive probability ratios (number of falls vs. average number of falls) for adjustment of conventional FRAX fracture probabilities.

#### Results

Compared with the average number of falls, the probability ratios for hip fracture and MOF were lower than unity in the absence of a fall history and increased progressively with an increasing number of reported falls. For example, at the age of 70, the probability ratios were 0.92, 1.19, 1.30 and 1.63 for 0, 1, 2 and 3 or more prior falls in the previous year respectively. Thus, for a UK woman age 70, BMI 24 and a sole risk factor of glucocorticoid use, the MOF probability ranged from 17% to 29% depending on falls history. The probability ratios decreased with age, an effect that was more marked the greater the number of prior falls.

#### Conclusions

The probability ratios provide adjustments to conventional FRAX estimates of fracture probability according to the number of prior falls in the previous year.

## OC26

### PAIN INCREASES THE RISK FOR SARCOPENIA IN COMMUNITY-DWELLING ADULTS: RESULTS FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING

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**Objectives:** Pain and sarcopenia are common in older people. Cross-sectional studies have reported a significant association between these two conditions, but cohort studies exploring pain as potential risk factor for sarcopenia are scarce. Given this background, the aim of the present study was to investigate the association between pain (and its severity) at baseline, and the incidence of sarcopenia over ten years of follow-up in a large representative sample of the English older adult population.

**Material and methods:** Pain was diagnosed using self-reported information and categorized as mild to severe pain at four sites (low back, hip, knee, feet). Incident sarcopenia was defined as having low handgrip strength and low skeletal muscle mass during the follow-up period. The association between pain at baseline and incident sarcopenia was assessed using a logistic regression analysis, and reported as odds ratios (ORs) with their 95% confidence intervals (CIs).

**Results:** The 4,102 participants without sarcopenia at baseline had a mean $\pm$ SD age of  $69.7 \pm 7.2$  years and they were mainly male (55.6%). Pain was present in 35.3% of the sample. Over ten years of follow-up, 13.9% of the participants developed sarcopenia.

After adjusting for twelve potential confounders, people with pain reported a significantly higher risk of sarcopenia (OR=1.46; 95%CI: 1.18-1.82). However, only severe pain was significantly associated with incident sarcopenia, without significant differences across the four sites assessed.

**Conclusions:** The presence of pain, particularly severe pain, was associated with a significantly higher risk of incident sarcopenia.

## OC27

### POCOSTEO: RAPID, COST-EFFECTIVE AND EASY-TO-USE POINT-OF-CARE (POC) DEVICE FOR EARLY DETECTION AND MONITORING OF OSTEOPOROSIS

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Despite the rapidly growing number of osteoporotic cases due to the ageing society, the disease is still underdiagnosed and undertreated, imposing a heavy burden on patients, health systems and society.

To date, there is no simple to use and sufficiently accurate or sensitive tool for the identification and monitoring of treatment for this disease. This is mainly attributable to critical shortcomings in assessment of bone mineral density. Clinical acceptance of bone turnover markers (BTMs) measurements is adversely affected by their lack of widespread accessibility and pre-analytical variability.

The EU-funded H2020 project, PoCOsteo (No. 767325) focused on the development of a Point-of-Care (PoC) solution for real-time monitoring and early diagnosis of high turnover patients at risk of osteoporosis and fracture. The tool consists of a self-contained, single-use lab-on-a-chip cartridge, housing either a multiplex proteomic immunosensor to measure several BTMs, or a genomic sensor to measure multiple single nucleotide polymorphisms (SNPs) linked with bone loss. The assay is completely automated, controlled by a portable read-out device with the only required end-user intervention being addition of a fingerpick blood sample. The results are available in less than 30 minutes.

Both the proteomic and genomic platforms were validated using real patient samples and the results revealed excellent correlation with the gold standards ECLIA and qPCR. The proteomic platform achieved detection limits of 0.73 pg/mL for CTx (coefficient

of variation (CV%): 1.1 – 5.1) and 0.86 µg/mL for P1NP (CV%: 1.5 – 8.6), respectively. The blood level readings of the proteomic markers were then adjusted based on a modeling equation, addressing the effect of fasting, circadian rhythm and certain underlying diseases on the BTMs. This reduces the pre-analytical variability significantly.

We believe this tool can help physicians deliver personalized care, revolutionize the treatment monitoring process in order to provide a more efficient treatment rather than the one-fit-all approach and improve the patient's compliance to treatment, the most important reason for undertreatment in these individuals.

## OC28

### MUSCULOSKELETAL FUNCTIONAL ABILITY AND STRENGTH IN SUB-SAHARAN AFRICA (THE MUFASSA STUDY): DETERMINING SARCOPENIA PREVALENCE IN SOUTH AFRICA, THE GAMBIA AND ZIMBABWE

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**Objective:** To determine sarcopenia prevalence in women and men aged 40 years and above in three African countries at different stages of epidemiological transition.

**Methods:** Population-based samples sex- and age stratified were recruited in South Africa (n=825), Zimbabwe, (n=885) and The Gambia (n=698). All participants had hand grip strength, gait speed, sit-to-stand time and balance measured as part of the Short Physical Performance Battery (SPPB). Prevalence of sarcopenia was defined by the modified Sarcopenia Definition and Outcomes Committee<sup>1</sup>; men: grip strength<35.5kg and gait speed <1.0m/s; women: <20kg & <1.0m/s). Differences between groups were tested using T-tests, Mann-Whitney-U and chi-squared tests.

**Results:** Sarcopenia was more prevalent in men than in women in

all three countries, and those with sarcopenia were older (Table). There were significant differences in age, sit to stand and overall SPPB, with those with sarcopenia being older, with consistently lower physical performance measures than those without sarcopenia ( $P < 0.01$ ).

**Conclusion:** Sarcopenia prevalence was low in women which contrasts with other populations. In men findings were similar to those previously reported in The Gambia <sup>2</sup>, but higher than those reported in US and European populations<sup>1</sup>. There is a need for further validation to test appropriateness of existing and context-specific thresholds through testing against physical function, disability, falls outcomes.

References:

<sup>1</sup> Westbury et al. J Cachex Sarc Musc 2023 <https://doi.org/10.1002/jcsm.13160>

<sup>2</sup> J Cachexia Sarcopenia Muscle. 2018 Oct;9(5):920-928. doi: 10.1002/jcsm.12341. Epub 2018 Sep 16.

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Table 1. Descriptive statistics of those with and without sarcopenia.

	The Gambia		Zimbabwe		South Africa	
	Sarcope- nia (n=77)	No sarcope- nia (n=621)	Sarcope- nia (n=117)	No sarcope- nia (n=768)	Sarcope- nia (n=153)	No sarcope- nia (n=672)
<b>Age*</b>	70 [62 - 77]	56 [49 - 70]	78 [70 - 85]	56 [48 - 67]	65 [56 - 74]	56 [48 - 64]
<b>Male</b>	22.0%	78%	20.7%	79.3%	28.4%	71.6%
<b>Fe- male</b>	4.8%	95.2%	5.7%	94.3%	9.9%	90.1%
<b>Grip stren- gth<sup>^</sup></b>	26.0 (7.4)	35.5 (9.5)	25.6 (7.1)	40.8 (10.8)	24.7 (7.2)	35.1 (9.5)
<b>Gait speed (m/s)<sup>^</sup></b>	0.6 (0.2)	0.7 (0.2)	0.6 (0.2)	0.8 (0.2)	0.7 (0.2)	0.8 (0.3)
<b>Sit-to- stand time (sec)<sup>^</sup></b>	19.7 (4.8)	17.6 (5.0)	19.8 (6.8)	16.2 (5.2)	14.5 (8.8)	13.2 (9.7)
<b>SPPB score*</b>	7 [6 - 8]	8 [7 - 9]	7 [5 - 8]	9 [8 - 10]	8 [6 - 11]	10.5 [8 - 12]

\*median [IQR]; <sup>^</sup>mean (SD)

OC29

**TREATMENT PERSISTENCE OF JANUS-KINASE (JAK) INHIBITORS IN RHEUMATOID ARTHRITIS AND THE EFFECT ON GLUCOCORTICIDS USAGE AND THE IMPACT OF COMEDICATION OF CONVENTIONAL DMARDS ON TREATMENT PERSISTENCE: RETROSPECTIVE STUDY IN THE AUSTRALIAN POPULATION**

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**Objectives**

To compare persistence of disease-modifying antirheumatic (DMARDs), with a focus on Janus kinase (JAK) inhibitors in Australian rheumatoid arthritis (RA) patients.

**Materials and Methods**

A retrospective observational study was conducted among 4,521 RA patients in the Australian Medicare Database (from 2011 to 2022, a 10% deidentified sample of the database), aged  $\geq 18$  and for whom a JAKi or bDMARDs were dispensed. KM analysis was used to calculate drug persistence rates, defined as the occurrence of 6 months gap after the end of a drug description. Log-rank tests was used for the comparison between the following sub-groups: (a) monotherapy; (b) combination MTX; and (c) combination cDMARDs. Wilcoxon Singed Rank test was used to compare glucocorticoid dose changes from 1-year prior to 1 and 1-2 years after initiation of the DMARDs. Only patients who had persisted on DMARDs for 2 years were included for analysis ( $n=634$ ).

**Results**

At 12 months post-initiation, persistence rate was 72% for upadacitinib, 61% for baricitinib, and 53% for tofacitinib, 58% for TNFi, 55% for tocilizumab, and 49% for abatacept. For each drug individually, treatment persistence rates were higher in combination with MTX and in combination with other cDMARDs, compared to monotherapy (**Table**). Significance was only reached when comparing baricitinib combined with cDMARD to monotherapy baricitinib (65% vs 52%), tofacitinib combined with MTX and combined with other cDMARDs to monotherapy tofacitinib (56% [ $p < 0.01$ ] and 55% vs. 45%); and TNFi combined with MTX and combined with other cDMARDs to monotherapy TNFi (63% and 65% vs. 43%). Average dose of glucocorticoids decreased from 4.1mg/day at 1 year prior to initiation of DMARD, to 2.9mg/day and 2.0mg/day at 1- and 1-2-years post-initiation, respectively. Changes were sig. for all RA DMARDs, tofacitinib and baricitinib combined (1-2 years post initiation only), TNFi, abatacept, and tocilizumab.

**Conclusion**

This real-world data showed that among Australian RA patients 12-month persistence rates was highest for upadacitinib, followed by baricitinib, and then TNFi. When treatment was combined with MTX or other cDMARDs persistence rates were not sig. different when comparing upadacitinib, baricitinib and TNFi. Tofacitinib had similar persistence rates to TNFi.

**Disclosures**

This work was supported by Pfizer and they were given a courtesy review of the abstract, but were not involved in planning the study, performing the analyses, or interpretation of the results.

**Table:** Persistence rates at 12 months post-initiation

	All			Monotherapy			Combination methotrexate			Combination cDMARD		
	n	Estimate	95% CI	n	Estimate	95% CI	n	Estimate	95% CI	n	Estimate	95% CI
Baricitinib	553	61%	(58 – 67)	86	52%	(44 – 65)	199	64%	(58 – 72)	373	65%	(61 – 71)
Tofacitinib	1230	53%	(68 – 76)	161	45%	(38 – 54)	480	56%	(52 – 61)	813	55%	(52 – 59)
Upadacitinib	574	72%	(68 – 76)	78	70%	(60 – 82)	236	75%	(69 – 81)	371	74%	(70 – 79)
Abatacept	941	49%	(46 – 53)	165	44%	(38 – 53)	421	49%	(45 – 55)	671	49%	(47 – 55)
Tocilizumab	1139	55%	(54 – 60)	273	52%	(47 – 59)	423	56%	(52 – 62)	748	58%	(57 – 64)
TNFi	3501	58%	(57 – 61)	899	43%	(41 – 48)	1381	63%	(62 – 67)	2169	65%	(63 – 67)

### OC30

#### INTEGRATING POST-FRACTURE CARE INTO THE PRIMARY CARE SETTING (INTERFRACT): A MIXED-METHODS STUDY TO CO-DESIGN A CARE PROGRAM TO IMPROVE RATES OF OSTEOPOROSIS AND FRACTURE TREATMENT

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**Objectives:** This study will develop the Integrating Post-Fracture Care into Primary Care (interFRACT) care program that aims to enhance diagnosis and treatment of osteoporosis and improve initiation and adherence to fracture prevention strategies for older adults in the primary care setting.

**Materials and Methods:** This mixed-methods study follows an established co-design approach that involves gaining an understanding of the consumer experience and needs (stage 1) and determining ways to improve that experience through design and action (stage 2). In stage 1, we will develop a Stakeholder Advisory Committee (SAC) to provide guidance all aspects of study design; conduct interviews with 15 primary care physicians and 20 consumers (older adults with a diagnosis of osteoporosis and/or fragility fracture) to explore beliefs and attitudes toward osteoporosis and fracture treatment, and to identify current needs in osteoporosis treatment and fracture prevention. Stage 2 will include a series of co-design workshops with the SAC to develop the components of the interFRACT program based on published guidance and findings from interviews; and a feasibility study with primary care physicians to determine the usability and acceptability of the interFRACT program.

**Results:** This presentation will share the results from stage 1 of this co-design study (scheduled to be analysed in March 2023). The SAC was formed and includes 2 primary care physicians; 1

geriatrician; 1 fracture liaison nurse; 1 exercise physiologist; 1 representative of the Frailty Fracture Network; 1 representative of Musculoskeletal Australia; and 5 consumers. Interviews with consumers are complete and interviews with primary care physicians are currently underway.

**Conclusion:** By utilising the principles of co-design, we will form a research partnership with consumers and key stakeholders in the development process, which will increase acceptance, uptake, long-term adherence, and satisfaction of the final intervention. The interFRACT program will potentially be able to guide primary care physicians with evidence-based treatment plans for osteoporosis and secondary fracture prevention and may have the potential to eliminate the persistent underdiagnosis of osteoporosis and address the care gaps in secondary fracture prevention worldwide.

### OC31

#### A DEEP LEARNING, COMPUTER VISION APPROACH TO SEGMENTATION OF BONE MICROARCHITECTURE HIGHLIGHTS THE ROLE OF THE TRABECULAR COMPARTMENT IN FRACTURE DISCRIMINATION

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**Objectives**

High-resolution peripheral quantitative computed tomography (HR-pQCT) provides detailed, 3-dimensional (3D) reconstructions of the human skeleton. Our previous work has shown that a computer vision approach (where the entire scan is 'read' by a computer algorithm) to determine fracture discrimination provides benefits above the use of available HR-pQCT parameters, clinical risk factors or dual energy X-ray absorptiometry (DXA) areal BMD. In this study, we aimed to develop a deep learning technique to separate the 3D cortical and trabecular compartments and examine the fracture discriminative properties of these compartments when analysed via computer vision.

**Methods**

This study was nested in the Hertfordshire Cohort Study, a group of community-dwelling older adults. Participants attended research visits at which height and weight were measured; prevalent fracture history was determined via self-report and vertebral fracture assessment. Bone microarchitecture was assessed via HR-pQCT scans of the non-dominant distal tibia (Scanco XtremeCTi) and bone mineral density measurement was performed using DXA (Lunar Prodigy Advanced). Cortical and trabecular compartments were pre-processed and segmented using a deep neural network-based algorithm and texture analysis was performed using a 3D local binary patterns method. The extracted features were used in an random-forest classification algorithm. Receiver operating characteristic (ROC) analysis was used to compare fracture discrimination.

Results

Overall, 180 men and 165 women were included in this study with a mean age of approximately 76 years. Using DXA-aBMD alone gave an area under the curve (AUC) of 0.66 (95% CI: 0.59-0.73), which improved to 0.89 (0.83-0.95) using the unsegmented HR-pQCT reconstruction. The AUCs of the segmented 3D compartments were 0.88 (0.81-0.95) for the cortical region and 0.95 (0.91-1.00) for the trabecular region.

Conclusions

This segmentation of 3D HR-pQCT images and assessment using computer vision demonstrates that the trabecular compartment out-performs the cortical compartment in terms of fracture discrimination.

OC32

**EVALUATING THE DIAGNOSTIC VALUE OF AN AUTOMATIC IMAGE ANALYSES SYSTEM FOR OSTEOPOROSIS AND SARCOPENIA IN OLDER MEN: MROS STUDY**

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**Introduction:** One of the necessities in studying osteoporosis and sarcopenia is quantitatively analyzing medical images of the musculoskeletal (MSK) system. This task, if done manually, is time-consuming and cumbersome. Hence the development of new automatic techniques is essential. This study aimed to determine the diagnostic values for osteoporosis and sarcopenia of a previously developed and validated machine learning (ML) technique (DenseUnet) for automatically segmenting and quantifying MSK tissues in proximal hip in older men.

**Methods:** We performed a cross-sectional analysis on 200 older men (1 CT scan sections per participant) from the Osteoporotic Fractures in Men Study (MrOS) (age 73 ± 4 y). DenseUnet was used to segment seven tissues in proximal hip. Cortical bone, trabecular bone, marrow adipose tissue (MAT), hematopoietic bone marrow (HBM), muscle, intermuscular adipose tissue (IMAT), and subcutaneous fat (SF) were manually segmented and used for developing the ML model (Tissue Compass 2.0™). The relationship between quantitative outcomes from the model and grip strength, chair stand time, and gait speed was evaluated as indicators of sarcopenia. Furthermore, the association of these data with the incidence of non-trauma fractures after age 50 was analyzed. The

data was adjusted for height, weight, and age.

**Results:** The ML model (Figure 1) demonstrated a high degree of accuracy in all study regions (Avg 90.71%). The results of the study showed that a significant correlation exists between higher grip strength and higher cortical bone area (Beta coefficient=1.71, 95% CI=[0.66,2.76]), higher muscle area (1.11, [0.67,1.56]), lower IMAT area (-2.04, [-3.03,-1.05]), and lower SF (-0.58, [-0.87,-0.29]). Shorter chair stand time was associated with a higher cortical bone area (0.95, [0.91,0.99]), lower MAT (1.08, [1.02,1.15]), higher muscle area (0.96, [0.95,0.98]), lower IMAT area (1.05 [1.01,1.09]), and lower SF area (1.02, [1.01,1.03]). Only higher IMAT area was found to be associated with lower gait speed (-0.04, [-0.07,-0.01]). The likelihood of non-trauma fractures after 50 was found to be solely associated with a higher MAT area (1.86, [1.08,3.19]). Interestingly, a 10 cm<sup>2</sup> increase in cortical bone area is associated with 1.7 kg higher grip strength.

**Conclusion:** Our automated method (Tissue Compass™ 2.0) demonstrated to be capable of quantifying key tissues in CT scan images of the proximal hip region. This easy-to-implement technique has a significant value in the diagnosis of osteoporosis and sarcopenia, with solid potential to be implemented in clinical practice.

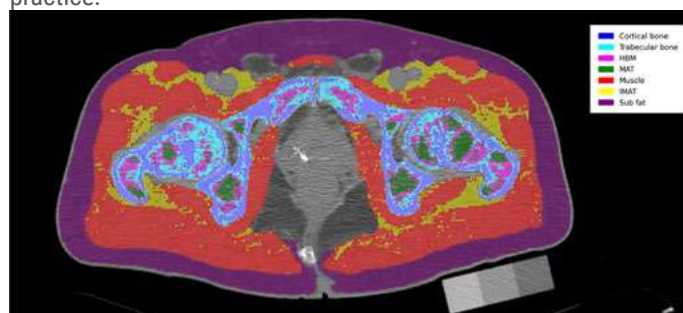


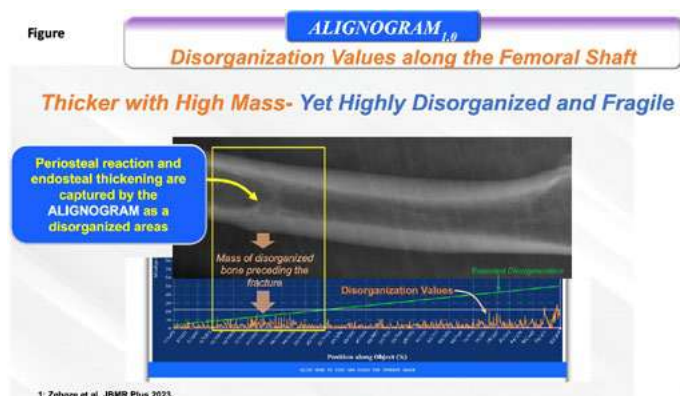
Figure 1- Segmentation results from ML model overlaid on original image.

## OC33

**DISORGANIZED BONE COMPONENTS: A NOVEL BIOMARKER UNRELATED TO BONE DENSITY AND STRUCTURE THAT MAY HOLD THE KEY TO THE DIAGNOSIS OF ATYPICAL OR STRESS FRACTURES**

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**Objective**– The cause of many fragility fractures remains a mystery as they are unexplained by reduced bone mineral density (BMD), or degraded microarchitecture. To address this enigma, we proposed that fragility in these patients is due to the incorrect arrangement of an otherwise sufficient or even high amount of normal bone tissue (disorganization). Incorrectly positioned (disorganized) components by abnormally transferring loads cause damage; triggering inflammation, and a vicious cascade of events leading to abnormalities and fractures. We further developed and validated a tool to quantify this novel biomarker (disorganization). Here, we test the hypothesis that measures of disorganization although unrelated to bone density or degradation, are associated with atypical femoral fractures (AFFs) (a type of fracture unexplained by BMD or structural decay).

**Methods**–We studied 35 women (10 AFFs, 25 fracture-free peers) mean (SEM) age of 68.1(1.83) years. Curves displaying the extent of disorganization along the femur shaft (**ALIGNOGRAM**) were produced and metrics of disorganization were quantified, as previously reported<sup>1</sup>. Correlations between disorganization metrics, bone structure, and attenuation (surrogate of density) were assessed.

**Results**– Disorganization values (DVs) along the femur shaft were unrelated to mass or structure (**Fig**). The mean DV (MDV) distinguished AFFs from controls [36.3 (IQR 23.9-60.8) vs 3,139 (IQR 1212-14788)];  $p < 0.0001$ . However, MDV was not correlated with lateral and medial cortical thicknesses, or periosteal diameter (All  $R^2 < 0.001$ ; NS). The MDV was also unrelated to density

( $R^2 = 0.08$ ;  $p = 0.17$ ).

**Conclusion**– Disorganization is a novel mechanism and a biomarker of bone fragility, completely unrelated to bone mass and microarchitecture. This novel biomarker, readily quantifiable from standard X-rays, may hold the key to the cause of fractures that occur in individuals without reduced bone density or microarchitectural decay, such as AFFs. Larger studies are now needed in larger populations with different bone diseases to confirm our findings.

## OC34

**LONG-TERM SAFETY OF BUROSUMAB IN ADULTS WITH X-LINKED HYPOPHOSPHATAEMIA (XLH) IN A PHASE 3B OPEN-LABEL STUDY**

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**Objective:** Report long-term safety data for burosumab, a recombinant human mAb that inhibits fibroblast growth factor 23, from the Phase 3b open-label study BUR02 in adults with XLH (NCT03920072).

**Materials and Methods:** European participants of two completed Phase 3 clinical trials (UX023-CL303/UX023-CL304) were eligible to continue treatment in BUR02.<sup>1</sup> They received their previously prescribed burosumab dose at study entry. Safety objectives included evaluating adverse events (AEs), ectopic mineralisation risk, cardiovascular effects, and immunogenicity profile.

**Results:** 35 adults were enrolled and included in this safety analysis: 23 (65.7%) were female, mean (SD) age was 43.7 (11.6) years. 25 (71.4%) participants completed the study; none withdrew due to AEs, there were no deaths. Mean (SD) exposure to burosumab was 116.2 (30.7) weeks.

Treatment-emergent AEs (TEAEs) were reported in 34 participants (97.1%; Table). The most frequent TEAEs were associated with the underlying disease. Burosumab treatment-related TEAEs were reported for 16 (45.7%) participants, the most frequent of which were injection-site reactions, which resolved without requiring dose changes.

No fractures or pseudofractures were reported as AEs during the BUR02 study. No clinically meaningful changes were observed for



vital signs or ECG parameters. Prolonged burosumab treatment was not considered to increase the risk of ectopic mineralisation. Three participants tested positive for anti-burosumab antibodies without neutralising activity, indicating no effect on safety.

**Conclusions:** Safety data gathered during the BUR02 study are in line with previous findings. The most frequently reported treatment-related TEAEs were injection-site reactions. This study supports the long-term safety and tolerability of burosumab in adults with XLH.

**Reference**

Kamenicky P, et al. *RMD Open*. 2023;In Press

**Disclosure**

Kyowa Kirin Pharmaceutical Development Limited is sponsor of the BUR02 study and this abstract.

**Table. Summary of TEAEs**

Category, n (%)	Participants (N = 35)
TEAEs	34 (97.1)
By severity	
Mild (Grade 1)	5 (14.3)
Moderate (Grade 2)	23 (65.7)
Severe (Grade 3)	6 (17.1)*
Life-threatening (Grade 4)	0
Death (Grade 5)	0
Common TEAEs	
Vitamin D deficiency	19 (54.3)
Arthralgia	13 (37.1)
Hypophosphataemia	9 (25.7)
Treatment-related TEAEs	16 (45.7)
By severity	
Mild (Grade 1)	7 (20.0)
Moderate (Grade 2)	7 (20.0)
Severe (Grade 3)	2 (5.7) <sup>†</sup>
Life-threatening (Grade 4)	0
Death (Grade 5)	0
Common treatment-related TEAEs	
Injection-site hypersensitivity	6 (17.1)
Injection-site haematoma	3 (8.6)
Injection-site erythema	1 (2.9)
Treatment-emergent SAEs	6 (17.1)
Treatment-related treatment-emergent SAEs	1 (2.9) <sup>†</sup>

\*Six participants experienced seven severe TEAEs: pericarditis (two episodes in one participant), Ménière's disease, diverticulum intestinal, procedural failure, drug hypersensitivity, respiratory-tract infection, and sciatica. <sup>†</sup>One participant experienced two episodes of pericarditis. The investigator downgraded the causality to "not related" for the first episode, reducing the Grade 3 treatment-related TEAEs to one and the treatment-related treatment-emergent SAEs to none. SAE, serious adverse event; TEAE, treatment-emergent adverse event.

**OC35**

**HEALTHCARE RESOURCE UTILIZATION ASSOCIATED WITH TUMOR-INDUCED OSTEOMALACIA: REVIEW OF PATIENT HISTORIES PRIOR TO ENTRY IN CLINICAL TRIAL UX023T-CL201**

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**OBJECTIVES:** Tumor-induced osteomalacia (TIO) is an ultra-rare paraneoplastic disorder, characterized by renal phosphate wasting due to increased production of fibroblast growth factor 23 (FGF23). Chronic hypophosphatemia causes the accumulation of severe musculoskeletal morbidities, and delays in diagnosis are common, which can lead to considerable healthcare resource use (HCRU). The objective of this study is to estimate HCRU from histories of adults with TIO not curable by surgery, prior to enrolment in the UX023T-CL201 burosumab phase 2 trial.

**METHODS:** Histories of the 14 TIO patients enrolled in UX023T-CL201 were assessed independently by two reviewers. Data related to clinical events directly associated with HCRU were extracted and categorized.

**RESULTS:** Mean age of TIO subjects enrolled in the trial was 56.9 ± 10.3 years (range 33-68); 57% (8) were male. Mean time between first symptoms and TIO diagnosis was 4.2 ± 4.1 years (range 0.1-13.2); mean time since diagnosis was 13.7 ± 13.0 years (range 0.7-35.8). Tumors were identified in 71% (10) patients, with surgical removal attempted in 64% (9).

Subjects underwent a mean of 11.1 ± 13.2 tumor investigations (range 1-46). The most frequent were magnetic resonance imaging (mean 4.9 ± 7.5 per patient; range 0-29), positron emission tomography/computed tomography (mean 1.9 ± 5.3; range 0-20), octreotide scan (mean 1.4 ± 2.3; range 0-7), and computed tomography (mean 1.3 ± 1.8; range 0-5).

All patients had a history of active vitamin D treatment, and 93% (13) had a history of oral phosphate treatment, with a mean duration of 10.4 ± 12.5 (range 0.3-35.0) and 10.5 ± 12.2 years (range 1.2-35.0), respectively.

History of fracture was reported in 93% (13) patients, with a mean of 5.4 ± 6.8 fractures per patient (range 0-28). The most frequently reported fracture locations were the ribs (mean 1.6 ± 3.3 fractures; range 0-13), foot/ankle (mean 1.0 ± 2.1; range 0-8), and femur (mean 0.7 ± 0.9; range 0-2).

Orthopedic procedures included spinal laminectomy in 21% (3) subjects, spinal corpectomy in 14% (2) subjects, and hip and knee arthroplasty in 14% (2) subjects each.

**CONCLUSION:** TIO is associated with substantial HCRU resulting from diagnosis, attempted tumor localization/removal, and disease management.

**FUNDING:** Kyowa Kirin International plc and Ultragenyx Pharmaceutical Inc.

**CONFLICT OF INTEREST:** SMJdB has received research support from Mereo BioPharma and Ultragenyx, and has provided consultancy services to Amgen, Ascendis Pharma, Inozyme Pharma, Kyowa Kirin, and Ultragenyx. TOC has received research support from Ultragenyx, and has provided consultancy services to Kyowa Kirin, Ultragenyx, and Viridian Therapeutics. KD has received research support from and provided scientific advice to Alexion/AstraZeneca and Ultragenyx. EAI has received research support from Ultragenyx and has provided consultancy services to Kyowa

Kirin and Ultragenyx. MBZ has provided consultancy services to Amgen, Adium, and Ultragenyx. AW, MS and BJ are employees of Kyowa Kirin International. ZL is an employee of Kyowa Kirin North America.

### OC36

#### A DIETARY PLUS EXERCISE INTERVENTION IMPROVES BONE TURNOVER IN PATIENTS WITH METABOLIC SYNDROME AND TYPE 2 DIABETES

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#### OBJECTIVES

Low bone turnover and higher fracture risk are commonly reported in Type 2 Diabetes Mellitus (T2D) patients. Besides, T2D is often associated with cardiovascular risk factors including central obesity, dyslipidemia, and hypertension as clustered in the Metabolic Syndrome (MetS). We aimed to investigate the effects of a dietary plus exercise intervention on bone turnover in obese patients with MetS ± T2D.

#### METHODS

This study is a nested subpopulation analysis of The ReSolve (Reverse metabolic SyndrOme by Lifestyle and Various Exercises) randomized control trial. Here, we studied the effects of a 6-month endurance and resistance training plus dietary restriction (-500 kcal/d) in 97 obese men and post-menopausal women with MetS (n= 68) and Mets-T2D (n= 29) aged 59±5 yrs. 50 healthy age-matched controls (Ctr) served for baseline comparisons. ELISA measured HbA1C, fasting serum glucose (FSG), serum osteocalcin (OCN), CTX, P1NP, Sclerostin (Scl) and Pigment epithelium derived factor (Ppdf). Body composition, BMC and BMD were evaluated using DXA.

#### RESULTS

At baseline, T2D had higher Hb1Ac, FSG and Ppdf levels than MetS and Ctr (+16%, +27%; +31%, +56%; +13%, +38%, p<0.01), and lower OCN, CTX and P1NP levels than MetS and Ctr (-37%; -44%; -44%; -55%; -25%, -40%; p<0.01). P1NP was also lower in MetS than Ctr (-19%, p<0.05). BMD was not different between groups.

The intervention decreased body weight and fat mass similarly in T2D and MetS (-5 and -7%; -14 and -17%, respectively vs baseline; p<0.001). BMD and BMC were preserved (pNS). HbA1C and FSG improved significantly in both groups but remained higher in T2D. Bone turnover markers increased significantly but remained lower in T2D, with similar results in men and women. Hb1Ac correlated positively with Scl and Ppdf (r =0.195, 0.438; p<0.001), whereas HbA1c, Scl and Ppdf correlated negatively with CTX, OCN and P1NP (range r =-0.431 to -0.192, all p<0.001). Interestingly, improvement of bone turnover markers by intervention was not anymore significant when Scl and Ppdf were added as covariates.

#### CONCLUSION

A 6-month dietary and exercise intervention improves bone turnover in relation to better glycemic control in Mets and T2D. Sclerostin and Ppdf may be involved in this mechanism.

### OC37

#### INTEGRATED LONG-TERM BONE MINERAL DENSITY OUTCOMES IN WOMEN RECEIVING RELUGOLIX COMBINATION THERAPY IN LIBERTY AND SPIRIT STUDIES VS NON-TREATED WOMEN

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**Objective:** To develop a single bone mineral density (BMD) profile for once-daily oral gonadotropin-releasing hormone antagonist relugolix combination therapy (Rel-CT; relugolix 40 mg, estradiol 1 mg, norethisterone acetate 0.5 mg) using data from the LIBERTY and SPIRIT studies in premenopausal women with symptomatic uterine fibroids (UF) or endometriosis-associated pain (EM), respectively.

**Materials and methods:** Data were pooled from Phase 3 LIBERTY 1 & 2 and SPIRIT 1 & 2 studies, representing 24 weeks of Rel-CT, relugolix-monotherapy/Rel-CT or placebo, followed by 28 weeks of open-label Rel-CT in long-term extensions (LTE) of each study. A 52-week observational study in contemporaneous age-matched untreated women with UF or EM (Natural History Study [NHS], N=714) was used to benchmark BMD changes. Mean percent change from baseline in BMD was provided by treatment group.

**Results:** There were 2019 women included. Percent change in BMD from baseline in pooled study data was consistent with changes in the separate UF and EM populations. For lumbar spine (LS) BMD, mean percent change from baseline was -0.56% at Week 12 in women treated with Rel-CT. This timepoint marked the

beginning of a BMD plateau. At Week 52, the change from baseline was  $-0.66\%$  in women treated with Rel-CT compared with  $0.19\%$  in women in the NHS. Women initially treated with relugolix monotherapy had a larger mean percent change in LS BMD from baseline to Week 12 ( $-1.84\%$ ) that plateaued after transition to Rel-CT (mean percent change from baseline to Week 52:  $-1.31\%$ ).

**Conclusions:** In premenopausal women with UF or EM, Rel-CT led to an initial decline ( $<1\%$ ) in BMD without further decline through 52 weeks, and not significantly lower than the natural decline of BMD in a comparable population. An integrated BMD profile for women with UF and EM allows a better understanding of the overall risk profile of Rel-CT for physicians and patients. Funded by Myovant Sciences GmbH.

## OC38

### **ZOLEDRONATE AS A PREVENTATIVE MEASURE FOR BONE LOSS FOLLOWING DENOSUMAB DISCONTINUATION: RESULTS FROM A MULTI-INSTITUTIONAL RANDOMIZED CONTROLLED TRIAL**

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#### Objective:

The discontinuation of denosumab for the treatment of osteoporosis can result in a rebound effect, characterized by a significant loss of bone mineral density (BMD) and an increased risk of vertebral fractures. This prospective multi-institutional randomized controlled trial aims to investigate whether zoledronate can prevent BMD loss after denosumab discontinuation in patients who have been receiving denosumab treatment for two or more years.

#### Materials and Methods:

A total of 101 patients, including 95 females and 6 males with an average age of 70.9 years, were recruited for the study. Participants were stratified into 4 groups and received either regular denosumab therapy (group 1) or zoledronate treatment in the first year followed by on-time denosumab (group 2), on-time zoledronate (group 3), or drug holiday (group 4) in the second year. BMD and bone turnover markers (BTMs) were measured at baseline and annually thereafter. To facilitate the analysis of first-year results, we combined groups 2, 3, and 4 since all of them received zoledronate treatment in the first year, and compared them with group 1.

#### Results:

After one year, patients receiving continuous denosumab therapy had a significant increase in vertebral BMD compared to those

receiving zoledronate treatment in the first year ( $2.07\pm 0.80\%$  vs  $0.64\pm 0.58\%$ ,  $p=0.02$ ). The difference in BMD loss was more pronounced in patients who had received denosumab for  $\geq 3$  years compared to those treated for  $\leq 2.5$  years ( $-3.94 \pm 1.60\%$  vs.  $0.45\pm 1.87\%$ ,  $p=0.03$ ). Low body weight was also identified as a risk factor for decreased BMD. Changes in P1NP were more sensitive to changes in bone metabolism indicators than CTX.

#### Conclusions:

The study results suggest that the duration of denosumab treatment affects the efficacy of sequential treatment with zoledronate, with significantly greater BMD loss observed in patients receiving denosumab for  $\geq 3$  years compared to those treated for  $\leq 2.5$  years. P1NP may be a leading indicator for deciding to add another zoledronate when monitoring BTMs. These findings align with the recommendation of the European Calcified Tissue Society.

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## ESCEO-IOF1 REAL WORLD EVIDENCE: A CRITICAL NEW APPROACH FOR PHARMACEUTICAL REGULATION

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**Objectives:** A multidisciplinary expert working group under the auspices of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis was convened to provide recommendations for the conduct and reporting of real-world evidence studies focussing on osteoporosis research.

**Methods:** Based on a comprehensive literature search on principles and use of real world evidence the working group discussed and agreed on opportunities and challenges of integrating such evidence in osteoporosis research, management and decision making.

**Results:** Real world data are derived from various sources other than traditional clinical trials, such as drug prescription or dispensing, claims databases, registries, patient reported outcomes including from wearables and electronic health records. Analysis of these data delivers real world evidence.

Real world evidence for regulatory purposes is used to provide supportive evidence for marketing authorisation and to monitor the safety and effectiveness of approved medicines. Pre-authorisation it may inform the design and feasibility of planned studies, define the natural history, epidemiology and clinical context of disease, confirm standard of care and complement clinical trials especially for medicines for rare diseases, e.g. as external control group. Post-authorisation evidence from real world data serves to evaluate safety signals and risk minimisation measures, characterise adverse events and drug utilisation and investigate the effectiveness of a product in authorised indications or in populations not yet studied.

There are several limitations and challenges when applying real world data, such as feasibility issues, questionable adequacy of the data due to potential confounding and bias, variability in timing and methods of assessment or selection of unsuitable endpoints. These aspects need careful consideration if real world evidence is incorporated in regulatory procedures.

**Conclusions:** Real world evidence can support benefit-risk conclusions on marketing authorisation and monitoring of safety and effectiveness of medicines, resulting in better informed and more efficient regulatory decision making.

**References:** Manuscript in preparation

**Acknowledgements:** The contribution of all working group members is appreciated.

## ESCEO-IOF2 STATE-OF-THE-ART EPIDEMIOLOGY FOR REAL WORLD EVIDENCE

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### Background

There is an increasing number of studies being conducted on the use, risks, and benefits of osteoporosis therapies in the general population. These studies rely on data that have been recorded as part of routine health care, and beyond research settings. It is therefore essential that clinicians and healthcare professionals in the field understand the key types of research, the methods, and the best practices underpinning epidemiological research using real world data.

### Contents

I will discuss data discovery, state-of-the-art methods, and cover examples of best practice studies on the epidemiology of bone health, fracture/s, and related conditions.

## ESCEO-IOF3 REAL WORLD EVIDENCE: THE FUTURE OF RESEARCH IN OSTEOPOROSIS?

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Osteoporosis is one of the most frequent diseases in postmenopausal women and in men leading to significant increase of fracture incidence, morbidity and mortality. In the past, many different pharmacological treatments have been developed of which many but not all have made its way into clinical care.

Beforehand, numerous preclinical studies have been performed identifying possible targets which have then been transferred into phase I studies. Of those successful, some have made it into phase II and after the presumably ideal dose have been identified, phase III studies have investigated the magnitude of efficacy. After successful phase III studies with little or no significant side effect profile, the study results are transferred to an agency seeking for approval before introduced to the market and being available for patients care.

This long process is necessary to assure the desired effect with minimal side effect profile. Because of the immense financial investment during this long process, pharmaceutical companies in the field osteoporosis usually perform their pivotal studies in the largest expected patient's population which in fact are Caucasian postmenopausal women.

But this is just a subset of the patients we treat in clinical practice. About half the global population is male and only studies with BMD endpoint are being required by the agencies using a bridging strategy to estimate the efficacy on fracture risk reduction. If this bridging strategy is reliably valid still needs to be proven. But there are many more important subgroups and important research question in clinical practice we need to address with

no phase III study results available. What about ethnic minorities, can we expect an equivalent efficacy with a certain treatment as we know that the effective dose of a bisphosphonates in Caucasian women differs significantly compared to Japanese women. What about treatment in premenopausal women or in children or of rare diseases such as pregnancy induced osteoporosis with multiple vertebral fractures where we, for many reasons will never be able to perform any phase III study?

In clinical practice, we need to choose for the best sequential treatment for each individual patient. Questions like: what do we do after 5 years of alendronate or anabolic first and if so in what population and which anabolic drug to choose or HRT/raloxifene first in early postmenopausal women and then how to proceed or how do we continue after an anabolic first treatment?

None of these important clinical questions will ever be addressed in phase III studies. The only way to be able to fulfil the needs of an individual patient is to perform high-class real-world efficacy studies. These studies are certainly not the future, but an important part of the future in osteoporosis research.

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## ESCEO-OARSI1

## IMPACT OF ANTI-OSTEOPOROSIS MEDICATIONS ON PRE-CLINICAL MODELS OF OSTEOARTHRITIS

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The importance of subchondral bone in the pathogenesis of osteoarthritis (OA) has been well established. Therefore, drugs effective to treat bone diseases might also be efficacious to treat, delay or prevent OA. Here, we review the effect of those bone drugs in pre-clinical models of OA.

Estrogen and raloxifene have been shown to delay osteoarthritic changes in ovariectomized models of knee OA. Bisphosphonates, which have been evaluated as early as the 1990s, represent the bulk of data. Their efficacy seemed to depend on the type of animal model tested, along with the experimental design. The drug type (zoledronate and alendronate were more commonly found to exert significant effects), the duration of therapy and the dose also mattered. The time point of treatment initiation was also a key factor. Better chondroprotective effects were observed at higher doses and when the bisphosphonate was administered pre-emptively. In addition, these drugs showed subchondral bone improvements but few biochemical markers changes. Osteophyte development has been altered in some studies. Synovial inflammation might also be reduced. A variety of other bone drugs with different modes of action, have been tested in several types of models. Calcitonin had effects on matrix synthesis by chondrocytes and the inhibition of cartilage degradation. Genetic absence of sclerostin did not alter the normal development of age-dependent OA in mice, and pharmacologic inhibition of sclerostin with Scl-Ab had no impact on articular cartilage remodeling in rats with posttraumatic OA. Pre-emptive treatment with OPG-Fc significantly attenuated the development of MIA-induced changes. Strontium ranelate administration mitigated histological changes in the articular cartilage and reduced the inflammatory process. Inhibition of Cathepsin K provided significant benefits in ACLT-model of OA (rabbits), including: 1) protection of subchondral bone integrity, 2) protection against cartilage degradation and 3) reduced osteophytosis. Chondro-protective and chondro-regenerative effects of teriparatide have also been observed in several studies. In one study, abaloparatide has shown improved chondrogenesis.

In conclusion, estrogen and raloxifene partially prevented development of knee OA. Bisphosphonates positive effects depended on the time of intervention : the earlier the better; on the dose, and on the duration of therapy. The effects of bone drugs in pre-clinical models was consistent because a variety of medications – despite different mechanisms of action – exhibited positive effects on OA joints.

## ESCEO-OARSI2

## OUTCOMES OF CLINICAL TRIALS HAVING ASSESSED ANTI-OSTEOPOROSIS DRUGS IN OSTEOARTHRITIS

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Since almost three decades, medications which were licensed for the treatment of osteoporosis have generated a lot of interest amongst clinicians treating osteoarthritis. Vitamin D deficiency was shown to be more prevalent in patients undergoing knee arthroplasty compared to controls but interventional studies provided discrepant results, presumably related to the doses used. Risedronate was investigated in a large two-year multinational knee osteoarthritis study but failed to demonstrate any beneficial effect on clinical symptoms and on osteoarthritis progression. Alendronate showed beneficial and transient effect on pain in patients with hip osteoarthritis but with no benefit on structure modification and a post-hoc analysis of the FIT trial suggested a beneficial effect of Alendronate on the progression of spinal osteophytes and disc-space narrowing. In a post-hoc analysis of the Osteoarthritis Initiative, it was suggested that Bisphosphonate users have a lower progression rate, particularly in baseline KL grade < 2 and in non-overweight subjects. Zoledronic Acid was extensively investigated and most of the studies did not show any benefit, in spinal radiographic progression of osteoarthritis, in knee osteoarthritis with bone marrow lesions. However, a recent paper suggested that Zoledronic Acid might decrease bone marrow edema volume in patients with non-malignant painful Bone Marrow Lesions. In an observational cohort of patients undergoing lower limb arthroplasty, Bisphosphonate use was related to a two-fold increase in implant survival time. Oral salmon calcitonin failed to provide any significant clinical or structural benefit in knee osteoarthritis. Denosumab prevents early periprosthetic bone loss after uncemented total hip arthroplasty and Strontium Ranelate showed beneficial effect on spinal osteoarthritis progression as well as improvement of radiological progression and reduction in symptoms, in patients with knee osteoarthritis, in a double-blind, randomized placebo-controlled trial. In conclusion, except for Strontium Ranelate, very few randomized prospective clinical trials have demonstrated the ability of an anti-osteoporosis medication to reduce the structural progression of osteoarthritis or to improve pain, function and/or stiffness in such patients. Further investigations are needed to better identify patients (high subchondral turnover rate?) who might benefit from anti-resorptive agents to prevent or to treat osteoarthritis.



**ESCEO-OARSI3****WHY DID ANTI-OSTEOPOROSIS DRUGS FAIL IN STUDIES OF OSTEOARTHRITIS?**N. Lane<sup>1</sup><sup>1</sup>MD, University of California at Davis Health System, Sacramento, California, United States

Osteoporosis and osteoarthritis are two low grade inflammatory diseases of aging. Both diseases are associated with bone remodeling which ultimately can result in fractures in osteoporosis and increased joint pain and accelerated degeneration in osteoarthritis (OA). During the past 20 years, several studies have evaluated if treatments that reduce bone turnover or remodeling in osteoporosis can alter the course of osteoarthritis. Initial epidemiologic studies suggested estrogen, a hormone that could reduce bone remodeling, inhibited the development and progression of OA. Similarly, in a small Phase 2 study knee OA subjects treated with risedronate or placebo reported reduced pain and disability with risedronate. However, a large, randomized placebo-controlled Phase 3 study that utilized fluoroscopy to determine joint space width in subjects with established knee OA, who were treated with risedronate (5mg/d, 15mg/d, 35mg/wk. in EU and 50mg/wk. in USA) or placebo, found no effect on signs and symptoms or change in joint space narrowing. Risedronate did reduce a serum marker of cartilage turnover in a dose dependent manner. Interestingly while epidemiologic studies found bone marrow lesions (BML) are predictors of joint pain and joint space loss, a randomized placebo controlled clinical trial that compared zoledronic acid with placebo showed no effect on either size of BMLs or knee pain. However, very recently a pilot study was performed with denosumab, a RANKL inhibitor that reduces osteoclast maturation and activity, in subjects with painful erosive hand OA. Denosumab, dosed at 60mg every 3 months over 24 weeks showed reduced radiographic progression in erosive hand OA compared to placebo. In summary, while osteoporosis and osteoarthritis share changes in bone remodeling that result in weak bones and joint degeneration, there is little evidence that treatments that reduce bone remodeling and improve bone strength are effective in moderate to severe large joint OA. However, reduction in bone remodeling with denosumab in subjects with erosive hand OA was effective over a 2-year period in reducing joint destruction, suggesting there may be some efficacy in bone active agents in subsets of OA subjects. Additional studies are needed to identify subgroups of OA subjects that may respond to these bone active agents.

**ESCEO-OARSI4****SUBCHONDRAL BONE AS A TARGET FOR ANTI-OSTEOARTHRITIS MEDICATIONS: HOW CAN WE IDENTIFY THE MOST APPROPRIATE PATIENTS TO BE INCLUDED IN CLINICAL TRIALS?**M. Englund<sup>1</sup><sup>1</sup>Lund University, Department of Clinical Sciences Lund, Orthopaedics, Clinical Epidemiology Unit, Lund, Sweden

Bone displays a number of characteristic shape changes in osteoarthritis (OA) as well as the formation of osteophytes. There is a constant remodeling to adapt to changes in biomechanical loads. After acute anterior cruciate ligament injury there are early changes in condyle shapes of the knee that resemble the changes seen in later stage OA. Also, meniscal tears seem to be associated with increased risk of these bone shape changes suggesting it is a reaction to altered biomechanical loads. Still, such bone shape changes may in turn lead to, e.g., meniscal body extrusion, which in turn worsens the biomechanical situation of the knee. Also, findings from synchrotron light experiments suggest that unloading the knee might be involved with the growth of mineral crystals, which is especially evident in the calcified cartilage. Targeting mechanisms of bone remodeling or mineral crystal formation may thus have the potential to modify the incidence and progression of OA.

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## ESCEO-WHO1 NEW INSIGHTS ON THE USE OF TBS IN CLINICAL PRACTICE

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Trabecular bone score (TBS) is a grey-level textural measurement acquired from dual-energy X-ray absorptiometry lumbar spine images and is a validated index of bone microarchitecture. Following a review from a Working Group of the European Society on Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal diseases (ESCEO) in 2015, an Expert Group convened by ESCEO has recently updated the evidence review to further inform the use of TBS in clinical practice.

This systematic review addressed four key topics with respect to the potential use of TBS: 1) fracture prediction; 2) initiating and monitoring treatment in postmenopausal osteoporosis; 3) fracture prediction in secondary osteoporosis; and 4) treatment monitoring in secondary osteoporosis. Statements to guide the clinical use of TBS were derived from the review and graded by consensus using the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) approach.

A total of 96 articles were reviewed including data derived from studies of TBS in men and women in more than 20 countries internationally. The updated evidence shows that TBS enhances fracture risk prediction in both primary and secondary osteoporosis, and can, when combined with BMD and clinical risk factors, inform treatment initiation and the choice of antiosteoporosis treatment. The two main approaches are to enter TBS as a risk factor within FRAX (via FRAXplus) or to derive a TBS-adjusted BMD for use in guidelines where thresholds for intervention are BMD-driven. Evidence also indicates that TBS provides useful adjunctive information in monitoring treatment with long-term denosumab and for anabolic agents.

In conclusion, this review confirms that the addition of TBS assessment to that with FRAX and/or BMD enhances fracture risk prediction in primary and secondary osteoporosis, and is useful in treatment decision-making and monitoring.

## ESCEO-WHO2 OPERATIONAL GUIDELINES FOR THE USE OF TRABECULAR BONE SCORE

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Trabecular bone score (TBS) is a grey-level textural measurement acquired from dual-energy X-ray absorptiometry lumbar spine images and is a validated index of bone microarchitecture.

An Expert Working Group was convened by the ESCEO and a systematic review of the evidence was undertaken in February 2023, with defined search strategies for four key topics with respect to the potential use of TBS: 1) fracture prediction; 2) initiating and monitoring treatment in postmenopausal osteoporosis; 3) fracture prediction in secondary osteoporosis; and 4) treatment monitoring in secondary osteoporosis. Statements to guide the clinical use of TBS were derived from the review and graded by consensus using the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) approach. All statements were voted as 'strongly recommended'.

The addition of TBS assessment to that with FRAX and/or BMD enhances fracture risk prediction in primary and secondary osteoporosis, and is useful in treatment decision-making and monitoring. This presentation is a guide on the integration of TBS in clinical practice for the assessment and management of osteoporosis. It is based on four steps: 1) Indications for the assessment of TBS, 2) Image acquisition and quality assessment (technical considerations), 3) Bone health assessment, 4) Fracture risk assessment, 5) Antiosteoporosis treatment initiation, decision-making and monitoring. An example of an operational approach will also be provided.

## ESCEO-WHO3

## OSTEOPOROSIS IN MEN: SCREENING, DIAGNOSIS AND IDENTIFICATION OF PATIENTS TO BE TREATED

J. A. Kanis<sup>1</sup>, L. Vandenput<sup>1</sup>, M. Lorentzon<sup>2</sup>, N. C. Harvey<sup>3</sup>, E. Liu<sup>1</sup>, E. V. McCloskey<sup>4</sup>, H. Johansson<sup>2</sup>

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The T-score describes the number of SDs by which the BMD in an individual differs from the mean value expected in young healthy individuals. Osteoporosis is defined operationally as a T-score of less than -2.5 SD at the femoral neck using the NHANES III reference range for BMD in young healthy women. The same cut-off point is recommended to define osteoporosis in men. The reason is that the gradient of risk (the increase in fracture risk/SD decrease in BMD) is the same in women as it is in men. Moreover, with the same femoral neck BMD, the risk of hip fracture in men is very similar to that in women.

In some countries, treatment is directed based on BMD and intervention is recommended when the T-score for BMD is found to be less than -2.5 SD. There are, however, several problems with the use of BMD as the sole gateway to the assessment of patients. BMD has low sensitivity for fracture prediction. Additionally, the same T-score has a different significance at different ages and in different countries. The use of clinical risk factors in conjunction with BMD and age improves sensitivity of fracture prediction without adverse effects on specificity. Thus, the performance of FRAX is enhanced using BMD tests, but FRAX without BMD has a predictive value for fractures that is comparable to the use of BMD alone. FRAX has been developed for risk assessment in both men and women. In general the strength of the clinical risk factors used in FRAX are similar in both men and women.

The most common approach is to recommend treatment in women with a prior fragility fracture and to reserve the use of FRAX in those without a prior fracture. If a prior fracture is an indication for treatment, then women (without fracture) but a fracture probability that is equivalent or higher also merit treatment. Such age-specific thresholds have been now adopted in more than 30 countries. The same intervention threshold is recommended for men, namely the fracture probability that is equivalent or higher than that of a woman with a prior fragility fracture. This sex equality is supported by health technology assessment indicating that the cost-effectiveness of intervention is very similar in men as it is in women.

## ESCEO-WHO4

## OUTCOMES OF A NEW META-ANALYSIS ASSESSING PHARMACOLOGICAL TREATMENTS IN OSTEOPOROSIS IN MEN

C. Beaudart<sup>1</sup>

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In this lecture, we will present the results of a new systematic review and meta-analysis developed to provide the latest evidence on the efficacy of osteoporosis interventions in men. This research was done in accordance with the PRISMA statement. Two electronic databases (i.e., Medline (via Ovid) and Cochrane CENTRAL) were searched in September 2022 to identify all randomized controlled trials evaluating the efficacy of osteoporosis treatment on bone mineral density (BMD) progression and fracture incidence in men with primary osteoporosis. When at least two studies using the same pharmacological treatment and evaluating the same outcome were identified, a random-effects model meta-analysis was used to report the pooled mean difference (MD) and 95% CI between the group receiving the active treatment and the one receiving the placebo. Heterogeneity in each meta-analysis was measured using Cochran's Q and I<sup>2</sup> statistics. Egger's regression asymmetry test was used to detect publication bias. A total of 1,124 studies were identified through bibliographic search. Among those studies, 21 RCTs fitted the inclusion criteria and were included in the systematic review. Results revealed that bisphosphonates (k=10, n=2,992 men with osteoporosis; alendronate k=5, risedronate k=2, zoledronic acid k=2, ibandronate k=1) improved all three BMD sites compared to placebo; lumbar spine: MD +4.75% (95% CI 3.45;6.05); total hip: MD +2.72% (95% CI 2.06;3.37); femoral neck: MD +2.26% (95% CI 1.67;2.85). Publication bias was not detected (Egger test p>0.05). Denosumab (k=2, n=242), teriparatide (k=2, n=309) and abaloparatide (k=2, n=248) also produced significant improvement of all sites BMD compared to placebo (p-values of MD <0.05). Romosozumab was only identified in one study (reporting significant improvement compared to placebo) and was therefore not meta-analysed. Incidence of fractures was reported in 16 RCTs but only four of them reported fractures as the primary outcome. Treatments were nevertheless associated with a lower incidence of fractures (median of vertebral fracture risk of 1.7% in the treatment group versus 4.1% in the placebo group). In conclusion, medications used to treat osteoporosis in women appear to have a similar benefit in men with osteoporosis. Therefore, the algorithm for treating osteoporosis in men could be identical to that previously recommended for treating osteoporosis in women, i.e., antiresorptive agents in men at high risk of fracture and bone-forming agents followed by antiresorptive agents in men at very high risk of fracture.

## ESCEO-WHO5 RECOMMENDATIONS FROM ESCEO: GRADE ASSESSMENT

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When considering the geography of the field of osteoporosis, it is vital that all groups are considered and that recommendations for screening, investigating and managing are tailored appropriately. Given the higher proportion of women affected by osteoporosis, research and guidelines have historically centred on the female sex.

In February 2023, The European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO) convened a working group to specifically address the issue of 'Osteoporosis in Men'. This culminated in a GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) assessment to determine recommendations for the diagnosis, screening, assessment and treatment of men with osteoporosis.

The GRADE process involved grading a statement with a level of agreement ('agree', 'disagree') and a strength of recommendation ('recommended' or 'not recommended', rated 'strong' to 'weak') based on the considered quality of evidence, magnitude of effect, risk to benefit ratio, health economic data and values and preferences.

The statements included the appropriateness of a female reference database being used in the context of densitometric diagnosis of osteoporosis in men, FRAX usage to assess fracture risk and the setting of intervention thresholds (and whether these thresholds should be age-dependent) and the role of previous fracture in determining the decision to treat.

Treatment decisions were addressed in statements referring to the need for vitamin D and calcium repletion, first line use of oral bisphosphonates, second line use of zoledonic acid or denosumab and sequential therapy with bone forming agents (or first line use of these agents in accordance with regulatory authorities). The recommendation of physical activity and balanced diet was also covered.

Monitoring was addressed via statements regarding the use of bone turnover markers to monitor adherence and the measuring of serum testosterone in the pre-treatment assessment (together with the appropriateness of hormone replacement therapy) was also attended to.

The results of the above GRADE assessment will be shared during this symposium.

# WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

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**EUGMS-ESCEO Symposia Abstract**

## EUGMS-ESCEO 1

### FALLS PREVENTION AT A FRACTURE LIAISON SERVICE: WHAT'S NEW FROM THE WORLD FALLS GUIDELINES

N. van der Velde<sup>1</sup>

<sup>1</sup>Amsterdam UMC, Amsterdam, Netherlands

#### *Objectives*

A fall in an older person is a major determinant of fracture risk in addition to osteoporosis, a condition characterised by bone fragility. Over 90% of fractures in older persons result from a fall and approximately 10% of falls result in a fracture. Studies addressing prevalence of risk factors at a fracture liaison service showed that in >50% of patients one or more fall risk factors are present, e.g. arthritis, other comorbidities or use of fall-risk increasing drugs. The efficacy of falls prevention interventions to reduce fractures is however still debated, in part because it depends on the individual's fall risk profile and the type of intervention program.

#### *Methods*

In this presentation an overview of effective components of falls- and related injury prevention –i.e. fractures- as derived from the World Falls Guidelines will be presented. Furthermore, an overview of the recent literature on effectiveness and optimal content of fall risk assessment and treatment in older fracture patients will be given. Single, multidomain and multifactorial approaches will be compared and potential approaches in fracture liaison services will be discussed.

#### *Results*

Multidomain interventions, when delivered, are effective for reducing the rate of falls in high-risk community-dwelling older adults and as a consequence risk of fall-related fractures and other injuries will also be addressed. This is supported by the findings of several meta-analyses including two recent Cochrane reviews (2018, 2019) and a recent systematic review and network meta-analysis (2021). These confirmed that (1) multifactorial interventions may reduce the risk of fall-related fractures and (2) effective components of falls preventive interventions were the 'basic fall risk assessment' (including medication review), exercise interventions and quality improvement strategies.

#### *Conclusions*

Both bone fragility and propensity to fall are important determinants of fracture risk. Fracture liaison services, which identify adults with recent fractures, are now in place in many areas and their remit should include identification of those at high falls risk in addition to investigating for osteoporosis. Conversely, those identified as having a moderate to high falls risk should have a bone health assessment using local protocols. Engaging older adults is essential for prevention of falls and injuries.

#### *Acknowledgements*

Steering committee members, experts and older adults panel of the World Falls Guidelines.

#### *Disclosures*

None

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**SICOT-ESCEO-IOF Symposia Abstracts**



## SICOT-ESCEO-IOF1 MANAGEMENT OF OSTEOPOROTIC SPINE FRACTURES

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Osteoporotic fractures of the spine are becoming a serious epidemic when life expectancy is increased with the modern way of living. Combined with alcohol, nicotine, and other drug/medication abuse, they become a serious medical and social problem. Osteoporotic spine fractures are often treated conservatively but sometimes undertreated conservatively. A lot of controversial publications have been published last two decades about the effectiveness of vertebroplasty in these fracture pathologies. A lot of different surgical techniques have been further developed, to increase the effectiveness of bone cement injecting in the fractured vertebral body, in the meaning of stability and pain relief, but also in kyphosis correction. Kyphoplasty and recently Vertebral Body Stenting has been proven to have better results than conservative treatment with/-out vertebroplasty.

In the terms of osteoporotic vertebral fractures that require decompression and fixation, different surgical techniques have been developed, but the best anchoring technique that has been used recently with persistent success is anchoring the pedicle screws in the vertebral body through augmenting them with PMMA. The double-thread philosophy of the pedicle screw with narrow threads in the pedicle also helps with the better grip of these screws in the pedicles.

Preventing proximal vertebral fracture and kyphosis, prevention of screw pull-out, anterior support in severe bone defects, increasing stability, etc., has been proven to increase the success of treatment of these complex osteoporotic fractures. A careful postoperative plan of rehabilitation and medicamentous long-term treatment with bracing and other types of support ensures the prevention of the domino effect of spine osteoporotic fractures.

## SICOT-ESCEO-IOF2 TREATMENT OF UNSTABLE OSTEOPOROTIC BIMALLEOLAR ANKLE FRACTURES

K. H. Teoh<sup>1</sup>

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Background: Fibula pro-tibia fixation was a technique prior to the advent of locking plates that was used to enhance stability in ankle fractures by achieving tri or tetra-cortical fixation. There is renewed interest in the use of this construct with modern locking plates especially in treating osteoporotic ankle fractures. The fib-

ula pro-tibia construct involved fixation with 3 consecutive locking screws applied across 3 cortices proximally from the level of the syndesmosis.

Objective: To assess whether it is safe to weightbear fibula pro-tibia construct early when compared with various ankle fixation using a biomechanical osteoporotic sawbone model

Material and Methods: Twenty-four osteoporotic sawbones with simulated supination external rotation injuries were used. Four constructs were tested (locking fibula pro-tibia construct, locking fibula pro-tibia construct but using 3 syndesmosis non-locking screws, normal locking fixation, normal non-locking fixation). Each construct was tested 3 times at 0 degrees (walking cast) and 20 degrees external rotation (walking boot). All fixations were cyclically loaded at 1200N (120kg patient) on an electromagnetic test frame (MTS 858 Mini-Bionix test machine, MTS Corp, Eden Prairie, MN) till failure or to 250,000 cycles.

Results: None of the fibula pro-tibia construct failed at 250,000 cycles at either 0 degrees or 20 degrees of external rotation. The other constructs failed earlier at 20 degrees of external rotation than 0 degrees in this order: locking fibula pro-tibia construct but using 3 syndesmosis non-locking screws (1302 vs 72793 cycles), normal locking fixation (735 vs 62012 cycles), normal non-locking fixation (636 vs 26699 cycles).

Conclusion: The locking fibula pro-tibia locking plate construct demonstrates biomechanical superiority when cyclically loaded compared to other forms of fixation. It should be safe to weightbear these patients early in either a walking cast or boot based on our biomechanical study.

## SICOT-ESCEO-IOF3 MANAGEMENT OF ACETABULAR FRACTURES IN THE ELDERLY

E. Bolierakis<sup>1</sup>, I. Mamoutakis<sup>1</sup>, H. Alabdulrahman<sup>1</sup>, F. Hildebrand<sup>1</sup>, K. Horst<sup>1</sup>

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Due to the demographic changes and high activity levels also in the geriatric population, the prevalence of geriatric acetabular fractures is increasing. In contrast to younger patients, fractures in the elderly result most often from low energy trauma mechanisms (e.g. falls from lower height). Management of this population remains challenging. While the initiation of interdisciplinary orthogeriatric co-management is imperative to reduce the complication rates resulting from pre-existing comorbidities, there is still no consensus regarding the appropriate fracture treatment strategy. Current therapeutic modalities include non-operative treatment, closed reduction with percutaneous fixation (CRPF), open reduction with internal fixation (ORIF), acute total hip arthroplasty (aTHA) with or without simultaneous fracture fixation and delayed total hip arthroplasty (dTHA). While the observed mortality rates are comparable in regard to all of the aforementioned treatment options, indications and outcomes show a high variability. Non-operative treatment is reserved for undislocated

fractures, secondary congruency after an associated both column fracture and individuals that would not survive the operative stress due to reduced general medical status. CRPF appears to be appropriate for minimally displaced fractures as well as fractures with high risk of secondary displacement under non-operative treatment. ORIF is the treatment of choice for fracture patterns amenable to anatomical reduction, sufficient bone quality and healthy patients that are able to perform partial weight bearing. The aTHA is primarily reserved for fractures with prognostically unfavourable radiological characteristics (i.e. severe, comminution, pre-existing osteoarthritis, impaction of the acetabular dome) or fractures that are at risk for secondary displacement early after ORIF. The dTHA presents a salvage option for secondary osteoarthritis after non-operative treatment or failure of ORIF. Although good functional outcomes are observed after CRPF and ORIF, both strategies are associated with higher rates of non-fatal postoperative complications as well as significant rates of secondary conversion to total hip arthroplasty. aTHA and dTHA offer the possibility of direct patient remobilisation with full weight bearing. Yet functional outcomes remain lower than in THA for primary osteoarthritis as higher revision rates are reported. The results of currently ongoing prospective studies (e.g., GATOR and AceFIT studies) might influence future decisions on this subject. Irrespective of the chosen treatment method, the main therapeutic goal in the elderly population with acetabular fractures is a quick remobilisation supported by effective interdisciplinary co-management of pre-existing comorbidities. The fracture management should be performed in regard to individual needs and based on fracture pattern, medical condition, and life quality expectations of the elderly population.

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**Meet-the-expert Abstracts**

## MTE1

**DISORDERS OF PHOSPHATE HOMEOSTASIS:  
HYPOPHOSPHATEMIA**M. Chandran<sup>1,2</sup>

<sup>1</sup>Senior Consultant and Director Osteoporosis and Bone Metabolism Unit, Department of Endocrinology Singapore General Hospital, Singapore, Singapore, <sup>2</sup>Faculty, Skeletal Rare Disorders Academy, IOF, Switzerland

Phosphate is the most abundant intracellular anion in the human body. There are three hormonal systems responsible for phosphate homeostasis, the parathyroid hormone (PTH), Fibroblast growth factor-23 (FGF-23)/klotho, and 1,25 dihydroxyvitamin D3 (1,25 (OH)2D3, calcitriol). Disorders of phosphate homeostasis include hypophosphatemic conditions which may be acquired such as tumour induced osteomalacia (TIO) or congenital such as X-linked hypophosphatemic rickets (XLH) and autosomal dominant hypophosphatemic rickets (ADHR). This presentation will focus on two hypophosphatemic conditions – XLH and TIO and will describe the pathophysiology, clinical manifestations, and management of these two conditions with the help of some illustrative cases.

## MTE2

**SPORT – HOW MUCH IS TOO MUCH?**J. F. Kaux<sup>1</sup>, O. Bruyère<sup>2</sup>

<sup>1</sup>Physical Medicine and Sports Traumatology, FIFA Medical Centre of Excellence, International Olympic Committee (IOC) Research Centre, WHO Collaborating Center for Public Health aspects of musculoskeletal health and ageing, University of Liège, Liège, Belgium, <sup>2</sup>WHO Collaborating Center for Public Health aspects of musculo-skeletal health and ageing, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium

Numerous research studies have shown that physical activity has a positive effect on physical and mental health. More particularly, regular aerobic exercise and resistance training are associated with a reduced risk for cardiovascular morbidity and mortality. In 2020, the updated World Health Organization (WHO) recommendations highlighted that adults aged over 65 years should engage in at least 150 min/week of moderate intensity aerobic activities or 75 min/week of vigorous intensity aerobic activities or an equivalent combination. In addition, complementary muscle-strengthening activities should be performed involving major muscle groups on two or more days a week. However, the WHO provides no recommendations for upper limits in terms of intensity and volume of physical activity. Yet, the health effects of exercise volumes beyond the “optimal dose” are currently under debate. Some observational studies have reported an increased risk of disease and/or mortality at the highest exercise volumes. Excessive exercising can indeed have harmful effects on physical (e.g. injury) and mental health (e.g. addiction-like behaviour,

relative energy deficiency in sport (RED-S)). Regarding the musculoskeletal field, data on how much sport is too much are scarce, especially in the older adult. In this Meet-the-Expert session, we will first discuss the adverse effects observed in randomised controlled trials that have evaluated the impact of physical activity programmes in the older population. Then, we will discuss available data having assessed the impact of different exercise load (i.e. volume, intensity) on the risk of musculoskeletal disorders (e.g. osteoarthritis, tendinopathy, stress fracture, muscle tear, overuse injuries). Finally, we will discuss the advantages and disadvantages of the “weekend warrior” behaviour, i.e. a person who only exercises at the weekend. We will end the session with some practical recommendations to prescribe the optimal dose of sport.

## MTE3

**POST-FRACTURE MANAGEMENT IN THE PATIENTS  
WITH OSTEOPOROSIS**T. Nakamura<sup>1</sup>

<sup>1</sup>TOTO Sangen-jaya Rehabilitation Hospital, Tokyo, Japan

The most common sites of fragility fractures in patients with osteoporosis include the spine, hip, shoulder and wrist. These sites are located in and around the central parts of the skeleton, playing major roles for the movement of the body.

For patients who have sustained the fracture, physiotherapy for ambulation and occupational therapy for ADLs are started as early as possible when the general condition of the patient has stabilized. Patients who are able to ambulate independently return home and attend to the family physicians. We give further treatment in the rehabilitation hospital to those who still need further rehabilitation for ambulation and ADLs. At the discharge of the hospital, we recommend performing daily exercises and walking, pertaining adequate meals, and maintaining the circadian rhythm. It has been confirmed that the fragility fractures at these sites increase the risk of recurrent fragility fractures. The risks are highest immediately after the fractures, maintaining the level for at least 3 years (Johansson 2017). Bone tissue destructions in these fractures are usually severe and the healing processes, starting just after the fracture, are often enough to increase bone turnover systemically, to provide sufficient minerals at the injured sites. Inactivity after fracture also increases systemic bone turnover, reducing bone mass in the skeleton. Bone modeling activity at the fractured sites continues to correct the deformity even after the completion of bone union at the fracture sites.

The potent anti-resorptive agents such as zoledronate and denosumab have been shown to be effective to reduce the risk of recurrent fractures. The potent bone formation-stimulating agents with reducing bone resorption such as teriparatide (weekly or twice-a-week dose), abaloparatide and romosozumab could be useful for the limited of 1-2 years. The subsequent treatment is necessary after the end of these periods as a manner of sequential therapy.

## MTE4 PRIMARY HYPERPARATHYROIDISM (PHPT) NEW GLOBAL GUIDELINES FROM THE 5TH INTERNATIONAL WORKSHOP

A. Khan<sup>1</sup>

<sup>1</sup>Professor of Clinical Medicine, McMaster University, Hamilton, Canada

The new guidelines from the 5th International Workshop were the result of 2yrs of deliberation by a 50-member international task force and followed GRADE methodology. These guidelines were published in Dec 2022 in JBMR and this MTP session will address advances in diagnosis and management both medical and surgical and include recommendations for pregnant patients. Normocalcemic hyperparathyroidism will also be discussed as well as current recommendations regarding diagnosis and management. The Summary Statement and Guidelines for the Evaluation and Management of Primary Hyperparathyroidism (attached) provide an overview of the recommendations detailed in the accompanying 8 manuscripts which describe advances in medical and surgical management for PHPT. These guidelines were endorsed by 65 regional and international organizations and it is anticipated that these recommendations will be of value in enhancing patient care internationally.

Bilezikian JP, Khan AA, Silverberg SJ, Fuleihan GEH, Marcocci C, Minisola S, Perrier N, Sitges-Serra A, Thakker RV, Guyatt G, Mannstadt M, Potts JT, Clarke BI, Brandi ML. Evaluation and Management of Primary Hyperparathyroidism: Summary Statement and Guidelines from the Fifth International Workshop. *J Bone Miner Res* 2022

## MTE5 MANAGEMENT OF HYPOPARATHYROIDISM

M. L. Brandi<sup>1</sup>

<sup>1</sup>F.I.R.M.O. Foundation, Florence, Italy

Hypoparathyroidism is a rare disorder with a prevalence of ~30 cases per 100.000 person-years.

Approximately 25% of cases arise from genetic or metabolic disorders, autoimmune destruction, infiltration of the glands, with many cases remaining idiopathic. Most commonly, ~ 75% of cases of hypoparathyroidism are iatrogenic following neck surgery.

The disease is associated causes hypocalcemia and it is associated with significant mortality and impaired quality of life.

Genetic diagnosis can use either simple gene tests or gene panels, exome sequencing, whole genome sequencing. Autoimmune hyperparathyroidism is dependent upon the development of a sensitive and specific assays, particularly regarding the detection of CaSR antibodies.

Conventional therapy with calcium and active vitamin D analogs is necessary to maintain serum calcium and treat symptoms of hypocalcemia.

Parathyroid hormone (PTH) replacement therapy with PTH peptides has been evaluated in chronic hypoparathyroidism. Because of limitations of short duration and small samples size, evidence from randomized trials is limited regarding important benefits of PTH therapy compared with conventional therapy.

All these topics will be presented and discussed in the meet with expert session.

## MTE6 OSTEOPOROSIS TREATMENTS AND MATERIAL LEVEL PROPERTIES OF BONE

X. Nogues<sup>1</sup>

<sup>1</sup>Internal Medicine.Hospital del Mar. IMIM.CIBERFES.Universitat Pompeu Fabra, Barcelona, Spain

Bone quality and material bone properties will be discussed in this Meet-the-Expert Session with the participants as well as important aspect of the definition of Bone quality and its clinical assessment. We are going to discuss if the participants believe that it remains a significant diagnostic gap for clinicians. New tools as impact microindentation (IMI) will be presented with a review of new evidences supporting their potential in the clinicians' diagnostic methods.

Fracture is clearly related with an unbalance between applied force (trauma) and bone strength (BS). According to the definition of Osteoporosis (OP), bone strength reflects the integration of bone quantity and bone quality. However, the determinants of BS are several: bone mass or density, bone geometry and microarchitecture, bone material properties (i.e. bone "quality"). Micro and nano components of bone tissue are also determinant: bone remodeling balance, stress risers (porosity, Havers), microdamage, crack bridging, osteons (density, cement lines), organic matrix proteins, sacrificial bonds, water content and other (mineralization degree, crystals size and shape, mineral composition, etc...). All together determine the important mechanical properties as stiffness, resilience, quasistatic strength (compression, tension, shear), toughness and fatigue resistance.

The main problem is that there are no tools available for the clinical assessment of a patient's bone quality and measure all the components mentioned above. Indirect methods as Trabecular Bone Score, Peripheral QCT and other high-resolution images techniques give us an approach of bone quality.

IMI (OsteoProbe®) was developed to diagnose and monitor material aspects of bone quality in vivo with, safe, convenient and minimally invasive. We will review some of clinical data about their clinical relevance and safety. Finally, we will discuss the available evidence on the effect of treatments (anabolics, antiresorptives and dual) on material properties on bone strength.

**MTE7****CHANGING THE BONE PARADIGM OF KIDNEY TRANSPLANT RECIPIENTS**J. B. Cannata-Andía<sup>1</sup>

<sup>1</sup>Bone and Mineral Research Unit. Instituto de Investigación Sanitaria del Principado de Asturias. Universidad de Oviedo, Oviedo, Spain

The key players of the chronic kidney disease (CKD)-mineral and bone disorders (CKD-MBD) are calcium, phosphorus, PTH, FGF23, Klotho and the vitamin D hormonal system. The progressive reduction of kidney function greatly modifies the tightly interrelated mechanisms that control these parameters. As a result, important changes occur in the bone and mineral hormonal axis, leading to changes in bone turnover with relevant consequences in clinical outcomes, such as decrease in bone mass, increased bone fragility, bone fractures and vascular and valvular calcification.

The worsening of CKD implies a progressive reduction of serum calcium, calcitriol and soluble Klotho and increase in serum phosphorous, FGF 23, triggering the secondary hyperparathyroidism of CKD which leads to high bone turnover. Until recently, the progressive increase in the prevalence of low bone in CKD, mainly in the late stages of CKD, had been associated to the aggressive treatment of secondary hyperparathyroidism. However, recent studies have shown that in early stages of CKD there is stimulation of the inhibitory components of the Wnt/Beta catenin pathway which will directly induce low bone turnover, a finding that is changing the bone paradigm of kidney transplant recipients and may influence the bone post-transplant evolution.

**MTE8****TREATMENTS OF ENDOMETRIOSIS AND BONE HEALTH**S. Palacios<sup>1</sup>

<sup>1</sup>The Palacios Institute of Women's Health, Madrid, Spain

Endometriosis is defined as the presence of endometrial tissue outside the uterus. This tissue is morphologically and functional similar to normal endometrium. It is estimated to occur in 7-10% of reproductive age women. Women with endometriosis experience clinical symptoms including pelvic pain, dysmenorrhea, dyspareunia, and infertility.

Management of endometriosis is recommended when the disease has a functional impact. Recommended therapies for the management of endometriosis-related pain are as first line, hormonal contraceptives and progestins. Both treatments have side effects and limited efficacy.

GnRH agonists such as leuprorelin are highly effective but decrease bone mineral content. In addition, GnRH agonists induce a transient increase in the secretion of gonadotropins (flare), which results in a temporary worsening of symptoms, and they cannot be orally administered.

A new potential opportunity for the endometriosis therapy is the

use of new-generation oral GnRH receptor antagonists elagolix, relugolix and linzagolix, which do not induce an initial clinical flare.

The use of this GnRH-antagonist resulted, in the different trials, in improvement of clinical symptoms of endometriosis, after both 3 and 6 months of treatment. These treatments resulted in hypoestrogenic effects, producing some side effects, including hot flushes, changes in bone mineral density and in lipid levels.

These treatments decreased BMD in a dose response and also related to the duration of treatment. These side effects may potentially be mitigated through add-back therapy using low-dose hormones, but it also reduces effectiveness.

These treatments in relation with BMD open some questions. When and how does BMD recover after stopping treatment? Should we always determine BMD before and after treatment? Should the BMD mark the treatment dose? Should we give any treatment (vitamin D) in these patients?

**MTE9****COMPLEX CASES – QUESTIONS AND ANSWERS.**E. Dennison<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Centre, Southampton SO16 6YD, Southampton, United Kingdom

This interactive meet the professor session aims to cover discussion of many of the challenging management situations faced by clinicians who care for patients with metabolic bone disease. Discussion will be grounded in available literature and will include discussion of management of patients who are nearing the end of 10 years of denosumab therapy; the young adult with osteoporosis and fragility fracture; osteoporosis presenting in pregnancy; the non-compliant patient and the patient facing transplantation. Participants are invited to share their thoughts and personal experience.

**MTE10****HIGH BONE MASS: WHAT SHOULD WE DO?**C. Gregson<sup>1</sup>

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A finding of high bone mineral density (BMD) on routine DXA scanning is not infrequent and most commonly reflects degenerative disease. However, BMD increases may also arise secondary to a range of underlying disorders affecting the skeleton. Although low BMD increases fracture risk, the converse may not hold for high BMD, since elevated BMD may occur in conditions (i) with increased fracture risk (e.g. osteopetrosis or Paget's disease), or (ii) in the case of artefacts which themselves do not affect fracture risk but may mask low BMD, and (iii) where fracture risk may be reduced but other co-morbidities may exist, this latter group includes cases of high bone mass (HBM).

In this meet-the-expert session, I will outline a classification for the causes of raised BMD, based upon identification of focal or

generalised BMD changes, which can be used to structure appropriate investigation by clinicians after careful interpretation of DXA scan findings within the context of the clinical history. I will describe our learning from conducting a systematic analysis of patients undergoing routine clinical DXA scanning, having screened 335,115 DXA scans across 15 UK centres. I will include discussion of prevalence of HBM conditions and will review the mild skeletal dysplasia associated with the largely yet to be explained High Bone Mass phenotype. I will discuss the phenotypes seen in LRP4, LRP5, LRP6 HBM, as well as Sclerosteosis and van Buchem's disease. I will go on to describe HBM pedigrees affected by mutations in SMAD9; a c.65T>C loss-of-function mutation thought to reduce BMP inhibition, and by the recently identified mutation in GALNT3; a c.1657C>T mutation thought to influence BMD through a phosphate independent pathway, and in PIEZO1 in which different mutations in different parts of the protein are associated with opposing BMD phenotypes.

## MTE11

### TRANSGENDER MEDICINE AND BONE

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Transgender or trans persons are people with a gender identity not aligned with their birth-assigned sex: trans men have a female birth-sex but self-identify as male; trans women have a male birth-sex but identify as female. In addition to social transition, trans persons may seek gender-affirming medical care, i.e. hormonal treatment and/or surgery inducing and maintaining body changes more congruent to the self-identified gender. Gender-affirming hormonal treatment (GAHT) in trans men consists of testosterone treatment; GAHT in trans women consists of a testosterone-lowering drug [GnRH analogue (GnRHa), cyproterone acetate or spironolactone] and estradiol. Hormonal treatment of transgender adolescents consists of suppression of pubertal development with a GnRHa followed, if gender dysphoria persists, by GAHT usually from around age 16y. Considering the major role of sex steroid hormones in bone homeostasis, the potential impact of GAHT on bone health deserves attention.

Studies in trans women on long-term GAHT revealed a lower areal (DXA) and volumetric (peripheral QCT) bone mineral density (BMD), a smaller cortical bone size and a higher prevalence of low BMD and osteoporosis compared to healthy cis men. However, later studies have shown that these differences are present before initiation of any GAHT and are also seen in adolescent trans girls before any treatment. Moreover, longitudinal studies have shown that pre-treatment BMD in adult trans women is well maintained and even slightly increased under GAHT. The less favourable bone parameters in untreated trans women have been attributed to lifestyle-related factors such as low level of physical activity. Fracture risk in trans women ≥50y is greater than in cis men and similar to that in cis women. In treatment naïve trans women BMD is not different from cis women controls. BMD is

maintained and cortical bone size might slightly increase during long-term GAHT with testosterone. Adolescent trans girls but not trans boys have a low BMD before initiation of treatment. GnRHa monotherapy impairs physiologic pubertal BMD increase, resulting in decrease of BMD Z-scores in trans girls and boys. BMD and Z-scores increase upon initiation of GAHT with at least partial recovery. Nevertheless, there is a high prevalence of low BMD in young adult trans girls.

In conclusion, GAHT in trans persons has no detrimental effects on bone health, whereas there is still a knowledge gap as to the longer-term effects on bone health in adolescents. Bone health deserves attention in adult and adolescent trans women because of increased risk of low BMD and osteoporosis. Strategies to optimize bone health include monitoring of adequacy of sex steroid exposure and patient compliance for GAHT in addition to the general bone health-promoting measures such as adequate intake of calcium and vitamin D, adequate physical activity, avoidance of alcohol and smoking. Systematic DXA screening is not advised, but in presence of risk factors for osteoporosis the threshold to perform DXA should be low, in particular in trans women. Treatment decisions for trans persons can be based on the guidelines for osteoporosis in the general population.

## MTE12

### DIETARY PATTERNS AND BONE HEALTH

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Nutrition is an important modifiable factor for several non-communicable diseases, such as cancer and cardiovascular diseases. Increasing literature is showing that nutrition plays an important role in bone health. Diet is a complex mixture of nutrients and foods that correlate or interact with each other: therefore, unless focusing on a single nutrients as made in older literature, dietary pattern approaches have gained in importance in nutritional epidemiology, including bone health research. Altogether, recent literature suggests that dietary patterns higher in fruits, vegetables, legumes, nuts, low-fat dairy, whole grains, and fish, and lower in processed meats, sugar sweetened beverages, and sweets are associated with favorable bone health outcomes in adults, in particular decreased incidence in hip fracture. On the contrary, insufficient evidence is available to determine the relationship between dietary patterns consumed during childhood and bone health, even if the question has important public health priorities. Among the dietary patterns usually investigated, a special role is dedicated to Mediterranean diet. The combination of the nutrients included in the Mediterranean diet, including high presence of anti-oxidants and anti-inflammatory components, leads to a favorable bone health. On the contrary, too selective diets, such as veganism, lead to an increased risk of osteoporotic fractures, as shown by several recent works indicating that (animal) proteins are necessary for a good bone health.

**MTE13****HOW CAN HEALTH ECONOMICS HELP TO OPTIMIZE PATIENT CARE IN OA****M. Hiligsmann<sup>1</sup>**

<sup>1</sup>Department of Health Services Research, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, Netherlands

Osteoarthritis (OA) is associated with a substantial and increasing burden on patients and society as a whole. In a world with limited resources, it is of crucial importance to efficiently allocate scarce healthcare resources available in order to optimize OA patient care. Health economics has therefore gained importance in healthcare policy-making in recent years. In addition to be safe and effective, a health technology (such as a drug) should also be cost-effective and affordable. Cost-effectiveness analysis assesses the costs and outcomes (typically expressed in quality-adjusted life years) of health technologies to derive their economic value, while affordability is typically assessed through budget impact analysis. During this Meet-the-Expert session, you will first learn about the rationale and roles of health economics in decision-making, with a focus on OA. Then, both cost-effectiveness and budget impact analyses will be briefly introduced and their methods described. The results of these analyses will then be discussed as well as the need for sensitivity analyses. The Meet-the-Expert session will also include an example on the cost-effectiveness of a single intra-articular injection of a high and low molecular weight hyaluronic acid formulation (HA-HL) as illustration.

**MTE14****AN EXAMPLE OF HEALTH ECONOMIC EVALUATION: THE CASE OF I.A. HL-HA FORMULATION****O. Bruyère<sup>1</sup>**

<sup>1</sup>WHO Collaborating Center for Public Health aspects of musculo-skeletal health and ageing, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium

In a world with limited resources and healthcare budgets, the allocation of cost-effective treatments is very important, and in that perspective, economic evaluations are playing an increasingly important role in pricing and reimbursement decisions. Indeed, regulatory authorities take into account, at least partly, pharmaco-economic evaluations in guiding their decisions. During this Meet-the-Expert session, we will take an example of health economics evaluation using one hyaluronic acid treatment for the management of osteoarthritis. We will use the data from a recent randomized placebo-controlled trial having shown that a single intra-articular injection of a high and low molecular weight hyaluronic acid formulation (HA-HL) was clinically effective in providing a reduction in pain and functional limitation. We will discuss the cost-effectiveness of this HA-HL compared with placebo

using individual patient data from the clinical trial in a specific health care perspective. A critical assessment of the methodology for costs and effectiveness evaluations will be presented during this Meet-the-Expert session. Sensitivity analyses (e.g., using lower or upper limit prices or using other threshold values for the incremental cost/effectiveness ratio) will also be presented and discussed.

**MTE15****IDENTIFYING VERY HIGH FRACTURE RISK PATIENTS IN REAL-WORLD CLINICAL PRACTICE: INNOVATIONS AND IMPLICATIONS****M. Talla<sup>1</sup>**

<sup>1</sup>Queen Elizabeth University Hospital, Glasgow, United Kingdom

In this forward-thinking session, Dr Maria Talla will provide her expert perspective on the identification of patients with osteoporosis at very high fracture risk (VHFR) – a population with a great clinical need. Building on this, the optimisation of pathways for such patients will also form an important focus of this meeting. To begin, Dr Talla will offer an insight into the key development milestones that now underpin her own clinic's fracture-identification pathway. She will then discuss how the implementation of tools and prioritisation strategies have led to improved efficiencies in the care of VHFR patients. Finally, Dr Talla will explore some of the latest innovations being pioneered in her clinic that are helping to advance fracture-risk evaluation, including a digital fracture liaison service solution and other technology-based approaches.

This session features an engaging, interactive format, with the audience encouraged to provide their comments, thoughts and questions throughout.

Dr Maria Talla's disclosures:

Honoraria from UCB

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## CSA-OC1

**ADVANCES IN HRPQCT – FROM NOVEL PHENOTYPES TO IMPROVED FRACTURE RISK PREDICTION**M. Lorentzon<sup>1,2,3</sup>

<sup>1</sup>Sahlgrenska Osteoporosis Centre, Department of Internal Medicine and Clinical Nutrition, Institute of Medicine, University of Gothenburg, Gothenburg, Sweden, <sup>2</sup>Region Västra Götaland, Department of Geriatric Medicine, Sahlgrenska University Hospital, Mölndal, Sweden, <sup>3</sup>Mary MacKillop Institute for Health Research, Australian Catholic University, Melbourne, VIC, Australia

Although dual x-ray absorptiometry (DXA) is the gold standard technique for measuring bone mineral density (BMD) and for the evaluation of fracture risk, together with clinical risk factors, it does not allow the characterization of several important skeletal traits, such as bone geometry, volumetric BMD and bone microstructure. With the introduction of high-resolution peripheral quantitative computed tomography (HR-pQCT), a low-dose X-ray-based imaging technique, over a decade ago, better and more precise bone phenotyping, allowing discrimination between cortical and trabecular bone, as well as analyzing bone microstructure became available.

The added value of HRpQCT measurements for fracture prediction has been investigated in several cohorts. In the Bone Microarchitecture International Consortium (BoMIC) HR-pQCT data of 7254 participants (66% Women) from cohorts assembled in Canada (CaMos), France (QUALYOR), STRAMBO, OFELY, Sweden (MrOS), Switzerland (GERICO), and the USA (Framingham, Mayo Clinic), were investigated in relation to fracture risk in a prospective analysis.<sup>1</sup> Several HRpQCT parameters, representing both trabecular microstructure and cortical morphology, were associated with the risk of incident fracture. Adjusting models for femoral neck BMD, resulted in significant but lower hazard ratios for several HRpQCT variables, demonstrating a small but significant improvement in fracture risk prediction with HRpQCT. Recently, machine learning methods and microstructural indices have been developed and found associated with fracture risk, although these methods have not been extensively validated yet.<sup>2, 3</sup>

The use of HRpQCT has also enabled the evaluation of the effect of different osteoporosis medications on trabecular and cortical bone separately. For example, combined teriparatide and denosumab treatment has been shown to have the greatest effect on cortical bone microstructure, overcoming the teriparatide-induced increase in cortical porosity.<sup>4</sup>

In addition to bone microstructure assessments, HRpQCT has also been used for the development of methods to quantify bone marrow fat and determine arterial calcification, but these applications and their clinical utility need further exploration.<sup>5</sup>

Challenges for future implementation of HRpQCT in clinical use, include the issue with motion artifacts, particularly relevant for the radius measurements, the high cost of the equipment, and the lack of widely acceptable diagnosis criteria and risk stratification levels based on HRpQCT outputs.

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## CSA-OC2

**ANTIRESORPTIVE THERAPY TO REDUCE FRACTURE RISK AND EFFECTS ON DENTAL IMPLANT OUTCOMES IN PATIENTS WITH OSTEOPOROSIS: A SYSTEMATIC REVIEW AND CONSENSUS STATEMENT**A. Khan<sup>1</sup>

<sup>1</sup>Professor of Clinical Medicine, McMaster University, Hamilton, Canada

Placement of a dental implant in a patient on antiresorptive therapy has been hypothesized to increase the risk of Medication-Related Osteonecrosis of the Jaw (MRONJ) and/or impact implant survival. In patients with osteoporosis, the risk of MRONJ with antiresorptive therapy is only marginally higher than observed in the general population. The International ONJ Taskforce conducted a systematic review of the literature and evaluated the outcomes of implant placement in individuals with osteoporosis receiving antiresorptive therapy. The data were reviewed by the International Taskforce, and consensus was achieved on the GRADEd recommendation. In patients with osteoporosis on antiresorptive therapy the Taskforce suggests that antiresorptive therapy does not need to be stopped prior to proceeding with dental implant (weak recommendation, very low-quality evidence). Current evidence does not suggest an association between antiresorptive therapy and implant failure.

## CSA-OC3

**MUSCULOSKELETAL AGEING-A GLOBAL PERSPECTIVE**K. Ward<sup>1</sup><sup>1</sup>MRC Lifecourse Epidemiology Centre, Southampton SO16 6YD, Southampton, United Kingdom

Objective: In low- and middle-income countries (LMIC), there are already more than 1 billion people aged over 60 years. These older people spend longer living with disability and dependence than do those in high-income settings, leading to individual, family, societal and healthcare burdens in some of the most resource-poor countries (1). Life expectancy is rising more rapidly in Africa than any other continent globally (2). The United Nations declaration of the Decade of Health Ageing 2021-2030 stated there has never been a timelier opportunity to act to ensure the health of ageing adults, their families and communities. Central to this is the World Health Organization (WHO) definition of healthy ageing (to which we contributed): the process of developing functional ability that enables wellbeing in older age. Locomotion is one of the five key domains of functional ability; a functional musculoskeletal system is at its core.

Shifting demographics, together with rapid urbanisation and changing physical activity patterns, are generating an exponential rise in the prevalence of non-communicable diseases (NCDs). Hence, musculoskeletal diseases (sarcopenia, osteoporosis, osteoarthritis) are a major, and growing, contributor to the global NCD burden, accounting for more years lost due to disability than cancer and cardiac disease combined (3). Globally, multimorbidity, defined as the co-existence of two or more chronic conditions in the same individual, is now a global health research priority (4); importantly one third of multimorbidity cases includes at least one musculoskeletal disease (5). Reductions in muscle strength and function, fractures and joint pain are inevitable manifestations of ageing (this is known as sarcopenia), which lead to falls and fragility fractures (from low impact injuries), disability, frailty, morbidity and mortality.

Challenges exist across the globe to ensuring successful identification, diagnosis and treatment of musculoskeletal conditions with a necessity to ensure context specific approaches are taken. There will be a focus on osteoporosis and sarcopenia, reviewing current knowledge and identifying key gaps to the evidence base.

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## OCs1

**APPLICATION OF DEEP LEARNING ALGORITHM TO DETECT AND VISUALIZE VERTEBRAL FRACTURES ON PLAIN FRONTAL RADIOGRAPHS**C. Soong<sup>1</sup>, F.-H. Lin<sup>2</sup>, R.-S. Yang<sup>3</sup>, T.-H. Yang<sup>4</sup>, H.-Y. Chen<sup>3</sup>

<sup>1</sup>Institute of Biomedical Engineering, College of Medicine and College of Engineering, National Taiwan University, Taipei, <sup>2</sup>Dept. of Biomedical Engineering, College of Medicine and College of Engineering, Taipei, <sup>3</sup>Dept. of Orthopaedic Surgery, National Taiwan University College of Medicine and National Taiwan University Hospital, Taipei, <sup>4</sup>Dept. of Orthopedic Surgery, National Taiwan University Hsin-Chu Hospital, Hsinchu, Taiwan

**Objective:** Identification of vertebral fractures (VFs) is critical for effective secondary fracture prevention owing to their association with the increasing risks of future fractures. Plain abdominal frontal radiographs (PARs) are a common investigation method performed for a variety of clinical indications and provide an ideal platform for the opportunistic identification of VF. This study uses a deep convolutional neural network (DCNN) to identify the feasibility for the screening, detection, and localization of VFs using PARs.

**Methods:** A DCNN was pretrained using ImageNet and retrained with 1306 images from the PARs database obtained between August 2015 and December 2018. The accuracy, sensitivity, specificity, and area under the receiver operating characteristic curve (AUC) were evaluated. The visualization algorithm gradient-weighted class activation mapping (Grad-CAM) was used for model interpretation.

**Results:** Only 46.6% (204/438) of the VFs were diagnosed in the original PARs reports. The algorithm achieved 73.59% accuracy, 73.81% sensitivity, 73.02% specificity, and an AUC of 0.72 in the VF identification.

**Conclusion:** Computer driven solutions integrated with the DCNN have the potential to identify VFs with good accuracy when used opportunistically on PARs taken for a variety of clinical purposes. The proposed model can help clinicians become more efficient and economical in the current clinical pathway of fragile fracture treatment.

## OCs2

**ASSESSMENT OF MACHINE LEARNING MODELS FOR FRACTURE RISK PREDICTION**E. Sykes<sup>1</sup>, R. Jain<sup>2</sup>, N. Sano<sup>1</sup>, H. N. Moon<sup>1</sup>, J. Weldon<sup>2</sup>, R. Shanker<sup>3</sup>, V. Voytenko<sup>1</sup>, J. Sullivan<sup>3</sup>, D. Sauer<sup>3</sup>

<sup>1</sup>Centre for Mobile Innovation, Sheridan College, Oakville, <sup>2</sup>Osteoporosis Canada, Toronto, <sup>3</sup>Inovex, Oakville, Canada

**Objective:** BMD T-Scores are important in the assessment of risk fracture. However, historically in Canada, many patients do not complete a bone mass density scan, despite their physician's request. In this work, we created three machine learning (ML) models using 819 patient data from Osteoporosis Canada, to classify patients as low, moderate, or high risk of an osteoporotic fracture. The aim is to help clinicians prioritise patients that have a high risk of a fracture when BMD T-scores are not available.

**Methods:** The ML models included Random Forest Classifier (RFC), Support Vector Classifier (SVC), and Stacking Classifier. Models were trained with the FRAX calculation results with T-scores. The Synthetic Minority Oversampling Technique was used to generate and balance the training data.

**Results:** The RFC model performed the best with precisions of 82.1% and 79.2% for low and moderate classifications. The precision for high classifications suffered from overpredicting moderate classifications which lowered its precision to 55.6%. The sensitivity had a major difference, we saw that RFC correctly predicted 93% of high risk patients in its test set in comparison to FRAX without a T-score managing to predict 68%.

**Conclusion:** The RFC offers the best-balanced performance. The low precision rate in high classification was from slightly over diagnosing moderate risk patients to high, which is preferable to underestimating high classification. SVC and Stacking were adequate at identifying moderate classification but struggled with other classifications. FRAX without T-score was good at predicting low classification but had tendency to under diagnose.

## OCs3

**SCREENING FOR SARCOPENIA IN OLDER COMMUNITY-DWELLING ADULTS: FINDINGS FROM SOUTHAMPTON LONGITUDINAL STUDY OF AGEING (SALSA)**

F. Laskou<sup>1</sup>, L. D. Westbury<sup>1</sup>, G. Bevilacqua<sup>1</sup>, C. Cooper<sup>1</sup>, P. Aggarwal<sup>2</sup>, H. P. Patel<sup>1</sup>, E. Dennison<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Centre, <sup>2</sup>Living Well Partnership, Southampton, UK

**Objective:** The SARC-F questionnaire is a validated screening tool that can be rapidly implemented by clinicians to identify patients with probable sarcopenia. A score  $\geq 4$  is predictive of sarcopenia and poor outcomes. In this study we sought to identify the prevalence and demographic correlates of probable sarcopenia (SARC-F score  $\geq 4$ ) in a community-dwelling cohort of older adults.

**Methods:** 480 participants (219 men, 261 women) identified from a Primary Care Network in Southampton (UK). Participants completed a postal questionnaire which ascertained demographic and lifestyle factors, in addition to number of comorbidities, nutrition risk score (DETERMINE) and SARC-F score. Participant characteristics in relation to probable sarcopenia were examined using sex-stratified logistic regression; age was included as a covariate in all models.

**Results:** The median (lower quartile, upper quartile) age of participants was 79.8 (76.9, 83.5) years; 12.8% of men and 23% of women had probable sarcopenia. Self-reported walking speed was strongly associated with probable sarcopenia (men: odds ratio (OR) 10.39 (95%CI: 4.55, 23.72),  $p < 0.001$ ; women: 11.42 (5.98, 21.80),  $p < 0.001$  per lower band). Older age was associated with probable sarcopenia in both sexes ( $p = 0.01$ ) as was higher DETERMINE score (men: 1.30 (1.12, 1.51),  $p = 0.001$ ; women: 1.32 (1.17, 1.50),  $p < 0.001$  per unit increase). Among men, being married or in a civil partnership or cohabiting was protective against probable sarcopenia (0.39 (0.17, 0.89),  $p = 0.03$ ) as was reporting drinking any alcohol (0.34 (0.13, 0.92),  $p = 0.03$ ) while in women generally similar relationships were seen though these were weaker. In addition, higher BMI (1.14 (1.07, 1.22),  $p < 0.001$  per unit increase) and higher number of comorbidities (1.61 (1.34, 1.94),  $p < 0.001$  per extra medical condition) were also associated with probable sarcopenia in women. All the above associations were robust to adjustment for age.

**Conclusion:** Probable sarcopenia (SARC-F score  $\geq 4$ ) is common in older adults living in their own homes. As expected, self-reported walking speed was highly predictive of probable sarcopenia. In addition to advancing age and malnutrition, socio-demographic factors were also important. Presence of these factors might trigger sarcopenia screening of older adults in clinical care.

## OCs4

**PATIENTS' PREFERENCES FOR COMMUNICATING FRACTURE RISK: THE RISK COMMUNICATION IN OSTEOPOROSIS (RICO) STUDY**

C. Beaudart<sup>1</sup>, M. Sharma<sup>2</sup>, S. Silverman<sup>3</sup>, M. Hilgsmann<sup>1</sup>

<sup>1</sup>Dept. of Health Services Research, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, Netherlands, <sup>2</sup>The OMC Research Center, Beverly Hills, USA, <sup>3</sup>Cedars-Sinai Medical Center, UCLA, Los Angeles, USA

**Objective:** Patients seek active involvement in decisions about their bone health, but little is known about how to best communicate fracture risk information to them. In order to facilitate greater patient involvement in clinical decision-making, this study aims to understand patient preferences, regarding fracture risk communication.

**Methods:** Semistructured interviews were conducted in 11 centres around the world (UK, Belgium, the Netherlands, Spain, Japan, Canada – Hamilton and Montreal, Argentina, Mexico, USA – Los Angeles and Spokane). The interview guide used to collect data was designed based on a systematic review and a qualitative pilot study involving 26 patients at risk for fractures. 332 postmenopausal women or women aged 60 years and older with or at risk of osteoporosis to whom anti-osteoporosis medicine were proposed were studied.

**Results:** Although participants (mean age  $67.5 \pm 8.02$  years, 48.2% with an history of fracture) considered it as important to receive information about their fracture risk (mean importance of  $6.2 \pm 1.4$  on a 7-point Likert scale), only 56% (i.e. 185/332) of them reported having received such information from their healthcare professionals. Globally, participants preferred a visual representation of their FRAX<sup>®</sup> score to a verbal or written presentation. Among visual presentations, colored graphs were preferred more often than icon arrays (colored graph ranked as the most understandable presentation and the most convincing to initiate a treatment by 61% of the sample). Many patients found a direct comparison of their fracture risk with and without medication use to be useful in deciding whether to initiate treatment. Almost all participants also considered it important to discuss the consequences of fractures (i.e. risk of death, inability to walk, loss of independence, loss of quality of life, and disability) and to receive a verbal explanation of their fracture risk from healthcare professionals. They also showed a potential interest in receiving a printed format or access to an online website that could present their own fracture risk.

**Conclusion:** The RICO study provides insights into preferred approaches, including visual representations of the FRAX score, to communicate fracture risk information with patients.

## OCs5

**SHORT-TERM (2 YEARS) FRACTURE RISK PREDICTION: A MACHINE LEARNING APPROACH**G. Adami<sup>1</sup>, E. Grisan<sup>2</sup>, O. Viapiana<sup>1</sup>, A. Fassio<sup>1</sup>, D. Bertelle<sup>1</sup>, C. Benini<sup>1</sup>, D. Gatti<sup>1</sup>, M. Rossini<sup>1</sup><sup>1</sup>University of Verona, Verona, Italy, <sup>2</sup>London South Bank University, London, UK

**Objective:** Osteoporotic fractures continue to be a major cause of global health concerns around the world. The most common risk scores (FRAX, DeFRA) are evaluating this risk within a 10-year time window, which might not be suitable for evaluating shorter term risk, or quickly progressing patients. The objective of the present analysis is to develop 2-year fracture risk scoring models using Machine Learning (ML) techniques and compare their performance with the DeFRA tool.

**Methods:** Data were obtained from web-based fracture risk assessment tool (DeFRA) used in Italy. This tool is a derived version of the FRAX and can be accessed through a website (<https://de-fra-osteoporosi.it/>). 33 clinical and densitometric variables were used to compute the DeFRA risk score, with variable degree of completeness for each patient. After eliminating the attributes with a large number of missing values, and eliminating the patient with large outlier values for any of the attributes, the dataset was reduced to 2516 patients (with follow-up visits) and 15 attributes (age, weight, height, bmi, smoking, alcohol, familial fractures/osteoporosis, previous femur or vertebra fractures, previous other fractures, comorbidities, prednisone mg equivalent per day, T-score femoral-neck, T-score spine, serum CTX levels, anti-osteoporotic therapy prescribed). For the development of the machine-learning prediction, the dataset has been randomly divided into a train-set and a test-set, and the train-set has been synthetically balanced using Synthetic Minority Oversampling Technique (SMOTE). A Logistic Regression (LR) model and a Random Forest (RF) model have been optimized on the train-set for predicting the patients who incurred either a hip fracture, or any major osteoporotic fracture, or both in the 2 years following the baseline visit. DeFRA risk score is used as a benchmark for the prediction of either hip fracture or of any major fracture within 2 years.

**Results:** The DeFRA score, when used to predict the patients incurring a hip fracture within 2 years, has an area under the receiver-operating curve (AUROC) of 0.52, compared to 0.76 for random Forest and 0.81 for logistic regression. When looking at other major osteoporotic fractures, the AUROC is 0.59 for DeFRA, 0.77 for LR and 0.80 for RF, and when looking at any fracture the values are 0.58, 0.78, 0.80 for DeFRA, LR and RF respectively. Performance metrics including accuracy, sensitivity, and specificity are summarized in Table 1.

Table 1: Performance of DeFRA and machine learning classifier in predicting patients incurring an osteoporotic fracture within 2 years

	Hip fracture			Major osteoporotic fracture			Any fracture		
	DeFRA	LR	RF	DeFRA	LR	RF	DeFRA	LR	RF
AUROC	0.52	0.81	0.76	0.59	0.77	0.80	0.58	0.78	0.80
Accuracy	0.62	0.63	0.92	0.68	0.69	0.89	0.61	0.71	0.90
Sensitivity	0.40	0.76	0.29	0.49	0.76	0.34	0.54	0.79	0.34
Specificity	0.63	0.62	0.95	0.69	0.69	0.93	0.61	0.70	0.95

**Conclusion:** Currently used risk scores for osteoporotic fractures are developed within a 10-year time window, which might be too long to stratify the most at risk-patients or those that are showing a fast-progressing disease. This is reflected by the poor predictive performance of DeFRA when looking at a 2-year time window. Machine-learning (either logistic regression or random forest) could greatly improve the predictive performance of a scoring system to identify the patients most likely to incur an osteoporotic fracture in the short term, thus requiring shorter follow-ups.

## OCs6

**APPENDICULAR LEAN MASS AND FAT PERCENTAGES CUTOFF VALUES TO DEFINE SARCOPENIC OBESITY IN UKRAINE COMMUNITY-DWELLING OLDER ADULTS**N. Grygorieva<sup>1</sup>, M. Bystrytska<sup>1</sup>, A. Musiienko<sup>1</sup><sup>1</sup>Dmitry F. Chebotarev Institute of Gerontology of the National Academy of Medical Sciences of Ukraine, Kyiv, Ukraine

**Objective:** Sarcopenic obesity – the combination of muscle loss and obesity reduces physical activity and mobility and increases the risk of inability and mortality. Data on its prevalence in the population are ambiguous, which is due to the lack of unified diagnostic criteria. Sarcopenic obesity is the combination of an increased fat percentage and decreased skeletal muscles mass (appendicular lean mass) percentage or appendicular lean mass index according to EWGSOP2 criteria (appendicular lean mass (ALM) <15 kg or appendicular lean mass index (ALMI) <5.5 kg/m<sup>2</sup> for women and ALM <20 kg or ALMI <7 kg/m<sup>2</sup> for men). The aim of the study was to investigate the appendicular lean mass and fat-percentages cut-off values for sarcopenic obesity in the Ukrainian population.

**Methods:** Fat percentage cutoff values to define sarcopenic obesity were measured above the 60th percentile (Zoi-co-method) in 3095 persons (2666 women and 429 men) aged 20-90 years. Cutoff values for appendicular lean mass percentages (ALM/BW) were assessed as -2 SD in 770 healthy persons (385 women and 385 men) aged 20-39 years. The body composition (body weight (BW), height, fat mass (FM), lean mass, appendicular lean mass (ALM), appendicular lean mass index (ALMI) and fat mass/BW (%), ALM/BW (%)), were assessed by DXA (Hologic, Discovery).

**Results:** Body fat percentage thresholds for sarcopenic obesity were >28% for men and >41% for women. Prevalence of sarcopenic obesity was 3.6% (using ALM <15 kg) and 1.6% (ALMI <5.5 kg/m<sup>2</sup>) for women and 1.6% (ALM <20 kg) and 4.2% (ALMI <7 kg/m<sup>2</sup>) for men. Cutoff values for ALM/BW were <22% for women and

<28% for men. The frequency of sarcopenic obesity in a cohort of 3,095 subjects using the cut-off values for fat and lean mass that we selected was 9.6% in men and 9.8% in women.

**Conclusion:** Determining the population-specific cut-off points of fat mass and lean mass is necessary for the further selection of individuals with sarcopenic obesity. Our results are similar to data for other European populations. Differences in the frequency of sarcopenic obesity obtained according to different criteria require further research and unification of criteria.

## OCs7

### THE CONCEPT OF 'TIME TO FIRST FRACTURE' IN THE FRISBEE COHORT: ANALYSIS OF RISK FACTORS AND ASSOCIATION WITH 'IMMINENT FRACTURES'

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**Objective:** Risk factors for fragility fractures were assessed in several prediction models. However, predictors of a shorter 'time to first fracture' and its impact on imminent re-fracture occurrence are unknown.

**Methods:** Here, we looked at the 'time to first fracture' after inclusion in the FRISBEE ("Fracture Risk Brussels Epidemiological Enquiry") cohort (3560 postmenopausal women; median follow-up time of 10.1±2 years). Validated fractures were divided into 3 groups: first fracture <2 years, 2-5 years, and >5 years after inclusion. Uni- and multivariate analyses using Cox modeling were performed to evaluate factors associated with first fracture risk in these three groups. We also examined if a short 'time to first fracture' was a risk factor for imminent fractures. Differences between groups were evaluated by chi-square tests.

**Results:** Classical risk factors (age, prior fracture, fall history and low BMD) were associated with a first fracture in all groups. Previous glucocorticoid use and rheumatoid arthritis (RA) were predictors for early fracture (<2 years), consistent with the concept of very high risk. On the other hand, 'time to first fracture' was not an independent risk factor for subsequent imminent fractures.

**Conclusion:** Among the risk factors considered, only previous glucocorticoid use and RA were specific predictors for early fracture. Moreover, the 'time to first validated fracture' was not an inde-

pendent risk factor for imminent fractures. Patients with a first osteoporotic fracture should thus be considered at very high risk for re-fracture, independent of the 'time to first fracture'.

## OCs8

### APPLICATION OF TOMOSYNTHESIS FOR VERTEBRAL COMPRESSION FRACTURE DIAGNOSIS AND BONE HEALING ASSESSMENT IN FRACTURE LIAISON SERVICES

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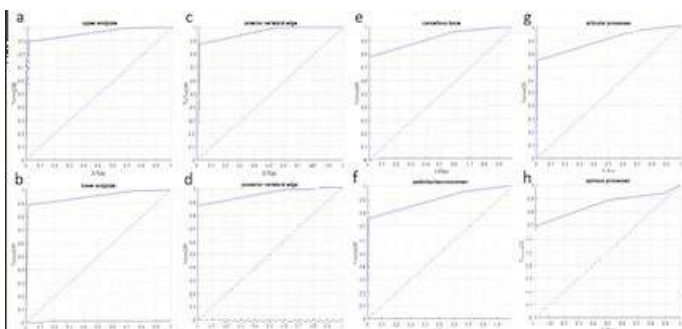
**Objective:** Early identification of vertebral compression fractures (VCFs) is crucial for successful secondary fracture prevention. Tomosynthesis, a low-dose tomographic imaging technique, may facilitate the evaluation and long-term follow-up of VCFs in patients with osteoporosis.

**Methods:** We compared the performances of plain radiography and tomosynthesis for VCF diagnosis and healing assessment in patients enrolled in fracture liaison services in our hospital. 49 patients with new VCFs at the T10-L5 levels were prospectively recruited between August 2018 and May 2020; all patients underwent thoracolumbar plain radiography and tomosynthesis.

**Results:** We evaluated the accuracy of the VCF diagnosis, image quality, and VCFs healing process. Tomosynthesis identified 90 levels of VCF in 49 patients, while plain radiography revealed only 87.8% (79/90) of them. There were 44.9% (22/49) patients with neglected chronic VCFs as seen on tomosynthesis. Tomosynthesis images had improved VCF diagnostic accuracy up to 12.2% and showed significantly more anatomic details than plain radiography. For diagnosis of VCFs, the performance of plain radiographs was poorer than that of tomosynthesis images (plain radiographs: sensitivity 84%, specificity 93.5%, false positive rate 6.5%, and false negative rate 16%; tomosynthesis: sensitivity 93.2%, specificity 100%, false positive rate 0%, and false negative 6.8%), using MRI as gold standard. The kappa coefficient between tomosynthesis and MRI is 0.956 while between radiography and MRI is 0.704. Tomosynthesis showed significantly more anatomic details than plain radiography and all the examiners revealed a clear preference for tomosynthesis. Tomosynthesis scored 3.3 times higher on the fracture healing assessment at the 3-month follow-up than plain radiographs.

**Conclusion:** Tomosynthesis is a promising tool for VCF screening and diagnosis in patients with osteoporosis and for monitoring fracture healing status at a low radiation dose and cost.





## OCs9

### THE ASSOCIATION OF REGIONAL BODY MUSCLE MASS AND FATTY LIVER INDEX IN OLDER PEOPLE: BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

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**Objective:** Some studies have found a relationship between hepatic steatosis and sarcopenia. The common pathogenesis of non-alcoholic fatty liver disease (NAFLD) and age-related low muscle mass is insulin resistance and the distribution of fat in these organs. This study aimed to assess the association between body skeletal muscle mass and another parameter of sarcopenia with fatty liver index (FLI), as an invasive and simple tool to establish NAFLD, in Iranian older people.

**Methods:** This cross-sectional study ultimately included 400 participants aged  $\geq 60$  from stage II of the BEH program. FLI was cal-

culated from BMI, waist circumference (WC), serum triglyceride (TG), and gamma-glutamyl transferase (GGT). The body muscle mass was established by DXA and muscle strength was assessed by a dynamometer. The skeletal muscle mass index (SMI) was defined as the appendicular lean mass (ALM) adjusted for the BMI. low SMI was defined as  $ALM/BMI < 0.789$  and  $< 0.512$  in men and women, respectively.

**Results:** There was a pattern of decreasing SMI with increasing quartiles of FLI ( $P < 0.001$ ). Compared with the first quartile (Q1) of FLI, mean lower limbs lean, upper limbs lean, and trunk lean in the fourth quartile (Q4) were lower ( $P < 0.001$ ). Also, percent of people with lower SMI was 27.6% in Q4 compared to Q1 which was 18.3%. However, there was no significant association between muscle strength and FLI. Multivariate linear and logistic regressions were used to reveal the association between FLI and regional muscle mass and low SMI. In all linear models, the higher quartile of FLI was associated with decreased lower limbs lean., upper limbs lean, trunk lean, and SMI ( $P < 0.05$ ). Also, participants with the higher quartile of FLI were more likely to have the risk of low SMI and this association remained even after adjusting for potential covariates [aOR: 7.81(3.51-17.41)].

**Conclusion:** The findings revealed that FLI, as an index of NAFLD, was a significant and potent risk factor for low skeletal muscle mass in older people.

## OCs10

### ASSOCIATIONS BETWEEN HEALTH LITERACY AND BONE, MUSCLE, AND PHYSICAL FUNCTION OUTCOMES IN COMMUNITY-DWELLING OLDER ADULTS

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**Objective:** Health literacy (HL) refers to the ability to access, understand, and use health information to make decisions about health; and was identified by WHO as a critical enabler to achieve sustainable health by 2030. This study aimed to explore whether bone, muscle, and physical function outcomes differ by HL level.

**Methods:** Data were collected from 300 older adults (mean age: 66.4 years; 62% female; 201 with osteopenia/osteoporosis) including BMD, grip strength, and several physical function measures. Osteopenia/osteoporosis was defined by the WHO definition and sarcopenia by the SDOC definition. HL was measured using the HL questionnaire (HLQ) comprising nine distinct scales: 1) Feeling understood and supported by health providers; 2) Having sufficient information to manage health; 3) Actively managing my health; 4) Social support for health; 5) Appraisal of health in-

formation; 6) Ability to engage with health providers; 7) Navigating the health system; 8) Ability to find health information; and 9) Understanding health information.

**Results:** Mean scores were lower in six HLQ scales for participants with osteopenia/osteoporosis compared to those with normal BMD, however these were not statistically significant. Associations in sarcopenia were not calculated due to low prevalence (n=14; 4.7%), though positive associations with HL were seen in related outcomes. Positive correlations were seen between hand grip strength and HLQ scales 4, 6 and 7 (p<0.05); faster sit-to-stand test times were associated with higher scores in all HLQ scales (except scale 4; p<0.05); and positive correlations were reported between gait speed and most HLQ scales (excluding 1, 6 and 7; p<0.05).

**Conclusion:** This is the first study to provide insights into the important role of HL in bone, muscle, and physical function in older adults. Our findings are particularly relevant for clinicians and policy makers seeking to implement and/or develop interventions to improve prevention of musculoskeletal conditions.

## OCs11

### A SYSTEMATIC REVIEW AND CRITICAL APPRAISAL OF QUALITY INDICATORS TO ASSESS OPTIMAL CARE FOR FRAGILITY HIP FRACTURE

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**Objective:** Fragility hip fractures are a public health problem. Quality indicators for hip fracture care can reduce variability among healthcare centers, promote equity, and enable better use of healthcare resources. They have also been shown in other countries to improve patient outcomes. However, there is currently no proposal in Mexico that fits the Mexican healthcare system. We aimed to identify and critically evaluate quality indicators for optimal care for fragility hip fractures.

**Methods:** A systematic review of the literature was conducted in July 2022 to identify quality indicators for fragility hip fractures. English-language articles published from 2012 to 2022 in PubMed, Cochrane Library, and Google Scholar were included. Systematic reviews, meta-analyses, clinical practice guidelines, and consensus documents were included. Publications from the Fragility Fracture Network (FFN) Hip Fracture Registry Working Group were also included. Search strategies were planned and recorded using MeSH terms, Boolean operators, and advanced search techniques for hip fracture, quality indicators, quality standards, and key performance indicators. The abstracts of the articles found were reviewed. Duplicates, lack of agreement between the title, objectives, and body of the article, incorrect identification of the type of published article, and incomplete results were

excluded. The Appraisal of Indicators through Research and Evaluation (AIRE) tool was used to establish the indicators' quality. A result greater than 50% for each indicator or domain was interpreted as high methodological quality. The level of evidence and recommendation for each of the indicators found were analyzed using the Scottish Intercollegiate Guidelines Network (SIGN) tool. The study was registered in PROSPERO CRD42022339800.

**Results:** A total of 539 publications were obtained from databases and five from the FFN, of which 15 articles were included for the review of quality indicators. Fifty-four indicators were extracted and evaluated using the AIRE tool, after which ten were removed due to poor methodological quality, leaving a total of 44 indicators. They were classified according to the time of application (preoperative, intraoperative, or postoperative) and type (structure, organization, or results).

**Conclusion:** We systematically derived and assessed a set of quality indicators using a robust framework that provides clear definitions of the fragility hip fracture care. Identifying indicators with high validity represents the first step in adapting and adopting a proposal that can improve patient outcomes for hip fractures in Mexico.

# WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

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**Non-Sponsored Symposia Abstracts**

## NSS1

## EFFICACY OF PRP IN TENDINOPATHIES

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Tendinopathy is a major problem in medicine. It is caused, among other things, by mechanical overload. It remains a challenge for the medical world as its frequent resistance to conventional treatments never promises the patient a favorable response following therapeutic management. The development of PRP is a new hope when therapeutic treatments such as NSAIDs, corticosteroid injections, eccentric rehabilitation, shock waves, etc. have shown their limits. PRP is obtained by centrifuging autologous blood to obtain a higher concentration of platelets than in blood. Platelets contain growth factors and cytokines that can have an anti-inflammatory and/or healing effect.

## NSS2

## STANDARDISATION OF PRP IN THE MANAGEMENT OF KNEE AND HIP OSTEOARTHRITIS

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The use of intra-articular PRP injections for knee osteoarthritis has increased considerably in recent years. Several randomized controlled trials and meta-analyses have been performed, showing superiority of PRP injection over placebo and other intra-articular treatments. Indeed, they are considered as first-line treatments in accordance with the latest international guidelines and working groups (ESSKA, AAOS). However, the heterogeneity of the protocols limits the extrapolation of these results. Twenty-five recommendations were elaborated by the GRIIP (Groupe de Recherche International sur les Injections de Plaquettes - [www.griip.org](http://www.griip.org)), an international multidisciplinary working group, to provide a basis for standardisation of clinical practice and future research protocols. This presentation will review the main recommendations issued by the GRIIP for PRP injections in knee osteoarthritis, in addition to reviewing the most recent data in the literature on this subject, in order to help the physician offer the optimal treatment for his patient.

## NSS3

## FUTURE PERSPECTIVES FOR THE USE OF PRP IN THE MANAGEMENT OF MUSCULOSKELETAL DISORDERS

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The knee joint presents mechanical and biological characteristics that make it a unique complex organ. The imbalance caused by the injuries and aggressions to which this joint is subjected requires a multifunctional approach to restore functionality. The treatments applied must therefore focus on mechanical and structural repair as well as on the restoration of biological balance. Surgical interventions are currently the only definitive treatments for numerous pathologies and injuries that the knee may suffer from. However, the use of Platelet-Rich Plasma (PRP) as an adjuvant to surgery is a valuable tool due to the biological stimuli it generates, improving and accelerating the patient's recovery. In order to achieve this objective, it is important to understand the application of PRP and to follow rational protocols that make the most of the properties of this therapy.

## NSS4

## OSTEOPOROSIS IN AGED: ¿WHAT WE KNOW AND WHAT WE NEED TO KNOW?

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Osteoporosis is a bone disorder characterized by low bone mass, and weakening of the skeletal, which lead to increased risk of fracture. Osteoporosis can be divided into primary and secondary. The first one can be divided into postmenopausal and senile or age-related osteoporosis. Whereas postmenopausal osteoporosis arises to estrogen deficiency, senile osteoporosis is associated with aging processes including inflammatory processes, increased parathyroid hormone levels, calcium and vitamin D insufficiency, or osteoblast dysfunction. Aging leads to bone loss, and its prevalence osteoporosis increases with age(3). Fragility or osteoporotic fractures are the main complication of osteoporosis. An osteoporotic fracture is that one following a fall from standing height, when coughing or moving and even at rest and includes fractures of the spine, hip, forearm, proximal humerus, ribs, sternum, pelvis, sacrum, and clavicle. Elderly women have more risk than men to suffer an osteoporotic fracture during her lifetime. A fracture is often followed by the sequelae of hospitalization, impaired quality of life, need for long-term care, disability, and even death, especially hip fracture. Of all osteoporosis-related fractures, a vertebral compression fractures creates accentuation of the spine and bone deformity known as hyperkyphosis, associated to decreased ageing chest wall compliance, leading to decline in forced vital capacity and restrictive lung disease

which is further worsened if kyphosis is present. Dysphagia and associated malnutrition may occur in severe kyphosis from direct mechanical obstruction of the esophagus due to severe spinal deformity. Senile osteoporosis besides in the imbalance between bone formation and resorption, in relation with accumulation of senescent cells. With age increase number and function in bone marrow stromal cells (BMSCs) and its differentiation into more adipocytes rather than osteoblasts which leads to decreased bone formation and contributes to senile osteoporosis. Frailty, a clinical syndrome of decline in physiologic reserve and increased vulnerability, is another risk factor that has been linked to poor bone health and osteoporotic fractures in elderly, because the frailer elderly is more likely to fall and have an osteoporotic fracture and the higher risk is of having a fracture in the future. Identify the fragile and quantify degree of frailty could aid in the assessment, management, and decision-making for the elderly at a clinical research level and at a health care policy level. Treatment of osteoporosis should be initiated in women and men 50 years old or older who have a bone mineral density T score of  $\leq -2.5$  SD, a history of a major fracture or a Fracture Risk Assessment Tool score indicating increased fracture risk. Several guidelines recommend a non-pharmacologic and pharmacological approach. Exercise increases osteoblast and osteocyte function while reducing osteoclast activity. Resistance and weight-bearing exercise can increase muscle mass and transiently increase bone mineral density. Tai chi and yoga improve balance and increase muscle tone, which as a secondary effect reduces the risk for falls among elderly patients. Counseling about smoking cessation and alcohol cessation are encouraged and systematically ask about falls in the past year is mandatory. Numerous drugs have shown an improvement about parameters of reduction of osteoporotic fractures and studies have shown that the efficacy of pharmacological treatment in the elderly is like that of the adult population in terms of cost-effectiveness, especially after suffering a major fracture. Before deciding the pharmacological intervention factors like, fracture risk, comorbidities, polypharmacy, cognitive status, and life expectancy must be taken into account. However, the therapies we know of are aimed at the specific changes of the aged bone at risk of fracture. Strategies based on pharmacologic elimination of senescent cells so called senolytics, selectively promote apoptosis of senescent cells are going. Several researchers have reported the successful transplantation of BMSCs using animal models. Clinical trials are needed in future. In the search for prevention and treatment we will also need answers to other questions: ¿What regulatory factors play a primary role in regulating BMCs differentiation? ¿Which is the relationship between frailty and osteoporotic fractures in different populations? ¿Whether interventions in the pre-frail older adults can prevent osteoporotic fractures?.

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## NSS5

### OSTEOPOROSIS IN CHILDHOOD AND TEENAGERS

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Osteoporosis is known to be a major problem for adults and elderly individuals. Nevertheless, it is also a common said that osteoporosis is a geriatric disease resulting from pediatric conditions. This affirmative is supported by the fact that around 80% of the peak bone mass is genetically determined. Although genetics is quite important, it is not the single determinant of fragility fracture risk. There are situations, during the developmental period of bone mass acquisition, that may lead to higher fracture risk in the future.

Besides that international consensus and guidelines have been published; diagnostic and treatment of osteoporosis at younger ages are caveats still challenging.

According to the International Society for Clinical Densitometry (ISCD), pediatric osteoporosis is currently defined by a combination of bone mineral density (BMD) Z-score  $\leq -2$  and clinically significant fracture history defined as the presence of either two or more long bone fractures before the age of 10 years or three or more long bone fractures at any age up to 19 years; or one or more vertebral compression fractures occurring without high energy trauma or local disease irrespective of the BMD Z-score. Reference databases should be specific for children and adolescents. Bone Mineral Density in Childhood Study - BMDCS, is a large, standardized cohort of children comprised of recommended DXA reference database for younger population. Areal BMD corrected for Height-for-Age Adjusted Z-score (aBMDHAZ) and Bone Mineral Apparent Density (BMAD) are outputs parameters evaluated. The sites for DXA acquisitions are total body and lumbar spine. Nevertheless, there may be special circumstances when forearm or proximal femur may be the preferred. Total body less head (TBLH) BMC or aBMD is preferred due to the changes in relative contribution of the head to total BMC and aBMD during growth. Although challenges in bone densitometry of the youngsters remain, statement positions and guidelines provide standards for the use of bone densitometry in clinical practice.

The investigational approach also includes physical exam, laboratory tests and history. Primary osteoporosis usually occurs due to an underlying genetic defect. The most common conditions are osteogenesis imperfecta and juvenile idiopathic juvenile osteopo-

rosis. Secondary osteoporosis is more common in patients under 18 years old with inflammatory, hematological, and oncological disorders, renal disease, immobility or muscle impairment and chemotherapy and corticosteroids. The onset of puberty is associated with a significant increase in bone mass mainly in the last stages of puberty in both sexes, markedly in boys. Sex steroids act on the skeleton through direct stimulation of bone receptors and indirectly through activation of the GH-IGF-I axis by estrogens, leading to longitudinal bone growth. Besides their anabolic actions; androgens and estrogens mechanism of action manifest through anti-resorptive effects. The asynchrony between BMD accumulation and height gain is likely to play a role, as skeletal volume is increasing at a faster rate than the mineralization process. Exposure to estrogens and testosterone has a protective effect on BMD and is associated with a reduced incidence of atraumatic fractures. Delayed puberty as due to chronic conditions like Turner and Klinefelter syndromes, hypogonadotropic hypogonadism, ovarian failure, and anorexia nervosa; can result in reduced bone mineral density and subsequent increased rate of fractures.

Laboratory studies shall include serum calcium, phosphate, magnesium, creatinine, alkaline phosphatase (ALP), gamma glutamyl transferase (GGT), 25-hydroxy vitamin D, PTH, and urinary creatinine, calcium, and phosphate. Where no secondary cause of osteoporosis can be found, targeted, whole exome, and RNA sequencing methods should be considered.

Another issue that limits the approach to youngsters' osteoporosis regards to treatment. The drugs available were originally designed for postmenopausal populations, and not for youngsters. One exception is the asfotase alpha, approved for hypophosphatasia, a rare inherited disorder characterized by defective bone and teeth mineralization, due to deficiency of serum and bone alkaline phosphatase activity with a prevalence of 1/100.000 individuals. PTH, and effective anabolic agent for bone in adults, has a warning against its use in children and teens because it has caused osteosarcoma in growing animals.

Other medications, originally developed for adult patients may also be administered to youngsters. It is the case of bisphosphonates. Nevertheless, gains in BMD observed with bisphosphonate therapy are encouraging, none of the studies was sufficiently powered to examine effects on vertebral or appendicular fractures. There is no consensus regarding the optimal bisphosphonate agent in children, dosage, or duration of therapy. The lack of randomized trials comparing drugs and doses in various conditions makes it impossible to declare one therapeutic regimen superior to another. Nor the optimal duration of bisphosphonate therapy in young patients can be established. The more serious side effects linked to bisphosphonates in adults such as uveitis, thrombocytopenia, or esophageal or oral ulcerations are rare in children. Avascular necrosis of the jaw has not been reported. There is concern for potential adverse effects on reproductive health. Therefore, it is prudent to assure birth control to adolescent girls during bisphosphonate therapy and consider pregnancy testing before bisphosphonate infusion.

In conclusion, there are several controversies and specificities for osteoporosis at younger ages. Identifying individuals at greatest risk for fracture is difficult but may lead to better out-

comes. Until more robust data is available, a rational and conservative approach to the use of medications for osteoporosis in children and adolescents is recommended.

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## NSS6

### OSTEOPOROSIS IN REPRODUCTIVE LIFE

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**Definition:** The diagnosis of osteoporosis is most certain when there is an insufficiency fracture, equivalent to a fall from a standing height or less. Stress fractures occur in the context of ongoing skeletal stress and in the absence of a specific traumatic event. Clinical judgment is required to determine if there was normal stress on brittle bone or excessive stress on normal bone. As in all cases of unusual fracture, the diagnosis of osteoporosis should be considered only after excluding: osteomalacia (vitamin D deficiency or hypophosphatemia), malignancy, avascular necrosis, fibrous dysplasia, or other bone lesion.

**Epidemiology:** Fracture rate in premenopausal women varies largely from 0.5% to 50%. Although 40% to 80% of the variation in BMD and bone microarchitecture is genetically determined, a many diseases and lifestyle, may influence physiological peak bone mass accrual resulting in a lower bone mass in adulthood.

#### Clinical Findings:

- Sexual development is a major determinant of peak bone mass. Disorders an/or gender interventions will have their outcomes according the time onset and nature of the hormones involved. A specific group of women, who may experience menstrual dysfunction, are those actively involved in sports at the competitive level. When this is accompanied by a low caloric intake and a low bone density, it constitutes the so-called female athlete triad. The Female Athlete Triad and Relative Energy Deficiency in Sport are clinical syndromes evolved over the past two and half decades, relating energy availability to health and performance deficits in athletes. It has become evident that low energy availability predisposes athletes to possible physical injury, systemic pathology (osteoporosis), psychological stress, and poor athletic performance.

- Contraceptives containing b-estradiol practically do no harm to bone health. On the other hand, depot medroxyprogesterone

acetate (DMPA) induces amenorrhea due to suppression of gonadotropin secretion and consecutive inhibition of ovarian estradiol production. A similar mechanism of ovarian suppression is presented by Goserelin, Elagolix, both GnRH-receptor antagonists, approved for endometriosis and fibroids pre-surgical approach.

- Inflammatory Bowel Diseases, Celiac Disease, Latose Intolerance and exclusion of animal meat protein intake (vegetarianism and veganism) lead to increased risk of osteoporosis.

Cancer and its treatment, may induce bone loss. Chemotherapy, Aromatase Inhibitors and Tamoxifen also favors increased risk of osteoporosis.

-Pregnancy- and Lactation-Associated Osteoporosis. The precise cause of this rare disorder remains unknown and remains unclear whether it is entirely caused by pregnancy itself in certain individuals and/or whether pregnancy reveals a status of prior bone fragility. A search for causes of secondary osteoporosis should be undertaken in women suffering a fracture during pregnancy and lactation.

- Idiopathic Osteoporosis. In absence of an underlying disorder, BMD together with fragility fractures, as idiopathic osteoporosis. Constitutionally lean subjects with low BMD, which is usually caused by low peak bone mass accrual related to both the genetic constitution, lifestyle, and environmental conditions should not be considered affected by idiopathic osteoporosis in the absence of fragility fractures.

**Diagnosis:** Routine BMD screening of pre- or perimenopausal women is not recommended. Some studies have shown beneficial changes in behavior when BMD testing is combined with education about bone health. After a detailed medical history and a DXA measurement, including, if possible, a vertebral fracture assessment, an adapted biochemical evaluation is needed to ascertain causes of secondary osteoporosis, as proposed by IOF. Remind that FRAX® algorithm is validated only for individuals older than 40 years. Although HR-pQCT parameters are able to capture a difference in bone microstructure between women with and without fracture, independently of BMD, more sophisticated analyses may be necessary to better characterize premenopausal women at increased risk of fracture.

#### **Pharmacological treatment:**

Calcium and vitamin D mast majority of premenopausal women had a dietary calcium intake below that suggested in the guidelines.

Very few data are available to guide clinicians in the use of these medications in premenopausal women including bisphosphonates, selective estrogen receptor modulators (SERMs), teriparatide, abaloparatide, denosumab, and romosozumab. Thus, in the absence of guidelines for fractures prevention in premenopausal women with breast cancer and hormone ablation therapy, it has been suggested that bisphosphonates should be initiated in women with a Z score less than  $-2.0$  SD. In women with a Z-score equal to or less than  $-1.0$  SD and a 5% to 10% annual decrease in BMD, bisphosphonates are also recommended. The literature regarding bisphosphonate use in humans does not report severe adverse fetal and maternal events. Nevertheless, a measure of safety, it has been proposed that bisphosphonate treatment should not be initiated if a woman is planning a pregnancy in the

following 12 months.

Subcutaneous PTH (1-34) has been shown to increase BMD in women with GnRH analog-induced estrogen deficiency, in premenopausal women taking glucocorticoids, in premenopausal women with idiopathic osteoporosis, in women with pregnancy and lactation-associated osteoporosis, in women with anorexia nervosa, and in adults with OI. Teriparatide is approved in the United States and other countries for the treatment of women with glucocorticoid-induced osteoporosis. No study has been large enough to document fracture risk reduction.

For premenopausal women with idiopathic osteoporosis, we usually favor consolidation therapy with bisphosphonates after teriparatide treatment. Sequential use of teriparatide followed by denosumab in idiopathic osteoporosis was associated with continued gains in BMD. Denosumab after teriparatide led to large BMD increases in patients with pregnancy and lactation-associated osteoporosis.

**Conclusion:** the diagnosis of osteoporosis in premenopausal women requires not only the presence of low BMD but also evidence of bone fragility, which reflects an abnormal bone microarchitecture. The management should never miss contraceptive caution, identification of secondary causes and conditions related to bone loss. Potential short- and long-term risks, as well as potential pregnancy-related risks, should be considered as part of the decision to use bisphosphonates or teriparatide for the treatment of premenopausal osteoporosis.

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## NSS7

**OSTEOPOROSIS AND LIFE: FROM CHILDHOOD TO AGING (NO SPONSORED SYMPOSIUM)**J. J. Scali<sup>1</sup><sup>1</sup>Iberic-American Society of Mineral Metabolism, Buenos Aires, Argentina

Life changes through processes of development, specialization of organs and systems that occur from childhood to adulthood, with changes of involution and deterioration in old age. Bone and muscle are the main organs affected in these changes. In our symposium we will address how bone development is affected in children and adolescents, secondary causes are presented as pathological conditions during reproductive life and in old age. Everything from an international and multidisciplinary group of experts in densitometry, women's health, bone health and geriatrics.

## NSS8

**COUNTRY SPECIFIC OUTCOMES / RESOURCES/ EVENTS" FOR THE LATIN-AMERICA**A. Medina<sup>1,2</sup><sup>1</sup>FLS Hospital San José, Bogota, Colombia, <sup>2</sup>Internist and endocrinologist, Associate Professor at the University Foundation of Health Sciences, Bogota, Colombia

The CTF mentorship programme was initiated in Mexico with four mentors, followed by Brazil, Colombia and Argentina with four, three and five mentors, respectively, with multidisciplinary representation.

Mexico completed the program in December 2019 followed by Brazil in July 2020, Colombia in March 2021 and Argentina in December 2021. Despite have started mentorship activities during the COVID pandemic in 2020, there have been new 64 FLSs in mentored countries in Latin-America, located on the BPF map (22 FLSs in Mexico, 30 in Brazil, 3 in Colombia, and 9 in Argentina). The cumulative number of patients from FLS after mentorship up to 2021 were 18,464.

The activities developed by each country looking for improve the performance of existing FLS and increase the number of new ones consisted of IOF tours and presentation of benefits of FLS to government entities and private health insurances (PHI) in Mexico. Brazilian mentors participated in meetings of societies interested in bone health, as well as they made presentations to PHI companies and published a review about how initiate and develop a FLS. Colombian mentors applied a survey to FLS coordinators about strengths and barriers of their FLSs, they organized two FLSs cafes, one IOF tour, and participated in meetings of ACSO (Colombian alliance bone-like). Argentina used the FLS cafe strategy.

The FLS Café is a virtual webinar that facilitates discussion on the four elements of an FLS. The IOF tour shared evidence to support FLSs as the best strategy to prevent secondary fractures

and there was the participation of 199 healthcare professionals from 43 FLSs (174/30 in Mexico and 25/13 in Colombia) in four IOF tours identifying 86 potential new FLSs.

The post-training meetings led to identified the resources and needs in FLSs of each country. FLS mentorship program in four Latin-American countries was associated with an increase in the number and quality of FLSs. It is expected to increase the number of participating countries in this program to achieve greater prevention of fractures and quality of life in the Region.

## NSS9

**COUNTRY-SPECIFIC OUTCOMES/RESOURCES/ EVENTS: ASIA-PACIFIC REGION**J.-Y. Lim<sup>1</sup><sup>1</sup>Professor, Department of Rehabilitation Medicine, Seoul National University College of Medicine, Seoul National University Bundang Hospital, Seoul, South Korea

Population aging presents us with an epidemiological emergency in terms of the predicted incidence of fragility fractures, particularly in the Asia-Pacific (APAC) region where the number of older adults is rising at an unprecedented rate. Caring for patients with fragility fractures poses critical challenges regarding functional outcomes and medical costs in aged society. Comprehensive and integrated care systems can minimize complications and increase the success rate of medical and surgical treatments, thereby lowering the degree of impairment and preventing repeated fractures. However, since the countries in the Asia-Pacific (APAC) region have different economic levels and cultural backgrounds, there are significant gaps between countries in terms of the status of healthcare and welfare development and care culture. Therefore, considering the significant gap between knowledge and practice, a country-specific approach is required. Major outcomes of fragility fracture can be shared in common, but core outcomes differ from country to country. In many countries, the main barriers and practice gaps in fragility fracture care are lack of resources in the healthcare system and limited integration and communication among healthcare providers. International Osteoporosis Foundation (IOF) has been trying to spread Fracture Liaison Services (FLS) as a standard care model of fragility fracture to the APAC region through the Capture-the-Fracture, and Fracture Liaison Network (FLN) has its vision and mission by supporting the colleagues worldwide to turn the Global Call to Action on fragility fractures into actual action in their countries.

Recently, the mentorship training program was successfully carried out in some APAC regions and the FLS mentors began to contribute to building the FLS system in their region. I would share our experience of FLS activities in the AP region and highlight recent events that have contributed to implementing FLS in some countries.



## NSS10 COUNTRY SPECIFIC OUTCOMES / RESOURCES/ EVENTS

A. Naranjo<sup>1,2</sup>

<sup>1</sup>Adjunct Physician in Rheumatology at the University Hospital of Gran Canaria Dr. Negrín, Gran Canaria, Spain, <sup>2</sup>Professor of Medicine at the University of Las Palmas de Gran Canaria, Gran Canaria, Spain

The IOF "Capture the Fracture®" program has been successful in Spain since the first unit was accredited in 2014. Currently there are 83 FLS on the map, 14 gold, 16 silver, 35 bronze and 18 blue. The specialties that lead the FLS are mainly Geriatrics, Rheumatology, Internal Medicine and Traumatology.

The Spanish osteoporosis society SEIOMM has launched the FLS excellent project since 2018, through the annual award of 6 scholarships for FLS case managers. At the same time, the SEIOMM/FEIOMM launched the REFRA registry, which as of January 3, 2023, includes 6,211 patients. The registry published in 2022 the first report in Archives of Osteoporosis. In parallel with the FLS excellent program, visits to units of excellence have been facilitated with grants from the pharmaceutical industry. The FLS model has been given visibility at the SEIOMM congresses and awards have been established for the best national publications on FLS. The Mentorship program includes, since 2022, 4 Spanish experts, who at the end of the same year have started a mentoring process through webinars to 17 FLS interested in achieving a higher category of IOF accreditation.

Other actions:

- 1) external audit project on the quality of the FLS units, through the Spanish society for healthcare quality;
- 2) An analysis using the social return on investment methodology (SROI) for Spain has been published, which places the creation of FLS units as the one with the highest return with 40 euros and 7 euros per euro invested over a 3-year horizon from the social perspective and of the national health system, respectively.
- 3) The first cost-effectiveness study of an FLS in the context of Spanish public health was published in 2022, which estimates an ICER of around 7,000 euros per QALY. Likewise, the University of Oxford has designed a specific cost-effectiveness calculator for Spain that will make it possible to show health professionals and managers the cost and benefits of FLS implementation.

For the future there are two key challenges for Spain: 1) the implementation of fracture registries at the regional and national level; 2) improvement of the efficiency of existing FLS, especially in terms of patient identification.

## NSS11 CAPTURE THE FRACTURE MENTORSHIP – GLOBAL DELIVERY AND WHAT WE HAVE LEARNT OVERVIEW AND PROGRESS

K. Javaid<sup>1</sup>

<sup>1</sup>NDORMS, University of Oxford, Oxford, United Kingdom

Fracture liaison services ( FLSs) are recommended by both national and international government and professional societies as clinically and cost effective models of healthcare to improve secondary fracture prevention. However, the skills and time needed to get FLSs funded, started, improved and sustainable often lie outside of the usual capability and capacity of clinicians. a number of regional, national and global initiatives have being implemented to meet this need from the professional community. Through a unique partnership between the IOF, University of Oxford and industry, the Capture the Fracture Partnership, a mentorship based approach has been implemented. Mentoring is a reciprocal learning relationship which a mentor and mentee agree to a partnership, where they work collaboratively toward the achievement of mutually-defined goals that will develop a mentee's skills, abilities, knowledge, and/or thinking.

The mentorship pillar has developed communities of mentors in 11 countries, sharing expertise and experience in FLS pathways, how to get FLSs started and how to get FLSs more effective. The CtF mentors have developed guidelines at the national level and initiated workshops and FLS engagement events to support delivery of secondary fracture prevention in their countries.

## NSS12 20 YEARS OF EXPERIENCE WITH AN FLS

S. Ferrari<sup>1</sup>, T. Chevalley<sup>2</sup>

<sup>1</sup>Service of Bone Diseases, Geneva University Hospital, Geneva, Switzerland, <sup>2</sup>Service of Bone Diseases, Geneva University Hospital and Faculty of Medicine, Geneva, Switzerland

More than 20 years ago, the bone disease group at the Geneva University Hospital started a fracture liaison service (FLS) in patients admitted to our hospital with a low-trauma fracture<sup>1</sup>. Composed of a part-time liaison nurse and an osteoporosis specialist (geriatrician), it provided diagnosis and treatment of osteoporosis to these very high risk patients, as well as educational sessions for the patients themselves, - a key component of FLS success with regards to patients adherence to the diagnostic and treatment plan-, and rapidly obtained an IOF best practice framework (BPF) gold certification. However the limited human resources prevented us to capture a majority of fragility fractures, to ensure proper monitoring for treatment compliance, to assess and manage falls risk, etc...After several years, in collaboration with the department of medicine we were able to introduce an electronic alert in the hospital informatic system to signal when a lateral chest or spine X-ray was performed. This allowed us to systematically review these X-rays and diagnose prevalent vertebral fractures, which is

another key component of the prevention of secondary fractures. We then tested the efficiency of introducing osteoporosis therapy in the hospital phase rather than providing recommendations to the treating physician outside the hospital, which increased the treatment adherence rate at 6 months from 22% to 54%<sup>2</sup>. More recently, we have introduced a systematic evaluation of falling risks by a simple questionnaire and when appropriate oriented the patients towards our falls risk and prevention rehabilitation program. Despite these notable improvements however the performance and sustainability of the FLS remains a challenge, notably towards the identification of conservatively treated fractures and the ability to provide service without interruptions when competing health problems occur within the hospital, - as demonstrated by the COVID epidemic.

Based on this experience, we recently launched the Swiss FLS initiative with the Swiss Association against Osteoporosis to promote the development of FLS services in major hospitals throughout the country. In three years only, we were able to triple the number of hospitals with an IOF-BPF certification in Switzerland, and to identify as much as 5'000 patients for post-fracture osteoporosis care.

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## NSS13

### RUNNING AN FLS IS COST-EFFECTIVE

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<sup>1</sup>Senior Health Economist, University of Oxford, Oxford, United Kingdom

Ascertaining that a health intervention is effective is generally not sufficient for it to be adopted in most universal health care system in the developed world, and increasingly more commonly in middle income countries. The new intervention must provide 'value for money', that is, it must generate a large enough improvement in health in relation to the extra cost it may entail. In essence, that is what cost-effectiveness means. Fracture Liaison Services (FLS) have demonstrated to be effective at avoiding subsequent fractures, but they do so at a cost. So, considering these, would they also be cost-effective?

There are different ways to answer this question. An RCT would be unethical, but there is evidence from modelling studies reporting on the widespread cost-effectiveness of FLSs. In a systematic review which identified 23 published economic evaluations of FLSs, Wu *et al* (2018) reported that "FLS was cost-effective in comparisons with usual care or no treatment, regardless of the program intensity or the country in which the FLS was implemented." This is consistent with the wider literature about the cost-eff-

fectiveness of FLSs the world over.

Cost-effectiveness results will vary between countries and settings because key drivers of the outcomes (i.e. fractures) and costs are different in each setting. But they also vary because methods are different. When modelling the cost-effectiveness of FLS, key determinants of both outcomes and costs have been often overlooked. Yearly cycles are generally employed but they can be too long considering that fractures happen frequently. Imminent subsequent fracture confirms that re-fracture rates are not constant over time, yet fixed long-term refracture rates are often used. Social care is rarely mentioned, even though fractures lead to loss of independence and significant impacts in the need and use of social care.

To estimate the impact of FLS implementation more accurately, these shortcomings should be addressed, and models populated with local data reflecting a validated patient care pathway. As the main purpose is to properly inform national decision-making about FLS implementation, outputs should include not only cost-effectiveness estimates but numbers of fractures avoided, and crucially impact on health and social care resource use and costs. We developed an FLS Benefit and Budget Impact Calculator using published literature, other national data, and consensus from FLS experts in each country to do just this for Spain, Japan, the Netherlands, Colombia, and the Russian Federation, with results from France, Mexico, and a handful of other countries coming soon. We found that FLSs are already cost-effective over the first five years of implementation, which is when they would have higher costs and fewer quality-adjusted life year (QALY) gain. QALY benefit comes from the reduction in fractures and also mortality, whilst impact on health and social resource use and costs is benefits from significant savings in from surgeries, hospital bed days, outpatient consultation, and social care avoided. These partially offset the investment needed to run FLSs in the form of healthcare staff, DXA scans, laboratory tests, and primarily anti-osteoporotic medication. We found these results to be most sensitive to site-to-site sex specific re-fracture rates, pharmacologic practice, identification rates, and adherence.

## NSS14

### THE FRACTURE LIAISON SERVICE, A STEP FORWARD IN FRACTURE REDUCTION, BUT PROBABLY ALSO IN MORTALITY REDUCTION.

W. F. Lems<sup>1</sup>

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The concept of Fracture Liaison Services (FLS) is probably the best instrument to lower the frequency of osteoporotic fractures, since elderly patients with a recent fracture, thus at high-risk for subsequent fractures, are invited for screening for underlying osteoporosis with DXA and preferably also VFA, and because effective, relatively safe and affordable drugs are available, particularly oral bisphosphonates.<sup>(1)</sup>

In a recent systematic literature review and meta-analysis, in nine before and after FLS implementation studies, it was found that FLS-care was associated with a significantly lower probab-

ity of fractures (HR 0.70; 95% C.I.: 0.52-0.93).(2) It is important to realize that this is not the highest level of methodology, but performing randomized “placebo-controlled” studies in patients with a recent fracture at the FLS versus usual care is regarded as unethical.

But what about mortality risk? In a 15-year observational study in 6120 participants, a 34% mortality risk-reduction was reported in bisphosphonate users compared to controls (3). In another study comparing FLS attenders to non-attenders after 8 years of follow-up, with 5011 patients, a 40% lower subsequent fracture rate and a 21% lower mortality was found (4). In a recent systematic literature review and meta-analysis, in nine before and after FLS implementation studies, it was found that FLS-care was associated with a 35% lower probability of mortality (HR 0.65; 95% C.I.: 0.44-0.95) (2).

But what is the explanation for the reduced mortality risk? One of the reasons might be the use of zoledronic acid, since the use of zoledronic acid versus placebo in a randomized study with hip fracture patients induced a reduction in mortality (hazard ratio: 0.72 (95% CI, 0.56–0.93) (5). Other reasons could be the selection of healthy patients who visited the FLS versus non-visitors, the finding of curable diseases other than osteoporosis, and the careful follow-up by physicians and nurses.

These data suggest that the FLS may not only be associated with lower fracture risk, but also with a lower mortality risk. In addition to the favorable cost-analysis data presented in one of the other lectures of this NSS-symposium, the data on mortality risk strongly support the introduction of FLS services.

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## NSS15

### OSTEOPOROSIS CASE ASCERTAINMENT STRATEGIES: NORTH AFRICA EXPERIENCE

M. Eissa<sup>1</sup>

<sup>1</sup>Kasr Elainy Hospital, Cairo University, Cairo, Egypt

Case-finding in osteoporosis is vital to commence treatment and minimize the risk of sustaining a fragility fracture. The African guideline for osteoporosis management adopted the fracture risk-centric approach to identify those patients at increased risk of fractures. Calculating the fracture probability by integrating the weight of important clinical risk factors, with or without an a BMD measurement is a valid approach to calculate an individual's risk of fracture. Standardized case-finding strategy is expected to improve treatment rates. Based on the notion that screening for fracture risk is associated with a significant risk reduction for hip fractures, the Targeting to Treat project was launched recently in Egypt. The primary target is to set up and evaluate a “Targeting to Treat” service based on population screening for fracture risk in both postmenopausal women as well as men as a rational step in reducing the burden of osteoporotic fractures. The national Target is to reduce the incidence of osteoporosis-related hip and vertebral fractures by 25% by the year 2025. This presentation will discuss how optimized case-finding strategies are essential for adequate osteoporosis assessment and therapy.

## NSS16

### DXA SCAN: BEYOND BMD MEASUREMENT

M. H. Abu-Zaid<sup>1</sup>

<sup>1</sup>Associate Professor of Rheumatology and Rehabilitation, Tanta University, Tanta, Egypt

Dual-energy x-ray absorptiometry (DEXA) has sustained a niche for measuring bone mineral density since its approval by the Food and Drug Administration (FDA) for clinical use in 1988.

This activity reviews the indications, contraindications of DEXA and highlights the role of the interprofessional team in the management of patients with osteoporosis.

Throughout the past 2 decades, technological advancements such as the transition from the original pencil-beam densitometers to the most recent narrow fan-beam densitometers have allowed for faster scan times and better resolution. The majority of reports that have compared DXA-derived body composition measurements to the gold standard method of body composition appraisal, the four-compartment model, have observed significant differences with this criterion method.

Recently, there is an extent to the technological advancements of the DXA which have impacted its ability to accurately assess body composition and more advanced bone quality measurements.

## NSS17

**HOW TO MANAGE OSTEOPOROSIS BEFORE THE AGE OF 50**S. Miladi<sup>1</sup>, Y. Makhoul<sup>1</sup><sup>1</sup>University of Tunis, El Manar, Faculty of medicine, Tunis, Tunisia

These recent years, several therapeutics have emerged regarding the management of postmenopausal osteoporosis. Indeed, agreed guidelines are available to ensure bone protection and to prevent fragility fractures [1]. However, osteoporosis before the age of 50, did not receive as much attention nor for diagnosis neither for treatment. Before the age of 50, osteoporosis is suspected mainly in presence of fragility fractures, diseases or treatments known to cause bone loss. Idiopathic osteoporosis in young adult is rare. An evaluation of secondary causes is indicated in all patients [2]. Before the age of 50, glucocorticoid treatment is the most common secondary cause of low bone mass and osteoporosis.

Because of a lack of consensual treatment, it can be difficult to predict the potential risk of a fracture and formulate the correct course of action. At this age, low bone mineral density measured by DXA is not synonymous of osteoporosis, and treatment is not always necessary [3]. The mainstay of treatment in osteoporosis before the age of 50 includes risk factor reduction, corrected dietary and lifestyle habits [4]. More importantly, effective control of the secondary cause of osteoporosis should remain the best first line approach. In specific cases in which healthy lifestyle treatment is not sufficient, pharmacological interventions with bisphosphonates or teriparatide may be considered [5].

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## NSS18

**DIABETES AND BONE METABOLISM**S. Cerdas Perez<sup>1</sup><sup>1</sup>Endocrinologist, University of Costa Rica, Hospital CIMA, San José, Costa Rica

Diabetes Mellitus (DM) is a global pandemic affecting 537 million people worldwide, rising at an alarming rate, with a prevalence tripling the last two decades. Both type 1 and type 2 DM are at increased risk of fragility fractures (FF) an underrecognized complication of this disease. These patients fracture with normal or slightly decreased bone mineral density values due to a predominant deterioration of bone microarchitecture. This phenomenon has been called the “diabetic paradox” with the aggravating circumstance that fracture risk stratification tools (FRST) that we traditionally use in clinical practice underestimate the risk of fracture in this population. Pathophysiology is complex and involves numerous mechanisms mediated by insulin deficiency, chronic hyperglycemia, advanced glycosylation product, oxidative stress, vascular involvement, incretin deficiency, hypercortinemia among others and aggravated by Vitamin D deficiency, phosphocalcic imbalance antidiabetic drugs and DM chronic complications. Adaptations of the FRST, specific risk factors and comprehensive management algorithms have been proposed form the adequate management of this pathology.

## NSS19

**OBESITY, BONE METABOLISM, OSTEOPOROSIS AND FRACTURES**O. Messina<sup>1</sup><sup>1</sup>IRO Medical Research Centre, Rheumatologist, Professor of Medicine - Rheumatology, University of Buenos Aires, Buenos Aires, Argentina

Obesity and osteoporosis are two prevalent diseases worldwide. Both lead to increased morbidity and mortality. Obese patients have higher bone mineral density values due to a higher mechanical skeletal load and higher estrogen. However, recent scientific evidence has shown and increased risk of fractures in patients with obesity especially in those with higher visceral adipose tissue content, contradicting the old paradigm that obese patients were more protected than those with normal weight. Other factors that lead to bone impairment are, vitamin D deficiency, greater risk of falling due to the “osteosarcopenic” syndrome, and the “osteosarcopenic obesity syndrome”, reduced mobility, altered adipokynes, low levels of adiponectin and higher levels of TNF alpha, IL-6, PTH and PPAR gamma and alterations in gut microbiota among others. Osteosarcopenia is a newly proposed syndrome that describes the coexistence of osteoporosis and sarcopenia that increase risk of falling and fractures. Fractures have an atypical distribution in the obese with a lower incidence of typical osteoporotic fractures such as hip, spine or wrist and an increased in fracture risk of the ankle, upper leg and humerus.

## NSS20

**GOING DIGITAL – THE ROLE OF DIGITAL HEALTH TECHNOLOGIES FOR GERIATRIC ASSESSMENTS AND THE REMOTE DELIVERY AND MONITORING OF EXERCISE AND LIFESTYLE INTERVENTIONS FOR OLDER ADULTS**R. Daly<sup>1</sup><sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Burwood, Victoria, Australia

The rapid evolution of digital health technologies (DHTs) has provided new opportunities in geriatric healthcare for remote patient communication, education, diagnostic assessment, and the personalised, remote delivery and monitoring of home-based preventive and rehabilitative services for older adults. Despite the appeal of such technologies, it is first important to evaluate whether they are safe, feasible, acceptable, and reliable, as well as effective for improving health outcomes. Since the COVID-19 pandemic, a growing number of researchers and healthcare professionals have shifted to remote assessments of physical function, a critical element of all geriatric assessments to identify at-risk populations and guide personalised prevention and management programs. This presentation will summarise the findings of a series of studies we (and others) have conducted to determine the feasibility, acceptability, reliability and validity of commonly used physical function tests when conducted either under remote supervision (via videoconferencing) or self-administered (after watching instructional videos) within the homes of older adults, along with the role of wearable sensors and apps to evaluate functional performance and falls. DHTs have also provided viable, equitable and highly accessible opportunities for the remote delivery and monitoring of personalised, evidence-based exercise and lifestyle self-management programs to older adults and those with chronic diseases where and when they need it with timely communication between clients/patients and healthcare providers. This presentation will provide an update on the current evidence related to the effectiveness and acceptability of different digital health interventions for the management of musculoskeletal conditions and prevention of falls. It will also include an overview of our experiences in designing and delivering mobile health interventions for older adults using smart device apps/platforms that incorporate remotely delivered, narrated video-based exercise prescription, in-app logging of exercise completion, remote monitoring and feedback and online education and health messages to promote self-management. Finally, challenges and barriers identified by end-users and healthcare providers will also be presented.

## NSS21

**DIGITAL VOICE ASSISTANTS: A NOVEL TECHNOLOGICAL APPROACH TO SUPPORTING OLDER ADULTS TO SELF-MANAGE MUSCULOSKELETAL CONDITIONS**D. Scott<sup>1</sup><sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Burwood, Victoria, Australia; School of Clinical Sciences at Monash Health, Monash University, Clayton, Victoria, Australia

Self-management skills empower patients to collaborate with health professionals in the management of chronic diseases, improving patient adherence to effective treatments, self-efficacy and health behaviours, and appropriate use of health services. Digital health technologies (DHTs), such as websites and apps, are commonly used to self-manage chronic conditions and have been shown to be effective for improving health outcomes in older adults. However, DHTs appear to have relatively poor uptake in this population due to barriers including lack of technical literacy and poor ongoing engagement with such platforms. Digital voice assistants (DVAs) may provide an approach to overcome these barriers because they use artificial intelligence to instantly interpret normal human conversation and can also provide personalised responses via engaging audio-visual content. We have developed a novel web-based software that allows health professionals to create individually-tailored self-management programs and deliver these to patients via DVAs located in their own homes. Across several feasibility studies targeting bone and muscle health in older adults with chronic diseases (including osteoporosis and type 2 diabetes mellitus), this DVA-supported self-management approach has been demonstrated to increase physical activity and reduce sedentary behaviour with excellent adherence and safety in remotely-delivered home-based exercise programs. Furthermore, educational content delivered via our DVA software has resulted in improved knowledge, attitudes and self-efficacy regarding self-management of musculoskeletal health. This presentation will summarise the findings of these studies, including barriers and enablers to DVA-supported self-management of musculoskeletal conditions in older adults, and potential opportunities for future research and implementation.

## NSS22

**SOCIAL DISADVANTAGE AND MUSCULOSKELETAL HEALTH: ENSURING THAT THE 'DIGITAL DIVIDE' DOES NOT IMPACT ON THE EQUITABLE DELIVERY OF CARE**J. Talevski<sup>1,2,3</sup>

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Non-communicable chronic diseases commonly follow a social gradient, whereby greater prevalence and incidence are observed in socially disadvantaged populations; musculoskeletal disorders including osteoporosis and sarcopenia are no exception. In many countries, the embedding of digital health technologies (DHTs) into health care is now seen as a priority to help educate, organise and support people to manage their health. Therefore, healthcare systems are increasingly more reliant on a patient's ability to navigate the digital world. Despite this, little research has been conducted into why some communities are less able, or less likely, to successfully engage with DHTs. This presentation will begin by summarising the emerging evidence-base regarding associations between social disadvantage and modifiable risk factors for osteoporosis and sarcopenia, including the presentation of new findings concerning associations between individual (and area-level) social disadvantage and bone health, muscle mass, strength, and physical function. The current evidence regarding the role in which social determinants of health (e.g. social adversity, social isolation and exclusion, rurality, health literacy) are known to influence engagement with DHTs in older adults will be discussed, particularly barriers to access and uptake of DHTs from the perspectives of disadvantaged population groups (e.g. culturally and linguistically diverse populations). Finally, recommendations for improving the potential of DHTs to be more acceptable, accessible, and sustainable to socially disadvantaged populations will be presented. In an era of ageing populations, preventive efforts need to account for social as well as objective clinical factors; these data offer much potential to reduce the already existing inequalities within our healthcare system.

## NSS23

**PHYSICAL ACTIVITY AND EXERCISE FOR THE PREVENTION OF DEMENTIA**O. Bruyère<sup>1</sup>

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A rapidly growing literature strongly indicates that physical ex-

ercise may attenuate cognitive impairment and reduce dementia risk. Overall, some recent systematic reviews and meta-analyses based on observational cohort studies suggest that higher physical activity level was associated with a lower risk of dementia. These epidemiological findings were also supported by brain cognitive networks studied with functional magnetic resonance imaging display improved connectivity after 6 to 12 months of physical exercise. Animal studies show that physical exercise facilitates neuroplasticity through several biomechanisms, with improved learning outcomes. Moreover, endocrinological factors are important since the induction of brain neurotrophic factors by exercise has been confirmed in several animal studies. Indirect evidence is available for this process in humans. Finally, besides a brain neuroprotective effect, physical exercise may also attenuate cognitive issues via mitigation of cerebrovascular risk, e.g., reducing the contribution of small vessel disease to dementia indicating an important role of physical exercise and activity as an important preventive strategy for cognitive disorders.

## NSS24

**IMPORTANCE OF PHYSICAL ACTIVITY AND EXERCISE IN MILD COGNITIVE IMPAIRMENT**D. Pinto<sup>1</sup>

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Mild cognitive impairment (MCI) is seen by some authors as an early window for treatment for delaying dementia. Conflicting epidemiological evidence supports the idea that MCI could be considered a potential risk factor for dementia, since it is estimated that the rate of conversion to dementia in the MCI population is equal to 10–15% per year compared to 1–2% in people without MCI. Physical inactivity and sedentary behavior seem to have independent risk factors for the transition from MCI to dementia, even if their role are still debated. Therefore, physical exercise may delay the onset of dementia in people already affected by MCI. Overall, it is largely known that physical activity improves overall health and reduces the risk of negative health outcomes and may be effective in improving cognition, independent functioning, and psychological health in people affected by MCI.

## NSS25

**PHYSICAL ACTIVITY AND EXERCISE IN MILD COGNITIVE IMPAIRMENT AND DEMENTIA: GUIDELINES FROM EUROPEAN SOCIETIES**N. Veronese<sup>1</sup>

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Dementia and mild cognitive impairment (MCI) are of critical importance in older people since these conditions are associated with several unfavorable outcomes. Definitive treatments for

these conditions are not still available: therefore, the interest in non-pharmacological approaches, such as physical exercise and activity, is growing. The evidence regarding the role of physical activity/exercise in dementia and MCI was investigated by several systematic reviews, but still European guidelines are missing. With this work, involving several European scientific and patients' societies, we will present indications regarding the use of physical activity and exercise for the prevention and treatment of dementia and MCI. In this project, lasted more than one year and actively involving ESCEO members, we used the GRADE approach for increasing the transparency of our findings and for giving solid recommendations based on the literature and on experts' opinion.

## NSS26

### STRENGTH TRAINING ALTERS LPS-INDUCED IMMUNE RESPONSES IN PERIPHERAL MONONUCLEAR BLOOD CELLS OF OLDER PERSONS

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#### BACKGROUND

Recently, we showed that 3 months of strength training affect 18 canonical pathways related to chronic inflammation in peripheral mononuclear blood cells (PBMC) of older adults. It remains unclear whether these exercise-induced changes also alters the stress-induced immune response in PBMC.

#### AIM

To investigate if resistance training improves the stress response of PBMC by mimicking in-vitro an acute infection by lipopolysaccharide (LPS)-challenge.

#### METHODS

14 women aged  $\geq 65$  years were randomized into 3 months of either 3x/week intensive strength training (IST: 3x10 rep at 80% 1RM), strength endurance training (SET: 2x30 reps at 40% 1RM) or control (CON: 3x30 sec stretching). Before and after 3 months training, PBMC were isolated and cultured with and without LPS. Prior culture and after 24 hours of culture, RNA was collected from pre-cultured, post-cultured and LPS challenged PBMC's, respectively. Targeted RNA sequencing including 407 inflammation-related genes was performed. Pathway analysis was performed with Ingenuity Pathway Analyses using all 407 genes, a Benjamini-Hochberg p-value  $< 0.05$  and a z-score of  $\leq -2$  or  $\geq 2$  were considered as significant.

#### RESULTS

Strength training altered 23 pathways in LPS-stimulated PBMC; (IST: 7 upregulated and 2 down-regulated, SET: 5 upregulated and 10 downregulated). None of the altered pathways overlapped between IST and SET. The Cytotoxic T Lymphocyte-mediated Apoptosis of Target Cells pathway was enriched oppositely in both training groups (downregulated in IST versus upregulated in SET). CONCLUSIONS

We conclude that three months IST and SET can induce changes in the inflammatory stress response of PBMC, but by affecting different genes and related pathways. A balanced exercise program altering both training regimes might therefore provide optimal immune adaptations in older persons.

## NSS27

### THREE MONTHS OF RESISTANCE TRAINING ALTERS THE EXPRESSION OF INFLAMMATION RELATED GENES IN PBMCS WITH A LPS CHALLENGE

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#### Background:

Ageing is accompanied by a chronic low-grade inflammatory profile (CLIP). Resistance exercise has shown anti-inflammatory effects and is one of the most effective non-pharmacological means to counter chronic low-grade inflammation in older adults. However, the involvement of peripheral blood mononuclear cells (PBMCs) remains unclear. Therefore, we aimed to investigate the impact of three months of resistance exercise on the gene expression in PBMCs stimulated by lipopolysaccharide (LPS, mimicking an in vivo acute infection).

#### Material and methods:

Data was used from the Senior PRoject INTensive Training (SPRINT) study, in which the effects of resistance exercise on the inflammation status of older adults aged 65 years or more were investigated. Participants were randomly allocated to three exercise groups: intensive strength training (high-load, IST), strength endurance training (low-load, SET), and flexibility training (control group (CON)). Blood was collected at baseline and after 3 months of resistance training. Isolated PBMCs were cultured with LPS challenge, whereafter RNA was collected pre-cultured and post-cultured. RNA was analysed by RNA sequencing for a targeted panel of 407 inflammation-related genes related to exercise, inflammation, or ageing. An absolute fold change (3 months vs

baseline) of 0.67 or 1.5 was considered as relevant.

#### Results:

Fourteen women were included in the analyses of this study (IST: 4, SET: 5, CON: 5). One hundred and fifty-one genes with a significant fold change after the exercise intervention were identified (92 pro- and 37 anti-inflammatory genes, 22 genes of which the role after exercise intervention is undefined). Several pro- and anti-inflammatory genes were upregulated in the IST group (respectively 39 and 12) and SET group (respectively 20 and 7 genes). Downregulated gene expressions were also seen (IST: 24 pro-inflammatory and 17 anti-inflammatory genes, SET: 23 pro-inflammatory and 15 anti-inflammatory genes). In the CON group a less pronounced effect was visible.

#### Conclusion:

Resistance exercise at different intensities can both induce changes in inflammation-related gene expression in LPS-challenged PBMCs, which suggests an improved immune response. However, different inflammation-related genes among IST and SET group were affected.

## NSS28

### IS PHYSICAL ACTIVITY ASSOCIATED WITH PRE-FRAILTY, T-CELL PHENOTYPES AND INFLAMMATION IN THE OLDEST OLD?

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#### OBJECTIVE(S)

Frailty and its associated mortality risks are one of the major concerns regarding our aging population. Together with immunosenescence, an aging-associated dysfunction of the immune system and an aging-related chronic low grade inflammatory profile, frailty seriously threatens healthy ageing. Literature indicates that exercise may counteract these phenomena. However, this was evidenced in a dose-response using specific interventions. The objective of this study was to investigate if physical activity performed during daily life activities (PADL, such as gardening) is associated with pre-frailty, immunosenescence-related T-cell phenotypes and inflammation in older adults aged 80 years and more.

#### MATERIAL AND METHODS

The BUTTERFLY-study aims to identify early predictors of frailty and healthy ageing in non-frail elderly aged 80 and over. The Fried Frailty Index was used to assess (pre-)frailty or robustness. Immunosenescence markers on blood leukocytes were identified using flow cytometry. CRP, an inflammation marker, was measured using immunonephelometry. PADL was mapped using the Yale Physical Activity Survey questionnaire. Independent T-tests, correlation analyses and binary or linear regressions were performed with SPSS.

#### RESULTS

A prevalence of 46.60% pre-frailty was found in preliminary data from 309 participants. No associations were found between pre-frailty and PADL ( $r=-.063, p=.269$ ). PADL was associated with a decreased percentage of CD8+CD28+CD57- (naïve) ( $r=-.142, p=.013$ ) and an increased percentage of CD8+CD28-CD57- (memory) ( $r=.119, p=.038$ ) T-cell phenotypes, except in men (respectively  $r=-.100, p=.192$ ,  $r=.064, p=.406$ ). PADL was also associated with lower counts of CD8-CD28+CD57- T-cells but only in men ( $r=-.249, p=.019$ ). Lastly, a higher PADL was associated with lower CRP levels ( $r=-.205, p=.016$ ) in women.

#### CONCLUSION(S)

Although associations between PADL and T-cell phenotypes and inflammation were shown in this study, PADL is probably not enough to trigger the same responses as exercise. Physical activity at higher intensities should be considered in the oldest old.

## NSS29

### EFFECTS OF DAILY IMMUNONUTRIENT INTAKE ON INFLAMMATION AND SARCOPENIA: ROLE OF PHYSICAL ACTIVITY

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#### Background and objective:

Age related chronic low-grade inflammation (CLIP) is a condition typified by systemic chronic inflammatory status in the absence of acute inflammation. This inflammaging can be seen as an important causative factor for sarcopenia. Both CLIP and sarcopenia are accelerated by nutrient deficiencies and sedentary lifestyle. In this study, we sought to investigate the effect of daily immunonutrient intake on the CRP levels (c-reactive protein) and muscle strength adaptations after training.

#### Methods:

In a randomized control design, 102 independently living older person (+65y) were randomly assigned to 3 training groups. The IST group performed 3x10 repetitions at 80% of 1 repetition maximum (1RM) (13♂, 18♀). The SET group performed 2x30 repetitions at 40% of 1RM (13♂, 20♀) and the FT group performed stretching exercises as control (16♂, 22♀). The average food intake was measured by 3-day food diaries and nutrients (protein, selenium, zinc, vit A, D, C, w3 and w6) were calculated using the NUBEL program at baseline and after 3 months.

#### Results:

At baseline 97%, 93% and 87% participants of the IST group showed insufficiencies for respectively vit D, w3 and selenium; for the SET group the figures were respectively 97%, 94% and 76% and 100%, 97% and 89% for the FT group. Lower CRP levels at baseline were related to higher vit C intake ( $r = -0.26, p = 0.008$ ,



all subjects), higher protein intake ( $r = -0.26$ ,  $p = 0.043$ , women only) and higher vit D intake ( $r = -0.30$ ,  $p = 0.048$ , men only). Higher baseline muscle strength was associated with higher protein intake ( $r = 0.26$ ,  $p = 0.008$ , all subjects;  $r = 0.31$ ,  $p = 0.041$ , men only), and higher zinc intake ( $r = 0.22$ ,  $p = 0.023$ , all subjects). Higher strength gains (IST 29%, SET 26%) were associated with lower baseline CRP ( $r = -0.27$ ,  $p = 0.032$ ) and with higher selenium intake ( $r = 0.33$ ,  $p = 0.008$ ).

#### Conclusions

Nutrient insufficiencies (vitD, w 3 and selenium) in elderly are highly prevalent. Immunonutrients (vit C, vit D and protein) can act as important anti-inflammatory agents. Strength gains can be blunted by higher levels of inflammation whereas they could be enhanced by higher levels of selenium. Our results therefore highlights the importance of sufficient daily nutrient intake and regular physical exercise for healthy aging.

### NSS30

#### INTRA-ARTICULAR BIOMARKERS AND CHARACTERISTICS OF PAIN SENSITIZATION: HOW ARE THEY RELATED TO EACH OTHER IN KNEE OSTEOARTHRITIS PATIENTS?

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#### Aim:

Synovitis and central sensitization are common features in knee osteoarthritis (KOA), however, the relationship between them is unclear. Therefore, this study aimed to investigate the association between sensitization and intra-articular biomarker levels in KOA patients.

**Methods:** Seventeen KOA patients scheduled for total knee arthroplasty in UZ Brussel were included. Pressure pain thresholds (PPTs), temporal summation (TS) and conditioned pain modulation (CPM) were assessed. During surgery, synovial fluid was obtained to determine biomarker levels. Multiple linear regression was used to assess the association between pain sensitization parameters and intra-articular biomarker levels. Four independent predictors were created: inflammation ( $\log(\text{CXCL-10} \times \text{CXCL2/IL-10})$ ), cartilage degeneration ( $\log(\text{MMP-1} \times \text{MMP-7})$ ), sensitization

( $\log(\text{BDNF} \times \text{NGF})$ ), and ageing ( $\log(\text{CXCL-9})$ ). Regression models were corrected for BMI, sex and age.

#### Results:

Two out of eight PPT locations around the knee (i.e. 1 and 8) seemed most relevant and were chosen as dependent variables in the regression model, besides the control sites; m. tibialis anterior and m. ext. carpi radialis longus.  $\log(\text{CXCL-10})$  was inversely correlated with mean PPT at locations 1 and 8 (Pearson's  $r$ : -0.518 and -0.502). No regression model could significantly predict the mean PPT at locations 1 and 8 around the knee. However, 82.7% ( $R^2 = 0.827$ ) of the variation in relative CPM effect could be significantly explained by the ageing, and cartilage degeneration predictors ( $p < 0.001$ ).

#### Conclusion:

Top-down pain inhibition can partially be predicted by intra-articular MMP-1, MMP-7 and CXCL-9. However, more research on this topic is recommended.

### NSS31

#### CAN EXERCISE THERAPY INFLUENCE INFLAMMATORY MARKERS AND BDNF IN PATIENTS WITH KNEE OSTEOARTHRITIS? A SYSTEMATIC REVIEW WITH META-ANALYSIS

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**Objective:** To summarize the literature regarding the acute and/or basal exercise-induced effects on inflammatory biomarkers and BDNF in patients with knee osteoarthritis (KOA).

**Methods:** PubMed, Web Of Science and PEDro were systematically searched for appropriate studies. A meta-analysis was performed or effect sizes (ES) were estimated, where possible.

**Results:** Twenty-one studies were included: 15 investigated basal exercise-induced effects, 4 acute effects, and 2 both. Biomarkers were intra-articular ( $n = 4$ ) or serologically ( $n = 17$ ) determined. Meta-analyses showed that basal CRP was reduced in KOA patients after exercise therapy, although, IL-6 and TNF- $\alpha$  levels did not

significantly change. Also, sTNFR1/2 did not significantly change after exercise therapy. The exercise-effect on different other biomarkers was less clear and, there were insufficient data available to perform a meta-analysis. However, a low degree of evidence was present for a decrease in IL-6 after swimming or cycling for 6 weeks, increase in sTNFR1 (ES: 2.325), decrease in sTNFR2 (ES: -0.997) and increase in BDNF (ES: 1.412) after 12 weeks of walking. Locally, intra-articular IL-10 (ES: 9.163) increased, and IL-1 $\beta$  (ES: -6.199) and TNF- $\alpha$  decreased (ES: -2.322) after strength exercises. An acute training session elicited a myokine response (ES IL-6: 0.314), and an increase in BDNF. No inflammatory effect (ES CRP: 0.052; ES TNF- $\alpha$ : -0.019; 0.081) following an acute bout of training was found. However, a single bout of exercise elicited an increase in intra-articular IL-10.

**Conclusion:** The anti-inflammatory properties of exercise therapy have important implications for informing KOA patients and clinicians about this underlying effect.

### NSS32

#### IMPLEMENTING PHYSICAL ACTIVITY AS A CARE FOR OLDER ADULTS FOLLOWING IN GERIATRIC OUTPATIENT CLINICS

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Physical capacity is a prerequisite for social participation for older adults. With age, balance, strength and muscle mass decline, making it difficult to perform domestic tasks. It is recognized that physical activity reduces the risk of functional decline and counteracts the loss of physical and cognitive autonomy. However, the prescription of physical activity in geriatric outpatient clinics for frail populations is almost non-existent. Thus, a negative spiral is established since the lack of physical activity induced by this sedentary behaviour (social and physical isolation) contributes to the physical deconditioning which accelerates the state of frailty and the decline in mobility of older adults and consequently leading to the use of the healthcare system. Among the reasons for the absence of exercise recommendation is: 1) the lack of training and specific tools for physicians and, 2) the fear of injury, the lack of specific prescription and the inability to move around (lack of transportation) for patients and their caregivers. Fortunately, studies have shown that it is feasible to carry out assessments and adapted physical activity programs remotely, with or without the use of technology, for frail older adults. Indeed, a solution integrated with technology in order to potentially be administered remotely was designed using a pragmatic and co-construction approach. This tool (PACE) via its objective and subjective decisional tree, allows to determine the mobility profile of the older adult and to prescribe one of 35 adapted, specific and unsupervised physical activity programs (1 session per day during 12 weeks) to prevent or counteract deconditioning and loss of autonomy. The feasibility, acceptability, safety and potential effectiveness of PACE were measured and compared to usual care.

### NSS33

#### IMPLEMENTING PHYSICAL ACTIVITY FOR COMMUNITY-DWELLING SENIORS DURING ISOLATION PERIODS (E.G. COVID 19 PANDEMIC)

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Physical inactivity and sedentary lifestyle affect more than 50% of the older adults. The COVID-19-related lockdowns have imposed sedentariness and limited seniors' mobility and engagement in physical activity, which could precipitate or accelerate frailty or loss of functional capacities.

However, maintaining or improving the physical condition is of critical importance as our population ages. Fortunately, previous studies showed that pragmatic web tools integrating physical exercise (PE) programs that are adapted to older adults functional capacities are potential solutions to prevent their physical decline. Moreover, 50% of seniors use the Internet every day and have a tablet, computer or smartphone. Thus, implementing remote PE using web technology could be a solution to maintain the health in older adults while avoiding physical contact and risk of contagion. In times of restricted physical activity due to pandemics, home-based exercises could be an alternative to counteract physical inactivity and to keep older adults fit and healthy. Therefore, it was important to assess if distance-training in PE helps counteract the lockdown deleterious effects (sedentary/inactivity) in pre-disabled seniors.

### NSS34

#### IMPLEMENTING PHYSICAL ACTIVITY FOR OLDER ADULTS IN NURSING HOMES

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The majority of nursing home residents are physically inactive. Most of their time is spent sleeping, doing nothing or watching TV in a lying or sitting position. Promoting regular physical activity is considered to be an effective strategy in reducing all-cause mortality and improving quality of life among older adult from nursing homes. In order to move beyond the relatively monotonous lifestyle in nursing homes, making physical activity enjoyable and sociable could encourage residents to participate in activities more regularly. Growing evidence indicates that gaming approaches for physical activity promotion, such as interactive video games or giant board games, led to increased enjoyment and motivation in addition to positive cognitive and physical outcomes. Interestingly, physical activity contests among nursing homes has been shown to be feasible and may improve the motivational climate and physical performance. At last, it has recently been suggested that participants of group exercise sessions tended to perceive motivational climate as more task-involving than ego-involving

and highlighted the importance of individual positive feedback, new exercises and mutual aid.

### NSS35

#### **BUILDING COMMUNITIES OF GOOD PRACTICE GLOBALLY: THE IMPACT OF BONE HEALTH ECHO, NOW AND BEYOND**

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Bone Health ECHO (Extension for Community Healthcare Outcomes) was established at the University of New Mexico Health Sciences Center (UNM HSC) through collaboration of Project ECHO and the Osteoporosis Foundation of New Mexico. It is the prototype for technology-enabled collaborative learning to expand capacity to deliver best practice skeletal healthcare worldwide and is a member of the IOF Committee of National Societies. The ECHO model of learning uses videoconferencing to link participants located anywhere there is an electronic connection. Learning is focused on interactive case-based discussions that recapitulate familiar learning strategies of postgraduate medical training programs. This symposium reports the progress and challenges in the global development of Bone Health ECHO.

The proof-of-concept Bone Health ECHO program has held weekly videoconferences since 2015, with over 1200 registrants, an average of about 100 participants at each session, and thousands of no-cost CME credits awarded. Over the following 8 years, 8 other programs have started in the US, each with a different focus, including osteoporosis / metabolic bone diseases, fracture liaison services (FLS), orthopedics, rare bone diseases, hypophosphatasia, and osteogenesis imperfecta. In addition, Bone Health ECHO programs have been started in Ireland, Lebanon, Mexico, Australia / New Zealand, and 2 in Russia. Each of the 15 Bone Health ECHO programs has a reach that may extend far beyond its state or country of origin. More Bone Health ECHO programs are expected to follow soon. Challenges for initiating and maintaining these include funding, staffing, recruitment of participants, bureaucratic barriers, language, and time zones.

ECHO connects participants to advance their level of knowledge, with the goal of making them better equipped to manage patients with bone diseases. It offers educational opportunities with minimal disruption to office routines and relieves professional isolation that commonly occurs in a wide range of practice settings. Through replication and innovation in many global locations, Bone Health ECHO leverages scarce resources and expands capacity to provide better skeletal health care for more patients, closer to home, with greater convenience and lower cost than referral to a specialty center. ECHO can enhance the effectiveness of FLS by linking FLS coordinators to improve their clinical and administrative skills, and help Capture the Fracture to be more effective at secondary fracture prevention.

### NSS36

#### **FRACTURE LIAISON SERVICE ECHO IN THE U.S.A**

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Approximately 10 million Americans have osteoporosis and an additional 44 million have low bone mass. In recent years, fractures relating to osteoporosis have become a substantial public health concern, and differences in treatment guidelines along with ambiguity around optimal patient care have played a part in the undertreatment of osteoporosis-related fractures. Efforts have been made to establish Post Fracture Care (PFC) programs to provide secondary fracture prevention services to patients living with osteoporosis and to streamline the management of osteoporosis to improve quality of life for patients. The Fracture Liaison Service (FLS) represents the current most successful model for secondary fracture prevention by focusing on the management of bone health for patients following an osteoporosis-related fracture.

The financial burden of osteoporosis-related fractures in the U.S. is staggering. The current cost burden associated with fractures of the hip in the US is over \$10 billion per year, with costs associated with all osteoporosis-related fractures expected to rise to \$95 billion annually by 2025 due to the aging population. A 2021 study from Nayak et al. calculated that secondary fracture prevention programs and services could save approximately \$418 million for every one million patients in the US Medicare system. The Bone Health and Osteoporosis Foundation (BHOFF) launched the FLS ECHO program in 2017 with monthly meetings designed to support healthcare providers as they launch and grow FLS programs within their own communities. Participants in the BHOFF FLS ECHO program represent a variety of professions and specialties, suggesting that there is a spectrum of healthcare providers that can benefit from the content and reinforcing the evidence that thorough osteoporosis care requires the involvement of providers in numerous specialties and professions.

A survey of BHOFF's FLS ECHO participants determined 28% were nurses, 25% physician assistants, 11% physicians, 2% students, and 32% other. Those in the other category included pharmacists, nurse practitioners, and physical therapists. Specialties also varied, with 46% of participants in orthopedics, 16% in general/internal medicine, 7% in family practice, and 7% in endocrinology. Other participant specialties included rheumatology (4.6%), physician medicine and rehabilitation (2.3%), pharmacy (2.3%), obstetrics/gynecology (2.3%), and other (11.6%). Practice types included multispecialty groups, specialty groups, hospital-based practices, and Academic Medical Centers/Universities.

## NSS37

**NATIONAL UNIVERSITY OF IRELAND GALWAY  
BONE HEALTH TELEECHO**J. J. Carey<sup>1</sup><sup>1</sup>University of Galway, Galway, Ireland

Ireland has a long history of using telemedicine for the care of patients with musculoskeletal diseases. We previously showed patient care delivered remotely with electronic technology is concordant with in-person visits for diagnosis and management, while patient satisfaction is similar, but travel time and costs are significantly reduced. Online learning was subsequently expanded to educate primary care physicians in the care of musculoskeletal diseases: The Rheumatology Toolbox. Virtual clinics are a core element of our fracture liaison service (FLS) across sites for over a decade, which resulted in osteoporosis treatment rates increasing to over 80% for patients admitted to Galway University hospitals with a hip fracture.

In 2012, staff at National University of Ireland, Galway (NUIG) traveled to the ECHO Institute at University of New Mexico Health Sciences Center in Albuquerque, New Mexico, USA. Intensive on-site training in the ECHO model of learning was provided at no cost in anticipation of launching NUIG Bone Health TeleECHO in 2012. The program has had some gaps in provision due to limited funding, loss of key staff and our education centre. COVID saw the rapid deployment of telemedicine and a surge in the number of "ZOOMERS", resulting in unprecedented interest in Bone Health ECHO. Currently the program is up and running a monthly FLS ZOOM takes place for the national FLS program, as well as additional offerings related to other aspects of bone health and ISCD courses. Challenges remain with limited sources of funding, uncertain administrative support, and scheduling logistics.

## NSS38

**BONE HEALTH TELEECHO AT THE AMERICAN  
UNIVERSITY OF BEIRUT, LEBANON**M. Chakhtoura<sup>1</sup>, G. El-Hajj Fuleihan<sup>1</sup>

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Over the last two decades virtual platforms for knowledge exchange have flourished globally, to address challenges incurred by competing priorities and work agendas, travel across the globe including time and costs. The COVID-19 pandemic rendered on-line learning a necessity allowing scientific societies to meet. Bone Health TeleECHO provides the ideal model, offering our bone community the opportunity to meet and interact with experts, advance their knowledge, and improve the care of patients at risk for osteoporosis or other metabolic bone disorders. Bone Health TeleECHO at AUB and AUB-MC was launched in December 2021, in collaboration with our CME office. The Program included vetting for conflict of interest, and incorporated anonymous on-line evaluation, by the participants for each session.

It featured 4 sessions, each included case discussions and interactive audience participation with polling. The sessions covered: current concepts for the assessment and management of osteoporosis, IOF capture the fracture global initiative, challenging osteoporosis cases, and osteoporosis treatment failure. The total number of attendees was 180, the majority were physicians from a wide range of specialties and years in practice. They were mostly from Lebanon, others were from countries in the Middle East, North Africa, Europe and USA. The sessions were rated as excellent or very good.

Challenges encountered include limited regional outreach, audience engagement, and funding. Future strategies include network expansion through major scientific organizations such as IOF, regional concerned stakeholders and societies, a call for "cases submission" by participants, and incorporation of topics suggested by participants in the surveys. There remains a pressing need for collaboration between Bone Health TeleECHO programs to augment knowledge acquisition and identify funding sources ensuring their sustainability and growth.

## NSS39

**SEEKING ANSWERS TO THE CHALLENGES IN  
IMPLEMENTING BONE HEALTH TELE ECHO IN THE  
ASIA PACIFIC**M. Chandran<sup>1</sup>

<sup>1</sup>Senior Consultant and Director Osteoporosis and Bone Metabolism Unit, Department of Endocrinology Singapore General Hospital, Singapore, Singapore

Bone Health Tele ECHO learning is focused on interactive case-based discussions that recapitulate learning strategies of post-graduate medical training programs but in the new world that we live in- are conducted online. Participants present clinical cases and seek input and guidance from a panel of experts. Bone Health Tele Echo provides a platform for health care practitioners who do not work in tertiary specialist centres, when there is no easy access to metabolic bone experts. This allows them to receive guidance on the approach to complex cases whose management may fall outside of common treatment protocols and may require expert opinion. Though this format has shown success in single countries, how to extrapolate/ extend its utility to a vast region like the Asia Pacific is a challenge.

A Bone Health Tele Echo system has been functioning in Australia with participants from Australia and New Zealand for more than a year. APCO (Asia Pacific Consortium on Osteoporosis) is a unique organization that has taken upon as its vision to reduce the burden of osteoporosis and fragility fractures in the Asia Pacific region. APCO has 46 representatives representing 19 countries and regions. APCO is currently in discussion with Bone Health Tele ECHO Australia to extend the reach of the Australia Chapter to across the Asia Pacific. Several challenges remain including the divergent and disparate health care systems and practices prevalent amongst and between the multiple countries that are represented in APCO, language barriers, the differences in prescribing

practices, and lack of specialized labs and imaging technologies in some medical centres. All these make simple acceptance of guidance provided by the expert panel difficult. Solutions such as simultaneous translation may have to be considered and an understanding by the experts of cultural sensitivities. In addition, sustainability of such a programme in the long-term with increasing funding constraints poses a significant challenge and does not have an easy solution.

## NSS40

### IDENTIFICATION OF FRAILTY IN HIP FRACTURE PATIENTS

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Frailty is a condition characterized by a reduced ability to adapt to external stressors because of a reduced physiologic reserve. The presence of frailty is a strong predictor of fractures. Frail older persons are at higher risk of osteoporosis and minimal trauma fractures (particularly hip fractures) through several common mechanisms, including sarcopenia, inflammation, malnutrition, co-morbidities, and hormonal insufficiency. In patients admitted with a hip fracture, prompt identification of frailty is essential to provide appropriate care and prevent adverse outcomes. This talk will review the overlapping mechanisms between osteoporosis and frailty while highlighting the importance of identifying osteoporosis in frail older persons and vice versa. In addition, the utility of tools to identify frailty in older persons admitted with a hip fracture will be discussed.

## NSS41

### FORESTALLING PROGRESSION OF FRAILTY PERIOPERATIVELY IN HIP FRACTURE PATIENTS: A REVIEW OF SYSTEMIC AND INDIVIDUALIZED APPROACHES

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Can we prevent the expected decline in function when an older

person suffers a hip fracture? The patient's baseline level of frailty is compounded by the immobility experienced while waiting for surgery. Perioperative factors such as anesthesia and pain medicines also inhibit physical activity, nutrition, and normal mentation. Post-operatively, physical pain and psychological suffering often lead to decreased mobility after surgery and a significant drop in functional ability leading to post-hospital discharge to a rehabilitation facility. This talk will highlight in-hospital management strategies that target these high-risk frail older adults to mitigate the negative effects of hip fracture and subsequent surgery. We will highlight examples such as national guidelines and auditing programs, geriatric orthopedic co-management, HELP, and mobility programs. The common theme is that these are interdisciplinary, multifaceted, and integrated into the care of patients as a standard that must be upheld. Data is collected and reviewed to ensure protocols are followed and variability in care is minimized. Outcomes are followed to ensure quality initiatives are initiated in the event of a noted opportunity for improvement.

## NSS42

### FRAILTY IN POST-HIP FRACTURE PATIENTS: ¿WHAT SHOULD WE DO?

C. Alonso-Bouzon<sup>1</sup>

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Frailty is a powerful predictor of adverse outcomes. It can be prevented, reversed, and managed to avoid these adverse events. Patients with hip fractures often experience frailty. Few health-care professionals are aware of frailty after surgery and therefore do not implement effective interventions. This talk aims to summarize: the impact of frailty on clinical outcomes in patients with hip fractures; the role of hip fractures as a risk factor for frailty and disability; successful strategies to prevent and manage frailty to significantly improve postoperative outcomes among these patients; and, lastly, the literature gaps, analyzing futures lines of research in this area.

## NSS43

### BASICS OF FRACTURE HEALING

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The process of indirect fracture healing is complex. It begins with the reaction phase, where immediately after trauma the hematoma that forms acts as a template for callus and where the inflammatory environment that recruits mesenchymal stem cells that differentiate into chondrocytes (Fibrocarrilage matrix) and osteoblasts (osteoid). Subsequent callus formation seeks to bridge the fracture and this is in parallel with osteoclast recruitment and infiltration. Further mineralization leads to endochondral ossification and bony substitution that leads to formation of lamellar bone and

this is then followed by further remodelling.

Throughout these phases, various cell signalling molecules are recruited such as proinflammatory cytokines, TGFbeta and angiogenic factors. Osteoclasts play a vital role in the bone callus remodelling stage in order to convert woven bone to mature lamellar bone. In animal models, BP, a potent inhibitor of osteoclast activity, has been proved to inhibit the remodelling stage significantly, resulting in delayed bone turnover and increased callus volume with immature woven bone. Bisphosphonates have not been reported to have a significant influence on the early callus formation stage.

## NSS44

### BISPHOSPHONATES AND FRACTURE HEALING

M. Chandran<sup>1</sup>

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Bisphosphonates attach to hydroxyapatite binding sites on osteoclast cell surface and they concentrate at sites of active bone resorption. When bone containing a Bisphosphonate is resorbed, the Bisphosphonate molecules are released into the acidic lacuna created by osteoclasts and are taken up by these cells. The non-nitrogen containing isphosphonates induce osteoclast apoptosis while nitrogen containing Bisphosphonates inhibit farnesyl pyrophosphate synthase (FPPS) that causes cytoskeletal changes in the osteoclast resulting in inhibition of their activity.

The mechanical effects of bisphosphonates have been studied in animal models in a study that evaluated the long-term effects of alendronate on fracture healing and bone remodeling in ovariectomized rats who underwent bilateral femoral osteotomy 12 weeks afterwards. From day 2 post-ovariectomy, the animals were divided into 3 groups, and treated with Alendronate for 28 weeks (ALN/ALN), ALN for 12weeks and saline for 16 weeks (ALN/Saline) or saline for 28 weeks (Saline/Saline). What was found was that in the ALN groups, there was a greater size of callus area and thickness and greater ultimate load. It thus appears that ALN is beneficial for the mechanical properties of the callus but delays callus remodeling by suppressing remodeling of woven bone into lamellar bone. The increases in biomechanical strength may be due to the retention of trabecular elements in the callus and or increased fracture bridging. Severely suppressed bone turnover as a potential complication of Bisphosphonate therapy was first highlighted by Odvina et al. They demonstrated marked suppression of bone turnover on bone biopsies in 9 patients with osteoporosis or osteopenia on chronic Alendronate (ALN) treatment. Majority of the patients studied displayed either delayed or absent fracture healing for 3 months to 2 years during therapy. SSBT has also been characterized by incident nontraumatic fractures involving the skeletal areas that are rich in cortical bone, with fractures usually occurring at atypical sites such as femoral shafts, pubic bone, and ischium. No significant delay has been noted in upper extremity or lower extremity fracture healing in any of the human

studies that have explored the use of BSPs in this context. In a meta-analysis that assessed eight RCTs that included fractures of the distal forearm, hip and vertebrae, none of the studies showed any delay in indirect bone healing or non-union. There are limited studies on upper limb fractures – a systematic review looked at 6 studies of which one was an RCT. In studies of pre-fracture Bisphosphonate use and how that impacted on rates of fracture union, one retrospective review of 196 patients with distal radius fractures reported a 6 day greater mean time to union healing times in the Bisphosphonate group vs control. This difference however is not deemed significant enough to change current practice patterns given the proven benefits of bisphosphonate therapy in patients with underlying osteoporosis. In a nested case-control study by Solomon et al of medicare beneficiaries (19731 humerus fractures) there were 81 cases (0.41%) with non-union of proximal humerus fractures, mean BSP exposure was 26 ( $\pm$ 23) days with BSP was associated with an approximate doubling of the risk of non-union (OR 2.37, 95% CI 1.13–4.96). This is of unclear clinical significance with a number needed to harm of  $\sim$ 125. In addition, it must be remembered that morbidity and mortality associated with a new fracture are often much greater than a non-union. An RCT by a Korean group randomized 50 women (>50yrs of age) who had undergone volar locking plate fixation of a distal radial fracture and had been diagnosed with osteoporosis to early initiation of bisphosphonate treatment at 2 weeks post-operatively or late initiation at 3 months post-operatively. They found no significant differences with respect to radiographic or clinical outcomes after the plate fixation. No significant data exists on the influence of BSPs on osteoporotic vertebral fracture healing. In a prospective study that enrolled 105 consecutive patients with acute osteoporotic spinal fractures and who had a history of BSP use, usage of BPs was not shown to significantly affect the clinical outcomes; with majority achieving union with no noticeable differences in clinical and radiological outcomes. In the HORIZON Recurrent Fracture Trial (pre-planned secondary analysis) 2127 participants were randomized within 90 days of surgical repair of hip fracture to IV Zoledronic acid (ZOL) versus placebo to examine whether the timing of ZOL infusion affected the risk of delayed hip fracture healing. There was no significant difference in incidence of delayed union of the qualifying hip fracture (3.2% for ZOL vs 2.7%, OR 1.17,  $p=0.61$ ) neither was any interaction noted by timing of infusion; nonunion rates were similar even when ZOL was given within 2 weeks of fracture repair. In a Meta-analysis of 10 RCTs ( $n=2888$ ) where 4 trials used ALN, 3 used Zol, 2 risedronate, and 1 etidronate that aimed to analyze benefits and adverse effects of early administration of BSPs so as to provide recommendations on when BSPs should be utilized, it was shown that patients who were treated with early BSP therapy had no statistically significant difference in radiological fracture healing times compared with patients in the control group. Patients who were treated with early BSP therapy did not have a significantly higher risk of delay or nonunion of fracture healing than patients in the control group. The effect of BSP on fracture union has been studied further. 421 bisphosphonate-naive patients aged  $\geq$ 50 years with a radiographically confirmed fracture of the distal radius were randomized to receive ALN 70 mg once weekly or placebo within 14 days of

fracture. The primary outcome measure was the proportion of patients with fractures that had radiologically united at 4 weeks. No significant difference was noted between the proportion of patients with fracture union or non-union at any time point. In summary, current evidence does not suggest any deleterious effect of BSPs on fracture healing in humans.

## NSS45

### OTHER ANTIOSTEOPOROSIS AGENTS AND FRACTURE HEALING

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**Denosumab** is a monoclonal antibody, the mechanism of action of which is based on its binding to the receptor activator of nuclear factor- $\kappa$ B ligand (RANKL), thus leading to the decrease of differentiation and function of osteoclasts with consequent inhibition of bone resorption. In a pre-planned analysis of the FREEDOM trial evaluating the effect of denosumab administration on fracture-healing to address theoretical concerns related to initiating or continuing denosumab therapy in patients presenting with a nonvertebral fracture, delayed healing was noted in 7 subjects (two in the DMB group and five in the placebo group); one subject in the placebo group had nonunion. Neither delayed healing nor nonunion was observed in any subject who had received DMB within six weeks preceding or following the fracture. Denosumab does not seem to delay fracture-healing even when it is administered at or near the time of the fracture.

**Raloxifene** is a SERM that has mild anti-resorptive properties. It has been shown in mouse models to enhance periosteal callus remodeling in later stages. However, there are no studies evaluating the influence of raloxifene on fracture healing in humans. Parathyroid hormone (PTH) analogue Teriparatide (TPT) and, more recently, the PTH-related protein analogue Abaloparatide have been used to exert bone-forming effects with a concomitant increase in bone turnover of variable magnitude (greater with teriparatide than with Abaloparatide). Animal models of normal fracture healing showed increased callus area and improved bone strength with TPT. A meta-analysis and systematic review by Eastman and colleagues looked at 11 randomized controlled trials (RCTs) to evaluate the evidence of PTH analogues on fracture healing. There were 3 comparators: placebo or positive comparator or standard care, and they considered all fracture types to maximise the inclusion of all RCTs of PTH analogues and fracture healing at the compromise of increased heterogeneity of the results. Fracture sites in the 11 articles were vertebrae (n=789, 3 trials), femur (atypical) (n=13, 1 trial), hip (n=343, 4 trials), tibia (n=13, 1 trial), humerus (n=40, 1 trial) and radius (n=102, 1 trial). No difference in fracture healing rate at first reported time point was noted in the TPT treated patients. There were however significant reductions in pain and improved functional outcomes. The authors concluded that PTH analogues have a role in improving functional outcomes across a range of fracture types with no

additional incidence of adverse events compared with bisphosphonates and standard care. There were several limitations of the study and that which may be extended to the currently available evidence base. Different comparators, varying trial designs and a lack of common fracture healing analysis time point and criteria between trials are the main limitations. Plain radiographs might not have been sensitive enough to differentiate different phases of healing. Another meta-analysis by Kim and colleagues of 11 trials showed a varied effect of TPT on fracture healing based on site of fracture. The conclusion was TPT appears to provide selective advantages to fracture healing and functional recovery. A clearer picture can be obtained by isolating some of the more pertinent RCTs within this meta-analysis. The trial by Aspenberg and colleagues was a 53 week RCT that randomized 102 postmenopausal women with a distal radius fracture who required closed reduction but did not require surgery to 8 weeks of TPT 20 $\mu$ g, 40 $\mu$ g or placebo within 10 days of fracture. They hypothesized that the higher TPT dose would shorten the time to cortical bridging. They found that the median time from fracture to first radiographic evidence of complete cortical bridging in three of four cortices was significantly reduced in teriparatide 20 $\mu$ g group vs placebo. No significant differences for functional outcomes or adverse effects were found between groups. The lack of effect of TPT 40  $\mu$ g to accelerate healing compared with placebo was an unexpected finding. The authors postulated that the higher dose resulted in a decreased mineral density in the cortex of the radial shaft, likely related to increased remodeling that may have made a larger and mechanically functional callus less visible on X-rays by increasing its porosity. In animal models of fracture healing and implant fixation, the effect of teriparatide appeared to be stronger on newly forming bone than on preexisting bone. A positive effect of TPT can be expected only after an osseous callus has been developed.

Although TPT might reduce the risk of nonunion, it appears from animal data as well as the present study that the main clinical advantage of using TPT would be an acceleration of time to fracture healing and enhanced bone formation. Another randomized trial randomized 171 patients to either TPT (20  $\mu$ g/day) with risendronate (35 mg/week) initiated within 2 weeks after fixation of a low-trauma pertrochanteric hip fracture. This study showed improved functional outcomes up to 26 weeks and improved pain up to 18 weeks. However, there was no cases of non-union seen in either arm. TPT has also been shown to improve function for patients with a pelvic fracture with no differences in fracture healing (n=35).

**Abaloparatide** is a novel synthetic peptide analog of PTHrP. In postmenopausal women it has been shown that 24 weeks of daily subcutaneous Abaloparatide increases BMD of the lumbar spine, femoral neck, and total hip in a dose-dependent fashion compared to placebo. There is no available data on human fracture healing. Evidence of improved outcomes comes only from mouse models. In these studies, both metaphyseal and diaphyseal healing were assessed.

Abaloparatide was seen to result in an increase in screw pull-out force, a surrogate for the strength of the bone and is a measure of local cancellous bone formation in response to trauma ie sur-

rogate for cancellous bone healing. It also resulted in a denser callus being formed.

#### **Romosozumab**

Endogenously produced sclerostin stimulates bone resorption through an autologous effect on osteocyte RANKL production. Romosozumab is a humanized monoclonal antibody to sclerostin.

In phase 2 randomized trials involving Romosozumab, there has been no evidence of improvements on fracture healing-related clinical and radiographic outcomes. In this trial the investigators looked at patients post open reduction and internal fixation of intertrochanteric or femoral neck hip fractures. There was no difference in Timed Up and Go score, and no dose or treatment-group-related trends in the median time to radiographic evidence of healing. The reason for the absence of accelerated healing, despite stimulation of bone formation, is unclear. Similarly, in a Phase 2 trial evaluating the effect of Romo post surgical fixation of tibial diaphyseal fractures, there was no significant difference in time to radiographic or clinical healing, neither was there a benefit in physical function. The reasons for the lack of acceleration of fracture-healing in the romosozumab groups compared with the placebo group are unclear. It could be that the study period was too short, or the study was underpowered to detect changes in subgroups of patients who might benefit from treatment.

#### **NSS46**

### **CHALLENGES IN CURRENT POLICY AND POST-FRACTURE CARE LANDSCAPE, AND THE IMPORTANCE OF HEALTH ECONOMICS TO GENERATE AND LEVERAGE EVIDENCE BASED DATA TO BUILD THE CASE FOR POLICY CHANGE**

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Fragility fractures are a substantial public health issue. Fragility fractures affect numerous women and men across the world; they cause pain, disability, loss of independence; and have a significant impact on patients' quality of life and costs to the healthcare systems. Despite effective and safe medications to reduce the risk of (subsequent) fractures, a majority of people who are at high risk of fracture remain untreated for osteoporosis. Poor treatment initiation is especially marked in high-risk patients with more than half of the individuals (aged 50 years and above) not currently receiving effective secondary fracture prevention after an initial fragility fracture, despite this population being most likely to sustain a further fracture. During this presentation, you will first learn about several challenges in the current policy and post-fracture landscape, following which the importance of health economics to generate and leverage evidence based data will be presented. In particular, the rationale and roles of cost-effectiveness analyses (that assess the costs and outcomes of health interventions

such as drugs or Fracture Liaison Services) and of budget impact analyses will be shown. Health economics is nowadays increasingly important and used by policy makers to allocate healthcare resources. Recent policy reports by the International Osteoporosis Foundation's Capture the Fracture® initiative, including the expected economic benefits of Fracture Liaison Services, will enrich the presentation.

#### **NSS47**

### **THE CAPTURE THE FRACTURE® INITIATIVE : DESIGNING POLICY TOOLS FOR EFFECTIVE ENGAGEMENT WITH POLICYMAKERS**

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Fragility fractures represent a significant and growing concern to policymakers due substantial morbidity, mortality and health economic implications. As described in the adage 'fractures beget fractures' it is clear that, when attempting to identify those at risk of fractures, focussing on those who have already sustained a fragility fracture is a logical and high-yield place to start. Under the umbrella of the Capture the Fracture® initiative, the International Osteoporosis Foundation (IOF) has produced a suite of tools to assist in the process of policymaker engagement with secondary fracture prevention. These include the policy generic narrative described in 'The Capture the Fracture® Partnership: Guidance for Policy Shaping' outline the building blocks of an effective policy response which has been shown to improve patient outcomes, deliver financial savings and save lives. This general resource is complemented by a collection of Country-Specific Policy documents which assess the policy and post-fracture care landscape and provides recommendations which are aligned to the particular needs and opportunities within individual countries. This presentation will highlight key areas to consider when engaging with policy makers and draw attention to particular examples of gold-standard, national, post-fracture care.

#### **NSS48**

### **THE BRUSSELS STUDY ON THE EARLY PREDICTORS OF FRAILTY - BUTTERFLY**

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On behalf of the Gerontopole Brussels Study Group. Vrije Universiteit Brussel (VUB), Brussels, Belgium; <https://fria.research.vub.be/en/butterfly-study>



The Brussels study on the early predictors of frailty (BUTTERFLY) is a project of the interdisciplinary network "Gerontopole Brussels", that has been initiated by the Frailty in Ageing research (FRIA) and Belgian Ageing Studies (BAS) groups of the Vrije Universiteit Brussel (VUB) bringing together 10 VUB research teams and the Department of Ageing and Life Course of the WHO. BUTTERFLY is an explorative, observational cohort study aiming to identify new frailty/healthy ageing markers in elderly persons aged 80 and over and to determine their predictive value for the occurrence of frailty or maintenance of healthy ageing. Within the study, a large cohort of n=496 community dwellers aged 80 years and over were recruited. 403 non-frail subjects (i.e. robust on the Fried Phenotype, the Rockwood Frailty Index and the Groningen Frailty Indicator) were reassessed in a large test battery (medical, physical, psychological, social and environmental) for potential early markers of frailty every 6 months over a period of 2 years.

The outcomes of this study will in different ways provide basis for further research opportunities and practical utilizations with regard to older people, enclosing interventions of specific treatments or new models of care. Moreover, findings will allow to proactively differentiate those elderly, who will remain fit and independent from those who are apparently fit but at risk of becoming frail. Future studies within the research program will focus on intervention trials to prevent/counter frailty in older persons aged 80 and over by targeting specifically early frailty markers and maintaining healthy ageing.

During this symposium the BUTTERFLY project will be presented and the up-to-date results will be reported by means of short (to-the-point) scientific communications. At the end, sufficient time for discussion with the audience is provided.

## NSS49

### MUSCLE ENDURANCE & SELF-PERCEIVED FATIGUE PREDICT DECLINE IN GAIT SPEED AND ACTIVITIES OF DAILY LIVING AFTER ONE YEAR FOLLOW-UP: RESULTS FROM THE BUTTERFLY STUDY

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**Objectives:** remains still poorly understood due to the multidimensional character and the co-existence of different underlying mechanisms but is related to adverse health-outcomes. Fatigue might influence the losses in activities of daily living (ADL) and gait speed in older adults. When fatigue parameters are present before the experience of losses in ADL and gait speed they can be used as early warning signals. The aim of this study was to explore the predictive value of muscle endurance and fatigue on changes in ADL and gait speed in community-dwelling older adults aged 80 and over.

**Material and Methods:** 324 community-dwelling older adults aged 80 and older of the BUTTERFLY study were assessed after one year for muscle endurance, self-perceived fatigue, Activities of Daily Living and gait speed. Mediating logistic regression analyses were used to investigate whether muscle endurance mediated by self-perceived fatigue predicts decline in gait speed and ADL after one year follow-up.

**Results:** After one year follow-up, there was a significant ( $p < 0.05$ ) decrease in handgrip strength, increased feelings of fatigue and decreased gait speed and ADL in males and females. Muscle endurance mediated by self-perceived fatigue had an indirect effect on the prediction of decline in Basal- (-0.27), Instrumental-ADL (-0.25) and gait speed (-0.28) after one year follow-up.

**Conclusion:** This study showed that low muscle endurance combined with high self-perceived fatigue can predict changes in ADL and gait speed after one-year follow-up. Low muscle endurance combined with high self-perceived fatigue can predict changes in ADL and gait speed after one-year follow-up. Muscle endurance separately did not predict change in functioning after 1 year follow-up. Therefore, the results indicate that changes in ADL and gait speed after 1-year are dependent on the level of muscle endurance and self-perceived fatigue. These parameters might be very suitable for use in evaluating intrinsic capacity and can help to reduce the limitations in clinical usage of the vitality domain in the framework of intrinsic capacity.

## NSS50

### THE EFFECT OF MEDICATION CAUSING AUTONOMIC DYSFUNCTION ON INCIDENCE FRAILTY IN OCTAGENARIANS

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#### Objectives

Autonomic dysfunction and frailty are common and complex geriatric syndromes with similar negative health outcomes. This study investigates the relationship between medication with known effect on autonomic functioning and incidence frailty in people aged 80 and over.

#### Methods

The BUTTERFLY cohort (v1\_20140911) included 404 non-frail or pre-frail community dwelling elderly aged 80 and over for a physical evaluation at baseline and after one year. The relationship between: Medication with known negative effect on autonomic functioning and decline in frailty status were modelled using logistic regression analyses.

#### Results

Medication with effect on autonomic functioning had a significant predictive value for decline in frailty status and development of orthostatic hypotension after 1-year follow-up with a multiplicative odds ratio of respectively 1.378 (1.007 – 1.887,  $p = .045$ , corrected for vascular problems, age and gender) and

1.516 (1.075 – 2.136,  $p=.018$ , corrected for orthostatic hypotension at baseline, vascular problems and gender).

#### Conclusion

Our study revealed that medication with detrimental effect on autonomic function plays an important role in the development and decline in frailty status in community dwelling people aged 80 and over. Regular review of medication with effect on autonomic functioning and prevention of vascular problems could have a positive effect on the prevention of frailty and orthostatic hypotension in people aged 80 and over. Thereby reducing falls, hospitalisations and reduce mortality in this population.

### NSS51

#### IMPACT OF COVID-19 ON PHYSICAL ACTIVITY, FATIGUE AND FRAILTY IN COMMUNITY DWELLING OLDER ADULTS: A CROSS SECTIONAL STUDY

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**Objectives:** At the beginning of the pandemic keeping up one's physical activity during times of social restrictions and lockdowns was an important strategy for maintaining both physical and mental health in the population. However, Covid-19 restrictions may have prevented people from complying with recommended levels of physical activity, especially older persons leading to increased negative health outcomes such as fatigue and frailty. Therefore, we sought to describe the level of physical activity and levels of perceived fatigue during the Covid-19 pandemic by community-dwelling older adults aged 80 and over. On top we explored whether physical activity was related to increased levels of fatigue and frailty.

**Material and Methods:** Three-hundred-ninety-one older adults from the BUTTERFLY-study (aged  $86.5 \pm 3.00$ ) completed a Covid-19 survey including physical activity questions, the Mobility-Tiredness scale and the FRAIL scale. Linear regression analysis was conducted to assess whether the variables age, sex and physical activity (independent factors) were significantly related to fatigue and frailty.

**Results:** Respectively 30.5% and 24.7% of the participants reported a decrease in walking and in energy intensive activities; 25.4% reported increased sedentary behaviour. A lower level of physical activity was associated to higher levels of fatigue and increased frailty risk ( $p < 0.05$ ), independently from psychological symptoms.

**Conclusion:** The level of physical activity is important, since participants with lower levels of physical activity and more sedentary behaviour were more likely to feel fatigued and have higher risk for frailty. In this regard, health professionals, organisations and families must support older adults to stay physically active during future Covid-19 pandemics and lockdowns to decrease the negative physiological and physiological impact of sedentary behaviour.

### NSS52

#### THE IMPACT OF COVID-19 LOCKDOWN ON THE QUALITY OF LIFE, MEANINGFUL ACTIVITIES, AND FRAILTY IN COMMUNITY-DWELLING OCTOGENARIANS: A STUDY IN BELGIUM

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**Objectives:** To investigate the impact of COVID-19 lockdown on quality of life (QoL), meaningful daily activities, and (pre)frailty in community-dwelling octogenarians.

**Methods:** Cross-sectional design with bivariate and multiple linear regression modeling using a stepwise approach examining the level of QoL during the COVID-19 lockdown in a group of 215 community-dwelling octogenarians (Mage =  $86.49 \pm 3.02$ ). A comprehensive set of biopsychosocial variables (FRAIL scale, general health, engagement in meaningful activities survey, questions on loneliness, and feelings) were used as explaining variables.

**Results:** Particularly, a decrease in daily activities, social activities, and an increase in free times activities were observed, but the decrease in QoL could be explained by the meaningfulness in activities, together with experiencing emptiness in life, taking  $\geq 4$  medications a day and feeling down or depressed.

**Conclusions:** We tried to understand which components contribute to and might affect a person's QoL caused by restrictions imposed by the governance and its influence on the lives of the community-dwelling octogenarians. As such, this output could be a baseline for the development of minimally impacting countermeasures during future lockdowns.

**Clinical implications:** Studying lifestyle changes and thus also variables related to QoL during a pandemic, may support policy-makers and practitioners to develop relevant interventions.

### NSS53

#### FUTURE PERSPECTIVE: HEALTHY AGEING CENTERS

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#### Objective(s)

All societies experience population ageing. The WHO found an increase in human life expectancy (LE) from 66.8 years (2000) to 73.4 (2019) and in healthy life expectancy (HALE) from 58.3 years (2000) to 63.7 (2019). The latter is due to declining mortality rates and not caused by the reduction of years lived without disability. As a consequence a compression of the number of years lived with disabilities is needed. Within an ageing in place policy, it should take place close to older persons in the commu-

nity. In response to this, our research group proposes the concept of Healthy Aging Centre (HAC), which is a local hub where older persons are stimulated to age healthy and preventive behaviour is promoted.

#### Material and Methods

In order to focus on the feasibility and the implementation of HAC in Belgium, 5 online focus groups, one meeting and two individual interviews with stakeholders were organised between March and September 2021, using a semi structured scenario. The concept of a HAC was proposed and followed by a discussion. The stakeholders were: Nursing home managers (5), community social welfare (1), geriatrician (1), policymaker (6), expert active ageing (1), expert housing and care (1), local/provincial policy advisors (2), members of home care organisations (3) and local care centres(1), care-innovator (1), members of senior advisory boards (2), psychologist (1), physiotherapist (1), manager assisted living (1) and an expert medicine, health and life sciences (1).

#### Results

The benefits of a HAC were its focus on active ageing, on resilience, on the strengths of older people, on the personalized care and early prevention.

The challenges of a HAC were defining the target population as prevention starts early, and their awareness to use a HAC, the inclusion of frail older people, persons with low health literacy and from different cultural backgrounds. Besides this, a risk of fragmentation of care, due to the installation of a HAC, is also possible.

#### Conclusion

The HAC concept is appreciated by stakeholders as it offers opportunities for prevention and to age healthy in place. However challenges need to be tackled prior to the installation of a HAC in communities.

### NSS54

#### SKELETAL MUSCLE DYSFUNCTION AND SARCOPENIA IN CHRONIC KIDNEY DISEASE

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Skeletal muscle dysfunction is common in people with chronic disease, and is highly prevalent in people with chronic kidney disease (CKD). Reduced muscle mass and muscle quality are associated with premature mortality, morbidity, and a reduction in physical functioning and the ability to complete activities of daily living. Recent evidence from a large UK CKD population suggests 10% of patients have some form of muscle dysfunction, and this is associated with increased risk of mortality and progression to end stage kidney disease. Furthermore, sarcopenia has been linked to worse clinical outcomes from COVID-19 in this population. The reasons for this are multifactorial, and include contributions from increased inflammation, malnutrition, and physical inactivity. Novel assessment techniques to assess muscle mass involve imaging techniques such as ultrasound, which can also be

used to indicate changes in muscle composition and structure. Interventions to improve muscle function are often based around some form of physical activity and exercise, with structured programmes increasing muscle size and physical performance; in particular, a combination of resistance and aerobic-based exercise can help ameliorate some of the reductions observed, as well as having synergistic effects on kidney-based symptoms and other clinical parameters.

Learning objectives:

- To provide an overview of the prevalence and impact of skeletal muscle dysfunction and sarcopenia in CKD;
- To discuss methodologies for the assessment of skeletal muscle dysfunction and sarcopenia in CKD;
- To understand the best means to improve skeletal muscle dysfunction and sarcopenia in CKD through physical activity and exercise principles.

### NSS55

#### THE ROLE OF CALCIPROTEIN PARTICLES IN BONE FUNCTION AND VASCULAR CALCIFICATION

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Bone mineralization and vascular calcification share many common pathways in their pathophysiology. Calciprotein particles, nanoparticles composed of calcium phosphate crystals and calcification inhibitors, mediate the clearance of calcium and phosphate in the body. However, in diseased state such as kidney disease, excess calciprotein particles build up in the blood and contribute to the synthesis and secretion of fibroblast growth factor-23 in bone, as well as calcification of vascular smooth muscle cells in arteries. The findings from these preclinical studies suggest that calciprotein particles could be a biomarker and therapeutic target for bone disease and vascular calcification.

Learning objectives:

- To understand the calcification paradox in bone and vasculature as well as its associated therapeutic dilemma
- To discuss the role of calciprotein particles in bone function and vascular calcification
- To discuss the potential prognostic and therapeutic values of calciprotein particles in bone disease and vascular calcification

**NSS56****PSORIATIC DISEASE IN THE ERA OF COVID-19**L. Athanassiou<sup>1</sup><sup>1</sup>Department of Rheumatology, Asclepeion Hospital, Voula, Athens, Greece

Psoriatic arthritis and psoriasis are interrelated autoimmune diseases which are treated with immune modulating agents. They are currently known as psoriatic disease. Both psoriatic arthritis and psoriasis are related with metabolic syndrome, hyperuricemia, obesity and diabetes mellitus type 2, factors leading to severe or even fatal Covid-19 disease. Therefore, the question has arisen as to the prevalence and incidence of Covid-19 infection in psoriatic arthritis and psoriasis patients. Patients with psoriatic arthritis and psoriasis appear to have the same risk of infection with SARS-CoV-2 and similar Covid-19 outcomes as the general population. Treatment for psoriatic arthritis and psoriasis does not alter the risk of getting SARS-CoV-2 infection or having worse Covid-19 outcome. Chronic systemic corticosteroid treatment should be avoided, if possible, as it is associated with worse Covid-19 outcome. Patients with psoriatic arthritis or psoriasis who are not infected with SARS-CoV-2 should continue their biologic or oral treatment. Treatment which targets the immune system should be withheld in the setting of SARS-CoV-2 infection in psoriatic arthritis and psoriasis patients and reinstated upon recovery.

**NSS57****PSORIATIC DISEASE. COMORBIDITIES**P. Tsakiridis<sup>1</sup><sup>1</sup>Rheumatologist, Thessaloniki, Greece

Psoriatic arthritis and psoriasis are systemic autoimmune inflammatory diseases which are recently known as psoriatic disease. The disease has a variety of phenotypes and is well known for the involvement of all organ systems. The disorder is immune mediated and is characterized by the involvement of Th-1 and Th-17 cells in its pathogenesis. The disease is characterized by an elevated risk of metabolic syndrome, characterized by abdominal obesity, hypertension, hyperglycemia, hyperuricemia and hyperlipidemia. Psoriatic disease and the associated metabolic syndrome may be related to the presence and overexpression of inflammatory cytokines. This association of a systemic inflammatory disease which affects the joints and the skin with the metabolic syndrome confers an increased cardiovascular risk. In addition, the severity of the metabolic syndrome is associated with increased severity of the psoriatic disease and the need for treatment modulation. In patients with psoriatic disease the various components of the metabolic syndrome should be therapeutically targeted to decrease the cardiovascular risk.

**NSS58****PSORIATIC DISEASE AND REHABILITATION**Y. Dionyssiotis<sup>1</sup><sup>1</sup>SCI Rehabilitation Clinic, General University Hospital of Patras, Rio Patras, Greece

The relationship between arthritis and psoriasis was observed during the 19<sup>th</sup> century. Psoriatic arthritis (PsA) is the inflammatory arthritis observed in patients with psoriasis. The incidence of PsA amongst patients with psoriasis is approximately 5-10%, although it may reach 30%. Inflammatory synovitis and enthesitis are observed in PsA. The disease is characterized by the presence of psoriatic rash and arthritis. In 75% of cases psoriasis precedes arthritis, in 10% of cases arthritis precedes psoriasis and in 15% of cases psoriasis and arthritis develop simultaneously. In PsA peripheral, sacroiliac and spinal joints are affected. There are no diagnostic laboratory tests in PsA. ESR and CRP may be increased. Uric acid may be increased in the case of florid psoriasis and mild anemia of chronic disease may be observed. Rheumatoid factor and antinuclear antibodies in low titers may be found. HLA-B27 is detected in 50-70% of patients with axial disease, while in <15-20% only peripheral joints are affected. Disease severity is the decisive factor in treatment selection. Mild PsA with minimal inflammatory manifestations, minimal functional involvement and minimal joint involvement is managed by physiotherapy and non-steroidal anti-inflammatory agents. Severe disease is managed by corticosteroids, disease modifying agents and biologic agents which control the disease and inhibit its evolution. Physiotherapy in the form of exercise for the prevention of ankylosis and preservation of joint function is important for the management of the disease.

**NSS59****PSORIATIC DISEASE. NEW THERAPEUTIC HORIZONS. SMALL MOLECULE INHIBITORS, BIOLOGIC AGENTS AND JAK INHIBITORS**P. Athanassiou<sup>1</sup><sup>1</sup>Department of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

Psoriasis and psoriatic arthritis are clinically heterogenous diseases which affect the joints and the skin, currently known as psoriatic disease. The disease is a systemic immune mediated inflammatory disease. Psoriasis treatment includes topical application of agents such as vitamin D analogues and corticosteroids, phototherapy, standard systemic treatment with disease modifying agents such as methotrexate, cyclosporin and acitretin, small molecule inhibitors such as dimethyl fumarate and apremilast, biologic agents and JAK inhibitors. Dimethyl fumarate is a methyl ester of fumaric acid which is hydrolyzed in the small intestine to the active metabolite monomethyl fumarate and is approved for the treatment of moderate to severe plaque psoriasis. Dimethyl fumarate exerts anti-inflammatory, anti-oxidative and im-

munomodulatory effects and improves quality of life in psoriasis patients. Dimethyl fumarate is a very promising small molecule inhibitor applied in the treatment of other systemic autoimmune diseases such as multiple sclerosis and may open new therapeutic horizons for autoimmune diseases. Psoriatic arthritis treatment involves the use of NSAIDs, topical therapies for psoriasis, disease modifying drugs, such as methotrexate and sulfasalazine, biologic agents, such as TNF $\alpha$  inhibitors, ustekinumab, an IL-12/23 inhibitor, secukinumab, a monoclonal antibody to IL-17A, ixekizumab, an IL-17A inhibitor, apremilast and JAK inhibitors.

## NSS60 CIGARETTE SMOKE AND BONE DISORDERS

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Cigarette smoking has a negative impact on the health of the musculoskeletal system, by reducing bone mass, exerting direct or indirect effects on bone remodeling. The effect is dose-dependent and is associated with a vertebral fracture risk of 13% for women and 32% for men, and a hip fracture risk of 31% for women and 40% for men. Scientific evidence shows that smoking causes an imbalance in bone turnover in favor of bone resorption, making bone more prone to osteoporosis and fragility fractures. Among the 150 toxic compounds contained in cigarette smoke, some are in fact capable of impairing osteogenic differentiation of osteoprogenitor cells by directing them toward an adipogenic phenotype, and significantly inducing cellular senescence and its attendant effects, such as mitochondrial dysfunction and DNA damage. In addition, cigarette smoking is known to have deleterious effects on the fracture healing process: it results in physiological changes at the fracture site, such as hypoxia and alterations in metabolic cellular activity, delayed consolidation, and increased risk of postoperative complications, which are responsible for longer hospital stays and consequent increased resource consumption. Abstinence from smoking is therefore advisable to prevent the onset of metabolic bone disease, although some of the consequences of tobacco use appear to linger for decades. Because smoking is a major public health concern, understanding the association between cigarette smoking and the occurrence of diseases of the musculoskeletal system is necessary to identify new potential targets for intervention.

## NSS61 HEALTH LIFESTYLES AND BONE HEALTH: THE CASE OF TOBACCO HARM REDUCTION

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Damage to the bone cumulates over time in people who smoke and quitting is the only proven method to attenuate the smoking damage to the bone.

However, most smokers find it very hard to quit smoking and many

do not intend to quit smoking. For smokers who are having difficulty stopping smoking, the alternative of lessening the negative effects of long-term cigarette smoke exposure on bone health by switching to non-combustible nicotine delivery alternatives, such as heated tobacco products (HTPs) or e-cigarettes (ECs) should be considered.

Compared with conventional cigarettes, HTPs and ECs offer substantial reductions in combustible toxic chemicals and, for this reason, they are proposed for harm reduction from cigarette smoke and for smoking cessation.

There is limited data on how harm reduction strategies may impact bone health.

The existing evidence will be reviewed and suggestions for future research discussed.

Health professionals can also learn more about the opportunities offered by reducing the harm caused by smoking for healthier lifestyle and bones in people who are using or intending to use these products.

## NSS62 ROLE OF CIGARETTE SMOKE AND TOBACCO HEATED PRODUCTS ON BONE REMODELING

G. Li Volti<sup>1</sup>

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Several lines of evidence demonstrate the detrimental effects of smoking mainly due to the stimulation of osteoclastogenesis and inhibition of osteoblastogenesis. However, the clear pathophysiological mechanisms underlying such effects remain to be elucidated. Furthermore, data related to tobacco heated products on such mechanisms and comparison with cigarette smoke are not available so far. The aim of the present study was therefore to test the effect of cigarette smoke, tobacco heated products and nicotine on osteoblastogenesis. Human mesenchymal stromal cells were cultured in osteoblastic medium in the presence or absence of bubbled extract obtained from cigarette or a commercially available tobacco heated product. To further test the effect of nicotine under our experimental conditions, in a separate set of experiments we also treated cells with nicotine (range 0.0001-1 ng/ml). In order to set our experimental conditions to resemble clinically relevant conditions and to compare cigarette to tobacco heated product, nicotine concentration was assessed in both bubbled media. Our preliminary results suggest that cigarette smoke (1 ng/ml of final nicotine concentration) results in a significant decrease of cell viability (about 30%) compared to vehicle treated cell culture. Similar results were obtained with tobacco heated products and following pharmacological treatment with nicotine. No significant changes in cell viability were observed with all other nicotine concentrations. Future studies are now warranted in order to elucidate the molecular mechanisms of nicotine toxicity in mesenchymal stromal cells and its potential impact on osteoblastogenesis.

**NSS63****FLS: CLOSING THE TREATMENT GAP**N. Gadallah<sup>1</sup><sup>1</sup>Professor of Rheumatology and Rehabilitation, Ain Shams University, Cairo, Egypt

Fragility fractures are sentinels of osteoporosis, and as such all patients with low-trauma fractures should be considered for further investigation for osteoporosis and, if confirmed, started on osteoporosis medication. It has been widely reported that most patients with fragility fractures presenting to medical attention do not have the appropriate bone health assessment and treatment. It is reported that small fraction of these patients proceed to have formal bone health assessment. Simply treating the acute fracture is insufficient and must be followed by the appropriate osteoporosis treatment. To ensure that the "osteoporosis treatment gap" is addressed, a robust proactive system needs to be in place to take responsibility for this, and the fracture liaison service (FLS) has been proposed as an effective model of care. This presentation will share the experience of setting up an FLS service from scratch, the importance of setting up FLS standards and how it helped to achieve its targets.

**NSS64****HOW PHARMACEUTICAL INDUSTRY CAN SUPPORT NATIONAL FLS**Y. El Miedany<sup>1</sup><sup>1</sup>Prof. Rheumatology, Canterbury Christ Church University, Kent, United Kingdom

The traditional commercial approach based on ready access to physicians, mass-media advertising, hefty sales forces, and relatively uninformed patients is falling short. In particular, companies are failing to engage with facilities providing actual service to patients in the standard practice, when they look for marketing or to create sales funnel as a guide for promotion programs. The concept of healthcare decision journey, or CareFlow has changed the approach pharma companies adopt to understand how consumers make healthcare decisions. A CareFlow maps a patient's journey from the first awareness of a problem to treatment. These insights paved the way for pharma companies and marketers to engage with and support services provided to the patients in a professional way. FLS is a good example of the CareFlow model. In fact, every point in the FLS pathway is potentially a vital point of interaction; by understanding it, the marketer can understand the relative importance of points and (re)allocate investment and attention accordingly. In the meantime, but supporting such provision as FLS, it helped to streamline the service and providing it free to the patients. This presentation will show how pharma can support FLS service professionally at a national level.

**NSS65****FALLS: RAISING AWARENESS THROUGH HCP EDUCATION**S. Plummer<sup>1</sup><sup>1</sup>Director of the Institute of Medical sciences, Canterbury Christ Church University, Kent, United Kingdom

There is an increasing focus on improving healthcare in order to ensure higher quality, greater access and better value for money. Health professionals often lack adequate protocols or knowledge to detect, manage and prevent falls in standard practice. The fact that falls and fractures in older people are often preventable, highlights the importance of delivering HCP education in a trusted independent environment. Reducing falls and fractures is important for maintaining the health, wellbeing and independence of older people.

The Falls and Fragility Fractures Pathway has been developed in collaboration with the Egyptian Academy of Bone Health and Metabolic Bone Diseases. It defines the core components of an optimal service for people who have suffered a fall or are at risk of falls and fragility fractures. In the meantime, it provides a national case for change and a set of resources to support Local Health Economies.

This presentation describes the efforts of setting up educational interventions to improve health professionals' recognition and management of falls and explain the falls and fragility fractures pathway.

**NSS66****GUIDELINES METHODOLOGY**P. Clark<sup>1</sup><sup>1</sup>Clinical Epidemiologist, Hospital F. Gomez, Mexico City, Mexico

An expert committee in osteoporosis with broad representation and experience from LATAM countries were gathered to review and evaluate the most recent guidelines and relevant literature published to develop a list of recommendation and statements based on the best evidence and carry out a Delphi Consensus with a larger group of experts from different specialties. Electronic databases searched were MEDLINE, EMBASE, SCOPUS AND COCHRANE. Based on the first search, six recent published guidelines were found (Pereira RM 2021, Buckley L 2017, Compton J 2018, Laurent MR 2022, Park SY 2018 and Weare – Regales N 2021). After reviewing all of them two were selected as the most appropriated to use for this study: the ACR 2017 and the Brazilian Guidelines 2021.

A list of fifty recommendations was chosen and developed for consensus. From these, 26 were selected and updated from the Brazilian guidelines, 14 from the ACR guidelines and 10 were de novo statements. Questions, level of evidence and recommendations were identified preserving the level of evidence and strength of recommendation published in the original guidelines: grading of recommendations based on the strength was made according

to the criteria of the Oxford Centre for the Evidence-based Medicine (EBM).

These recommendations (statements) were submitted to the expert panel members for voting rounds according to Delphi methodology looking for at least 70% of agreement for each statement. Every recommendation and statement were scored by each member according to Lickert Scale from 1 (absolutely in agreement) to 5 (disagreement).

Recommendations were classified into four categories: preventive measures, follow-up and subsequent evaluation risk, diagnostic procedures and treatment.

## NSS67

### RESULT

J. A. Morales Torres<sup>1</sup>

<sup>1</sup>Rheumatologist, Hospital Aranda de La Parra, Guanajuato Leon, Mexico

Preventive measures and evaluation risks included 32 statements. Clinical actions should be taken in patients who will receive treatment with GC for more than 3 months at a dose higher than 2,5 mg/day orally. Clinical risk factors are useful to predict the risk of fracture in patients taking GC. All the patients should be evaluated with DXA measurements and Rx or VFA to determine vertebral fractures. FRAX tool must be used to determine Hip and MOF risk. If Hip Fx is < 3% of MOF is < 20% general measures and controls should be advised. If FRAX values are > 3% of MOF > 20% pharmacological treatment must be recommended. Risk stratifications of fractures in adults are determined according to age (older than 40 years) history of previous fractures, FRAX values and dose and time on GC therapy. All the patients should receive calcium (1000 – 1200 mg/day) and vitamin D.

## NSS68

### PANEL PROPOSAL FOR PHARMACOLOGICAL THERAPIES ACCORDING TO FRACTURE RISK STRATIFICATION

O. Messina<sup>1</sup>

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Bisphosphonates may be used continuously if GC treatment is maintained and the patient has moderate to high risk of fracture according to FRAX tool. If GC are discontinued the interruption of treatment may be recommended. Bisphosphonates should be avoided or carefully used during pregnancy and should be stopped as early as possible.

Treatment of GIO in children must include calcium and vitamin D. In all the patients vitamin D levels must be above 30 ng/ml. Teriparatide is not recommended in children and adolescents. Patients treated with high GC doses or pulse therapy are at high risk of fracture. Zoledronic acid or teriparatide are indicated in

these cases.

Denosumab is approved for the treatment of GIO and showed to increase bone mineral density and reduces bone turnover markers in patients on GC therapy. Denosumab showed superiority vs rosedronate in patients with rheumatoid arthritis receiving GC.

Denosumab is also useful in patients receiving organ transplantation.

Romozosumab is a new bone forming agent. To date there are no studies about its efficacy in patients with GIO.

In summary Adults and postmenopausal women with moderate risk of fracture should be indicated general measures, oral bisphosphonates, denosumab or zoledronic acid.

Patients on high risk should receive teriparatide, denosumab or zoledronic acid.

Premenopausal women who do not plan to become pregnant may receive oral bisphosphonates. Denosumab and IV bisphosphonates should not be used due to potential fetal harm.

## NSS69

### PANDEMICS THROUGH THE AGES. THE ROLE OF STRESS TRAUMA AND FRAILITY

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The pandemics have occurred over the ages. When occurring, a pandemic has altered the social structure and has led to major geopolitical restructuring. The recent pandemic which was due to the SARS-CoV-2 virus has had a major impact on nations, people and interpersonal relationships. It has also led to major changes in work and the way it is organized as remote work is now a recognized pattern of offering and accepting work. The SARS-CoV-2 virus has led to stress in people, families and nations. The fear of disease as well as disease itself has led to stress. Stress is related both to the disease, as well as to post-COVID and long-COVID disease. COVID-19 disease, post-COVID and long-COVID is related to stress and ultimately the disease may lead to frailty.

## NSS70

### MENOPAUSE AND OSTEOIMMUNOLOGY

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Estrogens characterize a woman. Estrogens lead to puberty and the formation of the female body. The cyclic secretion of estrogens characterizes the menstrual cycle. Estrogen secretion and circulation in high levels is the characteristic of a successful pregnancy. Estrogen withdrawal characterizes menopause and is the major biochemical phenomenon which ultimately leads to all major events which are observed in postmenopausal women. Estrogen withdrawal leads to immune activation. Estrogen withdrawal stimulates interferon- $\gamma$  production from T lymphocytes which acts on macrophages. Antigen presentation is induced

which activates T cells and inflammatory cytokine production. Inflammatory cytokine production induces osteoclastogenesis. Osteoclastogenesis leads to increased bone turnover and thus osteopenia and ultimately osteoporosis. The description of the major biochemical events of menopause has led to the development of drugs which may ultimately lead to osteoporosis prevention and treatment in the postmenopausal patient.

## NSS71

### OSTEOIMMUNOLOGY AND CURRENT TREATMENT OF OSTEOPOROSIS

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Treatment of osteoporosis involves the administration of vitamin D, calcium, antiosteoclastic agents and bone forming agents. Despite the new therapeutic developments in the treatment of osteoporosis and the new therapeutic horizons treatment with alendronate as an initial therapeutic modality or as follow on after other kind of regimens such as denosumab or teriparatide is a necessity. Very important is the use of alendronate in the form of effervescent tablets which increases patient compliance and adherence to the treatment as it improves patient quality of life. In conclusion, vitamin D and alendronate, in particular, alendronate in the form of effervescent tablets continue to be gold standards in the treatment of osteoporosis.

## NSS72

### OSTEOIMMUNOLOGY. THE CONNECTION BETWEEN BONE AND THE IMMUNE SYSTEM

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Osteoimmunology is a new concept describing the connection between bone and the immune system. Bone and the immune system are interconnected. The nice where this connection takes place is the bone marrow. Various cells of the immune system reside within the bone marrow. In particular, T lymphocytes reside within the bone marrow and secrete inflammatory cytokines which affect bone cells. Disease states which support this novel concept are menopause, rheumatoid arthritis, osteoarthritis and periodontitis. In menopause the major event is estrogen withdrawal. Estrogen withdrawal stimulates interferon- $\gamma$  production from T lymphocytes which acts on macrophages. Antigen presentation is induced which activates T cells and TNF $\alpha$  production. TNF $\alpha$  induces osteoclastogenesis. Osteoclastogenesis leads to increased bone turnover and thus osteopenia and ultimately osteoporosis. Rheumatoid arthritis is characterized by systemic and periarticular osteoporosis, which are due to osteoclast activation. Inflammatory cytokines, such as TNF $\alpha$ , interleukin-1 and interleukin-6 are secreted in patients with rheumatoid arthritis and induce

osteoclastogenesis. Osteoclastogenesis leads to systemic and periarticular osteoporosis. Osteoarthritis is also characterized by low grade systemic inflammation. In osteoarthritis the circulation of inflammatory cytokines leads to osteopenia and osteoporosis. Periodontitis is an inflammatory disorder, which leads to secretion of inflammatory cytokines, jaw resorption and systemic osteopenia and osteoporosis. In conclusion, osteoimmunology describes the connection between bone and the immune system which may lead to osteopenia and ultimately osteoporosis.

## NSS73

### WHAT IS SARCOPENIA? HOW IS IT DIAGNOSED?

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Sarcopenia is a syndrome characterised by progressive and generalised loss of skeletal muscle mass and strength with a risk of adverse outcomes such as physical disability, poor quality of life and death. Diagnosis is based on documentation of criterion 1 plus (criterion 2 or criterion 3); 1. Low muscle mass 2. Low muscle strength 3. Low physical performance.

There are several mechanisms that may be involved in the onset and progression of sarcopenia. These mechanisms involve, among others, protein synthesis, proteolysis, neuromuscular integrity and muscle fat content. European Working Group on Sarcopenia in Older People (EWGSOP) recommends use of the SARC-F questionnaire as a way to elicit self-reports from patients on signs that are characteristic of sarcopenia. SARC-F can be readily used in community healthcare and other clinical settings. The SARC-F is a 5-item questionnaire that is self-reported by patients as a screen for sarcopenia risk. The assessment of muscle strength with grip strength is simple and inexpensive. Low grip strength is a powerful predictor of poor patient outcomes such as longer hospital stays, increased functional limitations, poor health-related quality of life and death. DXA is advised in clinical practice, and DXA, bioimpedans analysis, CT or MRI have been used in previous studies to confirm sarcopenia. The determination of the severity of sarcopenia is essential. Physical performance can be variously measured by gait speed, the Short Physical Performance Battery (SPPB), and the Timed-Up and Go test (TUG), gait speed, SPPB, and 400-m walk tests.

In this lecture, we aim to raise awareness for early diagnosis of sarcopenia and the assessment methods in clinical practice. We also strive to encourage more research in the field of sarcopenia to prevent or delay the negative consequences that also place a heavy burden on patients and health systems.



## NSS74

## SARCOPENIA AND NEW BIOMARKERS

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Bone and muscle are required for mobility but they also act as secretory endocrine organs. Muscle-bone crosstalk is a bi-directional communication via several molecular mechanisms which can be also a therapeutic approach in ageing bone loss and muscle atrophy occurring simultaneously, leading to concomitant osteoporosis and sarcopenia. Biochemical crosstalk occurs through myostatin/activin receptor signaling pathway; myokines such as myostatin, irisin, interleukin (IL)-6, IL-7, IL-15, insulin-like growth factor-1, fibroblast growth factor (FGF)-2, and  $\beta$ -aminoisobutyric acid and through bone-derived factors including FGF23, prostaglandin E<sub>2</sub>, transforming growth factor  $\beta$ , osteocalcin, and the Wnt/ $\beta$ -catenin pathways are associated with osteosarcopenia. Although there are definitions for the diagnosis of sarcopenia, there is not any direct consensus for the laboratory tests, both for the cut-off values and instruments. There is a need to identify biomarkers to measure in clinical trials to have useful information on the drug's mode of action, therapeutic response and side effect monitoring. Current consensus papers had recommended two series of biochemical markers for phase studies as biochemical markers evaluating musculoskeletal status (myostatin-follistatin, brain derived neurotrophic factor, N-terminal type III procollagen and serum creatinine to serum Cystatin C Ratio- or the Sarcopenia Index) and biochemical markers evaluating causal factors (the hormones insulin-like growth factor-1, dehydroepiandrosterone sulphate, and cortisol, and the inflammatory markers C-reactive protein, IL-6 and tumor necrosis factor- $\alpha$ ).

In this lecture, besides the proposed biochemical markers we will discuss the role of Wnt/ $\beta$ -catenin pathway inhibitor sclerostin. Sclerostin might be a potential marker for clinical use as it reflects a number of physiological and pathophysiological events in bone and in the cross-talk with other tissues in the human body. In our different studies, we measured the levels of serum sclerostin in hip fracture patients with and without sarcopenia. There are limited studies that have demonstrated the effect of sclerostin on muscle metabolism and as a result of our studies we can suggest serum sclerostin levels as a biomarker for muscle health or muscle diseases, especially for sarcopenia and osteoporosis.

## NSS75

## THE MANAGEMENT OF SARCOPENIA

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Sarcopenia is a common aging-induced generalized decrease in muscle mass, strength, and function. Owing to the impact of sarcopenia on quality of life (QoL), disability and mortality, awareness and early treatments are important for prevention of pro-

gression, disability and to enhance quality of life.

Diagnosis, treatment, and prevention of sarcopenia is likely to become part of our routine clinical practice. Recent clinical trials on sarcopenia therapies such as physical exercise, nutraceutical, and pharmaceutical interventions have revealed that exercise is the best effective therapeutic modality for sarcopenia. The exercise prescription aims to improve muscle strength and endurance using resistance bands or weights. But exercise may have limited benefit to immobile patients. The nutraceutical and pharmaceutical interventions showed controversial results in sarcopenia alleviation. Although medication is not the preferred treatment for sarcopenia, a few are being studied. Hormone replacement therapy, high-dose testosterone increases muscle power and function, but has a number of potentially limiting side effects. Other drugs for the treatment of sarcopenia that are in clinical development, include selective androgen receptor molecules, ghrelin agonists, myostatin antibodies, activin IIR antagonists, angiotensin converting enzyme inhibitors, beta antagonists, and fast skeletal muscle troponin activators. There are no approved pharmacologic agents for the treatment of sarcopenia. The enhanced benefits of exercise training, when combined with dietary supplementation, have been shown in some trials but that existing evidence is inconsistent. In this lecture all current management strategies and future therapeutic approaches will be covered.

In conclusion, currently the management of sarcopenia is primarily focused on physical therapy for muscle strengthening and gait training. As sarcopenia is a major predictor of frailty, hip fracture, disability, and mortality in older persons, further studies are needed to provide the evidence on clinical recommendations and pharmacological strategies.

## NSS76

## DEGENERATIVE JOINT DISEASE OF HAND , OSTEOARTHRITIC HAND

E. Dincer<sup>1,2,3</sup><sup>1</sup>ESCEO Scientific Advisory Board Member, Ankara, Turkey, <sup>2</sup>ESPRM Chair Musculoskeletal Disorders Committee, Ankara, Turkey, <sup>3</sup>President Turkish Society of Rehabilitation Medicine, Ankara, Turkey**Introduction:**

Hand osteoarthritis (HOA) is a common musculoskeletal disease, affecting the small joints of hands and wrists formed from 29 bones, increasing with age. The symptoms and signs of HOA; are hand pain, stiffness, functional limitation in daily activities of life , decreased grip strength and reduced quality of life.

In this article, our aim is to Synthesize Systematic Literature Review especially, about update in non pharmacological and pharmacological approaches in Hand Osteoarthritis.

**Material and Method:**

New information from Guidelines, SRs and RCT published in last 5 years, is mentioned in this update of Degenerative joint disease of Hand, which made recommendations or evaluated the persons with Hand OA.

Essentially in 2022, Management of hand osteoarthritis: from an

US evidencebased medicine guideline to a European patientcentric approach is published and written by an ESCEO expert working group (The European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases) about the management and especially which gave much importance to patient preferences research in hand osteoarthritis.

Search covered «Pubmed Database» and «Web for Management of Hand OA guidelines» written in English and extracted their recommendations.

Also referred to earlier guidelines, especially ,(Eular Recommendations for Hand OA Management (2007);and Eular Recommendations for Hand OA Diagnosis (2009) when guideline updates referred to these former guidelines where the evidence and recommendations were not changed.(4,5)

Intended to provide guidance for management of Hand OA and to disseminate best evidence-based strategies in the management of Hand OA from these revised guidelines.

#### Results :

Available guidelines and consensus recommendations on HandOA recommend exercises as part of current best practice for Hand OA management.

Also the combination of splints for thumb base OA, orthoses and exercise regimen reduce pain and improve functionality in the short and long term and prevent/correct lateral angulation and flexion deformity.

There is strong evidence to support the recommendation of strengthening, stretching and joint mobility exercises for the management of the hand OA. These recommended exercises, however, lacked specific details regarding the type and dosage (frequency, intensity and time) for optimal uptake, which therefore need to be established through research.

#### Hand ex.recommendations for the H and OA management:

1) Exercises to improve hand function and muscle strength, and reduce hand pain such as strengthening, stretching and joint mobility exercises should be considered for every patient with hand OA. These exercises can either be prescribed as home-based or supervised weekly exercises over several weeks. Grade of recommendation(A) Strength of recommendation(Strong)

2) Hand strengthening exercises should be considered for hand OA management due to their clinically beneficial effect on hand pain and grip force.

Grade of recommendation(B) Strength of recommendation(Strong)

3) Ex. in combination with orthosis improves hand pain and functionality in both short and long term. Grade of recommendation(B) Strength of recommendation(Strong)

4) Education regarding an ex.regimen including muscle strengthening and ROM exercises in combination with joint protection techniques should be recommended for all patients with HOA.

Grade of recommendation(GCP /good clinical practice based on expert opinion)

Strength of recommendation(Weak)

5) Advise people with hand OA to ex. as a core treatment irrespective of age, comorbidity, pain severity or disability. Ex. should include local muscle strengthening and general aerobic fitness

Grade of recommendation –GCP (good clinical practice based on

expert opinion.) - Strength of recommendation – Weak (1)

According to Fuggle et al.; in pharmacological treatment of Hand OA; chondroitin sulphate among SYSADOAS is the only agent which has shown efficacy for pain and function.(2)

Regarding intra-articular hyaluronic acid or steroid injections,the patients emphasised that they need to see some proof of efficacy and that they would prefer devices using a small needle, minimal volume of injection and, if possible, as few injections as possible. (2)

Patient preference research and the derived health economics analyses support the use of a pharmacological management of hand osteoarthritis. Corticosteroid injections appear to be a promising approach in the acute phase of the disease with hyaluronic acid for chronic symptoms but both require further demonstrations of efficacy and safety.

Biologic agents have shown no significant benefit, to date. (2) Besides the recommendations of Fuggle et al;(2) in pharmacological treatment of Hand OA, with respect to Update of the EULAR recommendations for the management of hand osteoarthritis topical treatments are preferred over systemic treatments because of safety reasons. (3) Topical NSAIDs are the first pharmacological topical treatment of choice. (3)

Oral analgesics, particularly NSAIDs, should be considered for a limited duration for relief of symptoms. (3)

Also according to Kloppenburg et al.;(3) Chondroitin sulfate may be used in patients with hand OA for pain relief and improvement in functioning. Intra-articular injections of glucocorticoids should not generally be used in patients with hand OA, but may be considered in patients with painful interphalangeal joints. Patients with hand OA should not be treated with conventional or biological disease-modifying antirheumatic drugs. Surgery should be considered for patients with structural abnormalities when other treatment modalities have not been sufficiently effective in relieving pain. Trapeziectomy should be considered in patients with thumb base OA and arthrodesis or arthroplasty in patients with interphalangeal OA. (3)

**Conclusion:** As a result of this literature survey, it is concluded that essentially and especially ;

Optimal Management of Hand OA requires a combination of Non pharmacological and Pharmacological treatment modalities and must be individualised to the patient's requirements, best results are achieved when both Non pharmacological & Pharmacological treatment modalities are applied together. Long-term follow-up of patients with hand OA should be arranged according to the patient's individual requirements.

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## NSS77

### HAND INVOLVEMENT IN COMPLEX REGIONAL PAIN SYNDROME (CRPS)

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#### Introduction

Complex regional pain syndrome (CRPS) is the current diagnostic label for a constellation of symptoms characterized by pain, sensory alterations, autonomic and trophic changes, and motor sequela which may occur after trauma or surgery.

The earlier concepts that the predominant problem is sympathetic dysfunction and that CRPS occurs in (stereotyped) stages are now obsolete

CRPS is defined as either CRPS type I or II depending on the presence (II) or absence (I) of identifiable nerve damage.

**Purpose:** To describe the role of Physical and Rehabilitation Medicine (PRM) specialists in the management of CRPS

**Methods:** A systematic search of the literature was conducted to identify all randomized controlled trials, systematic reviews, and clinical practice guidelines addressing rehabilitation of CRPS. Using the MEDLINE, Embase, the Cochrane Library, PEDro in 2016 and updated in 2022.

#### Conclusions:

CRPS can be a very difficult condition to be treated successfully. The primary aims are to reduce pain, preserve or restore function, and enable patients to manage their condition and improve their quality of life. There is a critical lack of high quality evidence for effectiveness of most therapies for CRPS. Currently there is no strong consensus regarding the optimal management of this condition and a multitude of therapeutic interventions are currently utilised, including pharmacological, surgical, neurostimulation and physical therapy-based treatments. There is low quality evidence that bisphosphonates, calcitonin, gabapentin or a daily course of intravenous ketamine may be effective for pain when compared with placebo and also for local anaesthetic sympathetic blockade to be effective.

Guidelines recommend that physiotherapy rehabilitation should be included as part of the treatment for CRPS. Physiotherapy for CRPS could include a range of treatments and rehabilitation approaches, such as exercise, pain management, manual therapy, electrotherapy or advice and education, either used alone or in combination, but the evidence is very uncertain about the effects of physiotherapy interventions on pain and disability in CRPS. We need more high quality research regarding CRPS interventions still stands.

## NSS78

### SOFT TISSUE LESIONS /NON ARTICULAR INVOLVEMENT OF HAND

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#### Introduction

Soft tissue musculoskeletal disorders (MSDs)/ lesions refer to regional and generalized pain conditions and describe a broad spectrum of health problems, most of them poorly defined according to diagnostic criteria and case definitions (1). Here we want to focus at regional arm/wrist/hand conditions with non-articular involvement of hand.

#### Purpose:

The aim is to present biopsychosocial risk factors, risk groups and trends, preventive/ conservative therapeutic/ rehabilitative strategies for functional health in the case of regional soft tissue lesions, and non-articular wrist/hand involvements.

#### Methods:

A systematic literature search was performed to identify all randomized controlled trials, systematic reviews, addressing risk factors and groups, prevention, conservative therapy and rehabilitation of musculoskeletal and non-articular soft tissue involvement, lesions and disorders of the hand. Using the MEDLINE, Embase, the Cochrane Library, PEDro and UptoDate.

#### Results:

Regional pain and disorders, nonarticular involvement of hand region, may reflect soft tissue conditions within the hand or as referred pain from a proximal region such as myofascial pain, epicondylitis, tendinopathy/tendinitis, enthesitis, fasciitis (Dupuytren's palmar contracture), bursitis or structural lesions/ disorders (such as hyperlaxity), neurovascular entrapment disorders (carpal tunnel syndrome). These disorders are common(2)

Many physical, psychosocial and work-related factors play a role in etiology and prognosis. There is a lack of evidence for the management of most soft tissue disorders with therapeutic and rehabilitative strategies. Also good prevention policy does not exist for most conditions, due to the lack of knowledge on risk factors, risk groups and trends.(1) The work-related characteristics such as vibration, repetitiveness, work posture and force can play a role as risk factors for arm/wrist/hand conditions. In forearm pain, high levels of distress and adverse psychosocial factors are

associated with the onset of symptoms.(1)

There is low-level evidence on preventing work-related MSDs for participants using computers with supplementary breaks.(3) Risk groups for upper limb MSDs/ overuse are characterized by being overweight due to stress over functional capacity.(4) Musicians appear to be at risk (point prevalence of playing-related MSDs up to 47%, hand and wrist being among the most affected areas, and with lifetime prevalences as high as 89% (5, 6).

#### Conclusion:

Work-related physical and psychosocial factors can play a role as risk factors for soft-tissue arm/wrist/hand conditions. There is low-level evidence for supplementary breaks to prevent work-related MSDs. Because the study results only relate to specific professions, they cannot be representative for the general population.

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### NSS79

#### STATE OF THE ART. WHAT DO WE KNOW ABOUT BONE DENSITY AFTER ARTHROPLASTY?

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Nowadays, no consensus nor guideline states about diagnosis and treatment in the patient candidate for an arthroplasty. Less than 5% of the arthroplasty candidates are screened to assess bone health before arthroplasty, But more than 30-50% of the patients who will undergo arthroplasty have osteoporosis or bone loss risk factors, in whom we could expect more implant-related non-septic complications (fractures, loosening, subsidence). In

this scenario, a “preoperative bone optimization” could be helpful. This approach could mean we must diagnose and treat all the patients undergoing arthroplasty.

However, first, we will need to know, if we have evidence, how can we identify these patients? Is this an excellent time to prevent bone loss around the arthroplasty? Furthermore, could that approach help reduce revision rates, improving arthroplasty survival rates and periprosthetic fractures?

Today we will show the audience the evidence regarding BMD changes after arthroplasty, periprosthetic bone loss, and revision rates in the different scenarios and discuss how we can approach the arthroplasty patient to provide a perioperative bone optimization before arthroplasty.

### NSS80

#### THE EFFECT OF ANTIRESORPTIVE ON BONE LOSS AFTER ARTHROPLASTY. LITERATURE REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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There is increasing interest in evaluating and addressing bone quality in patients undergoing arthroplasty. A new term, “bone optimization”; has been created to identify and correct metabolic deficits and treat structural deficiencies of the skeleton.

As part of the Joint Position Statement on the diagnosis of osteoporosis and perioperative bone optimization in candidates for arthroplasty, a review of available literature was conducted in three relevant areas for the Joint Statement.

These areas include the evolution of bone mineral density after arthroplasty, the effect of anabolic and antiresorptive bone medications on the evolution of periprosthetic bone after arthroplasty, and the effect of anabolic and antiresorptive bone medications on the rate of non-septic complications related to arthroplasty.

Initial searches in August 2022 involved a classic search in the databases: PubMed, Scopus, Web of Science, and ScienceDirect. After selecting the studies, review and meta-analysis articles were retrieved and contrasted against selected clinical trials to cross-validate the selection. An additional search was conducted to detect possible related studies that did not appear in the classic search using the review and meta-analysis articles rescued from the initial examination. Included studies should have at least two measurements of periprosthetic bone mineral density.

A random-effects meta-analysis was performed using the Der Simonian and Laird approach.

Results: After full-text examination, the meta-analysis included 24 studies enrolling 554 adult patients undergoing elective total hip arthroplasty surgery and following up for at least 24 months with at least two bone mineral density of periprosthetic bone DXA examinations and antiresorptive and bone formers application after the surgical procedure. BMD in Gruen zones 1 and 7 decreased during the 24 months following hip arthroplasty.

The size of the effect is represented in Figure 1. Spine and hip BMD are not reported in most of the studies, Gruen BMD is not consistently reported in all cases, and in some cases, only the percentage of change is noted, even without data on baseline BMD.

Patients undergoing hip arthroplasty show a decrease in BMD in Gruen zones 1 and 7 during the 24 months following hip arthroplasty. The use of antiresorptive drugs appears to attenuate this loss. Not all studies provide detailed information about baseline BMD, follow-up BMD measurements, and other important factors for assessing bone health after hip arthroplasty. Therefore, further research is needed to understand the effects of bone health on hip arthroplasty and to develop effective strategies for preventing bone loss and reducing the risk of complications after surgery.

### NSS81

#### PERIPROSTHETIC BMD LOSS AND ITS IMPLICATION IN THE REVISION AND COMPLICATION RATES

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After verifying that patients undergoing arthroplasty show a decrease in BMD in the metaphyseal areas during the 24 months following hip arthroplasty and that the use of antiresorptive drugs appears to attenuate this loss, we wanted to know the relation between that bone loss and the non-septic revision and complication rates. Unfortunately, we found little information on the periprosthetic BMD loss and the complication rates.

Nevertheless, we revised the literature, starting in August 2022, involving a classic search in the databases: PubMed, Scopus, Web of Science, and ScienceDirect. About the implication of antiresorptive and anabolic in the non-septic revision and complication rates.

After selecting the studies and reviewing the articles, we retrieved and contrasted them to cross-validate the selection. An additional search was conducted to detect possible related studies that did not appear in the classic search using the review articles rescued from the initial examination. Included studies should have at least two years of follow-up.

We retrieved a total of 5 studies, with 447,117 patients who underwent hip and knee arthroplasty; of the ones, 92,418 were taking bisphosphonates. In the patients taking bisphosphonates, the non-septic revision rate was half that of the ones without treatment, with relative risks from .26 - .58 CI 95% (.20-.85) except for one study in which the methodology was not transparent.

Some of the other factors that influenced were age above 65 and comorbidities. However, most studies do not have a preoperative BMD or osteoporosis diagnosis approach in all patients nor the evaluation for bone loss risk factors. Thus the results can not desegregate to see the osteoporosis relation to the revision rates. Also, in some studies, the periprosthetic fracture incidence increased in the patient receiving bisphosphonates, being this

rate most notable in the younger patients below 65 or with normal BMD or no preoperative BMD.

Using bisphosphonates after arthroplasty in selected cases could help decrease non-septic complications and revision rates. The periprosthetic increased BMD loss can be associated with more implant-related complications.

### NSS82

#### STATEMENT POSITION PROPOSAL OF HOW TO DO "BONE OPTIMIZATION IN THE ARTHROPLASTY CANDIDATE

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After verifying that patients undergoing arthroplasty show a decrease in BMD in the metaphyseal areas during the 24 months following hip arthroplasty and that the use of antiresorptive drugs appears to attenuate this loss, it seems that in selected cases, the use of antiresorptive could help to decrease non-septic complications and revision rates.

We conducted a Delphi modified Method of 3 rounds with experts from 6 National Orthopedic and Osteoporosis societies. (FEMECOT, ACOMM, AMMOM, SCCOT, SECOT, SEIOMM, SEFRAOS). To propose to the orthopedic community how we could do a perioperative bone optimization in the arthroplasty candidate.

With this Delphi method, we found the gaps in the evidence about the role of osteoporosis, preoperative BMD, antiresorptive and anabolic treatments after arthroplasty, and the role of the metaphyseal periprosthetic bone loss and its implication in the revision and non-septic complication rates.

Most experts agreed that osteoporosis should be diagnosed and treated in all arthroplasty candidates before the arthroplasty. Also, that the age, comorbidities, medications that increase bone loss (corticoids, aromatase inhibitors), and the presence of osteoporosis can increase the periprosthetic bone loss in the first 24 months, thus increasing the revision rate; These patients could benefit from an osteoporosis treatment starting during the preoperative or first months after an arthroplasty. However, this statement position will need further research to confirm this approach by starting to diagnose and treat the bone in all the arthroplasty candidates, also measuring periprosthetic bone mass and doing prospective studies with good preoperative BMD assessment.

Previously	Sent	Abstract	Content
Literature	scoping	review	about perioperative bone optimization in the arthroplasty patient, and statement position of 7 National Societies: FEMECOT, AMMOM, ACOMM, SCCOT, SECOT, SEFRAOS, SEIOMM.
The main focus of the research was to find in the patient candidate for arthroplasty the effect of optimizing the bone during the perioperative time and its impact on periprosthetic bone loss and implant-related complications.			

## NSS83

**TUMOR-INDUCED OSTEOMALACIA AND FIBRODYSPLASIA OSSIFICANS PROGRESSIVA IN COLOMBIA AND LATIN AMERICA**A. Roman-Gonzalez<sup>1</sup><sup>1</sup>Universidad de Antioquia-Hospital Universitario San Vicente Fundación, Medellín, Colombia

Tumor-Induced Osteomalacia (TIO) is a rare paraneoplastic syndrome caused by mesenchymal tumors, which can lead to bone pain, fractures, osteomuscular deformity, and weight and height loss. There is limited information regarding the diagnostic difficulties associated with TIO in medium-income countries in Latin America. This seminar presents our experience with TIO in Colombia, as well as a review of published cases from across Latin America. Additionally, we discuss the rare genetic disease, fibrodysplasia ossificans progressiva (FOP), which is also unrecognized in our region.

We conducted a multicentric retrospective chart review of surgically treated TIO cases in Colombia, followed by a review of published cases in Colombia and other Latin American countries. We also searched for cases of FOP in Latin America.

Results: We found four cases of TIO, three women and one man, with an average age at diagnosis of 47 years and an average time between symptom onset and diagnosis of 4.75 years. We performed a literature review and found three additional cases from Colombia in the Scielo database and one case in other databases. An additional case was seen in the clinic last month but was not resected at the time of abstract submission, for a total of eight cases in Colombia. The Scielo database reported two cases from Argentina and one case from Brazil. In other databases, including Medline, we found nine cases from Argentina, including two studies of microarchitecture and quality of life. From Mexico, we found one case, and from Chile, a clinical study of six cases. Most cases have been reported from Argentina and Chile.

We found 11 reports of FOP in Latin America from Mexico, Argentina, Chile, Ecuador, Paraguay, and Brazil.

In conclusion, TIO is a rare paraneoplastic syndrome with limited evidence from Latin America, highlighting the need for local registries to increase awareness of this disease. FOP is an ultra-rare disease, and few cases have been reported in our region. Local registries may improve awareness of this disease and help provide better support for affected individuals

## NSS84

**X-LINKED HYPOPHOSPHATEMIA (XLH): DIAGNOSIS AND TREATMENT IN ADULTS**A. Medina<sup>1</sup><sup>1</sup>Hospital San José-Universidad Nacional de Colombia, Bogotá, Colombia

HLX is a rare hereditary disease characterized by hypophosphatemia; its global incidence is 3.9 to 5 cases per 100,000 live births

and its prevalence between 1.7 and 4.8 per 100,000 people leading to a poor quality of life. (1)

A Colombian consensus was carried out with a panel of multidisciplinary experts on the diagnostic and therapeutic recommendations of XHL in children and adults from 1041 documents, of which 38 were included.

For diagnosis, the clinical characteristics of suspected rickets have been documented in adults: short stature, osteomalacia, bone pain, osteoarthritis, hypophosphatemia, elevated alkaline phosphatase (2), overweight and limitations in mobility (3,4). Radiological findings include lower limb deformities, spinal stenosis, enthesopathies, (1), pseudofractures and fractures with delayed union, among others (2). Biochemical studies should be performed to evaluate phosphorus metabolism in order to calculate the reabsorption of phosphorus by TmP/GFR (normal >2.8) and tubular phosphorus reabsorption (RTP) (normal >80%); other tests that should be requested are: PTH, calcium, alkaline phosphatase and 1,25(OH)2D3 (3,5). Renal ultrasound is also recommended in patients receiving conventional treatment due to risk of nephrocalcinosis (6); on the other hand, DXA is not recommended to assess bone mass given the high presence of false negatives associated with enthesopathy (5). It has been proposed to study the PHEX gene using next-generation sequencing (NGS) and deletion/duplication study (3,5,6).

In adults, conventional therapy based in phosphate salts and calcitriol should be aimed at preventing or curing pseudofractures and fractures, pseudoarthrosis, and improvement of osteomalacia. However, the adverse gastrointestinal effects are common. (7) Burosumab is an anti-FGF23 monoclonal antibody recommended in adult patients with a confirmed diagnosis of HLX, with radiographic evidence of bone disease, persistent bone, and joint pain, osteomalacia affecting functionality and activities of daily living, pseudofractures, fractures, insufficient or refractory response to conventional therapy or in need of orthopedic surgery such as osteotomies for limb realignment, management of consolidation delays or joint replacements. (3, 5,8,9)

Follow-up in adult patients is suggested to be done every 6 to 12 months depending on their individual needs (10)

Finally, targeted therapy has been shown not only to achieve normal levels of phosphorus and alkaline phosphatase, but also to improve the quality of life of patients, avoiding complications of conventional therapy.

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## NSS85

### TRANSITION OF CARE: FROM CHILDHOOD TO ADULTHOOD. HOW CAN WE IMPROVE THE CARE OF OUR PATIENTS WITH ENDOCRINE DISORDERS?

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The transition from pediatric to adult healthcare can be a challenging process, particularly for individuals with chronic endocrine disorders such as XHL and TIO. Successful transition requires a coordinated and collaborative effort between pediatric and adult healthcare providers, as well as the patient and their family. The transition process should begin early, ideally at least 1-2 years before the patient reaches the age of majority. This allows time to identify potential barriers to successful transition, such as financial, educational, or social factors. It also provides an opportunity to educate the patient and their family about the importance of transition and to involve them in the decision-making process. Several key components of successful transition include the es-

tablishment of a transition team, the development of a transition plan, and the provision of ongoing support and education for the patient and their family. The transition team should include healthcare providers from both the pediatric and adult settings, as well as other relevant stakeholders such as social workers or vocational counselors. The transition plan should be individualized and include specific goals and timelines for the transfer of care. Ongoing support and education can be provided through a variety of mechanisms, such as peer support groups or online resources.

In conclusion, successful transition from pediatric to adult healthcare requires a coordinated and collaborative effort. Early identification of potential barriers and the establishment of a transition team and plan are key components of successful transition. Ongoing support and education can help to ensure that patients with chronic endocrine disorders receive the care they need throughout the transition process and into adulthood.

## NSS86

### OSTEOPOROSIS AND BONE HEALTH IN DIABETES MELLITUS

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Fragility fractures are considered an important complication of diabetes mellitus (DM) and are associated with higher mortality, morbidity and healthcare costs. The risk of fracture is significantly higher than in the general population. For example, the incidence of hip fractures is 6-fold higher in diabetes mellitus type 1 (DM1) and 2.5-fold higher in diabetes mellitus type 2 (DM2). Several factors that affect bone fragility and bone health influence the micro- and macro-architecture of the bone, as well as certain medications used to treat diabetes, resulting in reduced resistance to mechanical stress. With increased risk of falls due to disease effects (hypoglycemia risk, peripheral neuropathy, visual impairment, foot ulcers), bone fractures are a major concern. DM1 and DM2 differ in pathogenesis of diabetes-induced osteoporosis.

In DM1,  $\beta$ -cell function decreases and chronic hyperglycemia causes organ damage and reduced bone strength. Various disturbances in signaling pathways also cause low bone formation. DM2, on the other hand, is typically associated with dysregulation of adipokines and loss of the incretin effect, affecting bone health. In both DM1 and late stages of DM2, there is reduced bone formation due to the inhibitory effect of insulin deficiency on osteoblasts and altered calcium-parathyroid hormone axis.

Regarding medication, some antidiabetic drugs may contribute to an increased risk of fracture, especially thiazolidinediones and sulfonylureas. Therefore, drugs with a favorable or at least neutral effect on bone metabolism should be considered. Several tools are available for stratifying fracture risk: FRAX and DXA. FRAX as a way to stratify fracture risk and the bone mass density from DXA

are still clinically useful.

Nevertheless, there are no current guidelines on how and at what stage antiosteoporotic medication should be initiated in these patients. Current evidence supports the use of antiresorptive and anabolic agents, but there is no evidence that any osteoporosis medication is effective in DM patients who are at high risk of fracture despite non-osteoporotic BMD levels. In contrast, the data suggest that the presence of diabetes does not affect the response to antiosteoporotic treatment. These data indicate that the links between DM and bone health need to be further explored.

## NSS87

### NUTRITION AND BONE HEALTH IN DIABETES-INDUCED OSTEOPOROSIS

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It is a well known fact that obesity is linked to type 2 diabetes mellitus. On the other hand, type 1 diabetes mellitus is generally associated with weight loss, but a growing body of evidence suggests otherwise. In the context of osteoporosis, obesity has a positive effect on bone density but is insufficient considering the impact of low-grade systemic inflammation associated with excessive adipose tissue on bone mass in obese individuals.

Therefore, the first line of treatment should be alterations of dietary habits and physical activity in individuals with either type of diabetes mellitus, not only for glycemic control improvement but for prevention of the onset and progression of comorbidities associated with long-term hyperglycemia. Highly restrictive diets such as the keto diet, UN, paleo and many more are becoming increasingly popular but observed in a negative context if introduced improperly. A low-calorie diet is recommended with the guidance of a professional dietitian in order to achieve weight loss and omit nutritional deficiencies which can worsen the course of the disease as well as result in comorbidities such as osteoporosis.

Results from recent observational analysis demonstrated that calcium intake was highest among patients following the principles of the Mediterranean diet when compared to those on paleolithic diet and intermittent fasting; an interesting observation considering that dietary calcium intake increases weight loss among T2DM patients. Another finding was reduced glycated hemoglobin noticed with the Mediterranean diet. HbA1c is inversely correlated to vitamin D levels in T2DM patients. Moreover, adipose tissue found in obesity and diabetes represents a depot for vitamin D due to the excessive adipose tissue promoting the formation of reactive oxygen species.

In conclusion, diabetes mellitus, as a systemic disease, requires a multidisciplinary approach regarding dietary regimen and pharmacological therapy. Even though there are no particular recommendations for osteoporosis screening or prevention in patients with diabetes mellitus, the adequate calcium and vitamin D intake as well as appropriate physical activity and smoking cessation should be an essential part of treatment.

## NSS88

### BONE HEALTH AND OSTEOPOROSIS TREATMENT IN DIABETES MELLITUS

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One of the most effective therapeutic options for treating diabetic bone disease is undoubtedly appropriate glycemic control, lifestyle modification, diet and exercise. However, there are also highly effective drugs for osteoporosis that work in two ways: by promoting bone formation or by inhibiting bone resorption.

Drugs that promote bone formation include teriparatide and synthetic parathyroid hormone analogues, while drugs that inhibit bone resorption include bisphosphonates (alendronate) and estrogen receptor modulators (raloxifene). Relatively new are human monoclonal antibodies, one of which binds to the receptor activator of nuclear factor kappa B ligand and reduces bone resorption (denosumab), while the other binds to sclerostin (romosozumab), a potent inhibitor of osteoblast differentiation and bone formation.

Taking into account the therapeutic challenges posed by diabetes comorbidity, anti-osteoporotic drugs appear to have a similar effect on reducing fracture risk in patients with and without diabetes. However, certain considerations should be made. Teriparatide, although very effective in increasing bone mass density (BMD) in osteoporotic patients with diabetes mellitus, could lead to an increase in fasting blood glucose levels in patients with postmenopausal osteoporosis. The bisphosphonate alendronate has a somewhat subdued effect in increasing BMD, but is known to improve fasting blood glucose and insulin resistance in postmenopausal osteoporotic patients with preclinical diabetes mellitus. Raloxifene showed comparable efficacy against vertebral fractures in type 2 diabetics and non-diabetics, while it had no effect on non-vertebral fractures.

In contrast, denosumab appears to be particularly effective against vertebral fractures in diabetics, with a positive effect on insulin resistance in patients not taking antidiabetic medication. In addition, the newly developed romosozumab has shown excellent efficacy in the treatment of postmenopausal osteoporosis. New research also suggests that sclerostin may play a role in the development of obesity and diabetes mellitus, indicating that romosozumab may be a promising therapeutic drug for diabetic bone disease.

To conclude, international guidelines do not set out a different therapeutic approach for osteoporosis in patients with diabetes, bisphosphonates remaining first choice treatment. However, the impact of new therapeutic choices in patients with diabetes mellitus warrants further investigation.



## NSS89

**ADDRESSING BONE LOSS IN CANCER PATIENTS**W. Elwakil<sup>1</sup><sup>1</sup>Alexandria University, Alexandria, Egypt

Almost all cancers can have a negative impact on the skeleton. Cancer increases the risk of osteoporosis by causing bone loss and deterioration of bone microarchitecture. Both of these factors contribute to a decrease in bone strength, which leads to increased bone fragility and fracture risk. This is due to both direct effects of cancer cells on bone cells and negative effects of cancer-specific therapies on bone cells.

Osteoporosis associated with breast cancer (BC) is mainly linked to estrogen deprivation induced by chemotherapy (CT) and hormone therapy (HT), and more specifically, to the use of nonsteroidal aromatase inhibitors (AI)

Bone loss caused by CT or HT is rapid, reaching 6-8% in the first year, particularly in trabecular bone. Furthermore, CT-induced ovarian failure has more immediate and difficult-to-reverse effects, whereas hormone-induced failure, especially in young women, can be reversed months after discontinuation.

Osteoporosis is present at diagnosis in 25-40% of patients with prostate cancer (PC). Treatment based on surgical or pharmacological hormone deprivation (androgen deprivation therapy [ADT]), reduces testosterone levels to 20% below baseline after 2-4 weeks of starting treatment. [18]. Thus increasing the risk of osteoporosis from 10%-40% to 80% after 10 years of treatment exposure.

Fragility fractures occur in up to 20% of ADT patients in the first 5 years, and the risk increases with time and dose number. Androgens are also beneficial to muscle, whereas ADT causes an increase in total body fat at the expense of a decrease in lean mass. As a result, ADT causes sarcopenia, characterised by rapid loss of muscle mass and an increased risk of falling. Other risk factors for osteoporosis in PC patients include CT, RT, prolonged use of GC, and interventions such as orchiectomy in patients with testicular tumours, where the appearance of osteoporosis is related to age and time since surgical intervention.

Other factors that affect bone health include prolonged immobilisation and/or sedentary lifestyle, primary bone cancer, and bone metastases from other types of cancer.

## NSS90

**WHAT TREATING DOCTORS AND BREAST CANCER SURVIVORS NEED TO KNOW ABOUT OSTEOPOROSIS**M. Eissa<sup>1</sup><sup>1</sup>Kasr Elainy Hospital, Cairo University, Cairo, Egypt

Management of breast cancer whether medical or surgical, end in reduction of the estrogen levels in the patients' bodies. This reduces the bone mineral content which consequently, makes the patient prone to sustain a fragility fracture. Other medications

used for patients with breast cancer, though they do not have a negative impact on oestrogen levels, it may still have a direct negative influence on bones and reduce their strength. Furthermore, the breast cancer itself may induce reduction of bone strength. Not only the breast cancer cells do stimulate the growth of the tumour growth but it can also enhance osteoclasts production. This is aggravated by the premature-menopause or postmenopausal status.

Osteopenia and osteoporosis are prevalent among postmenopausal breast cancer survivors, with prior reports of up to 80% of the patients developing loss in their bone mineral density. If left untreated, such loss of the bone density may cause significant morbidity attributed to pain and the occurrence of fragility fractures, with consequent possibility of death. Baseline evaluation of fracture risk assessment and bone density close to breast cancer diagnosis is strongly recommended, especially among young survivors being treated with combined hormone therapy and/or chemotherapy. Therefore, prevention strategies, commencing appropriate management as well as monitoring should be implemented early. This presentation will discuss which breast cancer patients are at increased risk for developing osteoporotic fractures; how should these patients be screened and treated, as well as what are the effective intervention for reduction of the fragility fracture risk.

## NSS91

**OPTIMAL BONE HEALTH MANAGEMENT STRATEGIES IN PATIENTS WITH PROSTATE CANCER**M. Toth<sup>1</sup><sup>1</sup>Senior Clinical Lecturer, King's College, London, United Kingdom

Osteoporosis and fragility fractures are global health problems. Even though postmenopausal osteoporosis is the most common type, 1 in 5 men over the age of 50 years will experience an osteoporotic fracture in their lifetime and secondary osteoporosis is more common in men, estimated to occur in between 50% and 80%. Our national osteoporosis guideline group in the UK (NOGG) only considers a small number of specific conditions as secondary causes for osteoporosis including glucocorticoids, rheumatoid arthritis, smoking and alcohol. Whilst NOGG recommends using a FRAX adjustment of +20% and +15% for hip and major osteoporotic fracture risk, respectively, for patients aged >50 years receiving >7.5mg prednisolone per day, no such guidance exists for other 2ndary causes of osteoporosis, such as male hypogonadism and an adjustment of FRAX taking other causes into consideration has been recommended. It has been estimated that detailed laboratory evaluation of men thought to suffer with primary osteoporosis unmasked a specific underlying cause in almost half of the patients, with 24% secondary to male hypogonadism. Serum testosterone levels decrease by 1% annually with age in elderly men and consequently the incidence of hypogonadism increases with age, with a prevalence of up to 50% in those over 80 years of age. Androgen receptors are present in chondrocytes and osteoblasts. Directly or indirectly through estrogens, androgens help preserve trabecular bone by inhibiting osteoclastogenesis.

Studies in mouse models suggest that testosterone stimulates androgen receptors on osteoblasts promoting trabecular bone formation, and selective inactivation of the androgen receptor in osteocytes accelerated age related deterioration of skeletal health, findings supporting a role of androgens in maintaining trabecular bone health via stimulation of androgen receptors in osteocytes. However, estrogen deficiency in hypogonadal men is believed to be the primary hormone deficiency responsible for bone loss. Finkelstein et al showed that estrogen deficiency as a result of aromatase inhibition in young men on gonadal suppressive therapy led to significant bone losses and raised bone markers independent of testosterone levels.

Prostate cancer is the second most common cancer in men, and increasingly sophisticated treatments have resulted in an increasing prevalence of prostate cancer survivors. Hormone ablation therapy (HAT) or androgen-deprivation therapy (ADT) remains the preferred modality in prostate cancer treatment. ADT has a systemic effect on bone and is associated with significant bone loss, microarchitectural deterioration, and increased risk of fracture. A Swedish cohort study reported an increased risk of any fracture, hip fracture and major osteoporotic fracture compared with controls, or men with prostate cancer not receiving ADT. There is increasing evidence that antiresorptive treatment in men with prostate cancer on androgen depletion therapy is effective in reducing vertebral fractures and improving BMD, yet surprisingly a recent Australian study confirmed that less than 20% of men underwent DXA scanning between 6 months before and 12 months after commencing ADT.

## NSS92

### BONE HEALTH IN CHILDHOOD CANCER

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In the last decades, there is marked improvement regarding diagnosis and management of childhood cancer and the overall survival of childhood cancer in USA reached about 80% (1).

So, more interest was laid on Care of childhood cancer survivors who experience long term consequences and drug toxicities affecting mainly bone and endocrine systems. These bony problems may be symptomatic or asymptomatic and may be acute or chronic and can affect the quality of life. The peak bone mass is reached in mid 20s and childhood cancer and its therapy can affect bone metabolism and growth by many mechanisms that leads to low peak bone mass can result in osteoporosis and fractures early in life. Other skeletal toxicities include avascular necrosis, altered physal growth.

The aim of this presentation to shed light on possible mechanisms of skeletal toxicities in childhood cancer survivors as well as recent guidelines regarding diagnosis and management strategies.

## NSS93

### THE ROLE OF POST-FRACTURE EXERCISE IN WOMEN'S PHYSICAL FUNCTION AND QUALITY OF LIFE

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**Background:** Non-pharmacological treatment, such as physical exercise, cannot be neglected, being part of the non-pharmacological treatment of osteoporosis and incidental fracture in several national and international recommendations. The number of studies on this topic is mostly for short term follow-ups, and lower in patients with vertebral fractures compared to patients who have suffered a hip fracture. In Portugal, we are not aware of the effect of exercise on physical function and on the quality of life of women who have suffered an incident fracture. This knowledge can be very important to implement regular post-fracture exercise programs as a non-pharmacological measure.

**Objective:** To estimate the effects of post-fracture exercise versus non-exercise on physical function and health-related quality of life in women older than 50 years who suffered an incident fracture.

**Methods:** The study sample for this research was women <sup>3</sup> 50 years, evaluated at baseline and at least at one follow-up wave of the EpiDoC cohort (waves 1, 2, 3 and 4), who self-reported at least one incident fracture after the age of 40 years old by responding to the question "Have you ever suffered from a fracture following a minimum traumatism, after the age of 40 years old?". Self-reported data regarding sociodemographic, lifestyles behaviours, self-reported chronic diseases, health-related quality of life (HRQoL) and physical function (HAQ) was collected through a semi-structured questionnaire. Physical exercise was divided in non-frequent, frequent, and very frequent. Women with post-fracture exercise were compared with women without exercise. Analyses were carried out in R version 4.1.1, and statistical significance was assumed at  $p < 0.05$ .

**Results:** A negative association was found between exercise frequency and physical function. With all adjustments, it is show that frequent ( $b = -0.147$  [-0.283, -0.012]) and very frequent ( $b = -0.192$  [-0.294, -0.090]) physical exercise were associated with improvements in the physical function relative to non-frequent physical exercise. As for HRQoL, a positive association was found for exercise frequency, specifically frequent ( $b = 0.134$  [0.068, 0.199]) and very frequent ( $b = 0.136$  [0.086, 0.186]) suggesting improvements for HRQoL, in this follow-up period.

**Conclusions:** This study emphasizes the need to promote phys-

ical exercise as a non-pharmacological treatment of osteoporosis, especially in patients older than 50 years old.

## NSS94

### FRID (FALLS RISK INCREASING DRUGS) AVOIDANCE

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#### Objective(s)

Falls are a major public health issue in the older population. Certain classes of medication are a significant risk factor for falls. However, these drug classes are frequently prescribed to older people. We aim to summarize the existing knowledge on older adults' fall risk associated with the Fall-Risk Increasing Drugs (FRIDs) and present tools that can support clinicians in optimizing medication in clinical practice and identifying, avoiding, and deprescribing FRIDs. In this context, we will present a study's preliminary data on FRIDs prevalence and older patients' willingness to deprescribe.

#### Material and Methods.

We conducted a literature search in January in PubMed and Embase with citation and reference checking. Keywords included "falls", "deprescribing", "fall-risk-increasing-drugs", "FRIDs", "older people", and matching synonyms. To assess older patients' willingness to have a deprescribed medication and FRIDs prevalence, we conducted a cross-sectional study including Portuguese patients aged 65 years or older. O Revised Patients' Attitudes Towards Deprescribing (rPATD) Questionnaire-Portuguese version [1] was used to assess patients' willingness to have a medication deprescribed and participants' medications were examined for FRIDs with the STOPPFall tool.

#### Results and Conclusion(s)

A total of 808 records were found, including 33 systematic reviews and 19 meta-analyses. About a third of community-dwelling people aged 65 years or older fall each year, and the fall-related injury rate increases with age. Around 10% of falls result in fractures [2, 3] associated with significant morbidity and mortality. [4, 5] Fall-related costs burden healthcare systems and are among the 20 most expensive medical conditions among community-dwelling older [6]. In an ageing society with a growing number of multimorbid older adults, polypharmacy and FRIDs prevalence increase significantly. A recent meta-analysis found a polypharmacy prevalence of 45% in older adults aged ≥65 years. [7] Polypharmacy can be appropriated in a multimorbid patient, or unappropriated when the risks outweigh the benefits. FRIDs are medications potentially inappropriate in older adults, and one of

the most prominent but modifiable fall-risk factors. [8, 9] Furthermore, FRIDs' deprescribing effectively prevents falls. [10]. Still, among prescribers, there is a lack of awareness and knowledge about FRIDs and their consequences, which is a lost opportunity to reduce fall risk and falls. Recently, a European expert group developed a consensus identifying 14 medication classes as FRIDs, [8] and an explicit tool, the STOPPFall tool, to support clinicians in managing FRIDs and to facilitate the deprescribing process in older adults with high fall risk. [11] In the context of older patients' medication optimization related to falls and fracture prevention, FRID avoidance and FRIDs deprescribing are mandatory topics. Preliminary results of a cross-sectional study in 192 patients aged ≥ 65 years revealed that FRIDs prevalence is 19,2%.

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## NSS95

**RHEUMATOID ARTHRITIS AND MUSCULAR INVOLVEMENT**A. Panagiotis<sup>1</sup><sup>1</sup>Department of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

As the disease progresses, it damages and destroys cartilage and bone. Eventually, it weakens the supporting tendons, ligaments, and muscles. Muscular involvement is one of the less known. However, many patients develop loss of muscular strength and endurance. Weakness has usually been attributed to muscular atrophy secondary to antalgic reflexes and the disease itself. In such cases, the most frequent histological finding is muscle fibers atrophy, predominantly of type 2, although a few cases of type 1 atrophy have also been reported in patients with severe RA. Almost two thirds of cases are affected by potentially treatable conditions, such as inflammatory or toxic myopathies.

## NSS96

**SARCOPENIA AND RHEUMATOID ARTHRITIS**Y. Dionyssiotis<sup>1</sup><sup>1</sup>SCI Rehabilitation Clinic, General University Hospital of Patras, Rio Patras, Greece

Patients with RA are at higher risk for sarcopenia with a reported prevalence ranging from 17.1% to 60%. Mechanisms of sarcopenia and metabolic modifications in rheumatoid arthritis include inflammatory cytokines (IL-6, TNF- $\alpha$  and IL-1 $\beta$ ), oxidative stress and reduced physical activity, leading to an unbalanced anabolism and catabolism of proteins. In addition to the primary symptoms arising from inflammatory processes in the joints, muscle weakness is commonly reported by patients with rheumatoid arthritis (RA). A 25–70% reduction in muscular strength has been observed in patients with RA when compared with age-matched healthy controls.

## NSS97

**TREATMENT OF SARCOPENIA IN RHEUMATOID ARTHRITIS**I. Kostoglou -Athanasios<sup>1</sup><sup>1</sup>Department of Endocrinology, Asclepeion Hospital, Voula, Athens, Greece

Treatment is based on exercise and diet, and drugs which modify the disease itself. Resistance exercise, twice per week is recommended in patients with RA. Aerobic exercise mainly low impact weight bearing exercise. Nutrition is the other main intervention for the prevention and management of sarcopenia. Several consensus statements recommend an average protein intake of at least 1–1.5 to 2 g/kg/day during severe disease and inflamma-

tion. Essential amino acids, vitamin D and  $\beta$ -hydroxy- $\beta$ -methylbutyrate may be required. Combined exercise and nutrition therapy shows the best results. Regarding disease-modifying antirheumatic drugs data suggest that targeting inflammatory cytokines can prevent muscle atrophy; however, this is a work in progress.

## NSS98

**CO-MORBIDITIES OF MUSCLE FUNCTION IN OLDER ADULTS FROM THE GAMBIA**A. Zengin<sup>1</sup><sup>1</sup>School of Clinical Sciences at Monash Health, Monash University, Melbourne, Australia

The prevalence of non-communicable diseases (NCD) of ageing are rising globally, and account for 70% of deaths annually; 80% occur in low- and middle-income countries. The highest burden is among countries in Sub-Saharan Africa, mainly due to a rapid demographic transition characterized by increasing urbanization and changing lifestyle factors. With this transition, there is an increase in the prevalence of obesity, sarcopenia and cardiovascular disease (CVD) – consequently giving rise to multimorbidity. Declines in physical function have been associated with multimorbidity, with more severe consequences reported in low-middle income countries, coupled to a higher economic healthcare burden. Characterisation of the association between cardiovascular health and physical function in the ageing population may help identify preventative strategies for CVD in Sub-Saharan African countries such as The Gambia.

We investigated sex differences in associations between cardiac-workload, arterial stiffness, peripheral vascular calcification (PVC) and physical function in Gambian adults. Gambians aged 40-75+ years were recruited (n=489). Supine blood pressure and heart rate were measured to calculate rate pressure product (RRP) and pulse pressure. Presence of PVC was determined from tibia pQCT scans. Physical function was assessed by chair rise test (CRT), single two-legged jump (s2LJ) and hand grip strength (HGS). Body composition was measured by DXA; body size corrections were used to calculate fat mass index (FMI) and appendicular lean mass index (ALMI). Sex-interactions were tested (p-int) adjusting for age and ALMI/FMI. Mediation analyses used ALMI/FMI as mediator.

In men, RRP was negatively associated with s2LJ force (p-int=0.029) and power (p-int=0.004), after adjusting for age and FMI. In men, pulse pressure was associated with negative differences in CRT power, s2LJ force and HGS vs. women (all p-int<0.01). There were similar associations in men for PVC. In men, FMI mediated the association between RPP and CRT power (p=0.002), s2LJ force (p<0.001) and s2LJ power (p=0.001). ALMI did not mediate

Multiple risk factors for CVD were associated with poorer physical function in men and were mediated by FMI. There is a need to identify preventative strategies to slow/prevent the rising CVD burden and poor physical function in Sub-Saharan Africa.

## NSS99

## IMPACT OF HIV ON MIDLIFE MUSCULOSKELETAL HEALTH IN SUB-SAHARAN AFRICA

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Of the nearly 38 million people with HIV globally, two-thirds live in sub-Saharan Africa (SSA). Successful antiretroviral therapy (ART) roll-out for people with HIV has dramatically improved survival, and life expectancy is increasing more rapidly across SSA than any other region globally. Together this means that there is an ageing cohort of individuals with HIV who are at risk of chronic comorbidities, including those affecting the musculoskeletal system.

Osteoporosis is increasingly evident in older African populations, manifesting in fragility fractures of the spine and hip, the latter associated with high mortality in black South Africans. HIV infection affects bone through a variety of mechanisms; directly through dysregulated systemic immune activation increasing bone turnover, indirectly through associated malnutrition, social deprivation and/or opportunistic infection(s), as well as through HIV treatment itself. In South Africa, ART drugs such as tenofovir disoproxil fumarate (TDF) (part of first-line regimens) and/or protease inhibitors may promote bone loss at the hip and spine during the early years of treatment.

Effects of HIV on muscle health in ageing populations in SSA is less clear, in part due to the fewer studies. In this talk I will discuss the emerging epidemiological evidence from SSA assessing the impact of HIV on the musculoskeletal health, with particular focus on midlife perimenopausal women.

## NSS100

## MUSCLE AND FUNCTIONAL ABILITY IN SUB-SAHARAN AFRICA: THE MUFASSA STUDY

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In sub-Saharan African (SSA) countries the shifting demographics, together with rapid urbanisation and changing physical activity patterns, are generating an exponential rise in the prevalence of non-communicable diseases (NCDs) of ageing. Reductions in muscle strength and function are inevitable manifestations of ageing (this is known as sarcopenia), which leads to falls and fragility fractures (from low impact injuries), disability, frailty, morbidity and mortality. Despite this, in SSA little is known of the epidemiology of functional ability, risk factors for functional disability nor their impact on activities of daily living and health-related quality of life (HRQoL).

The few estimates of the prevalence of sarcopenia in Africa have been variable; in Ghanaian women and men aged 65 years and above, low grip strength (defined using European Working Group on Sarcopenia (EWGSOP2) criteria) was estimated to be 22 and

34% in women and men respectively; in contrast in the same study, data from South Africa gave estimates of 7% and 17% respectively. In the same populations, low gait speed was reported in 70% of Ghanaians and 63% South Africans (men and women were combined). Of note, these data were self-reported with few objective physical measures. In The Gambia we reported a sarcopenia prevalence of 45% for women aged 40 years and above, and 68% of those over 60 years, with 20% and 81% of men also affected in these age groups. This definition was based on low grip strength or lower leg muscle power using the Federation of the National Institutes of Health (FNIH) lean mass criterion 22. Whilst describing prevalence for the first time, our data suggest the international criteria used (FNIH and EWGSOP1 31, 32) could be improved to determine sarcopenia prevalence more accurately in the Gambian population. We therefore need to better define thresholds for poor functional ability and sarcopenia. To do this, country and sex-specific thresholds need to be developed and validated in larger populations.

The presentation will cover our work in the MUFASSA study with detailed phenotyping across population samples in The Gambia, South Africa and Zimbabwe, reporting descriptive epidemiology of measures of functional ability and prevalence of sarcopenia in men and women aged 40 years and above and review systematic approach to defining sarcopenia using scalable, implementable tools in resource-limited African populations.

**Funding:** The work is funded through a MRC UK project grant ref MR/W003961/1 and National Institute for Health Research (NIHR) (using the UK's Official Development Assistance (ODA) Funding) and Wellcome (217135/Z/19/Z) under the NIHR-Wellcome Partnership for Global Health Research.

## NSS101

## MARKERS OF LOW MUSCLE MASS AND FUNCTION: INSIGHTS FROM PROTEOMICS IN MIDDLE-AGED SOUTH AFRICANS

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**Background:** Biological mechanisms for low appendicular skeletal muscle mass (ASM) and handgrip strength (HGS), components of sarcopenia, are poorly understood. This study aimed to investigate associations between circulating biomarkers and ASM and HGS in middle-aged South Africans.

**Methods:** Participants (n=934; 41–72 years) were from the Middle-aged Soweto Cohort. Linear regression models were used to examine relationships between 182 biomarkers (measured with proximity extension assay) and dual-energy x-ray absorptiometry-measured ASM and dynamometer-measured HGS, adjusting for confounders. Significant sex-interactions were stratified by sex, and the Benjamini-Hochberg False Discovery Rate (FDR) was used to control for multiple testing.

**Results:** Of the 39 biomarkers associated with ASM, 8 were also associated with HGS (P<0.05). Significant sex-interactions were

identified for 52 biomarkers for ASM and 6 for HGS. For men, MEPE and SCF were associated with higher ASM ( $P=0.004$  and  $0.006$ , respectively), and higher HGS ( $P=0.001$  and  $0.012$ , respectively). The 37 biomarkers associated with lower ASM ( $P<0.05$ ) were not associated with HGS. Furthermore, DLK-1 and MYO-GLOBIN were associated with higher HGS only ( $P=0.004$ ,  $0.006$ , respectively), while GAL-9 was associated with lower HGS only ( $P=0.005$ ). For women, 5 biomarkers were associated with higher ASM, while IGFBP-2, CTSC and RAGE were associated with lower ASM ( $P=0.043$ ,  $0.001$ ,  $0.014$ , respectively). No biomarkers were associated with HGS in women.

**Conclusion:** More biomarkers were associated with ASM than HGS, with many sex-specific associations. Future proteomic studies should examine ASM and HGS individually, and sexual dimorphism in the pathophysiology of sarcopenia should be considered when developing treatment and diagnostic methods.

# WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

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Abstract Book

**Posters Abstracts**

P101

**CALCIUM AND OSTEOPOROSIS IN VERY ELDERLY PATIENTS WITH CORONARY ARTERY DISEASE**S. Topolyanskaya<sup>1</sup>, T. Eliseeva<sup>2</sup>, O. Turna<sup>2</sup>, O. Vakulenko<sup>2</sup>, M. Romanova<sup>2</sup>, O. Gordeeva<sup>2</sup>, I. Zvyagina<sup>2</sup>, D. Koshurnikov<sup>2</sup>, K. Lytkina<sup>2</sup>, G. Melkonyan<sup>2</sup><sup>1</sup>First Moscow State Medical University; War Veterans Hospital N3, <sup>2</sup>War Veterans Hospital N3, Moscow, Russia

**Objective:** To determine the blood concentration of ionized calcium and daily excretion of calcium in the urine and to analyze the relationship between calcium and various clinical and laboratory parameters in elderly patients with coronary artery disease (CAD).

**Methods:** This work was a cross-sectional study enrolled 102 patients (84 women and 18 men) aged 70 to 97 years (mean age 83.0±5.9 years) hospitalized with CAD. Centenarians accounted for 14.7% of patients. The blood level of ionized calcium (N 1.16-1.32 mmol/l) and daily excretion of calcium in the urine (N 2.5-7.5 mmol/l) was determined. In addition, the concentration of 25-hydroxycalciferol (25(OH)D) was determined in all patients; the level of 25(OH)D<10 ng/ml was regarded as a severe deficiency of vitamin D, 10-19 - deficiency, 20-29 - deficiency, ≥30 ng/ml - normal. Along with this, the BMD of the lumbar spine and proximal femur was analyzed using DXA.

**Results:** The mean daily excretion of calcium in the urine was 1.39±1.1 mmol/l (0.17 - 7.44 mmol/l). Only 15.6% of patients had calcium excretion within the normal range, in 84.4% there was a low calcium content in daily urine. The mean blood concentration of ionized calcium was 1.26±0.05 mmol/l (1.16 - 1.53 mmol/l). Hypocalcemia was not registered in any case, hypercalcemia was observed in 8.3% of patients. There were no gender differences in the blood level of ionized calcium and in the daily excretion of calcium in the urine (p=0.83 and p=0.88, respectively). The mean T-score in the lumbar spine reached -1.0 SD, in the proximal left femur -1.6 SD, in the neck of the left femur -1.8 SD, in the proximal right femur -1.7 SD, in the neck of the right femur -2.0 SD. Osteoporosis in the proximal femur was registered in 32.9% of patients, osteopenia in 45.5%, normal BMD in 21.6% of cases. In the lumbar spine, osteoporosis was found in 18.1% of patients, osteopenia in 40.4%, and normal BMD in 41.5%. The mean blood concentration of vitamin D was 20.8±11.7 ng/ml (5.0 - 61.5 ng/ml). In patients with normal vitamin D level the mean urinary calcium excretion was 1.77±1.2 mmol/l, with vitamin D deficiency - 1.1±0.7 mmol/l (p=0.07). In patients with low calcium excretion in the urine, the mean blood concentration of vitamin D was 18.7±7.7, with normal excretion - 28.5±10.8 ng/ml (p=0.007). Direct correlations were established between urinary calcium excretion and blood vitamin D levels (r=0.31; p=0.004). Significant inverse relationships were registered between urinary calcium excretion and creatinine (r=-0.36; p<0.0001). In patients with elevated creatinine levels the mean daily urinary calcium excretion was 0.93±0.6 mmol/l, with normal creatinine levels - 1.65±1.2 mmol/l (p=0.001). In the group of patients with low urinary calcium excretion the mean creatinine level reached 102.3±23.9 μmol/l, with normal excretion - 84.9±11.2 μmol/l (p<0.0001). There was a sig-

nificant direct correlation between daily urinary calcium excretion and glomerular filtration rate, estimated using the CKD-EPI formula (r=0.39; p<0.0001) and an inverse correlation between blood calcium and GFR (r=-0.26; p=0.01). The mean age of patients with low urinary calcium excretion was 83.7±6.0 years, with normal excretion - 80.1±5.1 years (p=0.03). No significant correlations were found between urinary calcium excretion and BMD in the lumbar spine and proximal femurs (p=0.26-0.76). No significant correlation was found between the blood concentration of ionized calcium and calcium excretion in the urine (r=-0.08; p=0.44). Significant direct relationship was registered between the blood concentration of ionized calcium and the creatinine (r=0.2; p=0.05) and urea (r=0.32; p=0.04) concentration. In the group of patients with elevated creatinine levels the mean blood concentration of ionized calcium was 1.27±0.06 mmol/l, with normal - 1.25±0.04 mmol/l (p=0.04). There were no other significant relationships between the blood concentration of ionized calcium and various clinical and laboratory parameters.

**Conclusion:** The study results demonstrate a low level of calcium excretion in the urine in very elderly patients with coronary artery disease. The urine calcium excretion is primarily due to impaired renal function and low vitamin D concentration. No significant relationship between the blood concentration of ionized calcium and calcium excretion in the urine has been registered.

P102

**RELATIONSHIPS BETWEEN VITAMIN D AND DIFFERENT CLINICAL AND LABORATORY PARAMETERS IN VERY ELDERLY PATIENTS WITH CORONARY ARTERY DISEASE**S. Topolyanskaya<sup>1</sup>, T. Eliseeva<sup>2</sup>, O. Turna<sup>2</sup>, O. Vakulenko<sup>2</sup>, M. Romanova<sup>2</sup>, D. Koshurnikov<sup>2</sup>, K. Lytkina<sup>2</sup>, G. Melkonyan<sup>2</sup>, S. Ratchina<sup>3</sup><sup>1</sup>First Moscow State Medical University; War Veterans Hospital N3, <sup>2</sup>War Veterans Hospital N3, <sup>3</sup>First Moscow State Medical University, Hospital Therapy Dept. N2, Moscow, Russia

**Objective:** To determine vitamin D blood concentration and analyze its relationships with different clinical and laboratory parameters in very elderly patients with coronary artery disease (CAD).

**Methods:** This work was cross-sectional study performed in the War Veterans Hospital. The study enrolled 230 patients (175 women and 55 men) aged 76-99 years (mean age 87.7±5.3 years) hospitalized with CAD. 25-hydroxycalciferol (25(OH)D) level was determined using the immunochemiluminescence assay. 25(OH)D concentration <10 ng/mL was considered as severe vitamin deficiency, 10-19 - deficiency, 20-29 - insufficiency, ≥30 ng/mL - the normal level.

**Results:** The mean 25(OH)D concentration was 14.9±10.2 ng/mL, varying from 1.48 to 80.0 ng/mL. Only 7.5% of patients had normal 25(OH)D level, 12.3% - insufficiency, 43.6% - deficiency, 36.6% - severe vitamin deficiency. In centenarians, the mean concentration of vitamin D was 12.9±9.9 ng/mL, in people younger than 90 years - 16.4±10.2 ng/mL (p=0.01). In the centenarians



group, only 5.9% had normal levels of vitamin D. Significant direct relationship was revealed between 25(OH)D and Lawton scale of instrumental activities ( $r=0.1$ ,  $p=0.03$ ), as well as handgrip strength ( $r=0.2$ ,  $p=0.008$ ). The mean level of vitamin D in the group in patients with a high risk of cognitive impairment was  $11.2\pm 5.8$  ng/mL, with a low risk of cognitive impairment -  $20.8\pm 18.5$  ng/mL ( $p<0.0001$ ). In patients with severe vitamin D deficiency, the mean values of the Mini-Cog test were  $1.4\pm 1.3$ , those with normal vitamin D levels were  $4.2\pm 0.8$  ( $p<0.0001$ ). Inverse correlations were established between the level of vitamin D and the risk of falls on the Morse scale ( $r=-0.2$ ;  $p=0.03$ ). In patients with hyperuricemia, the mean level of vitamin D reached  $18.0\pm 12.3$  ng/mL, with normal uric acid concentration -  $12.5\pm 7.4$  ( $p=0.004$ ). Hyperuricemia was registered in 15.8% of centenarians with severe vitamin D deficiency, in 38.9% with deficiency, in 100% with deficiency and in 80% of patients with normal levels of this vitamin ( $p=0.005$ ). On the other hand, in the presence of hyperuricemia, 23.5% of centenarians had a normal concentration of vitamin D, while with a normal content of uric acid, only 3.6% had normal levels of this vitamin. A significant direct correlation was registered between the blood level of uric acid and vitamin D ( $r=0.3$ ;  $p=0.001$ ). Negative correlation was found between 25(OH)D and interleukin-6 blood levels ( $r=-0.3$ ,  $p=0.01$ ). There were no significant relationships between vitamin D levels and BMD in various parts of the skeleton, with the exception of the T-score in the lumbar spine in centenarians ( $p=0.004$ ). Significant differences in 25(OH)D concentration in groups of patients with myocardial infarction in history, heart failure, atrial fibrillation, diabetes mellitus and obesity were not found.

**Conclusion:** The study results indicate presence of various relationships between 25(OH)D blood concentration and different clinical and laboratory parameters in very elderly patients with CAD.

## P103

### RELATIONSHIPS BETWEEN BODY COMPOSITION AND HEMATOLOGICAL PARAMETERS IN LONG-LIVING PATIENTS WITH CORONARY ARTERY DISEASE

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**Objective:** To study hematological indicators and analyze their relationships with various parameters of body composition in patients with coronary artery disease (CAD) over 90 years of age (long-livers).

**Methods:** This work was cross-sectional study performed in the War Veterans Hospital. The study enrolled 245 patients (166 women and 79 men) aged 90-106 years (mean age  $92.9\pm 2.5$  years) hospitalized with CAD. Hemoglobin level, erythrocyte count, mean

erythrocyte volume (MCV) and mean cell hemoglobin (MCH), leukocyte and platelet count, erythrocyte sedimentation rate (ESR) were determined. The neutrophil-lymphocytic, neutrophil-monocytic and lymphocytic-monocytic indices were calculated. Body composition was analyzed by DXA.

**Results:** Anemia was registered in 112 (45.7%) patients, the mean hemoglobin level was  $120.2\pm 17.6$  g/l, varying from 61 to 172 g/l. 200 (81.6%) patients had normal MCV, 23 (9.4%) had macrocytosis, 17 (6.9%) - microcytosis. 117 (47.7%) patients had normal MCH, 106 (43.3%) had hyperchromic erythrocytes, 22 (9.0%) - hypochromic. Leukocyte count was normal in 199 (81.2%) patients, 14 (5.7%) had non-significant leukocytosis, 32 (13.1%) had leukopenia. Platelet count was normal in 138 (56.3%) patients, 95 (38.8%) had thrombocytopenia, 11 (4.5%) had slight thrombocytosis. Patients with obesity have higher levels of hemoglobin ( $123.2$  vs.  $116.4$  g/l,  $p=0.01$ ), erythrocytes ( $4.0$  vs.  $3.88\times 10^{12}/l$ ,  $p=0.01$ ), leukocytes ( $6.0$  vs.  $5.48\times 10^9/l$ ,  $p=0.03$ ), lymphocytes ( $1.7$  vs.  $1.38\times 10^{12}/l$ ,  $p=0.008$ ) and monocytes ( $0.28$  vs.  $0.238\times 10^{12}/l$ ,  $p=0.03$ ). Correlation analysis revealed significant direct relationships between hemoglobin level and total fat mass ( $p=0.006$ ), trunk fat ( $p=0.0007$ ) and trunk fat/total fat ratio ( $p=0.001$ ). Significant direct correlations were registered between hemoglobin level and total lean mass ( $p=0.006$ ), trunk lean mass ( $p=0.004$ ), arms ( $p=0.003$ ) and legs lean mass ( $p=0.04$ ). There was a trend towards positive correlation between hemoglobin levels and muscle strength as assessed by dynamometry ( $p=0.05$ ). Anemic patients had less total lean mass ( $p=0.03$ ), trunk lean mass ( $p=0.02$ ) and arms lean mass ( $p=0.02$ ). Significant direct correlations were found between the level of hemoglobin and all indicators of BMD, both in general and in certain parts of the skeleton ( $p=0.002-0.00003$ ). Patients with osteoporosis had lower hemoglobin level and erythrocyte count compared to patients with normal BMD: hemoglobin - 117 and 126 g/l, respectively ( $p=0.003$ ), erythrocytes -  $3.8\times 10^{12}/l$  and  $4.1\times 10^{12}/l$  ( $p=0.04$ ). Significant direct correlations were registered between all indicators of BMD and MCV ( $p=0.04-0.0004$ ), as well as MCH ( $p=0.02-0.002$ ). Similarly, direct significant correlations were found between the parameters of lean tissue and MCV ( $p=0.01-0.008$ ), as well as MCH ( $p=0.01-0.002$ ). The inverse correlation between platelet count and BMD, especially in upper ( $p=0.02$ ) and lower extremities ( $p=0.03$ ), was observed. Significant direct correlations were found between platelet count and all indicators of fat tissue ( $p=0.02-0.00008$ ), with the exception of trunk fat ( $p=0.3$ ). The inverse correlation was registered between platelet count and lean tissue, both in general and in each part of the body ( $p=0.004-0.0002$ ).

**Conclusion:** The study results indicate presence of relationships between body composition and hematological parameters in long-living patients with CAD.

P104

### WHY MALNUTRITION IN ORTHOPAEDIC ELECTIVE PATIENT IS STILL AN ISSUE? A RECENT REVIEW OF THE LITERATURE

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**Objective:** Malnutrition is a known risk factor for complications and adverse outcomes after elective total joint arthroplasty (TJA), but little is known about the burden this risk factor places on the health care system. The progressive increase in the aging of world population and in the numbers of TJA, widens the demand for a faster post-operative recovery and function. The aim of this study was to review the literature regarding: post-operative transfusion, infections, wound complications, length of hospital stay (LOS), rate of admission in Intensive care unit (ICU), total patient charges, in malnourished patient undergoing TJA.

**Methods:** A review was conducted to evaluate the role of malnutrition in TJA procedures. This study was developed according to the PRISMA statement. A computer-based literature search was completed in May 2021, and the electronic databases reviewed included PubMed and Google Scholar. The search reviewed all fields of the available peer-reviewed literature, published in the English language during the last six years 2015-2021. We started from a total of 745 studies and finally we included in the review 16 articles.

**Results:** In 10 studies an increased surgical site infection was shown, being by far the most common complication, in 8 studies malnutrition was associate with the increase of the average length of stay (LOS) and in 5 studies the major founding was the increase in costs. An increase of the morbidity was found in 3 studies, instead a larger number of transfusions was highlighted in 2 studies. Lastly, one study showed a major unplanned ICU admission rate.

**Conclusion:** Although the literature trend indicates that the nutritional status of TJA candidate patients is a parameter that influences the surgical outcome, in particular surgical site infections, length of stay and costs, there are, to the authors' knowledge, no studies aimed at identifying validated and recognized protocols for the correction of malnutrition.

P105

### OSTEOPOROSIS: INFLUENCE OF LIFESTYLE FACTORS AND VITAMIN D IN HEALTHY INDIAN MALE POPULATION

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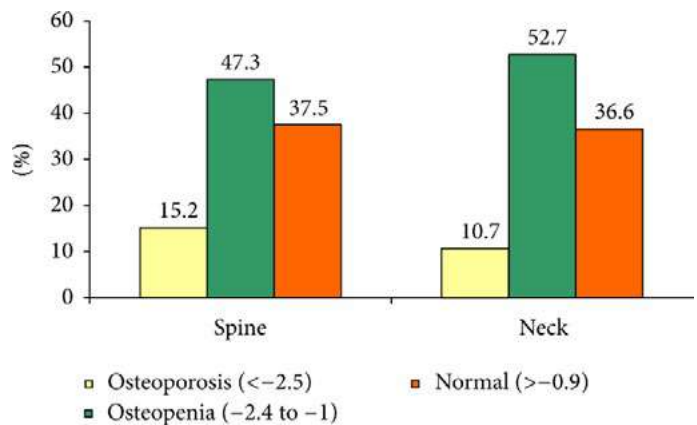
**Objective:** To study the prevalence of osteoporosis and vitamin D deficiency in healthy Indian men and to explore the influence of various lifestyle factors on BMD and also to look at number of subjects warranting its treatment.

**Methods:** Ambulatory Indian male population aged above 200

were recruited by cluster random sampling. The physical activity, risk factors in the FRAX tool, BMD, vitamin D, and PTH were assessed. The number of people needing treatment was calculated, which included subjects with osteoporosis and osteopenia with 10-year probability of major osteoporotic fracture >20% and hip fracture >3% in FRAX India.

**Results:** A total of 1208 men with a mean age of 56 years were studied. The prevalence of osteoporosis and osteopenia at any one site was 20% (200/1208) and 58%, respectively. Vitamin D deficiency (<20 ng/dL) was seen in 53%. On multiple logistic regression, BMI (OR 0.3; value=0.04) and physical activity (OR 0.4; value<0.001) had protective effect on BMD. 25% warranted treatment.

**Conclusion:** A significantly larger proportion of otherwise normal healthy men in our community had osteoporosis and vitamin D deficiency compared to previously published studies. Men with a higher BMI were physically active and had a better BMD. Large scale prospective studies with interventions are needed to look at the reduction in the end points like number of incident fractures and morbidity associated with them.



P106

### ROLE OF QUANTITATIVE COMPUTED TOMOGRAPHY VS. DXA IN OSTEOPOROSIS DETECTION RATE IN POSTMENOPAUSAL INDIAN WOMEN

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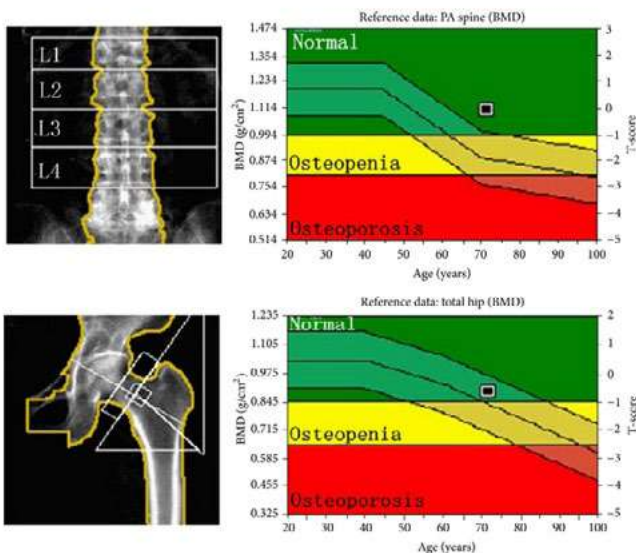
**Objective:** To compare the osteoporosis detection rates in postmenopausal Indian women using BMD with QCT in the spine vs. DXA in the spine and hip and to investigate the reasons for the discrepancy between these two techniques.

**Methods:** Spinal volumetric BMD was measured with QCT, and areal spinal and hip BMDs were measured with DXA in 280 postmenopausal women from India. We calculated the osteoporosis detection rate from these two methods. Lumbar CT images of patients who had a discrepancy between QCT and

DXA findings were reviewed to evaluate vertebral fractures, spinal degeneration, and abdominal aortic calcification.

**Results:** For the entire 280 patients, the detection rate was 17.1% for DXA and 46.4% for QCT, a significant difference ( $P < 0.01$ ). Of the 82 patients with conflicting diagnoses, 14 whose diagnosis by QCT was osteoporosis had vertebral fractures even though their DXA findings did not indicate osteoporosis. Varying degrees of spinal degeneration was seen in all of the 82 patients.

**Conclusion:** QCT may avoid the overestimation of BMD by DXA associated with spinal degeneration, abdominal aortic calcification, and other sclerotic lesions. It may be more sensitive than DXA for detecting osteoporosis in postmenopausal women.



## P107 BONE TURNOVER MARKERS: AN EMERGING TOOL IN THE MANAGEMENT OF OSTEOPOROSIS

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**Objective:** Bone is a dynamic tissue which undergoes constant remodelling throughout the life span. Bone turnover is balanced with the coupling of bone formation and resorption at various rates leading to continuous remodelling of bone. A study of bone turnover markers (BTMs) provides insight into the dynamics of bone turnover in many metabolic bone disorders. An increase in bone turnover seen with ageing and pathological states such as osteoporosis leads to deterioration of bone microarchitecture and thus contributes to an increase in the risk of fracture independent of low BMD. These microarchitectural alterations affecting bone quality can be assessed by BTMs and thus may serve as a complementary tool to BMD in the assessment of fracture risk.

**Methods:** A systematic search of literature regarding BTMs was carried out using the PubMed database for the purpose of this review. Various reliable, rapid, and cost-effective automated as-

says of BTMs with good sensitivity are available for the management of osteoporosis. However, BTMs are subjected to various preanalytical and analytical variations necessitating strict sample collection and assay methods along with utilizing ethnicity-based reference standards for different populations.

**Results:** Estimation of fracture risk and monitoring the adherence and response to therapy, which is a challenge in a chronic, asymptomatic disease such as osteoporosis, are the most important applications of measuring BTMs. This review describes the physiology of bone remodelling, various conventional and novel BTMs, and BTM assays and their role in the assessment of fracture risk and monitoring response to treatment with antiresorptive or anabolic agents

**Conclusion:** BTMs are important tools for the management of osteoporosis that are gaining acceptance in clinical practice worldwide. Estimation of fracture risk based on bone remodelling rates and monitoring the adherence and response to therapy is the most important application of BTMs. Large epidemiologic studies have demonstrated BTMs as an independent contributor to fracture risk. Understanding the biological and preanalytical variations and availability of reliable, rapid, cost-effective and standardized BTMs assays may help in better utilization of BTMs in the management of osteoporosis.

## P108 A REVIEW OF SARCOPENIA: PATHOPHYSIOLOGY, DIAGNOSIS, TREATMENT AND FUTURE DIRECTION

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Sarcopenia is a progressive and generalized loss of skeletal muscle mass and function. The prevalence of sarcopenia was reported to be up to 29% in older persons in the community healthcare setting. Sarcopenia diagnosis is confirmed by the presence of low muscle mass plus low muscle strength or low physical performance. Sarcopenia management options include nonpharmacological and pharmacological approaches. Non-pharmacological approaches include resistance exercise and adequate nutrition. Of the two, resistance exercise is the standard nonpharmacological treatment approach for sarcopenia with significant positive evidence. Some dietary approaches such as adequate intake of protein, vitamin D, antioxidant nutrients, and long-chain polyunsaturated fatty acid have been shown to have positive effects against sarcopenia. Currently, no specific drugs have been approved by the Food and Drug Administration for the treatment of sarcopenia. However, several agents, including growth hormone, anabolic or androgenic steroids, selective androgenic receptor modulators, protein anabolic agents, appetite stimulants, myostatin inhibitors, activating II receptor drugs,  $\beta$ -receptor blockers, angiotensin-converting enzyme inhibitors, and troponin activators, are recommended and have been shown to have variable efficacy. Future research should focus on sarcopenia biological pathway and improved diagnostic approaches such as biomarkers for early detection, development of consistently preeminent treatment

methods for severe sarcopenia patients, and establishing sensitive measures for predicting sarcopenia treatment response.

### P109

#### PREFERENCE AND EFFICACY OF ZOLEDRONIC ACID FOR THE TREATMENT OF GLUCOCORTICOID-INDUCED OSTEOPOROSIS IN PATIENTS WITH AUTOIMMUNE DISEASE

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**Objective:** The most commonly used drugs for glucocorticoid-induced osteoporosis (GIOP) is bisphosphonates, which include oral alendronate and risedronate, and intravenous zoledronic acid. Among them, zoledronic acid is a convenient treatment option that allows compliance to be advantageous over other bisphosphonates. In this study, we aim to evaluate preference and patient satisfaction as well as the efficacy of zoledronic acid compared to other bisphosphonates.

**Methods:** 50 patients with continued osteoporosis or new fractures were recruited in follow-up bone densitometry after taking oral bisphosphonates for at least 1 year in patients diagnosed with GIOP during treatment for autoimmune diseases. After 1 year of treatment with zoledronic acid, patients completed the survey to rate their preference and satisfaction. The treatment efficacy was analyzed by comparing the changes in bone density and fractures with patients maintaining oral bisphosphonates as controls.

**Results:** The mean age of patients was 64.1 years, 96% were female, and the mean duration of GIOP was 5.5 years. There was no difference in the cumulative glucocorticoid doses in zoledronic acid group and oral bisphosphonate group. 39 patients (78%) preferred and were more satisfied with intravenous zoledronic acid over oral bisphosphonates, and satisfaction was greatly affected by the administration interval and convenient regimen. The infusion-related adverse events of zoledronic acid were only 2 patients (4%). In terms of efficacy, there were no significant differences in annualized percentage change in bone density in the lumbar spine ( $1.9 \pm 3.91$  g/cm<sup>2</sup> vs.  $1 \pm 5.3$  g/cm<sup>2</sup>,  $p=0.355$ ), femur neck ( $-0.91 \pm 6.31$  g/cm<sup>2</sup> vs.  $0.41 \pm 5.07$  g/cm<sup>2</sup>,  $p=0.264$ ), and hip ( $0.29 \pm 2.91$  g/cm<sup>2</sup> vs.  $0.41 \pm 5.07$  g/cm<sup>2</sup>,  $p=0.888$ ) between patients who received zoledronic acid and those who took oral bisphosphonates. The occurrence of new fractures was two in each of the two groups, showing no difference.

**Conclusion:** In our study, zoledronic acid was preferred and more satisfactory by patients, and the treatment efficacy for osteoporosis was similar to oral bisphosphonates. Therefore, zoledronic acid is recommended as an appropriate treatment for GIOP in patients with autoimmune disease.

### P110

#### TO ASSESS THE LEVELS OF VITAMIN D IN MALES WITH LOW TESTOSTERONE LEVELS (TOTAL & FREE)

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**Objective:** To assess the levels of vitamin d in males with low testosterone levels (total & free) to confirm the need for vitamin D supplementation.

**Methods:** A retrospective study was done of 300 patients who had undergone testing for testosterone and vitamin D levels using chemiluminescence method of these 150 patients had low testosterone levels and 150 had normal levels (total & free).

Normal Range – Vitamin D Deficient: >20 ng/ml, Insufficient: 21-29 ng/ml, Sufficient: >30 ng/ml, Toxic: >150 ng/ml; Testosterone: Total: 250-850 ng/ml, Free: 8.69-54.69 pg/ml.

**Results:** On analyzing the data of we found a significant correlation between the two parameters with the Pearson's correlation strengthened to a significant positive association ( $r=0.001$ ;  $P=0.006$  and a CI of 97%). The incidence of low vitamin D levels was a 79%.

**Conclusion:** Patients with low testosterone levels (free & total) showed low to very low levels of vitamin D indicating a need for an initial screening of all these patients with a supplementation of vitamin D from the start of treatment. Low testosterone in men is linked to infertility, irritability, and erectile dysfunction. In both men and women, low testosterone can lead to a variety of cardiovascular diseases and mental health concerns such as depression. Testosterone is critical for performance because it facilitates anabolic (recovery) processes, and low levels of free testosterone may lead to poor recovery, poorer fitness gains, and increased chance of injury. Vitamin D stimulates muscle growth, increases power, and cuts unnecessary body fat. In men, testosterone levels elevate during puberty and stimulate the production of sperm and the formation of secondary sexual characteristics such as body hair and a deeper voice. In both men and women, testosterone helps increase bone strength, stimulates the development of muscle mass and strength, and improves libido and mood. This study indicates that serum Vitamin D concentrations seems to be a significant, positive predictor of testosterone level. This result suggests that young active people may also remedy low testosterone level by optimizing their vitamin D levels.

P111

### THE EFFECT OF FRAILTY IN OLDER COMMUNITY-DWELLING OUTPATIENTS WITH ATRIAL FIBRILLATION – A NEW SCORE: HAS-BLED- F(RAIL)

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**Objective:** To determine the effect of frailty on thromboembolic events (TEE) and bleeding in older patients with non-valvular atrial fibrillation (AF). **Methods:** Patients aged  $\geq 65$  years who were diagnosed as having non-valvular AF in a geriatric outpatient clinic between June 2015 and February 2021 were included in the study. Frailty, the risk of thrombosis secondary to AF, and the risk of bleeding as a complication of AF treatment were evaluated using the FRAIL scale, CHA2DS2-VASc and HAS-BLED scores, respectively. **Results:** A total of 83 patients were included in the study. According to the FRAIL scale, 72.3% of the patients were frail, 21.7% were pre-frail. Bleeding occurred in 31.7% of the patients with frailty and 11.1% of pre-frail patients; no bleeding complications were seen in normal patients ( $p=0.112$ ). There was no difference between the normal, pre-frail, and frail groups in terms of TEE and bleeding history ( $p=0.112$  and  $0.571$ , respectively). In multivariate analysis, mortality decreased with the use of apixaban; frailty and malnutrition were found to increase mortality ( $p=0.014$ ,  $0.023$ , and  $0.020$ , respectively). HAS-BLED-F score was obtained as a result of the sum of the patients' HAS-BLED and FRAIL scores to predict the bleeding risk. A HAS-BLED-F score of  $\geq 6$  predicted the risk of bleeding with 90.5% sensitivity and 40.3% specificity. **Conclusion:** HAS-BLED-F score can be used to better predict the risk of bleeding in frail patients.

P112

### EVALUATION OF SARCOPENIA IN PATIENTS WITH HYPERTHYROIDISM

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**Objective:** Sarcopenia is a generalized skeletal muscle disease and thyroid hormones have regulatory effects on skeletal muscle metabolism. This study aims to evaluate the association between hyperthyroidism and sarcopenia. **Methods:** Thirteen patients with overt hyperthyroidism (OH), 13 patients with subclinical hyperthyroidism (SH) and 30 healthy volunteers were included. OH was defined as serum thyroid-stimulating hormone (TSH)  $<0.34$  mU/L and free T4 (fT4)  $>1.12$  ng/dL and/or free T3 (fT3)  $>4.37$  ng/L; while SH was defined as TSH  $<0.34$  when fT4 and fT3 were within the normal reference range (0.61-1.12 ng/dL for fT4; 2.6-4.37 ng/L for fT3). Handgrip strength (HGS) measurement and chair stand test were performed for muscle strength, while skeletal muscle mass index measurement with bioelectrical impedance analysis and calf circumference (CC) measurement were performed for muscle mass evaluation. **Results:** The median age was 44.9 (21-76), and 16 (61.5%) were female. HGS and CC were found to be significantly lower in the OH and SH groups than in the control group ( $p=0.007$ ;  $p=0.008$ , respectively). Sarcopenia was more common in the OH and SH groups than in the control group ( $p=0.007$ ), and the risk of sarcopenia was higher in the OH group than in the SH group (OR: 2.44, 95%CI: 0.26-31.87). In hyperthyroid patients, a high fT4 increased the possibility of sarcopenia (OR: 6.0 95%CI: 0.59-79.23). **Conclusion:** Sarcopenia is significantly more common in patients with hyperthyroidism.

P113

### THE RELATIONSHIP OF GERIATRIC SYNDROMES AND MORTALITY IN PATIENTS OVER 65 YEARS OLD IN THE INTERNAL MEDICINE DEPARTMENT

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**Objective:** To screen hospitalized older adults for geriatric syndromes and to show their effects on mortality. **Methods:** This cross-sectional study was conducted with 85 patients over 65 years of age hospitalized in the internal medicine department of Marmara University Hospital between September 2021 and January 2022. Patients with a hospital stay of less than 72 hours and patients who were under 65 years of age were excluded. All patients underwent comprehensive geriatric assessment. Frailty was assessed using the FRAIL scale, nutritional status was assessed using the Mini-Nutritional Assessment-Short Form, and functionality was assessed using Katz Activities of Daily Living and Lawton-Brody Instrumental Activities of Daily Living questionnaires. In-hospital mortality and 9-month mortality data were recorded. **Results:** The mean age of the patients was  $75 \pm 7$  years (66-97). In-hospital mortality was 15.3% (n:13) and the median length of stay was 19 days (3-126). A total of 26 patients died during the 9-month follow-up. Frailty was found to be an independent predic-

tor of in-hospital mortality (HR: 2.67, 95%CI: 1.41-5.06, p=0.003). **Conclusion:** Frailty is associated with in-hospital mortality in older adults. Comprehensive geriatric assessment in frail older individuals has a great importance in terms of reducing the risk of unnecessary hospital admissions, long hospitalizations and mortality, as well as increasing the life quality of the patients.

## P114

### THE ROLE OF DAILY HABITS OF THE ARAB-MUSLIMS IN THE DEVELOPMENT OF OSTEOARTHRITIS IN KNEE AND HIP JOINTS

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It is known that primary osteoarthritis of the hip joint (POA-HJ) is extremely rare in men and Additionally, the range of movements in patients of osteoarthritis knees of different grades, and other clinical manifestations, are different in Arabic citizens compared with their European women of the Arab citizens (AGC) in comparison to the primary osteoarthritis of the knee and also in comparison to primary osteoarthritis of the hip in European men and women counterparts. These observations, among others, have been examined by the author based on clinical and scientific methods. We report that there is a strong correlation between the daily habits of sitting, praying, and practicing specific types of sports, and the development of POA-HJ in AGC citizens. We hypothesize that the above habits may play important roles in the protection of hip joint against degenerative OA and other clinical conditions in Arabic citizens compared with citizens of western countries, who perform different daily habits. Consequently, the authors recommend modifying methods of conservative and surgical treatments according to the needs and the requirements of the patients in different countries. The author will discuss the above hypothesis in addition to the biomechanics of hip joint and its correlation to the above daily habits.

## P115

### EVALUATION A RISK OF FALLS IN OLDER WOMEN WITH HISTORY OF FALLS AND LOW BONE MINERAL DENSITY PARTICIPANTS IN A SPECIFIC EXERCISE PROGRAM

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**Objective:** To analyze the risk of falls in active elderly women, with low BMD and a history of falls, participating in physical exercise programs.

**Methods:** A total of 107 elderly Brazilian women aged 60 years or older were included in the study, but after performing the bone assessment and the presence of risk of falls, 87 women with low BMD were used in the statistical analysis. The sample was ob-

tained from participants in an exercise program group promoted by the City of Curitiba. The protocol consists of DXA for body densitometry and bone health classification, sociodemographic and anamnesis questionnaire, handgrip strength (HGS), Berg Balance Scale (BBS) and Short Physical Performance Battery (SPPB).

**Results:** The total of 87 subjects were used in the statistical analysis and divided into two groups: control group (without history of falls, N=58) and study group (with history of falls, N=29). When comparing the variables between the two groups, there was no statistical difference between them, despite the study group having the lowest scores. Correlation between variables were made in study group and presented the weak but significant correlation between age and BBS (-0.281, p=0.008) and age and falls (0.230, p=0.032). SPPB presented weak and significant correlation with LT-score (0.216, p=0.045).

Table 1. Compare means between groups

	Control group=58			Study group=29			p
	Min	Max	Mean	Min	Max	Mean	
Age	60	80	70.1	60	84	69.0	0.372
HGS	16	42	25.4	18	34	24.7	0.472
BBS	43	56	52.5	46	56	52.6	0.863
Sarco	4.44	7.80	5.99	4.41	7.56	5.93	0.611
SPPB	5	12	9.16	5	12	8.97	0.673
LBMD	0.385	1.233	0.824	0.633	1.760	0.857	0.910
LT-score	-5.2	1.7	-1.9	-3.8	1.4	-1.9	0.749
HBMD	0.407	0.961	0.681	0.540	0.787	0.675	0.882
HT-score	-4.0	1.0	-1.5	-2.8	-0.5	-1.5	0.756

LBMD and LT-score: Lumbar values and standard deviation  
HBMD and HT-score: Hip values and standard deviation  
Sarco: sarcopenia; Meno: menopause age

**Conclusion:** Age was associated with BBS while BMD was associated with SPPB. In this way, it is concluded that the use of various tools can not only assess the risk of falls, but also associate it with BMD and greater risk of fractures.

## P116

### FRACTURE LIAISON SERVICE: ENDOCRINOLOGY EMBEDDED IN AN ORTHOPEDIC TRAUMA SERVICE

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**Objective:** We present our institution's approach of a unique combined Endocrinology-Orthopedic Fracture Liaison Service (FLS) that showed significant improvements in treatment outcomes with limited resources.

**Methods:** This is a retrospective chart review of the patients seen by a FLS at an academic university hospital from December 2014-May 2017.

**Results:** A total of 210 patients were evaluated by a nurse run FLS in 2014-2015, compared to 271 patients by a physician (endocrinologist) run FLS in 2015-2016. The patients in both periods shared similar demographics, fracture locations, and biochemical profiles. When the physician run FLS was implemented, there was an 84% increase in the percentage of patients starting treatment for osteoporosis. During the nurse run FLS period, 13% of patients evaluated initiated anti-resorptive therapy compared to 24% of patients evaluated during the physician run FLS period. Interestingly, once the physician run FLS was started, there was an increase of treatment initiation by family medicine and internal medicine PCPs. We also found a 42% increase in outpatient follow up for osteoporosis and a 27% increase in the number of patients getting proper outpatient evaluation with DXA scans with a physician run model vs. a nurse run model. In the nurse run model, 33% of patients followed up after discharge for osteoporosis (primary care and endocrine combined) compared to 47% after the change to physician run FLS. DXA scan completion increased from 30% to 38% with the change in FLS model.

**Conclusion:** There was an improvement in the start of osteoporosis medications and completed DXA scans after the switch to a physician run model. There is still a need for improvements in patient followup and treatment initiation after fracture.

P117

### PAGET'S DISEASE AND PULMONARY SARCOIDOSIS: COINCIDENCE OR COEXISTENCE?

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Paget's disease is a disorder characterized by increased bone turnover and skeletal lesions. Sarcoidosis is a systemic disease characterized by the formation of granulomas, most frequently involving the lungs. We report a case of Paget's disease in an older patient with pulmonary sarcoidosis. A 78-year-old-female presented to the geriatric outpatient clinic with headache and pain in her right upper arm dating four years back. The pain in the right arm radiated to the right shoulder. Five years before the current presentation, the patient received a diagnosis of pulmonary sarcoidosis in the pulmonary medicine clinic of the same hospital. The patient complained of fatigue, daytime sleepiness and loss of appetite. She lost approximately 15 kg over the last 6 months and described excessive night sweating without fever. Activities of daily living (ADL) and instrumental activities of daily living (IADL) were moderately dependent. Mini Nutritional Assessment score was 10 out of 30; consistent with malnutrition. FRAIL scale score was 3 out of 5, indicating frail status.

Laboratory tests elevated sedimentation rate (83 mm/h), calcium:9.63 mg/dL, phosphate:3.7 mg/dL, PTH:15.2 ng/L, and alkaline phosphatase (ALP):169 U/L (range:33-98 U/L). Plain radiograph of the right humerus showed osseous expansion. Cranial computed tomography (CT) revealed several hypodense lesions in the skull. CT of the thorax showed bilateral reticulonodular ap-

pearance, and a sclerotic lesion in T5 vertebral body. Bone scintigraphy revealed increased diffuse osteoblastic activity in the calvarial bones, the right humeral head and the right aspect of T11 vertebral body. The patient was diagnosed with polyostotic Paget's disease based on the diagnostic radiologic findings and elevated serum ALP. Treatment with intravenous yearly zoledronic acid therapy was initiated along with oral nutritional supplements for malnutrition. At the follow-up visit, the patient reported no headache or bone pain. Follow-up cranial CT after treatment with zoledronic acid showed complete resolution of the cranial lesions.

The etiologies of Paget's disease and sarcoidosis are not well-defined. However, the fact that both conditions are seen after a certain age suggests that triggering environmental factors may play a role. The pathophysiology in sarcoidosis includes defective T cells and macrophages that lead to the formation of granulomas. On the other hand, increased turnover of osteoclasts have been observed in Paget's disease and osteoclasts are a member of the macrophage family. There may be a common intrinsic factor associated with the VDR gene receptor, triggering the defective activation of macrophages in both disorders. Whether bisphosphonates have a place in the treatment of osseous sarcoidosis is a subject for future research.

P118

### OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURES AND ITS ASSOCIATION WITH AGE, BONE MINERAL DENSITY, AND QUALITY OF LIFE IN INDIAN POSTMENOPAUSAL FEMALES

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**Objective:** The average life expectancy of the Indian population is increasing, and with it, the frequency of osteoporosis and osteoporotic fractures is also expected to increase rapidly. Osteoporotic vertebral compression fractures (OVCFs) are the most common type of osteoporotic fracture, but they are often neglected due to relatively mild symptoms in developing countries like India. However, it has been reported that OVCFs not only increase morbidity and mortality but also affect psychosocial aspects. The study aim was to investigate the characteristics of OVCFs in Indian postmenopausal women and the association between OVCFs and clinical factors such as age, BMD, and quality of life.

**Methods:** 2562 postmenopausal women patients were included in this observational study from tertiary care hospital in Mumbai, India. Radiologic, asymptomatic, and within three months of OVCF groups were analyzed based on age, fracture location, and prevalence according to BMD. BMD, T-score, BMI, and European Quality of Life-5 Dimensions (EQ-5D) were investigated in the three groups, and the differences between groups were compared and analyzed.

**Results:** The OVCFs prevalence at the T11-L1 was 3.7 times higher in the 70s group (44.0%) than in the 50s group (11.9%). Total hip and femur BMD were significantly lower in patients with thora-

columbar junction fractures than in patients with L2-L5 fractures, whereas no difference was observed in lumbar spine BMD. Out of three OVCF groups, then within three months of OVCF group had the lowest lumbar spine T-score of -2.445. The asymptomatic OVCF group also showed a significantly lower lumbar spine T-score than did the group without radiologic OVCFs ( $p < 0.001$ ). The EQ-5D showed a significant decrease in the radiologic OVCF group ( $p < 0.001$ ) and within three months of the OVCF group ( $p < 0.001$ ).

**Conclusion:** The OVCFs prevalence increases rapidly with old age and low BMD in Indian postmenopausal females. Femur and total hip BMD are more predictive of thoracolumbar junction fractures than lumbar spine BMD. Patients with radiologic OVCFs had a significantly lower quality of life than those without the OVCF group. Therefore, this study shows it is important to treat and prevent osteoporosis before an OVCF occurs.

### P119

#### CLINICAL, RADIOLOGICAL AND FUNCTIONAL OUTCOME OF THE OSTEOPOROTIC BURST FRACTURE TREATED WITH THREE-COLUMN RECONSTRUCTION USING SINGLE POSTERIOR APPROACH

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**Objective:** The incidence of wedge fractures in the osteoporotic spine is gradually increasing with increasing life expectancy. Most osteoporotic fractures are well-managed conservatively. Osteonecrosis of fractured vertebrae can lead to non-union and delayed collapse, which can result in progressive kyphosis with the possibility of delayed neurological deficits. These cases require decompression-fixation surgeries. There is a controversy regarding the ideal surgical procedure to evaluate a novel effective procedure utilizing three-column reconstruction via a posterior approach with a technique that utilizes an arthroscope to visualize the anterior surface of the dura during decompression.

**Methods:** A prospective study. 80 osteoporotic vertebral burst fracture patients with similar demographic data, clinical parameters (Visual Analog Scale VAS, Oswestry Disability Index ODI, Frankel grade) and radiological parameters (BMD, kyphosis) managed by three-column reconstruction through single posterior approach surgery: Pedicle screw fixation, Corpectomy, Arthroscope Assisted Transpedicular Decompression (AATD) and Fusion (Mesh Cage + Bone grafting). Preoperative data, postoperative data, surgical variables and complications were recorded and analysed.

**Results:** No significant differences in demographic data. Significant improvement was noted in VAS (preoperative,  $7.90 \pm 0.60$ ; final follow-up  $2.90 \pm 0.54$ ) and ODI (preoperative,  $77.10 \pm 6.96$ ; final follow-up  $21.30 \pm 6.70$ ). Neurological improvement was noted in 74 patients (Frankel grade E) while 6 patients remained nonambulatory (Frankel grade C). Significant improvement was noted in local kyphosis angle (preoperative,  $22.14 \pm 2.60$ ; postoperative,

$10.40 \pm 1.40$ ) with a 10% loss of correction ( $2.5 \pm 0.90$ ) at the final follow-up. Implant failure in two patients and proximal junctional failure in two patients were managed with revision surgery. No iatrogenic dural or nerve injury.

**Conclusion:** Osteoporotic burst fracture can be managed with single posterior surgery and three-column reconstruction with a mesh cage. It provides a significant improvement in clinical, radiological and functional outcomes. The arthroscope can improve a surgeon's operative field and magnification thereby ensuring complete decompression without injuring the dura or spinal cord.

### P120

#### ASSOCIATION BETWEEN SARCOPENIA AND FRACTURE RISK IN A POPULATION FROM THE UK BIOBANK DATABASE

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**Objective:** To assess whether presarcopenia and sarcopenia are associated with an increase in fracture risk.

**Methods:** We conducted a retrospective study using the UK Biobank cohort, and the European Working Group on Sarcopenia in Older People 2 (EWGSOP2) criteria. Muscle strength was evaluated using handgrip strength (HGS), and muscle mass using the skeletal muscle index (SMI, from bioimpedance analysis). Presarcopenia was defined as low HGS with normal SMI, and sarcopenia as low HGS and low SMI. Presarcopenics and sarcopenics were merged to form a PreSarc group, and compared against non-sarcopenics (NonSarc group) to determine whether presarcopenia and sarcopenia were predictors of fracture. Fracture events were recorded as "fracture" (location compatible with an osteoporotic origin) and "major osteoporotic fracture" (MOF), as listed in the FRAX tool. Associations were assessed using Cox proportional hazards models, adjusted for multiple covariates (including socio-demographics, bone status assessed by QUS, and a history of falls and fracture). Adjusted hazard ratios (HRa) and their 95% confidence intervals were reported.

**Results:** A total of 387,025 participants (women: 54.4%; median age: 58.0 (IQR: [51.0; 63.0]) years) were included. At baseline, there were 18,257 (4.7%) presarcopenics and 1,124 (0.3%) sarcopenics. Over a median follow-up of 12.0 (IQR: [11.4; 12.6]) years, 18,300 (4.7%) participants were diagnosed with at least one incident fracture. The PreSarc group was significantly associated with a higher risk of fracture (HRa=1.25 [1.18; 1.32]) and MOF (HRa=1.28 [1.19; 1.37]) than the NonSarc group. When analyzed separately, the presarcopenia and sarcopenia groups were still associated with a higher risk of all fractures (HRa=1.25 [1.18; 1.32] and HRa=1.27 [1.06; 1.53], respectively).

**Conclusion:** In a middle-aged population, the fracture risk was higher in both presarcopenic and sarcopenic participants.



P121

### THE EFFECT OF PERICAPSULAR NERVE GROUP (PENG) BLOCK ON POSTOPERATIVE ANALGESIA AFTER HIP SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** PENG block is a novel regional anesthesia technique that was recently introduced in the clinical field. This study aimed to identify the benefits of the PENG block, focusing on its postoperative analgesic effect in hip surgery.

**Methods:** Electronic databases, including PubMed, EMBASE, CINAHL, Scopus, and Web of Science, were searched to identify studies. The primary outcome was 24-h postoperative opioid consumption. The secondary outcomes included 48-h postoperative opioid consumption; pain scores at 6, 12, and 24 h after surgery at rest and during movement; and highest pain score at 24–48 h after surgery. We estimated the standardized mean difference (SMD) using Hedges' g method with 95% confidence intervals (CIs) to determine the effect size using a random-effects model.

**Results:** A total of 450 participants from eight randomized controlled trials were included in the final analysis. No significant difference was observed in postoperative 24-h opioid consumption between the PENG block and other block groups (SMD -0.35 mg; 95%CI -0.79 to 0.10 mg; p=0.13; I<sup>2</sup>=76%). In the comparison of postoperative 48-h opioid consumption, the PENG block did not reduce the amount of opioid used compared with other blocks (SMD -0.17 mg, 95%CI -0.48 to 0.14 mg; p=0.13; I<sup>2</sup>=22%) and no block (SMD -0.26 mg, 95%CI -1.08 to 0.16 mg; p=0.54; I<sup>2</sup>=82%). No significant postoperative pain reduction was observed at rest at 6 h (SMD 0.11, 95%CI -0.16 to 0.38; p=0.41; I<sup>2</sup>=0%), 12 h (SMD -0.29, 95%CI -0.67 to 0.09; p=0.14; I<sup>2</sup>=49%), and 24 h (SMD 0.26, 95%CI -0.05 to 0.56; p=0.10; I<sup>2</sup>=0%) postoperatively in the PENG block group compared with the other block groups. Similarly, the PENG block did not attenuate the pain intensity during movement at 6 h (SMD 0.17, 95%CI -0.20 to 0.55; p=0.37; I<sup>2</sup>=0%), 12 h (SMD 0.37, 95%CI -0.08 to 0.82; p=0.11; I<sup>2</sup>=27%), and 24 h (SMD 0.27, 95%CI -0.73 to 1.26; p=0.60; I<sup>2</sup>=90%) postoperatively compared with other blocks. In the highest pain score between 24 and 48 h after surgery, no significant pain reduction was reported in the PENG block group compared with the no-block group (SMD -0.24, 95%CI -0.58 to 0.10; P=0.16; I<sup>2</sup>=0%).

**Conclusion:** The PENG block did not show a superior effect in postoperative analgesia compared with no block or other blocks. Further large randomized controlled trials are required to confirm and clarify our results.

P122

### DENOSUMAB PERSISTENCE IN POSTMENOPAUSAL AND MALE OSTEOPOROSIS IN ROUTINE CLINICAL PRACTICE IN HUNGARY: A NATIONAL, SINGLE-ARM, PROSPECTIVE OBSERVATIONAL STUDY

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**Objective:** Estimate persistence with denosumab among patients at increased fracture risk in Hungary.

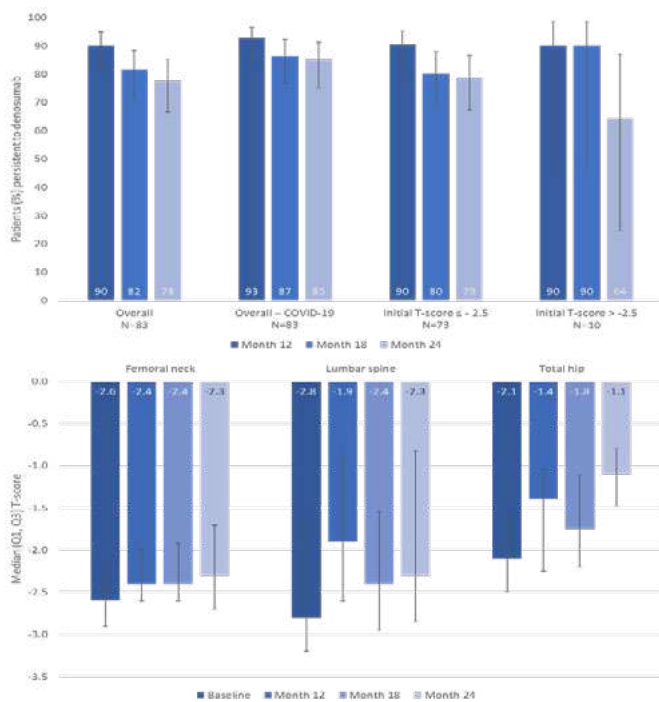
**Methods:** This national, single-arm, prospective observational study included consenting postmenopausal (PMO) and male osteoporosis (MOP) patients who had initiated denosumab in the 15 days prior to enrollment, followed for 24 months or until documented denosumab discontinuation. Primary outcome was persistence (time between injections 6 months + 8 weeks) in primary prevention (no previous fracture during available history) at 12, 18 and 24 months. A sensitivity analysis for COVID-related delays extended the allowed gap to 6 months + 90 days. Secondary objectives were to describe baseline patient characteristics and BMD changes between baseline and months 12, 18, and 24.

**Results:** Overall, 139 patients from 9 sites were enrolled (135 women, 4 men), mean (SD) age at baseline: 69.8 (8.9) years. The majority (60%, n=83/139) of patients were receiving denosumab for primary fracture prevention, with 89% (74/83, 95%CI: 81%, 95%), 81.5% (n=63/83; 95%CI: 71%, 88%), and 77.5% (n=58/83; 95%CI: 67%, 85%) of these patients persistent to denosumab at 12, 18, and 24 months, respectively (Figure). Accounting for COVID-related delays did not significantly change persistence. Most frequently reported baseline risk factors were previous fractures (40%, n=56/139), secondary osteoporosis (35%, n=49/139), parental hip fracture (29%, n=40/139), and rheumatoid arthritis (10%, n=14/139). Prior anti-osteoporosis therapy was recorded for 72% (n=100/139). Baseline T-score was ≤ -2.5 in 81% of patients (n=113/139) and >-2.5 in 19% (n=26/139). At month 24, the BMD and the T-score had improved at the femoral neck, hip, and lumbar spine (Figure).

**Conclusion:** Persistence with denosumab in primary osteoporosis prevention was high. Denosumab treatment resulted in improved BMD and T-score at all locations.

**Acknowledgments:** Funding from Amgen. Margit Hemetsberger provided medical writing support, funded by Amgen.

**Disclosures:** I.T. received lecture fees from Amgen. E.M. is an Amgen employee and holds Amgen stock.



## P123

## GAUCHER DISEASE ASSOCIATED WITH SEVERE OSTEOPOROSIS

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**Objective:** Gaucher disease is an inherited metabolic disorder characterized by a wide range of clinical manifestations including bone pain, joint pain, osteonecrosis and osteoporosis associated with bone brittleness, fragility and increased risk of fracture.

**Methods:** We report the case of a female with complex medical conditions which were periodically checked-up in several medical centres from Romania. Bone profile included: DXA, wholebody MRI, intact PTH, 25-hydroxyvitamin D (25OH D), bone turnover markers:  $\beta$ -CrossLaps ( $\beta$ -CTx) and osteocalcin.

**Case report:** A 52-year-old female diagnosed with Gaucher disease at the age of 3 years was evaluated for high intensity lumbar pain associated with paresthesia in the right lower limb. From her medical history we mention splenectomy, cholecystectomy, ureteral lithiasis and short right leg after osteomyelitis. MRI exam of the lumbar spine described subsidence of the L2 vertebral body of 12 mm anteriorly and 20 mm posteriorly, a reduction in the ver-

tebral body height >80%, L1-L2 retrolisthesis with narrowing of the spinal canal. Low BMD of 0.866 g/cm<sup>2</sup> at DXA was consistent with a T-score L1-L4 of -2.7 SD, total BMD left femur of 0.810 g/cm<sup>2</sup> and T-score of -1.6 SD. The laboratory investigations showed low total calcium levels of 8.72 mg/dL (normal: 8.8-10.6 mg/dL), increased alkaline phosphate (of 160 U/L, normal: 30-120 U/L), vitamin D deficiency (25OH D of 22.3 ng/mL, normal >30 ng/mL), PTH in the normal range. Daily 20  $\mu$ g teriparatide by self-administration through subcutaneous route, calcium and vitamin D supplements were offered.

**Conclusion:** Teriparatide is an option for severe osteoporosis in patients with Gaucher disease which an unusual cause of low bone mass. VD supplementation in association with enzyme replacement therapy may maintain BMD and reduce the risk of fracture.

## P124

## HYPER IMMUNOGLOBULIN IGM SYNDROME ASSOCIATED WITH SEVERE OSTEOPOROSIS

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**Objective:** Hyper immunoglobulin IgM syndrome (IG) is a rare primary immunodeficiency disorder presenting a variety of clinical manifestation including pulmonary, gastrointestinal complications, autoimmune disorders, hematologic abnormalities, lymph proliferation and malignancies. Severe osteoporosis may be a part of clinical profile due to imbalance in BMD and marked osteoclastogenesis.

**Methods:** We report the case of a 49-year-old female diagnosed with osteoporosis, vitamin D deficiency and IG. Bone profile evaluation included: DXA, PTH and 25-hydroxyvitamin D (25-OHD).

**Case report:** A 49-year-old female patient was evaluated for asthenia, weight loss (5 kg in the last 8 months), dizziness and diffuse osteoarticular pains. Her medical history includes autoimmune thyroiditis with normal function, acute articular rheumatism and dorsal spondylosis. Evaluation of calcium metabolism showed low 25-OHD (19.2 mg/mL, normal:30-100 ng/mL) normal total serum calcium and ionized calcium, normal PTH (17.6 pg/mL, normal:12-88 pg/mL). DXA revealed low lumbar BMD of 0.680 g/cm<sup>2</sup>, T-score of -4.2SD, total left femur BMD of 0.625 g/cm<sup>2</sup>, total left T-score of -3SD. FRAX predicted a 4.7% risk of major osteoporotic fracture and a 2% risk of hip fracture. Complementary examinations excluded the presence of a neoplasia. The patient was prescribed vitamin D supplements to achieve 25-OHD of 30

ng/mL followed by 5 mg zoledronate IV with careful monitoring of calcium, phosphorus and PTH levels and further VD supplementation.

**Conclusion:** The decision to treat bone loss in hyper Immunoglobulin M syndrome is difficult. Limited data are published so far concerning the decision of anti-osteoporotic drugs.

## P125

### SUBACUTE OSTEOMYELITIS: TRICKY TO PROBE AND PROBLEMATIC TO TREAT

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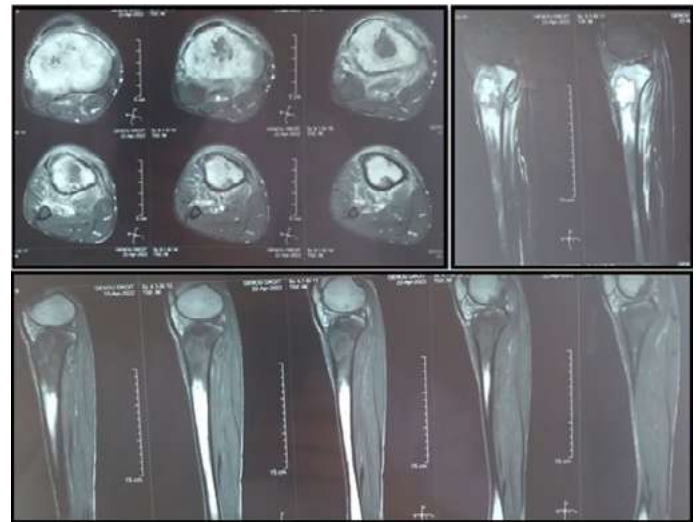
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**Objective:** Subacute osteomyelitis may have deceptive features which can delay the diagnosis. Metaphyseal localisation is the most frequent. The aim of this case report is to highlight the radiological aspect of this presentation and its therapeutic management.

**Case report:** We report the case of a 12-year-old child who was presented to the orthopedic emergency department for inflammatory pain of the right knee. This symptomatology has been evolving for 5 weeks and there was no history of trauma. The child had no medical no surgical history. On examination, there was no fever, no inflammatory signs of the skin, no visible wound, hematoma or scars, but a swelling next to the anterior tibial tuberosity, a painful restriction of range of motion as compared to the normal opposite and a pain at palpation of the proximal tibial metaphysis. The white blood-cell count=10000 elements/ml, the C-reactive protein=171 mg/dl. The X-ray of the knee (Fig. 1) showed rounded, regular bone lysis with surrounding sclerosis in the proximal tibial metaphysis. MRI showed a central bone fluid lesion, with a target aspect evoking the Brodie's Abscess (Fig. 2). Surgical debridement of the abscess was planned. An incision over the anterior-medial aspect of the proximal tibia was taken. The abscess cavity was cleared and the purulent collection was sent for culture. The patient was kept under the cover of broad-spectrum antibiotics administered intravenously for 3 days followed by oxacillin 2g x 3 and Ciprofloxacin 800mg x 2 for one week adapted to staphylococcus aureus found in culture then oral antibiotics for one month. Infectious parameters decreased and there were no complications in the postoperative period. Regular follow-up for 2 weeks showed clinical improvement. At 6 months follow-up, the patient had made full recovery with radiographic improvement.

**Discussion:** Brodie's abscess was most frequently encountered in young men. Brodie's abscess has been described as a subacute presentation of osteomyelitis, a median of 12 weeks of complaints before diagnosis was established. The tibia (48.6%) and the femur (31.1%) were mostly involved. In children, the modality of choice to distinguish between infection and bone tumors is MRI. MRI has also been proven to be superior than plain x-ray in adults to diagnose osteomyelitis. Recent studies also show that scintigraphy with SPECT/CT or FDG-PET combined with CT give great diagnostic accuracy in haematogenous osteomyelitis and

for fracture related infections. Unfortunately, these techniques are also not readily available in many hospitals, especially not in the geographic areas with higher incidence of osteomyelitis. Therefore, conventional radiographs are still the most utilized diagnostic imaging modality for most physicians. In line with previous reports *Staphylococcus aureus* is the dominant pathogen found. Treatment consisted primarily of surgery (94%) often in combination with antibiotics (77%).



**Conclusion:** Brodie's abscess was first described by Sir Benjamin Brodie in 1832. With appropriate surgical debridement and aggressive antibiotic cover, a near 100% success rate is observed in the treatment of Brodie's abscess with no residual deformities in the affected bones or restrictions in the range of movements in the neighboring joints.

P126

### APPLICATION OF TOMOSYNTHESIS FOR VERTEBRAL COMPRESSION FRACTURE DIAGNOSIS AND BONE HEALING ASSESSMENT IN FRACTURE LIAISON SERVICES

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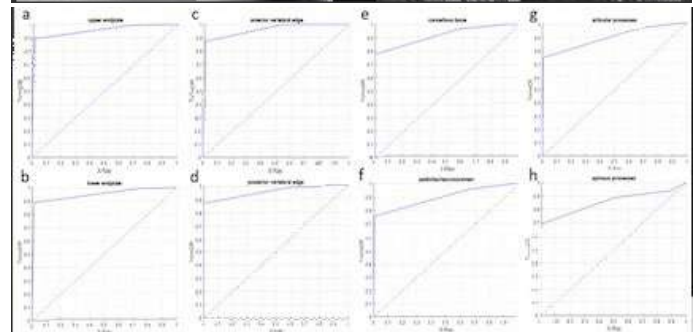
<sup>1</sup>Institute of Biomedical Engineering, College of Medicine and College of Engineering, National Taiwan University, Taipei, <sup>2</sup>Dept. of Biomedical Engineering, College of Medicine and College of Engineering, Taipei, <sup>3</sup>Dept. of Orthopedic Surgery, National Taiwan University Hsin-Chu Hospital, Hsinchu, <sup>4</sup>Dept. of Orthopaedic Surgery, National Taiwan University College of Medicine and National Taiwan University Hospital, Taipei, Taiwan

**Objective:** Early identification of vertebral compression fractures (VCFs) is crucial for successful secondary fracture prevention. Tomosynthesis, a low-dose tomographic imaging technique, may facilitate the evaluation and long-term follow-up of VCFs in patients with osteoporosis.

**Methods:** We compared the performances of plain radiography and tomosynthesis for VCF diagnosis and healing assessment in patients enrolled in fracture liaison services in our hospital. 49 patients with new VCFs at the T10–L5 levels were prospectively recruited between August 2018 and May 2020; all patients underwent thoracolumbar plain radiography and tomosynthesis.

**Results:** We evaluated the accuracy of the VCF diagnosis, image quality, and VCFs healing process. Tomosynthesis identified 90 levels of VCF in 49 patients, while plain radiography revealed only 87.8% (79/90) of them. There were 44.9% (22/49) patients with neglected chronic VCFs as seen on tomosynthesis. Tomosynthesis images had improved VCF diagnostic accuracy up to 12.2% and showed significantly more anatomic details than plain radiography. For diagnosis of VCFs, the performance of plain radiographs was poorer than that of tomosynthesis images (plain radiographs: sensitivity 84%, specificity 93.5%, false positive rate 6.5%, and false negative rate 16%; tomosynthesis: sensitivity 93.2%, specificity 100%, false positive rate 0%, and false negative 6.8%), using MRI as gold standard. The kappa coefficient between tomosynthesis and MRI is 0.956 while between radiography and MRI is 0.704. Tomosynthesis showed significantly more anatomic details than plain radiography and all the examiners revealed a clear preference for tomosynthesis. Tomosynthesis scored 3.3 times higher on the fracture healing assessment at the 3-month follow-up than plain radiographs.

**Conclusion:** Tomosynthesis is a promising tool for VCF screening and diagnosis in patients with osteoporosis and for monitoring fracture healing status at a low radiation dose and cost.



P127

### APPLICATION OF DEEP LEARNING ALGORITHM TO DETECT AND VISUALIZE VERTEBRAL FRACTURES ON PLAIN FRONTAL RADIOGRAPHS

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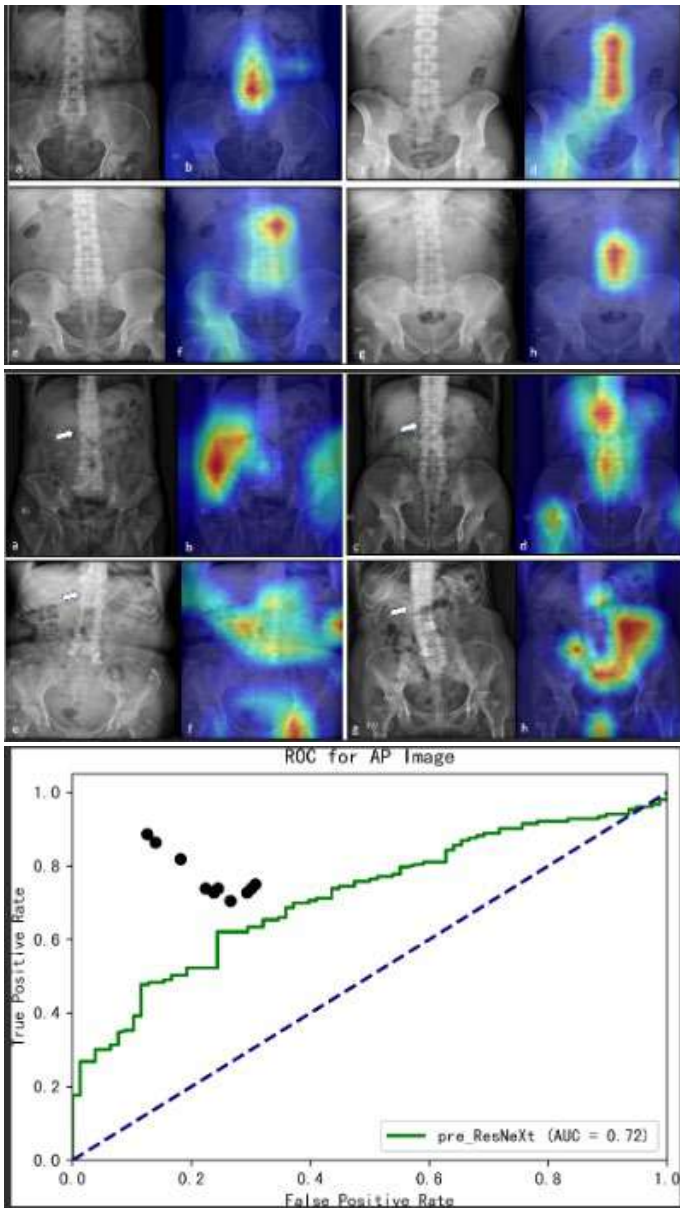
**Objective:** Identification of vertebral fractures (VFs) is critical for effective secondary fracture prevention owing to their association with the increasing risks of future fractures. Plain abdominal frontal radiographs (PARs) are a common investigation method performed for a variety of clinical indications and provide an ideal platform for the opportunistic identification of VF. This study uses a deep convolutional neural network (DCNN) to identify the feasibility for the screening, detection, and localization of VFs using PARs.

**Methods:** A DCNN was pretrained using ImageNet and retrained with 1306 images from the PARs database obtained between August 2015 and December 2018. The accuracy, sensitivity, specificity, and area under the receiver operating characteristic curve (AUC) were evaluated. The visualization algorithm gradient-weighted class activation mapping (Grad-CAM) was used for model interpretation.

**Results:** Only 46.6% (204/438) of the VFs were diagnosed in the original PARs reports. The algorithm achieved 73.59% accuracy, 73.81% sensitivity, 73.02% specificity, and an AUC of 0.72 in the

VF identification.

**Conclusion:** Computer driven solutions integrated with the DCNN have the potential to identify VFs with good accuracy when used opportunistically on PARs taken for a variety of clinical purposes. The proposed model can help clinicians become more efficient and economical in the current clinical pathway of fragile fracture treatment.



### P128 EFFECTS OF DENOSUMAB ON RENAL FUNCTION AND PERSISTENCE IN DIABETIC PATIENTS FOLLOWING HIP FRACTURE

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**Objective:** Type 2 diabetes mellitus (T2DM) is a common metabolic disease and associated with high risk of renal insufficiency and osteoporosis. Denosumab is a human recombinant monoclonal antibody that has been approved for the treatment of osteoporosis. Although previous studies revealed that denosumab seemed to be safe for patients with chronic kidney disease, the renal effect of long-term use in patients with T2DM is still seldom studied. The current study was conducted in T2DM patients with hip fractures (HFx) following surgical treatment treated with denosumab to evaluate the persistence and renal function.

**Methods:** We used the database from our hospital database to identify patients newly diagnosed with T2DM between 2010 and 2017. Subjects with previously used anti-osteoporotic medication, ever suffered HFx before index date, and HbA1c >10% during the study were excluded. Subjects with HFx during 2011-2017 were collected and calculate the persistence of denosumab within 24 months. Estimated glomerular filtration rate (eGFR) was calculated at baseline and 24 months after treatment.

**Results:** There were 139 T2DM patients using denosumab after HFx enrolled in this study. High persistence (HP) group (N=76) received more than two doses within 24 months. Low persistence (LP) group (N=63) received two doses or less within 24 months. The averaged pre-therapy eGFR is  $75.20 \pm 39.32$  ml/min/1.73m<sup>2</sup> and post-therapy is  $68.11 \pm 38.56$  in HP group which significantly decreased ( $p=0.001$ ). After excluding pre-therapy eGFR >60 ml/min/1.73m<sup>2</sup>, there is no significant difference between pre-therapy and post-therapy eGFR in both HP and LP group. The persistence with denosumab at 12 and 24 months is 70.4% and 39.7%.

**Conclusion:** In our study, renal function in T2DM patients with CKD remained stationary after denosumab use for 24 months. The 24-month denosumab persistence in this study is only 39.7%. Further studies are needed to prove the safety of denosumab in T2DM population.

### P129 SHOULD THE FRAX TOOL CONSIDER OTHER VARIABLES TO EVALUATE THE OSTEOPOROTIC FRACTURE?

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**Objective:** FRAX is still a recommendable and valid method to determine fracture risk. The objective of this study was to evaluate whether or not other variables outside those included in this algorithm could be relevant as well.

**Methods:** 316 women over 50 years have been randomly picked from the EVOS-EPOS study. They were prospectively followed for 8 years to determine the clinical or radiographically previously confirmed osteoporotic fracture (Fx) incidence. Variables such as age, BMI, previous fractures, family's history of hip fractures,

smoking habit, the use of glucocorticoids and femoral neck BMD. Furthermore, other variables that are not currently included on FRAX such as age of menarche, menopause, fertile years and nulliparity were analysed.

**Results:** Among all the FRAX variables, on an univariate level, the only ones associated to hip Fx incidence were age and family's medical records. Nevertheless, a relationship was also found when regarding the age of menopause and women's fertile years. The multivariate analysis age and BMI adjusted showed that age 1.09 (1.01-1.17) and age of menopause 0.90 (0.82-0.99) were related to hip Fx incidence as well. Moreover, on an univariate level both femoral neck's BMD in patients with hip fractures and nulliparity were connected to incident Colles' fracture. On a multivariate level, nulliparity is associated with Colles' fracture 4.59 (1.59-13.26). Additionally, when conducting an univariate analysis to regard major osteoporotic fracture age, family's history of hip Fx, femoral neck's BMD, nulliparity and fertile years were significantly associated. On the other hand, family's history of hip Fx 3.26 (1.23-8.61), age 1.05 (1.01-1.09), nulliparity 3.07 (1.48-6.37) and fertile years 0.92 (0.87-0.98) were linked to an increase on major osteoporotic Fx on a multivariate level.

**Conclusion:** Amid all the variables in FRAX algorithm, age and family's history of hip Fx were associated with both major osteoporotic and hip Fx but, at the same time, other gynaecological variables were similarly relevant. Hip fracture risk was increased by 9% per year of age matching the 10% decrease of hip Fx risk per year of delay in menopause. Family's history of hip Fx and nulliparity increased major osteoporotic Fx more than 3 times (3.26 and 3.07 times, respectively). These results indicate that, when talking about women, some gynaecological variables could be taken into consideration along with traditional risk factors that FRAX algorithm already includes in its calculation.

### P130

#### SEVERE OSTEOPOROSIS COMPLICATED WITH MULTIPLE RIB FRACTURES IN A PATIENT WITH MULTIPLE MYELOMA

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**Objective:** The association of multiple myeloma with bone loss and pathological fractures is known even if certain fractures are difficult to be recognized.

**Methods:** A case of severe postmenopausal osteoporosis associated with multiple rib fractures is introduced. Bone was evaluated

by central DXA, bone scintigraphy and bone radiography. Phosphor-calcium metabolism assay including bone turnover was performed. The informed consent was obtained.

**Case report:** A 55-year-old female patient with menopause at the age of 45 and medical history of papillary thyroid cancer at the age of 46 cured after surgery and radioiodine therapy was admitted for further investigation in the context of multiple rib fractures revealed at the radiological examination. No causative factor for rib fractures has been identified at that moment. DXA performed after 5 years of treatment with bisphosphonates (alendronate and risedronate) showed decreased BMD of 0.689 g/cm<sup>2</sup>, T-score of -4.3SD, Z-score of -3.6SD, total hip BMD of 0.892 g/cm<sup>2</sup>, T-score of -0.9SD, Z-score of -0.3SD. Circulating osteocalcin,  $\beta$ -CrossLaps, biological and hormonal parameters including PTH, 25-hydroxyvitamin D, cortisol and thyroid hormones were within the normal ranges. However, an additional urinary test revealed positive Bence-Jones proteins. Specific haematological investigations confirmed the diagnosis of multiple myeloma. Wholebody scintigraphy indicated no metastasis. Denosumab 60 mg subcutaneously every 6 months and 2000 IU/d vitamin D was initiated in combination with specific haematological therapy.

**Conclusion:** In severe osteoporosis associated with atypical fractures such as rib fractures is useful to exclude secondary causes of osteoporosis.

### P131

#### BUTTERFLY VERTEBRA: THE MIMICKER OF VERTEBRAL FRAGILITY FRACTURES

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**Objective:** Fragility fractures are one of the most relevant differential diagnoses of low back pain (LBP), but recognition of potential mimickers is essential. The authors aim to raise awareness for a rare entity easily mistaken for a vertebral fracture.

**Case report:** A 41-year-old woman presented to the Rheumatology department due to LBP lasting for more than one year, without other symptoms or history of trauma. She was otherwise healthy, non-smoker and practiced regular physical activity. The physical exam was unremarkable. A spine X-ray was performed and showed a sinking of the vertebral body of the 11<sup>th</sup> dorsal vertebra (D11), suggesting a fragility fracture. Her blood work revealed a slightly raised parathormone (75.5 pg/mL) and vitamin D deficiency (47.5 nmol/L), that resolved after vitamin D supplementation, with no other abnormalities. DXA suggested a trabecular osteoporosis (spinal T-score of -3.2; femoral neck T-score of -0.6). Thus, she was first diagnosed as having severe osteoporosis with a fragility fracture. Nevertheless, she performed a computed tomography scan of the spine that showed a butterfly vertebra at D11 (Fig. 1), giving the vertebra a wedge morphology, with no evidence of fracture. Although a fragility fracture had been excluded, due to DXA results, she was started on alendronate.



**Figure 1.** Spinal computed tomography scan showing a Butterfly Vertebra at D11.

**Conclusion:** Butterfly vertebra is a rare and benign congenital spinal anomaly caused by a failure of fusion of the two lateral chondrification centers of vertebrae, resulting in a butterfly-like appearance. Fragility fractures are erroneously assumed in 10% of cases<sup>1</sup>. Recognition of this condition is important to avoid misdiagnosis and overtreatment.

**Reference:** 1. Katsuura Y, Kim H J. *Global Spine J* 2019;9:666.

### P132

#### PREOPERATIVE ANEMIA WAS ASSOCIATED WITH ALL-CAUSE MORTALITY IN PATIENTS WITH VERTEBRAL FRACTURE WHO UNDERWENT PERCUTANEOUS VERTEBROPLASTY

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**Objective:** We investigated the association between preoperative anemia and long-term all-cause mortality in patients with vertebral fracture who underwent a vertebroplasty.

**Methods:** We retrospectively selected patients who were admitted for vertebroplasty for vertebral compression fracture between 2013-2020. Patients who had pathologic fractures or had no assessment of BMD were excluded. Relevant information was collected from electronic medical records. Patients' survival status was confirmed at the end of March 2021. Cox-proportional hazard models were conducted to examine the effects of anemia (<12 g/dL vs. ≥12 g/dL) and preoperative hemoglobin levels (as a continuous variable) on all-cause mortality with multivariate adjustments.

**Results:** A total of 167 patients were analyzed (mean age 75.8±9.3 years, male 25.7%).

After a median follow-up duration of 2.1 years, preoperative anemia (hemoglobin <12 g/dL vs. ≥12 g/dL) was independently associated with a higher risk of all-cause mortality (hazard ratio 2.762, 95%CI 1.184 to 6.442, p=0.019). An increase in preoperative hemoglobin was associated with a lower risk of all-cause mortality after multivariate adjustment (hazard ratio 0.775, 95%CI 0.606 to 0.991, p=0.042).

**Conclusion:** Preoperative anemia (<12 g/dL) was independently associated with survival outcome among patients with vertebral compression fractures who underwent vertebroplasty. Our findings highlight anemia as a risk factor of long-term mortality in this elderly surgical population.

### P133

#### THE TIMELINE OF BONE MINERAL DENSITY VALUES AS CLUE FOR PRIMARY HYPERPARATHYROIDISM

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**Objective:** Increased osteoclastic activity and bone resorption in primary hyperparathyroidism (PHPT) leads to decreased BMD. We aim to introduce a patient diagnosed with PHPT with mild hypercalcemia and BMD loss over a 5-year period.

**Methods:** This is a case report. DXA (GE Lunar) was performed, as well as phosphorus-calcium metabolism assays.

**Case report:** This is a 54-year-old female patient admitted for bone status assessment. The patient accused muscular pain in the lower members and unspecific lumbar pain. She has no personal pathological history. Total serum calcium was 10.35 mg/dL (normal:8.4-10.3), phosphorus=3.5 mg/dL (normal:2.5-4.5), 25OHD (25-hydroxyvitamin D)=15.7 ng/mL (normal:30-100) and PTH=76.29 pg/mL (normal:15-65). The bone marker panel shows formation bone marker osteocalcin=28.8 ng/mL (normal:11-43), and resorption bone marker CrossLaps=0.7 ng/mL (normal:0.158-0.442). Cervical ultrasound showed increased hypoechoic, inhomogeneous thyroid, inferior and posterior to right thyroid lobe there is a hypoechoic, inhomogeneous structure of 2.68/0.8/1.1 cm, suggestive for inferior right parathyroid adenoma. Her medical records showed a decrease of DXA-BMD. 5 years ago lumbar L1-L4 BMD=1.18 g/cm<sup>2</sup>, T-score=0SD, Z-score=0.1SD, total hip BMD=0.904 g/cm<sup>2</sup>, T-score=-1SD, Z-score=-0.4SD. Currently, DXA shows L1-L4 BMD=1.026 g/cm<sup>2</sup>, T-score=-2.3SD, Z-score=-1.9SD, total hip BMD=0.919 g/cm<sup>2</sup>, T-score=-0.7SD, Z-score=-0.3SD, 1/3 distal radius BMD=0.799 g/cm<sup>2</sup>, T-score=-1SD, Z-score=-0.6SD. No other complications of PHPT are identified such as kidney stones or fractures. In accordance with the patient's option and guidelines, surgery was postponed. Hydration and vitamin D supplements 1000 UI/d, and weekly alendronate was recommended.

**Conclusion:** In this asymptomatic patients, decision of parathyroidectomy is controversial. BMD decrease over the time may be caused by PHPT or an age-dependent pattern. However, the presence of a secondary cause of bone loss may indicate starting anti-osteoporotic medication.

P134

**MANAGEMENT OF A PELVIC GIANT CELL TUMOR**F. Boughattas<sup>1</sup>, J. Saadana<sup>1</sup>, A. Bader<sup>1</sup>, W. Achour<sup>1</sup>, M. Zaibi<sup>1</sup>, A. Abid<sup>1</sup><sup>1</sup>Orthopedic surgery department CHU Fattouma Bourguiba Monastir, Tunisia

**Objective:** Enlighten the benefit of preoperative use of denosumab. Management of great bone loss in pelvic tumors using 3D printed models.

Giant cell tumors are locally aggressive and rarely malignant or metastasizing bony neoplasms, typically found at the end of long bones extending into the epiphysis and to the joint surface, less frequently they occur in other locations including flat bones and in the innominate bones of the pelvis. Denosumab, a human anti-RANKL monoclonal antibody, has recently been introduced in the management of these lesions. 3D printed models have been of a great help for the surgical team in planning wide tumor resection.

**Case report:** We report the case of a 21-year-old male, who presented a painful swelling of the posterior left side of the pelvis, without any neuro-vascular complication. An X-ray of the pelvis was performed, showing an eccentric osteolytic lesion of posterior upper part of the left ilium wing, exhibiting geographic bone destruction, well-defined with nonsclerotic margins, extended to the sacroiliac joint. Various explorations were carried out, a thoracic-abdominal-pelvic scanner and magnetic resonance imagery of the pelvis showing an osteolytic lesion 9\*8\*7cm of dimensions of the posterior upper part of the left ilium wing extended to the adjacent sacroiliac joint and muscles without metastasis. A pathological examination of the tumefaction highlighted a giant cell tumor. A neoadjuvant therapy of denosumab was carried out with appropriate survey of the biotherapy. After planning the surgery, assisted by a 3D printed model of the pelvis, the tumor was removed using a posterior approach of the sacroiliac joint. Single-axis pedicle screws were inserted in the fourth, fifth lumbar vertebrae and in the ilium bone linked with a stem twisted 90° at the concavity of the bone loss that was filled with the homolateral fibula divided into 2 portions. The postoperative follow-up was with no incident.



**Conclusion:** Giant cell tumor can be difficult to remove, especially when it occurs in uncommon locations that are hard to access. Therefore, a good preoperatively prepay is needed, using 3D printed models, an appropriate biotherapy with denosumab, and a meticulous surgical planning.

P135

**SYNOVIALSARCOMA OF THE MIDFOOT**F. Boughattas<sup>1</sup>, J. Saadana<sup>1</sup>, S. Rebhi<sup>1</sup>, M. Ben Hnia<sup>1</sup>, H. Beji<sup>1</sup>, A. Abid<sup>1</sup><sup>1</sup>Orthopedic surgery Dept. CHU Fattouma Bourguiba Monastir, Tunisia

**Objective:** Report a new case of primary synoviosarcoma contrasting with the primary investigation.

Synoviosarcoma is a rare and aggressive soft tissue tumor representing 8-10% of malignant sarcomas. This tumor mainly sits in the limbs and around the joints. This type of tumor occurs in young adults with a sex ratio of 3, thus preferentially affecting young men. There are three anatomopathological forms: monophasic with spindle cells, biphasic with a double epithelial and spindle cell contingent and finally the undifferentiated form.

**Case report:** We report the case of a 52-year-old male patient, who presented a painful swelling of the left mid foot for about one month. A primary investigation was misled, as the patient reported fever and was from rural origin. An X-ray was performed showing lysis of most of the tarsal bones. Various explorations carried out, in particular scanner and magnetic resonance imagery of the foot. A pathological examination of the tumefaction highlighted a monophasic synoviosarcoma grade III. The decision was a midleg amputation, which was carried out after a comforting assessment of the tumor's extension. The patient then undertook chemotherapy.

**Conclusion:** Synoviosarcoma requires wide resection sometimes leading to amputation of the limb, saving the patient from a tumor with high metastatic potential and whose recurrence is the most common complication. We report a clinical observation of synovial sarcoma of the foot while emphasizing this tumor



with a poor prognosis that must be known to evoke in front of unexplained pain, progressing insidiously, contrasting with a poor clinical examination.

### P136

#### ASSOCIATIONS OF MECHANICAL LOADING FROM PHYSICAL ACTIVITY WITH BONE MINERAL DENSITY, PHYSICAL FUNCTION AND KNEE IMPAIRMENT IN OLDER ADULTS: THE TASMANIAN OLDER ADULT COHORT (TASOAC) STUDY

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**Objective:** Physical activity that induces high mechanical loading may benefit bone, but there are concerns of harm to joints in older adults. This longitudinal study aimed to investigate associations between loading intensities and application rates, estimated from self-reported physical activity, with BMD, physical function, knee pain, knee cartilage defects and bone marrow lesions (BMLs) over 2.7 years.

**Methods:** 943 community-dwelling older adults (mean age 63.0±7.5 years) from the Tasmanian Older Adult Cohort (TASOAC) study were assessed at baseline and 2.7 years later. Self-reported physical activity over the past year was assessed using the Global Physical Activity Questionnaire (GPAQ; estimates metabolic equivalents of task or METs), from which loading scores (product of peak force and application rate) were estimated using previously reported load ratings for different activities. Hip and lumbar spine BMD was measured by DXA scans, dynamometry assessed knee extension strength and WOMAC assessed knee pain, stiffness and dysfunction (higher scores indicate poorer outcomes). MRI measured cartilage defects and BMLs at the medial and lateral tibia and femur. Linear mixed models investigated associations between physical activity scores and outcome measures accounting for repeated measures.

**Results:** Loading scores, but not METs, were significantly positively associated with femoral neck BMD (standardised  $\beta=5.49$  mg/cm<sup>2</sup> [95%CI=0.09, 10.9 mg/cm<sup>2</sup>]) and knee extension strength (5.40 kg [0.13, 0.95 kg]) after adjustment for covariates including sex and BMI. Neither loading scores nor METs were associated with spine BMD, WOMAC scores, knee cartilage defects or BMLs in unadjusted and adjusted models.

**Conclusion:** In community-dwelling older adults, self-reported physical activity of high and rapid impact maintains higher femoral neck BMD and knee extension strength over 2.7 years without apparent deleterious effects on knee joint structure or pain.

### P137

#### AN EVALUATION OF THE IMPLEMENTATION OF THE EUROPEAN CALCIFIED TISSUE SOCIETY RECOMMENDATIONS ON THE PREVENTION AND TREATMENT OF SECONDARY OSTEOPOROSIS TO BARIATRIC SURGERY

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**Objective:** The impact on bone of bariatric surgery is now well known, with significant bone loss, an increase in bone remodeling markers, an alteration in bone microarchitecture and, above all, an increase in fracture risk. The question of assessing fracture risk in this population at-risk is paramount. The objective of this study was to determine the prevalence of patients eligible for anti-osteoporotic treatment according to the recommendations of the European Calcified Tissue Society (ECTS) in a cohort of postmenopausal women and men aged 50 years or more.

**Methods:** This is a retrospective analysis of a prospective cohort of patients seen as part of (i) preoperative evaluation for bariatric surgery or (ii) postoperative follow-up. Data necessary to apply the ECTS recommendations (age, sex, and BMI, history of fragility fracture, comorbidities, osteoporosis risk factors, and DXA) were collected. In postmenopausal women and men older than 50 years, anti-osteoporotic therapy is indicated if any of the following criteria is present: (i) history of recent (within 2 years) fragility fracture after the age of 40 years, (ii) T-score  $\leq -2$  at any of the sites of measurement (lumbar spine, femoral neck, and total hip), (iii) FRAX<sup>®</sup>  $\geq 20\%$  for major osteoporotic fractures and/or  $\geq 3\%$  for hip fractures. The prevalence of osteoporosis, osteopenia, and a T-score  $\leq -2$  for all sites and for each of the 3 sites and the prevalence of patients eligible for treatment according to ECTS recommendations were calculated with their 95% confidence intervals.

**Results:** 170 patients (144 women, mean age 58.5±7.2 years) were included between February 2019 and March 2022 with 96 patients awaiting surgery. Of these 96 patients, 30 had already undergone at least one bariatric procedures in the past. Seventy-four patients were seen for postoperative follow-up (with no new procedure planned). In the whole population, the prevalence of osteoporosis was 5.3% [CI95%: 2.7%-9.9%], osteopenia 40.4% [CI95%: 33.2%-48.0%], and 14.7% [CI95%: 10.1%-20.9%] for a T-score  $\leq -2$ . A history of fragility fracture within 2 years was found in 12 patients with a prevalence of 7.1% [CI95%: 4.0%-12.0%]. The primary fracture site was the ankle/leg (n=5), followed by forearm/wrist (n=3) and the proximal humerus (n=3). Only 2% [95%CI: 0.4%-6.1%] of patients met the eligibility criteria using FRAX. In our cohort, 33 patients with a prevalence of 19.4% [CI95%: 14.1%-26.0%] were finally eligible for anti-osteoporotic treatment according to the ECTS recommendations.

**Conclusion:** In this study, 1/5 of our population was eligible for anti-osteoporotic treatment after application of the ECTS recommendations in postmenopausal women and men  $\geq 50$  years.

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### ROLE OF GROWTH FACTOR CONCENTRATE INTRA-ARTICULAR INJECTION FOR DEGENERATIVE OR OSTEOARTHRITIS ANKLE JOINT DISEASE: A PROSPECTIVE CLINICAL CASE SERIES OF 30 CASES & REVIEW OF LITERATURE

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**Objective:** Degenerative joint disease and osteoarthritis are the most common and disabling of the orthopaedic diseases. Currently, the conservative treatment is limited to symptomatic treatment, whose goal is to improve function and pain control. Osteoarthritis (OA) or degenerative ankle joint disease is comparatively uncommon, as compared with osteoarthritis of the hip and knee, and so the therapeutic options (both conservative and surgical). With surgeries providing poorer and less predictable results for such cases. The effectiveness of growth factor concentrate (GFC) injections for such cases is still controversial, particularly so for ankle joint arthritis, owing to the lack of evidence. The objective of this study was to evaluate the safety and the efficacy of intra-articular injections of intra-articular injection of GFC for degenerative or OA ankle joint disease in patients affected by degenerative or OA ankle joint disease.

**Methods:** A total of 30 symptomatic patients, aged 37-89 years, affected by either degenerative or OA ankle, were treated with 2 dose of 5 ml of autologous GFC intra-articular injection one month apart followed by yearly injection of the same. Clinical evaluations before the treatment and after one, 6, 12, and 24 months were performed. We evaluated the presence of pain using the visual analog scale, function using the Foot and Ankle Disability Index, and subjective satisfaction by Physical Quotient Of Life Index (PQLI) for patients. Adverse events were recorded.

**Results:** No severe complications were noted during the treatment and the follow-up period. Basal follow up evaluation to the patients was done for pre- and post-treatment scores at one, 6, 12, and then yearly up to for 5 years and a statistically significant improvement was noticed with overall improvement of PQLI for patients. We found a strong positive effect for yearly GFC injections on pain ( $p=.0001$ ) and function ( $p=.001$ ), with 90% of patients very satisfied and satisfied, and only 3 patients (10%) required surgery because of early treatment failure.

**Conclusion:** GFC intra articular injection is safe and minimally invasive therapeutic option for patients with degenerative or OA ankle joint disease and good alternative to postpone the need for surgery. We advocate a yearly injection for such cases for gaining the best long-term results and improving PQLI of patients. Further high-quality multicentre studies are needed to confirm findings.

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### PREVALENCE OF SHOULDER PAIN AND ASSOCIATED RISK FACTORS AMONG FARMERS

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**Objective:** Agriculture is a labor-intensive industry in which its types and characteristics in different regions are determined by the climate, soil, and topographical conditions. Work-related injuries and musculoskeletal disorders are common among farmers due to high physical strain and repetitive laborious activities associated with agricultural work. One of the most common complaints related to musculoskeletal disorders is shoulder pain. This study aimed to investigate the prevalence of shoulder pain and analyze the socio-demographics, agricultural work-related conditions, and biomechanical factors associated with shoulder pain among farmers in Jeju.

**Methods:** We used initial survey data from the Safety for Agricultural Injury of Farmer's cohort study of adult farmers in Jeju Island. The presence and characteristics of shoulder pain, socio-demographics, agricultural work-related conditions, and biomechanical factors were assessed using semi-structured questionnaires. A total of 1206 participants were analyzed for prevalence and associated risk factors using frequency analysis and multivariate logistic regression analysis, and a p-value <0.05 was considered statistical significance.

**Results:** The overall prevalence of shoulder pain was 17%. In the multivariate logistic regression analysis, which was adjusted for the significant variables among socio-demographic and agricultural work-related condition variables in the simple logistic regression analysis, stress level (occasional: adjusted odds ratio [aOR], 1.581; 95%CI, 1.079 to 2.318; frequent: aOR, 1.964; 95%CI, 1.205 to 3.200; extreme: aOR, 2.999; 95%CI, 1.480 to 6.074 vs. rarely), type of farming (orchard: aOR, 0.82; 95%CI, 0.597 to 1.124; livestock: aOR, 0.225; 95%CI, 0.079 to 0.641 vs. field), and agricultural damage within one year (yes: aOR, 2.078; 95%CI, 1.269 to 3.405) were significantly related to shoulder pain. Multivariate logistic regression analysis adjusting for a set of covariates (total years of farming, sex, stress level, type of farming, agricultural injury within a year) revealed three biomechanical factors significantly related to shoulder pain: shoveling, pickaxing, hammering; repetitive use of particular body parts; constant elevation of the arm above the head.

**Conclusion:** Some occupational and biomechanical risk factors contribute to shoulder pain. Therefore, postural education, injury prevention, and psychological support will be needed to prevent shoulder pain.

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### BONE TURNOVER SUPPRESSION IN PATIENTS WITH ATYPICAL FEMORAL FRACTURES: A COMPARATIVE STUDY OF EXACT MATCHING WITH OSTEOPOROTIC FEMUR FRACTURES

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**Objective:** To evaluate bone remodeling suppression in the patients with atypical femoral fractures with exact matching comparison to osteoporotic hip fractures.

**Methods:** This retrospective comparative study was conducted from January 2010 to March 2021 in a single institution. Patients who were aged  $\geq 60$  years women underwent operative treatment of atypical femoral fractures (AFFs) and osteoporotic femoral fractures (typical femur fractures, TFFs) with serum bone turnover markers (BTMs) were included. Total 327 patients were enrolled in this study (114 AFF and 213 TFFs). We collected Data including patient demographics, fracture site, past medical history, BMD, medication history of bisphosphonate (BP), and BTM including serum calcium (Ca), phosphorous (P), 25(OH) vitamin-D (Vit. D), parathyroid hormone (PTH), C-telopeptide (CTX), and osteocalcin (OC) level were evaluated. Binary logistic regression was conducted to identify characteristics of AFFs and TFFs. After one-to-one matched-pair samples were obtained by using greedy-matching techniques, comparison analysis with 48 matched-pair samples was performed to evaluate difference of BTM between AFF group and TFF group.

**Results:** The mean age (74.3 vs. 80.8 years,  $P < 0.001$ ) and BMD T-score (-2.68 vs. -3.50,  $P < 0.001$ ) were lower in AFF groups. The mean BMI (23.4 vs. 22.5,  $P = 0.044$ ) was higher in AFF group. The prevalence of diabetes was higher in TFF group (14% vs. 38%,  $P < 0.001$ ) and the prevalence of rheumatoid arthritis was higher in AFF group (11% vs. 5%,  $P = 0.041$ ). The rate of BP use was higher in AFF group (66% vs. 32%,  $P < 0.001$ ). The duration of BP use was longer in AFF group (62.5 vs. 41.4 months,  $P = 0.020$ ). In matched group analysis, AFF group had higher serum 25(OH) vitamin-D (30.5 vs. 18.22 ng/mL,  $P < 0.001$ ), higher Ca level (8.8 vs. 8.3,  $P = 0.009$ ) and lower serum CTX level (0.33 vs. 0.54,  $P = 0.010$ ). There was no difference in the other BTM.

**Conclusion:** The patients with AFF group had higher BMI, higher incidence of rheumatoid arthritis and BP use, and longer use of BP. After adjustment of BP use and its duration, age, BMD and BMI, CTX level was lower in AFF group, which might indicate more suppressed bone remodeling state.

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### LONG DOSING INTERVALS OF ANTIOSTEOPOROSIS MEDICATIONS DECREASE NATIONAL FRACTURE RISK: A NATIONWIDE POPULATION-BASED COHORT STUDY

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**Objective:** We hypothesized that long dosing interval antiosteoporosis medications (AOMs), mainly those delivered parenterally, will guarantee higher adherence and persistence, which could help reduce fracture risk. The aim of this research was to evaluate the relationship between different dosing intervals of AOM and the subsequent fracture risk among patients newly initiated AOM therapies.

**Methods:** It is a nationwide population-based cohort study based on Taiwan's National Health Insurance Research Database. Osteoporosis patients with age  $\geq 50$  who newly initiated AOM during 2008-2018 ( $n = 336,229$ ) were included. We categorized AOMs into short dosing intervals (oral AOMs) or long dosing intervals (parenteral AOMs). The adherence and persistence of treatment by medication possession ratio (MPR) and subsequent fracture after treatment for 3 years were measured.

**Results:** Among patients who initiated parenteral AOMs, the percentage of patients with high adherence ( $MPR \geq 75\%$ ) increased from 33% in 2008 to 69% in 2018. However, among patients who initiated oral AOMs, the percentage of high adherence remained stable (30%) between 2008-2018. The use of parenteral AOMs increased from 1% in 2008 to 62% in 2018. At the same time, the percentage of high adherence of those initiated AOMs significantly increased from 34% in 2008 to 61% in 2018. The risk of subsequent fracture decreased significantly between 2008-2018 after controlling for all potential confounders (hazard ratio=0.85, 95%CI=0.81-0.89).

**Conclusion:** AOMs with long dosing intervals not only increased adherence and persistence but also decreased the subsequent fracture risk at a nationwide scale.

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**LONG TERM DXA FOLLOW-UP ON A PATIENT WITH OSTEOPOROSIS: DECISION OF DRUG HOLIDAY**E. D. Rentea<sup>1</sup>, O. C. Sima<sup>1</sup>, M. Scricciu<sup>2</sup>, C. E. Nistor<sup>3</sup>, E. Petrova<sup>4</sup>, G. Voicu<sup>1</sup>, A. Dumitrascu<sup>1</sup>, A. Ghemigian<sup>4</sup><sup>1</sup>C.I. Parhon National Institute of Endocrinology, Bucharest,<sup>2</sup>Dept. of Prosthodontics, Faculty of Dental Medicine, University of Medicine and Pharmacy of Craiova, Craiova, <sup>3</sup>Carol Davila University of Medicine and Pharmacy & Dr. Carol Davila Emergency Military Hospital, Bucharest, <sup>4</sup>Carol Davila University of Medicine and Pharmacy & C.I. Parhon National Institute of Endocrinology, Bucharest, Romania

**Objective:** Osteoporosis is a chronic condition that might affect the quality of life. Periodic follow-up is required, and rethinking the indication of anti-resorptive agents is needed in patients with low or even medium fracture risk or to whom causes of secondary bone loss are corrected.

**Methods:** This is a case report of a patient with osteoporosis and a decision of drug holiday.

**Case report:** This is a 66-year-old female patient admitted for bone status evaluation. Her personal medical history includes subtotal left thyroidectomy at 38 years for a benign thyroid condition. She had surgical menopausal at age of 35 without hormone replacement therapy. At age of 59, osteoporosis was confirmed. On current admission, the thyroid panel shows normal TSH=1.21  $\mu$ UI/mL(normal:0.5-4.5), and FT4(free levothyroxine)=13.51 pmol/L(normal:9-19) under daily LT4 100  $\mu$ g with normal phosphorus-calcium profile and bone turnover markers and 25-hydroxyvitamin D of 29 ng/mL(normal>30). At the age of 59, initial DXA showed lumbar L1-L4 BMD=0.826 g/cm<sup>2</sup>, T-score=-2.8SD, Z-score=-2.2SD, total hip BMD=0.813 g/cm<sup>2</sup>, T-score=-1.6SD, Z-score=-1.1SD, femoral neck BMD=0.715 g/cm<sup>2</sup>, T-score=-2.2SD, Z-score=-1.7SD. The patient started alendronate 5600 IU/week. 5 years later, DXA showed L1-4 BMD=0.918 g/cm<sup>2</sup>, T-score=-2.2SD, Z-score=-1.7SD, TBS=1.223; total hip BMD=0.893 g/cm<sup>2</sup>, T-score=-0.9SD, Z-score=-0.5SD, femoral neck BMD=0.743 g/cm<sup>2</sup>, T-score=-2.1SD, Z-score=-1.3SD. Due to BMD increase, the patient started drug holiday. Currently, after one year later (no prevalent fragility fracture), DXA shows L1-L4 BMD=0.950 g/cm<sup>2</sup>, T-score=-1.9SD, Z-score=-1.5SD, total hip BMD=0.888 g/cm<sup>2</sup>, T-score=-0.9SD, Z-score=-0.5SD, femoral neck BMD=0.730 g/cm<sup>2</sup>, T-score=-2.2SD, Z-score=-1.4SD. The patient with adequate vitamin D replacements and prolonged the bisphosphonates drug holiday for one year.

**Conclusion:** Osteoporosis is a condition that requires periodical follow-up. Efficacy of treatment with anti-resorptive agents should also be carefully assessed.

P143

**A STUDY OF TREATMENT SATISFACTION IN CHRONIC RHEUMATIC DISEASES**H. J. Choi<sup>1</sup>, M. R. Seo<sup>1</sup>, H. J. Baek<sup>1</sup><sup>1</sup>Gachon University Gil Medical Center, Incheon, South Korea

**Objective:** To evaluate treatment satisfaction in the patients with rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE).

**Methods:** This cross-sectional study was performed from September 2021 through December 2021 using treatment satisfaction questionnaire for medication (TSQM) to the patients with RA and SLE who visited our rheumatology clinic.

**Results:** 215 patients (RA patients n=114, SLE patients n=101) were enrolled. 82.3% were female (73.7% of RA, 92.1% of SLE, p<0.001). The mean of age was 52.8 years (57.8 vs. 47.2, p<0.001), of BMI was 23.4 (22.8 vs. 24.2, p=0.050), of disease duration was 9.1 years (6.8 vs. 11.8, p<0.001), of duration of education was 11.5 years (11.0 vs. 12.0, p=0.010). Mean of DAS28-ESR was 2.0, of DAS28-CRP was 1.8, of SLEDAI was 1.8, and of EQ5D-VAS was 68.6, and level 1 of EQ-5D was most common in both RA and SLE patients. Mean of TSQM summary scores; 1) treatment effectiveness 64.5 (66.5 vs. 62.3, p=0.028), side effects 97.6 (97.9 vs. 97.3, p=0.726), convenience of administration 67.7 (66.9 vs. 68.7, p=0.268), and global satisfaction 65.2 (66.2 vs. 63.9, p=0.307). There were good correlations between TSQM and demographic data in age at symptom onset, duration of education, global assessment of patient or physician, ESR, CRP, DAS28-ESR/CRP, and SLEDAI. The score 80 or more of global satisfaction was defined as 'satisfied'. 80 or more group (n=36, 16.7%) showed longer duration of education, higher income, lower global assessment of patients or physician, and higher EQ5D-VAS (all, p<0.05) compared to 80 or less group. Those significance were more prominent in RA patients, however, SLE patients showed just a trend in the household income per month (p=0.054). Among EQ-5D questionnaires, the level of pain/discomfort and anxiety/depression were significantly difference between 80 or more and less group. Pain and psychological factors rather than mobility, self-care or usual activities could be associated patients' global satisfaction.

**Conclusion:** We found differences of treatment satisfaction in RA and SLE patients. Although most of them were stable disease status, SLE patients showed lower global satisfaction than RA patients. Factors associated with global satisfaction 'satisfied' were duration of education, household income per month, pain/discomfort, or anxiety/depression in this study.

P144

### SELECTED MECHANICAL PROPERTIES OF HUMAN CANCELLOUS BONE SUBJECTED TO DIFFERENT TREATMENTS: SHORT-TERM IMMERSION IN PHYSIOLOGICAL SALINE AND ACETONE TREATMENT WITH SUBSEQUENT IMMERSION IN PHYSIOLOGICAL SALINE

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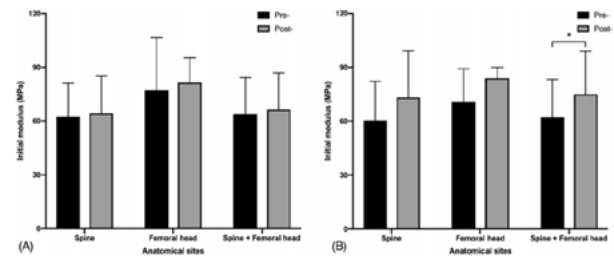
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**Objective:** To investigate the mechanical properties of cancellous bone subjected to short-term immersion in saline and acetone treatment with subsequent immersion in saline.

**Methods:** Cylindrical samples ( $\varnothing 6 \times 12$  mm) were harvested from three positions (left, middle, and right) of 1 thoracic vertebral body, 19 lumbar vertebral bodies, and 5 sacral bones, as well as from 9 femoral heads. All samples were divided into two groups according to the different treatments, (i) samples from the left and middle sides were immersed in saline at 4°C for 43 h (saline-immersed group, n=48); (ii) samples from the respective right side were treated with a combination of acetone and ultrasonic bath (4 h), air-dried at room temperature (21°C, 15 h), and then immersed in saline at room temperature (21°C, 24 h) (acetone and saline-treated group, n=38). All samples were subjected, both before and after treatment, to a non-destructive compression test with a strain of 0.45%, and finally destructive tests with a strain of 50%. Actual density ( $\rho_{act}$ ), initial modulus ( $E_0$ ), maximum stress ( $\sigma_{max}$ ), energy absorption (W), and plateau stress ( $\sigma_p$ ) were calculated as evaluation indicators.

**Results:** Based on visual observation, a combination of acetone and ultrasonic bath for 4 h failed to completely remove bone marrow from cancellous bone samples. The mean values of  $\rho_{act}$ ,  $\sigma_{max}$ , W, and  $\sigma_p$  were significantly higher in the femoral head than in the spine. There was no significant difference in  $E_0$  between non-treated and saline-immersed samples (non-treated  $63.98 \pm 20.23$  vs. saline-immersed  $66.29 \pm 20.61$ ,  $p=0.132$ ). The average  $E_0$  of acetone and saline-treated samples was significantly higher than that of non-treated ones (non-treated  $62.17 \pm 21.08$  vs. acetone and saline-treated  $74.97 \pm 23.98$ ,  $p=0.043$ ).

**Conclusion:** Short-term storage in physiological saline is an appropriate choice and has no effect on the  $E_0$  of cancellous bone. Treatment of cancellous bone with acetone resulted in changes in mechanical properties that could not be reversed by subsequent immersion in physiological saline.



The initial modulus ( $E_0$ , MPa) in different groups before and after treatment: A saline-immersed group, B acetone and saline-treated group (\* $p < 0.05$ )

P145

### ASSESSMENT OF THE EFFICIENCY OF DIFFERENT CHEMICAL TREATMENTS AND ULTRASONIC CLEANING FOR DEFATTING OF CANCELLOUS BONE SAMPLES

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**Objective:** To assess the defatting efficiency of different methods, which are commonly used and easily available in the laboratory in order to find a method that is effective, convenient, safe, and economical.

**Methods:** Cylindrical cancellous bone specimens were obtained from fresh-frozen human cadaver femoral condyles, cut into multiple small specimens ( $\varnothing 8 \times 2$  mm), and assigned to two groups that were treated with either chemical solvent soaking (Solvent group) or ultrasonic cleaning (Ultrasound group). Each group was divided into several subgroups based on different treatments. Digital photographs were taken of each specimen. The difference in material density ( $\Delta\rho_b$ ), apparent density ( $\Delta\rho_{app}$ ), and porosity ( $\Delta P$ ) before and after treatment were used as evaluation indicators.

**Results:** For the solvent group, in  $\Delta\rho_b$ , only the combination of 99% ethanol and detergent solution showed a significant difference before and after treatment ( $P=0.00$ ). There was no significant difference in  $\Delta P$  among acetone, the mixture of 99% ethanol and acetone, and the combination of 99% ethanol and detergent solution ( $P=0.93$ ). For the ultrasound group, the median of all subgroups in  $\Delta\rho_{app}$  and  $\Delta P$  were all lower than the solvent group.

**Conclusion:** The combination of 99% ethanol and detergent solution (v/v=1:20), as well as the mixture of 99% ethanol and acetone (v/v=1:1), seem to be the optimal defatting methods for 2 mm thick cancellous bone slices due to their effectiveness, availability, low-cost and safety. Chemical soaking for 24 h is more effective than ultrasonic cleaning with 99% ethanol or acetone for 20 or 40 min.

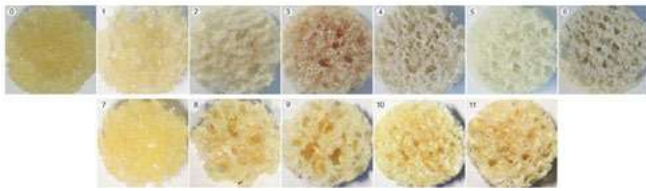


Figure: The appearance of fresh specimens and defatted specimens. The first line from left to right (Solvent group), fresh dried specimen (0), Solv.-saline subgroup (1), Solv.-ethanol subgroup (2), Solv.-acetone subgroup (3), Solv.-mixture subgroup (4), Solv.-detergent subgroup (5), Solv.-gradient subgroup (6). The second line from left to right (Ultrasound group), Ultr.-saline subgroup (7), Ultr.-ethanol subgroup (8), Ultr.-acetone subgroup (9), Ultr.-mixture-20 subgroup (10), Ultr.-mixture-40 subgroup (11). The fresh dried specimen, Solv.-saline subgroup, and Ultr.-saline subgroup were yellow with a lot of fat in the pores, the specimens that defat by chemical solvent soaking for 24 h were white and the pores were relatively clean, the specimens that defat by ultrasonic cleaning (20 min or 40 min) still leave a certain amount of lipids in specimens

P146

ONE- AND FIVE-YEAR SURVIVAL AFTER FRAGILITY FRACTURE: REAL-WORLD RETROSPECTIVE MATCHED-COHORT STUDY IN ONTARIO, CANADA

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**Objective:** To characterize the survival rates among men and women with an index hip, vertebral or proximal or distal non-hip and non-vertebral (NHNV) fragility fracture.

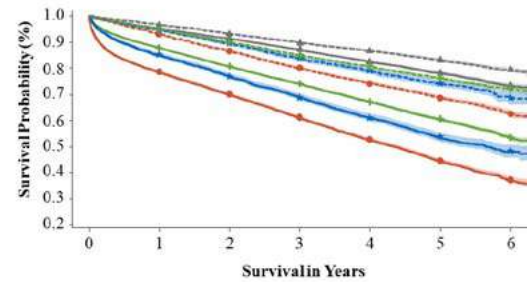
**Methods:** This retrospective, population-based study used public healthcare records in the ICES Data Repository from Ontario, Canada. Men and women aged ≥66 years with an index fragility fracture between January 2011 and March 2015 were matched 1:1 with non-fracture controls based on date, age, sex, geography and comorbidities. Patients were followed between 2 to 6 years post-index date.

**Results:** Of 98 474 fracture patients (73.0% women, median age 80 [IQR 73-87] years), 9.2% of men vs. 35.3% of women received osteoporosis treatment prior to their fracture. The worst 1- and 5-year absolute survival rates were observed after hip fractures in men (67.7% and 32.3%), followed by vertebral fractures in men (75.5% and 37.6%), hip fractures in women (78.5% and 44.7%) and vertebral fractures in women (84.9% and 54.1%). In both sexes, survival probability decreased markedly within 1 year of hip, vertebral and proximal NHNV fractures, with persistent decreases during follow-up across all fracture types relative to matched controls (Figure 1). Within the 66-75 age group, 5-year relative survival rates in women were similar for those with a hip (79.0%) or vertebral (79.8%) fracture, yet distinct for men with a hip (63.9%) vs. vertebral (69.4%) fracture. However, within the 76-85 age group, 5-year relative survival rates in men were similar between those with a hip (51.9%) or vertebral (53.2%) fracture, yet distinct for women with a hip (69.8%) vs. vertebral (77.7%) fracture, with consistent trends in patients aged ≥86 years.

**Conclusion:** In this real-world study, men and women with a fra-

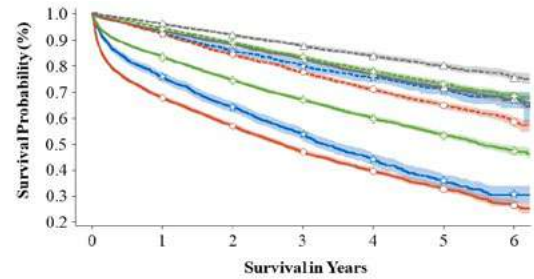
gility fracture had substantially worse 1- and 5-year survival outcomes relative to individuals without a fracture across all fracture types and age groups. Consistent with previous data, hip fracture resulted in the worst survival among men and women. Interestingly, 5-year survival for vertebral fracture was as poor as for hip fracture in younger women (66-75 years) and older men (≥76 years). These data underscore the significance of fragility fractures in both sexes and may inform initiatives to optimize initiation and adherence to fracture prevention strategies.

a) Women



	0	1	2	3	4	5	6
Case - Hip	19 229	15 110	13 448	11 885	10 600	9 222	7 396
Control - Hip	19 229	17 904	16 643	15 085	13 706	12 311	10 854
Case - Vertebral	4 575	3887	3527	3187	2850	2522	2206
Control - Vertebral	4 575	4331	4089	3895	3732	3582	3448
Case - Proximal NHNV	23 636	20 755	19 057	17 100	15 382	13 825	12 311
Control - Proximal NHNV	23 636	22 411	21 252	19 626	18 139	16 706	15 311
Case - Distal NHNV	24 485	23 334	22 387	21 593	20 932	20 311	19 729
Control - Distal NHNV	24 485	23 659	22 829	22 139	21 511	20 929	20 348

b) Men



	0	1	2	3	4	5	6
Case - Hip	7734	5338	4415	3734	3116	2603	2144
Control - Hip	7734	7135	6507	5887	5270	4653	4036
Case - Vertebral	2020	1528	1299	1091	935	792	650
Control - Vertebral	2020	1866	1729	1598	1474	1356	1238
Case - Proximal NHNV	10 577	8828	7585	6338	5186	4036	2999
Control - Proximal NHNV	10 577	9977	9412	8631	7932	7262	6603
Case - Distal NHNV	6218	5814	5487	5189	4933	4686	4439
Control - Distal NHNV	6218	5979	5710	5495	5286	5079	4872

NHNV: Non-hip and non-vertebral. Patients were censored starting at year 2 if they were alive at the end of the observational period. A patient was considered censored at the end of the study period (March 31, 2017). Shaded regions represent upper and lower confidence intervals.

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ASSOCIATION BETWEEN TRAJECTORY OF METABOLIC SYNDROME AND KNEE PAIN OVER 11 YEARS IN MIDDLE-AGED ADULTS

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**Objective:** Metabolic syndrome (MetS) is characterised by the clustering of central obesity with metabolic abnormalities. MetS has been suggested as having a role in osteoarthritis (OA) pathogenesis. To describe the association of MetS and trajectories of MetS over 10-13 years with knee symptoms in general population-based middle-aged adults.

**Methods:** Fasting blood biochemistry, waist circumference

and blood pressure measures were collected during the Childhood Determinants of Adult Health (CDAH)-1 study (year:2004-6;n=2447;mean age:31.48±2.60) and at 10-13 year follow-up at CDAH-3 (year:2014-2019;n=1549;mean age:44±2.90). Participants were defined as having MetS as per International Diabetes Federation (IDF) definition. Participants were grouped in four MetS trajectories—'No MetS': no MetS at either life stage; 'Improved MetS': MetS only at young adulthood (CDAH-1); 'Incident MetS': MetS only at mid-adulthood (CDAH-3); and 'Persistent MetS': MetS at both life stages. Knee symptoms were assessed using the WOMAC scale at the CDAH-3. Univariable and multivariable (age, sex, and BMI adjusted) zero-inflated Poisson regression models were used for analysis.

**Results:** The prevalence of MetS increased from 8% at young adulthood (female:52.06%) to 13% in mid-adulthood (female:53.78%). Presence of MetS at mid-adulthood was associated with knee symptoms at mid-adulthood [ratio of means (RoM): 1.33; 95%CI:1.27, 1.39]. Four MetS trajectories were identified—'No MetS' (85.01%); 'Improved MetS' (2.14%), 'Incident MetS' (8.81%), and 'Persistent MetS' (4.04%). Compared to 'No MetS' 'Persistent MetS' [RoM:1.15; 95%CI:1.06,1.25], 'Incident MetS' [RoM:1.56; 95%CI:1.48,1.65], and 'Improved MetS' [RoM:1.22; 95%CI:1.05,1.41] was associated with higher knee symptoms. Notably, 'Incident MetS' was most strongly associated with knee symptoms [RoM:1.56; 95%CI: 1.48,1.65] and pain [RoM:1.52; 95%CI:1.37,1.70] at follow-up.

**Conclusion:** In middle-aged adults, there was an independent positive association between MetS and knee symptoms. Relative to those without MetS at either life stage, the elevation in mean knee pain scores was more pronounced for those who developed MetS after young adulthood than those who had MetS in young adulthood.

## P148 EFFECT OF ROMOSOZUMAB ON BONE MICROARCHITECTURE AS ASSESSED BY TISSUE THICKNESS-ADJUSTED TRABECULAR BONE SCORE IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS: RESULTS FROM THE ARCH STUDY

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**Objective:** Trabecular bone score (TBS) is an indirect measure of bone microarchitecture independent of BMD. In the ARCH study, 1 year of romosozumab (ROMO) followed by alendronate (ALN) significantly improved bone mass and strength with superior fracture risk reduction vs. ALN alone. Here, we explored the effect of ROMO→ALN vs. ALN alone on bone microarchitecture using an

updated tissue thickness-adjusted TBS algorithm (TBS<sub>TT</sub>).

**Methods:** In ARCH, postmenopausal women with osteoporosis and prior fracture were randomized 1:1 to ROMO 210 mg SC QM or ALN 70 mg PO QW for 12 months, followed by ALN 70 mg PO QW for 24 months. BMD and TBS<sub>TT</sub> were assessed on lumbar spine (LS) DXA scans at baseline and Months (M) 12, 24, and 36 in a subgroup of patients randomly selected for this analysis (ROMO→ALN=190; ALN→ALN=188).

**Results:** Baseline characteristics were similar between groups. At M12, significantly greater gains in TBS<sub>TT</sub> were observed with ROMO (5.1%) vs. ALN (1.5%). Greater gains with ROMO were maintained after transition to ALN vs. ALN alone and persisted at M24 (4.8% vs. 1.9%) and M36 (4.8% vs. 2.5%). In the ROMO→ALN group, the percentage of patients with normal microarchitecture (TBS<sub>TT</sub>>1.074) increased from 28.9% at baseline to 45.4% at M36 and the percentage of patients with degraded microarchitecture (TBS<sub>TT</sub>≤1.027) decreased from 52.6% to 33.5% (P<0.001). A similar trend was observed in the ALN→ALN group from baseline to M36 (normal, 26.1% to 32.4%; degraded, 60.6% to 47.9%; P=0.002). TBS<sub>TT</sub> percent changes were largely unrelated to LS BMD percent changes from baseline to M36 (r<sup>2</sup>=0.058 in ROMO→ALN; r<sup>2</sup>=0.057 in ALN→ALN).

**Conclusion:** In postmenopausal women with osteoporosis and a fragility fracture, 12 months of ROMO followed by 24 months of ALN significantly improved bone microarchitecture, as measured by TBS<sub>TT</sub> independent of BMD, and to a greater extent vs. 36 months of ALN alone.

**Acknowledgments:** Funding from Amgen Inc., UCB Pharma, and Astellas Pharma Inc.

**Disclosures:** MR McClung received honorarium and consulting fees from Amgen. BZ Leder received consulting fees from Amgen and Radius. DL Kendler received consulting fees from Amgen, BioSynt, and Paladin; honorarium from Amgen; and grants/research support from Radius. J Timoshanko is an employee and stockholder of UCB. D Betah, M Oates, and Z Wang are employees and stockholders of Amgen

## P149 HIP CROSS-SECTIONAL AREA PREDICTS THE 10-YEAR RISK FOR HIP FRACTURE IN POSTMENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS INDEPENDENTLY OF FEMORAL NECK BONE MINERAL DENSITY AND DISEASE-ASSOCIATED PARAMETERS

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**Objective:** Hip structural analysis (HSA) predicts hip fracture risk in rheumatoid arthritis (RA), with cross-sectional area (CSA) being the strongest predictor (Ark et al, 2021). Our study aimed to measure HSA parameters in a Greek cohort of RA patients and

evaluate their predictive value for hip fracture.

**Methods:** A case-control study including 97 postmenopausal women with RA under treatment and 52 controls. Both arms underwent bone densitometry and HSA using DXA (Lunar Prodigy). Serum samples were analyzed for bone metabolism parameters and inflammatory markers. In the RA arm, disease activity and functionality were evaluated using the DAS-28 (ESR) score and the HAQ-DI score respectively. The 10-year hip fracture risk was calculated with FRAX<sup>®</sup> score and a value  $\geq 2.5\%$  signified an increased risk. Statistical significance was set at  $p < 0.05$ .

**Results:** The two arms were comparable in terms of demographic data. In the RA arm, 45% had seropositive disease, 64% were administered biological therapies and 52% low-dose corticosteroids. The mean DAS-28 (ESR) and the mean HAQ-DI were  $3.7 \pm 1.7$  and  $0.8 \pm 0.6$  respectively. The two arms did not differ in HSA parameters, in bone metabolism values and in the prevalence of osteoporosis and hip fracture. CSA significantly correlated with increased hip fracture risk only in the RA arm ( $-0.327$ ,  $p = 0.005$  vs.  $-0.260$ ,  $p = 0.069$ ). This relationship remained significant when corrected for femoral neck BMD (BMD FN), for disease parameters and for administered therapies. The patients' age was the single covariate influencing the above relationship. CSA values  $< 114 \text{ mm}^2$  predicted 10-year risk for hip fracture  $\geq 2.5\%$  with a sensitivity of 83% and specificity of 49% (AUC 0.671,  $p = 0.030$ , 95%CI: 0.537-0.806).

**Conclusion:** In a Greek cohort of postmenopausal women with RA, CSA was the single HSA parameter to adequately predict increased 10-year risk for hip fracture, independently of femoral neck BMD, disease activity and administered therapies.

**Reference:** Ark R, Bukhari M. *Annals Rheum Dis* 2021;80:488.

## P150

### TRABECULAR BONE SCORE CAN BE USED TO PREDICT VERTEBRAL FRACTURES IN POSTMENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS AND IS INDEPENDENT OF DISEASE-ASSOCIATED CHARACTERISTICS OR ADMINISTERED THERAPIES

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**Objective:** Rheumatoid arthritis (RA) is associated with decreased trabecular bone score (TBS) and biological therapies hardly reverse these changes (Toussiro, 2017). Our study aimed to measure TBS in a Greek cohort of RA patients and associate it with disease parameters.

**Methods:** A cross-sectional study including 97 postmenopausal women with RA under treatment. Patients underwent bone densitometry using DXA (Lunar Prodigy). Serum samples were analysed for bone metabolism parameters and inflammatory markers. Disease activity and functionality were evaluated using the

DAS-28 (ESR) score and the HAQ-DI score respectively. Statistical significance was set at  $p < 0.05$ .

**Results:** The mean age was  $66 \pm 10$  years and the mean disease duration was  $7 \pm 3$  years. 46% of the patients had seropositive disease, 64% were administered biological therapies (bDMARDs) and 52% received low-dose corticosteroids (prednisone equivalent  $< 7.5 \text{ mg/d}$ ). The mean DAS-28 (ESR) and the mean HAQ-DI were  $3.7 \pm 1.7$  and  $0.8 \pm 0.6$  respectively. 33% received anti-osteoporotic treatments, 38% had suffered at least one major osteoporotic fracture and 8% had a history of vertebral fracture. Mean TBS was  $1.286 \pm 0.129$  and it was independent of seropositivity ( $p = 0.44$ ), disease duration ( $p = 0.82$ ), disease activity ( $p = 0.87$ ), functionality scores ( $p = 0.10$ ) and current corticosteroid therapy ( $p = 0.92$ ). Therapy with bDMARDs did not result to increased TBS values ( $1.294 \pm 0.116$  vs.  $1.272 \pm 0.146$ ,  $p = 0.47$ ). TBS was associated with a history of vertebral fractures ( $p = 0.01$ ) and TBS values  $< 1.332$  correlated with existent vertebral fractures with a sensitivity of 83% and a specificity of 74% (AUC 0.767,  $p = 0.03$ , 95%CI: 0.618-0.915).

**Conclusion:** In a Greek cohort of postmenopausal women with RA under treatment, TBS was independent of disease parameters, disease activity, patient functionality and administered therapies. On the contrary, TBS was associated with vertebral fractures and could be used to predict their occurrence.

**Reference:** Toussiro E et al. *Annals Rheum Dis* 2013;72:A1008.

## P151

### OSTEOMYELITIS OF THE SUPERIOR PUBIC RAMUS

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**Objective:** Enlighten uncommon osteomyelitis localisation. Multi-disciplinary management of this rare and elusive diagnosis.

Osteomyelitis of the pubic bone is unusual, representing 2% of all haematogenous osteomyelitis. The diagnosis is often overlooked, as it may present as osteitis pubis, fracture, or noninfectious inflammation of the pubic symphysis.

**Case report:** We report the case of a 19-year-old male, who presented ten days of severe pelvic pain. At first, he reported a spontaneous pelvic pressure without any symptoms like fever or chills. Then he had a progressively worsening pain in his left hip and groin. Three days prior to presentation, he consulted our emergency department, but he was discharged with pain killers. He reconsulted the emergency department the day after with worsening pain, he had tachycardia and a temperature of  $39^\circ$ , unable to weight bear on the left lower limb, and then had a pain that radiated into his left buttock. Inflammatory markers were raised with WCC 23.3 and a raised CRP of 172. The laboratory abnormalities caused the treating physicians to order a MRI of the pelvis, which was consistent with osteomyelitis pubis, with an endopelvic spread. The patient was taken to the operating room where a wedge resection was performed and tissue cultures grew *Staphylococcus aureus*, confirming the diagnosis of osteomyelitis pubis



and the collection extending into the adductor compartment. He was treated with intravenous antibiotic for 3 weeks, later receiving a further three weeks of oral antibiotic at the time of discharge from the hospital. A 3 months' follow-up showed a painless patient with settled inflammatory markers, and a CT scan showed resolution of the osteomyelitis.



**Conclusion:** Osteomyelitis of the pubic bone is a rare but serious life-threatening condition that should be added to the emergency physician's differential diagnosis for acute onset pelvic pain of unclear etiology, and Early diagnosis with either MRI or CT scan is indicated. Despite the complicated workup and treatment of this disease, the emergency physician can make a significant difference in the timely diagnosis and early treatment in these patients. Treatment includes debridement and long-term antibiotics.

## P152

### CALCIUM INTAKE DEFICIT: A REALITY WE MUST FACE

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**Objective:** Evaluate calcium intake in a randomized population of Medellin, Colombia.

**Methods:** Observational, descriptive study of a transverse cohort with a prospective data collection. The sample was obtained by convenience, from volunteers over 18 years of age in Medellin and its metropolitan area. The calcium intake questionnaire of the International Osteoporosis Foundation was completed between June and November 2022. We stratified by gender, age and socioeconomic level. In those who received calcium or vitamin D

supplements we evaluated the indication.

**Results:** 452 volunteers participated. 356 were women (78.7%) with a median age of 47.3 years (interquartile range IQR 34-61) and 42.3 years (IQR 31-50.2) for men. Mean calcium intake was 835 mg/d (IQR 586-982 mg/d); 812.9 mg/d (IQR 567-975 mg/d) for women, being 794.7 mg/d, 816.5 mg/d and 817.2 mg/d for women in the range of 18-30, 31-50 and older than 50 years. In men the average consumption was 918.3 mg/d (IQR 717.5-1017 mg/d), being 972.6 mg/d, 911.9 mg/d and 880.6 mg/d in the range of 18-30, 31-50 and older than 50 years. Adequate calcium intake for age was documented in 21% of the volunteers, with an average intake of 1363 mg/d (IQR 1123-1458 mg/d), of which 45.3% had calcium supplementation. Of the 78.9% of the volunteers who didn't have adequate intake, the average consumption was 694 mg/d (IQR 520-879 mg/d). Of these, 10.9% had calcium supplementation. The median calcium intake in lower socioeconomic level was 657 mg/d (IQR 336-915 mg/d) for women and 650 mg/d (IQR 452-734 mg/d) for men, 656.8 mg/d (IQR 499-717 mg/d) and 742 mg/d (IQR 596-771 mg/d) in middle socioeconomic level and 1008.1 mg/d (IQR 837-1117 mg/d) and 1040.9 mg/d (IQR 878-1123 mg/d) in highest socioeconomic level. In patients who were taking supplements, the main indication was prevention: 56% in women and 73% in men for calcium and 70% for women and 77% for men for vitamin D.

**Conclusion:** The calcium intake in Medellin, Colombia is 835 mg/d, it is below the recommended requirements. The calcium intake deficit is a reality we must face. Although the levels are higher than previous studies in other populations in Colombia, it is still below the objectives.

## P153

### PREVALENCE AND IMPACT OF NEUROPATHIC PAIN AMONG DENTISTS

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**Objective:** Neuropathic pain is a major problem for patients who suffer from it. They are often the cause of sleep disturbances, irritability, anxiety and a reduction in daily activities. Certain professions are often at risk, particularly those requiring prolonged vicious positions. The objective of this study is to characterize the prevalence and impact of neuropathic pain in dentists.

**Methods:** A 29-item questionnaire was set up targeting dentists practicing in the private or public sector in Tunisia. This survey assessed certain socio-demographic characteristics of the patients as well as the prevalence of neuropathic pain evaluated by the DN4 score (neuropathic pain, 4 questions). It was inspired by the Nordic questionnaire on musculoskeletal health of workers (1) and included only blocks A and C of part 1 and part 2. Recruitment of participants was done online using the Google Forms application.

**Results:** 168 dentists (sex ratio=0.46), mean age 37.97 years [20-67], responded to the questionnaire. 72% were in private practice.

The average length of practice was 11.67 years [1-40]. The average number of hours worked per day was 6.26 [1-12]. 47 patients (28%) had a work stoppage in the last 12 months due to musculoskeletal pain affecting the neck, shoulders, elbows, wrists/hands, upper back, lower back, hips/thighs, knees and ankles.

48 dentists (28.6%) had a DN4 $\geq$ 4 score suggesting the presence of a neuropathic component to the pain. These neuropathic pains were cervico-brachial neuralgia in 72% of cases, sciatica in 42.4% of cases and Arnold's neuralgia in 12.8% of cases. There was no significant relationship between work stoppage and the location of neuropathic pain,  $p=0.384$ .

The average length of practice was 14.67 years for dentists with aDN4 $\geq$ 4 score vs. 10.48 years for those with aDN4 $\leq$ 4 score. This difference was statistically significant,  $p=0.014$ .

There was no significant difference between the two groups (G1: scoreDN4 $\geq$ 4 and G2: score DN4 $\leq$ 4) regarding the average hours of work done per day with  $n=6.23$  h and  $n=6.27$  h, respectively for G1 and G2,  $p=0.911$ .

**Conclusion:** The presence of neuropathic pain is frequent among dentists and seems to be related to the average duration of exercise.

**Reference:** 1. Kuorinka I et al. Appl Ergon 1987;18:233.

## P154

### MUSCULOSKELETAL MANIFESTATIONS IN DENTISTS

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**Objective:** Musculoskeletal disorders in relation to certain professions are attracting more and more attention. Dentists may be particularly concerned, due to the nature of their practice.

However, these disorders, although sometimes serious, are not considered as occupational diseases. The objective of this study is to characterize the various musculoskeletal disorders suffered by dentists and their possible impact on professional and private life.

**Methods:** A questionnaire of 29 items was set up targeting dentists practicing in the private or public sector in Tunisia. This survey assessed certain socio-demographic characteristics of patients and was inspired by the Nordic questionnaire on musculoskeletal health of workers (1). However, for practical reasons, only blocks A and C of part 1 and part 2 were included. The triggers of the disorders and the prevention methods were reported. The questionnaire was conducted online using the Google Forms application.

**Results:** 168 dentists (68.5% female) responded to the questionnaire. The average age was 37.97 years [20-67]. 72% were in private practice. The average years of practice were 11.67 years [1-40]. The average number of hours worked per day was 6.26 [1-12]. On the Nordic questionnaire, neck pain was most frequently reported ( $n=130$ ) followed by lower back ( $n=125$ ), shoulders ( $n=116$ ), wrists/hands ( $n=104$ ), upper back ( $n=103$ ), hips/thighs ( $n=57$ ), knees ( $n=52$ ), elbows ( $n=42$ ) and ankles ( $n=40$ ). Pain in

the lower back, neck, shoulders, wrists/hands, upper back, elbows, knees, hips/thighs, and ankles prevented  $n=54$ ,  $n=53$ ,  $n=46$ ,  $n=39$ ,  $n=24$ ,  $n=15$ ,  $n=14$ ,  $n=9$ ,  $n=9$  dentists in the past 12 months from performing their usual work, respectively, and 28% had been on sick leave in the past 12 months because of this pain. 86 respondents stated that they had consulted a physician during the last 12 months for this pain and had been diagnosed with lumbosciatica ( $n=36$ ), cervico-brachial neuralgia ( $n=29$ ), shoulder tendinopathy ( $n=29$ ) de Quervain's tendinitis ( $n=14$ ), knee osteoarthritis ( $n=14$ ), carpal tunnel syndrome ( $n=12$ ), osteoarthritis of the thumb ( $n=7$ ), lateral epicondylitis of the elbow ( $n=5$ ), spinal scoliosis ( $n=2$ ), thoracic outlet syndrome ( $n=2$ ), spondyloarthritis ( $n=2$ ), psoriatic arthritis ( $n=2$ ). The position of the head during the procedure, the position of the arm during the procedure, the duration of the consultation, defective dental equipment (e.g. lack of elevation of the examination table) and the use of vibrating instruments were considered as factors triggering the pain by 89.9%, 66.5%, 65.2%, 34.2% and 13.3% of the dentists respectively. As a prevention method, 47% practiced stretching and posture correction exercises and only 12.5% used dental loupes. Finally, 78.7% ( $n=133$ ) considered this pain to be a burden that negatively affects the quality of their work and 88.8% ( $n=150$ ) considered it to be a burden that negatively affects their private life.

**Conclusion:** Musculoskeletal disorders are diverse and frequent among dentists. They represent a burden that has a negative impact on the quality of work and the quality of life of the physician. For this reason, it would be wise to look further into this area and to take certain preventive measures.

**Reference:** 1. Kuorinka I et al. Appl Ergon 1987;18:233.

## P155

### ESTABLISHING THE PREVALENCE OF OSTEOMALACIA IN ARAB ADOLESCENTS USING BIOCHEMICAL MARKERS OF BONE HEALTH

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**Objective:** Nutritional-acquired osteomalacia is a bone mineralization disorder associated with dietary calcium and/or solar vitamin D deficiency, risk factors considered common in the Middle Eastern region. Establishing less invasive, cheap and widely available diagnostic markers for this underdiagnosed entity is essential, in particular for screening in high risk groups. This study was designed to assess the prevalence of biochemical osteomalacia in Saudi adolescents.

**Methods:** In this cross-sectional study performed between September 2019 and March 2021, Saudi adolescents aged 12-17

years from 60 different secondary and preparatory year schools in Riyadh, Saudi Arabia were included. Anthropometrics and fasting blood samples were collected. Biochemical osteomalacia was defined as a combination of any two of the following three serum markers of hypomineralization namely; low 25 hydroxyvitamin D (25OHD <30 nmol/l); high alkaline phosphatase (ALP, above age- and sex specific adjusted reference ranges) and low Ca and/or Pi. **Results:** A total of 2938 Saudi adolescents [1697 girls; mean age (years) 14.8±1.8; 1241 boys; mean age 15.1±1.6 years] participated. Vitamin D deficiency was noted in 56.2% (n=953) of girls and 27.1% (n=336) of boys (p<0.001). The overall prevalence of biochemical osteomalacia was 10.0% (n=295/2938) and higher in girls than boys (14.7% vs. 3.6%, OR=4.6, 95%CI 3.3-6.4, p<0.001). The prevalence of low Ca and/or Pi was also higher in girls than in boys (24.2% vs. 12.5% respectively, p<0.001), as well as elevated ALP (5.1% vs. 1.5%, p<0.001). Overall, girls were almost 5 times more likely to have biochemical osteomalacia than boys.

**Conclusion:** Screening of otherwise healthy Saudi adolescents revealed a high prevalence of hypomineralization markers suggestive of biochemical osteomalacia, with girls being significantly more affected than boys. The proposed combination of typically altered mineralization markers for the diagnosis of osteomalacia is at best suggestive of this diagnosis until further comparisons with established diagnostic tools (histological analysis of bone biopsies) are conducted.

## P156

### ASSOCIATION OF DIETARY INTAKES OF CALCIUM/PHOSPHOROUS WITH BIOCHEMICAL OSTEOMALACIA AND ITS INDIVIDUAL RISK COMPONENTS

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**Objective:** Our previous study revealed a high prevalence of abnormal mineralization markers namely low 25 hydroxyvitamin D (43.9%); high serum alkaline phosphatase (3.6%) and low calcium and/or inorganic phosphate (19.2%) suggestive of biochemical signs of osteomalacia (OM, defined as any two of these risk factors). OM was more prevalent in girls (14.7%) compared to boys (3.6%). In this follow-up study, we aimed to evaluate if biochemical OM was associated with low intakes of calcium and phosphorous.

**Methods:** Saudi adolescents (N=2938, 57.8% girls), aged 12-17 years from 60 different secondary and preparatory year schools in Riyadh, Saudi Arabia were included in this study. A dietary recall for daily intakes of nutrients/minerals using a validated computerized food database "ESHA—the Food Processor Nutrition Anal-

ysis program" was collected. Compliance to reference daily intake (RDI) was calculated. Fasting blood samples were collected and circulating levels of 25 hydroxyvitamin D, alkaline phosphatase, calcium and phosphate were analyzed.

**Results:** A total of 1703 Saudi adolescents (991 girls, 712 boys) provided the dietary recall data. Most of the participants failed to achieve the RDI of 1000 mg/d and 10 ug/d of dietary calcium and vitamin D respectively. The average daily dietary calcium intake was strikingly low and significantly lower in girls compared to boys (median levels of 294.3 and 345.5 mg/d respectively, p<0.001). In contrast, boys reported lower dietary intakes of phosphorous compared to girls (p<0.01). Interestingly, no significant correlation in status of biochemical OM or its individual risk factors with dietary calcium intake was found, irrespective of sex. However, circulating 25 hydroxyvitamin D and alkaline phosphatase levels correlated negatively with daily dietary intakes of phosphorous in girls (r=-0.18, p<0.001) and boys (r=-0.14, p<0.05) respectively.

**Conclusion:** This study suggests a need for vitamin D fortification and increased dietary calcium in the diet of Saudi adolescents. The results also show that all adolescents exceeded the RDI for dietary phosphorous but none met the RDI for dietary calcium and vitamin D, and none had sufficient 25 hydroxyvitamin D levels (>50 nmol/L). We speculate that the high phosphate diet may somehow compensate for the insufficient supply with calcium and vitamin D. This insufficient supply would otherwise have caused a much higher prevalence of biochemical OM than the 10% we observed.

## P157

### ACCELEROMETRY-BASED ASSESSMENT OF BALANCE ALTERATIONS IN PATIENTS WITH PRIMARY FIBROMYALGIA: A PILOT CROSS-SECTIONAL STUDY

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**Objective:** To test the ability of an accelerometry-based method for detecting balance alterations in patients suffering from fibromyalgia syndrome (FMS).

**Methods:** The 23 non-treated primary fibromyalgia patients (3 ♂, 21 ♀, 48.8±7.75 y) and 24 healthy age and gender-matched subjects were recruited. All participants were wearing 4 tri-axial accelerometers: over the L4-L5 junction (LAW), right anterior superior iliac spine (RAW), and two over the lateral malleolus of both feet (RLA, LLA). Patients' balance characteristics were assessed using Modified Romberg Test (4 tasks), Modified Berg Balance Scale (14 tasks), Modified Time Up and Go test (TUG), and Modified five times sit to stand test (STS-5). Raw data was sent through the Wi-Fi connection from accelerometers to the tablet and then to the central server for further analysis. The feature which was used for discrimination during signal processing was power - amount of energy transferred or converted per unit time.

**Results:** Baseline characteristics regarding medical history and

concomitant treatment are shown in Table 1. The fact that 12/23 (52,2%) of the patients had reduced BMD is noteworthy. The task within modified Romberg test (eyes closed with mental task), tasks within the Berg balance scale (standing in tandem stance, standing on one leg, 360° turn), and "Sit to Stand" test showed the best discriminative ability to separate "controls" from "patients".

MEDICAL HISTORY	Pts (23)	%	Concomitant treatment	Pts (23)	%
Cervicobrachial syndrome	9	39,1	NSAIDs	15	65,2
Lumbosacral disease	7	30,4	Proton-pump inhibitors	8	34,8
Spondylosis	6	26,1	Biphosphonates	6	26,1
Gonarthrosis	4	17,4	Vitamin D formulations	10	43,5
Osteoporosis	7	30,4	ACE inhibitors	2	8,7
Osteopenia	5	21,7	Diuretics	2	8,7
Menopause	7	30,4	Beta blockers	2	8,7
Arterial hypertension	5	21,7	Calcium channel blockers	1	4,3
Arrhythmia (Tachycardia)	4	17,4	Paracetamol	3	13,0
Only FMS reported	8	34,8	Glucosamine	3	13,0

Table 1. Medical history and concomitant therapy

**Conclusion:** Wearable sensors and the accelerometry method may be used to investigate new therapies and rehabilitation protocols for balance improvement in the hope of reducing the frequency of falls because a significant portion of the patients had reduced BMD. Further research should be aimed at finding the subgroup of FMS patients who already have balance impairment and in whom the use of FMS-related therapy would be contraindicated.

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## P158

### TOTAL SCORE OF ATHLETICISM: PROFILING STRENGTH AND POWER CHARACTERISTICS IN PROFESSIONAL SOCCER PLAYERS FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION TO ASSESS RETURN TO SPORT READINESS

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**Objective:** There is no consensus on the optimal testing procedure

to determine return to sport (RTS) readiness. Current approaches use limb symmetry across a range of tests, but this does not consider an individual's level of athleticism or benchmarking relative to their non-injured counterparts. We aimed to examine the utility of the total score of athleticism (TSA), a composite score including strength, power and reactive strength assessments to aid RTS decision making.

**Methods:** 95 professional soccer players (60 with ACL reconstruction [23.4±4.8 years] assessed prior to RTS and 35 who were uninjured [23.8±2.8 years]) completed a test battery including isokinetic knee extension and flexion torque, bilateral and unilateral countermovement jump height, relative peak power and reactive strength index modified. The TSA (derived from z – scores) was calculated and we: 1) examined differences between ACL reconstructed players and uninjured controls at the time of RTS; 2) assessed the predictive ability of the TSA to identify players status (ACL reconstruction vs. uninjured control); and 3) included a case series to discuss the characteristics of individuals who sustained a subsequent injury within 4 months following their RTS.

**Results:** A large difference between ACL reconstructed and uninjured players in TSA score (d=0.84) was evident. For every additional increase of one unit in the TSA, the odds of belonging to the ACL reconstructed group decreased by 74% (95%CI 0.19, 0.56). Frequency of re-injured players was higher in the "low" (4/7) compared to the "medium" (2/7) and "high" (1/7) TSA tertiles.

**Conclusion:** Preliminary evidence indicates the TSA may be a useful RTS readiness tool as the composite score derived from strength and power measures was different in soccer players at the time of RTS following ACL reconstruction compared to healthy matched controls. There was also a higher frequency of low TSA scores in players who sustained a second injury following RTS.

## P159

### RISK FACTORS FOR THE LONG-TERM DEVELOPMENT AND PROGRESSION OF KNEE OSTEOARTHRITIS IN AN ELDERLY POPULATION: THE ROLE OF NONSURGICAL INJURY

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**Objective:** In the elderly, uncertainties remain on impact of injury chronology and role of repeat injury, as well as etiopathogenic factors leading to the incidence/progression of osteoarthritis (OA) and the need for knee arthroplasty (KA). This study explores, in an elderly population, how nonsurgical knee injury relates to incidence/progression of OA and weight of independent risk factors for KA.

**Methods:** We used knees from the Osteoarthritis Initiative cohort with no prior injury (n=6,358) and with at least one injury (n=819) ≤20 years before enrollment. Sociodemographic, clinical, and structural (X-ray, MRI) data at study inclusion and changes within

96 months were analyzed. Statistics included a mixed model for repeated measurements, generalized estimating equations, and multivariable Cox regression with covariates.

**Results:** At enrollment, knees with prior injury demonstrated greater incidence and severity of OA, including increased WOMAC and structural alterations comprising Kellgren-Lawrence, medial meniscal extrusion, and joint space width (JSW) ( $p \leq 0.002$ ). At 96 months, there was a greater increase in WOMAC, JSW loss, medial cartilage volume loss (CVL) and bone marrow lesion (BML) size ( $p \leq 0.049$ ). Knees with/without injury at enrollment but with new ones over time had a pronounced increase in WOMAC, JSW loss, lateral (without) and medial CVL (with/without), lateral (without) and medial meniscal extrusion (with/without), and medial BML (without) ( $p \leq 0.030$ ). Levels of lateral and medial meniscal extrusion (with/without), WOMAC and JSW loss (with) ( $p \leq 0.020$ ) were all increased with a repeated new injury. Risk factors associated with the highest KA occurrence are new meniscal extrusion and new injury, followed by the presence of meniscal extrusion at inclusion, age, and bone mass index ( $p \leq 0.001$ ).

**Conclusion:** Data showed that new injury(ies), as well as meniscal extrusion and increase in BML size, are the most strongly associated with the worst disease prognosis. This study highlights the importance of nonsurgical knee injury in an elderly population as an independent risk factor for knee OA and arthroplasty. Data from this study will benefit clinical practice and help improve the identification of individuals at greater risk of a significant disease progression and worst disease outcome.

## P160

### THE INTERCORRELATION OF VITAMIN D DEFICIENCY AND SPP1 (OSTEOPONTIN) GENETIC POLYMORPHISMS WITH BONE MINERAL DENSITY IN MIDDLE-AGED WOMEN

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**Objective:** To examine the following: 1) the association of vitamin D deficiency with BMD and 2) the joint effect of single-nucleotide polymorphisms (SNPs) and haplotypes of the *SPP1* (osteopontin) gene and vitamin D deficiency on BMD.

**Methods:** This is a cross-sectional study, which recruited 657 middle-aged Taiwanese women (524 premenopausal and 133 postmenopausal). Vitamin D deficiency was defined as serum 25-hydroxyvitamin D levels  $< 20$  ng/mL. Three tagging SNPs (rs11730582, rs6839524, and rs4754) of the *SPP1* gene were selected. The BMD of the lumbar spine was measured by DXA. Low BMD was defined as a Z-score in the lowest quartile in premeno-

pausal women and osteopenia or osteoporosis in postmenopausal women.

**Results:** Vitamin D deficiency was associated with an increased risk of low BMD in both premenopausal and postmenopausal women (adjusted odds ratio [OR]: 1.65, 95%CI: 1.06-2.61; adjusted OR: 3.04, 95%CI 1.08-9.36, respectively), after adjustments for age, BMI, body fat, seasons that vitamin D were measured, physical activity, calcium supplements, and sedentary work. In postmenopausal women, rs11730582 variant carriers (TC or CC) with normal vitamin D levels were associated with a decreased risk of low BMD (adjusted OR: 0.13, 95%CI: 0.02-0.66). Vitamin D deficiency in postmenopausal women, rs6839524 variant carriers (CG or GG) had a significantly increased risk of low BMD (adjusted: OR 7.61, 95%CI: 1.4-41.47). In postmenopausal women without vitamin D deficiency, the haplotype CCT containing the allele of rs11730582 (C), rs6839524 (C), and rs4754 (T) was protective against low BMD (adjusted OR: 0.14, 95%CI: 0.03-0.76). No significant association was found for premenopausal women.

**Conclusion:** Our results suggested that vitamin D deficiency is associated with an increased risk of low BMD in middle-aged women. *SPP1* genetic polymorphisms and vitamin D deficiency had a joint effect on low BMD in postmenopausal women.

## P161

### NON-ALCOHOLIC FATTY LIVER DISEASE IS ASSOCIATED WITH DECREASED BONE MINERAL DENSITY IN ADULTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** To investigate the impact of non-alcoholic fatty liver disease (NAFLD) on BMD and osteoporosis in adults.

**Methods:** PubMed, MEDLINE, Embase, CINAHL, Web of Science, Cochrane Library, and Scopus were searched for observational studies published from inception to March 2022 that reported the adjusted effect sizes of NAFLD on BMD or osteopenia/osteoporosis. Two independent reviewers extracted the data and assessed bias. Random-effects models were used in this study.

**Results:** Among the 12 included studies, seven examined the effect of NAFLD on BMD, two reported the effect on odds ratios of osteoporosis, and three disclosed the hazard ratios of osteoporosis. Meta-analysis of the adjusted effect sizes showed that NAFLD was associated with decreased BMD (mean difference:  $-0.02$  g/cm<sup>2</sup>, 95%CI:  $-0.03$  to  $-0.01$ ;  $I^2$ : 88%). There was no significant association between NAFLD and odds ratio (OR: 1.13, 95%CI: 0.58 to 2.2) and hazard ratio (HR: 1.38, 95%CI: 0.79 to 2.42) of osteopenia/osteoporosis. Subgroup analyses revealed that NAFLD had

a significantly detrimental impact on BMD in men and the BMD of the femoral neck and total hip. The publication bias of all included studies was low. However, heterogeneity between the studies was high, and our findings should be interpreted with caution.

**Conclusion:** Overall, our results suggest that NAFLD is associated with decreased BMD. Male sex, the BMD of the femoral neck and total hip may be potential risk factors for decreased BMD in adults with NAFLD. Further larger and prospective studies with large sample sizes and repetitive measurements are required to examine the role of NAFLD in BMD.

## P162

### THE ELASTICITY AND THICKNESS OF THE HOFFA'S FAT PAD IN KNEE OSTEOARTHRITIS: ULTRASOUND ELASTOGRAPHY EVALUATION

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**Objective:** Using ultrasound elastography to evaluate Hoffa's fat pad characteristics in knee osteoarthritis (OA) patients.

**Methods:** This was a prospective observational study in a single medical center. We enrolled a knee OA group and a control group. WOMAC and Kellgren-Lawrence X-ray grading were employed to determine disease severity. All the study participants received ultrasound assessment, including strain and shear-wave elastography in knee fully extension and 45° flexed position. We calculated the strain ratio from strain elastography and recorded the shear modulus under shear wave elastography. Each patient with knee OA received ultrasound examination after the scheduled hyaluronic acid injection.

**Results:** We recruited 63 knees from 32 participants, including 19 knee OA patients and 13 controls. There was no significant difference in age, sex, and BMI between the two groups. We noted larger strain ratio ( $0.27 \pm 0.24$ ,  $p=0.035$ ) and faster velocities ( $8.57 \pm 11.11$  kPa,  $p=0.04$ ) in the shear wave elastography among the patients with knee OA compared with the healthy controls under knee extended position. There was no significant difference in Hoffa's fat pad thickness between the two groups. The elasticity and thickness of Hoffa's fat pad did not change after hyaluronic injections. While comparing the elasticity under different positions, the mean shear modulus in full extension was significantly lower than that in 45° flexion ( $p=0.012$ ).

**Conclusion:** The results of our study provide meaningful and novel features of OA knee. Knee OA is considered a whole-joint disease that affects not only joint cartilage. Hoffa fat pad was one of the structures investigated to involve the pathophysiology of OA knee accordingly. We determined the stiffness of the fat pad using ultrasound elastography; these data were believed to provide additional information in the diagnosis and treatment of OA knee in future research.

## P163

### EFFICACY AND SAFETY OF NON-OPERATIVE INTRA-ARTICULAR TREATMENTS FOR BONE MARROW LESIONS IN KNEE OSTEOARTHRITIS IN ADULTS

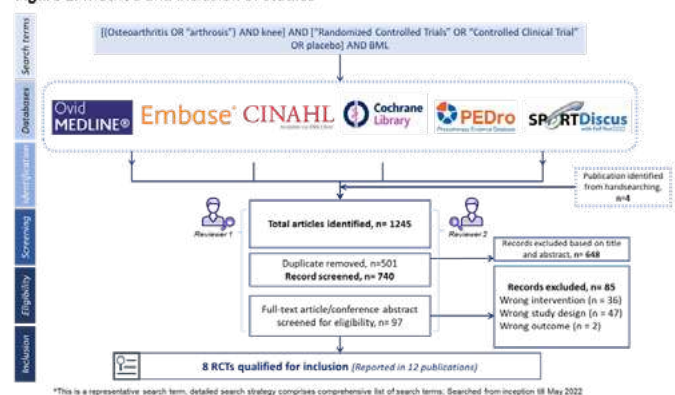
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**Objective:** Knee osteoarthritis (OA) is a progressive joint disease and a leading source of chronic pain and disability. OA-bone marrow lesions (BMLs) are a recognised aetiopathological feature of knee OA. Several intra-articular injectable therapies are recommended and used for management of knee OA. This systematic review assessed the efficacy and safety of intra-articular therapies for improving OA-BMLs and reducing pain in adults with knee OA.

**Methods:** Ovid MEDLINE®, Embase, CENTRAL, CINAHL, SPORT-Discus and pEDro were searched from inception through May 2022. Two reviewers independently screened for randomised controlled trials (RCTs) comparing intra-articular injectable non-operative interventions with placebo or other active treatments for knee OA (with at least one OA-BML outcome) extracted data and performed Cochrane risk of bias assessments (Figure 1).

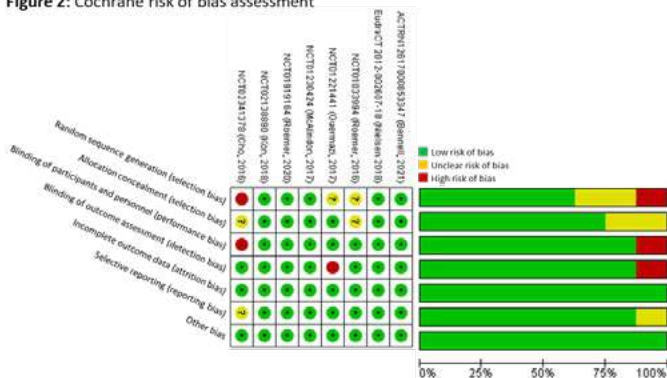
Figure 1: Method and inclusion of studies



**Results:** We included eight RCTs involving 1294 participants, reported in 12 publications from 2016-2021. The overall risk of bias in included studies was low, with five trials assessed as having a low risk of bias according to the Cochrane RoB-1 tool (Figure 2). Two studies of sprifermin, one of autologous protein solution (APS) and one of high-dose TissueGene-C, reported a positive effect on OA-BMLs under 1-year follow-up. Two studies with corticosteroids reported mixed findings with no beneficial effect beyond 14 weeks of follow-up. One study assessing platelet-rich plasma found no significant improvement in OA-BMLs at 12 months fol-

low-up. Knee pain was improved in two studies evaluating TissueGene-C and one study assessing APS; the remaining studies found no improvement in knee pain.

Figure 2: Cochrane risk of bias assessment



**Conclusion:** Overall, we found mixed evidence on the efficacy of intra-articular therapy for improving OA-BMLs in knee OA. Additional studies with long-term follow-up are needed to confirm the effect of various intra-articular therapies on OA-BMLs in knee OA.

## P164 PREVALENCE OF HYPOTHYROIDISM AND VITAMIN D DEFICIENCY IN INDIVIDUALS AFFECTED WITH TRISOMY 21

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**Objective:** Vitamin D plays a very important role in the immune response. Trisomy of chromosome 21 or Down's syndrome (DS), is the most common genetic disorder associated with autoimmune diseases. The spectrum of thyroid dysfunction in patients with DS include congenital hypothyroidism, subclinical hypothyroidism, acquired hypothyroidism and hyperthyroidism. We aimed to investigate the prevalence of hypothyroidism and vitamin D deficiency affected in individuals with Trisomy 21 in blood serum.

**Methods:** This is a retrospective study conducted in the 2-year period, specifically from 1 March 2020 to 1 April 2021, and it included 42 individuals with DS between intervals (1-4 check-up) whose blood samples were collected and analysed at the Clinical Center University of Sarajevo. All patients were established the level of vitamin D and TSH levels in serum.

**Results:** 32 patients (75,5%) was women. Women (34,4%) with average age amounting to 21,5 years variables ranging from 18-25. Four of men (2%) average age amounting to 20 years variables ranging from 26-35. Average D vitamin value amounted to 26,9 ng/ml variables ranging from 1,8-52 mg/mL. Average TSH values in serum amounted to 18,25 uIU/mL variables ranging from 1,2-35,3 uIU/mL. Correlation between vitamin D (ng/mL) and TSH val-

ues (uIU/mL) with Spearman's correlation showed a statistically significant negative correlation between the two, with  $p < 0.001$ .

**Conclusion:** The research showed the occurrence of hypothyroidism and vitamin D deficiency in subjects with trisomy of 21 chromosome pair.

## P165 MRI AND QCT WERE USED TO ANALYZE MUSCULOSKELETAL CORRELATION IN PATIENTS WITH OSTEO-SARCOPENIA

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**Objective:** Sarcopenia (SP) and osteoporosis (OP) are two common chronic musculoskeletal diseases in the elderly population. With the aging of the global population, the prevalence of OP and SP increases year by year, which seriously increases the risk of falls, fractures and hospitalization of the elderly. According to the 7th national census data, by the end of 2020, the elderly population aged 60 or above has reached 264.02 million, accounting for 18.7% of the total population, making it the country with the largest elderly population in the world. In recent years, the epidemiological survey of SP in Chinese population shows that the prevalence rate of SP among the elderly in the community is 8.9%~38.8%. The epidemiological data of OP showed that the prevalence rate of OP in Chinese people over 50 years old was 20.7% in females and 14.4% in males. The prevalence of OP is significantly higher in people over 60 years old, especially in women. SP and OP have insidious onset and a low overall diagnosis and treatment rate, but they can cause organism dysfunction, increase the risk of falls, disability and death in the elderly, seriously damage the quality of life and health of the elderly, and create a heavy burden for our medical system and society. Therefore, SP and OP have become a major health problem faced by the elderly people in our country. In 2009, Binkley et al. developed the concept of osteosarcopenia (OS) based on the same pathophysiological basis for SP and OP and the same adverse effects on physical health in older adults. At present, there is still no authoritative organization or guide to put forward unified OS diagnostic criteria. Most of them are based on the diagnostic criteria of SP and OP, and the diagnostic criteria of both SP and OP are taken as the judgment criteria of OS. The study of the relationship between muscle and bone and the intervention and treatment of muscle loss and bone mass loss can more effectively reduce the disability rate and fatality rate of this disease and improve the quality of life of the elderly.

**Methods:** OS subjects were initially screened according to the SARC-CalF questionnaires and International Osteoporosis Foundation (IOF) one-minute osteoporosis risk test and were selected according to the inclusion and exclusion criteria of OS. Muscle strength was measured using a grip strength meter, and physical function was measured by 5-time chair stand test, 6-minute walk test, stair-climb power test, timed-up-and go test and the Short

Physical Performance Battery (SPPB). Pain using Visual Analogue Scale (VAS) score and assessment of health related quality of life in osteoporosis (ECOS-16) were used to evaluate the function of patients with osteoporosis. MRI and QCT were used to detect muscle mass and bone mass levels in the lumbar and hip joints of patients to explore musculoskeletal correlations and possible patterns of interaction in patients with OS.

**Results:** OS subjects were significantly lower than normal patients in muscle strength,

5-time chair stand test, 6-minute walk test, stair-climb power test, timed-up-and go test, SPPB and other physical function indicators. MRI results showed that the lumbar and hip muscle mass of OS subjects was significantly decreased, and QCT results showed that the lumbar and hip bone mass was significantly decreased. The reduction of muscle mass and bone mass in lumbar and hip joints was synergistic to some extent.

**Conclusion:** MRI and QCT can noninvasively evaluate musculoskeletal structures and their dynamic changes in OS population at the microscopic level. The muscle mass and bone mass of patients with OS are decreased simultaneously, which is characteristic of sarcopenia and osteoporosis.

## P166

### HIP FRAGILITY FRACTURES IN THE ELDERLY: THE REALITY IN GREECE DURING THE RECENT FINANCIAL CRISIS

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**Objective:** Hip fracture remains a main issue in the elderly patient. More than 1.5 million patients per year, on a global scale, are victims of a hip fracture. Their incidence is expected to increase with the ageing of the world's population. The identification of risk factors is necessary in order to reduce mortality and morbidity. The aim of the study was to identify risk factors of mortality twelve months after surgery for a hip fracture. Also, to investigate potential factors that affect mortality in the first year.

**Methods:** A prospective observation study was carried out, of a secondary and a tertiary hospital in Greece. 744 patients (501 women, 243 men), of average age 82.6 years (SD=7.20) participated. The 147 patients (92 women, 55 men) come from a secondary hospital (General Hospital of Kastoria) and the remaining 597 patients (409 women, 188 men) from tertiary (University General Hospital of Larissa). The perioperative data were collected from medical charts and interviews. The mortality rate and also the functional ability and quality of life were recorded at 12 months. To investigate the change of a quantitative variable between two time points, the paired t-test was used. The analysis for controlling survival was carried out by the Kaplan-Meier method.

**Results:** Mortality in one year is 19.4%. The highest death rate is recorded among those older than 81 years old compared to those

under 81 years of age ( $p < .001$ ). The highest death rate is recorded in men vs. women ( $p = .062$ ). The highest average survival time was calculated in the rehabilitation clinic and the lowest in the orthogeriatric clinic ( $p < .001$ ). No significantly different survival time was found depending on the coexistence or non-existence of osteoporosis ( $p = .779$ ) or by the type of fracture ( $p = .267$ ). The highest death rate is recorded in patients who have not operated on compared to patients who have undergone surgery ( $p < .001$ ), as well as in patients who have undergone surgery over a period of  $\geq 48$  h from the fracture event compared to patients who have undergone surgery within a period of  $< 12$  h from the fracture event ( $p < .002$ ). No significantly different death rate was found in the patients of the secondary level hospital compared to the patients of the tertiary level hospital ( $p = .096$ ). No relationship was found between mortality and length of stay in hospital ( $p = .485$ ), type in intracapsular fractures ( $p = .332$ ), type in subtrochanteric fractures ( $p = .359$ ) and type in trochanteric fractures ( $p = .396$ ). The surgical treatment of trochanteric, intracapsular and subtrochanteric fracture was not found to be related to mortality ( $p = .545$ ,  $p = .075$ ,  $p = .652$  respectively). Patients who re-admitted within 30 days observed more deaths statistically compared to patients who re-admitted in the period 31-365 d or with patients that they had not any readmission ( $p = .001$ ). In patients who experienced complications, more deaths were observed statistically compared to patients they did not experience any complication ( $p = .001$ ). It was found that the higher the ASA score, the more deaths are statistically observed ( $p < .001$ ). Also, patients who died record, statistically, a higher Charlson index ( $p < .001$ ) and a lower BMI ( $p = .001$ ). The value of albumin, at the time of admission, does not differ significantly in patients who died compared to those who did not die ( $p = .291$ ). The value of albumins, at the time of introduction, is significantly different in patients who died compared to those who eventually did not die ( $p = .011$ ). Also, there is no significant difference in mortality rate between patients who had to transfuse and those who did not transfuse ( $p = .293$ ). Functional ability ( $p < .001$ ), cognitive function ( $p < .001$ ) and quality of life, physical ( $p < .001$ ) and mental ( $p < .001$ ), changed negatively in the period of 12 months after the fracture.

**Conclusion:** Predicting the postoperative outcome could help in making clinical decisions. The results of this thesis highlight the importance of meeting the basic needs of the elderly, not only at the time of surgery, but also afterwards. Improved functioning, independence and overall quality of life are important outcomes for rehabilitation and should be taken into account in rehabilitation strategies for older people after a hip fracture. Further studies involving control groups and a greater perspective of monitoring are needed to confirm these results.



P167

## SECONDARY KNEE OSTEOARTHRITIS IN A 59-YEAR-OLD FEMALE WITH POLYARTICULAR JUVENILE IDIOPATHIC ARTHRITIS: A CASE REPORT

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**Objective:** Pediatric patients diagnosed with juvenile idiopathic arthritis usually have disease that persists into adulthood. In the current era of biologics, prognosis for these patients have improved. However, the inflammatory nature of juvenile idiopathic arthritis predisposes to secondary osteoarthritis.

**Methods:** We describe a case of secondary osteoarthritis seen in a 59-year-old female from The Philippines. She initially presented with chronic polyarticular joint pains in 1972 and was diagnosed by a rheumatologist as a case of juvenile idiopathic arthritis in 1995, using the American College of Rheumatology (1977) Criteria. She is on hydroxychloroquine, chronic steroids, and has history of receiving biologic therapies: tofacitinib, rituximab, tocilizumab, and golimumab.

**Results:** She presents with persistent knee pain, swelling, and effusion for which she undergoes regular knee arthrocentesis. On gross examination, synovial fluid samples are clear, cell count shows non-inflammatory fluid, gram stain and culture are negative for microorganisms, and polarizing microscopy shows no inflammatory cells, red blood cells, or crystals. These findings favor a diagnosis of osteoarthritis.

**Conclusion:** Few studies follow patients with juvenile idiopathic arthritis into adulthood, and even fewer describe secondary osteoarthritis caused by such. This report provides a glimpse of such in the setting of a resource-limited developing country.

P168

## DIGITAL VOICE ASSISTANTS FOR DELIVERING EXERCISE, NUTRITION AND MEDICATION INFORMATION TO POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS: A 24-WEEK PILOT RANDOMISED CONTROLLED TRIAL

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**Objective:** To determine the feasibility and preliminary effectiveness of a 24-week digital voice assistant-delivered intervention for improving osteoporosis-related health behaviours, knowledge, and attitudes in postmenopausal women with osteoporosis.

**Methods:** 50 postmenopausal women currently prescribed anti-osteoporosis medications were randomised to 24 weeks of

automated osteoporosis education content (video/audio/text) on medication, nutrition, and exercise (including 3 sessions/week home-based strength, balance and impact exercise) broadcast via a supplied Amazon Alexa Echo Show device located in their home (Alexa; see Figure), or monthly educational emails (control). Outcomes included changes in accelerometer-determined moderate-to-vigorous physical activity (MVPA) and sedentary behaviour, dietary calcium intakes (via 3-day food records), and scores for the Modified Falls Efficacy Scale, Osteoporosis Knowledge Assessment Tool, and Adherence Evaluation of Osteoporosis Treatment Questionnaire.



**Results:** Forty-eight (96%) women (mean±SD age 64.3±6.1 years) completed follow-up (24 Alexa group; 24 control group). Alexa group participants engaged with 57±18 of 72 (mean adherence=80%) prescribed education and exercise sessions with no adverse events. Over 24 weeks, MVPA time significantly increased (+17.9±28.8 min/d P=0.008) and sedentary time significantly decreased (-40.2±71.7 min/d; P=0.016) for Alexa only, but these changes did not differ to controls (both P>0.05). Calcium intakes similarly increased in Alexa and decreased in controls (+84±372 vs. -91±393 mg/d) with no significant group differences (P=0.127) whereas scores for falls efficacy (P=0.032) and osteoporosis knowledge (P=0.038) significantly increased for Alexa compared with controls. Changes in attitudes to osteoporosis medication adherence did not differ between groups (P=0.114) but scores improved within the Alexa group only (baseline 18.7±3.3 vs. follow-up 19.9±2.0; P=0.041).

**Conclusion:** This pilot 24-week digital voice assistant-delivered multifaceted exercise and education intervention demonstrated excellent adherence and safety in postmenopausal women with osteoporosis, but larger trials are needed to confirm its effectiveness for improving osteoporosis-related health behaviours, knowledge and attitudes, and clinical outcomes such as BMD.

P169

### BICIPITORADIAL BURSTITIS IN A PATIENT WITH MYELODYSPLASTIC SYNDROME AND AUTOIMMUNE MANIFESTATIONS

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**Objective:** To present a rare case of bicipitoradial bursitis in a patient with myelodysplastic syndrome (MDS) and inflammatory arthritis.

**Case report:** An 82-year-old man with diagnosis of MDS was presented to our outpatient clinic with autoimmune phenomena including symmetric polyarthritis involving small joints of the upper and lower limbs and right ear chondritis. Inflammatory markers were slightly elevated while RF, ANA, ANCA, and anti-CCP were negative and X-rays were remarkable only for osteoarthritis. Patient has received only low dose of steroids with gradual tapering and had excellent response. Three months after stopping steroids was presented with painful antecubital mass in his right elbow. He did not recall any trauma. There were no inflammation signs. Forearm pronation and supination were painful with limitation of the motion range. The vascular status, neurological examination and plain X-ray were unremarkable. There was no other joint involvement. Ultrasound of the area has revealed enlarged bicipitoradial bursa with anechoic fluid and thickened wall (Figure 1). MRI scan was performed and confirmed the findings from ultrasound scan and excluded other pathologies. (Figure 1).

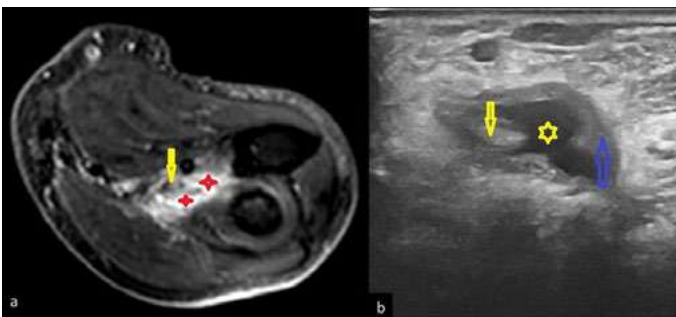


Figure 1. Axial PD fs weighted MRI image (a) shows fluid collection in bicipitoradial bursa (red asterisks) almost surrounding the thickened and high signal altered biceps tendon (yellow arrow). Corresponding transverse sonographic image (b) showing hypochoic fluid collection (yellow asterisk) of thickened bicipitoradial bursa (blue arrow) surrounding the thickened biceps tendon (yellow arrow).

Ultrasound guided aspiration was performed. We aspirated 6 ml of inflammatory fluid without crystals while cytology and cultures were negative. The patient underwent a steroid injection (triamcinolone acetate 40 mg) into bursa under ultrasound guidance. He did not receive further treatment. Patient during follow-up remained asymptomatic.

**Conclusion:** Bicipitoradial bursitis can be due to several condi-

tions such as chronic mechanical friction, partial or complete tear of the distal biceps tendon, inflammatory arthritis and infection. Ultrasonography is first-line examination and it is usually sufficient to make the diagnosis of bursitis and to guide the aspiration and treatment. Bicipitoradial bursitis should be considered in every patient with history of inflammatory arthritis and anterior elbow pain.

P170

### SUPPRESSIVE LEVOTHYROXINE THERAPY AND PRIMARY HYPERPARATHYROIDISM: DECISION FOR FRACTURE RISK REDUCTION – ASSOCIATED TREATMENT

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**Objective:** Suppressive levothyroxine therapy after surgery for papillary carcinoma leads to increased bone resorption and a decreased BMD. Primary hyperparathyroidism (PT) also contributes to secondary osteoporosis. We aim to introduce a patient diagnosed with papillary thyroid carcinoma, PT and osteoporosis.

**Methods:** This is a case report.

**Case report:** This is a 70-year-old female admitted for thyroid and bone status evaluation. Her personal medical history includes onetime thyroidectomy and right inferior parathyroidectomy for PT 3 years ago. She associates arterial hypertension, kidney stones, and surgical premature menopause at age of 45 (no hormone replacement therapy). On current admission, thyroid panel shows low TSH=0.3 µUI/mL(normal:0.5-4.5), FT4 (free levothyroxine)=14.9 pmol/L(normal:9-19) under levothyroxine 100 µg/d. Total serum calcium is 9.2 mg/dL(normal:8.4-10.3), phosphorus=3.2 mg/dL(normal:2.5-4.5), 25OHD(25-hydroxyvitamin D)=35.4 ng/mL(normal:30-100) with PTH=36.29 pg/mL(normal:15-65). Bone formation marker panel shows osteocalcin=22.78 ng/mL(normal:11-43), with bone resorption marker CrossLaps=0.44 ng/mL(normal:0.158-0.442). 3 years ago, DXA showed osteoporosis: L1-L4 BMD=0.924 g/cm<sup>2</sup>, T-score=-2.6 SD, Z-score=-0.6 SD; total hip BMD=0.889 g/cm<sup>2</sup>, T-score=-0.9SD, Z-score=0.2SD, femoral neck BMD=0.802 g/cm<sup>2</sup>, T-score=-1.7 SD, Z-score=-0.2SD, 1/3 distal radius BMD=0.605 g/cm<sup>2</sup>, T-score=-1.5 SD, Z-score=0.1SD. TBS was of 1.318. She did not receive any medication against osteoporosis. Currently, DXA reveals osteoporosis L1-L4 BMD=0.940 g/cm<sup>2</sup>, T-score=-2.1 SD, Z-score=-0.5 SD, total hip BMD=0.911 g/cm<sup>2</sup>, T-score=-0.8 SD, Z-score=0.6 SD, femoral neck BMD=0.771 g/cm<sup>2</sup>, T-score=-1.9 SD, Z-score=-0.3 SD, 1/3 distal radius BMD=0.762 g/cm<sup>2</sup>, T-score=-1.3 SD, Z-score=0.5 SD. She

continued LT4 suppression therapy in addition to vitamin D 1000 UI/d and no anti-osteoporotic drug was started.

**Conclusion:** The correction of PT might be reflected in improved BMD; however, levothyroxine suppressive therapy might increase the risk of bone loss, but the adequate timing of anti-osteoporosis drugs initiation is less predictable.

## P171

### STRUCTURAL SEVERITY IN KNEE OSTEOARTHRITIS IMPACTS TREATMENT RESPONSE: A POST HOC POOLED ANALYSIS OF LORECEVIVINT CLINICAL TRIALS

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**Objective:** Osteoarthritis (OA) is a leading cause of disability globally, with unmet need for safe and efficacious symptom and structure treatments. Disease heterogeneity and pain and joint structure assessment in clinical trials are challenges to developing effective therapeutics. This post hoc analysis of lorecevivint (LOR), an intra-articular (IA) CLK/DYRK inhibitor thought to modulate Wnt and inflammatory pathways, examined structural heterogeneity Phase 2 and 3 LOR trials and the associated treatment responses within KL grade subgroups. This analysis sought to identify potential relationships between OA pain and knee joint structure to aid future clinical trial design.

**Methods:** Data was analyzed from two Phase 2 (OA-02, NCT02536833; OA-04, NCT03122860), and two Phase 3 trials (OA-10, NCT04385303; OA-11, NCT03928184). In all trials, participants had Kellgren-Lawrence (KL) grades 2-3 knee OA. OA-04, OA-10 and OA-11 criteria included Pain Numeric Rating Scale (NRS) [0-10]  $\geq 4$  and  $\leq 8$  in the target knee and  $< 4$  in the contralateral knee. Baseline JSW for each study was compared using cumulative frequency distribution plots by KL grade; percentages of participants with JSW  $< 3$  mm (surrogate for loss of  $\sim 50\%$  healthy JSW)<sup>1</sup> was summarized per study. For the trials which captured Pain NRS, treatment responses were assessed according to KL grade and by trial. Change from baseline was estimated using baseline adjusted ANCOVA at each timepoint for pain outcomes.

**Results:** In the Phase 2 trials, 16% (OA-02) and 21% (OA-04) and in the Phase 3 trials, 30% (OA-10) and 49% (OA-11) of KL 2 participants had baseline mJSW  $< 3$  mm. For KL 3 participants, OA-02 had 55% and OA-04 53%, while OA-10 had 81% and OA-11 88% mJSW  $< 3$  mm (Fig. 1). Beneficial treatment effect of LOR vs. PBO was seen in KL 2 for OA-04 and OA-10, but not OA-11 (Fig. 2A). Beneficial treatment effect of LOR was seen only in OA-04 for KL 3, with similar magnitude of change for LOR through week 12 (Fig. 2B).

Figure 1. Cumulative frequency of baseline mJSW by KL grade across LOR trials

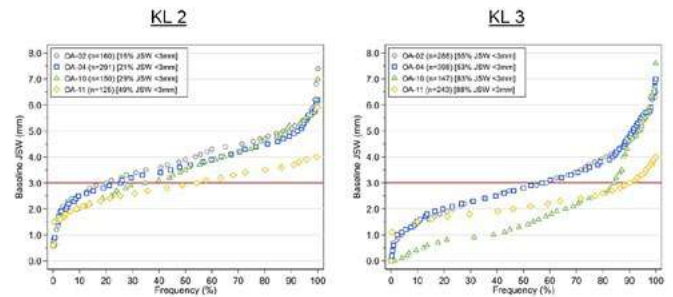
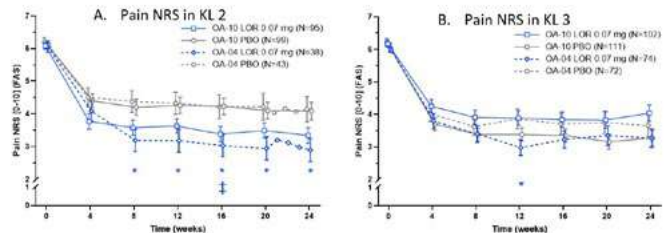


Figure 2. Treatment effect of LOR vs PBO by KL grade across LOR trials



**Conclusion:** This post hoc analysis showed substantial baseline mJSW heterogeneity across LOR clinical trials despite KL 2-3 grade inclusion criteria. Participants with less structurally advanced knee OA showed greater pain treatment responses to LOR compared to those with more advanced disease. These data support association of OA structural damage and pain of knee OA and that earlier intervention may improve outcomes.

**Reference:** 1. Deep et al. JBJS 2003

## P172

### FATTY INFILTRATION OF MULTIFIDUS MUSCLE INDEPENDENTLY INCREASES OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURE RISK

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**Objective:** Vertebral compression fractures decrease daily life activities and increase economic and social burdens. In addition, sarcopenia and back muscle atrophy influence osteoporotic vertebral compression fractures (OVCF). Therefore, this study aimed to evaluate the influence of the multifidus muscle on the OVCF.

**Methods:** We retrospectively recruited the study population based on the hospital database following the inclusion and exclusion criteria. The inclusion criteria were: 1)  $\geq 60$  years and 2) concurrent BMD and lumbar spine MRI. The exclusion criteria were: 1) a history of lumbar spinal surgery, 2) lumbar spine metastasis, and 3) systemic diseases affecting bone density, including chronic renal failure and liver cirrhosis. The participants were divided into three groups based on lumbar spine BMD and OVCF. The control group underwent BMD and spinal MRI evaluation but not OVCF. Based on the T-score of lumbar spine BMD, the fracture groups with OVCF were divided into osteopenia and osteoporosis groups. Osteopenia BMD groups showed osteopenia T-scores of

spinal BMD of over -2.5. Osteoporosis BMD groups also showed osteoporosis T-scores of lumbar BMD of -2.5 and below.

**Results:** We included 120 patients who had visited our hospital. Based on spinal MRI, 75 participants were diagnosed with OVCF, and 45 were not. Age, BMD, and the psoas index significantly differed between the control and fracture groups. Moreover, fatty infiltration of the multifidus muscle indifferently affected the OVCF, with and without adjusting for other significant factors.

**Conclusion:** The severity of fatty infiltration of the multifidus muscle increases the risk of a spinal fracture. Therefore, preserving the quality of the spinal muscle and bone density is essential for preventing OVCF.

### P173

#### ASSESSMENT OF MACHINE LEARNING MODELS FOR FRACTURE RISK PREDICTION

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**Objective:** BMD T-Scores are important in the assessment of risk fracture. However, historically in Canada, many patients do not complete a bone mass density scan, despite their physician's request. In this work, we created three machine learning (ML) models using 819 patient data from Osteoporosis Canada, to classify patients as low, moderate, or high risk of an osteoporotic fracture. The aim is to help clinicians prioritise patients that have a high risk of a fracture when BMD T-scores are not available.

**Methods:** The ML models included Random Forest Classifier (RFC), Support Vector Classifier (SVC), and Stacking Classifier. Models were trained with the FRAX calculation results with T-scores. The Synthetic Minority Oversampling Technique was used to generate and balance the training data.

**Results:** The RFC model performed the best with precisions of 82.1% and 79.2% for low and moderate classifications. The precision for high classifications suffered from overpredicting moderate classifications which lowered its precision to 55.6%. The sensitivity had a major difference, we saw that RFC correctly predicted 93% of high risk patients in its test set in comparison to FRAX without a T-score managing to predict 68%.

**Conclusion:** The RFC offers the best-balanced performance. The low precision rate in high classification was from slightly over diagnosing moderate risk patients to high, which is preferable to underestimating high classification. SVC and Stacking were adequate at identifying moderate classification but struggled with other classifications. FRAX without T-score was good at predicting low classification but had tendency to under diagnose.

### P174

#### TREATMENT WITH ANTI-OSTEOPOROSIS MEDICATIONS MAY REDUCE ALL-CAUSE MORTALITY AFTER VERTEBRAL FRAGILITY FRACTURES: A NATIONWIDE POPULATION STUDY

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**Objective:** Treating osteoporosis with anti-osteoporotic medications may prevent second fractures after the first occurrence of vertebral fractures. However, whether the treatment may benefit patients' survival is unknown. The purpose of this population study was to analyze the survival following the use of anti-osteoporotic medication after vertebral fractures.

**Methods:** There were 59,926 patients with osteoporotic vertebral fractures from 2009-2019 included in this study by using the Taiwan National Health Insurance Research Database (NHIRD).

**Results:** Patients who had previously received anti-osteoporotic medications had a low mortality risk (hazard ratio (HR): 0.84). Patients receiving treatment >3 years had a much lower mortality risk (HR: 0.53). Patients who used oral bisphosphonates (alendronate and risedronate, HR: 0.95), intravenous zoledronic acid (HR: 0.83), and subcutaneous injection of denosumab (HR: 0.71) showed lower all-cause mortality rates than patients without use of anti-osteoporotic medications.

**Conclusion:** In addition to fracture prevention, anti-osteoporotic treatments after occurrence of vertebral fractures might benefit for survival. A longer duration of treatment or the use of long-acting drugs was also associated with lower mortality.

### P175

#### ANTI-OSTEOPOROSIS DRUGS REDUCE MORTALITY IN ELDERLY PATIENTS WITH OR WITHOUT CANCER: A NATIONAL COHORT STUDY OF ADULTS WITH VERTEBRAL FRACTURES

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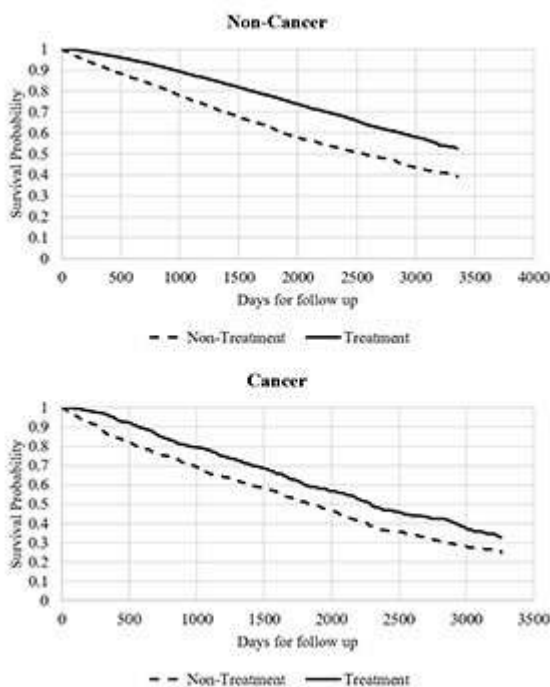
**Objective:** The most prevalent type of fragility fractures is osteoporotic vertebral fractures (OVFs). However, few studies have examined the relationship between anti-osteoporosis treatments and malignancy-related mortality following an OVF. The goal of this study is to determine the effect of anti-osteoporosis therapy on mortality in OVF patients with and without cancer.

**Methods:** Data from elderly persons over the age of 65 who were hospitalized for OVFs between 2003-2018 were acquired from Taiwan's National Health Insurance Research Database. We utilized all-cause mortality as an endpoint and a variety of comorbidities as adjustment factors. The study initially comprised 35,089 patients (6,139 who had received osteoporosis therapy and 28,950 who did not receive the treatment). After matching, 6,136 individ-

uals from each group were chosen for analysis.

**Results:** Overall survival was significantly higher in the osteoporosis treatment group compared to the non-osteoporosis treatment group. This was true for both those without cancer (HR 0.49; 95%CI: 0.45 to 0.53;  $p < .0001$ ) as well as those with cancer (HR 0.70; 95%CI: 0.60 to 0.83;  $p < .0001$ ) (Fig. 1). Amongst cancer patients over 70 years old, those with type 2 diabetes and chronic kidney disease had a significantly increased risk of death. Women and those receiving anti-osteoporosis treatment had a significantly lower risk of death regardless of whether or not they had cancer.

**Conclusion:** Our findings suggest that anti-osteoporosis therapy should be initiated regardless of whether or not a patient has cancer, as it improves survival after OVFs.



### P176 EPIDEMIOLOGY AND MORTALITY OF PATIENTS WITH OSTEOGENESIS IMPERFECTA IN TAIWAN

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**Objective:** Osteogenesis imperfecta (OI), a hereditary connective tissue disorder characterized by fragile bone and limb deformities, is the leading cause of pediatric fractures, requiring real world evidence to improve the health-related outcomes. However, the endemic data for OI in Asia is lacking. The objective of the present study is to perform nationwide assessment of epidemiology, fractures, and mortality risks in Taiwan OI patients.

**Methods:** Patients with officially confirmed OI diagnosis were identified from Registry for Catastrophic Illness in Taiwan Nation-

al Health Insurance Research Database (NHIRD) 2008 to 2019. The demographic data, including sex, age, registry date, comorbidities, fracture characteristics, mortality, and cause of death, were analyzed. We also used multivariable Cox proportional hazard model to estimate the risks between OI and reference population adjusted by sex, age, and comorbidity on survival probability using hazard ratio (HR).

**Results:** Of 319 OI patients, 153 (48%) were male and 166 (52%) were female. The age of diagnosis was frequently made in the 1st (37.9%) decade of life. There were 238 (74.6%) patients with at least one fracture event before diagnosis. The most common fracture site was femur (24.1%), following by lower leg and ankle (13.2%), forearm (10.3%) upper arm (6.9%) and spine (1.9%). Death was noted in 9 (2.8%) patients, and the leading causes of death were either OI (22.2%) or cardiovascular disease (22.2%). OI population had higher mortality rate (HR 6.49; 95%CI 2.49-16.90) than general population, and the female OI patients had lower mortality rate than male OI patients (HR 0.24; 95%CI 0.08-0.73). Furthermore, female OI patients (HR 4.98; 95%CI 1.66-14.94) had much higher mortality risks than general population than that in the male OI patients (HR 15.76; 95%CI 1.64-151.57) as compared to the reference population.

**Conclusion:** The current study presented the latest endemic results and health-related outcomes of OI patients using the real-world evidence in Taiwan. Our health care system should consider how early diagnosis and care for OI patients could be improved based on the up-to-date evidence.

### P177 EFFECTS OF POSTURAL CORRECTION FEEDBACK SYSTEMS ON NECK POSTURE AND CERVICAL ERECTOR SPINAE MUSCLE ACTIVITY DURING COMPUTER USE IN OFFICE WORKERS

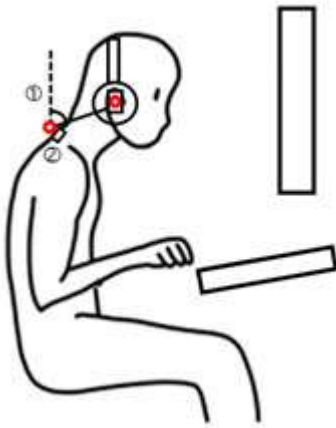
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**Objective:** Prolonged computer use leads to an incorrect posture with flexed head and neck posture, causing neck pain. However, there are few studies on physical changes during posture correction. This study investigated how the angle and muscle activity of the neck changed when a postural correction feedback system was applied during computer use.

**Methods:** Ten healthy young participants (seven men, aged 22.9±3.5 years) without neck pain participated in this study. Surface electromyography (EMG) measured the muscle activation of the cervical erector spinae (CES) muscle of the participants' dominant side. Muscle activity was measured using EMG at 0–1 min and 15–16 min of each session. Measured muscle EMG amplitudes were a percentage of the reference voluntary contraction (%RVC) value. In addition, the kinematic data of the neck was col-

lected through an image J program from photographs taken at 0 min and 16 min at shoulder height with the camera on the dominant side of the participants. The participants underwent two sessions. In the first session, participants wore a headset with no activated postural correction feedback system and worked on the computer for 16 min. All participants took a 20 min break between the sessions to remove the carry-over effect. In the second session, the participants wore the headset with an activated feedback system and performed the same computer tasks. A two-way repeated ANOVA compared the postural angle and muscle activity (time and feedback) differences.



**Figure 1.** Posture during experiment (1: Definition of the neck angle, 2: Placement of the feedback System).

**Results:** Significant differences in the neck angle ( $F=6.206$ ,  $p=0.034$ ) and %RVC of CES ( $F=7.688$ ,  $p=0.022$ ) were confirmed using the feedback system.

**Conclusion:** Our study revealed that the feedback system corrects poor postures and reduces unnecessary muscle activation during computer work. In a previous study, the group with neck pain showed flexed neck posture and high CES muscle activity, suggesting possible overload. The improved neck posture and reduced CES muscle activity in this study suggest that neck pain can be prevented. Therefore, we suggest using a feedback system to prevent neck pain.

P178

### ANALYZING BONE TURNOVER MARKERS IN NEWLY DETECTED THYROTOXICOSIS

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Craiova, Romania

**Objective:** Thyrotoxicosis is associated with accelerated bone turnover, reduced BMD and potential high fracture risk. Bone turnover markers (BTM) might normalize under the correction of thyroid hormones excess.

**Methods:** This is a case report of a female in her late 30s with very high hyperthyroidism-associated BTM.

**Case report:** This is a 39-year-old patient admitted as an emergency for psychomotor agitation, tremors of the extremities, palpitations, feeling of retro-orbital tension, weight loss of 15 kg in 3 months. Some symptoms started about a year with emphasis in the last days, non-specific bone pain. The thyroid panel at the admission showed a suppressed TSH<0.03  $\mu$ UI/mL(normal:0.5-4.5), FT4 (free levothyroxine)=26.86 pmol/L(normal:9-19), high ATPO (anti-thyroperoxidase antibodies)=21.45 UI/mL(normal:0-5.61), and ATG (aAnti-thyroglobulin antibodies)=168.6 UI/mL(normal:0-115), and positive TRAb (thyroid stimulating hormone receptor antibody)=17.35 U/L(normal:0-1.75). 25OHD (25-hydroxyvitamin D) was tested and found low=18.41 ng/mL(normal:30-100) with normal PTH=20.34 pg/mL(normal:15-65). BTM panel showed high bone formation marker osteocalcin=92.54 ng/mL(normal:11-43), normal alkaline phosphatase=118 U/L(normal:38-129), and elevated P1NP=320.6 ng/mL(normal:15.13-58.59), with increased bone resorption marker CrossLaps=1.8 ng/mL(normal:0.158-0.442). Thyroid ultrasound showed hypo-echoic, intensely inhomogeneous pattern, suggestive for an autoimmune disease. The patient started daily methimazole 20 mg/d and vitamin D supplements 2000 UI. After 6 weeks, TSH remained high=0.0021  $\mu$ UI/mL(normal:0.5-4.5) with a good response of FT4=8.48 pmol/L(normal:9-19). 25OHD increased to 21.1 ng/mL(normal:30-100) while BTM got close to normal: osteocalcin=60.65 ng/mL(normal:11-43), alkaline phosphatase=134 U/L(normal:38-129), P1NP=322.4 ng/mL(normal:15.13-58.59), CrossLaps=0.88 ng/mL(normal:0.158-0.442). After 3 months, TSH was 0.25  $\mu$ UI/mL(normal:0.5-4.5), FT4=9.15 pmol/L(normal:9-19) under methimazole 10 mg/d while BTM decreased: osteocalcin=57.61 ng/mL(normal:11-43), alkaline phosphatase=141 U/L(normal:38-129), P1NP=195.4 ng/mL(normal:15.13-58.59), CrossLaps=0.95 ng/mL(normal:0.158-0.442).

**Conclusion:** Hyperthyroidism leads to abnormal profile of BTMs that should be taken into consideration as an alternative cause with a general good prognostic.

P179

### VITAMIN D STATUS AND HABITUAL DIETARY CALCIUM INTAKE MODIFY THE EFFECT OF DEER MILK (AS COMPARED WITH AN ORAL NUTRITIONAL SUPPLEMENT) ON BONE BIOMARKERS: AN EXPLORATORY PILOT STUDY

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**Objective:** To compare the effectiveness of deer milk for improving bone turnover markers with that of a commercially available oral nutritional supplement (ONS) in older women.

**Methods:** This study was a 11-week randomised, double-blind, control, parallel group, longitudinal study. 120 healthy women aged 65-80 years having a BMI <25 kg/m<sup>2</sup> were recruited. The women were randomized into two groups and supplemented with 200 ml deer milk (Pāmu Deer Milk) (providing 15 g protein and 623 mg calcium) or a commercial ONS (providing 12 g protein, 2.2 µg vitamin D and 182 mg calcium) for 11 weeks. Anthropometry and body composition were measured, and blood samples were collected for bone turnover markers, C-telopeptide of type I collagen (CTX-I) and procollagen I N-terminal propeptide (PINP), PTH, and 25(OH)D.

**Results:** 102 women (deer milk 45, ONS 57) completed the study. Mean baseline 25(OH)D was 112±35 nmol/L. 30% of the women had 25(OH)D concentrations ≥125 nmol/L, 57% had levels between 75-125 nmol/L, and 12% had levels between 50-75 nmol/L. 25(OH)D levels did not change significantly over time. Between group differences in PTH, CTX-I and PINP were not significant, however they decreased significantly in the deer milk group over time: PTH (4.51±2.50 to 4.06±2.24 pmol/L, P=0.02), CTX-I (0.40±0.23 to 0.32±0.18 pmol/L, P<0.01) and PINP (66.4±25.7 to 61.1±24.5 µg/L, P=0.01). When stratified according to vitamin D status, the between group differences reached statistical significance for PTH (-16.8±12.1% vs. 8.48±32.5%, P<0.036) and CTX-1 (-17.9±35.7% vs. 12.5±39.6%, P=0.036) only in women with baseline 25(OH)D ≥125 nmol/L. When stratified according to habitual calcium intake, at an intake of <800 mg/d, PTH and CTX-1 decreased significantly in the deer milk group, and the between group difference in change reached statistical significance for CTX-1 (-27.7±21.9% vs. 7.31±46.2%, P=0.01). In women with 25(OH)D <125 nmol/L or habitual calcium intake >800 mg, the change in these biomarkers did not differ between groups.

**Conclusion:** Vitamin D status and habitual calcium intake may modulate bone turnover markers' response to Pāmu Deer Milk (as compared with ONS), suggesting women with higher vitamin D status and/or lower calcium intake may benefit more from deer milk supplementation.

P180

### DECISION OF ANTI-OSTEOPOROTIC MEDICATION IN AN ELDERLY FEMALE WITH BREAST MALIGNANCY

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**Objective:** Adjuvant aromatase inhibitor therapy leads to accelerated bone loss, and an increased risk of fractures, thus a periodical assessment of bone turnover markers (BTM) and BMD is necessary. We aim to introduce a patient diagnosed with breast neoplasm surgically treated in addition to adjuvant radiotherapy and chemotherapy, and a diagnostic of osteoporosis.

**Case report:** This is an 85-year-old patient admitted for bone assessment. Her personal medical history includes mammary cancer at 77 surgically treated (plus adjuvant radiotherapy and chemotherapy) under Tamoxifen 20 mg/d for 2 years following an initial 3-y period of aromatase inhibitors (AI). The patient entered menopause at 58 years and had a prior diagnostic of osteoporosis at 69. On current admission, total serum calcium is 9.78 mg/dL (normal:8.4-10.3), phosphorus=4.38 mg/dL (normal:2.5-4.5), mildly reduced 25OH(25-hydroxyvitamin D)=24.1 ng/mL (normal:30-100) with normal PTH=33.36 pg/mL (normal:15-65), Bone formation marker panel shows osteocalcin=17.38 ng/mL (normal:15-46) with bone resorption marker CrossLaps=0.22 ng/mL (normal:0.33-0.782). The history of osteoporosis assessments and therapy shows at 69 y L1-L4 lumbar BMD=0.892 g/cm<sup>2</sup>, T-score=-2.4SD, Z-score=-0.7SD. Monthly oral ibandronate was started for 2 years. BMD-DXA showed an improvement of L1-L4 BMD=0.949 g/cm<sup>2</sup>, T-score=-1.9SD, femoral neck BMD=0.779 g/cm<sup>2</sup>, T-score=-1.9SD. She continued with zoledronate 5 mg/year for 2 years when AI was initiated then alendronate 70 mg/week for 6 more years. One year prior to current admission: L1-L2 BMD=1.000 g/cm<sup>2</sup>, T-score=-1.4SD, femoral neck BMD=0.770 g/cm<sup>2</sup>, T-score=-1.9 SD and drug holiday was preferred by the patient (no prevalent fractures) for 1 year. Currently, DXA showed a bone loss: L1-L4 BMD=0.950 g/cm<sup>2</sup>, T-score=-1.8SD, femoral neck BMD=0.752 g/cm<sup>2</sup>, T-score=-2.1SD, thus risedronate 75 mg/month was initiated.

**Conclusion:** Long term history of osteoporosis interferes with the treatment for breast cancer. The decision of drug holiday in these circumstances should take into consideration patient's option, as well.

P181

### COHORT STUDY OF FRAGILITY FRACTURES SCREENING ON ROUTINE CT SCANS ACCORDING TO L1 TRABECULAR ATTENUATION FRAGILITY FRACTURES

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**Objective:** Discuss the relationship between L1 vertebral trabecular attenuation measurement and fragility fracture on routine thoracoabdominal CT.

**Methods:** This retrospective cohort study included 695 consecutive participants 65 years and older hospitalized in this center between December 30, 2018, to December 30, 2020. Divided into 2 cohorts: one is the group of patients with fragility fracture, a total of 199 people; the other is the corresponding age group of non-fractured patients, a total of 576 people. Mean L1 vertebral trabecular attenuation of these patients were measured at thoracoabdominal CT. Analyze the differences between the two groups of patients in terms of age, gender, CT-attenuation, etc. Use SPSS 26.0, stata16.0 for statistical analysis.

**Results:** There were 119 patients diagnosed with fragile fractures clinically and radiologically. Among them, 87 were women (73.1%) and 32 were men (26.9%). The L1 CT-attenuation in the fragility fracture group (84.3 HU±34.2) was significantly lower than that in the non-fracture group (134.1 HU±44.0) (P<0.001). ROC curve analysis determined the optimal threshold was 105 HU. (sensitivity=73.1%, specificity=73.1%), and the area under the curve was 0.810.

**Conclusion:** For patients aged ≥50 years, the L1 CT-attenuation values in the fragility fractures group are significantly lower than that in the non-fracture group. Among them, women and the elderly are more likely to develop fragility fractures. Decreased L1 CT-attenuation are related to the occurrence of fragility fractures. This method can be used to detect and treat patients at risk of fragility fractures in an early stage.

P182

### EFFECTION OF 3D PRINTING COMBINED WITH LATERAL RECTUS ABDOMINIS MINI-INCISION IN THE TREATMENT OF ACETABULAR FRACTURES IN THE ELDERLY PATIENT

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**Objective:** To investigate the effect of 3D printing combined with lateral rectus abdominis mini-incision in the treatment of acetabular fractures in the elderly patient.

**Methods:** 48 cases of acetabular fractures were randomly divided into two groups: 3D printing combined with lateral rectus abdominis mini-incision group (Experimental group) and lateral rectus

abdominis mini-incision group (Control group), 24 cases in each group. In the Experimental group, CT scan the acetabular fractures side before the operation to provide image in the software in order to build the 3D printed physical model which is helpful in selecting the steel plate of appropriate length, whose local angle can also be adjusted and preset, whereas the control group only made a surgical plan based on imaging data. The incision length, bone fracture healing time, operation time, bleeding volume, fluoroscopy times, Matta criteria (evaluating fracture reduction) and Harris score (evaluating hip function in patients after surgery) were compared between two groups.

**Results:** Between Experimental and Control group, there was no significant difference in aspects of incision length [(9.21±1.03) cm vs. (8.93±0.98) cm], bone healing time [(3.6±0.4) months vs. (3.4±0.7) months]. There were significant differences in aspects of bleeding volume [(521.4±97.2) mL vs. (754.1±63.2) mL], operation time [(2.7±0.3) h vs. (3.7±0.3) h], fluoroscopy times (7.9±1.1) vs. (11.3±1.7), Matta imaging excellent and good rate 93.5% vs. 82.1%. Harris criteria excellent and good rate 80.4% vs. 70.1%, P<0.05. **Conclusion:** 3D printing combined with lateral rectus abdominis mini-incision has great significance in the treatment of acetabular fractures in the elderly patient. It is helpful the doctor to select the appropriate length of anatomic plate before operation and to pre-bend and adjust it. It is also helpful the surgeon to clearly know the expected operation reduction and understand the expected effect. So as to shorten the operation time, reduce the amount of bleeding and reduce the number of fluoroscopy, increase the Matta imaging and Harris criterial excellent and good rate. It is worthy of clinical application.

P183

### INVESTIGATION OF A BLENDED REHABILITATION APPROACH IN FUNCTION AND PHYSICAL ACTIVITY LEVELS OF PATIENTS WITH KNEE OSTEOARTHRITIS: A RANDOMISED CONTROLLED TRIAL IMPLEMENTED IN STRUCTURALLY WEAK URBAN AREAS IN GREECE

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**Objective:** To investigate the effectiveness of a blended web-based intervention in physical function, pain, physical activity (PA) and health-related QoL of patients with knee osteoarthritis (KOA).

**Methods:** 44 eligible and consenting participants with KOA were recruited from the West Attica region (structurally weak areas in Athens), Greece in an open, randomised study with two arms. The protocol of the study was conformed with the CONSORT guidelines and the registered in the ISRCTN clinical trial registry (ISRCTN12950684). Participants in the intervention group were prescribed to follow a 6-week blended rehabilitation program.



The blended approach consisted of a web-based component with functional balance exercises and advice material based on ES-CAPE-PAIN application (twice weekly) and an outdoor PA component (three times weekly). The control group was prescribed to follow an equivalent duration and frequency outdoor PA program and general advice. Baseline, 6-week and 12-week follow up assessments were performed. The primary outcome was self-reported function as measured by Knee Injury Osteoarthritis Outcome Score (KOOS). Secondary measures included pain using Visual Analogue Scale (VAS), and performance-based outcome measures of function (Timed Up and Go Test, Sit to Stand test), PA levels (Lower Extremity Activity Scale, Baecke Scale and diary), psychological perspective (Tampa Scale of Kinesiophobia) and health-related QoL (Short-Form 12). The effects of the blended approach were assessed using separate factorial analyses of variance involving group and by test occasion comparisons, with repeated measures on the latter factors.

**Results:** Patients undertaking the blended approach showed significantly greater improvements over the 12 weeks compared to the control arm in outcomes including function (30 vs. 12%); PA (57 vs. 12 %); pain (56% vs. 41%) and levels of kinesiophobia (15 vs. 4%), respectively ( $p < 0.05$ ). Health related QoL did not offer clinically relevant changes ( $p$ : ns) between groups over time.

**Conclusion:** An equivalent frequency and duration prescribed blended approach consisting of exercise, advice and outdoor PA compared to usual outdoor PA, elicited superior restoration of function, PA levels, pain in patients with KOA. However, health related QoL was improved in both groups showing that encouragement of PA is an essential component of rehabilitation in KOA patients' QoL but not function.

**Acknowledgments:** State Scholar Foundation Greece (IKY) grant for postdoctoral research. Special thanks to Prof Michael Hurley for the permission to use and adapt into the Greek language the ESCAPE pain awarded material. This abstract was partly funded by the University of West Attica, Greece

## P184

### TRANSCULTURAL ADAPTATION, VALIDATION AND INVESTIGATION OF PSYCHOMETRIC PROPERTIES OF THE GREEK VERSION OF THE LOWER EXTREMITY ACTIVITY SCALE (LEAS) IN PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** In Greece, there is no specific tool for measuring OA related PA, therefore aim of this study is to investigate the Lower Extremity Activity Scale (LEAS) [1,2] psychometric properties in KOA patients.

**Methods:** Eligible participants with KOA were recruited from the West Attica region, Greece. The backward translation approach was used, consisting of a total of 5 stages of translation. Internal consistency, test-retest reliability, construct validity, convergent

validity and responsiveness were assessed. In order to investigate LEAS construct and convergent validity correlations were investigated between LEAS, modified Baecke Scale, self-reported physical function measured with Knee Osteoarthritis and Injury Score (KOOS), pain levels, (Visual Analogue Scale-VAS), Tampa scale for Kinesiophobia (TSK) and Health-related QoL using Short-Form 12. Moreover, correlations were investigated between LEAS and functional clinical tests Timed Up and Go (TUG) and Chair Rise Test (CRT).

**Results:** 38 KOA patients (31 women, 63,4 years old) participated in the study. The transcultural adaptation of LEAS into Greek did not encounter any particular difficulties. Cronbach's alpha was found as 0,97, showing a high level of internal consistency. The test-retest reliability of LEAS was high (ICC=0,96). A moderate negative correlation was found with the TUG clinical test ( $r = -0.48$ ,  $p = 0.004$ ), a moderate positive correlation with the subscale of the SF-12 for physical function ( $r = 0.47$ ,  $p = 0.015$ ) and a positive good correlation was found with the TSK questionnaire ( $r = -0.58$ ,  $p = 0.002$ ). Responsiveness of LEAS was found medium (effect size=0,6) after 6 weeks of suggested increase in PA.

**Conclusion:** The Greek version of the of LEAS was found as reliable and valid scale for the clinical population of KOA assessed and can therefore be used by health professionals.

#### References:

1. Terwee CB et al. Osteoarthritis Cartilage 2011;19:620,
2. Ghomrawi HM et al. Clin Orthop Relat Res 2017;475:542.

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## P185

### PROGNOSTIC FACTORS FOR 1-YEAR MORTALITY AFTER FRAGILITY HIP FRACTURE IN CHRONIC KIDNEY DISEASE PATIENTS

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**Objective:** Fragility hip fracture (FHF) in the older population is increasing worldwide. A combination of FHF and chronic kidney disease (CKD) increased mortality rate of the patients. However, study on prognostic factors for 1-year mortality prediction after FHF in CKD patients is limited. We aimed to identify prognostic factors for 1-year mortality after FHF in CKD patients.

**Methods:** FHF (including femoral neck fracture and intertrochanteric fracture) patients who were admitted at Siriraj Hospital between July 2016 and April 2021 were retrospectively reviewed. The inclusion criteria included menopause women or men age >50 years, eGFR <60 mL/min/1.73m<sup>2</sup>, and follow-up ≥1 year or until death. Exclusion criteria included multiple, pathologic, or periprosthetic fractures. Data including demographic data, peri-operative laboratory and surgery related variables were compared between survive and decease groups. To determine predic-

tive variables associated with 1-year mortality after FHF in CKD patients, univariate logistic regression was used for independent variables. Variables with p-value <0.2 were entered into multivariate logistic regression for dependent variables which p-value <0.05 was considered as significant prognostic factor for 1-year mortality after FHF in CKD patients.

**Results:** Of 1,128 FHF patients registered, 383 CKD patients were analyzed. 74 patients died within 1 year after FHF. The survivors have a significant lower in Charlson comorbidity index (CCI) (p=0.015), ambulatory assisting device usage pre-operatively (p=0.036) and PTH (p=0.032). On the other hand, the survivors had significantly higher hemoglobin (p=0.014), eGFR (p=0.012), calcium (p<0.001) and albumin (p=0.046). Multivariate logistic regression analysis demonstrated that BMI (odd ratio 0.8 (95%CI 0.71-0.95), p=0.008) as an only predictor for mortality within 1 year after FHF in CKD patients.

**Conclusion:** CKD patients who prior used an ambulatory assisting device, higher CCI, PTH, lower hemoglobin, eGFR and calcium have a higher risk for mortality within 1 year after FHF. However, only low BMI was shown to be a prognostic factor which is associated with 1-year mortality after FHF in CKD patients.

## P186

### FEATURES OF VITAMIN D METABOLISM AND REGULATION OF CALCIUM PHOSPHORUS METABOLISM DURING PREGNANCY

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**Objective:** To study the features of vitamin D metabolism and their relationship with the main complications of pregnancy and calcium-phosphorus balance.

**Case report:** A 35 years old patient was diagnosed with gestational diabetes mellitus (GDM) at 20<sup>th</sup> week of gestation, which was managed by diet and long-acting insulin. She was taking 2000 IU of cholecalciferol since beginning of pregnancy without additional calcium. The features of vitamin D metabolism were evaluated at the 24<sup>th</sup> week of gestation, by HPLC-MS/MS method successfully participating in the DEQAS program: 25(OH) D - 29 ng/ml (20.0-60.0), 3-epi-25(OH)D3 - 2.3 ng/ml (1.0-10.0), 24,25(OH)2D3 - 3.2 ng/ml (0.5-5.6), 25(OH)D3/24,25(OH)2D3 - 8.8 (7.0-25.0) with significantly increased 1,25(OH)2D3 - 201.00 pg/ml (18.00-78.00) which is typical for physiological changes of this metabolite in patients during pregnancy, starting from its early stages. At the same time, PTH increased to 75.67 pg/ml (15-65), without deviations of calcemia (Ca total - 2.37 mmol/l (2.15-2.55), albumin - 44 g/l (35-50), albumin corrected calcium - 2.25 mmol/l).

**Conclusion:** The presented clinical case demonstrates the feasibility of studying calcium-phosphorus metabolism and activation of vitamin D metabolism during pregnancy and their connection with complications. The HPLC-MS/MS method in our case report makes it possible to detect an increase in activation of vitamin D

by 2.6 times without activation of vitamin D catabolism. These metabolic pathways are confirmed by the ratios of 1.25(OH)2D or 24.25(OH)2D to 25(OH)D. We may speculate that GDM is related to vitamin D metabolism associated with a higher rate of vitamin D activation than expected during pregnancy, which has no pathological effect on blood calcium levels with even increased PTH indicating the peculiarities of PTH or calcium circulation during pregnancy. The study of these issues is an urgent task for expanding knowledge about the regulation of vitamin D metabolism during pregnancy and will contribute to understanding its role in optimizing maternal and fetal health.

**Acknowledgment:** The study was supported by grant of the Russian Science Foundation, project № 19-15-00243-P

## P187

### SCORE ASSESSMENT OF EFFECTIVENESS OF KNEE OSTEOARTHRITIS TREATMENT WITH UNDENATURED COLLAGEN TYPE II

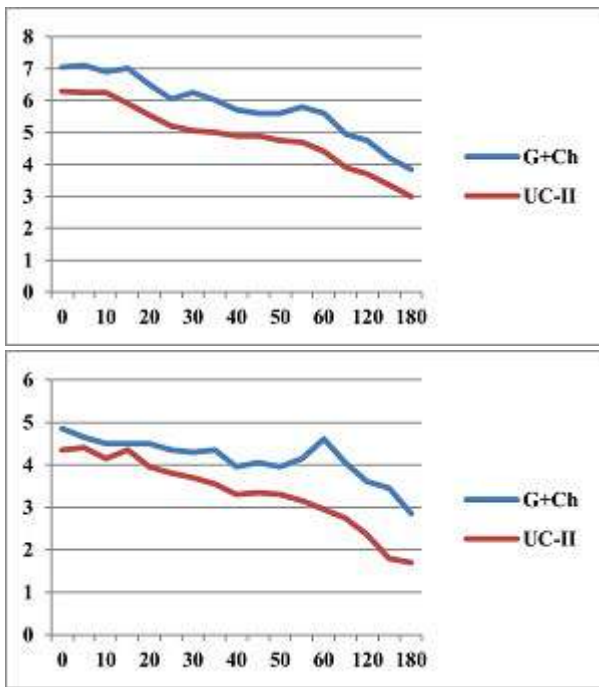
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**Objective:** The autoimmune degradation of type II collagen plays the important role in the pathogenesis of OA. The search for a chondroprotective agent that would reduce the autoimmune mechanisms of collagen degradation is actual. The perspective agent is undenatured collagen type II (UC-II), oral administration of which contributes to the formation of immune tolerance and leads to reduce of T-killers attack of cartilage, decrease of proinflammation cytokines synthesis and increase of antiinflammation cytokines production. The purpose of the study was to assess the dynamics WOMAC during UC-II administration in compare to glucosamine and chondroitin (G + Ch) combination in patients with Grade II knee OA.

**Methods:** 40 patients with Grade II knee OA were investigated. 20 patients were administrated the UC-II (40.0 mg cartilage collagen undenatured) during 180-d period, 20 patients took the combination of G + Ch during the same period. WOMAC index was used to evaluate the effectiveness and was completed before the start of therapy and after 180 d of treatment. Visual analog scale (VAS) from 0-10 was used for assessment the WOMAC subscale by patient.

**Results:** The initial and final results are presented in Figure 1 and Figure 2. The VAS score is set vertically, the WOMAC questions – horizontally.



We detected that the therapy during 180-day period with UC-II and G + Ch combination significantly improved the most subscales of WOMAC index, which indicates to the positive therapeutic effect of both chondroprotective agents. Comparing both investigated groups demonstrated the better results according to decrease of WOMAC pain subscale in the group of UC-II: reduce of pain during walking (item 1a) by 28.76% ( $2.99 \pm 0.37$  to  $3.85 \pm 0.35$ ), decrease of stair climbing pain (item 1b) by 31.34% ( $3.35 \pm 0.36$  to  $4.4 \pm 0.40$ ), (item 1c) reduce of nocturnal pain by 67.65% ( $1.70 \pm 0.41$  to  $2.85 \pm 0.51$ ), reduce of rest pain (item 1d) by 50.00% ( $1.50 \pm 0.39$  to  $2.25 \pm 0.42$ ) and weightbearing pain (item 1e) by 30.23% ( $2.15 \pm 0.36$  to  $2.80 \pm 0.42$ ) ( $p < 0.05$ ). The administration of UC-II significantly decreased the morning stiffness (subscale 2) by 58.70% in compared to the same WOMAC subscale in G + Ch treated group ( $2.30 \pm 0.4$  to  $3.65 \pm 0.33$ ,  $p < 0.05$ ). Similar dynamics was observed with the intensity of stiffness during the day (subscale 3). In this subscale UC-II demonstrated the statistically significant better result by 40.82% ( $2.45 \pm 0.39$  to  $3.45 \pm 0.90$ ,  $p < 0.05$ ) compared to the combination of G + Ch. We detected the significant benefit in improving of the following indicators of functional mobility of knee joint in the group of UC-II: bending to floor (item 4e) by 29.79% ( $2.35 \pm 0.46$  to  $3.05 \pm 0.49$ ), walking on flat (item 4f) by 20.00% ( $2.75 \pm 0.42$  to  $3.30 \pm 0.41$ ), getting in/out of car (item 4g) by 37.99% ( $2.79 \pm 0.39$  to  $3.85 \pm 0.39$ ), going shopping (item 4h) by 24.66% ( $3.65 \pm 0.46$  to  $4.55 \pm 0.45$ ), lying in bed (item 4i) by 59.26% ( $1.35 \pm 0.41$  to  $2.15 \pm 0.45$ ), sitting (item 4n) by 49.07% ( $1.61 \pm 0.44$  to  $2.40 \pm 0.41$ ), light domestic duties (4q) by 77.85% ( $1.49 \pm 0.34$  to  $2.65 \pm 0.47$ ) ( $p < 0.05$ ).

**Conclusion:** The therapy with undenatured type ii collagen during 180-d period in patients with Grade II knee OA demonstrates the significant benefit in reducing pain syndrome, joint stiffness and improving the most indicators of joint function in compare to glucosamine and chondroitin combination (according to WOMAC Index).

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## IN SITU PREPARATION OF ALENDRONATE-LOADED ZIF-8 NANOPARTICLES ON ELECTROSPUN NANOFIBERS FOR ACCELERATING EARLY OSTEOGENESIS IN OSTEOPOROSIS

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**Objective:** Applying guided bone regeneration membrane (GBRm) to treat bone defects in osteoporotic patients remains a challenge as they are unable to restore the fundamental balance between osteoblasts and osteoclasts, resulting in the ineffectiveness of osteoporotic bone injury treatment. In this study, a multifunctional polycaprolactone/gelatin (PG)-blended membrane embedded with alendronate-loaded zeolitic imidazolate framework-8 (Aln/Zif-8) nanoparticles were fabricated and was used as GBR membranes to repair critical bone defect under the impact of osteoporosis in rats.

**Methods:** The PG nanofiber membrane was prepared using the electrospinning technique and then embedded with Aln-loaded Zif-8 NPs using simple solution-phase synthesis. Next, the physicochemical properties of the target membrane, including (SEM, XRD, wettability, and tensile strength) were characterized. In vitro, the biological functions of osteoblasts/osteoclasts on cellular and molecular levels were analyzed. Finally, the in vivo repair potential was evaluated in osteoporosis SD rats.

**Results:** Surface characterizations confirmed the successful synthesis of PG/Aln-Zif-8 nanofibers endowed with excellent mechanical strength. The release kinetics analysis also showed the synergistic effects of the coordination bonds between Aln, zinc ions ( $Zn^{2+}$ ), and organic ligands playing a critical role in regulating the initial burst release and delayed release of Aln and  $Zn^{2+}$ , respectively. The in vitro results of MC3T3-E1 and RAW264.3 cells demonstrated that the PG/Aln-Zif-8 membranes possess superior anti-osteoporosis and osteogenesis properties. Furthermore, the PG/Aln-Zif-8 samples also exhibited significant bactericidal properties against *Staphylococcus aureus* and *Escherichia coli*. The in vivo results further confirmed that PG/Aln-Zif-8 membranes had superior osteoinduction abilities, contributing to the accelerated osseointegration in the osteoporosis model.

**Conclusion:** These newly bioinspired surface modifications highlight the promising alternative for the fabrication of multifunctional MOFs on electrospun nanofiber membranes to accelerate early osteogenesis in osteoporosis.

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### INTERPRETABLE DEEP LEARNING APPROACHES FOR OSTEOPOROSIS RISK SCREENING AND INDIVIDUALIZED RISK EVALUATION USING LARGE POPULATION-BASED DATA

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For screening osteoporosis, several clinical tools such as FRAX and machine learning models have been attempted, but they presented limitations including low accuracy, limited risk factors and lack individualized explanation. Therefore, this paper presents an interpretable deep learning (DL) model for osteoporosis risk screening with clinical features. Clinical interpretation with individual explanations of feature contributions is provided using an explainable artificial intelligence (XAI) technique. In this study, we used two separate datasets, namely NHANES and KNHANES datasets from the US and South Korea. DL model for osteoporosis diagnosis was trained on the datasets and significant risk factors were investigated. The performance of DL model was compared with ML models and conventional clinical tools. Additionally, contribution ranking of risk factors and individualized explanation of feature contribution were examined. Our DL model showed AUCs of 0.851 and 0.922 for the femoral neck and total femur BMD, respectively, for the NHANES dataset. The corresponding AUC values for the KNHANES dataset were 0.827 and 0.912, respectively. Significant features were induced and each feature's integrated contribution and interpretation for individual risk were presented. We demonstrate that the developed DL model significantly outperforms conventional machine learning models and clinical tools. Our XAI model produces high-ranked features along with the integrated contributions of each feature, which facilitates the interpretation of individual risk.

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### A NOVEL ACCELEROMETRY-BASED METHOD FOR POLYNEUROPATHY SCREENING: A PILOT STUDY

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**Objective:** To evaluate a telemedicine wearable device with a machine learning algorithm that can be used as a screening and tracking tool for polyneuropathies.

**Methods:** A monocentric, diagnostic study was conducted at the Institute of Rheumatology in 2020. A control group consisted of healthy volunteers and patients with radiculopathy, and the other group was composed of patients with systemic autoimmune

rheumatic diseases (SARDs) or diabetes who had suspected polyneuropathy. The participant started with the electromyography (EMNG) examination; electrodes were placed on the limbs, and the amplitude, latency, and conduction velocity of the n. medianus, n. ulnaris, n. peroneus, n. tibialis, and n. supraspinatus (motor and sensory fibers) were measured. The novel method consists of four wearable sensors placed over the middle of the hands and feet, and participants performed six exercises (EXC1: walking on the toes and heels; EXC2: tandem walking; EXC3: heel-knee test; EXC4: Romberg test; EXC5: postural tremor; EXC6: finger-nose test) with open and closed eyes. Raw data was sent through the Bluetooth connection from the sensors to the tablet and then via WiFi connection to the central server for further analysis. A wearable device uses a specific mathematical algorithm that transforms signals from the accelerometer and gyroscope into specific values. The outcome is defined as a binary variable: whether or not polyneuropathy exists.

**Results:** The study included 23 participants (9 ♂ and 14 ♀), 12 in a control group (5 healthy, 7 with radiculopathy), and 11 with suspected polyneuropathy (4 SARDs, 7 with diabetes). 8/11 (72.7%) participants had polyneuropathy confirmed with an EMNG examination. The features (such as acceleration and power) obtained with signal processing were examined, and only the most important features that can be used to discriminate polyneuropathy were used for binary classification model development (Table 1). As shown, 1 feature from EXC1 and 4 features from EXC3 had the best discriminatory power; compared to the EMNG (gold standard), the sensitivity and specificity are satisfactory, but the confidence intervals are still wide. Positive predictive value is significantly lower compared to negative predictive value.

**Table 1.** Validation of the new tool for polyneuropathy screening

Model		EMNG		Sn	Sp	PPV	NPV
		- (n=15)	+ (n=8)				
1 FT EXC 1 + 4 FT EXC 3	WS +	3	7	0.875 (0.466- 0.993)	0.800 (0.513- 0.946)	0.700 (0.513- 0.946)	0.923 (0.621- 0.996)
	WS -	12	1				

FT: feature, WS: wearable sensors, NCS: nerve conduction studies

**Conclusion:** Wearable sensors represent accurate and promising technology for the diagnosis of polyneuropathies of different etiologies. Further studies are needed to evaluate the true accuracy of the novel proposed diagnostic tool.

**Acknowledgment:** DIVS Neuroinformatics for providing equipment for signal processing and data analysis.

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### REDUCTIONS IN BODILY PAIN AND WOMAC PAIN FOLLOWING KNEE ARTHROPLASTY: A LATENT CHANGE SCORE ANALYSIS

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**Objective:** Chronic knee osteoarthritis pain may lead to chronic multisite pain via abnormal pain processing, poor mental health and enhanced central sensitization. Following a knee arthroplasty (KA), we hypothesize that pain reduction occurs not only in index knee over a year period, but also in other bodily pain areas and that pain reduction attributable to knee surgery leads to reductions in bodily pain. The objectives of this study are to estimate: (a) the change in pain across multiple bodily parts, including the index knee, from preoperative to one-year post-operative period; (b) relationship between the changes in bodily part pain and changes in the index knee pain measured by WOMAC Pain; and (c) predictors of change in pain using a set of established covariates.

**Methods:** Data from the KASTPain study, a multisite randomized clinical trial, was used (N=384) to estimate the change in bodily pain areas over one-year period following KA using univariate and bivariate latent change score (LCS) models. Using pre – one-year post design, the pain in the index knee was measured with the WOMAC Pain scale and pain in various body sites was measured with a scale derived from the Fibromyalgia Diagnostic Screen.

**Results:** Univariate LCS models showed that, following KA, all chronic bodily pain and index knee pain reduced significantly ( $p < 0.05$ ) over a one-year period with the exception of low back pain. Univariate LCS model with covariates indicated that persons with higher levels of baseline WOMAC Pain scores tended to have more reduction of bodily pain postoperatively (all  $p$ 's  $< 0.05$ ). Greater reductions in WOMAC Pain lead to greater reductions in all four bodily pain areas.

**Conclusion:** Our results are consistent with earlier reports that KA is highly effective at reducing pain in the surgical knee. Although KA specifically targets the index knee, our results showed parallel reduction in pain across multiple bodily regions. Further, the greater the reduction in surgical knee pain the greater the reduction in bodily pain sites beyond the surgical knee.

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### MALE OSTEOPOROSIS: ENDOCRINE CONSIDERATIONS ON NORMOCALCEMIC PRIMARY HYPERPARATHYROIDISM

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tics, Faculty of Dental Medicine, University of Medicine and Pharmacy of Craiova, Craiova, <sup>5</sup>Carol Davila University of Medicine and Pharmacy & Dr. Carol Davila Emergency Military Hospital, Bucharest, Romania

**Objective:** Male osteoporosis may involve several endocrine issues like high prolactin, hypogonadism, and primary hyperparathyroidism (PHP). The PTH has a catabolic effect on the bone and excessive secretion pathologically increases bone resorption, leading to low BMD. Hyperprolactinemia leads to osteoporosis through hypogonadism and the inhibition of osteoblasts. We aim to introduce a case with male osteoporosis and normocalcemic PHP.

**Methods:** This is a case report. DXA (GE Lunar) was assessed.

**Case report:** This is a 53-year-old male patient admitted for bone status assessment. His personal medical history includes lumbar L3-L4-L5 fractures 4 years ago and he received the diagnostic the osteoporosis after 2 years. DXA showed lumbar L1-L4 T-score=-3.2SD, Z-score=-2.8SD, femoral neck T-score=-2.3SD, Z-score=-1.8SD. Oral ibandronate 150 mg/month was initiated and followed for 2 years. Normal calcium levels were associated with a mild increased of PTH, PHP being otherwise asymptomatic and choose not to be referred to parathyroidectomy. On current admission, total serum calcium=9.4 mg/dL(normal: 8.4-10.2), phosphorus=2.9 mg/dL(normal: 2.3-4.7), mildly reduced 25-OHD(25-hydroxivitamin D)=20.9 ng/mL(normal <30) and mildly increased PTH=73.3 pg/mL(normal: 15-65). Cervical ultrasound shows increased thyroid volume and inferior to the right thyroid lobe - a hypoechoic, inhomogeneous, non-vascularized structure of 0.55/0.25/0.33 cm suggestive for parathyroid adenoma. Other causes of secondary osteoporosis were explored and found negative. Normal total testosterone with FSH=5.27 mUI/mL(normal:1.5-12.4), LH=7.29 mUI/mL(normal:1.7-8.6), IGF1=165.1 ng/mL(normal: 69-224), prolactin=16.13 ng/mL(normal: 4.04-15.2). Bone turnover markers panel shows low bone formation markers osteocalcin=13.86 ng/mL(normal: 14-42), and normal alkaline phosphatase=58 U/L(normal:40-150), P1NP=26.02 ng/mL(normal:15.13-58.59), and bone resorption marker CrossLaps=0.185 ng/mL(normal: 0.158-0.442). BMD improved as followings: L1-L4 T-score=-2.1SD, Z-score=-1.6SD, femoral neck T-score=-2.4SD, Z-score=-1.6SD, 1/3 distal radius T-score=-0.9SD, Z-score=-0.9SD. TBS was mildly reduced (1.318). Parathyroidectomy was recommended, but also a continuation of the same bisphosphonates regimes due to prevalent fractures in addition to vitamin D replacement was recommended.

**Conclusion:** Male bone mass loss may be caused by a series of factors including PHP which otherwise may not express other complications.

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### DEVELOPMENT OF A FULL-AUTOMATED SYSTEM TO ASSESS THE BONE MINERAL DENSITY OF THE PROXIMAL FEMUR FROM CLINICAL CT IMAGES

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**Objective:** QCT can be employed as a substitute for DXA in measuring proximal femur BMD. However, as commercially available software is usually necessary for quantifying BMD from QCT, we aimed to 1) develop a full-automated system that quantifies BMD from CT images and 2) validate its accuracy in a multi-center study.

**Methods:** This study included 872 pairs of hip CT and DXA images with a diagnosis of osteoporosis (380 hips) according to the T-score calculated from the DXA measurements of the proximal femur (DXA-BMD). CT images were acquired at three institutions with five CT models and seven imaging protocols. From the CT images, the femur and a calibration phantom were automatically segmented using a deep-learning model that we have reported previously (Figure). Then, nine landmarks at the proximal femur (centers of the head and neck, four at the head-neck junction, lesser trochanter, and 2&5 cm below the lesser trochanter) were selected by a deep-learning model trained by manual landmark selection of 315 cases. These landmarks were used to rotate the femur to the neutral position, and the landmarks and the femur model were projected onto the coronal plane. The calibration phantom was employed to convert the Hounsfield units into density, and the BMD of the proximal femur region was quantified (CT-aBMD). CT-aBMD was correlated to the DXA-BMD, and the accuracy in diagnosing osteoporosis was quantified by a receiver operating characteristic (ROC) analysis.

**Results:** The correlation coefficient between CT-aBMD and DXA-BMD was 0.944 ( $p < 0.01$ ), and the mean absolute difference between CT-aBMD and DXA-BMD was 0.05 g/cm<sup>2</sup>. In the ROC analysis, the area under the curve for diagnosing osteoporosis was 0.979, with a sensitivity of 92.5% and a specificity of 92.4%.

**Conclusion:** Quantification of proximal femur BMD and diagnosis of osteoporosis from QCT were accurately performed with the system developed in this study. This system can aid clinicians in opportunistically screening osteoporosis from CT images acquired for other clinical purposes.

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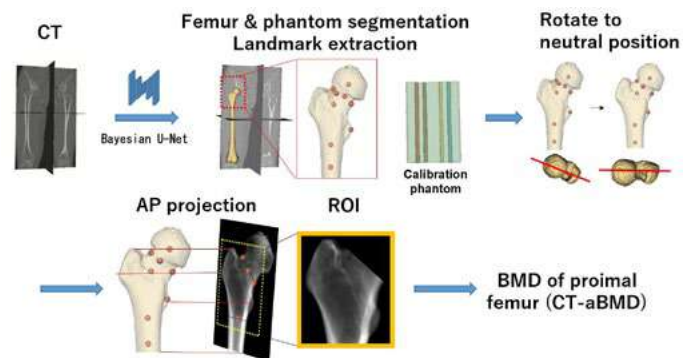


Figure: Flowchart for quantifying the CT-aBMD

P194

### PHYSICAL ACTIVITY ASSESSMENT IN YOUNG ADULTS WITH JUVENILE IDIOPATHIC ARTHRITIS

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**Objective:** Musculoskeletal features of juvenile idiopathic arthritis (JIA) may cause reduced physical activity (PA). This study aimed to assess PA in patients with JIA and investigate its associated factors.

**Methods:** This is a single-center cross-sectional study involving young patients with JIA. Inclusion criteria: patients with JIA aged 18-44. The exclusion criteria were refusal to participate in the study and any comorbidity. Patients responded to the International Physical Activity Questionnaire-Short form (IPAQ-SF). The following categories of PA levels were used: low PA (less than 600 MET-minutes per week); moderate PA (600-1500 MET-minutes per week); high PA (more than 1500 MET-minutes per week).

**Results:** 40 patients were included (16 M/24 F) with an average age of 24.4±5 years. The mean duration of JIA was 13.8±8.1 years. About 90% of patients were from an urban setting. The mean of vigorous PA was 677.7±1057.7 MET-min/week; the mean moderate PA was 826.9±906.6 MET-min/week; the mean walking time was 594±682 min/d; the mean sitting time was 330±118 min/d; the mean sum of PA - 2099±2453 MET-min/week. IPAQ distribution: 40% (16) of patients had low PA, 25% (10) had moderate PA while 35% (14) of the patients had high PA. The sum level of PA positively correlated with femoral neck BMD ( $r=0.429$ ,  $p=0.02$ ), ultradistal radius BMD ( $r=0.534$ ,  $p=0.05$ ), arm lean mass ( $r=0.678$ ,  $p<0.001$ ), leg lean mass ( $r=0.748$ ,  $p<0.001$ ), handgrip strength ( $r=0.617$ ,  $p<0.001$ ), gait speed ( $r=0.511$ ,  $p<0.001$ ); and negatively correlated with total fat (%) ( $r=-0.396$ ,  $p=0.01$ ), total fat (g) ( $r=-0.340$ ,  $p=0.03$ ), swollen joint count ( $r=-0.312$ ,  $p=0.05$ ) and articular damage index JADI-A ( $r=-0.311$ ,  $p=0.05$ ). Disease activity (DAS28, JADAS27 indices), pain by VAS, vitamin D, and Health Assessment Questionnaire scores did not correlate with the level of PA ( $p>0.05$ ).

**Conclusion:** Young patients with JIA perform different levels of

PA. Except for lean, bone mass, articular damage, muscle strength and performance, no other associated factors were found.

### P195 COMPREHENSIVE GERIATRIC ASSESSMENT FOR IDENTIFYING MORTALITY RISK IN OLD PATIENTS AFTER HIP FRACTURE SURGERY

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**Objective:** To determine the characteristics of old patients with hip fracture via comprehensive geriatric assessment (CGA) and identify mortality risk factor.

**Methods:** In this prospective cohort study, old adults ( $\geq 60$  years) who had undergone hip fracture surgery were consecutively enrolled in a single medical center from January 2020 to December 2021. The CGA, including physical health, functional status, psychological health, and nutrition, as well as clinical information of each patient was recorded during the hospital stay. The Cox regression model was performed to analyze the relationship of survival with the relevant variables.

**Results:** A total of 164 old patients (66 males and 98 females) with mean age of  $81.09 \pm 8.84$  years were included. 27 patients died within one year with a mortality rate of 16.46%. In Cox regression model, univariate analysis revealed gender, age, higher American Society of Anesthesiologists (ASA) grade (ASA=4), length of hospital stay, activities of daily living (ADL), comorbidity with COPD/asthma or cancer, and postoperative infection (pneumonia or urinary tract infection) were all associated with one-year mortality risk. After adjustment of the other confounding factors in multivariable analysis, female gender (HR=0.40; 95%CI 0.17-0.93;  $p=0.033$ ), higher activity of daily living score (HR=0.97; 95%CI: 0.95-1.00;  $p=0.045$ ), and postoperative infection (HR: 3.65; 95%CI: 1.25-10.69;  $p=0.018$ ) remained as significant mortality predictors.

**Conclusion:** Combining clinical data and CGA can help identify old patients at mortality risk after hip fracture surgery, that may be useful for improving outcomes.

**Acknowledgments:** Thanks to Dr. Chih-Hui Chen, Dr. Yi-Cheng Zhuo, Dr. Kun-Tsan Lee, Dr. Cheng-Chi Wang for guidance and Tan-Hsiu Liao for help with analysis.

### P196 WHOSE OSTEOPOROSIS SHOULD BE TREATED AMONG LONG-TERM CARE RESIDENTS?

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**Objective:** Previous studies revealed very high prevalence of osteoporosis from 59~92% among women and 34.4~79.6% among men at different age distribution among long-term care residents (LTCRs). And the incidence of hip fracture remained unacceptably high and were 3- to 10-fold greater than the incidence of similar age community dwellers. However, it is very difficult to determine whose osteoporosis should be treated after considering the fracture risk, mortality, onset time of anti-osteoporosis medications (AOMs) in this population. The onset time of most first-line anti-resorptive medication was at least one year. We aimed to find important factors that related to fracture and survival for more than one year to solve these complex problems.

**Methods:** This was a prospective cohort study with a follow-up period of three years. We prospectively enrolled 785 older residents aged  $\geq 50$  years old from 20 long-term care facilities. At baseline, we collect age, sex, BMI, activities of daily living (Barthel index), alcohol and smoking status, comorbidities, previous fracture history, parental history of fracture, age at menopause, fall history, information related to osteoporosis, and followed their clinical fracture and death. We categorised the residents into two groups: (1) those who would survive for more than 1 year and fractured; (2) others. Logistic regression was then applied to find out the risk factors that related to group 1.

**Results:** 785 LTCRs consented to screening from October 2018 to November 2019 in Yunlin County, Taiwan and followed up to June 2022. Of them, 338 were men and 447 were women with mean ages of 75.6 and 81.2 years, respectively. Most participants were severely dependent for their everyday physical activity, with a mean Barthel index of 28.6; and 44.1% were categorized as bedridden. 648 LTCRs could be followed till fracture, death, or for 2 years, with the follow-up rate 82.5%. The incidence of all fracture of LTCRs was 13.1 per 1000 PYs and the hip fracture incidence was 6.6 per 1000 PYs. The mortality rate was estimated at 172.7 per 1000 PYs. Some important factors were related to fracture and survival for more than one year, such as female gender, good activity of daily living function, Parkinsonism, and previous fracture history.

**Conclusion:** Good daily activity was positively related to fracture risk and negatively related to mortality of LTCRs. Other risk factors, such as female gender, Parkinsonism, and previous fracture history also significantly related to fracture and survival for more

than 1 year. LTCRs with these factors would be the candidate of AOMs treatment.

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### EFFECTS OF VITAMIN D ON DISEASE ACTIVITY IN RHEUMATOID ARTHRITIS

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**Objective:** Vitamin D deficiency is common in autoimmune diseases, including rheumatoid arthritis (RA). We aimed to determine the vitamin D status in patients with rheumatoid arthritis and their association with disease activity.

**Methods:** This is a descriptive retrospective study carried out in the Rheumatology Dept. over a period of 1 year in patients with RA meeting the criteria of the ACR/EULAR 2010 and having had a measurement of the serum vitamin D level. The activity of the disease is evaluated by the DAS score 28. The clinical and biological data were collected and analyzed. Exclusion criteria: Any patient who has been supplemented with vitamin D in the previous six months.

**Results:** We included 34 patients, their mean age was 54.3±11.7 years. The mean duration of RA was 14.4 years. A normal vitamin D level was found in 11.7%, vitamin D insufficiency (serum vitamin D level between 10-30 ng/ml) in 58.8%, and vitamin D deficiency (level serum vitamin D <10 ng/ml) in 14.7%. Disease activity was moderate with a DAS 28 score of 3.85±1.29. There is no correlation between vitamin D levels and disease activity ( $p=0.004$ ;  $r=0.16$ ).

**Conclusion:** Our study suggests that hypovitaminosis D is widespread in patients with RA, and that the serum 25 (OH) vitamin D level is not associated with disease activity.

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### BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN WITH TYPE 2 DIABETES

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**Objective:** The relationship between diabetes and osteoporosis is complex. The available data on the prevalence of osteoporosis in postmenopausal women with type 2 diabetes are controversial. The objective of our study is to compare the bone status in diabetic postmenopausal women with those of non-diabetic postmenopausal women.

**Methods:** We conducted a cross-sectional study of 60 postmenopausal women. The demographic, densitometric (DXA) data of 30 type 2 diabetic women were compared with those of a control group (n=30) without diabetic. Calcemia, phosphoremia, 25-OH-vitamin D3 and 24-h calciuria were measured in the 2 groups.

**Results:** The mean (SD) age was 63.56 (±8.61) years and 67.7 (±10.85) in cases and controls respectively. In the diabetic group, the mean spine BMD was at 0.835 g/cm<sup>2</sup> (T-score=-2.47) and for the femoral neck, the mean BMD was at 0.750 g/cm<sup>2</sup> (T-score=-1.44). In the control group, the mean spine BMD was 0.722 g/cm<sup>2</sup> (T-score=-2.75) and the mean femoral neck BMD was 0.633 g/cm<sup>2</sup> (T-score=-1.75). 11 out of 30 T2DM cases had vit D values <20 ng/ml. There was a weak negative correlation between HbA1C and femoral neck BMD. There was a weak positive correlation between HbA1C and lumbar spine BMD.

**Conclusion:** Although the relationship between type 2 diabetes and osteoporosis has been widely studied, the results on BMD remain controversial, some authors have reported an elevation of BMD. Other studies have earlier reported a decrease. In type 2 diabetes, obesity, increased bone load and insulin resistance resulting from hyperinsulinaemia all lead to increased bone formation. Our results are similar to those of other studies. BMD is higher in type 2 diabetes compared to the general population.

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### ASSESSMENT OF BONE MINERAL DENSITY IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** Osteoporosis is one of the well-established comorbidities of rheumatoid arthritis (RA). Systemic inflammation causes an alteration of the multiple homeostatic systems of bone tissue, to which is added the effect of corticosteroid therapy, as well as the reduction of mobility in relation to the disability caused by RA in severe forms. The objective of our study is to assess BMD in patients with RA;

**Methods:** This is a retrospective descriptive study conducted in the Rheumatology Dept. during 2 years. The inclusion criteria were patients with rheumatoid arthritis meeting the ACR/EULAR 2010 criteria followed in hospital at different stages of the disease, having had a measurement of BMD by DXA, and having a normal vitamin-calcium status. Densitometric data at the 3 sites: lumbar spine, femoral neck and total hip were analyzed in all patients.

**Results:** We included 73 patients with RA. The average age was 54±10.7 years with a female predominance (93%). The average BMI was 25.9 kg/m<sup>2</sup>. Early menopause was noted in 8.21% of our patients, and 75.3% of patients were on long-term corticosteroid therapy of more than 7.5 mg/d for at least 3 consecutive months. The average duration of evolution of rheumatoid arthritis was 13.6 years. The mean sedimentation rate was 54.7±29.7 mm at the 1st hour, the mean C-reactive protein was 27.28±25.6 mg/l, the mean DAS 28 was 3.98. The mean BMD of the lumbar spine was 0.761 g/cm<sup>2</sup> (mean T-score=-2.42), of the femoral neck was 0.686 g/cm<sup>2</sup> (mean T-score=-1.7), and that of the hip total was 0.720 g/cm<sup>2</sup> (mean T-score=-1.49). Osteoporosis was noted in 45.2% of patients, and 39.7% of our patients had osteopenia. Fur-



thermore, BMD was normal in 10.9% of cases. Among these patients, 2.7% had vertebral fractures, and peripheral fractures were found in 5.4% of cases. Osteoporosis was significantly associated with disease activity and corticosteroid therapy ( $p=0.004$ ,  $p=0.001$  respectively).

**Conclusion:** Our study shows that secondary osteoporosis is common in patients followed for RA and is associated with high disease activity and corticosteroid therapy. Our results are similar with those of the literature. The management of patients with RA should include assessment of bone mass and early management of osteoporosis to prevent the occurrence of fractures.

## P200

### A NOVEL OSTEOPOROSIS SCREENING TOOL AMONG LONG-TERM CARE RESIDENTS

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**Objective:** To test the validity of existing osteoporosis screening tools and develop a new osteoporosis screening tool for long-term care residents.

**Methods:** The study used convenience sampling among long-term care residents from 7 institutions in Yunlin County and 3 Veterans Home in Kaohsiung City, Taiwan. The participants were aged  $\geq 50$  years and living in long-term care facilities. The study collected baseline characteristics information and calculated several scores to predict osteoporosis. The BMD of the PA spine and hip were measured using the DXA method. Vertebral fractures were identified by Genant's semiquantitative method, and ROC curves were constructed to assess the clinical utility of existing screening tools. A new screening score was developed according to the methods suggested by Sullivan et al.

**Results:** The study included 444 long-term care residents with a mean age of 81.7 years, and 48.4% of them had osteoporosis. The prevalence of osteoporosis was 37.7% in men and 75.4% in women. The most common site to diagnose osteoporosis was the femoral neck, followed by the total hip and spine. The AUC of ROC for the existing tools was approximately 0.7, which is considered only acceptable. The new screening score had an AUC of 0.78, which was higher than the existing screening tools.

**Conclusion:** The study showed that osteoporosis is common among long-term care residents, and the new screening score has a better predictive ability for osteoporosis. The findings suggest that the new screening tool can be used for osteoporosis screening in long-term care residents.

## P201

### EPIDEMIOLOGY OF OSTEOPOROSIS AMONG OLDER LONG-TERM CARE RESIDENTS: A STUDY USING CENTRAL BONE MINERAL DENSITY MEASUREMENT

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**Objective:** Osteoporosis is a major health problem among older long-term care residents (LTCRs), and its prevalence is high in Asia. However, most previous studies on LTCRs' osteoporosis used peripheral DXA to measure BMD, which may not accurately reflect the true BMD of the central skeletal sites. This study aimed to investigate the epidemiology of osteoporosis among older LTCRs using central BMD measurement.

**Methods:** A convenience sampling method was used to recruit 103 LTCRs from National Taiwan University Hospital Yun-Lin branch and 341 LTCRs from Kaohsiung Veterans General Hospital. Participants were aged  $\geq 50$  years and living in long-term care facilities. Baseline characteristics information was collected. The BMD of the PA spine and hip were measured using the DXA method.

**Results:** The prevalence of osteoporosis was very high among LTCRs in Taiwan, especially in women (75.4%) compared to men (37.7%). Total osteoporosis prevalence was 48.4% among the study population. The femoral neck was the most common site for osteoporosis diagnosis (44.8%), followed by total hip (22.7%) and spine (19.3%). After stratification by age, the prevalence of osteoporosis did not differ much between men aged 50-79 and  $\geq 80$  years (31.1% and 40.4%, respectively). However, the prevalence of osteoporosis among women aged  $\geq 80$  years was extremely high (85%), and much more than that among women aged 50-79 years (66.7%).

**Conclusion:** Our study offers abundant evidence on the prevalence of osteoporosis among older LTCRs using central BMD measurement, which is more accurate than peripheral DXA. The high prevalence of osteoporosis among older LTCRs, especially among women, suggests that more attention should be paid to the care of bone health among this vulnerable population. This study may serve as a reference for those who want to treat osteoporosis or care for bone health among older LTCRs.

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**ANTI-RESORPTIVE TREATMENT AND BREAST CANCER: REAL-LIFE-MEDICINE ASPECTS**E. D. Rentea<sup>1</sup>, A. Camen<sup>2</sup>, L. M. Gheorghită<sup>3</sup>, O. C. Sima<sup>1</sup>, E. Petrova<sup>4</sup>, A. Dumitrascu<sup>1</sup>, G. Voicu<sup>1</sup>, C. E. Nistor<sup>5</sup>

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**Objective:** Estrogens have a protective effect on the bone, decreasing bone resorption and promoting bone formation. After bilateral ovariectomy (BO), the estrogenic balance is altered, resulting in unwanted consequences on the bone mass and associated fragility risk. We aim to introduce a patient with BO followed by breast cancer-associated management and then the identification of severe osteoporosis.

**Methods:** This is a case report.

**Case report:** This is an 84-year-old female admitted for bone assessment. Her medical history includes surgical menopause at age of 45 for uterine leiomyoma followed by a breast cancer diagnostic that has been managed through surgery, chemotherapy and radiotherapy. At age of 80 she was confirmed with osteoporosis at DXA: lumbar L1-L2 BMD=0.680 g/cm<sup>2</sup>, T-score=-4SD, Z-score=-2.4SD, femoral neck BMD=0.579 g/cm<sup>2</sup>, T-score=-3.4SD, Z-score=-1.5SD. However, she was not compliant to any anti-osteoporotic regimes, and 1 year later she experienced 2 fragility fractures at right distal radius and the right humerus, and then started weekly alendronate 70 mg. After 1 more year, BMD improved: L1-L2 BMD=0.716 g/cm<sup>2</sup>, T-score=-3.7SD, Z-score=-2.1SD, femoral neck BMD=0.587 g/cm<sup>2</sup>, T-score=-3.3SD, Z-score=-1.4SD and continued to the same drug until present time. Currently, normal blood phosphorus-calcium profile is confirmed: calcium=9 mg/dL(normal:8.4-10.2), phosphorus=2.7 mg/dL(normal:2.3-4.7), 25-OHD(25-hydroxivitamin D)=49.3 ng/mL (normal:30-100), PTH=33.95 pg/mL(normal:15-65), including bone formation markers osteocalcin=16.03 ng/mL(normal:15-46), respective CrossLaps=0.4 5 ng/mL(normal:0.33-0.782), of formation, respective resorption. DXA shows a reduced response in terms of L1-L2 T-score=-4SD, Z-score=-2.2SD, femoral neck T-score=-3.1SD, Z-score=0.8SD thus a switch to annual zoledronate 5 mg was initiated in addition to adequate vitamin D intake.

**Conclusion:** Compliance to therapy against osteoporosis might improve the prognostic in terms of early initiation after secondary causes are added or when incidental fractures' burden occurs.

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**RESULTS OF GENETIC DIAGNOSIS AND FRAX MODEL VS. RESULTS OF DXA (1-0) CASE STUDY**E. Shahrour<sup>1</sup>, B. Al-Halabi<sup>2</sup>, A. Dabboul<sup>2</sup>, W. Al-Achkar<sup>2</sup>, A. Hassan<sup>1</sup>, A. Khamis<sup>1</sup>, H. Yazigi<sup>1</sup>

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**Objective:** The definition, diagnosis and treatment plans for osteoporosis and osteopenia are defined on the basis of assessment of BMD by DXA. However, this method faces many limitations and challenges. The main difficulty in assessing fracture risk is that while this threshold is high specificity, but low sensitivity. The majority of fragility fractures occur in individuals with BMD values above the osteoporotic threshold. These limitations necessitated the search for alternative solutions of better quality, including radiological, genetic, and applications of more risk factors in the fracture risk assessment (FRAX). In fact, FRAX is more consistent with the opinion of the specialist than DXA. The role of genetic diagnosis has not been decided yet, but some studies confirm that it has an influential role. The matter is not settled so far, and the opinion of specialists remain the reference standard for diagnosis and therapeutic intervention. FRAX is an aid to confirm this diagnosis.

**Methods:** This study included two clinical cases from Tishreen University Hospital, Lattakia, Syria. Clinical history was taken. DXA imaging and FRAX application were applied. Genetic diagnosis (LRP5rs121908669, COL1A2rs72658152SNPs) were analyzed by RFLP, DNA sequencing,

**Results:** The first case is 75 years old. Results of DXA are osteopenia in the femur bone and normal in the lumbar bone. Results of FRAX are major osteoporotic 20, hip fracture 9.7. Therapeutic intervention is decided by the doctor. The genotype of LRP5G171R is GC. The second case is 45 years old. Results of DXA are osteoporosis in the femur and lumbar bones. Results of FRAX are major osteoporotic 0.4, hip fracture 0. Therapeutic intervention is not needed as the doctor's opinion. The genotype of LRP5G171R is GG. The results of DXA conflict with the opinion of the specialist, while the results of FRAX agree with the opinion of the specialist. Genotypes of LRP5G171R agree with the FRAX results but vary with DXA radiographic findings.

**Conclusion:** FRAX is not a diagnosis tool. FRAX is for predicting fractures. But logically, it can be used in the validity of the current diagnosis, especially with the existence of the problem of the approved criteria. When a case is diagnosed as osteoporosis and requires therapeutic intervention according to the approved criteria, then FRAX is applied and the results are not predictive of fractures. Illogical something has been facing. Or, when the case is not diagnosed as osteoporosis, FRAX is applied and the results are predictive of fractures. In fact, this case requires therapeutic intervention, although it does not conform to the standards of the WHO. This requires more studies for comparing the results of FRAX with the results of DXA on a larger scale of samples. We conclude that FRAX application results are more compatible with genetic and opinion of the specialist than radiographic diagnosis DXA.

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### EFFECTS OF DRIED PLUM (PRUNES) ON BONE HEALTH STATUS OF POSTMENOPAUSAL WOMEN: A SYSTEMATIC REVIEW

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**Objective:** Many plant-derived medicines have long been used for bone health due to their lower cost and fewer side effects besides more accessibility than synthetic drugs. It seems dried plum; a dehydrated version of *Prunes domestical L.* has numerous protective effects on bone. In this regard, we conducted a systematic review study to critically assess its impact on the bone health of postmenopausal women.

**Methods:** It comprehensively searched PubMed and Web of Sciences databases to find English trials conducted by dried plums on postmenopausal women with/without osteopenia or osteoporosis and published until 26 Oct. 2022. Exclusion criteria were non-trials, animal studies, letters, and meeting abstracts. This study was conducted according to PRISMA guideline 2020.

**Results:** Out of 2071 records, 4 trials were included after removing duplicated publications and unrelated studies. The total sample size was 363 postmenopausal women without hormone replacement therapy (42 women with osteopenia) who used 50 or 100 g/d dried plums compared with/without 75 g/d dried apples for 3-12 months. The main findings were a significant protective effect on BMD, especially in ulna and spine BMD, a considerable reduction in TRAP-5b (tartrate-resistant acid phosphatase-5b) and bone alkaline phosphatase, nonsignificant reduction in P1NP and sclerostin, nonsignificant acceleration in IGF-1, OPG, and RANK, without any effect on CTX, and finally maintained FRAX score by both dosages. A protective effect of dried plums on BMD was more obvious by daily intake of 50 g for 12 months. The most reported adverse effect was gastrointestinal discomfort that was tolerable by gradually incorporating plums into daily diets and low doses of plums. All included studies had high quality when assessed by the Jadad Modified scale.

**Conclusion:** It seems dried plums could be improved the bone health of postmenopausal women by influencing bone turnover and bone resorption markers. However, more well-designed trials are required to confirm these results.

P205

### TIME OF ANTERIOR CRUCIATE LIGAMENT INJURY

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**Objective:** Anterior cruciate ligament (ACL) is the main stabilizer and most commonly injured knee ligament. ACL injuries typically occur during sports activities. Due to the incidence of ACL injuries and the fact that they often involve the young, active population, ACL injuries represent a significant epidemiological problem. The aim of this study is to determine in which part of the training, the season, in what month, the day of the week and part of the day ACL injuries usually occur in recreational and professional athletes.

**Methods:** The study included 1152 patients, of which 943 (81.2%) were men and 209 (18.1%) were women. Among these patients, 671 are recreational athletes with an average age of 27 years and 481 are professional athletes with an average age of 21 years. Injury to the anterior cruciate ligament most often occurs in contact collective sports football (52%), basketball (16%) and handball (10%).

**Results:** Significantly more athletes injured ACL in the middle of the training ( $p < 0.001$ ). Recreational athletes most often get injured during the middle of the season, while professional athletes often get injured at the beginning of the season. There is a statistically significant difference in favor of injuries which happened during the middle of the season ( $p < 0.001$ ). The highest number of injuries in recreational athletes was recorded in May, while in professional athletes this was the case in October. Sunday is the day with the highest number of injuries in recreational athletes, while the critical day for professional athletes is Saturday. There is a significantly high difference in favor of injuries which happened on Saturdays ( $p < 0.001$ ). Both groups of athletes most often get injured in the afternoon.

**Conclusion:** Most ACL injuries occur in the middle of the training, during the middle of the season, in October, on Saturdays and in the afternoon. Injury prevention protocols could be the next big step in the management of ACL injuries. Knowledge of when ACL injuries most often occur could reduce ACL injuries.

P206

**FEMORAL NECK OSTEOPOROTIC FRACTURE IN A PATIENT WITH OSTEOPENIA AT CENTRAL DXA SCAN**O. C. Sima<sup>1</sup>, A. Nicola<sup>2</sup>, A. Turcu<sup>2</sup>, E. D. Rentea<sup>1</sup>, A. Dumitrascu<sup>1</sup>, C. E. Nistor<sup>3</sup>, E. Petrova<sup>4</sup>, A. Ghemigian<sup>4</sup><sup>1</sup>C.I. Parhon National Institute of Endocrinology, Bucharest,<sup>2</sup>Dept. of Oro-Dental Prevention, Faculty of Dental Medicine, University of Medicine and Pharmacy of Craiova, Craiova, <sup>3</sup>Carol Davila University of Medicine and Pharmacy & Dr. Carol Davila Emergency Military Hospital, Bucharest, <sup>4</sup>Carol Davila University of Medicine and Pharmacy & C.I. Parhon National Institute of Endocrinology, Bucharest, Romania**Objective:** To introduce a patient diagnosed with osteopenia while having a prevalent severe fragility fracture.**Methods:** This is a case report. Bone assessment was performed: blood bone formation marker osteocalcin and alkaline phosphatase (AP), bone resorption marker CrossLaps. Central DXA based on a GE Lunar Prodigy assessment provided BMD, respectively T-score, and Z-score.**Case report:** This is a 61-year-old female admitted for bone assessment. She is known with a femoral neck (fragility) fracture 2 years ago. After orthopedic treatment, she was not referred for any osteoporosis management. However, due to the presence of a possible autoimmune neutropenia, she was admitted for an endocrine checkup. The medical background also includes hypercholesterolemia, and hepatic steatosis. On admission, total serum calcium is 9.6 mg/dL (normal: 8.4-10.2), phosphorus=3.8 mg/dL (normal: 2.3-4.7), mildly reduced 25-hydroxyvitamin D)=22.5 ng/mL (normal:30-100) under vitamin D 1000 IU/d with normal PTH=58.89 pg/mL (normal:15-65). Osteocalcin is mildly increased at the level of 49.29 ng/mL (normal: 15-46), as well as alkaline phosphatase 185 U/L(normal:40-150), with normal CrossLaps of 0.74 ng/mL (normal: 0.33-0.782). DXA shows the lowest T-score within the range of osteopenia: lumbar L1-4 T-score=-1.2 SD, Z-score=-0.2 SD, femoral neck T-score=-1.9 SD, Z-score=-1.1 SD. A higher dose of vitamin D dose 2000 IU/d is recommended in addition to weekly alendronate 70 mg with annual reassessment at DXA.**Conclusion:** A gap between lowest T-score at central DXA and clinical detection of an osteoporotic fracture is present in numerous cases. However, these patients are candidates to specific anti-osteoporotic medication despite not all protocols of reimbursement allow drug initiation at these T-scores. Of note, in this case the patient did not have obesity, type 2 diabetes mellitus or arthrosis that might explain a higher BMD.

P207

**OPERATIVE VERSUS NONOPERATIVE TREATMENT OF SCAPHOID NON-UNION IN CHILDREN: A CASE PRESENTATION AND REVIEW OF THE LITERATURE**L. Käch<sup>1</sup>, N. Zechmann-Müller<sup>1</sup><sup>1</sup>Cantonal Hospital Winterthur, Hand- and Plastic Surgery, Winterthur, Switzerland**Objective:** We discuss the treatment of two young male patients, suffering from scaphoid non-union after traumatic scaphoid fracture. The currently propagated techniques for treating a scaphoid non-union in children is either the operative reconstruction of the scaphoid or the conservative treatment with splinting in a scaphoid cast.**Cases:** First case operative: 13 years old male patient with a post-traumatic scaphoid non-union in the middle third with a humpback deformity. We resected the middle third of the scaphoid and grafted the defect with an iliac crest bone, the DISI-Deformity was reduced. Fixation was performed with K-Wires and immobilisation in a scaphoid cast. Second Case conservative: 13 years old male patient also with a posttraumatic scaphoid non-union in the middle third and humpback deformity, DISI-deformity. Immobilisation in a scaphoid cast for four months was performed.**Results:** Operative: One year postoperatively the patient achieved painless free arc of motion. Flexion/Extension 70/0/60°, Radial/Ulnaruction 30/0/30° and Pro-/Supination 90/0/90°. The computer tomogram showed complete consolidation and bony fusion of the iliac crest bone. Conservative: Six to eight months after conservative treatment the patient demonstrated painless motion and AROM Flexion/Extension 80/0/80°, Radial/Ulnaruction and Pro-/Supination in maximum range. Complete consolidation in the computer tomogram with persistent humpback and DISI deformity.**Conclusion:** In the literature both techniques are described, either the operative scaphoid reconstruction or the conservative treatment with splinting. In our cases both the operative and conservative treatment showed comparable good results. However, the humpback and DISI deformity can only be addressed with a surgical approach.

P208

**PIP JOINT ARTHROPLASTY AFTER REPLANTATION WITH PRIMARY ARTHRODESIS: CASE PRESENTATION**L. Käch<sup>1</sup>, A. Kämpfen<sup>2</sup><sup>1</sup>Cantonal Hospital Winterthur, Hand- and Plastic Surgery, Winterthur, <sup>2</sup>University Hospital Basel, Hand- and Plastic Surgery, Basel, Switzerland**Objective:** Finger amputations through a joint are usually deleterious. Either an emergency arthroplasty or a shortening arthro-

esis is the management choice during replantation. We discuss the treatment of a male patient, suffering from an amputation through the proximal interphalangeal joint (PIPJ) of the nondominant index finger.

**Case report:** Despite diabetes and an honest explanation regarding outcomes our 55-year-old patient wished a replantation of his index finger. The FDS was resected and the crushed joint resected for a primary shortening PIPJ arthrodesis. One year postoperatively the patient wished a mobilisation of his index finger to increase his working capabilities as a fine mechanic. The arthrodesis was removed and joint-silicon-arthroplasty, type Swanson, implanted. Rehabilitation was uneventful and the patient gained 60° flexion with an extension deficit of 20°. He will return to normal workload 2 years post trauma.

**Conclusion:** Destruction of a finger joint poses difficult problems. Arthrodesis provides a strong buttress for pinch grip and relief of pain. The benefits of joint movement are unfortunately lost. There are several reconstructive procedures to restore mobility; interposition arthroplasty (Swanson spacer), vascularised joint transfer and total prosthetic joint replacement arthroplasty. Total interphalangeal joint arthroplasty is a useful secondary procedure, after initial replantation, for finger amputation and rewards consideration.

## P209

### ADDITIONAL CONTRIBUTORS TO OSTEOPENIA IN AN ELDERLY

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**Objective:** To introduce the perspective of bone assessment in an elderly with different comorbidities.

**Methods:** This is a case report. Mineral metabolism is explored based on serum total calcium (STC), 25-hydroxyvitamin D (25OHD), PTH, and bone turnover markers (BTM) of formation (osteocalcin), respective of resorption (CrossLaps). Central (GE Lunar Prodigy) DXA provided BMD with consecutive calculation of T-score, respective Z-score.

**Case report:** This is a 83-year-old female patient with a history of thyroidectomy for a benign thyroid nodule. She had several falls (with no fracture) thus she was referred for a bone status assessment. Her medical history includes arterial hypertension and post-surgery hypothyroidism under substitution therapy with levothyroxine (LT4) 75 µg/d. STC is within normal ranges of 9.8 mg/dL (normal: 8.4-10.2) with low 25OHD of 3.4 ng/mL (normal:30-100), and high PTH of 162.46 pg/mL (normal:15-65). BTMs reveal normal osteocalcin of 16.79 ng/mL (normal:15-46), and

mildly reduced CrossLaps of 0.296 ng/mL (normal: 0.33-0.782). DXA-based analysis confirmed osteopenia: lumbar L1-L2 T-score was of -0.8SD, Z-score of -0.1SD, and femoral neck T-score was of -2SD, Z-score of 0.3SD. Thyroid function identified an over-treatment due to low TSH 0.2 (normal 0.5-4.5) µIU/mL. No fractures were pointed at screening profile thoracic - lumbar spine X-ray. The management of this case included the adjustment of anti-hypertensive medication in order to prevent the falls, the reduction of LT4 doses and consecutive thyroid function surveillance, and high doses of vitamin D replacement cholecalciferol 4000 IU/d for 3 months, followed by 2000 IU/d for another 3 months and longtime follow-up.

**Conclusion:** The risk of fall may be related to variations of blood pressure and hypovitaminosis D, and even iatrogenic thyrotoxicosis in elderly. A part from age-dependent bone loss, overtreatment with LT4 might be an additional contributor.

## P210

### VITAMIN D REPLACEMENT DURING PREGNANCY IS AN IMPORTANT PART OF CARE

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**Objective:** A number of authors in their research prove that vitamin D supplementation reduces preeclampsia, gestational diabetes and low fetal weight. The aim of our study was to evaluate the levels of 25-hydroxyvitamin D [25(OH)D] in pregnant Bulgarian women with and without vitamin D supplementation.

**Methods:** We undertook a multicenter cross-sectional population-based study performed between September and November in overall 84 settlements and investigated 547 pregnant Bulgarian women (mean age 30±5 years), who filled in a specially designed standard questionnaire. Of these 547 unselected pregnant women 278/547 (50.82%) taking vitamins at the time of the investigation, as a monotherapy or in combination with other medications. We introduced three category level of vitamin D: Severe and moderate deficiency: <20 ng/ml (n-148); Insufficiency: 20-30 ng/ml (n-251); Sufficiency: >30 ng/ml (n-148). The peripheral levels of 25(OH)D were investigated using a standard electrochemiluminescence immunoassay (competition principle) in a central laboratory on the day of the sampling.

**Results:** For the whole group (547 pregnant women), the mean 25(OH)D level was 25.86±9.46 ng/ml; median 24.51 (7.96-70.00), corresponding to mild insufficiency. Sufficient vitamin D (≥30 ng/ml, n-148) had a significantly higher percentage of pregnant women supplemented with vitamin D compared to the nonsupplemented group – 87 (31.29%) vs. 61 (22.68%), p<0.05. At the same time, vitamin D severe and moderate deficiency (<20 ng/ml, n-148) was significantly higher in pregnant women without supplementation with vitamin D - 86 (31.98%) vs. those with supplementation - 62 (21.94%), p<0.01.

**Conclusion:** The levels of vitamin D among pregnant Bulgarian

women are within the span of mild insufficiency, probably due to the intake of combined vitamin supplements by approximately half of the studied women during the pregnancy. Including and adhering to the intake of vitamin D is especially important for the normal development and outcome of pregnancy, along with other care.

## P211

### THE EFFECT OF A FEMUR FRACTURE AND SIMULATED OSTEOPOROSIS ON METAPHYSEAL BONE IN AN ANIMAL MODEL

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**Objective:** Numerous risk factors for osteoporosis fractures have been identified. One of the most reliable risk factors is a prevalent fracture. One reason could be that regional changes in bone quality occur after a fracture. An established animal model was used to address the question of whether regional metaphyseal bone loss occurs after fracture of the femur and how an established osteoporosis influences the process.

**Methods:** To simulate osteoporosis, 15 SD rats were OVX at the age of 12 weeks and 15 animals were sham-OVX. All animals were operated according to the model of Bonnarens et al. and killed after 28 d. MicroCT (Scanco Medical) analysis were performed to assess microstructure. 250 slices of 20 µm thickness were placed in the femoral neck. A cylinder of a height of 0.8 mm and a volume of 1.5 mm<sup>3</sup> was manually defined. Bone density (mgHA/cm<sup>3</sup>), number of trabeculae (1/mm), their thickness (mm), and intertrabecular crosslinking (1/mm<sup>3</sup>) were analyzed. An ANOVA was used to compare the groups.

**Results:** Evaluation of the non-fractured femur showed a significant decrease in bone density after OVX (-24.2%). Equally significant was a decrease in trabecular count (-27.1%). Comparing the fractured vs. non-fractured side, there was a significant decrease in bone density in the proximal metaphysis of the femur in the non-OVX animals after fracture (-26.1%). After OVX and fracture, a significant decrease in bone density (-28.3%), the number (-22.9%) and thickness (-20.7%) of trabeculae and for intertrabecular crosslinking (-20.1%) was detected.

**Conclusion:** Changes in microCT based histomorphometry of the proximal femur can only be studied in an animal model. Furthermore, the influence of preexisting osteoporosis has not been considered, yet. Analysis of the metaphyseal bone of the non-fractured femur show the expected changes after ovariectomy. Comparing the metaphyseal results between fractured and non-fractured side of the non-OVX animals, there is a significant decrease in bone density after a femur fracture. However, microarchitecture is non-significantly decreased. In the OVX group, there is significant deterioration. Thus, trabecular degradation in

osteoporosis is increased by the fracture. However, the causes are not fully understood, yet. In this respect, tertiary prevention should always be initiated after an osteoporotic fracture.

## P212

### BONE MINERAL DENSITY IN RHEUMATOID ARTHRITIS IN PATIENTS RECEIVING GENETICALLY ENGINEERED BIOLOGICAL THERAPY

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**Objective:** To study BMD in rheumatoid arthritis (RA) in patients receiving genetically engineered biological therapy (GIBT).

**Methods:** The study included 55 women suffering from rheumatoid arthritis (ARA/EULAR 2010), mean age 48.1±2.4 years, duration of RA 13.4±3.5 years. Prior to the appointment of GIBT, all patients had a high degree of RA activity (DAS 28 5.5±3.0). The second and third radiological stages prevailed - 31 people (56.3%) and 14 people. (43.7%) respectively. Rituximab was received by 25 people (45.5%), infliximab 20 people (36.3%), adalimumab 2 people (3.6%), golimumab 3 people. (5.45%), tocilizumab 5 people (8.9%). All examined patients underwent X-ray osteodensitometry annually. Bone density was assessed in g/cm<sup>2</sup>, according to the T-criterion (in persons over 50 years of age) and Z-criterion (in persons under 50 years of age) and their percentage deviation from the standard. According to the WHO recommendations (1994), a decrease in BMD according to the T criterion to -1.0 SD was assessed as a variant of the norm, from -1.0 SD to -2.5 SD osteopenia, less than -2.5 SD osteoporosis. Statistical processing of the results was carried out using the Statistica 6.0 software package.

**Results:** The incidence of osteoporosis before the appointment of GIBT was 63.6% (35 people). Osteopenic syndrome was found in 9 people (16.3%), normal values of bone density were noted in 20% of cases (11 people). BMD values for BMD averaged 0.691±0.05 g/cm<sup>2</sup>. According to the indications, all examined patients were prescribed antiresorptive therapy with bisphosphonates (alendronate 58.3%, ibandronate 26.5%, zoledronate 15.2%) with the obligatory prescription of calcium and vitamin D3 preparations. A year later, the dynamics of BMD was 0.704±0.008 g/cm<sup>2</sup> (p=0.002). The increase in BMD for 1 year of follow-up was 1.75±0.03%, the incidence of osteoporosis was 49.1% on average. After 2 years of follow-up, the BMD values were 0.714±0.010 g/cm<sup>2</sup> (p=0.001 p=0.051 compared to baseline and follow-up data a year later, respectively). The frequency of osteoporosis was 46.2%, osteopenia - 25.3%. In the next year of observation, stable indicators of the state of BMD were noted with a significant decrease in the clinical and laboratory activity of inflammation. DAS 28 scores averaged 3.1±0.8. During 3 years of follow-up, no new fractures were noted in patients.

**Conclusion:** Effective genetically engineered biological therapy against the background of osteoporosis therapy can significantly reduce the incidence of osteoporosis and increase BMD in pa-

tients with rheumatoid arthritis in dynamics.

## P213

### EFFECT OF DIGITAL THERAPEUTICS USING DEEP LEARNING ON PAIN, CONTROL OF MOVEMENT IN LOW BACK PAIN

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**Objective:** To investigate the effects of the deep learning-based digital application physical therapy (DBPT) on back pain intensity, limited functional disability, lower extremity weakness, radicular symptoms, limited range of motion, functional movement, and quality of life when compared to traditional physical therapy (TPT) in patients with low back pain.

**Methods:** 100 randomly selected adults (mean age 35.5±8.8; 20 females) was recruited and completed either DBPT or TPT for 30-minute sessions, 3 times a week over a 4-week period. The Oswestry Disability Index (ODI), the Quebec Back Pain Disability Scale (QUE), the Roland-Morris Disability Questionnaire (RMDQ), the numeric pain rating scale (NPRS), the functional movement screen (FMS), the short-form 12 (SF-12), the range of motion (ROM) of the trunk in flexion, extension, and bilateral side bending were used as outcome measures. Statistical analysis included analysis of variance (ANOVA) to determine the intervention-related changes in the outcome variables.

**Results:** The ANOVA showed a beneficial effect on clinical outcome measures, ROM, lower extremities muscle forces, and FMS after 4 weeks of both DBPT and TPT. The repeated measures ANOVA revealed a significant time effect ( $p=0.01$ ) for ODI. There was no significant difference in ODI between groups ( $p=0.31$ ). Moreover, there were no significant interaction effects ( $p=0.07$ ). Post hoc Bonferroni analysis revealed a significant difference in ODI scores obtained at pre- and post-test and 4-week follow up, of both groups ( $p=0.01$ )

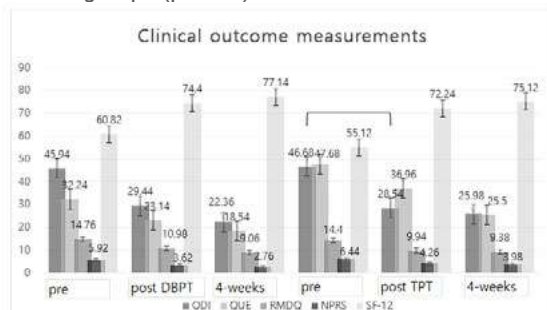


Figure 1. Clinical outcome measurements (DBPT: Deep learning based digital application physical therapy, TPT: Traditional physical therapy, ODI: Oswestry disability index, QUE: Quebec back pain disability scale, RMDQ: Roland-Morris disability questionnaire, NPRS: Numeric pain rating scale, SF-12: Short form-12).

**Conclusion:** In the current study compared the effects of the DBPT and TPT interventions among patients with LBP. We showed that DBPT was as effective as TPT in improving structure/functional impairment, activity limitation, and participation restriction domains. Our findings reveal the effective application of DBPT intervention for clinical outcome measures (ODI, RMDQ, and NPRS),

trunk mobility, lower extremity strength, QUE, SF-12.

## P214

### ASSOCIATION OF PROTEIN INTAKE WITH HANDGRIP STRENGTH IN KOREAN ADULTS AGED MORE THAN 60 YEARS IN KNHANES (2014-18)

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**Objective:** Weak handgrip strength (HGS) is associated with lots of negative health outcomes in older adults. Dietary protein intake is acknowledged as a significant modifiable factor for preserving HGS. There is an evidence that with resistance exercise, high protein intake leads to increases in HGS. The goal of this study was to examine the relationship between weak HGS in older adults and dietary protein.

**Methods:** Data of 8,497 Korean adults aged more than 60 years from the Korea National Health and Nutrition Examination Survey (KNHANES) 2014-2018, who measured HGS, BMI, and dietary protein intake were analyzed. The association between weak HGS and dietary protein intake were investigated using complex sample multivariate logistic regression analyses.

**Results:** The prevalence of weak HGS was 18.3 (0.7)% in men, and 28.8 (0.9)% in women. In multiple logistic regression analysis, low protein intake (<0.8 g/kg/d) was significantly associated with higher risk of weak HGS in men (odds ratio (OR) 1.37, 95%CI: 1.04-1.80,  $p=0.048$ ) compared with adequate protein intake (0.8-1.2 g/kg/d). In the strengthening exercise group, men with high protein intake ( $\geq 1.2$  g/kg/d) had significantly lower odds (OR 0.49; 95%CI: 0.24-0.98) of weak HGS compared with men with adequate protein intake.

**Conclusion:** In this study of representative sample of Koreans aged over 60, men with low protein intake had a higher risk of weak HGS than men with adequate protein intake. Meanwhile, men who had higher protein intake and engaged in strengthening exercise had a lower risk of weak HGS.

## P215

### AWARENESS, BELIEFS AND RESPONSIBILITY OF DRUG-INDUCED VITAMIN D DEFICIENCY: FOCUS GROUP INTERVIEWS WITH SWEDISH PRIMARY CARE PHYSICIANS

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**Objective:** Although the risk of vitamin D deficiency associated with the use of specific drugs have been described in the scientific literature, previous studies indicate varying levels of adherence to risk management guidelines recommending clinical follow-up. This study aimed to explore reasons for this varying adherence in primary care.

**Methods:** Focus group interviews on vitamin D deficiency, focusing on risk drugs (glucocorticoids, antiepileptic drugs and drugs reducing vitamin D uptake) were performed with physicians from seven primary care centers in Southeast Sweden. Data was transcribed verbatim and analyzed by inductive thematic analysis.

**Results:** Three major themes were identified within the data from the focus group interviews: 'awareness', 'beliefs' and 'responsibility'. 'Awareness' consisted of the subthemes 'knowledge' from education or guidelines and 'experience' from clinical practice as well as cultural influence from other settings. Expressed 'beliefs' were 'uncertainty', 'skepticism' and 'acceptance'. Within 'responsibility', two subthemes were identified: 'roles' for hospitals vs. primary care and 'priorities' both within the healthcare system and within the individual patient with multimorbidity. Glucocorticoids were known to cause secondary osteoporosis rather than vitamin D deficiency and these risks were accepted. Supplementation was prescribed according to local guidelines and primary care's responsibility was clear. Regarding antiepileptic drugs, physicians were unaware, lacking both knowledge and experience, were skeptical and questioned the risks. Responsibility was regarded as belonging to hospital-based specialists, even though some patients were treated in primary care. Drugs reducing vitamin D uptake were rarely used and not seen as a problem. The three major themes were interconnected.

**Conclusion:** Interventions to improve the adherence to risk management guidelines on vitamin D deficiency in primary care need to address awareness, as well as beliefs and the perceived responsibility.

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## P216

### LOW HAND-GRIP STRENGTH IN TYPE 2 DIABETES MELLITUS PATIENTS IN MONGOLIA: A CROSS-SECTIONAL STUDY

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**Objective:** Handgrip strength (HGS) is a simple and reliable measurement of muscle strength. It is an important tool for diagnosing sarcopenia and chronic diseases in the elderly. To investigate HGS in patients with type 2 diabetes mellitus (T2DM) in central

and suburban district hospitals in Ulaanbaatar.

**Methods:** The study was conducted using cross-sectional analysis and included 347 participants (209 females, 138 males) over 40 who had T2DM. Patients completed a questionnaire on their lifestyles and clinical information within 20-30 minutes from June 2022 to November 2022. HGS was measured by a handheld dynamometer with maximum effort; two attempts were made with each hand. HGS was defined according to the Asian Working Group for Sarcopenia (AWGS) criteria as low handgrip strength (<26 kg for males and <18 kg for females). Multivariate logistical regression analyses were used to identify low and normal hand grip strength predictors.

**Results:** The study involved 347 patients, with an average age of 60.64±9.56. Of the subjects, 166 (47.8%) had low hand grip strength and 181 (52.2%) had normal hand grip strength. Age, BMI, and diabetes duration were significantly associated with HGS in females and males. Also, high and low-level glucose was significantly associated with HGS in females. But regular exercise, alcohol consumption, and smoking status had not significantly associated with HGS. After adjusting for age, odds ratios (OR) for low hand grip strength remained significantly associated with BMI in T2DM men (OR, 1.95; p=0.001; 95%CI (0.87-1.01) and women (OR, 1.05; p=0.001; 95%CI (0.95-1.02). Also showed OR for absolute handgrip strength and blood pressure had a significant effect on the hand grip strength in T2DM men (OR, 1.24; p=0.001; 95%CI (1.14-1.34), women (OR, 1.05; p=0.001; 95%CI (0.90-1.02).

**Conclusion:** Low hand-grip strength is associated with the BMI of men and women in Mongolian diabetic patients. Therefore, these findings provide epidemiological evidence for the early intervention of reducing muscle strength in patients with type 2 diabetes mellitus.

## P217

### THE INTEGRATED SCORING SYSTEM FOR PREDICTING A POOR FUNCTIONAL OUTCOME AFTER PROXIMAL FEMORAL NAIL ANTI-ROTATION FIXATION IN ELDERLY INTERTROCHANTERIC FRACTURES

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**Objective:** Intertrochanteric fracture in elderly is associated with high morbidity and mortality especially within 1-yr postoperatively. Several clinical and surgical parameters were related to functional outcome after proximal femoral nail anti-rotation (PFNA) fixation. The majority of previous research has focused on the association between surgical factors and mechanical failure after internal fixation. There is, however, limited evidence to demonstrate the association between functional outcomes after proximal femoral nail anti-rotation (PFNA) fixation and the non-surgical factors including patient's comorbidities, cognitive impairment, and delayed surgery. Our study aimed to identify the prognostic factors for poor outcome after PFNA fixation in inter-



trochanteric fractures to develop an integrated scoring system to predict the poor outcome after PFNA fixation in elderly patients with an intertrochanteric fracture.

**Methods:** 450 elderly patients with intertrochanteric fractures underwent PFNA fixation for at least one year between January 2012 and December 2018 were included. Patients' demography and comorbidity were reviewed. Nonsurgical parameters included ASA classification, Charlson Comorbidity Index, Cognitive impairment, Time to operation while the surgical factors were nail shaft axis (NSA), AO/OTA classification, tip apex distance (TAD) (mm), Cleveland zone, and quality of reduction (QOL). Poor (Harris Hip Score was less than 70) and non-poor outcomes (HHS  $\geq 70$ ) were evaluated after a one-year follow-up. Univariate and multivariate regression analysis were used to determine the predictors for poor outcome after surgery. The score-based predictive model was created from the logistic regression equation using the regression coefficient-based scoring method to predict a poor outcome. The total score of integrated scoring system for poor outcome after PFNA fixation for each patient was calculated by adding each component together, then the receiver operating characteristic (ROC) curve analysis and the area under the ROC curves (AUC) were computed. The sensitivity and specificity were all calculated.

**Results:** 450 patients included, 21 (4.7%) patients were considered to have poor functional outcome during one-year follow-up after PFNA fixation. The predictive factors related to the poor outcome according to the multivariate analysis include the presence of cognitive impairment, Charlson Comorbidity Index  $>5$ , time to operation  $>5$  d, nail-shaft axis of less than -2 mm or more than 2 mm, AO/OTA classification subtype 31A2.2 or 31A2.3, Tip apex distance  $>30$  or  $<20$  mm, Cleveland zone 1,2,3,4,6, and poor quality of reduction. The range of the integrated scoring system was between 0-47 and the cut-off score of 23 with the sensitivity of 95% and the specificity 84% was found to have the highest discriminatory power to determine the poor functional outcome after PFNA fixation in elderly patients with intertrochanteric fracture, where the area of ROC was 0.95 (95%CI 0.92-0.97).

**Conclusion:** This scoring system provides the ability to predict poor functional outcome after PFNA fixation in intertrochanteric fracture patients. In addition, it is effortless and practical for orthopedic surgeons not only for predicting an outcome after PFNA fixation in elderly patients with an intertrochanteric fracture and for counseling purpose to patient and family.

P218

### COMPARATIVE SHORT TERM RECOVERY AND FUNCTIONAL OUTCOME BETWEEN ISOLATED HIP FRACTURE AND HIP FRACTURE COEXISTING WITH OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURE

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**Objective:** As the world's populations is gradually transitioning to an aging society, osteoporotic hip fractures have become more prevalent. Fragility hip fractures are also correlated with high mortality, loss in disability-adjusted life year, high resource, and financial burden on the healthcare system. The functional outcome declined at least one activity level after surgery in elderly hip fracture. In addition, the 2 out of 3 osteoporotic vertebral compression fracture (OVCF) is asymptomatic and is common seen in the elderly population. However, current study has not identified the association of hip fracture and OVCF including the recovery and functional outcome. The aim of this study was to identify a comparison of short term recovery and functional outcome between isolated hip fracture and hip fracture coexisting with osteoporotic vertebral compression fracture.

**Methods:** After the Institutional Research Board Approval, a prospective study was performed between 2019-2020. Patients' Demography, Comorbidity, American Society of Anesthesiologists Classification (ASA class), and Charlson comorbidity index (CCI) were reviewed. BMD of spine and hip were measured in all patients. The inclusion criteria were those patients with femoral neck fractures or intertrochanteric fractures over 60 years old underwent bipolar hemiarthroplasty or Proximal Femoral Nail Anti-rotation (PFNA), respectively. The exclusion criteria were those patients with follow up time less than one year, referred to other hospital after surgery, pathologic fracture, multiple fracture, high energy trauma. Patients were classified into 2 groups: Isolated hip fracture (Isolated group), and combined hip fracture and OVCF (Combined group). The severity of OVCF was evaluated by Genant classification: grade 0 is normal, grade I is mild fracture, grade II is moderate fracture, and grade III is severe fracture. Time Up and Go Test (TUG) was evaluated at 2 weeks, and 6 weeks. In addition, the functional outcome assessed by Harris Hip Score (HHS) was performed at 6 months, and one year. The association of the severity of OVCF, TUG, and HHS were also evaluated.

**Results:** There was no difference in age, gender, comorbidity, ASA class, CCI, and the percentage of intertrochanteric fractures and femoral neck fractures in both groups, as well as the operative time and operative blood loss. Hip BMD and spine T-score BMD in the combined group was significantly lower than the Isolated group (0.64 vs. 0.70 g/cm<sup>2</sup>,  $p=0.03$ ; -1.68 vs. -0.84,  $p=0.033$ , respectively). The length of hospital ( $p=0.022$ ) was significantly shorter and the 6 weeks TUG ( $p=0.042$ ) was significantly lower in the isolated group compared to the combined group. Moreover, the 6 months HHS, and one year HHS in the isolated group was significantly higher than the combined group (82.5 vs. 77.5,  $p=0.007$ ; 87.4 vs. 80.8,  $p=0.005$ , respectively). In term of severity of OVCF (Grade 1-2 vs. grade 0 and grade 3 vs. grade 0), the higher grade was significantly lower 6 months HHS (78.0 vs. 82.5,  $p=0.014$  and 74.5 vs. 82.5,  $p=0.012$ , respectively). However, there was no significant difference of one year HHS among 3 groups (87.4, 81.3, and 77.6 with  $p=0.056$ ).

**Conclusion:** The elderly hip fracture combined with OVCF had significantly longer hospital stay, longer time to recover, and worse functional outcome than the isolated group. The severity of OVCF was significantly associated with the worse outcome. This combined group needs more attention during the rehabilitation program.

P219

### SURVIVORS OF ELDERLY INTERTROCHANTERIC FRACTURE IN CHRONIC KIDNEY DISEASE: 9 YEARS STUDY

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**Objective:** Osteoporotic hip fracture is becoming the world's major health issue as the majority of population ages. [1,2] The fragility hip fracture has been shown to affect ambulatory status, quality of life, functional outcomes, mortality, resource and financial cost spent in health care system [3-6]. The mortality rate of osteoporotic hip fracture is elevated for at least 10 years afterward, with 1-year cumulative mortality of 20-40% [7-14]. Previous literatures demonstrated that older age, male gender, co-morbidities such as liver diseases, chronic kidney disease, heart pathology and Charlson index more than 2 were associated with increased mortality [15-19]. However, lack of data demonstrated the long-term survivors of elderly hip fracture combining with CKD. The primary outcome of this study was to identify long-term survivors of hip fracture in each stage of CKD. Secondary outcome was to demonstrate the risk factors associated with the survivors after hip fracture combined with CKD. Our study aims to demonstrate mortality after fragility hip fracture at a longer follow up period of 9 years, made possible by exploring the civil registration. In addition, we focus on other associating factors, with chronic kidney disease categorized by severity. Our primary outcome is the survival analysis after index osteoporotic intertrochanteric hip fracture. Our secondary outcomes are the survival analysis sub divided by the staging of chronic kidney disease presented at the time of surgery and the analysis of other risk factors that affect the mortality.

**Methods:** After Institutional Research Board Approval, a retrospective study was performed from our institute's database of intertrochanteric fracture over 60 years from low energy trauma who underwent surgical fixation with proximal femoral nail anti-rotation between December 1, 2011 to December 31, 2019. 443 elderly intertrochanteric fractures underwent PFNA fixation were recruited. The mortality rate was identified from 1 year and 9 years. The study categorized patients into non-CKD and CKD groups. We compared the survival time of elderly hip fracture in each stage of CKD.

**Results:** The mortality was found for 188 patients and the overall cumulative follow up time in all patients were 1717.96 person-year. The incidence rate of overall mortality was 10.94 per 100 person-year (95%CI 9.49-12.62) and the median survival time was 7.07 years (95%CI 5.89-8.59). The survival rate after surgical fixation for intertrochanteric fracture was 89.62% at 1 year, 74.09% at 3 years, 59.89% at 5 years, and 37.83% at 9 years as Even though CKD was not significantly increased the mortality after surgical fixation in hip fracture from the multivariate analysis ( $p=0.072$ ), the Kaplan-Meier survival curve was significant-

ly different ( $p<0.001$ ) in each CKD stage especially in CKD 5. In addition, the incidence rate of mortality was highest in CKD 5 (17.4% with 95%CI 11.76-25.75) and the median survival time in CKD 5 was 3.34 year (95%CI 2.17-7.50). Multivariate regression analysis identified that heart disease, operative time more than 60 minutes, pulmonary embolism, poor to fair functional outcome (HHS) were significantly increased mortality 63%, 51%, 2000% (20 times), and 58%, respectively.

**Conclusion:** CKD stage 5 (eGFR  $<30$  ml/min/1.73m<sup>2</sup>) is associated with the highest mortality rate during short term period and the shortest median time of survival in mid-term and long-term period. In addition, heart disease, longer operative time, pulmonary embolism, and poor to fair HHS were associated with increased mortality. This vulnerable group required intensive care in all follow up periods.

P220

### TREATMENT GAP AFTER OSTEOPOROTIC FRAGILITY FRACTURES: A REGIONAL ANALYSIS IN GERMANY

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**Objective:** Analysis conducted regarding the care situation of patients with osteoporotic fractures in Germany are mostly based on health insurance data. The aim of the study was to record the unreported number of non-diagnosed osteoporotic patients and to analyze the initiation of diagnosis and treatment after fragility fractures.

**Methods:** A retrospective observational study in ortho & trauma surgery departments in the Rhine-Main area was conducted. Included were patients aged  $>50$  years with an ICD encoded fractures. The information in the medical records were evaluated with a questionnaire for prevalent fractures, for underlying bone diseases, for bone compromising underlying diseases, a known osteoporosis, performed diagnostics to back up or rule out osteoporosis, initiated therapy or recommendations.

**Results:** A total of 2142 patients  $<50$  years with a fracture were evaluated (72.1% female and 27.9% male). Of these, in 1460 (68.2%) the fractures were considered to be osteoporotic. 80.3% of patients with osteoporotic fracture were older than 70 years. The hip fracture (55.2%) was the most common localization, followed by the vertebral fracture (14%). A prevalent fracture was reported in 14% in the medical history. Overall, only 29.9% of patients were diagnosed with osteoporosis as the cause of the fracture. Osteoporosis was detected in 67.2% of osteoporotic vertebral fractures, but only in 16.3% of hip fractures. At the time of discharge, 6.6% of patients were treated with an anti-osteoporotic medication and 5.1% were given recommendation in the discharge letter. The results of this study indicate that 70% of pa-

tients failed to diagnose osteoporosis and that 88.3% of patients were discharged without specific anti-osteoporotic therapy or recommendation.

**Conclusion:** There is a clear gap between guideline-based recommendations and everyday practice in osteoporosis. Fractures in the elderly rarely lead to a diagnosis or therapy for osteoporosis. Given the high prevalence of osteoporosis and the increase in the incidence of osteoporotic fractures, concepts are needed to better care for these high-risk patients. The Fracture Liaison Services concept shows in studies that it is effective to achieve optimal osteoporosis management after a fragility fracture and to prevent secondary fractures. Thus, it needs to be implemented in Germany.

## P221

### CONSIDERATIONS OVER LONG TERM HISTORY OF EARLY HYPOGONADISM-ASSOCIATED OSTEOPOROSIS AND NORMOCALCEMIC PRIMARY HYPERPARATHYROIDISM

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**Objective:** To introduce a patient who was diagnosed, after a long term history of post-early menopause osteoporosis, with normocalcemic primary hyperparathyroidism (PHP).

**Methods:** This is a case report.

**Case report:** This is a 66-year-old patient admitted for bone status assessment. Her personal medical history includes osteoporosis since the age of 44 (surgical menopause since the age of 36 for a benign gynecologic condition with no hormone replacement therapy). She was treated for 8 years with oral risedronate, and an incidental T12 thoracic vertebral fracture was identified during therapy, thus she continued with annual zoledronate 5 mg for 2 years. Since the age of 60, the patient was found with persistent mildly increased values of PTH with normal calcium and 25-hydroxyvitamin D (25OHD) levels and no clear identification of a parathyroid adenoma at imaging scans. On current admission, normal thyroid function is confirmed by TSH=1.69  $\mu$ UI/mL(normal:0.35-4.94), and FT4(free levothyroxine)=13.9 pmol/L(normal:9-19). After 6 years of PTH increase, serum total calcium became mildly elevated at 10.44 mg/dL(normal:8.4-10.3), with normal phosphorus. Reduced 25OHD=23.4 ng/mL(normal:30-100) is identified, and increase of PTH=80.31 pg/mL(normal:15-65). Bone turnover markers are normal: (formation) osteocalcin=22.16 ng/

mL(normal:15-46), alkaline phosphatase=58 U/L(normal:40-150), P1NP=38.03 ng/mL(normal:20.25-76.31), and (resorption) CrossLaps=0.32 ng/mL(normal:0.33-0.782). Tc-99m SESTAMI-BI scintigraphy is suggestive for right inferior parathyroid adenoma which is also confirmed by computed tomography. At the end of the 8-year therapy with risedronate, DXA showed lumbar L1-4 BMD=0.636 g/cm<sup>2</sup>, T-score=-3.7SD, Z-score=-2.6SD, total hip BMD=0.866 g/cm<sup>2</sup>, T-score=-1.2SD, Z-score=0.6SD, femoral neck BMD=0.805 g/cm<sup>2</sup>, T-score=-1.1SD, Z-score=0.1SD. After 2 years of zoledronate, DXA results improved (L1-4 BMD=0.855 g/cm<sup>2</sup>, T-score=-2.7SD, Z-score=-1.7SD, total hip BMD=0.957 g/cm<sup>2</sup>, T-score=-0.4SD, Z-score=0.4SD, femoral neck BMD=0.922 g/cm<sup>2</sup>, T-score=-0.8SD, Z-score=0.3SD, 1/3 distal radius BMD=0.654 g/cm<sup>2</sup>, T-score=-0.8SD, Z-score=0SD) and continued to do so despite a drug holiday that the patient took during COVID-19 pandemic years. Currently, DXA shows L1-4 BMD=0.907 g/cm<sup>2</sup>, T-score=-2.3SD, Z-score=-0.6SD, total hip BMD=0.947 g/cm<sup>2</sup>, T-score=-0.5SD, Z-score=0.8SD, femoral neck BMD=0.837 g/cm<sup>2</sup>, T-score=-1.4SD, Z-score=0.3SD, 1/3 distal radius BMD=0.818 g/cm<sup>2</sup>, T-score=-0.7SD, Z-score=0.8SD. IV ibandronate was recommended in addition to the indication of parathyroidectomy and vitamin D supplements 1000 UI/d.

**Conclusion:** In this case, osteoporosis was caused by early menopausal status followed by another cause due to PHP. Normocalcemic PHP should be referred to parathyroidectomy if severe osteoporosis is identified on a case-based decision.

## P222

### PROPORTION AND CHARACTERISTICS OF NEWLY ADMITTED LONG-TERM CARE RESIDENTS WITH HIP AND OTHER FRACTURES BEFORE AND DURING THE COVID-19 PANDEMIC IN ONTARIO, CANADA: A SERIAL CROSS-SECTIONAL STUDY

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**Objective:** To describe the proportion and characteristics of newly admitted long-term care (LTC) residents with a hip or other fracture before and during the COVID-19 pandemic in Ontario, Canada.

**Methods:** This is a population-based serial cross-sectional study. Data were obtained from Minimum Data Set 2.0, a comprehensive assessment completed for all LTC residents in Ontario upon admission and every 3 months thereafter. All newly admitted LTC residents with an expected long stay (e.g., >90 d) in Ontario, Canada between March 1, 2019 and February 28, 2021 were included. We describe proportion of new residents who had experienced a hip or other fracture (any body location) in the 6 months prior to their admission stratified by month. We also describe the age, sex, functional abilities (Activities of Daily Living Hierarchy Scale), cognition (Cognitive Performance Scale), frailty (54-item

Frailty Index), health instability (Changes in End-Stage Signs and Symptoms Scale), and location of admission (hospital, community, other in-patient) of those with a fracture before and during the pandemic through proportions compared via chi-square.

**Results:** Our sample included 29,890 new residents before and 18,451 during the pandemic, with a mean age of 82.2 (standard deviation, 10.9) and 60.2% were female. Before the pandemic, 3.2% and 3.7% of new residents had experienced a hip or other fracture in the past 6 months, respectively. During the pandemic this was 4.5% and 4.2%. The month with the highest proportion of new residents with a fracture was May 2020 at 6.9%. During the pandemic, a larger proportion of new residents with a fracture in the past 6 months had severe functional impairment (50.7 vs. 34.6%,  $p < 0.0001$ ), health instability (15.4% vs. 11.8%,  $p = 0.008$ ), a frailty index greater than 0.4 (21.6 vs. 18.6%,  $p = 0.02$ ), and were more frequently admitted from hospital (61.6 vs. 46.0%,  $p < 0.0001$ ) in comparison to those prior to the pandemic. They did not differ by age ( $p = 0.54$ ), sex ( $p = 0.87$ ), or cognition ( $p = 0.31$ ).

**Conclusion:** During the pandemic, new LTC residents who had experienced a fracture in the past 6 months were more functionally impaired with greater frailty and health instability.

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## P223

### FAST BONE LOSER PHENOTYPE IN EARLY MENOPAUSE

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**Objective:** To present a female patient diagnosed with menopausal osteoporosis detected early during physiological menopause who was non-responsive to anti-resorptive medication.

**Case report:** This is a 52-year-old female patient admitted for thyroid and bone status assessment. Her personal medical history consists of chronic autoimmune thyroiditis with nodular goiter, for which fine needle aspiration was performed 5 years ago with low risk follicular aspects are found as results. She entered menopause at age of 50 and one year later she was found with osteopenia (no prevalent fractures), but a decision of starting treatment with oral ibandronate 150 mg/month was done (in ad-

dition to adequate vitamin D intake). After 1 year, she suffered a vertebral fracture at lumbar L1 vertebra while being compliant to anti-osteoporotic therapy. On admission, normal thyroid function is confirmed by TSH=1.01 mUI/mL (normal: 0.5-4.5), FT4 (free levothyroxine)=13 pmol/L (normal: 10.3-24.4) under levothyroxine 50 mg/d. Cervical anterior ultrasound reveals a hypoechoic nodule in the right thyroid lobe of 1.9/1.15/1.3 cm. Calcium-phosphate metabolism shows normal total serum calcium=9.7 mg/dL (normal: 8.4-10.2), 25-OHD (25-hydroxvitamin D)=44.62 ng/mL (normal: 30-100), as well as suppressed bone formation marker osteocalcin of 23.18 ng/mL (normal: 15-46). Initial DXA from one year ago showed lumbar L1-4 BMD=0.907 g/cm<sup>2</sup>, T-score=-2.3SD, Z-score=-1.9SD, femoral neck BMD=0.768 g/cm<sup>2</sup>, T-score=-1.9SD, Z-score=-1.4SD, but following year BMD decreased to L1-4 BMD=0.845 g/cm<sup>2</sup>, T-score=-2.8SD, Z-score=-2SD, femoral neck BMD=0.678 g/cm<sup>2</sup>, T-score=-2.6SD, Z-score=-1.6SD. No other cause of secondary osteoporosis was found. A switch to annual zoledronate 5 mg is done with long term skeletal health surveillance.

**Conclusion:** This case of fast bone loser phenotype in early menopause requires particular attention to compliance with regard to the anti-osteoporotic medication and vitamin D replacement and prompt identification of additional causes of bone loss. Of note, it is debatable to declare non-responsive to a certain anti-osteoporotic drug during first few months exposure.

## P224

### SCIATICA IN THE ELDERLY IN THE EMERGENCY ROOM: RECENT ASPECTS: ABOUT 56 CASES

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**Objective:** Common sciatica is a pathology in young adults, uncommon in the elderly, in whom it is often associated with degenerative disc-vertebral lesions. The aim of our work is to study the recent aspects of common lumbosciatica in the elderly subject by specifying its clinical, radiological and evolutionary epidemiological characteristics.

**Methods:** Retrospective study of patients over the age of 65 hospitalized in the emergency department of the hospital for the management of common lumbosciatica over the past 5 years (January 2017-August 2022).

**Results:** These are 56 patients, 23 men and 33 women with an average age of 72.1 years (65-87). Half of the patients were hypertensive and 32.4% were diabetic. The average BMI was 26.2 kg/m<sup>2</sup> for men and 30.6 kg/m<sup>2</sup> for women. A progressive onset of pain was noted in all patients with an average duration of evolution of 47 months (2 weeks-45 years). A triggering factor was only found in 8.5% of cases. The pain was mechanical in 67.9% of cases, mixed in 26.6% of cases and inflammatory in 5% of cases. The sciatica was L5 in 63% of cases and S1 in 19% of cases. It was bilateral in 53.6% of cases. Intermittent root claudication was found in 51% of cases and paresthesia in 23% of cases. 12% of patients reported the notion of bladder and sphincter disorders. A

scoliotic attitude was found in 13.6% of patients. Lasègue's sign was absent in the majority of cases (63.2%). A motor deficit was present in 6% of cases and sensory disorders in 6.3% of cases. Standard radiography showed disc narrowing in 44% of cases, posterior interapophyseal osteoarthritis in 36.6% of cases, spondylolisthesis in 22.5% of cases and transition anomalies in 6.1% of cases. Bone demineralization was present in 24.3% of cases. More than half of the patients (57%) benefited from second-line radiological exploration (CT/MRI) which objectified a degenerative narrow lumbar canal in 76% of cases and a herniated disc in 63.9% of cases. In addition to symptomatic treatment, 64.7% of patients benefited from one or more epidural and/or posterior articular infiltrations. The short-term evolution was considered good in 57% of cases and unsatisfactory in 22% of cases.

**Conclusion:** Among the particularities of sciatica in the elderly subject, we note the bilaterality of the course, the rarity of a triggering factor and the frequency of intermittent root claudication. The Lasègue sign loses its meaning with age. Second-line radiological exploration eliminates a secondary cause and clarifies the mechanism of lumbosciatica.

## P225

### METHODS AND RELEVANCY IN MEASURING BONE MINERAL DENSITY OF FRACTURED OR DEFORMED HIP: COMPARISON WITH THE FRESH ISOLATED FEMORAL HEAD

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**Objective:** Many studies analyzed BMD at the unfractured hip to predict hip fracture types, despite some studies questioning the symmetry of the osteoporotic hip. This study aimed to demonstrate whether BMD of the fractured or deformed hip correlate with BMD of the fresh isolated femoral head.

**Methods:** Study group consisted of patients with nonpathological cervical fracture (n=57) or hip osteoarthritis (n=38). Before hip replacement surgery, BMD of the affected side was measured at the trochanter, femoral neck, and femoral head outside the acetabulum. After the surgery, the BMD of the fresh isolated femoral head was measured at the femoral neck and femoral head. ROI was settled manually so that each pre and postoperative region matched.

**Results:** Preoperative BMD values in the cervical fracture group were as follows; trochanter 0.51±0.09 g/cm<sup>2</sup>, neck 0.52±0.12 g/cm<sup>2</sup>, head 0.60±0.12 g/cm<sup>2</sup>. Preoperative BMD values in the hip osteoarthritis group were as follows; trochanter 0.54±0.14 g/cm<sup>2</sup>, neck 0.68±0.17 g/cm<sup>2</sup>, head 0.88±0.25 g/cm<sup>2</sup>. Pearson's linear correlation coefficients between BMD measured on the affected side and fresh isolated femoral head in the cervical fracture group were as follows; neck r=0.69 (95%CI 0.45-0.83, p<0.01), head r=0.45 (95%CI 0.21-0.64, p<0.01). Pearson's linear correlation coefficients between BMD measured on the affected side and

fresh isolated femoral head in the hip osteoarthritis group were as follows; neck r=0.71 (95%CI 0.50-0.85, p<0.01), head r=0.77 (95%CI 0.58-0.88, p<0.01).

**Conclusion:** We found strong correlations between BMD measured manually on the fractured or deformed hip and in the freshly extracted specimen. These BMD values can be used to assess the role of osteoporosis in fracture and osteoarthritis.

## P226

### BONE MINERAL DENSITY AND OSTEOPOROSIS IN RELATION TO ALL-CAUSE AND CAUSE SPECIFIC MORTALITY FROM TCVGH-OPC DATABASE: A POPULATION-BASED COHORT STUDY

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**Objective:** To identify the relationships between several cause-specific mortality and osteoporosis among the general population in Asia through a large longitudinal database from Taiwan.

**Methods:** Patients were enrolled from the Osteoporosis Prevention Center of Taichung Veterans General Hospital. High risk patients receiving DXA for BMD screening were enrolled for the study from 2011-2021. Osteoporosis is defined following the guidelines of the World Health Organization (WHO). Mortality of respective participants in TCVGH-OPC was ascertained by probabilistic record match to death certificate records. Cox proportional hazards models were adopted to calculate hazard ratios (HR) and the corresponding 95%CI for mortality.

**Results:** A total of 29493 patients were enrolled in the final analysis. During a 4.4-year median follow-up, 4255 men and women in the cohort died. There was a higher risk of all-cause mortality among participants to osteoporosis compared with normal measured overall (HR=2.02, 95%CI=1.9-2.16), femur areal BMD (aBMD) (HR=2.9, 95%CI=2.66-3.17), spine aBMD (HR=1.8, 95%CI=1.66-1.94) and via trabecular bone score (TBS) (HR=1.77, 95%CI=1.4-2.23). Moreover, a higher cancer, cardiovascular, and diabetic-related mortality rate was correlated with osteoporosis measured in overall, femur, spine and TBS score. After adjustment for clinical risk factors, the risk of all-cause mortality was higher among participants to osteoporosis compared with normal measured in the femur (HR=2.9, 95%CI=2.66-3.17). The addition of a TBS score <1.2 into the adjusted cox proportional model does not increase the mortality risk measured in femur aBMD (HR=2.61, 95%CI=1.92-3.55).

**Conclusion:** Our results concluded that maintaining normal BMD is critical to reducing the risk of mortality in the Asian population. A low level of BMD in the femur, spine, and TBS score demonstrated a significantly higher mortality rate related to cancer, car-

diovascular disease, and diabetes. The addition of a TBS score <1.2 into the prediction model does not increase the mortality risk measured in aBMD.

## P227

### OPPOSING TREND IN ANNUAL INCIDENCE OF OSTEOPOROSIS BETWEEN GENERAL POPULATION AND PATIENTS WITH FRAGILITY FRACTURES: A POPULATION-BASED COHORT STUDY FROM TCVGH-OPC DATABASE

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**Objective:** To analyze and update the annual incidence trend for osteoporosis and various types of fractures in Taiwan.

**Methods:** Patients were enrolled from the Osteoporosis Prevention Center of Taichung Veterans General Hospital. High risk patients receiving DXA for BMD screening were enrolled for the study from 2011-2021. Osteoporosis is defined following the guidelines of the WHO. Mortality of respective participants in TCVGH-OPC was ascertained by probabilistic record match to death certificate records. Cox proportional hazards models were adopted to calculate hazard ratios (HR) and the corresponding 95%CI for mortality.

**Results:** A total of 25592 patients were enrolled in the study. Between 2011-2021, the annual incidence rate of osteoporosis had increased significantly from 648 in 2011 to 763 in 2021 per 100,000 person years, particularly among women. Moreover, a significant decrease in the annual incidence rate of osteoporosis diagnosis for individuals with a history of spine, hip, or radius fractures from 2144 in 2011 to 888 in 2021 per 100,000 person-years was identified. Subgroup analysis had revealed a trend of increasing risk of osteoporosis among patients with a history of spine fracture from 1352 in 2011 to 1410 in 2021 per 100,000 person-years and hip fracture from 1320 in 2011 to 1386 in 2021 per 100,000 person-years, especially in women.

**Conclusion:** This study demonstrated significant findings on the trend of osteoporosis change in osteoporosis in the last 10 years. The result was consistent with the increasing prevalence of osteoporosis as the population ages. Moreover, the opposing trend in osteoporosis diagnosis for individuals with a history of fragility fractures may shed lights on the prevention efficacy of osteoporosis. We proposed that better care for patients with fracture histories is a result of medical policy, which lowers the incidence of osteoporosis. Limited mobility may be associated with an increased risk of osteoporosis in patients with a history of spine or hip fracture in the entire elderly population.

## P228

### RELATION BETWEEN ENDOCRINE DISORDERS AND LOW BMD IN MAJOR THALASSEMIA PATIENTS

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**Objective:**  $\beta$ -thalassemia major patients frequently have low BMD. We tried to determine relation between endocrinopathies and low BMD.

**Methods:** Major  $\beta$ -thalassemia patients, 114 cases, 3-38 yr of age, entered this study. Female to male ratio was 51/63. Children (<20 y/o) formed 57% of participants. Information about BMD and hormonal and biochemistry blood evaluation including FBS, ferritin, T3, T4 and TSH, luteinizing hormone (LH) and follicle-stimulating hormone (FSH), testosterone (males), and estradiol (females) entered data sheet. Low bone mass considered as Z-scores  $\leq -2$  BMD. Correlation between age, sex, ferritin, short stature, hypogonadism, hypothyroidism, impaired fasting glucose and diabetes and spine and femur low BMD measured.

**Results:** Sex and ferritin level showed no significant correlation with low BMD. Age significantly correlated to low BMD at femur and spine (P values, 0.009 and <0.001, respectively). Being 19 y/o and older increases the risk of Z-score  $\leq -2$  in femoral region, 5.84 times compared to younger patients (P-value=0.002). Being 14 y/o and older increases the risk of Z-score  $\leq -2$  in spinal region, 17 times compared to younger patients (P-value=0.007). Endocrine disorders showed no significant effect on low BMD of femur. Short stature and hypogonadism showed significant correlation with low BMD of spine (P values, 0.005 and 0.025, respectively)

**Conclusion:** In this study only vertebral low BMD affected significantly by endocrinopathies. May be the spine is better region for measuring the effects of hormonal changes on bone density in major thalassemia patients.

## P229

### BONE MINERAL DENSITY AT THE FRACTURE SIDE DISCRIMINATES TROCHANTERIC FRACTURES FROM CERVICAL FRACTURES

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**Objective:** Many studies analyzed BMD at the unfractured hip to predict hip fracture types. This study investigated the difference in fracture side BMD between two types of hip fractures.

**Methods:** This was a DXA analysis of patients with nonpatholog-

ical cervical (n=64) or trochanteric (n=39) hip fracture and hip osteoarthritis (n=38) as a control. Preoperatively, BMD on the affected side was measured at the trochanter, femoral neck and femoral head outside the acetabulum. ROI was settled manually.

**Results:** There was no statistically significant difference in left/right and gender between the three groups. BMI was significantly lower in the fracture group ( $19.4 \pm 3.4 \text{ kg/m}^2$ ) compared to the control ( $24.6 \pm 4.1 \text{ kg/m}^2$ ), but not differed between fracture types. The trochanteric group (age  $86.8 \pm 8.9$  years) was significantly older than the cervical group (age  $79.4 \pm 10.1$  years). Trochanteric BMD was significantly lower in the trochanteric group ( $0.40 \pm 0.13 \text{ g/cm}^2$ ), but not differed between the cervical group ( $0.50 \pm 0.10 \text{ g/cm}^2$ ) and the control ( $0.54 \pm 0.14 \text{ g/cm}^2$ ). Neck and head BMD was the lowest in the trochanteric group and the highest in control. The difference between the three groups was significant.

**Conclusion:** Low trochanteric BMD discriminates trochanteric fractures from cervical fractures. Low head and neck BMD with medium trochanteric BMD is a risk factor for cervical fracture.

## P230

### HIP OSTEOARTHRITIS AND PROXIMAL FEMORAL FRACTURE: ANALYSIS OF BONE MINERAL DENSITY ON THE FRESH ISOLATED FEMORAL HEAD

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**Objective:** To evaluate the influence of hip osteoarthritis on bone marrow density of the proximal femur in comparison with hip fracture cases.

**Methods:** This was a DXA analysis of patients with hip osteoarthritis (n=38) and nonpathological cervical (n=64) or trochanteric (n=39) hip fracture. Preoperatively, BMD on the affected side was measured at the trochanter, femoral neck and femoral head outside the acetabulum. In cases of hip replacement surgery, the BMD of the fresh isolated femoral head was measured at the femoral neck and femoral head. ROI was settled manually so that each pre and postoperative region matched.

**Results:** Hip osteoarthritis group (age  $73.7 \pm 6.7$  years) are significantly younger than the cervical fracture group (age  $79.4 \pm 10.1$  years) and the trochanteric fracture group (age  $86.8 \pm 8.9$  years). The inverse probability of treatment weighting method based on propensity-score analysis was used to reduce the impact of age and sex on BMD. First, we analyzed the osteoarthritis group and the cervical group. Adjusted trochanteric BMD was not significantly different between the osteoarthritis group and the cervical fracture group. Adjusted neck and head BMD were significantly higher in the osteoarthritis group compared to the cervical group. These results were consistent with the analysis using adjusted BMD of the fresh isolated femoral head. Second, we analyzed the osteoarthritis group and the trochanteric group. Adjusted trochanteric BMD was not significantly different between the osteoarthritis group and the trochanteric fracture group. Adjusted

neck and head BMD were significantly higher in the osteoarthritis group compared to the cervical group.

**Conclusion:** Age- and-sex-matched BMD of hip osteoarthritis and hip fracture cases were analyzed. In the osteoarthritis group, the trochanteric BMD values are reduced as in the trochanteric fracture group, and the neck and head BMD values are higher than in the cervical group. These findings support the hypothesis that hip osteoarthritis could be a risk factor for trochanteric fracture and a protective factor for cervical fracture.

## P231

### PREDICTORS OF QUALITY OF LIFE IN PEOPLE WITH OSTEOPOROSIS AFTER 50 YEARS OF AGE

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**Objective:** Quality of life and a sense of well-being arise as a result of many socio-demographic factors. As life expectancy increases, so does the number of chronic diseases, including osteoporosis. Osteoporosis, through its insidious, slow course, affects all spheres of human health. The initial diagnosis of a chronic disease during the visit to the doctor can be difficult to accept, and the sense of life satisfaction in the patient is further impaired by the problems associated with disease progression, treatment complications, limitation and exclusion from active life in society. The aim of the study was to assess the predictors of quality of life in people aged over 50 with osteoporosis.

**Methods:** The study involved 198 women over 50 years of age with postmenopausal osteoporosis treated in two Osteoporosis Treatment Clinics in the city of Lodz. The participants completed a sociodemographic questionnaire prepared by the authors, the visual analogue scale (VAS) and three validated psychometric scales: the Disease Acceptance Scale (AIS), the Satisfaction with Life Scale (SWLS) and the QUALEFFO-41 quality of life questionnaire. The study was approved by the Bioethics Committee of the Medical University of Lodz: Resolution No. RNN / 215 / 18KE of June 12, 2018.

**Results:** The analysis of the QUALEFFO-41 domains indicates that most problems were reported in the domain of "mental functions". The median QUALEFFO-41 score was 39 points, which corresponds to a moderate level of quality of life; in addition, the quality of life was found to deteriorate by 0.61% with each year of life. The occurrence of being woken due to pain and taking sleeping pills was also found to worsen the mental state by 4.9%. Increasing pain in the VAS scale by one point worsened the quality of life by 2.4%. The results of the AIS scale (median 26 points) as well as SWLS (median 19 points) were average.

**Conclusion:** The AIS and SWLS scales can be used to assess the mental state of women aged over 50 with postmenopausal osteoporosis. Monitoring the predictors of quality of life, i.e. the presence of pain and sleep disturbances, and the disease duration, could improve the doctor-patient relationship and have a positive influence on the effects of treatment.

P232

### ASSOCIATION BETWEEN OSTEOARTHRITIS AND BONE MINERAL DENSITY

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**Objective:** To evaluate association between OA and BMD was demonstrate in different studies, but still ambivalent.

**Methods:** The enrolled patients had knee OA based on ACR criteria with x-ray confirmation with stage I-III Kellgren-Lawrence. Mean disease duration was 5 (2-10) years. All participants were signed an informed consent form. Patients were evaluated by report form, using the anthropometric parameters, disease history, clinical examination data, assessment of knee joints pain by visual analog scale (VAS), indexes WOMAC and KOOS, standard X-ray and DXA examination with three sites the L1-L4 lumbar spine, femoral neck, and total hip.

**Results:** At prospective study were enrolled 176 (100% female), with mean age 58.2±9.9 years (38-74), with knee OA. Disease duration was >5 years at 54.8%, <5 years – 45.2%. Osteoporosis or osteopenia were diagnosed at 97 patients (55.1%), normal BMD – 79 (44.9%). Frequency of osteoporosis in female in perimenopause and menopause was 8.9% at L1-L4 lumbar spine, 5.5% at femoral neck and 1.7% at total hip; osteopenia was assessed at 35.2%, 43.8% and 20.3%, respectively. In comparative analysis was indicated that patients with low BMD were older (62.1±8.1 vs. 55.9 ±10.2 y.o., p=0.00001), had smaller weight (28.8±4.8 vs. 31.0±5.6 kg, p=0.01), smaller waist size (91.4±12.2 vs. 99.6±12.8 cm, p=0.01), bigger median of menopause duration (15 [10;22] vs. 8 [5-16] years, p<0.0001), more intensity pain in target knee during moving (50 [40;71] vs. 44 [25;51] mm, p=0.03), higher WOMAC score (1090 [655;1480] vs. 685 [400;1070] mm, p=0.13) and subscales: fatigue (105 [59;127] vs. 61 [40;90] mm, p=0.02), function (820 [460;1027] vs. 520 [289;780] mm, p=0.02) and lower KOOS score (49 [34;55] vs. 69 [48;86], p=0.001). At X-ray at patients with osteoporosis and osteopenia was smaller medial knee joint space, significantly, and smaller size of medial femoral osteophytes either than patients with normal BMD: 2.0 [1.3;4.7] vs. 4.5 [3.0;6.1] mm, p=0.05 and 3.7 [3.0;4.5] vs. 2.7 [1.8;3.6] mm, p=0.007, respectively. High BMD at L1-L4 lumbar spine and total hip more frequently diagnosed at pronounced stages of OA. In the Spearman correlation analysis are confirmed positive associations between OA stages and BMD at L1-L4 lumbar spine (r=0.24, p=0.05), femoral neck (r=0.18, p=0.04) and total hip (r=0.41, p=0.004); positive associations (p<0.05) between decreasing of BMD (osteoporosis and osteopenia) and thoracic kyphosis, menopause duration, patient's age, medial joint space, osteophytes of medial femoral condyle and medial and lateral tibial condyles (at X-ray) and negative association with BMI, waist size and hypermobility syndrome (Table 1).

**Table 1.** Correlation coefficient between BMD and risk or progression factors of OA.

Parameters	r	p
Age, years	0.31	<0.0001
BMI kg/m <sup>2</sup>	-0.22	0.004
Waist size, cm	-0.30	0.02
Menopause duration, years	0.26	0.001
X-ray size of medial knee joint space, mm	0.36	0.01
Size of medial femoral condyle osteophytes, mm	0.22	0.02
Size of medial tibial condyle osteophytes, mm	0.22	0.02
Size of lateral tibial condyle osteophytes, mm	0.22	0.02
Hypermobility syndrome	-0.24	0.001
Thoracic kyphosis	0.24	0.04

**Conclusion:** Our data demonstrated a high frequency of patients with low BMD (osteoporosis and osteopenia) – 55.1%. At 'osteoporotic' phenotype we investigated harder course of OA: significantly higher was pain intensity and WOMAC score include subscales score.

P233

### RHEUMATOID ARTHRITIS MIGHT NOT BE A RISK FACTOR FOR OSTEOPOROTIC FRACTURES IN NEW ERA; 10-YEAR COHORT TOMORROW STUDY ANALYZED BY COX PROPORTIONAL-HAZARDS REGRESSION MODEL WITH TIME-DEPENDENT VARIABLES

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**Objective:** Previous researchers have reported that patients with rheumatoid arthritis (RA) had the higher risk for osteoporotic fractures by 2- to 6-fold compared to controls. RA is identified as an independent risk factor for fragile fractures in the Fracture Risk Assessment Tool (FRAX). However, is the situation unchanged even in a new era when RA treatment has made remarkable progress?

**Methods:** To reveal the real risk factors for osteoporotic fractures



in RA, we launched a 10-year prospective cohort in 2010, the Total Management Of Risk factors in Rheumatoid arthritis patients to lower morbidity and mortality: the TOMORROW study including 208 RA patients and age- and sex-matched 205 volunteers (Vo) (84.5% female, age; 60.2 years, BMI; 22.4 kg/m<sup>2</sup>, history of fracture; 32.7%, ThBMD (thoracic spine bone density); 0.72 g/cm<sup>2</sup>). Since treatment content and internal factors change over 10 years, we attempted to identify fracture risk factors using the Cox proportional hazards model with time-dependent covariates.

**Results:** There were 42 and 15 major fractures in the RA and Vo groups, respectively, with significantly more cases in RA group (log-rank test, p=0.001). However, Cox model identified only age (HR 1.047, 95%CI 1.020, 1.070, p=0.001), history of fracture (HR 1.843, 95%CI 1.004, 3.380, p=0.049), and homocysteine level (HR 1.205, 95%CI 1.023, 1.420, p=0.026) as significant risk factors for major fracture. RA per se was not a significant risk factor (HR 1.876, 95%CI 0.918, 3.830, p=0.085). In a sub-analysis of patients with RA only, Cox hazard model with time-dependent variables such as BMI, ThBMD, GC dose, and disease activity revealed that age (HR 1.039, 95%CI 1.010, 1.07, p=0.009) and GC (HR 1.184, 95%CI 1.067, 1.31, p=0.001) were the only significant risk factors for major fractures.

**Conclusion:** The median disease duration of RA patients participating in the TOMORROW study was 10.3 years. RA is no longer a risk factor for osteoporotic fractures, although it is likely to be a trailing effect of the past. Tactics to reduce GC use may further reduce fracture risk associated with RA.

## P234

### PRP THERAPY IN OA KNEE: MY EXPERIENCE (A SERIES OF 123 CASES – 143 KNEES)

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**Objective:** Osteoarthritis (OA) is a major source of disability, pain, and economic burden worldwide. Genetic, biochemical, and mechanical factors are responsible for the complex multifactorial epidemiology of the disease. Abnormal joint biomechanics, age, gender, joint injury, and high BMI, along with a strong genetic basis, are associated with OA development. Presently, OA is the eighth most common disease in males world over and the fourth most common disease in females. Intra-articular injection of platelet-rich plasma (PRP) has been broadly considered for cartilage repair, as it could enhance matrix synthesis thanks to the properties of its growth factors (mostly PDGF and TGFβ). To evaluate the efficacy of PRP intra-articular injections in OA knee patients. A series of 123 patients with different grade of OA. Assessing the recovery on VAS and WOMAC scale.

**Methods:** 08ml of patient's blood taken in two tubes containing 0.5 ml of Sodium Citrate (38%w/l). Centrifuged at the 4000 rpm for 20 min. Let sample rest for about 5 min, about 05 to 06 ml of PRP is extracted. Patient shifted to operation theatre. After

proper skin sterilisation and knee draping. This PRP is injected into the knee joint. 2<sup>nd</sup> injection of PRP repeated after one month. The patient's progress is assessed at end of one month after the second injection and again at one year and then after 2 years. Recovery assessed with VAS and WOMAC scale. Four aspects of WOMAC score taken into consideration: 1) pain at night, 2) rising from sitting, 3) walking on flat surface, 4) ascending and descending stairs, 5) performing light domestic duties, and 6) performing heavy domestic duties.

**Results:** In the series of 123 patients (143 knees) taking into consideration the severity of OA as per K&J classification - Grade 2 (minimal) moderate joint reduction, Grade 3 (moderate) severe joint space reduction with subchondral sclerosis, Grade 4 (severe) large osteophytes, marked narrowing of joint space, severe sclerosis and definite deformity of bone ends. BMI of the patient, age of the patient showed: 1) pain at night 95-100%, 2) rising from sitting 86-100%, 3) walking on flat surface 85-100%, 4) ascending and descending stairs 60-90%, 5) performing light domestic duties 70-96%, and 6) performing heavy domestic duties 60-95% across various Grade of OA (Grade 2 to 4). Patients were also instructed for regular exercises to strengthen their thigh muscles and lifestyle changes to bring their body weight in permissible levels as per their height.

**Conclusion:** PRP therapy in moderate to severe OA knee showed good to excellent results in improving pain during rest, pain free walk, climbing stairs. Patients who do not want TKR is worth trying. Up to two years follow patients are happy and pain free.

## P235

### HYPERCALCEMIA IN A PATIENT WITH BASEDOW-GRAVES' DISEASE: IS THERE ANY OTHER CAUSE?

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**Objective:** To introduce a female with long term history of hypercalcemia which initially was associated with Basedow-Graves' disease (BGD) followed by an actual recognition of primary hyperparathyroidism (PHP).

**Methods:** This is a case report. Mineral metabolism and thyroid profile are provided.

**Case report:** This is a 52-year-old patient admitted for thyroid and bone status assessment. Her personal medical history includes BGD that was diagnosed 3 years ago initially treated with anti-thyroid drugs (thiamazole) followed by radioiodine ther-

apy 50 mCi with consecutive hypothyroidism. She also associates high blood pressure since last year. On admission, thyroid function is normal under 75 µg levothyroxine/day in terms of TSH=1.35 µUI/mL (normal:0.5-4.5), FT4 (free levothyroxine)=13.96 pmol/L (normal:9-19). Total serum calcium (TSC) is 10.4 mg/dL (normal:8.4-10.3), phosphorus=4.2 mg/dL (normal:2.5-4.5), 25OHD (25-hydroxyvitamin D)=34.6 ng/mL (normal:30-100), PTH=72.63 pg/mL (normal:15-65), consistent with the diagnostic of PHP. Bone turnover markers panel shows normal osteocalcin=25 ng/mL (normal:15-46), P1NP=44 ng/mL (normal:15.13-58.59), and mild elevation of bone resorption marker CrossLaps=0.5 ng/mL (normal:0.158-0.442). The patient had a history of hypercalcemia since the age of 48, initially considered as caused by hyperthyroidism, for instance, TSC of 10.4 mg/dL (normal:8.4-10.3), phosphorus=3.52 mg/dL (normal:2.5-4.5), with PTH=54.95 pg/mL (normal:15-65) and 25OHD=15.2 ng/mL (normal:30-100). Currently, DXA is normal as reflected by L1-4 lumbar BMD=1.205 g/cm<sup>2</sup>, T-score=0.2 SD, Z-score=0.1 SD, total hip BMD=0.975 g/cm<sup>2</sup>, T-score=-0.3SD, Z-score=-0.1SD, femoral neck BMD=0.928 g/cm<sup>2</sup>, T-score=-0.8SD, Z-score=-0.3 SD, 1/3 distal radius BMD=0.799 g/cm<sup>2</sup>, T-score=1.2 SD, Z-score=1.2 SD. No cardiac or renal complications of PHP are identified. Decision of wait and see was taken with regard to PHP. **Conclusion:** Hypercalcemia in thyrotoxicosis might mask HPH.

## P236

### BONE STATUS IN A PATIENT WITH SURGICALLY INDUCED MENOPAUSE

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**Objective:** Osteoporosis is a disease that affects postmenopausal women, causing complications such as fragility fractures. The low levels of estrogens in the postmenopausal state lead to a decrease in the protective effect that they have on bone mass with an imbalance between resorption and formation. We aim to introduce a patient with surgically-induced menopause and osteoporotic fractures.

**Case report:** This is a 67-year-old female patient admitted for fracture risk evaluation. Her medical history includes hypothyroidism associated with a right hemi-thyroidectomy at the age of 36 years for multinodular goiter, followed by substitutive treatment with levothyroxine 100 mg/d. Her medical background also includes arterial hypertension, mammary dysplasia, hysterectomy and bilateral adnexectomy for a leiomyoma at the age of 43 (no hormone

replacement therapy). She suffered a mild low-trauma L1 lumbar vertebra fracture 3 years ago while DXA was consistent with the diagnostic of osteopenia as followings: lumbar L1-4 BMD=1.035 g/cm<sup>2</sup>, T-score=-1.2SD, Z-score=-0.7SD, femoral neck BMD=0.826 g/cm<sup>2</sup>, T-score=-1.5SD, Z-score=-0.8SD, total hip BMD=0.972 g/cm<sup>2</sup>, T-score=-0.3SD, Z-score=0.1SD. Due to COVID-19 pandemic circumstances, no anti-osteoporotic regime was followed until recently when, starting from a non-sever back pain, she was identified with an incidental L2 fracture. Currently, total serum calcium is normal of 9.9 mg/dL (normal:8.5-10.2), so is phosphorus=3.7 mg/dL (normal: 2.5-4.5), mild hypovitaminosis D is identified based on 25-OHD (25-hydroxyvitamin D)=24.11 ng/mL (normal: 30-100) with normal PTH=35.62 pg/ml (normal:15-65). Thyroid panel shows adequate LT4 replacement: TSH=0.77 mUI/mL (normal: 0.5-4.5), FT4 (free levothyroxine)=14.4 pmol/L (normal: 10.3-24.4). Lowest DXA T-score remained in the ranges of osteopenia: L2-4 BMD=0.997 g/cm<sup>2</sup>, T-score=-1.7SD, Z-score=-1.2SD, femoral neck BMD=0.853 g/cm<sup>2</sup>, T-score=-1.3SD, Z-score=-0.5SD, total hip BMD=0.972, T-score=-0.3SD, Z-score=0.1SD. Zoledronic acid (5 mg/year) and vitamin D 2000 UI/d is recommended.

**Conclusion:** Women with surgical procedures that induce menopause are at higher risk of developing osteoporosis or a fragility fracture might be present despite DXA score being in the ranges of osteopenia with normal BMI and glucose profile.

## P237

### PARADOXICAL PSORIASIS: NEW DIAGNOSIS OR ADVERSE DRUG REACTION

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**Objective:** The paradoxical occurrence of psoriatic rash in patients undergoing treatment with TNFα inhibitors (iTNFα), still remains a mystery. The switching of the immune system and the appearance of a psoriatic rash from a given iTNFα leads to the appearance of psoriasis when switching to another drug of the same group.

**Methods:** The retrospective study of 360 patients with RA and AS, of which N=180 (50%) were on therapy with iTNFα, and of these N=100 (28%) – adalimumab, N=60 (17%) etanercept and N=20 (5%) - certolizumab pegol and N=180 (50%) are on IL-17 inhibitor therapy.

**Results:** The N=27 (7.5%) patients with paradoxical psoriasis, of which N=19 (70.3%) were on adalimumab therapy, N=7 (26%) on etanercept and N=1-(3.7%) of certolizumab pegol. None of the patients on IL-17 therapy had a psoriatic rash.

**Conclusion:** The prolonged synthesis of IFNα from the inhibited

maturation of pDC by TNF $\alpha$  leads to the induction of a paradoxical non-T cell response with the appearance of cutaneous psoriasis. However, this should not be considered as a new nosological unit but as adverse drug reaction from the treatment being administered. The precise mechanisms of this switchover and the exact involvement of pDC are still to be clarified.

## P238

### PSORIASIS AND PSORIATIC ARTHRITIS - SURPRISE OR MYSTERY: A CLINICAL CASE?

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**Objective:** The pathogenesis of psoriasis remains ambiguous and there are still undiscovered mechanisms. Its paradoxical occurrence from TNF therapy has long been known but has not been studied in patients receiving IL-6 inhibitors (iIL6).

**Methods:** 56-year-old woman with established Dg seropositive rheumatoid arthritis since 2010.

**Results:** Treatment and therapeutic route performed:

- Methotrexate (MTX) 15 mg/w 2010-2013
- In 2014 - attempted treatment with leflunomide with the appearance of allergy
- From 2014 to 2019 - MTX - 20 mg/w
- Start of biological therapy with certolizumab pegol - of June-September 2016

As of September 2016 tocilizumab (TCZ) 162 mg/w/ s.c. up to June 2022 good clinical response - no new joint areas, normalisation of acute phase markers and decrease in DAS 28=2,8. The December 2021- recovered from SARS-Cov-2 has not been stopped TCZ.

In July 2022 - new onset skin psoriasis, multiple enthesitis, axial pain with thoracic and lumbar involvement, DAS 28- 5.98, ASDAS- 3.6. The August 2022 start of upadacitinib - after 2 months, no new joint areas, retention of low levels of acute phase indicators, impact on enthesitis, moderate to low disease activity DAS 28- 2.67, ASDAS- 2.1.

**Conclusion:** The role of IL-6 in the pathogenesis of psoriasis has not been well studied. There are many controversies about its therapeutic response in patients with psoriasis on the one hand, and on the other - is it possible that a paradoxical reaction similar to that with the use of iTNF $\alpha$  is possible, or is it manifestation of the immune-mediated disease psoriasis itself.

## P239

### OBESITY AS A MAJOR RISK FACTOR FOR THE PROGRESSION OF KNEE AND HIP OSTEOARTHRITIS

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**Objective:** Osteoarthritis of the load-bearing joints is one of the most common rheumatological diseases worldwide and has become a socially significant disease in view of the direct and indirect consequences of the patients' disability. Modern lifestyle and diet are one of the main factors determining the severity of osteoarthritis.

**Methods:** 3 groups of patients with an average age of 76 years were followed for 12 months in 3 X-ray stages of osteoarthritis of the knee and hip joints with different BMI (kg/m<sup>2</sup>) 1 group (N=34) / control group / - with normal weight- BMI-18.5- 24.9, (kg/m<sup>2</sup>), group 2 (N=33) - obesity stage 2 BMI -35.0- 39.9 (kg/m<sup>2</sup>) and group 3 (N=35) with obesity stage 3 BMI >40 (kg/m<sup>2</sup>).

**Results:** After 12 months of follow-up, 3 (9%) patients from the control group, 6 (18%) and 9 (26%) patients progressed to X-ray stage 4 OA of one of the two joint areas - hip or knee.

**Conclusion:** Body weight is a major risk factor for the progression of osteoarthritis, along with other risk factors. Synthesis of adipokines and a higher level of inflammatory response supports disease progression in individuals with higher weight. Unlike inflammatory joint diseases, we do not yet have a specific pathogenetic treatment that controls the disease. Therefore, the influence of the risk factors is the basis of the delay of the progression and a future good therapeutic response of these patients.

## P240

### OBESITY AND VITAMIN D DEFICIENCY IN MODERN SOCIETIES: HOW ARE THEY INTERCONNECTED?

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The prevalence of both pathological conditions – obesity and low vitamin D status – continues to rise in many countries. There is no final view on how these two illnesses are interrelated and aggravate each other. But the main pathophysiological pathways (e.g., chronic low-grade inflammation) as well as common risk factors (e.g., sedentary lifestyle) are well-known. Some of them could be corrected, e.g., by changing their lifestyle habits. It is important to

emphasize that to achieve the best results, it is necessary to act simultaneously in two directions – to lose weight and to improve vitamin D status. The spread of such basic knowledge among physicians might help to improve clinical outcomes. Notably, all obese patients should be considered at high risk for vitamin D deficiency and usually need supplementation with large vitamin D doses.

## P241

### VITAMIN D DOSAGE IN OUTPATIENTS IN COVID-19 ERA: A BRIEF ALGORITHM

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In modern societies, many patients can be at high risk of low vitamin D. Therefore, testing of serum 25-hydroxyvitamin D (25-OH-D) levels should be performed before prescribing them vitamin D supplementation. However, in some cases the 25-OH-D levels assessment is not available at the right moment, e.g., due to mandatory quarantine of COVID-19 outpatients. Therefore, such patients could be advised to start taking moderate vitamin D doses (e.g., 4000 IU/d) and to check their 25-OH-D levels later. The proposed algorithm, developed in the light of COVID-19 pandemic and based on recent guidelines, also includes cases when baseline 25-OH-D levels are known.

## P242

### VITAMIN D DEFICIENCY IN MODERN SOCIETIES: WHY AND HOW?

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Vitamin D deficiency is prevalent in many countries and there are many risk factors for this condition. In countries located far away from the equator, a reduced production of vitamin D<sub>3</sub> in the skin due to naturally lower solar radiation plays the major role. In addition, unhealthy lifestyle habits, sunlight avoidance, comorbidities, e.g., obesity or malabsorption syndrome, as well as low rates of vitamin D supplementation contribute to the development of low vitamin D status. The understanding of vitamin D physiopathology might help in identifying the main risk groups. For patients in those groups, an analysis of serum 25-hydroxyvitamin D – the best marker of patient's vitamin D status – should be performed. In case of low vitamin D status, an appropriate supplementation should be recommended.

## P243

### NATIONAL OSTEOPOROSIS SCHOOL PROJECT 10 YEARS – MULTIDISCIPLINARY EDUCATION

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**Objective:** The osteoporosis (OP) care gap exists between the healthcare needs of older adults with fragility fractures and the medical care they receive from their GPs and other healthcare providers (HCP). Still, at this moment, a fracture liaison service has not yet been established in Latvia. Under the Latvian Osteoporosis and Bone Metabolic Diseases Association (LOKMSA) auspice, the National Osteoporosis School Project 2012–2022 (OS Courses) was organised and conducted. This study aimed to evaluate participants' feedback on the importance of OS Courses, overall satisfaction, Courses materials, lectors and acquired knowledge in different Latvian regions and cities.

**Methods:** Each OS Course was of 9 academic hours and included six sessions on OP and osteodensitometry (DXA) with a clinical case at the end of each session. We created a self-report questionnaire (SRQ) to gather feedback, and participants fulfilled it. The survey consists of 17 questions regarding their attitudes, satisfaction, perceived importance of the OS Courses, and acquired knowledge. We analysed anonymous response rates and structures in different regions and cities.

**Results:** OS Courses were organised in 9 regional cities and towns and Riga, the capital of Latvia. In total, 1510 participants (88.9% female) registered for the OS Courses. Each OS Course was attended by 35-65 different HCP, including GP 47.1%, rheumatologists 4.4%, endocrinologists 6.6%, traumatologists 2.2%, radiologists 8.8%, radiologist assistants 8.8%, dietitians 8.8%, rehabilitation specialists 2.2%, and residents 11.1%. The overall SRQ response rate was 99%. The overall satisfaction relating to OS Courses was 97.8%. The OS Courses, Courses materials, lectors and acquired knowledge as very good was 87%, and as good – as 13%. There is a considerable awareness of the importance of preventing OP – 97.8% perceived the significance of OP SC and acquired knowledge on OP management. There were no differences in the SRQ results of participants from Riga and other cities.

**Conclusion:** Multidisciplinary educational initiatives such as the national OS Project 2012–2022 are necessary to increase awareness and knowledge of OP. OS Courses participants are aware of the impact of this condition and prefer educational material of direct relevance to the care of their pts. OS Courses result in better cooperation between primary and secondary care, break down barriers to change clinical practice, and promote fully integrated care of pts with OP.

P244

### A RARE CASE OF FAMILIAL PSEUDOHYPOPARATHYROIDISM TYPE 1B

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**Objective:** Pseudohypoparathyroidism type 1B (PHPT T1B) is a rare disorder characterized by PTH resistance in the proximal renal tubules, which presents with increased serum PTH, hypocalcemia, and hyperphosphatemia. A methylation defect at the GNAS coding sequence causes it. The defect is often sporadic but may occasionally present as familial, with an autosomal dominant transmission pattern.

**Methods:** This is a case report. The patient agreed to the anonymous use of her medical records.

**Case report:** This case describes a family with autosomal dominant PHPT T1B. A 34-year-old male was referred to the endocrinology department at 17. The laboratory results suggest PTH resistance, TSH resistance, and hypogonadotropic hypogonadism. He was diagnosed with pseudohypoparathyroidism. DXA revealed secondary osteoporosis. Follow-up cerebral CT found abnormal deposits of calcium (Fahr's syndrome). His 17-year-old sister, at the age of 8, was hospitalized at the paediatric department with complaints of leg and arm cramps. She presented with PTH and TSH resistance. Her older sister at that time had no complaints. 3 yrs later methylation-specific MLPA test was suggested for the younger sister, and it confirmed the diagnosis of PHPT T1B. Blood examination of the 53-year-old mother of siblings showed only PTH resistance. DXA showed osteopenia of the lumbar spine and femur. Two siblings with TSH resistance received levothyroxine; a 34-year-old male additionally received testosterone propionate/testosterone phenylpropionate/testosterone isocaproate/testosterone decanoate injections. All of the family members received cholecalciferol and calcium supplements. Treatment led to the remission of the symptoms.

**Conclusion:** The case report demonstrates therapy and variable clinical manifestations of a family with AD-PHPT T1B. Pseudohypoparathyroidism is a complex disorder with extreme individual variability. It can remain undiagnosed till early and late adulthood if it remains asymptomatic. Genetic testing is significant for differentiation between the types and subtypes of PHPT and differentiates familial forms from sporadic ones.

P245

### RISK FACTORS OF URATE DEPOSITS IN A FEMALE POPULATION WITH ASYMPTOMATIC HYPERURICEMIA

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**Objective:** Gout is a male-dominated disease, for which much research is carried out in men and where the understanding, of the risk factors for this disease and urate deposits, is only relevant to men. This study aims to assess the prevalence of ultrasound signs of urate deposits in an exclusively female population with asymptomatic hyperuricemia (AHU) and to explore the potential risk factors for the formation of double contour signs (DC) and tophus in woman.

**Methods:** Osteoarticular ultrasound was performed in all subjects, at the knee, ankle and first metatarsophalangeal joint (MTP1) and on different tendons (Achillean, patellar and quadriceps tendon), on two groups of women (with and without AHU). Demographic, clinical, and laboratory data from two groups were recorded to explore potential risk factors for double-contour sign and tophus.

**Results:** A total of 93 women were analyzed (48 with AHU vs. 45 without AHU). The double contour sign was the most observed manifestation at the knee and ankle joints (knees: 7/48 vs. 1/45; ankles: 5/48 vs. 0/45). The tophi and the double contour sign were the two most observed ultrasound manifestations on the MTP1 joints (tophus: 3/48 vs. 0/45; DC: 8/48 vs. 2/45). Only one patient had a tophus on her patellar tendon in the group with AHU. Age and the presence of renal impairment were potential risk factors for the DC sign (odds ratio [OR], 2.67, p=0.01; OR, 1.71, p=0.022, respectively), while uricemia is the only risk factor for tophus (OR, 2.32, p=0.023).

**Conclusion:** Both DC and tophus affected 1 in 6 women in the study. The DC sign was observed at the knee, ankle and MTP1 joints. While tophus is observed only on MTP1 and patellar tendon. The risk factors for occurrence of DC were age and renal insufficiency, while tophus was linked to the level of uricemia in women.

P246

### CHEESES PRODUCED IN LATVIA AS AN IMPORTANT SOURCE OF CALCIUM FOR THE PREVENTION AND TREATMENT OF OSTEOPOROSIS

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**Objective:** Osteoporosis Guidelines (e.g., Latvian Osteoporosis Clinical Guidelines) recommend taking 1200 mg of calcium (Ca) with different foods. There needs to be data on the amount of Ca in various local Latvian kinds of cheese. This research would help physicians advise patients (pts) on choosing Latvian Ca-rich cheeses products. The study aimed to determine the amount of Ca in Latvian cheeses of various groups and types produced in Latvia 01/11/2021 – 01/02/2022.

**Methods:** We collected data on the amount of Ca in cheeses produced locally in Latvia for descriptive analysis. Ca amounts were evaluated in standardized samples in the Institute of Food Safety, Animal Health and Environment (BIOR), Latvia and J. S. Hamilton

Baltic lab., Latvia using inductively coupled plasma mass spectrometry (ICP-MS). The study is divided into six steps. 1st step – is the identification of producers (joint-stock companies, Ltd, farms, cooperative farms, individual producers) according to a specially designed survey questionnaire for this study, 2nd step – is the selection of manufacturers, 3 – is the choice of manufacturers, 4 – is a grouping of cheese according to producers, 5 – analysis of results, 6 – publication of research data. Data analysis was performed using IBM SPSS 26.0.

**Results:** We identified 84 cheese manufacturers in Latvia. Answers to the questionnaire were obtained from 45 (54% of the total) manufacturers. 35 cheese products were collected. We picked 24 producers with 39 types of Latvian cheeses. All cheeses are divided into three groups (gr.) depending on the amount of water: soft, semi-hard, and hard. The Ca content of soft cheese gr. was 361.6 mg/100g. Semi-hard – 538.3 mg/100g. Hard cheese – 866.5 mg/100g. Ca amounts in all cheeses were 493.6 mg/100g. There are differences in the amount of Ca in different types of cheese statistically significant ( $p < 0.001$ ). Differences in the amount of Ca between goat and hard cheeses ( $p < 0.020$ ), between soft and hard cheeses ( $p < 0.028$ ), and between St. John's and hard cheeses ( $p < 0.040$ ).

**Conclusion:** Cheese is an essential daily source of Ca for pts with osteopenia and osteoporosis. Widely available in Latvia. Cheese has become one of the most consumed milk products in the last 20 years. Different types of cheese satisfy pts with different tastes. For the first time, we obtained actual data on the Ca content of Latvian cheese types from various producers. Research data can also be used in preventing and treating other diseases and inpatient training.

## P247

### COVID-19 PANDEMIC IMPACT ON ADHERENCE TO MEDICATION AGAINST OSTEOPOROSIS

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**Objective:** To introduce a patient with a pre-pandemic history of osteoporosis who stopped the medication due to pandemic circumstances.

**Case report:** This is a 59-year-old female patient admitted for the assessment of thyroid and bone status. Her medical history consists of multinodular goiter and osteoporosis since the age of 53. She was treated with ibandronate for one year, followed by strontium ranelate for 2 years. After this, DXA showed L1-4

BMD=0.752 g/cm<sup>2</sup>, T-score=-2.6SD, Z-score=-1.6SD, femoral neck BMD=0.720 g/cm<sup>2</sup>, T-score=-2.3SD, Z-score=-1.6SD and a recommendation of weekly alendronate in addition to 1000 UI/d of vitamin D was done at the beginning of COVID-19 pandemic. Due to the travel restrictions and limited access to prescription, she became nonadherent to medication against osteoporosis for 3 years. Currently, thyroid function is normal based on TSH is 0.63 mUI/mL (normal: 0.5-4.5), FT4 (free levothyroxine)=14.25 pmol/L (normal: 9-19) under levothyroxine 50 mg/d. Mineral metabolism revealed no anomaly. Total serum calcium is 9.8 mg/dL (normal: 8.4-10.2), phosphorus=3.8 mg/dL (normal: 2.3-4.7), vitamin D levels are adequate: 25-OHD (25-hydroxyvitamin D)=56.9 ng/mL (normal: 30-100), PTH=63.14 pg/mL (normal: 15-65). Bone turnover markers are normal: of formation osteocalcin=15.43 ng/mL (normal: 15-46), P1NP=38.25 ng/mL (normal: 20.25-76.31), respective of resorption CrossLaps=0.4 ng/mL (normal: 0.33-0.78). DXA showed a reduced BMD associated with L1-4 T-score=-3.7SD, Z-score=-2.6SD, femoral neck T-score=-2.5SD, Z-score=-1.6SD. Treatment with zoledronate 5 mg/year was initiated.

**Conclusion:** Adherence to medication against osteoporosis amid first 3-year period of COVID-19 pandemic was affected and a reflection in BMD loss and increased fracture risk is identified in certain population subgroups.

## P248

### THE IMPACT OF MANUAL THERAPY ON ADHERENCE TO KNEE OSTEOARTHRITIS REHABILITATION PROGRAM

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**Objective:** Knee osteoarthritis (OA) is an increasingly common and disabling problem worldwide. Kinotherapy is a nonpharmacological treatment that is recommended in clinical guidelines for the management of OA, however long-term adherence to physical therapy programs is low and is influenced by different factors. The diversity of exercise programs determines the need to compare their efficiency and their influence on the compliance of the patients in order to improve treatment outcomes. The aim of the present study was to compare the effect of manual therapy on patient adherence to a rehabilitation program in patients with knee osteoarthritis.

**Methods:** 164 patients that fulfilled the ACR classification criteria for knee osteoarthritis (127 females and 37 males) ranging in age from 42 to 84 years (mean 62,2 SD 8,76), participated in a 10-day two-arm randomized trial. One group (Gr.1) received an exercises program, and the other group additionally manual therapy methods (Gr.2). The patient's adherence was assessed by direct observation and by recording the number of canceled or rescheduled patients' visits in both groups over 10 d of the rehabilitation program, as well as by interviewing the patients upon their com-

pliance and factors that influenced the low amount of exercises required to be performed within one month after the end of the program.

**Results:** In Gr.1 were 82 patients mean age of 61,8±9,2 years and in Gr.2 – 82 patients were 62,7±8,3 years (p>0.05). In Gr. 1 was established a high level of adherence was in 42,7% of cases, in 46,3% a mild level, and in 11,0% of cases a low level. In Gr. 2 high level of adherence was in 46,3% of cases, mild-45.12%, and low level in 8,54% of cases respectively. The qualitative data analysis revealed different themes concerning reasons for challenges in maintaining patients' adherence to the OA rehabilitation program. The factors related to the patient consisted of the individual perception of the disease, its symptoms, the effectiveness of the intervention, on their ability to integrate the routine of physical exercises into the daily program. Closely related to these are the availability of facilities, exercise space, and other social circumstances, which may favor or prevent patients from fully participating in the recommended rehabilitation program. Thus, from the patient's perspective, the decision to continue or discontinue therapy was considered motivated and rational.

**Conclusion:** Kinetotherapy rehabilitation is an important part of the management of knee osteoarthritis but adherence to the exercises could be influenced by different factors. Manual therapy as a part of a rehabilitation program seems to increase the patient's compliance with a rehabilitation program.

## P249

### COMPARATIVE ANALYSIS OF THE EFFECT OF BONE MINERAL DENSITY ON THE FRACTURE RISK IN HEMODIALYSIS AND KIDNEY TRANSPLANT PATIENTS

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**Objective:** To evaluate the impact of BMD on the risk of fractures in patients on hemodialysis and with kidney transplant.

**Methods:** The prospective cohort study included 131 kidney transplant recipients (men-55, women-76; average age 39.7±11.7 years) and 359 hemodialysis patients (men-166, women-193; average age 45,2±11,8 years). The duration of follow-up was 40.7±21.2 months. BMD was evaluated by DXA. All fractures in patients were recorded from the moment of inclusion in the study.

**Results:** Fractures were registered in 47 transplant patients (35.9%), in 32 women (42%) in 15 men (27.3%) and in 95 hemodialysis patients (26,5%), in 51 women (26,4%) and in 44 men (26,5%). All patients with fractures had lower BMD and longer-term renal replacement therapy (RRT). The absolute risk of fractures increased as BMD decreased in both groups. The

presence of previous fractures also increased risk for the future. Stepwise multivariate regression analysis showed that the combination of BMD scores of lumbar vertebra and duration of RRT the best predicts the overall fracture risk in the group of kidney transplant patients. In the group hemodialysis patients the best predictor of the overall fracture risk was a combination of BMD scores of the forearm, hip and the duration of RRT. A comparative analysis of the cumulative proportion of male and female with fractures confirmed a greater susceptibility of female transplant recipients to fractures. Risk of fractures in man and women in the group of hemodialysis patients did not differ.

**Conclusion:** The combination of BMD scores of lumbar vertebra with the duration of RRT best predicts the risk of fracture in kidney transplant patients. In hemodialysis patients the best predictor of fractures is a combination of BMD scores of the forearm and hip and the duration of RRT. Women with kidney transplant are more predisposed to fractures than man. Risk of fractures in man and women in the group of hemodialysis patients does not differ.

## P250

### THE IMPACT OF BISPHOSPHONATES DRUG HOLIDAY ON LONG TERM PRIMARY FEMALE OSTEOPOROSIS

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**Objective:** To introduce a patient with a long history of osteoporosis including periods of self-decided drug holiday.

**Case report:** This is a 79-year-old female patient admitted for bone status evaluation. Her medical history includes menopause at the age of 45, and osteoporosis diagnosed at the age of 50. She is also known with chronic autoimmune thyroiditis, recurrent urinary tract infections, gastroesophageal reflux disease, asthma and hypertension. Since the age of 50 she has been under treatment with alendronate for 4 years, followed by 2 years of oral monthly ibandronate ceased by the patient due to gastrointestinal adverse reactions. DXA showed (at that point) L1-4 T-score=-3.7SD, Z-score=-1.5SD. She did not follow any recommendation except for daily cholecalciferol (between 1000-2000 UI) until recently when she suffered a T12 thoracic fracture. On admission, thyroid panel is normal: TSH=0.8 mUI/mL(normal: 0.5-4.5), and FT4(free levothyroxine)=12.28 pmol/mL(normal: 9-19). Calcium metabolism is normal: total serum calcium is 8.89 mg/dL (normal: 8.4-10.3), phosphorus=3 mg/dL (normal: 2.3-4.7), sufficient vitamin D level is identified based on 25-OHD(25-hydroxivitamin D)=25.6

ng/ml(normal:30-100), and normal PTH=23.71 pg/mL(normal: 15-65). Bone formation markers osteocalcin is normal of 19.86 ng/mL (normal: 15-46), so is alkaline phosphatase=64 U/L(normal:40-150), and bone resorption marker CrossLaps=0.377 ng/mL (normal: 0.33-0.782). DXA reflects a reduced BMD as pointed out by L1-2 T-score=-4.4SD, Z-score=-2.1SD, femur T-score=-3SD, Z-score=-0.9SD, radius T-score=-4SD, Z-score=-1.8SD. Zoledronate (5 mg/year) is offered to the patient. Long term surveillance is mandatory.

**Conclusion:** The impact of bisphosphonates drug holiday might be dramatic in subjects with long terms of osteoporosis. The switch to injectable medication due to oral side effects might be the turning point of self-imposed drug holiday in one patient.

## P251

### SCIENTOMETRIC ASSESSMENT OF SCIENTIFIC PUBLICATIONS ON HERBAL MEDICINES USED FOR POSTMENOPAUSAL OSTEOPOROSIS

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**Objective:** Postmenopausal women are at risk of osteoporosis due to ovarian hormone deficiency. Herbal medicines have long been used in the management of osteoporosis. This scientometric study is aimed to provide a scientific overview of the published papers in the field of herbal medicines and postmenopausal osteoporosis.

**Methods:** We carried out a scientometric study by a comprehensive search in the Web of Science (WOS) database up to Oct 12, 2022. After excluding unrelated scientific papers, the remained documents were analyzed by the WOS analysis tool and VOSviewer 1.6.11. The extracted data were publication year, geographical distribution, document type, main journal, top keywords, top institutes producing papers, and h-index of citations.

**Results:** Within 2071 records, 890 studies were related to this topic. A time trend increase was shown in publications with the highest number in 2020 (n=83, 9.326%). The majority type of the paper was original articles (n=741, 83.258%). The top three productive countries were China (n=300, 33.708%), South Korea (n=147, 16.517%), and the US (n=126, 14.157%). The top three publishers were Elsevier, Springer Nature, and Wiley; n=208,105, and 67 papers, respectively. The majority of the published papers belonged to "Journal of Ethnopharmacology" (n=38, 4.270%), "Nutrients" (n=35, 3.933%), and "Evidence Based Complementary and

Alternative Medicine" (n=32, 3.596%). The total citation number and H-Index of 890 articles were 31194, and 78, respectively. The highest cited paper (3,517) was a review article entitled "Bioavailability and bioefficacy of polyphenols in humans. II. Review of 93 intervention studies", published in "American Journal of Clinical Nutrition". The top three ranked institutes in producing these documents were "The Kyung Hee University" (n=32, 3.596%), followed by "The Chinese University of Hong Kong" (n=26, 2.921%), both from China and then "The Council of Scientific Industrial Research Csr India" (n=24, 2.697%) from India. Out of the 3320 keywords, the top keywords included "osteoporosis", "postmenopausal women", "phytoestrogens" and "ovariectomy".

**Conclusion:** The time trend of scientific publications in the field of herbal medicines and postmenopausal osteoporosis with a good position for phytoestrogens would be helpful for health policy-makers to arrive at evidence-based decisions.

## P252

### A CASE OF A WOMAN WITH RECURRENT LYMPHOEDEMA AND OSTEOLYTIC BONE DISEASE

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**Objective:** To present a case of a woman suffering from recurrent lymphoedema of lower extremities, osteolytic lesions and pathological fractures of the pelvis and hip.

**Methods:** A 65-year-old woman with a history of recurrent lymphoedema of lower extremities admitted to hospital with spontaneous hip fracture. She was thoroughly examined including histopathological examination of the affected bone, treated with bisphosphonates and monitored for up to 10 years.

**Results:** The patient had a long history of recurrent lymphoedema and pain in sacroiliac area since August 2010. The examination revealed osteolytic lesion of the sacrum, areas of rarefaction of the bone structure of the ilium. Bone scintigraphy demonstrated intense uptake in the sacrum and knee joints. Three months later, she felt severe pain in her right groin. Plain radiography revealed a pathologic fracture of the right femoral neck. Endoprosthetics of the right hip joint was performed. Hematologic, hormonal, biochemical data and bone metabolites were within normal limits. Histopathological examination of the affected bone revealed no signs of oncological bone damage or Paget's disease of the bones. Idiopathic osteolysis was assumed. The patient refused the proposed intravenous administration of zoledronic acid and did not follow the oral medication regimen. After 6 months, she was admitted to the hospital with a spontaneous fracture of the pubic bone. Six intravenous infusions of zoledronic acid 5 mg/year were performed. During the 10 years follow-up, the patient was hospitalized 3 times with recurrent lymphoedema. No more fractures were reported.

**Conclusion:** Gorham-Stout disease is a rare bone disorder characterized by the proliferation of endothelial-lined vessels into bone and the progressive destruction of bone. The history of recurrent lymphoedema of lower extremities and low activity of bone me-



tabolites make this diagnosis the most likely. Zoledronic acid therapy has shown its effectiveness.

## P253

### DYNAPENIA, LOW MUSCLE MASS OR SARCOPENIA: WHICH BEST PREDICTS MOBILITY DECLINE IN OLDER WOMEN WITH NORMAL GAIT SPEED?

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**Objective:** To identify the best predictor of gait speed (GS) decline overtime, between dynapenia, low muscle mass (LMM) and sarcopenia. For this purpose, the EWGSOP2 definition, using different cut-offs for handgrip strength (HGS), was used.

**Methods:** A 8-year follow-up analysis was conducted using data from 1,382 women aged 60 years or older and free of mobility limitation (GS >0.8 m/s) at baseline who participated in the English Longitudinal Study of Aging. Dynapenia was defined by HGS (<23, <21, <20 and <16 kg). LMM was defined by the 20<sup>th</sup> percentile of the appendicular skeletal muscle mass index (ASM-MI) sample distribution (<6.52 kg/m<sup>2</sup>). Sarcopenia was defined using the EWGSOP2 criteria with the different HGS cut-off points mentioned above. Generalized linear mixed models adjusted by socioeconomic, behavioural and clinical conditions were used to analyse the decline in GS (m/s) as a function of dynapenia, LMM and sarcopenia.

**Results:** Over time, women with dynapenia defined by HGS <16 kg (-0.006 m/s per year, 95%CI -0.010 - -0.001) and <20kg (-0.008 m/s per year, 95%CI -0.010 - -0.001) had a greater decline in GS than women without dynapenia. In addition, pre-sarcopenic (-0.008 m/s per year, 95%CI -0.010 - -0.001) and sarcopenic (-0.009 m/s per year, 95%CI -0.020 - -0.001) women, defined by the EWGSOP2 with HGS <20 kg, and sarcopenic women (-0.008 m/s per year, 95%CI -0.020 - -0.001), defined by EWGSOP2 with HGS <23 kg, showed a greater decline in GS than non-sarcopenic women. LMM, cut-off points >20 kg to define dynapenia as well as cut-off points for HGS <16, <20 and <21 kg to define sarcopenia did not predict mobility decline overtime.

**Conclusion:** A HGS <20 kg was the best cut-off to define dynapenia or sarcopenia and to identify mobility decline risk in older women.

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Ethics Committee (MREC/01/2/91)] and an informed consent form was signed by all participants. This study was carried out with the support of the Coordination for the Improvement of Higher Education Personnel – CAPES (code 001 and process number 88887.613295/2021-00), the National Council for Scientific and Technological Development of Brazil – CNPQ (numbers 303577/2020- 7 and 303981/2017-2) and the State of São Paulo Research Foundation – FAPESP (processes 2021/11505-2 and 2018/13917-3). The Economic and Social Research Council [grant number 56 ES/T008822/1] supported this work. ELSA is funded by the National Institute on Aging USA (grant number R01AG017644) and by UK Government Departments coordinated by the National Institute for Health and Care Research (NIHR).

## P254

### THYROID HORMONES AND OSTEOPOROSIS IN CENTENARIANS WITH CORONARY ARTERY DISEASE

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**Objective:** To determine the concentration of TSH, free triiodothyronine (T3) and free thyroxine (T4) in centenarians with coronary artery disease (CAD) and to analyze the relationship of thyroid hormones with BMD.

**Methods:** This work was a cross-sectional study that enrolled 262 patients (195 (74.4%) women and 67 (25.6%) men) aged 90-101 years (mean age 92.9±2.5 years), who were hospitalized with CAD diagnosis. Concentration of TSH (normal 0.27-4.2 µIU/ml), the level of free T4 (12-22 pmol/l) and free T3 (3.1-6.8 pmol/l) were determined. BMD in the lumbar spine and proximal femurs was analyzed by DXA.

**Results:** The mean level of TSH was 3.1±3.1 µIU/ml (with fluctuations from 0.005-108 µIU/ml), free T3 - 3.7±0.65 pmol/l (from 1.9-5.3 pmol/ml). I), free T4 - 14.1±5.5 pmol/l (from 4.1-32 pmol/l). In 18.9% of patients the level of TSH was elevated, in 3.9% it was reduced, in the remaining 77.2% of patients it was normal. The concentration of free T4 was reduced in 37.7% of patients, increased in 5.8% and corresponded to normal values in 56.5%. Significant inverse correlations were established between the concentration of free T4 in the blood and absolute indicators of BMD in the lumbar spine (r=-0.36; p=0.03), in the proximal left spine (r=-0.44; p=0.006) and right (r=-0.43; p=0.009) femur. In the group of patients with low T4 concentration, higher absolute values of BMD were registered in the lumbar spine (1094.6±184 and 709.3±541 mg/cm<sup>3</sup>, respectively, p=0.004), in the left femur (859.6±166 and 513.3±370 mg/cm<sup>3</sup>, p<0.0001) and in the right femur (817.7±160 and 505.2±376 mg/cm<sup>3</sup>, p<0.0001). In patients with elevated TSH levels, BMD in left femur was 783.8±209 mg/cm<sup>3</sup>, compared with 663±300 mg/cm<sup>3</sup> in patients with normal TSH concentration (p=0.02), the T-score in the left femur reached

-1.5±1.0SD and -2.0±0.9SD, respectively (p=0.04). A similar trend was observed in relation to the neck of the right femur: 739.6±29 mg/cm<sup>3</sup> and 499.7±336 mg/cm<sup>3</sup>, respectively (p=0.02). In patients with osteoporosis in the proximal femur, the mean TSH level was 2.4±1.9 µIU/ml, with normal BMD - 3.36±1.8 µIU/ml (p=0.039). Osteoporosis in the proximal femur in patients with normal TSH concentration was observed in 73.2% of cases, with elevated levels of this hormone - in 38.5% (p<0.0001). With a normal blood concentration of T4, osteoporosis in the proximal femur was registered in 28% of patients, with a low level - in 16.7% (p<0.0001). The blood concentration of free T4 in patients with osteoporosis in the proximal femur reached 15.9±5.7 pmol/l, with normal BMD - 12.6±3.5 pmol/l (p=0.1).

**Conclusion:** The study results demonstrate the relationship between the blood concentration of thyroid hormones and indicators of BMD in centenarians with coronary heart disease.

## P255

### OSTEOPOROSIS IN OLD PATIENTS WITH AMPUTATED LOWER LIMBS: PRELIMINARY RESULTS

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**Objective:** To investigate BMD in patients with amputated lower limbs and to analyze the relationship of BMD with various clinical and laboratory parameters.

**Methods:** This work is a cross-sectional study, which to date enrolled 30 patients - 5 women and 25 men over 60 years of age, who underwent amputation of one of the lower extremities. The mean age of the study patients was 74.5±8.9 years, ranging from 62-101 years. 40.7% of patients underwent amputation of the left lower limb, 59.3% of the right. The time from amputation to enrollment in the study ranged from 6 to 264 months, with a median of 34.5 months. BMD in the lumbar spine and proximal femurs was analyzed by DXA.

**Results:** Osteoporosis in the proximal part of the left femur was registered in 50.0% of patients, osteopenia - in 19.2%, normal BMD - in 30.8% of cases. Osteoporosis in the proximal part of the right femur was observed in 57.7% of patients, osteopenia - in 15.4%, normal BMD - in 26.9% of cases. In the lumbar spine, osteoporosis was found only in 1 patient (3.8%), osteopenia - in 5 (19.2%), normal BMD - in 76.9%. The mean T-score in the lumbar spine reached +0.45 SD, in the proximal left femur - -1.5 SD, in the neck of the left femur - -2.1 SD, in the proximal right femur - -1, 9 SD, in the neck of the right femur - -2.0 SD. In the case of amputation of the left lower limb, the BMD of the left femur averaged 700.9±262 mg/cm<sup>3</sup>, and the T-score was -2.7±1.8SD, with the intact left leg - 1001.9±178 mg/cm<sup>3</sup> and -0.75±1.4SD (p=0.002 and p=0.007, respectively). In case of amputation of the right lower limb, the mean BMD of the proximal right femur reached 721.8±242 mg/cm<sup>3</sup>, and the T-score was -2.4±1.6SD, with the intact right leg - 948.4±190 mg/cm<sup>3</sup> and -1.3±1.4SD (p=0.01

and p=0.1, respectively). The likelihood of developing osteoporosis in the left femur with amputation of the left leg increased by 11.4 times, compared with patients who had a preserved left lower limb (odds ratio=11.4; 95%CI=1.2-113.1; p=0.02). In relation to the right leg, this indicator did not reach the statistical significance (odds ratio=2.44; 95%CI=0.4-14.7; p=0.3). In patients with amputation of the left leg, a correlation was registered between the time from the moment of amputation to inclusion in the study and BMD: r=-0.73, p=0.01 - for the absolute values of BMD of the left femur; r=-0.72, p=0.01 for T-score in the left femur; r=-0.62, p=0.04 for T-score in the lumbar spine; r=-0.61, p=0.04 for BMD in the lumbar spine. In patients who underwent amputation of the right leg, there were no significant relationships between BMD and the time elapsed since amputation. No other significant relationships between BMD and the analyzed clinical and laboratory parameters have been established.

**Conclusion:** Preliminary results of this study demonstrate a decrease in BMD in the proximal femur of the amputated limb. Further studies are needed to study BMD in amputees and to elucidate the pathogenetic basis of the relationship between BMD and other clinical and laboratory parameters in this group of patients.

## P256

### COMPLICATED PRIMARY OSTEOPOROSIS AND OSTEOPENIA AT DXA

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**Objective:** To introduce a case of menopausal osteopenia and osteoporotic fracture.

**Case report:** This is a 63-year-old female patient admitted for bone status evaluation due to non-specific lumbar pain since last 6 months. Her medical history includes vitamin D deficiency, treated surgical hypothyroidism after total thyroidectomy for a toxic thyroid Plummer adenoma and osteopenia. She is also known with arterial hypertension, atrial fibrillation and dyslipidemia. On current admission, thyroid panel shows overtreatment with levothyroxine (100 mg/d) based on TSH=0.1mUI/mL(normal: 0.5-4.5), FT4(free levothyroxine)=21.39 pmol/L(normal:9-19). Total serum calcium is low-normal 8.8 mg/dL(normal: 8.4-10.2), phosphorus=2.99 mg/dL(normal:2.5-4.5), vitamin D is insufficient due to low 25-OHD(25-hydroxivitamin D)=19.83 ng/mL(normal:30-100) in association with normal PTH=15.95 pg/mL(normal:15-65). Bone formation marker osteocalcin is normal 14.16 ng/mL (normal:15-46) as well as alkaline phosphatase=80

U/L(normal:38-105), with a mild reduction of blood bone resorption marker CrossLaps of 0.3 ng/mL (normal:0.33-0.782). Currently, DXA evaluation shows L1-3 BMD=0.986 g/cm<sup>2</sup>, T-score=-1.5SD, Z-score=-0.7SD, femoral neck BMD=0.795 g/cm<sup>2</sup>, T-score=-1.7SD, Z-score=-0.8SD, total hip BMD=0.876 g/cm<sup>2</sup>, T-score=-1SD, Z-score=-0.4SD. Screening X-ray of the spine showed two prior unknown vertebral fractures at thoracic T11 and T12 vertebra. Vitamin D3 2000 IU/d in addition to zoledronate (5 mg/year) is started. Levothyroxine daily dose was adjusted to 75 mg/d.

**Conclusion:** Practitioners should be aware of osteopenia at DXA in patients with clinical diagnostic of severe osteoporosis, individuals who are candidates to specific anti-osteoporotic medication.

## P257

### OSTEOPOROSIS IN PATIENT WITH PRIMARY HYPERPARATHYROIDISM AND INSULIN DEPENDENT TYPE 2 DIABETES MELLITUS

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**Objective:** To introduce a patient diagnosed with a complex panel of primary and secondary osteoporosis.

**Case report:** This is a 63-year-old patient admitted for bone status reassessment. Her personal medical history includes onetime total thyroidectomy (fora benign condition) and right inferior parathyroidectomy 4 years ago, type 2 insulin-dependent diabetes mellitus with distal sensitive diabetic neuropathy, and arterial hypertension since last 6 years. No family history of osteoporotic fractures is identified. She is normal weighted and had physiological menopause at age of 50. On admission, the thyroid panel shows adequate substitution according to TSH=0.39 µIU/mL(normal:0.5-4.5), FT4(free levothyroxine)=13.08 pmol/L(normal:9-19) under 100 µg levothyroxine/d. Total serum calcium is normal=9.2 mg/dL(normal:8.4-10.3), and phosphorus=3.6 mg/dL(normal:2.5-4.5). 25OHD(25-hydroxyvitamin D) is low=18.6 ng/mL(normal:30-100), with normal PTH=37.26 pg/mL(normal:15-65). Bone turnover markers are normal: formation - osteocalcin=17.86 ng/mL(normal:15-46), and resorption - CrossLaps=0.6 ng/mL(normal:0.33-0.782). At the first evaluation, 4 years ago DXA showed osteopenia: L1-4 BMD=0.972 g/cm<sup>2</sup>, T-score=-1.7SD, Z-score=-1.2SD, total hip BMD=0.841 g/cm<sup>2</sup>, T-score=-1.3 SD, Z-score=-0.9 SD, femoral neck BMD=0.769 g/cm<sup>2</sup>, T-score=-1.9SD, Z-score=-1.1 SD. 4 years after parathyroidectomy, DXA showed similar results: L1-4 BMD=0.978 g/cm<sup>2</sup>, T-score=-1.9 SD, Z-score=-1SD, total hip BMD=0.825 g/cm<sup>2</sup>, T-score=-1.5 SD, Z-score=-0.7 SD, femoral neck BMD=0.753 g/

cm<sup>2</sup>, T-score=-2.1 SD, Z-score=-1 SD, 1/3 distal radius BMD=0.648 g/cm<sup>2</sup>, T-score=-2.6 SD, Z-score=-1.4 SD. An asymptomatic vertebral T12 fracture is detected. DXA-TBS is low of 1.100. Based on these, therapy with weekly alendronate 70 mg is started in addition to 2000 IU vitamin D/d. Close follow-up is needed.

**Conclusion:** Multiple conditions such as primary hyperparathyroidism and diabetes mellitus especially in addition to menopausal status might lead to osteoporosis/osteopenia and high fracture risk, therefore DXA evaluation is required in these high-risk patients. TBS represents a helpful tool in decision of therapy.

## P258

### ZOLEDRONIC ACID AFTER SPINAL CORD INJURY MITIGATES LOSSES IN PROXIMAL FEMORAL STRENGTH: A POST HOC ANALYSIS OF A RANDOMIZED CONTROLLED TRIAL

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**Objective:** Rapid and profound bone loss below the level of neurological lesion is a well-known complication of spinal cord injury. The clinical consequence of this bone loss is an increased risk of fracture, and effective methods for bone loss prevention remains an active area of research. Zoledronic acid has demonstrated efficacy for attenuating bone loss at the hip after spinal cord injury, but these studies were limited to areal BMD assessments. The purpose of this study was to evaluate changes in 3-dimensional bone mineral and proximal femoral strength in individuals receiving zoledronic acid in the acute stage of spinal cord injury.

**Methods:** Clinical trial (NCT02325414) participants randomized to either zoledronic acid (n=29) or placebo (n=30) treatment received computed tomography (CT) scans at baseline, 6 and 12 months following drug infusion. CT-based finite element modeling was used to predict changes in proximal femoral stiffness and strength in a fall-type loading scenario for participants in each of the treatment groups. Longitudinal mixed-effects models were employed to evaluate the effects of treatment group and time from infusion on the measurements of bone stiffness, strength, and CT-derived measurements of bone mineral.

**Results:** After 12 months, finite element-predicted bone stiffness and strength reduced by a mean (SD) of 6.5 (9.4)% and 9.6 (17.9)%, respectively in the zoledronic acid group. The placebo group experienced significantly greater losses in bone stiffness and strength of 18.3 (16.1)% and 24.6 (24.5)%, respectively (p<0.007). The differences in stiffness and strength were well explained by corresponding differences in trabecular BMD (p<0.001) and cortical bone mineral content and volume (p<0.024) at both the femoral neck and trochanteric regions.

**Conclusion:** These findings demonstrate that treatment with zoledronic acid in acute spinal cord injury attenuates losses in trabecular and cortical bone mineral, and in turn, mitigates losses in proximal femoral stiffness and strength. Therefore, a single in-

fusion of zoledronic acid following spinal cord injury may reduce the risk of hip fractures in this population, at least for the first year after injury.

## P259

### OSTEOPOROSIS AND FRACTURES IN PATIENTS WITH ACROMEGALY

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**Objective:** To describe the prevalence of fragility fractures and low BMD in a cohort of patients with acromegaly.

**Methods:** In this cross-sectional study of adult patients with acromegaly, we collected data from medical records in search for the variables age, sex, BMI, time from diagnosis of acromegaly, level of IGF-1, control of the disease, presence of fragility fractures and diagnosis of osteoporosis or low BMD by using WHO criteria. We included other risks factors for osteoporosis and fractures such as diabetes mellitus, use of glucocorticoids and hypogonadism. Patients with traumatic fractures were excluded. Statistical analysis was performed with descriptive data were expressed as mean  $\pm$ SD or median with ranges as a measure of dispersion according to the result of the Shapiro Wilk test. Fisher's test was used to compare categorical variables. Data with nonparametric distribution were analyzed with the Mann-Whitney U-test. Relationships between variables were tested by Spearman correlation analysis. A p value of  $<0.05$  was considered significant.

**Results:** 100 patients with acromegaly (52 men and 48 women) were included, the mean age at diagnosis was 43 years (SD 12); mean time from diagnosis 12 years (SD 9.1), mean BMI was 27 kg/m<sup>2</sup>, (SD 2.1). There was no statistically significant difference in the presence of osteoporosis or fragility fractures according to age, sex, BMI, time of evolution of acromegaly and the level of IGF1 at the time of diagnosis. Patients on treatment with somatostatin analogues had more osteoporosis compared to patients without somatostatin analogs (46% vs. 15%) ( $p<0.05$ ). Osteoporosis was found in 22% (22 patients) using BMD WHO criteria. Fragility fractures were found in 26% (26) of the patients. More frequent fractures were vertebral (5%) and no vertebral fractures of the hip, humerus and radius (95%). In patients with fragility fractures 19% (5/26 patients) had active disease. In patients without fragility fractures 22% (17/74) had active disease.

**Conclusion:** We found a high prevalence of osteoporosis (22%) and fragility fractures (26%) in patients with acromegaly, independent of age, sex, BMI, time from diagnosis, level of IGF-1 and control of the disease, despite the presence of independent risk factors such as diabetes mellitus, glucocorticoid use and hypogonadism. The need to use a somatostatin analogue therapy in patients with acromegaly was associated with a higher risk of having osteoporosis. Patients with acromegaly had low BMD in the spine and hip.

## P260

### CHALLENGING IN BIOLOGICAL RECONSTRUCTION AFTER EN BLOC RESECTION OF GIANT CELL TUMORS AT THE DISTAL RADIUS: A SYSTEMATIC REVIEW AND META-ANALYSIS WITH CASE SERIES OF NOVEL WORLD METHOD

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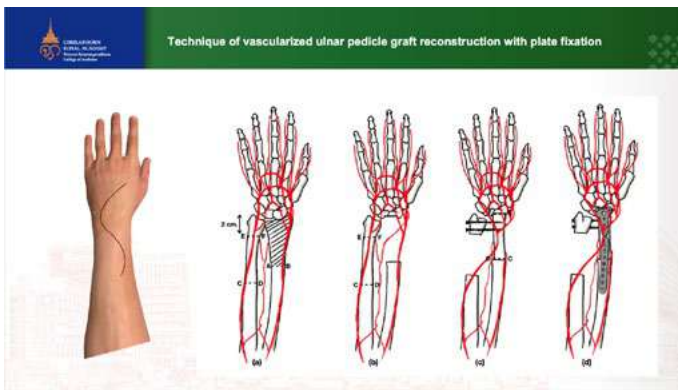
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**Objective:** To investigate the efficacy and safety of the different techniques of biologic reconstruction following GCTs total resection. And present novel technique study evaluated the functional outcomes in ten patients who underwent this reconstruction technique after en bloc resection of GCT of the distal radius.

**Methods:** A systematic review and meta-analysis of biological reconstruction after en-bloc resection of giant cell tumors at the distal radius was conducted concerning the reported functional outcomes, including grip strength, range of forearm motion, functional scores, and new bone formation, as well as postoperative complications, such as delayed union, local recurrence and metastasis. And composed of 10 patients (5 men and 5 women) who were treated in our unit for Campanacci grade III giant cell tumour of the distal radius. Following en bloc resection of a giant cell tumour of the distal radius, the wrist was reconstructed by transposing a vascularised pedicle graft from the ipsilateral ulnar shaft.

**Results:** En bloc resection with wrist reconstruction is effective for local control of GCTs of the distal radius and restoration of wrist functionality. Reconstruction surgeries, including arthroplasty, osteoarticular allografts, allograft arthrodesis, and vascularized or nonvascular fibular autografts with or without arthrodesis are recommended after large resection of the distal radius. Prostheses are not appropriate for long-term use because of incompatibility between the prosthesis and the host bone. The bone union is the most effective way to ensure the long-term survival of prostheses. Bone grafts remain the first choice in the treatment of distal radius lesions secondary to resection of recurrent GCT. For case series, all patients had a good range of pronation and supination, but flexion and extension of the wrist was limited. DASH scores ranged from 5-11.

**Conclusion:** Ulnar translocation following GCT en bloc resection warrants additional investigation in large cohorts and well-designed studies to corroborate the promising outcomes presented in this review. This reconstruction method is a safe and effective procedure that provides good aesthetic outcomes, removes the need for microvascular techniques, and reduces donor site morbidity.



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### MEASURE OF HEALTH-RELATED QUALITY OF LIFE IN INTERVENTIONAL STUDIES AIMING AT THE MANAGEMENT OF SARCOPENIA: RESULTS FROM A SYSTEMATIC LITERATURE REVIEW

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**Objective:** Currently, there is a rapid development of therapeutic strategies aiming at the management of sarcopenia. So far, mixed exercise and physical activity with nutritional supplementation have been shown to be the most effective sarcopenia interventions to increase muscle mass or muscle strength of participants. However, complete assessment of the benefits of a therapeutic intervention should also provide evidence of an impact on patients' health-related quality of life (HRQoL). The purpose of this systematic literature review is to summarize the effects of sarcopenia-designed interventions on the HRQoL of sarcopenic participants.

**Methods:** The electronic databases MEDLINE, Scopus, Allied and Complementary Medicine (AMED), EMB Review – ACP Journal Club, EBM Review- Cochrane Central of Register of Controlled Trials and APA PsychInfo were searched up to October 2022 interventional studies aiming at the management of sarcopenia reporting a HRQoL assessment. Study selection and data extraction were carried out by two independent researchers. Quality of individual studies was measured using the Cochrane Risk of Bias 2.0 tool. PRISMA guidelines were followed.

**Results:** From 3,725 potential studies, eight randomized controlled trials were identified as reporting HRQoL data for sarcopenic participants. The interventions proposed within those eight studies were heterogeneous; nutritional supplement (n=3), exercise intervention (n=2), combined exercise and nutrition (n=1) and pharmacological drugs (n=25). Sample sizes varied between 54 and 380 participants and time of interventions between 12 weeks and one year. None of the studies identified HRQoL as the primary outcome. Only one study used a specific HRQoL questionnaire (i.e. the SarQoL), whereas the other studies used the SF-12, SF-36 and EQ5D generic questionnaires. Even if most of those

studies- at the exception of the two studies using an intervention with pharmacological therapies- showed an improvement of sarcopenia biomarkers, results in terms of HRQoL improvements were less convergent. Only three out of the eight interventional studies (37.5%) highlighted an improvement of HRQoL following the proposed interventions including the one using the specific SarQoL. No study presented a high risk of bias in any of the five domains of the RoB 2.0 tool.

**Conclusion:** So far, a restricted number of interventional studies aiming at the management of sarcopenia provided a measurement of HRQoL as an outcome. Even if most of the proposed interventions tends to be beneficial to improve muscle parameters of patients, HRQoL improvement remain scarce. One of the explanation hypothesis could be that almost all of the included studies used a generic tool to assess HRQoL of participants. Specific instruments are more sensitive to change and therefore more appropriate to be used in interventional studies. One unique study used the specific SarQoL questionnaire and actually reported an improvement of HRQoL following the intervention.

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### RELATIONSHIP BETWEEN DIETARY INTAKE OF ZINC, B-CAROTENE, VITAMIN C AND VEGETABLES AND BONE MINERAL DENSITY IN POSTMENOPAUSAL INDIAN FEMALE POPULATION

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**Objective:** The prevalence of osteoporosis increases after menopause, with the reduction in oestrogen secretion in postmenopausal women resulting in decreased bone density that can lead to osteoporosis. Adequate nutrient intake is important for the prevention of osteoporosis in postmenopausal women. The study aim was to examine the relationship between nutritional intake and BMD in the postmenopausal Indian female population.

**Methods:** Dietary intake was recorded in postmenopausal Indian women using a semiquantitative questionnaire. The frequency of consumption of various food groups and nutrient intake were calculated. BMD T-scores were measured at the lumbar spine, femoral neck and total hip using DXA. Associations between T-scores and dietary intake were analysed using partial correlation coefficients and multiple linear regression analysis.

**Results:** A total of 378 postmenopausal women were included in the study. B-carotene intake was positively correlated with the lumbar spine T-score. Sodium and vitamin C intake were positively associated and folate intake was negatively associated with the femoral neck T-score. Sodium, zinc and vitamin C intake were positively correlated and potassium intake was negatively correlated with the total hip T-score. Vegetable intake showed a positive association with the femoral neck and total hip T-scores. **Conclusion:** In postmenopausal Indian women, b-carotene, zinc, and vitamin C intakes were positively associated with bone mass. Furthermore, the frequency of vegetable consumption was positively associated with femoral neck and total hip T-scores.

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### BONE TURNOVER MARKERS PROFILE IN A MALE WITH NEWLY DETECTED THYROTOXICOSIS AND TYPE 2 DIABETES MELLITUS

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**Objective:** Hyperthyroidism accelerates bone turnover, increasing the resorption-formation ratio. An excess of thyroid hormones amplifies resorption, and induces a negative bone balance, therefore resulting in decreased BMD and a high fracture risk. Excessive thyroid hormones potentially induce cardiothyreosis and other metabolic complications. We aim to introduce a patient diagnosed with Basedow-Graves' disease (BGD) and Graves' ophthalmopathy (GO) and diabetes mellitus (DM) and associated mineral metabolism anomalies.

**Case report:** This is a 52-year-old patient admitted for thyrotoxicosis evaluation. He was diagnosed with BGD complicated with GO at 40; methimazole was inconstantly self-administered. He developed atrial fibrillation, and congestive heart failure class C ACC and proved only partial compliant to cardiologic recommendations. On current admission, hyperthyroidism is confirmed based on low TSH=0.17  $\mu$ UI/mL(normal:0.5-4.5), high FT4(free levothyroxine)=21.2 pmol/L(normal:9-19) in association with positive thyroid antibodies of both types, blocking and stimulating: AT-PO(anti-thyropoxidase antibodies)=1000 UI/mL(normal:0-5.61), ATG(aAnti-thyroglobulin antibodies)=1.444 UI/mL(normal:0-115), TRAb(TSH-receptor stimulating antibodies)=15.13 UI/L(normal:0-1.75). Total serum calcium is high-normal 10.36 mg/dL(normal:8.4-10.3), with normal phosphorus=3.3 mg/dL(normal:2.5-4.5), normal vitamin D levels due to 25OHD(25-hydroxyvitamin D)=29.7 ng/mL(normal:30-100), and PTH=63.42 pg/mL(normal:15-65). He is newly identified with type 2 diabetes mellitus (DM) due to fasting glycaemia=117 mg/dL(normal:70-100), and glycated hemoglobin=7.2%(normal:4.8-5.9). Bone turnover markers (BTM) show normal osteocalcin=20.87 ng/mL(normal:14-46), and alkaline phosphatase=104 U/L(normal:40-150), but high P1NP=118.8 ng/mL(normal:20.25-76.31), with a small increase of bone resorption marker CrossLaps=0.61 ng/mL(normal:0.104-0.504). He started thiamazole 40 mg/d with progressive tapering of the doses in addition to oral corticotherapy for GO (initially with 25 mg/zi of prednisone). The patient was further referred for thyroidectomy when achieved normal thyroid function. The subject was also offered oral antidiabetics (metformin 1000

mg/d). Follow-up of BTM and long-term cardiac surveillance are required in order to treat any thyrotoxicosis complications.

**Conclusion:** Anomalies of BTM profile were due to thyrotoxicosis and normalized under progressive control of thyroid hormones excess. Corticotherapy exposure was reduced at minimum to protect from bone deterioration and other potential complications. Newly detected DM might impact, as well, BTM values and periodic fracture risk assessment is required. Normal values of osteocalcin and alkaline phosphatase might be the results of increasing GBD-associated effect and DM-related suppressive effects.

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### A PHASE 1, OPEN-LABEL, DOSE-ESCALATING STUDY TO EVALUATE THE SAFETY, TOLERABILITY, PHARMACOKINETICS, AND PHARMACODYNAMICS OF ALXN1850 IN ADULTS WITH HYPOPHOSPHATASIA

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**Objective:** Hypophosphatasia (HPP) is a rare, inherited disorder associated with recurrent fractures/pseudofractures, orthopedic/dental burden, pain, mobility impairments, and diminished quality of life. ALXN1850 is an investigational enzyme replacement therapy being developed for the treatment of HPP.<sup>1-3</sup> The primary objective is to assess the safety and tolerability of ALXN1850 given weekly intravenously (IV) as 1 dose and subcutaneously (SC) for 3 weeks. Secondary objectives include pharmacokinetics (PK) of 1 IV and multiple SC doses, absolute bioavailability of SC, pharmacodynamic (PD) effects of 1 IV and 3 SC doses, and immunogenicity potential of ALXN1850.

**Methods:** 3 Cohorts received ALXN1850 15, 45, or 90 mg as 1 IV dose weekly and SC for 3 weeks.

**Results:** Of 23 patients with HPP who signed informed consent, 15 were dosed (5 per cohort); 3 missed doses due to COVID-19 but did not discontinue the study. Following IV and SC doses, peak and total exposure of ALXN1850 increased dose-dependently (15–90 mg). Effective  $t_{1/2}$  was estimated at 3-6 days. Mean bioavailability of SC doses was ~43% (range: 6-75%). ALXN1850 achieved maximal lowering (nadir) of plasma inorganic pyrophosphate (PPI) in 7 days; ~40% post-dose PPI concentrations were below the limit of quantification (0.75  $\mu$ M). Mean PPI concentration was reduced for 3–4 weeks post-dose. There was no apparent impact of immunogenicity on ALXN1850 PK/PD.

**Table 1.** Safety overview

Safety finding, n (%)	Description (N = 16) 4 weeks treatment with ALXN1850
<b>Any TEAE</b>	12 (80.0%), 46 events
<b>Related TEAE</b>	10 (66.7%), 29 events
<b>Injection Site Reactions (ISRs)</b>	8 (53.3%), 10/41 (24.4%) SC injections led to an ISR* <ul style="list-style-type: none"> <li>• Four patients with 1 ISR (erythema)</li> <li>• One patient with 1 ISR (soreness, swelling, and redness)</li> <li>• One patient with 1 ISR (erythema and bruising)</li> <li>• One patient with 3 ISRs, 1 per each SC administration (erythema and pruritus, erythema and ecchymosis, erythema)</li> <li>• One patient with 1 ISR (bruise)</li> </ul> <p>Four patients had 1 ISR each of injection-site erythema not reported as TEAEs but included in this ISR total. One single case of induration in a patient following the IV dose is not included in this ISR total</p>
<b>Injection Associated Reactions</b> • Systemic reactions	1 (6.7%) Headache (grade 1), considered related to study drug***, occurred following the start of the IV dose and resolved the same day following medical intervention
<b>TESAE</b>	1 (6.7%) Atrial fibrillation (grade 3) considered not drug related***
<b>TEAE/TESAE leading to Study Drug Withdrawal</b>	0
<b>Immunogenicity (ADA+)**</b>	4 (26.7%) Only 1 (6.7%) was treatment emergent, ADAs persisted to the end of the study. Per protocol, patient was offered follow-up via the HPP registry. No patients tested Nab+

\*Most cases of erythema resolved in fewer than 2 hours following the SC dose. There was no pattern observed in the timing of subcutaneous administration (ie, first, second, or third dose) and the occurrence of erythema.

\*\*Assays for measuring anti-ALXN1850 antibodies and those with neutralizing characteristics (NAb) were fully validated for precision, specificity, selectivity, sensitivity, robustness, and drug tolerance following the current 2019 FDA Guidance on ADA method validation.

\*\*\*By the investigator

ADA, antidrug antibody; AE, adverse event; HPP, hypophosphatase; IV, intravenous; Nab, neutralizing antibodies; SC, subcutaneous; TEAE, treatment-emergent AE; TESAE, treatment-emergent serious AE

**Conclusion:** ALXN1850 has acceptable safety, tolerability, and PK profiles; it achieved a sustained reduction in PPI concentrations in adults with HPP (~40% post-dose PPI concentrations were below the limit of quantification). These results will support the selection of an appropriate therapeutic dose in future studies.

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## P265

### PLANT BASED INDIGENOUS DIETARY CALCIUM SUPPLEMENTATION ON BONE TURNOVER MARKERS AMONG PERI- AND POST-MENOPAUSAL WOMEN: A RANDOMISED CONTROLLED TRIAL

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**Objective:** To formulate an indigenous calcium rich food supplement and study its impact on markers of bone resorption and formation.

**Methods:** The developed product contained 701 mg of calcium and 378 mg of phosphorus per 100 g respectively. Sixty subjects (80% power,  $\alpha=0.05$ ) including 30 perimenopausal and postmenopausal women each were randomly assigned to control and experimental groups. Experimental postmenopausal and perimenopausal women received 1200 mg and 800 mg per day of calcium respectively from a plant based supplement comprising *Sesamum indicum*, *Eleusine coracana*, *Glycine max*, *Vigna mungo* and *Sesbania grandiflora* as a midmorning and evening snack. Compliance to the consumption of the supplementation was monitored through telephonic conversation every alternative day. Measures like serum calcium,  $\beta$ -CrossLaps (bone resorption marker), total P1NP (bone formation marker) were assessed at baseline, 3rd and 6th month. This study was conducted according to the guidelines of declaration of Helsinki and all procedures were approved by the Institutional Ethics Committee of Sri Ramachandra Institute of Higher Education and Research (Deemed to be University), (Ref: IEC/15/FEB/114/02). This trial was registered at the Clinical Trials Registry – India (Registry – India (Reg No: CTRI/2017/03/008272))

**Results:** 57 subjects were analysed with no adverse events reported. Results showed that after supplementation  $\beta$ -CrossLaps reduced from  $0.32\pm 0.130$  ng/ml to  $0.25\pm 0.130$  ng/ml and  $1.11\pm 0.290$  ng/ml to  $0.42\pm 0.263$  ng/ml in perimenopausal and postmenopausal subjects significant at ( $P=0.008$ ) and ( $P=0.012$ ) respectively.

**Table 1.** Bone turnover markers in experimental group

Bone turnover markers	Period	Perimenopausal women (mean $\pm$ sd)	Postmenopausal women (mean $\pm$ sd)
$\beta$ -CrossLaps (CTX) ng/ml	Baseline (n=15)	0.32 $\pm$ 0.13	1.11 $\pm$ 0.29
	After 3 Months (n=15)	0.29 $\pm$ 0.11	0.53 $\pm$ 0.25
	After 6 Months (n=15)	0.25 $\pm$ 0.13	0.53 $\pm$ 0.25
	P value	0.008**	0.012**
Total P1NP ng/ml	Baseline (n=15)	33.14 $\pm$ 15.61	37.62 $\pm$ 17.20
	After 3 Months (n=14)	33.39 $\pm$ 14.70	38.21 $\pm$ 17.32
	After 6 Months (n=14)	34.32 $\pm$ 16.66	39.59 $\pm$ 17.86
	P value	0.699 <sup>NS</sup>	0.326 <sup>NS</sup>

Data is shown as mean $\pm$ SD. Repeated measures of ANOVA \*\* $P<0.01$ , NS: Not significant, SD: standard deviation.

**Table 2.** Comparative effect of dietary calcium supplementation on bone turnover markers between groups

Subjects	Group	$\beta$ -CrossLaps (CTX) ng/ml (mean $\pm$ sd)		Total P1NP ng/ml (mean $\pm$ sd)	
		Baseline	After 6 months	Baseline	After 6 months
Perimenopausal Women	Control	0.31 $\pm$ 0.18 (n=15)	0.29 $\pm$ 0.12 (n=14)	35.83 $\pm$ 17.63 (n=15)	36.68 $\pm$ 15.22 (n=14)
	Experimental	0.32 $\pm$ 0.13 (n=15)	0.25 $\pm$ 0.13 (n=15)	33.14 $\pm$ 15.61 (n=15)	34.32 $\pm$ 16.66 (n=15)
	P value	0.74 <sup>ns</sup>	0.92 <sup>ns</sup>	0.66 <sup>ns</sup>	0.689 <sup>ns</sup>
Postmenopausal Women	Control	1.05 $\pm$ 0.32 (n=15)	0.99 $\pm$ 0.28 (n=13)	28.03 $\pm$ 15.46 (n=15)	30.47 $\pm$ 15.45 (n=13)
	Experimental	1.11 $\pm$ 0.29 (n=15)	0.53 $\pm$ 0.25 (n=15)	37.62 $\pm$ 17.20 (n=15)	39.59 $\pm$ 17.86 (n=15)
	P value	0.23 <sup>ns</sup>	0.024 <sup>**</sup>	0.11 <sup>ns</sup>	0.146 <sup>ns</sup>

Data is shown as mean $\pm$ sd. Paired t-test in comparison to respective baselines. Comparison between the groups at 6 months with student unpaired t-test <sup>\*\*</sup>P<0.01, NS: not significant, SD: standard deviation

**Conclusion:** Adequate dietary calcium intake using locally available foods is recommended as a strategic option in reducing risk of osteoporosis.

**Acknowledgment:** Our appreciation for the subjects for participating in this trial.

## P266

### PREMATURE OVARIAN FAILURE AND OSTEOPOROSIS

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**Objective:** Estrogen deficiency due to premature ovarian failure leads to decreased mineral density with a risk to fragility fractures and metabolic and cardiovascular consequences. Hormone replacement therapy relieves symptoms of menopause and improves bone status. We aim to introduce a patient with osteoporosis de novo and a history of premature ovarian failure treated with hormone replacement therapy (HRT).

**Case report:** This is a 50-year-old patient admitted for ovarian and bone status assessment. The patient entered menopause at 40

years and was treated with intermittent HRT (estradiol valerat 2 mg/norgestrel 0.5 mg 21 d/month) between 42-45 years, and for six months at 48 years. Currently the patient stopped HRT for the last 2 years. The patient has no current symptoms of menopause, or cardiovascular pathology, nor a history of fragility fractures. She has a family history of osteoporosis (maternal grandmother). At the current evaluation, the hypothalamic-pituitary-gonadal axis shows FSH=87.83 mIU/mL(normal: 25.8-143.8), LH (luteinizing hormone)=58.15 mIU/mL(normal: 7.7-58.5), estradiol=5 pg/mL(normal<5-138), values consistent with menopausal state. Hypovitaminosis D is detected. Total serum calcium is 9.52 mg/dL(normal:8.4-10.3), phosphorus=3.63 mg/dL(normal:2.5-4.5), 25OHD(25-hydroxyvitamin D)=17.8 ng/mL(normal:30-100) with PTH=31.85 pg/mL(normal:15-65). Bone turnover markers panel shows normal formation markers osteocalcin=32.24 ng/mL(normal:15-46), and alkaline phosphatase=48 U/L(normal:38-105), but high P1NP=85.8 ng/mL(normal:20.25-76.31), with normal resorption marker CrossLaps=0.65 ng/mL(normal:0.33-0.782). DXA (GE Lunar Prodigy) shows osteoporosis: L1-4 BMD=0.823 g/cm<sup>2</sup>, T-score=-3SD, Z-score=-2.5 SD, total hip BMD=0.792 g/cm<sup>2</sup>, T-score=-1.8 SD, Z-score=-0.9 SD, femoral neck BMD=0.749 g/cm<sup>2</sup>, T-score=-2.1 SD, Z-score=-1.6 SD, 1/3 distal radius BMD=0.709 g/cm<sup>2</sup>, T-score=-1.9 SD, Z-score=-1.9 SD. No prevalent fracture was identified at screening X-ray of the spine. TBS is normal of 1.389. Alendronate 70 mg/week was initiated in addition to 2000 UI cholecalciferol for 3 months followed by 1000 UI/d. Further surveillance was recommended, with annually DXA evaluation.

**Conclusion:** HRT in postmenopausal women has a protective effect over bone status. However, in the absence of vasomotor symptoms and having a confirmed osteoporosis, specific medication against osteoporosis should be started. In patients without HRT, bone status surveillance is mandatory since bone loss might be identified at early ages.

## P267

### CROSS CULTURAL ADAPTATION OF THE GREEK VERSION OF THE POST COVID-19 FUNCTIONAL STATUS SCALE

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**Objective:** To translate and validate into the Greek language and setting the Post-COVID-19 Functional Status (PCFS) scale.

**Methods:** A convenience sample of 41 Greek adults was recruited in this study. Greeks aged  $\geq$ 18 years who recovered from COVID-19 ( $\geq$ 14 d since diagnosis), were included to participate. PCFS was culturally adapted into Greek according international guidelines. This cross-sectional study followed two main steps. The first step consisted of the translation process (forward and backward) and the second one consisted of the reliability evaluation of the Greek version of the SARC-F. Reliability was assessed by test-retest analyses using the intraclass correlation coefficient (ICC) and its



95%CI. Ethical approval was given by the Ethical Committee of the School of Health Rehabilitation Sciences of the University of Patras.

**Results:** The PCFS was found understandable, applicable and practical in administration, as all participants filled in the questionnaire without encountering any problems. Final analysis in the clinical study included 41 adults (26 females, 15 males; aged  $56\pm 7.85$  years). All participants were treated as outpatients. In PCFS 24 participants had no functional limitations, 6 negligible limitations. 8 had slight and 3 moderate functional limitations. The translated Greek version of the PCFS demonstrated an excellent test-retest reliability, with an ICC of 0.93 (95%CI 0.91- 0.95).

**Conclusion:** The Greek version of the PCFS was successfully adapted into Greek and is recommended to be use in clinical settings and research in order to evaluate the consequences of COVID-19 and their effect on functional status.

## P268

### CHRONIC WIDESPREAD PAIN AND JOB LOSS IN A COHORT OF MIDDLE-AGED PEOPLE

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**Objective:** Chronic widespread pain (CWP) is a common and debilitating condition associated with high health and social costs. It is recognised that chronic widespread pain also affects ability to work but there are few data amongst older adults. We investigated the prevalence of CWP and its impact on job loss amongst older adults in the HEAF study, a UK cohort of men and women.

**Methods:** Participants were recruited from 24 English GP surgeries in 2013-14, when aged 50-64. They were followed-up annually for a period of four years reporting on their employment, finances, lifestyle, and health. Employment information included job characteristics if participant was still in work or reason/s for exit (either due to ill health or not) when participant had exited the workforce. Over the same period, information was collected about musculoskeletal health using a body mannequin. CWP was defined according to the American College of Rheumatology criteria. Associations between CWP and subsequent job exits were explored with a multiple-record survival dataset by Cox proportional hazards models. Adjustment for age, sex, depression, and subjective financial status was also performed.

**Results:** In total, 3353 people could be included in the analysis; 1595 (48%) were males and their average age was 60.8 years (SD=3.9). Over 4 years of follow-up, 375 (11.2%) of these older working adults reported CWP in the year before job loss. A higher prevalence of participants developed a health-related job loss (HRJL) in the subsequent 12 months among those with CWP, as opposed to those without CWP (10.7 vs. 4.5%), while prevalence of job exits not related to health was lower among those with CWP as opposed to without CWP (10.1 vs. 15.0%). In the fully adjusted model, CWP was not associated with job exit unrelated to health (HR=0.86; 95%CI 0.67 to 1.11) but it doubled the risk of HRJL (HR=2.18; 95%CI 1.63 to 2.94).

**Conclusion:** Our findings show that even amongst older workers, new onset CWP causes them to stop working for a health reason. Early diagnosis and treatment of CWP could enable people to work to older ages, an important outcome for financial stability.

## P269

### RELATIONSHIP BETWEEN BONE MINERAL DENSITY, ANTIBODY STATUS AND EUSTAR DISEASE ACTIVITY SCORE IN SYSTEMIC SCLEROSIS

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**Objective:** There are controversial opinions whether BMD is lower in patients with systemic sclerosis (SSc) than age-matched population. We aimed to determine BMD in postmenopausal SSc patients and to investigate possible relationship between BMD and antibody status as well as the relation between BMD and EUSTAR Systemic Sclerosis Activity Score.

**Methods:** 59 postmenopausal patients (mean age  $60.26\pm 6.86$ , mean disease duration  $9.5\pm 6.4$  years) who fulfilled the ACR criteria for SSc and 35 age-matched healthy controls (mean age  $58.80\pm 5.94$ ) were examined. BMD was measured on the lumbar spine (L1-L4) and the proximal femur by DXA densitometer-Hologic at the Institute for rheumatology "Niska Banja". The serological tests recorded present or absent of antinuclear antibodies (ANA), anticentromere antibodies - ACA (by immunofluorescence on HEP2 cells) and antitopoisomerase I antibodies -ATA (counter immunoelectrophoresis). Disease activity was obtained using the EUSTAR activity score in systemic sclerosis.

**Results:** We found significantly lower average BMD and T-score in postmenopausal SSc pts compared to the control groups (lumbar spine:  $0.900\pm 0.16$  vs.  $1.024\pm 0.09$  g/cm<sup>2</sup>,  $p<0.0001$ ; T-score  $-1.47\pm 1.49$  vs.  $-0.37\pm 0.75$ ,  $p<0.0001$ ; femoral neck:  $0.749\pm 0.17$  vs.  $0.963\pm 0.10$  g/cm<sup>2</sup>,  $p<0.0001$ ; T-score  $-1.30\pm 1.38$  vs.  $0.04\pm 0.70$ ,  $p<0.0001$ ). According to the antibody status no difference was found in BMD and T-score (on the lumbar spine and femoral neck) in SSc pts with ACA and ATA. Pts with ACA at lumbar spine  $0.881\pm 0.14$  g/cm<sup>2</sup> vs. ATA  $0.911\pm 0.13$  g/cm<sup>2</sup>,  $p=0.618$ ; T-score ACA  $-1.7\pm 1.45$  vs. ATA  $-1.50\pm 1.34$ ,  $p=0.830$ . Pts with ACA on the femoral neck:  $0.837\pm 0.18$  g/cm<sup>2</sup> vs. ATA  $0.719\pm 0.07$  g/cm<sup>2</sup>,  $p=0.524$ . T-score ACA  $-0.85\pm 1.48$  vs. ATA  $-1.52\pm 0.44$ ,  $p=0.643$ . No difference was found according to disease duration in ACA and ATA SSc pts. Increasing age correlated with significantly lower BMD ( $r=-0.714$ ,  $p=0.001$ ) and T-score ( $r=-0.705$ ,  $p=0.001$ ) on femoral neck. We also found negative correlation between disease duration and lower BMD ( $r=-0.467$ ,  $p=0.038$ ) and T-score ( $r=-0.455$ ,  $p=0.04$ ) only on the femoral neck. There was no correlation between low BMD and EUSTAR disease activity score in SSc pts on the lumbar spine (BMD  $r=-0.01$ ,  $p=0.936$ , T-score  $r=0.04$ ,  $p=0.75$ ) and femoral neck (BMD  $r=-0.344$ ,  $p=0.138$ , T-score  $r=0.21$ ,  $p=0.373$ ).

**Conclusion:** Scleroderma patients have significantly lower BMD on the hip and lumbar spine than age -matched healthy control. No statistical difference in BMD was found in ACA and ATA SSc patients. Longer disease duration indicates significantly lower BMD. No correlation between EUSTAR activity score and bone loss in scleroderma patients.

## P270

### TRABECULAR BONE SCORE IN PATIENTS WITH TYPE 2 DIABETES MELLITUS AND PREDIABETES

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**Objective:** Diabetes mellitus (DM) is associated with normal BMD but lower trabecular bone score (TBS) and increased risk of fracture. The aim of our study was to assess the association between TBS and glycemic status in patients with T2 DM, to determine whether prediabetes is linked with lower TBS and whether TBS is associated with insulin resistance in prediabetes patients.

**Methods:** 56 patients with T2 DM, 35 patients with pre-diabetes and 23 patients with normal glucose tolerance from age 43-65 were enrolled in the study. DM and Prediabetes were defined according to ADA standard of care diagnostic criteria (2022). Lumbar spine (LS) and total hip BMD values were obtained using DXA, TBS was calculated using TBS iNsign software. All patients were repleted with Vit D.

**Results:** Mean BMD was higher in patients with T2DM compared to control group (1.128±0.141 vs. 0.989±0.112, p<0.001). Patients with T2 DM have significantly lower TBS than those with normal glucose tolerance (p<0.001). TBS was higher in T2 DM patients with good glycemic control (HbA1C ≤7.5%) - 1.231±0.137 compared to patients with poor glycemic control (HbA1C ≥7.5%) - 1.179±0.120, p<0.01. TBS was lower in patients with prediabetes (1.289±0.121, p<0.01). The association between TBS and HOMA-IR in prediabetes patients was not found.

**Conclusion:** Mean BMD is higher in T2DM patients compared to control. Mean TBS is lower in T2DM and prediabetes patients. TBS is lower in T2DM patients with poor glycemic control. TBS can be a useful measurement for the assessment of fracture risk in patients with T2DM.

## P271

### USING MACHINE LEARNING TECHNIQUE TO DETERMINE OSTEOPENIA WITH CHEST RADIOGRAPH

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**Objective:** BMD determined by DXA on lumbar spine and hip are the mainstay of osteoporosis and osteopenia diagnosis, however, which is frequently deferred by the unavailability of DXA. Our aim is to validate whether chest X-ray, the most prevalent radiographs in the clinical setting, can be employed to screen osteopenia.

**Methods:** A total of 356 plain chest X-ray films and their DXA reports were collected from the geriatric annual examination in National Taiwan University Hospital, Bei-Hu Branch between March 2016 and September 2017. The chest X-ray films were pretreated for enhancement of brightness and selection of the region of interest (ROI). Then, the pre-trained convolutional neural network (CNN) models were used to extract the features from ROI. Due to the limited amount of samples, multi-layer perceptron (MLP) and random forest classifier (RFC) was trained to determine osteoporosis. This paper compared four pre-trained CNN models with each other, including InceptionV3, VGG16, Resnet50, and Densenet201.

**Results:** The average age is 73.6±6.2 years, and the male ratio is 36.5%. The BMI is 24.4±10.5 kg/m<sup>2</sup>. The prevalence of osteopenia and osteoporosis determined by T-score of hip are 52.8% and 6.5%, respectively. The ROI focused on clavicle is highly correlated with T-score. Densenet201 as a feature extractor provided the best average accuracy. In terms of classifier, the RFC outperformed MLP. The average accuracy, true positive rate, and false positive rate of the RFC model combined with the pre-trained Densenet201 for diagnosis of osteopenia are 72.9%, 83.7%, and 41.1%, respectively.

**Conclusion:** Chest radiography can be used to screen osteopenia with high accuracy by the RFC model with the pretrained CNN models as a feature extractor.

## P272

### QUANTITATIVE COMPUTED TOMOGRAPHY IN OSTEOPOROSIS

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**Objective:** To evaluate the importance of QCT in comparison with DXA in the measurement of BMD.

**Methods:** Although DXA is currently the most frequently used technique to measure BMD, QCT is an important alternative to DXA.

**Results:** In contrast to DXA, QCT allows separate estimation of trabecular and cortical BMD. Because trabecular bone has a substantially higher metabolic turnover, it is more sensitive to changes in BMD. QCT provides volumetric density in mg/cm<sup>3</sup>, rather than the areal density (mg/cm<sup>2</sup>) of DXA. QCT is less susceptible to degenerative changes of the spine than DXA. Osteophytes and facet joint degeneration as soft tissue calcifications (in particular of aortic calcification) do not significantly increase BMD in QCT. Surgical clips, contrast within the bowel, and status after spine surgery will not alter BMD measurements using QCT. Clinical indications for QCT:

1. Very small of large patients
2. Advanced degenerative spine disease (degenerative disc disease, facet arthropathy, DISH)
3. Very obese patients
4. If high sensitivity to monitor metabolic bone change is required as trabecular bone is more metabolically active.

**Conclusion:** QCT is superior to DXA because it provides volumetric BMD measurements of the trabecular bone and better morphologic assessment of the lumbar spine. It has less susceptibility to degenerative spine changes and higher sensitivity to changes in bone mass.

## P273

### BETWEEN TRAUMATIC AND OSTEOPOROTIC FRACTURE

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**Objective:** To introduce a female patient who experienced a femoral neck fracture while getting off a train; despite being considered as traumatic, she was identified with osteoporosis at central DXA.

**Case report:** This is a 54-year-old patient admitted for an endocrine checkup. Her personal medical history includes hemi-thyroidectomy for toxic thyroid (Plummer) adenoma at the age of 45 with consecutive surgical hypothyroidism under levothyroxine replacement. The patient entered menopause at 46 years old (spontaneously) and did not follow any hormone replacement therapy (HRT). At age of 52, she suffered a femoral neck fracture while getting off a train. The fracture was considered traumatic and she was not referred for further fracture risk assessment. DXA confirmed osteoporosis: L1-L4 lumbar BMD=0.876 g/cm<sup>2</sup>, T-score=-2.5 SD, Z-score=-2.1 SD, total hip BMD=0.767 g/cm<sup>2</sup>, T-score=-1.9SD, Z-score=-1.5SD, femoral neck BMD=0.726 g/cm<sup>2</sup>, T-score=-2.2SD, Z-score=-1.5SD, 1/3 distal radius BMD=0.728 g/cm<sup>2</sup>, T-score=0.2SD, Z-score=0.6SD with low TBS of 1.094. She started annual single injection of zoledronate 5 mg. One year later, thyroid function is controlled under low dose of LT4: TSH=1.42 µU/mL(normal:0.5-4.5), FT4(free levothyroxine)=13.28 pmol/L(normal:9-19); phosphor-calcium metabolism assays are normal: total serum calcium is 9.6 mg/dL(normal:8.4-10.3), phosphorus=4.1 mg/dL(normal:2.5-4.5); mild reduction of 25OHD(25-hydroxyvitamin D)=24.6 ng/mL(normal:30-100) with normal PTH=31.99 pg/mL(normal:15-65). Bone turnover markers

are within normal limits: bone formation marker osteocalcin is 18.23 ng/mL(normal:15-46), alkaline phosphatase=60 U/L(normal:38-129), P1NP=55.64 ng/mL(normal: 20.25-76.31), and bone resorption marker CrossLaps=0.37 ng/mL(normal:0.33-0.782). After a single injection of 5 mg zoledronate, 1 year later, there were no incidental vertebral fractures, DXA shows a mild reduction of BMD: L1-4 BMD=0.862 g/cm<sup>2</sup>, T-score=-2.6 SD, Z-score=-2SD, TBS=1.179 total hip BMD=0.754 g/cm<sup>2</sup>, T-score=-2SD, Z-score=-1.5SD, femoral neck BMD=0.702 g/cm<sup>2</sup>, T-score=-2.3SD, Z-score=-1.6SD, 1/3 distal radius BMD=0.848 g/cm<sup>2</sup>, T-score=-0.3SD, Z-score=0.2SD. A decision of continuing with the same medication was done in association with vitamin D supplements. **Conclusion:** The circumstances surrounding a fracture should be carefully evaluated; sometimes this is the tip of the iceberg that leads to osteoporosis detection. Probably, in this case both traumatic and osteoporotic elements are connected to the fracture.

## P274

### ANALYSIS OF CHONDROITIN SULFATE AND DICLOFENAC SODIUM EFFECTIVENESS IN SECONDARY OSTEOARTHRITIS

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**Objective:** Deficiency of thyroid hormones causes the slowdown of redox processes, accumulation of metabolic products, development of tissue dystrophy due to tissue impregnation with mucopolysaccharides with the formation of mucous edema (myxedema), and the development of «hypothyroid» arthropathies and myopathies. It is known that metabolic disorders adversely affect the state of bone and cartilage tissue and cause the development of a number of pathological conditions, among which osteoporosis and osteoarthritis are certainly important. Separate nosological forms of osteoarthritis (OA) and hypothyroidism (HT) differ in their etiology; however, the issue of comorbidity gains the utmost importance for these diseases, which are insufficiently explored in the literature.

The abovementioned facts outline the urgent character of this problem of medicine, which is associated with the search for new approaches to the pharmacological protection of OA and HT patients' joints by evaluating the effectiveness of chondroprotective agents in hormone replacement therapy for HT and OA.

**Methods:** Experimental studies were performed on 720 white mature nonlinear rats of both sexes. Experimental OA was reproduced by a single intra-articular injection of 0.1 ml of Iodoacetic acid solution into the knee joint, which was prepared at the rate of 3 mg of reagent per 50 µl of sterile saline. Experimental HT was performed by enteral administration of 0.02% carbimazole solution, which was prepared at the rate of 5 mg per 250 ml of saline. The tissue samples of experimental animals selected for a further histological examination were marked and fixed with a 10% neutral formalin solution. Tissue fixation time lasted 5-7 days. Decal-

cification of tissue samples was performed with a solution of 10% nitrous acid. After appropriate labeling, the fixed tissue samples were poured in celloidin-paraffin. Next, using a microtome, thin sections of 6-8  $\mu\text{m}$  were prepared and stained with hematoxylin and eosin. Microphotography of the stained histological specimens was performed according to the general rules of microphotography on a Ulab XY-B2T microscope.

**Results:** Having analyzed the cartilage and bone tissue structure of HT rat knee joints, we found signs of synovial membrane's inflammation, structural disruptions of the perichondrium with swelling phenomena, trophic disruption of the deep layers of the cartilage, accompanied by the destruction of a number of chondrocytes, as well as changes in histochemical properties of amorphous substance. No pronounced destruction of the bone tissue was observed; there were separate foci of disruption in the architecture of bone trabeculae.

**Conclusion:** Metabolic disorders in hypothyroidism have a negative influence on the condition of bone and cartilage tissue, stimulating the process of degeneration of cartilage tissue. With hypothyroidism, there are signs of inflammation of the synovial membrane, disorders of the cartilage structure with the phenomena of swelling, disorders of the trophic of the deep cartilage layers, accompanied by destruction of a number of chondrocytes. Combined use of diclofenac sodium, chondroitin sulfate and L-thyroxine promotes active regeneration of both cartilage and bone tissue with formation of neovasculogenesis areas.

## P275

### RISK OF DEVELOPING CARDIOVASCULAR DISEASE IN PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS AND SYSTEMIC SCLERODERMIA IN CASE OF ELEVATED ELASTIN ANTIBODIES

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**Objective:** Autoimmune inflammation, which occurs in systemic lupus erythematosus (SLE) and systemic scleroderma (SSD), is a risk factor for the development of early atherosclerosis and related cardiovascular diseases. A key role in the development of these diseases is attributed to elastin imbalance; elastin being the dominant poorly soluble component of the intercellular substance, found in large quantities in vascular walls and heart valves. The emerging autoimmune inflammation in SLE and SSD leads to the formation of elastin antibodies, which are a kind of predictor of the development of vascular disease in these diseases. We aimed to study the effect of elastin antibody production on the cardiovascular system in patients with SLE and SSD.

**Methods:** We assessed 56 patients with SLE. The disease activity was assessed using the ECLAM score. The mean value of the ECLAM index in SLE patients was  $10.2 \pm 6.7$  (values ranging from 2-28). We also observed 36 other patients diagnosed with SSD. The control group consisted of 30 healthy individuals. Elastin an-

tibodies were determined by enzyme immunoassay during antigen fixation in magnetically controlled sorbents according by the Gontar method.

**Results:** The number of patients with systemic lupus erythematosus with elevated levels of elastin antibodies was 53.3% (30 individuals). The concentration of elastin antibodies averaged  $0.138 \pm 0.067$  absorbance units (upper normal level 0.102 absorbance units). In SLE patients an elevated level of elastin antibodies was associated with vascular and heart lesions (22 patients, 73%). Heart lesions were represented by myocarditis (13 patients, 59.1%); mitral valve insufficiency and prolapse, aortic valve insufficiency were revealed in 9 patients (40.3%). Patients with SSD with elevated levels of elastin antibodies amounted to 28 people (77.7%), the level of elastin antibodies averaged  $0.128 \pm 0.046$  absorbance units (upper normal level  $0.084 \pm 0.051$ ). 71.4% (20 people) showed heart damage and lesion of medium-sized vessels, which indicates a certain role of specific autoantibodies that disrupt the structure and elasticity of the vascular wall.

**Conclusion:** Elevated levels of elastin antibodies in patients with SLE and SSD may be a risk factor for the development of early atherosclerosis and related cardiovascular complications.

## P276

### FIBRONECTIN AS A MARKER OF DISEASE ACTIVITY IN PATIENTS WITH RHEUMATOID ARTHRITIS AND SYSTEMIC LUPUS ERYTHEMATOSUS

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**Objective:** Fibronectin (FN) is a high molecular weight glycoprotein with an ability to induce an autoimmune disease in which specific immunoglobulins can cause destruction of connective tissue. The polyvalence of FN properties is due to the presence of specialized domains in its structure, with collagen-binding and cellular domains the major ones. The functional activity of FN in rheumatic diseases is determined by the presence of free collagen domains. It is in these regions that FN antibodies bind via Fab fragments. We aimed to reveal a relationship between the level of FN antibodies and disease activity in patients with rheumatoid arthritis and systemic lupus erythematosus.

**Methods:** We studied sera from 30 donors, 68 with rheumatoid arthritis (RA), 36 with systemic lupus erythematosus (SLE). According to the degree of activity the patients with RA were distributed as follows: 10 (15%) with degree I, 41 (60%) with degree II, and 17 (25%) with degree III. Patients with SLE: 5 individuals (14%) with degree I, 22 people (61%) with degree II, and 9 individuals (25%) had the maximum degree of disease activity. FN antibodies were determined by enzyme immunoassay during antigen fixation in magnetically controlled sorbents by the Gontar method. The findings were expressed in absorbance units.

**Results:** The study of blood sera from healthy individuals showed the level of FN antibodies to be  $0.03 \pm 0.01$  absorbance units. Ele-

vated levels of FN antibodies were found in 13 (19%) patients with RA and 14 (39%) patients with SLE. In RA, the severity of FN antibody production depended on the activity of the disease ( $p<0.05$ ) and the presence of extra-articular manifestations ( $p<0.02$ ). In SLE patients, the level of FN antibodies significantly depended on the disease activity ( $p<0.05$ ) and kidney damage ( $p<0.05$ ).

**Conclusion:** Our study revealed a relationship between the level of FN antibodies and the activity of RA and SLE. An elevated level of FN antibodies can serve as a marker of the disease activity in RA and SLE.

## P277

### SCREENING FOR SARCOPENIA IN OLDER COMMUNITY-DWELLING ADULTS: FINDINGS FROM SOUTHAMPTON LONGITUDINAL STUDY OF AGEING (SALSA)

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**Objective:** The SARC-F questionnaire is a validated screening tool that can be rapidly implemented by clinicians to identify patients with probable sarcopenia. A score  $\geq 4$  is predictive of sarcopenia and poor outcomes. In this study we sought to identify the prevalence and demographic correlates of probable sarcopenia (SARC-F score  $\geq 4$ ) in a community-dwelling cohort of older adults. **Methods:** 480 participants (219 men, 261 women) identified from a Primary Care Network in Southampton (UK). Participants completed a postal questionnaire which ascertained demographic and lifestyle factors, in addition to number of comorbidities, nutrition risk score (DETERMINE) and SARC-F score. Participant characteristics in relation to probable sarcopenia were examined using sex-stratified logistic regression; age was included as a covariate in all models.

**Results:** The median (lower quartile, upper quartile) age of participants was 79.8 (76.9, 83.5) years; 12.8% of men and 23% of women had probable sarcopenia. Self-reported walking speed was strongly associated with probable sarcopenia (men: odds ratio (OR) 10.39 (95%CI: 4.55, 23.72),  $p<0.001$ ; women: 11.42 (5.98, 21.80),  $p<0.001$  per lower band). Older age was associated with probable sarcopenia in both sexes ( $p=0.01$ ) as was higher DETERMINE score (men: 1.30 (1.12, 1.51),  $p=0.001$ ; women: 1.32 (1.17, 1.50),  $p<0.001$  per unit increase). Among men, being married or in a civil partnership or cohabiting was protective against probable sarcopenia (0.39 (0.17, 0.89),  $p=0.03$ ) as was reporting drinking any alcohol (0.34 (0.13, 0.92),  $p=0.03$ ) while in women generally similar relationships were seen though these were weaker. In addition, higher BMI (1.14 (1.07, 1.22),  $p<0.001$  per unit increase) and higher number of comorbidities (1.61 (1.34, 1.94),  $p<0.001$  per extra medical condition) were also associated with probable sarcopenia in women. All the above associations were robust to adjustment for age.

**Conclusion:** Probable sarcopenia (SARC-F score  $\geq 4$ ) is common

in older adults living in their own homes. As expected, self-reported walking speed was highly predictive of probable sarcopenia. In addition to advancing age and malnutrition, socio-demographic factors were also important. Presence of these factors might trigger sarcopenia screening of older adults in clinical care.

## P278

### THE FREQUENCY OF DETECTION OF INSUFFICIENCY AND DEFICIENCY OF VITAMIN D IN PREGNANT WOMEN

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**Objective:** It is known that vitamin D deficiency is associated with the risk of miscarriage, preeclampsia, and fetal growth retardation syndrome. This is reflected in the medical and demographic indicators. The aim of the study was to assess the incidence of vitamin D insufficiency and deficiency in pregnant women with infertility, miscarriage. **Methods:** 50 pregnant women were examined in the perinatal center in Yerevan in 2021. The average age is  $27.1\pm 2.4$  years, the gestational age is 12-14, 24-36, 34-38 weeks. The exclusion criterion was the presence of severe comorbid diseases. All pregnant women underwent blood sampling with subsequent determination of the level of 25-hydroxycalciferol. **Results:** As a result of the study, it was found that vitamin D deficiency and insufficiency were detected in 100% of women with infertility (in the follicular fluid in 80% of patients, in the blood serum in 100%). With the threat of abortion in the first trimester, vitamin D deficiency in blood serum was detected in 45.8% of pregnant women, deficiency in 24.9%, normal vitamin D levels were detected in 29.3% of pregnant women. During a physiological ongoing pregnancy, vitamin D deficiency was not detected: 17.4% of women had vitamin D deficiency, and 82.6% of women had a normal level of vitamin D. **Conclusion:** Thus, insufficiency and deficiency of vitamin D in the blood serum occurs in 100% of women with infertility, in patients with miscarriage, vitamin D deficiency and insufficiency occurs 5 times more often. During physiological ongoing pregnancy, vitamin D deficiency was detected only in 17.4% of women; vitamin D deficiency was not detected.

P279

**DETECTABILITY OF OSTEOPOROSIS IN VARIOUS FORMS OF SPONDYLOARTHRITIS**M. Saad<sup>1</sup>, A. Mayah<sup>1</sup>, N. Zhuravleva<sup>2</sup>, E. Guryanova<sup>2</sup><sup>1</sup>El-Mahalla El-Cubra General Hospital, El-Mahalla El-Cubra, Egypt,<sup>2</sup>Chuvash State University, Cheboksary, Russia

**Objective:** Osteoporosis is a frequent complication of ankylosing spondylitis, which causes a high risk of fractures of the vertebrae and other areas of the skeleton, spinal deformity, and increased mortality in patients [1]. We aimed to assess the prevalence of decreased BMD in patients with various clinical variants of spondyloarthritis.

**Methods:** The study included 72 patients (46 men and 26 women) with spondyloarthritis in El-Mahalla El-Cubra Hospital, who were divided into 3 groups according to the diagnoses. The first group included 46 patients with ankylosing spondylitis (AS), mean age 38.7±8.5 years. The diagnosis of AS was established according to the modified New York criteria. The second group included 18 patients with early axial and peripheral spondyloarthritis, mean age 34.2±3.6 years, disease duration more than 3 months and less than 3 years. The diagnosis was established according to the criteria (ASAS, 2009). The third group included 8 patients with spondyloarthritis associated with inflammatory bowel disease. The mean age was 32.1±3.7 years. Patients were analyzed for disease activity, frequency of HLA-B27 carriage, and risk factors for osteoporosis. BMD of the lumbar and proximal part of one of the femurs was determined using DXA. An automatically calculated T-test and Z-test were used for evaluation (WHO, 1994; ISCD, 2007). Low BMD was determined in a patient with osteopenia and/or osteoporosis. Statistical data processing was carried out using the IBM SPSS Statistics 21 software package.

**Results:** A decrease in BMD was detected in all groups of patients. In the AS group, the decrease in BMD was 87% (osteoporosis 20%), in the group of patients with early axial and peripheral spondyloarthritis, the decrease in BMD was 77% (osteoporosis was not recorded). In the group of patients with spondyloarthritis associated with inflammatory bowel disease, the decrease in BMD was 95% (osteoporosis 23%). This study did not demonstrate a clear dependence of the level of BMD on the duration of the disease, age, BMI, activity of the process, intake of glucocorticoids and genetically engineered biological drugs.

**Conclusion:** Low bone mass is noted in all clinical groups of patients with seronegative spondyloarthritis. There was no dependence of low BMD on BMI, activity of the process, intake of glucocorticoids and genetically engineered biological preparations.

**Reference:** 1. Lezhenina S et al. *Annals Rheum Dis* 2021;80:1482.

P280

**DOES MUSIC THERAPY DECREASE ANXIETY ON PATIENTS SEEN IN OUTPATIENT DEPARTMENT FOR CHRONIC RHEUMATIC DISEASES**M. Ketata<sup>1</sup>, S. Miladi<sup>1</sup>, A. Fazaa<sup>1</sup>, H. Boussaa<sup>1</sup>, Y. Makhoulouf<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup><sup>1</sup>Hopital Mongi Slim, La Marsa, Tunisia

**Objective:** Music therapy, an allied health discipline, is acquiring enhanced recognition for its benefits in medical settings. This recognition is due to its beneficial impact on physiological parameters and on mental states associated with medical health to reduce associated anxiety and pain. However, a global, quantitative assessment of the effectiveness of music therapy on patients' anxiety during medical consultation is missing. The purpose of this study was to evaluate the impact of music therapy on anxiety, distress, and vital signs among patients with chronic rheumatic diseases during medical consultation.

**Methods:** The present prospective study was conducted in a rheumatology outpatient department over a period of three weeks. 70 patients with chronic rheumatic diseases were randomly assigned into two groups. Patients of the experimental group G1 (n=40) were seen while listening to music. Patients of the control group G2 (n=30) had consultation without listening to music. The music displayed was The Mozart Sonata in A major K 331. Participants' anxiety levels were measured objectively by comparing their vital signs and subjectively by the Spielberger State Trait Anxiety inventory questionnaire (STAI). Vital signs (heart rate (HR) and respiratory rate (RR)) were measured before and immediately after medical consultations. For STAI questionnaire: low anxiety ranged from 20 to 39, moderate anxiety ranged from 40-59 and high anxiety ranged from 60-80.

**Results:** Among the 70 patients enrolled, the average age was 54.36±14.62 years with a female predominance (62.9%). The overall mean pre- and post-consultation STAI scores were 38.44 (range, 25-60) and 34.51 (range, 22-52), respectively. Before the consultation, the patients of experimental group (G1) had a mean HR of 71±2, a mean RR of 17±1 and a mean STAI of 40.4±2.5. While in control group (G2) the mean of HR was 68.5±2, the mean RR was 16±0.4 and the mean STAI was 45.35±1.5. The mean duration of medical consultation was 24±1.1 minutes in G1 vs. 20.63±1.3 in G2. At the end of the consultation and after music intervention in G1, the mean HR became 64±1.5 in G1 vs. 66.3±1.3 in G2 (p=0.02) and the mean RR became 16.1±1 in G1 vs. 16.96±1.7 in G2 (p=0.42) and the mean STAI became 34.72±1 in G1 vs. 40.7±5.2 in G2 (p value=0.018).

**Conclusion:** This study found a significant decrease in anxiety level and heart rate in patients receiving music during medical consultation, but no significant difference was identified in respiratory rate. Further studies investigating and searching the role of music therapy in improving patients' experience by reducing anxiety during medical consultations, should be carried and published in the literature for reference.

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**PREVALENCE OF FIBROMYALGIA OCCURRING AFTER A COVID-19 INFECTION**S. Miladi<sup>1</sup>, M. Ketata<sup>1</sup>, A. Fazaa<sup>1</sup>, H. Boussaa<sup>1</sup>, Y. Makhoulouf<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup><sup>1</sup>Hopital Mongi Slim, La Marsa, Tunisia

**Objective:** Post-COVID syndrome, also known as long COVID-19, had become a public health concern characterised by a large array of manifestations, including myalgia, fatigue, dyspnea, headaches, dizziness and brain fog syndromes. Objective symptoms are often lacking, which may induce us to suspect a fibromyalgia on these patients. Consequently, we decided to perform a web-based cross-sectional survey aiming to investigate the prevalence and the predictors of FM in patients who recovered from COVID-19. The aim of this study was to estimate the prevalence and to investigate predictive factors of Fibromyalgia in patients who recovered from COVID-19.

**Methods:** A cross-sectional online survey was conducted between 20-30 February 2022. The collection form consisted of 22 questions gathering demographic information, features and duration of acute COVID-19, comorbid diseases, and other individual's attributes such as height and weight. Moreover, it included the American College of Rheumatology (ACR) Survey Criteria and the Fibromyalgia Rapid screening Tool (FIRST) questionnaire.

**Results:** A final sample of 150 individuals (66% women) filled the form 6±3 months after the COVID-19 diagnosis. 65% of responders were in the [21-30] age group. 50,7% of responders were single and 37% were married. About 37.3% of the participants were students and 91 (60,7%) were in professionally active while 2 (1,3%) of the participants were retired. 31% of responders had comorbidities. The median BMI was 24,72 kg/m<sup>2</sup>. In all cases, 60,6% were categorized as having normal weight, 26,7% were in overweight, and 12,7% were obese. Median COVID-19 duration was 7 days with 0,7% of patients requiring hospital admission. Almost of these, 19,3% satisfied the FIRST questionnaire for fibromyalgia. Seven of the 29 subjects with Fibromyalgia had seen a physician after the occurrence of widespread pain. The prevalence of fibromyalgia among females (16%) was significantly higher than that among males (3.3%). Female gender (p=0.003), comorbidities (p=0.01) and obesity (0.03) were the strongest predictors of being classified as having post-COVID-19 FM. COVID Symptoms rate was significantly higher in Female (65% vs. 34%; p=0.004) respondents.

**Conclusion:** Fibromyalgia, according to the ACR Survey Criteria, appears to be a common disorder among patients who recovered from COVID-19. Female gender, obesity and comorbidities affect the risk of developing post-COVID-19 fibromyalgia. Therefore, physicians should consider this prevalence of Fibromyalgia among Post-COVID patients and educational programs are needed to increase awareness of the disease.

P284

**GLUCOCORTICOIDS INDUCE OSTEOPOROSIS MEDIATED BY GLUCOCORTICOID RECEPTOR DEPENDENT AND INDEPENDENT PATHWAYS**Y. J. Yu<sup>1</sup>, N. H. F. Ninghan<sup>1</sup><sup>1</sup>Jiangnan University Medical Center, Wuxi, China

Clinically, glucocorticoids (GCs) are widely used to treat inflammation-related diseases; however, their long term use causes side effects, such as osteoporosis and predisposition to bone fractures, known as glucocorticoid induced osteoporosis (GIOP). Nr3c1 is the major glucocorticoid receptor, and its downstream signaling pathway is involved in regulating various intracellular physiological processes, including those related to bone cells; however, its mechanism in GIOP remains unclear. In this study, a zebrafish nr3c1-mutant was successfully generated using CRISPR/Cas9 technology to investigate the role of nr3c1 in GIOP. Mutations in nr3c1 altered cartilage development and significantly decreased bone mineralization area. Additionally, qRT-PCR results showed that the expression of extracellular matrix-, osteoblast-, and osteoclast related genes was altered in the nr3c1-mutant. The GC-Nr3c1 pathway regulates the expression of extracellular matrix-, osteoblast-, and osteoclast-related genes via Nr3c1-dependent and Nr3c1-independent pathways. A dual-luciferase reporter assay further revealed that GCs and Nr3c1 transcriptionally regulate matrix metalloproteinase 9, alkaline phosphatase, and acid phosphatase 5a. This study reveals that GCs/Nr3c1 affect the expression of genes involved in bone metabolism and provides a basis to determine the role of GIOP and Nr3c1 in bone metabolism and development. We also identified a new effector target for the clinical treatment of GIOP.

P285

**ASYMPTOMATIC VERTEBRAL COMPRESSION FRACTURES IN POSTMENOPAUSAL WOMEN WITH SYSTEMIC LUPUS ERYTHEMATOSUS**S. Dahmani<sup>1</sup>, N. V. Zhuravleva<sup>2</sup>, T. L. Smirnova<sup>2</sup>, V. N. Diomidova<sup>2</sup><sup>1</sup>Rahmani Pharmacy, Casablanca, Morocco, <sup>2</sup>Federal State Budgetary Educational Institution of Higher Education, Chuvash State University named after I. N. Ulyanov, Cheboksary, Russia

**Objective:** To study the frequency and localization of asymptomatic vertebral compression fractures in postmenopausal women with SLE.

**Methods:** We examined 47 postmenopausal women (mean age 57±8.6 years) diagnosed with SLE in accordance with the SLICC criteria (Systemic Lupus Collaborating Clinics) 2012. The average duration of the disease and menopause was 13±8.3 years and 12.5±7 years respectively. All patients with SLE received glucocorticoid (GC) therapy for more than 12 months (mean duration of GC therapy 159.7±91.7 months) at a dose of 15±5 mg/d in terms

of prednisone and had low disease activity during the examination (average SLEDAI index  $-2K 5.1 \pm 3.2$  points). The SLE damage index (ACR Damage Index) was  $5.4 \pm 2.5$  points. All patients underwent spine morphometry (vertebral fracture assessment, VFA) using a bone densitometer (Hologic Explorer) to detect vertebral compression fractures in the thoracic and lumbar regions. At the same time, the anterior, middle, and posterior heights of the Th4-L5 vertebrae, as well as the height of each vertebra with the underlying vertebra, were calculated and compared. If the difference in vertebral heights was more than 20–25% in the anterior, middle, or posterior dimensions, then such a deformity was considered a compression fracture.

**Results:** Compression fractures of the vertebrae by VFA were detected in 40 (50.6%) patients with SLE, and in 22 patients (27.8%) for the first time, since they had no clinical manifestations. The most common compression fractures occurred in the midthoracic spine (Th 6-9). On average, there were 1.6 vertebral fractures per patient (from 1 to 4). When analyzing the frequency of asymptomatic vertebral fractures in different age groups (under 50 years, from 50-60 years and older than 65 years), in the group of women with SLE younger than 50 years, the frequency of asymptomatic vertebral fractures was the highest (69.4%). All patients with asymptomatic vertebral fractures had a fracture of only one vertebra.

**Conclusion:** Compression fractures of the vertebrae by VFA were detected in 50.6% of patients with SLE. It is necessary to conduct screening examinations in patients with SLE for the timely diagnosis of osteoporosis.

## P286

### BIOIMPEDANSOMETRIC CHARACTERISTICS OF WOMEN WITH COMORBIDITY AND RHEUMATOID ARTHRITIS AND OSTEOPOROSIS

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**Objective:** To evaluate bioimpedansometric features in women with rheumatoid arthritis in combination with osteoporosis.

**Methods:** 55 women with a reliable diagnosis of rheumatoid arthritis were examined, who underwent DXA, a bioimpedansometric study. The parameters studied were: fat mass, active cell mass, lean mass, skeletal muscle mass, basal metabolic rate, total fluid, waist/hip ratio, extracellular fluid. Bioimpedancemetry parameters were compared with those of healthy women of the same age. The average age of women is  $54.1 \pm 6.2$  years. Calculations were made using SPSS 22.0.

**Results:** Patients with RA and osteoporosis comorbidity differed in anthropometric parameters from healthy women in lower height ( $159 \text{ cm} \pm 0.32$  and  $162.9 \text{ cm} \pm 0.16$ ,  $p < 0.05$ ) and overweight ( $73.9 \text{ kg} \pm 1.2$  and  $70.71 \text{ kg} \pm 0.3$ ,  $p < 0.05$ ). Fat mass ( $35.75\% \pm 0.34$  and  $22.64 \pm 0.76$ ,  $p < 0.05$ ), the percentage of ac-

tive cell mass ( $62.12\% \pm 1.22$  and  $58.73\% \pm 0.19$ ,  $p < 0.05$ ) against the background of a decrease in lean mass ( $62.23\% \pm 0.31$ ,  $77.87 \pm 0.26$   $p < 0.05$ ). The surveyed women showed an increase in basal metabolism ( $1528 \pm 24.48$ ,  $1446 \pm 2.28$ ,  $p < 0.05$ ), probably while taking GCS. Biophysical parameters of women with RA and osteoporosis comorbidity, such as tissue reactivity ( $122.64 \pm 12.5$  and  $77.34 \pm 0.41$ ,  $p < 0.05$ ), active phase angle ( $10.1 \pm 0.75$  and  $7.41 \pm 0.03$ ,  $p < 0.05$ ) also had statistically significant higher rates compared to healthy women.

**Conclusion:** Women with comorbidity of rheumatoid arthritis and osteoporosis have bioimpedansometric differences from healthy women.

## P287

### REVEALING CHAIR-SIT-TO-STAND TEST CUT OFF POINTS TO DETERMINE LOW MUSCLE STRENGTH AND PROBABLE SARCOPENIA: REAL LIFE DATA

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**Objective:** EWGSOP2 recommends assessment of chair-sit-to-stand test (CSST) as a proxy marker for muscle strength when assessment of handgrip strength (HGS) is not convenient. The recommended CSST cut-off is 15 seconds and arbitrary. We aimed to determine the CSST cut-offs that can be used as the proxy marker of low HGS to diagnose probable sarcopenia. In addition, we aimed to determine CSST cut-offs that are associated with better functionality and physical performance.

**Methods:** This retrospective cross-sectional study included community-dwelling adults over 60 years of age who presented as outpatients to a university hospital between November 2016 and December 2021. All were evaluated for, handgrip strength (Jamar hand dynamometer), usual gait speed, short physical performance battery, and functionality [activities of daily living (ADL), instrumental activities of daily living (IADL)]. The cutoff thresholds of CSST that were associated with low muscle strength (probable sarcopenia), better functionality and physical performance, were calculated from ROC analyses determining the corresponding sensitivity, specificity, and AUC.

**Results:** Included in the study were 543 older adults (69% were women; mean age:  $74.1 \pm 6.4$  years). The CSST cut-off that best predicted the presence of low muscle strength was 11.9 seconds (sensitivity 79%, specificity 63.6%, AUC 0.76). Corresponding CSST cut-offs for low UGS, impaired SPPB and ADL were 13.6 sn (respectively sensitivity 71.7%, specificity 83.8%, AUC 0.84, sensitivity 89.4%, specificity 87.2%, AUC 0.94 and sensitivity 51.6%, specificity 77.8%, AUC 0.68); for impaired IADL, 12.2 sn (sensitivity 71.2%, specificity 71.8%, AUC 0.55). As rounded figures to ease use, CSST cut-offs were 12 sn for low HGS and impaired IADL and 14 sn for impaired UGS, SPPB and ADL.

**Conclusion:** To our knowledge is the first study that reported the



CSST cut-offs based on a real life data rather than the arbitrary considerations. These cut-offs have the potential to be used while diagnosing probable sarcopenia and deciding the optimal CSST levels in practice.

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### COST-EFFECTIVE MODIFIED NEGATIVE PRESSURE WOUND THERAPY IN WOUND HEALING OF ORTHOPAEDIC PATIENTS IN A TERTIARY HOSPITAL

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**Objective:** Negative pressure wound therapy (NPWT) is a post-operative wound care method utilized to build granulation tissue and eventually assist in treating open wounds. Numerous studies have utilized different alternative methods of conventional materials in simplifying the method of wound build up without sacrificing its quality of effect. Our study aims to identify that more conventional materials can be used to maximize wound care with NPWT and also adding the cost effectiveness of the treatment. This new method observes favorable in terms of recovery, decrease in hospital stay and fewer complications. The current study aims to evaluate the effectiveness of a modified pressure wound therapy as compared to its conventional method.

**Methods:** This was a prospective, single-center case-series study comparing the efficacy of conventional negative pressure wound therapy vs. a proposed new modified negative pressure wound therapy in postsurgical debridement of all open extremity wounds managed under the Dept. of Orthopaedics of Jose R. Reyes Memorial Medical Center between December 1, 2019 to July 31, 2022. Outcomes assessed during follow-up included size of wound, number of dressing changes, duration of hospital stay, need for skin grafting, and presence of complications.

**Results:** A total of 46 patients were included, forty of whom had modified NPWT. The median change in wound size of those who underwent modified NPWT was lower (16.2 cm<sup>2</sup>) compared to those who had conventional management (21.3 cm<sup>2</sup>). In both groups, the reduction in size of wound was significant from pre-op to post-op (p-value<0.001 for modified NPWT and p-value=0.01 for conventional). Granulation was inadequate in one patient from the conventional group and two in the modified NPWT group. The median number of VAC change was similar in both groups while the median duration of hospital stay was shorter in the modified NPWT group. Complications were present in one patient from the conventional group and as much as four in the modified NPWT group. There is a need for skin grafting in five patients from the conventional group and seventeen in the modified NPWT group.

**Conclusion:** The current study does not provide concrete evidence that support the effectiveness of the modified NPWT. While significant improvement in wound size was observed among patients who used modified NPWT, a similar significant improvement was also seen in conventional NPWT. Also, the number of VAC changes are the same in the two groups. The rates of complications and

need for graft are lower in the modified NPWT group but the observed percentages are still high. Randomized clinical trials that have larger sample size are needed to verify the findings of this study and determine if other factors may alter the effectiveness of modified NPWT in wound healing of orthopaedic patients.

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### THE ASSOCIATION OF SARCOPENIC OBESITY WITH DIABETES AND DYSLIPIDEMIA: DOES THE DEFINITION PROPOSED BY 2022 CONSENSUS PAPER DETECT METABOLIC DISEASES?

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**Objective:** Although the concept of sarcopenic obesity (SO) has been around for many years, the first consensus report on its definition was published in 2022. In our study, we aimed to evaluate the relationship of SO, which was determined by the consensus algorithm, with metabolic diseases, i.e., diabetes and dyslipidemia.

**Methods:** Our study was a retrospective, cross-sectional study, and outpatients aged ≥60 years admitted to the university hospital were included. The diagnosis of sarcopenia was made according to the EWGSOP2 criteria with the presence of low muscle strength+low muscle mass. Threshold values of 27 kg/16 kg were used for hand grip strength in men and women, respectively. Skeletal muscle mass index (SMMI) was determined by adjusting muscle mass for body weight as measured by a bioimpedance analyzer (BIA). Fat percentage measured via BIA was used for the diagnosis of obesity. Turkish population-specific thresholds were used for detection of low SMMI and obesity (37.4%/33.6%, and 27%/41% in males and females, respectively). Cases were grouped into 4 phenotypes according to their body composition: Non-sarcopenia+Non-obesity (non-S+non-O); Sarcopenia+Non-obesity (only S); Non-sarcopenia+Obesity (only O); sarcopenia + obesity (SO). Non-S+Non-O group was taken as reference. The association of body phenotypes with diabetes and dyslipidemia was evaluated in univariate analyses and multivariate analyses including age, gender, and BMI.

**Results:** There were 672 participants (69.3% women) in the study. Median age was 76 (61-99). The prevalence of diabetes and dyslipidemia were 31.5% and 30.8%, respectively. Among participants, 55.8% had non-S non-O; 1.8% had only S; 39.3% had only O; and 3.1% had SO phenotype. Among the body phenotypes in multivariate analyses, only SO was independently associated with diabetes [OR (95%CI)=4.1 (1.6-10.7), p=0.004] and dyslipidemia [OR (95%CI)=2.7 (1.1-6.8); p=0.04].

**Conclusion:** In our study, the concept of SO determined by the current consensus algorithm was associated with diabetes and dyslipidemia, while only obesity or only sarcopenia was found to be unrelated. Our study is the first to investigate the relationship between SO defined by consensus diagnostic criteria and metabolic diseases. Additional studies are needed in this regard.

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### EXECUTIVE FUNCTION AND INTELLIGENCE: ASSOCIATIONS WITH BONE SIZE AND MINERAL DENSITY IN CHILDHOOD

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**Objective:** Osteoporosis and poor cognitive function commonly co-exist. This is often attributed to postmenopausal loss of estrogen. However, a common early life origin for these conditions has not been explored. We assessed the relationships between cognitive function and bone mineralization in childhood.

**Methods:** Children participating in the Southampton Women's Survey birth cohort were assessed at age 6-7 years. Occipitofrontal circumference (OFC, proxy for brain volume), intelligence quotient (IQ) [Wechsler Abbreviated Scale of Intelligence] and visual-spatial working memory [CANTAB<sup>®</sup> Delayed Matching to Sample (DMS)] were assessed and adjusted for age and sex. Whole-body-less-head (WBLH) and lumbar spine DXA [Hologic Discovery] were performed. Bone area (BA), bone mineral content (BMC), BMD were adjusted for age and sex and associations assessed using linear regression for standardized variables ( $\beta$  represents standard deviation (SD) difference per SD of cognitive function).

**Results:** DXA was performed in 1331 children (mean age 6.8 years (SD 0.33 years), 51.5% male). OFC, IQ and DMS was assessed in 1250, 551 and 490 of these children, respectively. OFC ( $\beta=0.25$  SD/SD, 95%CI 0.20,0.30), IQ ( $\beta=0.11$  SD/SD, 95%CI 0.02,0.19), and DMS ( $\beta=0.11$ , SD/SD, 95%CI 0.01,0.20) were positively associated with WBLH BA, with similar associations for lumbar spine. Positive associations were also observed between OFC, IQ and DMS and WBLH BMC, but only OFC was associated with BMD (WBLH:  $\beta=0.38$  SD/SD, 95%CI 0.33,0.43; LS:  $\beta=0.19$  SD/SD, 95%CI 0.13,0.24).

**Conclusion:** Childhood OFC was positively associated with measures of bone size and mineralization, whereas IQ and visual-spatial working memory were associated only with skeletal size. These findings suggest that a common early life determinant for skeletal growth and mineralization and executive function should be explored.

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### FROM LUMBAR PAIN TO CUSHING'S SYNDROME FOLLOWED BY CUSHING'S SYNDROME COMPLICATED WITH LUMBAR VERTEBRAL FRACTURES AND ASSOCIATED PAIN

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**Objective:** To introduce a patient who experienced chronic back pain due to heavy work and developed Cushing's syndrome (CS) by chronic use of dexamethasone in order to relief the pain, thus experiencing new vertebral fractures as a new source of lumbar accusers.

**Case report:** This is a 51-year-old male patient admitted for chronic back pain (since last 4 years) who was referred for an endocrine evaluation. He is a heavy worker in constructions; under these circumstances, he experienced chronic back pain and start using dexamethasone (DXM) in association with different analgesics. A few months ago, the lumbar pain became more intense and responded less to medication. At the clinical examination, CS is suspected; he has a rounded moon face appearance, facial plethora and central obesity, with a BMI of 29.6 kg/m<sup>2</sup>. The exploration of glucocorticoid axes showed low plasma morning cortisol and ACTH (adrenocorticotrophic hormone). Calcium metabolism points out normal total serum calcium of 9.92 mg/dL (normal: 8.4-10.3), phosphorus=3.64 mg/dL (normal: 2.5-4.5); low vitamin D of 25OHD(25-hydroxyvitamin D)=22.1 ng/mL (normal: 30-100), and mildly increased PTH=87.59 pg/mL (normal: 15-66); decreased bone formation marker osteocalcin=9.13 ng/mL (normal: 14-46), normal alkaline phosphatase=51 U/L (normal: 40-150), low-normal P1NP=20.99 ng/mL (normal: 15.13-58.59), and normal bone resorption marker CrossLaps=0.1 ng/mL (normal: 0.104-0.504). Thyroid profile is normal. DXA showed reduced BMD for age: L1-4 BMD=1.108 g/cm<sup>2</sup>, Z-score=-2.7SD, total hip BMD=1.19 g/cm<sup>2</sup>, Z-score=0.7SD, femoral neck BMD=1.07 g/cm<sup>2</sup>, Z-score=0.1SD, 1/3 distal radius BMD=1.012 g/cm<sup>2</sup>, Z-score=0.3SD. L1, L2 vertebral fractures are identified at X-ray. He received oral ibandronate 150 mg/month and came back after 2 months after stopping DXM to assess the glucocorticoid axes that showed a plasma morning cortisol of 8 µg/dL (normal: 4.82-19.5). Periodic checkup is needed.

**Conclusion:** Iatrogenic CS in males might include a high fracture risk; sometimes, incidental vertebral fractures are masked by the initial lumbar pain that caused the long term self-administration of glucocorticoids.

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### RHEUMATOID ARTHRITIS IS ASSOCIATED WITH DECREASED SKELETAL MUSCLE MASS AND INCREASED SERUM MYOSTATIN

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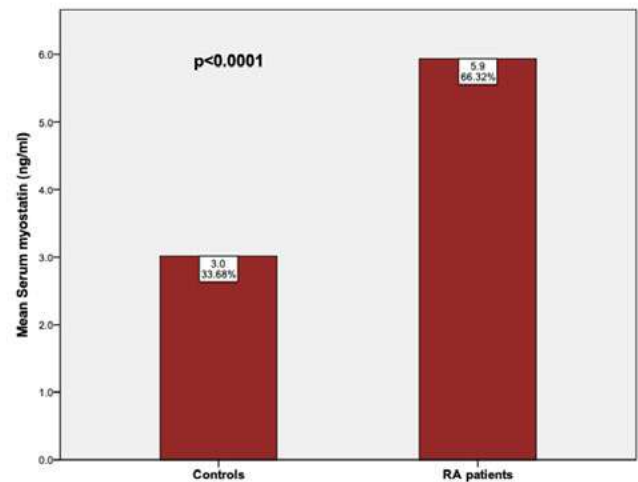
**Objective:** Myostatin is a molecule expressed in skeletal muscles and has a negative influence in myogenesis. Chronic inflammation in rheumatoid arthritis (RA) has been associated with increased levels of serum myostatin (Murillo-Saich et al, 2021). This study aimed to calculate the levels of serum myostatin in patients with RA and to associate it with disease parameters and skeletal muscle measurements.

**Methods:** A cross-sectional study including 30 postmenopausal women with RA under treatment and 30 controls. Serum myostatin was calculated using an ELISA method. Wholebody DXA (Lunar Prodigy<sup>®</sup>) was implemented to calculate the skeletal muscle mass (ASMI) and a Jamar-type hand dynamometer was used to calculate grip strength. Physical activity was approximated through an IPAQ questionnaire and physical performance was recorded using the Short Physical Performance Battery (SPPB). Functionality in RA patients was assessed using the HAQ-DI index. Sarcopenia was defined using the 2019 criteria of EWGSOP2. Data were processed using an IBM SPSS Statistics program (v.24) and statistical significance was set at  $p < 0.05$ .

**Results:** Patients and controls were randomized regarding age ( $p = 0.08$ ) and BMI ( $p = 0.10$ ). There was no difference in IPAQ physical activity scores ( $p = 0.36$ ). 56% of RA patients had mild disability (HAQ-DI score=0-1) and 40% had medium disability (HAQ-DI score=1-2). ASMI score was significantly lower in RA patients ( $p = 0.03$ ), while a similar trend was observed for handgrip strength ( $p = 0.002$ ) and SPPB score ( $p < 0.001$ ). 40% of RA patients fulfilled the EWGSOP2 criteria for sarcopenia, whereas no sarcopenia was found among controls ( $p < 0.0001$ ). Serum myostatin was significantly increased in RA patients ( $5.9 \pm 1.3$  vs.  $3.1 \pm 0.5$   $\mu\text{g/ml}$ ,  $p < 0.0001$ ). In the RA arm, serum myostatin levels were not significantly associated with sarcopenia ( $p = 0.25$ ).

**Conclusion:** Chronic inflammation in rheumatoid arthritis seems to be associated with increased prevalence of sarcopenia, decreased skeletal muscle mass and increased serum myostatin.

**Reference:** Murillo-Saich JD et al. *Medicine* (Baltimore) 2021;100:e24186.



**Graph 1:** Difference of serum myostatin between RA patients and controls (statistical significance:  $p < 0.05$ ).

P293

### A NOVEL MEASURE OF END-STAGE KNEE OSTEOARTHRITIS REDUCES THE DURATION AND SAMPLE SIZE REQUIRED FOR OBSERVATIONAL STUDIES AND TRIALS

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**Objective:** Total knee replacement (TKR) has been used as an outcome measure in research into the causes and possible treatments for knee osteoarthritis (KOA). However, because KOA progresses slowly, and because TKR has a low incidence, research using TKR as an outcome measure necessitates long duration and/or large sample sizes. Moreover, TKR is influenced by multiple factors (such as education and income) besides the progression of KOA. We defined a novel outcome measure that signifies end-stage KOA (esKOA); and determined whether esKOA was sensitive enough to detect the effect of an exposure that is known to have a modest effect on reducing TKR, namely weight loss.

**Methods:** A knee was considered to have esKOA if any of the following two conditions were met: 1) moderate, intense, or severe KOA symptoms (i.e., the sum of the pain and disability scores on WOMAC  $\geq 12$ ) and severe radiographic knee osteoarthritis (RKO), defined as a Kellgren-Lawrence grade (KLG) of 4); or 2) intense or severe KOA symptoms (i.e., the sum of the pain and disability scores on the WOMAC  $\geq 23$ ) and frequent knee pain (i.e., knee pain on most days of one or more months in the past 12 months) and mild or moderate RKO (KLG=2 or 3). We used data from two prospective cohort studies: the Osteoarthritis Initiative (OAI) and the Multicenter Osteoarthritis Study (MOST). We analyzed the data in two ways: as an observational study; and as an emulated trial. In the emulated trial, participants who lost  $\geq 5\%$  of their weight between baseline and 1-1.25 years (weight loss

group) were matched with participants who gained  $\geq 5\%$  of their weight in that same period (weight gain group), using 1:1 nearest-neighbour matching on propensity scores. In both analyses, we used a multilevel mixed effects generalized linear model. In the observational study, we investigated the association of weight loss between baseline and the following time points with esKOA and TKR at these time points: 1-1.25 years; 2-2.5 years; and 4-5 years. In the emulated trial, we compared the odds of incidence of esKOA and TKR between the weight loss and weight gain group at the following time points: 2-2.5 years; and 4-5 years.

**Results:** The observational study included 7107 participants (58.4% female, mean $\pm$ SD age and BMI 61.4 $\pm$ 8.8 years and 29.2 $\pm$ 5.1 kg/m<sup>2</sup> at baseline, and an incidence of esKOA of 2.9, 6.8, and 10.4% at 1-1.25 years, 2-2.5 years, and 4-5 years, respectively, and a corresponding incidence of TKR of 0.1, 0.5, and 1.6%. While weight loss was associated with a reduced adjusted odds ratio (aOR) for both esKOA and TKR at 4-5 years (for 5% weight loss: 0.85 [95%CI 0.79 - 0.92] for esKOA and 0.79 [0.67-0.93] for TKR), weight loss was only associated with a reduced aOR for esKOA - and not TKR - at the earlier time point of 2-2.5 years (for 5% weight loss: 0.80 [0.72-0.90] for esKOA and 1.05 [0.76-1.45] for TKR). At 1-1.25 years, there was no association between weight loss and esKOA or TKR. The sample size required to detect a 50% reduction in the odds of esKOA was 6% to 13% of the sample size required for that of TKR (236 vs. 3990 at 2-2.5 years; 162 vs. 1286 at 4-5 years). In the emulated trial, compared to the weight gain group (367 participants), the weight loss group (also 367 participants) had significantly lower odds of esKOA but not TKR at 4-5 years (0.43 [0.22 - 0.84] for esKOA and 0.39 [0.06-2.67] for TKR). There was no difference between groups in the odds of esKOA or TKR at the earlier time point of 2-2.5 years in the emulated trial.

**Conclusion:** Given that our novel measure of esKOA could detect an association with weight loss at a time point 1.5-3 years earlier than TKR in an observational study, and in a sample size that was too small to detect an association with TKR at 4-5 years in an emulated trial, esKOA is recommended as an outcome measure for observational studies and trials investigating causes and possible treatments for KOA. Our powerful novel measure of esKOA enables shorter and smaller - hence cheaper - studies, which can boost the research on effective treatment for KOA.

## P294

### ASSOCIATION OF WEIGHT LOSS WITH HIP OSTEOARTHRITIS IN OLDER COMMUNITY-DWELLING FEMALE ADULTS (STUDY OF OSTEOPOROTIC FRACTURES)

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**Objective:** Most guidelines recommending weight loss for hip osteoarthritis are based on research on knee osteoarthritis. Prior studies found no association between weight loss and hip osteoarthritis, but no previous studies have targeted older adults. We aimed to determine whether there is any clear benefit of weight loss for hip osteoarthritis in older adults because weight loss is associated with health risks in older adults.

**Methods:** We used data from white females aged  $\geq 65$  years from the Study of Osteoporotic Fractures. Our exposure of interest was weight change from baseline to follow-up at 8 years. We investigated the following 15 outcomes over the 8 years: total hip replacement (THR); development of hip pain; resolution of hip pain; development of radiographic hip osteoarthritis (RHOA); development of symptomatic RHOA; progression of RHOA; and degeneration of 9 individual structural features of the hip (as visualized by radiography). Generalized estimating equations (clustering of 2 hips per female) were used to investigate the association between exposure and outcomes adjusted for major covariates. We also analyzed the results in the subgroups defined by overweight and obese BMI and intention to lose weight.

**Results:** There was a total of 11,018 hips from 5509 females. There was no associated benefit of weight loss for any of the 15 outcomes. For example, the odds ratio (95%CI) for THR was 0.98 (0.87 to 1.11) for each 5% weight loss. The results were consistent across subgroups defined by overweight and obese BMI and intention to lose weight.

**Conclusion:** Our findings suggest no associated benefit of weight loss in older women in reducing the incidence of THR and hip pain or improving the structure of the hip joint as assessed by radiography.

## P295

### MALNUTRITION ASSESSED BY GLIM CRITERIA USING SIX DIFFERENT APPROACHES FOR REDUCED MUSCLE MASS CRITERION: WHICH VERSION IS BETTER ASSOCIATED WITH MORTALITY IN COMMUNITY-DWELLING OLDER ADULTS?

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**Objective:** The Global Leadership Initiative on Malnutrition (GLIM) criteria suggest alternative methods to be used for assessment of muscle mass, and which of these methods is more strongly associated with adverse outcomes remains an issue to be clarified. Our primary outcome was to report malnutrition prevalence defined by six different GLIM approaches and study their relationship with mortality.

**Methods:** This retrospective follow-up study included the data of

outpatients admitted to the outpatient clinic of a tertiary hospital. We used six different approaches for GLIM, based on method used to identify reduced muscle mass: i. skeletal muscle mass (SMM)/height<sup>2</sup>, ii. SMM/BMI, iii. handgrip strength (HGS), iv. calf circumference (CC), v. CC adjusted for BMI, and vi. GLIM without third phenotypic criterion (P3). We evaluated survival in malnutrition with Kaplan-Meier log rank test. Cox proportional hazards model was used to identify the relationships of different GLIM versions with mortality.

**Results:** The study population included 224 older individuals, with a median age of 72, and female predominance (68.8%). The prevalence with different GLIM versions ranged between 4.0-34.1%. During a median follow-up period of 31 months, 14 (6.3%) participants died. According to unadjusted analyses, only GLIM (SMM/h<sup>2</sup>), GLIM (HGS), GLIM (CC) and GLIM (without P3) were significantly associated with increased mortality risk [HR (95%CI) were 3.8 (1.1-13.7), 4.3 (1.4-12.8), 4.6 (1.3-16.7) and 7.3 (2.0-26.5), respectively]. After final adjustments made for age and gender, it was revealed that none of the versions were predictors of mortality in older adults living in the community.

**Conclusion:** GLIM criteria have a room for improvement as different options for muscle mass assessment are allowed, and this study aimed to fill the gap in the literature on whether malnutrition diagnosed by alternative GLIM definitions had a predictive validity in community-dwelling older adults. Further outcome studies using larger cohorts and different pragmatic approaches are needed to detect the ideal GLIM definition for malnutrition assessment.

## P296

### BONE FORMATION AND RESORPTION MARKERS IN OSTEOPOROSIS PATIENTS WITH DIABETES

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**Objective:** Diabetes mellitus is associated with an increased risk of fractures, which is not explained by BMD. Furthermore, in the Fracture Risk Assessment Tool (FRAX) model, common risk factors and BMD were underestimated the fracture risk in type 2 diabetes patients. Although, glycemic control condition, the duration of disease, hypoglycemia, risk of falling, and adverse effects of medication, which could lead to higher fractures in diabetic patients, and many studies have investigated biochemical bone turnover rate in osteoporosis patients, no definite inferences can be made, but bone turnover markers have useful in fracture risk assessment and monitoring treatment efficacy in postmenopausal osteoporosis. The aim of this study is to evaluate the bone turnover markers and fracture risk in postmenopausal osteoporosis patients with diabetes.

**Methods:** This cross-sectional study investigated patients who were postmenopausal osteoporosis women with diabetes at osteoporosis clinic. In this study, country-specific fracture risk for 10-year probability of a hip or major osteoporotic fracture, were calculated by the WHO Collaborating Center, using the FRAX algorithm. The FRAX algorithm includes femoral neck BMD, age,

BMI, previous history of fracture, parental history of hip fracture, current smoking, recent use of corticosteroids, presence of rheumatoid arthritis, and at least 3 alcoholic beverages per day. A single, blood sample to assess bone markers, and other laboratory tests were performed in the study visit. Patients were measure the bone specific alkaline phosphatase for formation markers, and  $\beta$ -CrossLaps ( $\beta$ -CTx) for resorption markers were analyzed the bone turnover rate.

**Results:** In this cross-sectional study, we investigated 82 Taiwanese postmenopausal women, with 40 subjects diabetes and 42 non-diabetes at osteoporosis clinic, aged between 50 and 79 years, had high risk for fractures by FRAX<sup>®</sup>, and found both bone formation and resorption markers were elevated.

**Conclusion:** Our findings suggest that in diabetes osteoporosis women have high risk for fractures by FRAX, with 10-year major osteoporotic fracture probability or hip fracture probability and high bone formation and resorption markers, but no significant difference in diabetes and non-diabetes osteoporosis patients.

## P297

### EVALUATION OF BONE METABOLISM IN CHILDREN WITH JUVENILE IDIOPATHIC ARTHRITIS RECEIVING THERAPY WITH A GENETICALLY ENGINEERED BIOLOGICAL DRUG

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**Objective:** To assess changes in BMD at the preclinical stage in patients with JIA receiving therapy with a genetically engineered biological drug (GEBD) soluble TNF $\alpha$ .

**Methods:** In the observation group there were 22 children (16 girls, 6 boys) with a verified diagnosis of JIA. The average age of children in the study group was 11.8 $\pm$ 4.3 years, the onset of the disease was noted at the age of 4.5 $\pm$ 2.7 years, by the time of the study, the duration of BA therapy was at least 2 years. Prior to the appointment of GEBD, all patients of the study group had a high degree of disease activity, ESR of 41 $\pm$ 10 mm/h, CRP level of 43.5 $\pm$ 5.7 mg/dl (with a norm of up to 5.0 mg/dl). During the treatment with GEBD, the minimum activity of the disease in terms of ESR and CRP was achieved by 2-3 months. Patients underwent ultrasound densitometry, a study in the blood serum of the degradation product of type I collagen (C-terminal telopeptides), pro-inflammatory IL-1 $\beta$ , IL-6 and anti-inflammatory IL-4 cytokines.

**Results:** Results of ultrasound densitometry BMD in children in the study group was characterized by signs of moderate osteopenia (-2.3 $\pm$ 1.42). The index of C-terminal telopeptides was at the level or slightly exceeded the upper limit of the reference interval (0.102-1.721 ng/ml). The pro-inflammatory cytokine IL-1 $\beta$  and anti-inflammatory IL-4 did not go beyond the reference values, while the serum concentration of IL-6 was more than 2.6 times higher than the normal values (4.4 $\pm$ 0.64 pg/ml), the level of IFN $\gamma$  in all

patients (29.1-12.72 pg/ml (63.7-14.6) exceeded normal values (21.8-10.2 pg/ml (27.5-12.1)).

**Conclusion:** Patients with JIA already in the early stages of the disease develop osteopenic syndrome and changes in bone metabolism.

## P298

### OSTEOPENIC SYNDROME IN PATIENTS WITH HYPERPROLACTINEMIA

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**Objective:** To study the clinical course of osteopenic syndrome in patients with hyperprolactinemia.

**Methods:** The object of the study were patients diagnosed with hyperprolactinemia of various origins. 85 patients were examined, among them 60 women and 25 men, aged 22-45 years, the average age was 30.1±0.1 years. All patients underwent a questionnaire and clinical examination, determined the level of prolactin in the blood and the study of BMD. The levels of bone metabolism markers were determined: the level of osteocalcin (the norm in men is 9.6-40.8 ng/mg, in women 8.4-33.9 ng/mg), the level of bone resorption marker (CTX β-CrossLaps) (the norm for men is 0.115-0.748 ng/mg, for women 0.112-0.738 ng/mg). The control group consisted of 35 healthy individuals (20 men and 15 women) aged 22 to 45 years.

**Results:** In the group of patients, where the average level of PRL was 2334±321.41 mIU/l, women complained of menstrual irregularity 85%, infertility 45%, galactorrhea 45.3%, decreased libido 38.5%, pain in back and joints in 44%. In men, there was a decrease in potency in 66.1%, galactorrhea in 20.5%, a decrease in libido in 71%. The results of densitometry in this group of patients revealed changes in BMD in 45.3% of patients (11.4% of men and 35.1% of women). Of these, manifestations of osteopenia in 6.8% among men and 21.2% among women, osteoporosis 1.5% among men and 4.7% among women. In the group of identified patients with osteopenic syndrome, the mean levels of osteocalcin were 13.91±1.78 ng/mg (in women 13.3±1.91 ng/mg and in men 10.6±2.14 ng/mg) in the blood were significantly ( $p<0.05$ ) reduced compared to the control group, where their average value was 18.31±1.69 ng/mg, respectively. The level of CTX in the blood of patients was 0.83±0.08 ng/mg (in men 0.91±0.16 ng/mg and in women 0.82±0.10 ng/mg) and was significant ( $p<0.05$ ) higher than in the control group -0.51±0.04 ng/mg.

**Conclusion:** A significant decrease in BMD was found in the group of patients with hyperprolactinemia. This correlates with changes in bone metabolism markers and requires preventive measures.

## P299

### BONE METABOLISM IN PATIENTS WITH IMPAIRED THYROID FUNCTION

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**Methods:** A comparative study of 2 groups of patients was performed. The first group of 20 patients with newly diagnosed thyrotoxicosis, the second group of 20 patients with newly diagnosed hypothyroidism. The functional state of the thyroid gland was determined by determining the basal concentrations of TSH, the free fraction of triiodothyronine (free T3) and the free fraction of thyroxine (free T4). Bone metabolism was assessed by the concentration of pyridinoline, a marker of bone resorption, and markers of bone formation, osteocalcin, alkaline phosphatase (AP), in blood serum. In addition, indicators of calcium-phosphorus metabolism were determined. The criterion for inclusion in the comparison groups was the age of 18-42 years, the presence of overt thyrotoxicosis for the first group and overt hypothyroidism for the second group in the absence of substitution therapy. The first group included 5 men (25%) and 15 women (75%). In 100% of cases, thyrotoxicosis was associated with diffuse toxic goiter. The second group included 4 men (20%) and 16 women (80%).

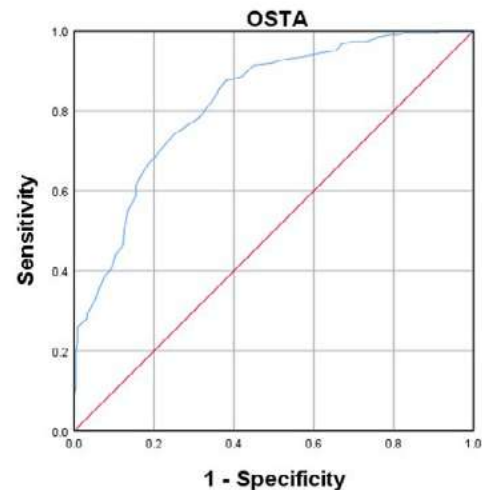
**Results:** In the group of patients with thyrotoxicosis, an increase in the level of both the marker of bone tissue resorption pyridinoline ( $p<0.001$ ), and the markers of bone formation osteocalcin ( $p<0.001$ ) and alkaline phosphatase ( $p<0.01$ ) was revealed. The results indicate a parallel activation of the processes of resorption and bone formation in thyrotoxicosis. However, the increase in the level of pyridinoline (2.7 times) was greater than that of osteocalcin (1.6) and alkaline phosphatase (1.7 times). This indicates the presence of an imbalance towards increased bone resorption, which is the cause of osteoporosis in thyrotoxicosis. In the group of patients with overt hypothyroidism, a decrease in the levels of pyridinoline (by 1.5 times) ( $p<0.05$ ) and osteocalcin (by 1.4 times) ( $p<0.05$ ) and alkaline phosphatase (by 1.2 times) was revealed ( $p<0.05$ ). This proves a slowdown in the processes of resorption and bone formation in patients with hypothyroidism.

**Conclusion:** With thyrotoxicosis, increased metabolism with a predominance of bone resorption, with hypothyroidism, slowing down the processes of bone metabolism with impaired remodeling.

## P300

**BONE MINERAL DENSITY IN PATIENTS WITH ASEPTIC NECROSIS OF THE FEMORAL AND TIBIAL CONDYLES**A. Ali<sup>1</sup>, N. V. Zhuravleva<sup>2</sup>, T. L. Smirnova<sup>2</sup>, A. S. Komelyagina<sup>3</sup>, S. A. Yastrebova<sup>2</sup><sup>1</sup>Pharmacy N5, Giza, Egypt, <sup>2</sup>Federal State Budgetary Educational Institution of Higher Education, Chuvash State University named after I. N. Ulyanov, Cheboksary, Russia, <sup>3</sup>Northwestern State Medical University named after I. N. Mechnikov, St. Petersburg, Russia**Objective:** To study the prevalence of total BMD loss in patients with aseptic necrosis of the femoral and tibial condyles.**Methods:** The study included 51 patients (40 women and 11 men, aged 45-72 years, mean age 54±13.1 years) diagnosed with AN of the femoral and tibial condyles. All patients underwent DXA of the lumbar spine (L1-L4) and proximal femur on a densitometer. Depending on the BMD parameters, patients were divided into 3 groups (according to the T-criterion, patients over 50 years old, and according to the Z-criterion, younger than 50 years old). In the first group, the loss of BMD was (up to -1.5 SD), group 2 (from -1.5 to -2.5 SD), group 3 (-2.5 SD or more).**Results:** According to the results of the study, it was revealed that in 21.75% of cases, patients had a loss of BMD from -1.5 to -2.5SD; in 7.29% of cases, -2.5SD or more.**Conclusion:** The detection of a total loss of BMD of varying severity in a third of patients with AN of the femoral and tibial condyles once again confirms the underestimation of osteoporosis in the development and course of the disease and requires long-term osteotropic therapy.

## P301

**THE PERFORMANCE OF OSTEOPOROSIS SELF-ASSESSMENT TOOL FOR ASIANS (OSTA) IN ASSESSING THE RISK OF OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN AGED 45 YEARS AND OLDER**N. Nguyen<sup>1</sup>, T. Tran<sup>1</sup>, T. Truong<sup>2</sup>, T. Truong<sup>2</sup><sup>1</sup>Hue University of Medicine and Pharmacy, Hue, Vietnam, <sup>2</sup>Hue Hospital University of Medicine and Pharmacy, Hue, Vietnam**Objective:** Application of the OSTA in assessing the risk of osteoporosis in postmenopausal women aged 45 years and older; Evaluation of the relationship between OSTA and BMD measured by DXA.**Methods:** A cross-sectional descriptive study was performed on 430 postmenopausal women aged 45 years and older who were treated at Hue University of Medicine and Pharmacy Hospital from 9/2021 to 6/2022. BMD was measured by DXA. Diagnosis and classification of osteoporosis are based on the T-score (WHO 1994).**Results:** The average OSTA value is  $-2.97 \pm 3.35$ , the minimum value is -12.8, and the maximum value is 7.0. Osteoporosis risk ratios according to the OSTA (using cut-offs 0 and -3) were: high risk (46.1%), moderate risk (35.3%), and low risk (18.6%). The predictive value of osteoporosis risk of the OSTA was ranked as good with the area under the curve (AUC) of 0.823 ( $p < 0.001$ ) (Fig. 1). At cut-off -3, the OSTA has a sensitivity of 70.3%, and a specificity of 78.4%. At cut-off 0, the OSTA has a sensitivity of 96.8%, and a specificity of 33.1%. The prevalence of osteoporosis in the high-, intermediate- and low-risk groups (using cut-offs 0 and -3) was 69.2%, 28.3%, and 6.3%, respectively (Table 1).AUC=0.823  
( $p < 0.001$ )**Figure 1.** ROC curve showing the sensitivity and specificity of the OSTA**Table 1.** Relationship between the risk of osteoporosis classified by OSTA and osteoporosis based on T-score

OSTA	Osteoporosis		Osteopenia		Normal		p
	n	%	n	%	n	%	
High risk (OSTA < -3) (n=198)	137	69.2	50	25.2	11	5.6	0.000
Moderate risk (-3 ≤ OSTA ≤ 0) (n=152)	43	28.3	74	48.7	35	23.0	
Low risk (OSTA > 0) (n=80)	5	6.3	30	37.5	45	56.2	
Total (n=430)	185	43.0	154	35.8	91	21.2	

**Conclusion:** OSTA can be used as a simple and convenient tool for self-assessment or screening for osteoporosis risk.

P302

### ASSOCIATION OF CTX-1 AND VITAMIN D WITH BONE MINERAL DENSITY IN WOMEN WITH RHEUMATOID ARTHRITIS AND HEALTHY CONTROLS

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**Objective:** To compare the association of serum C-terminal telopeptide of type I collagen (CTX-1) and 25-hydroxycalciferol (25(OH)D) levels with BMD in women with rheumatoid arthritis (RA) and healthy controls.

**Methods:** 124 women were enrolled in our study. 88 were with RA (group 1), verified with ACR/EULAR 2010 criteria. Healthy controls (group 2) were enrolled by self-referral and had no inflammatory joint diseases. The diagnosis of osteoporosis was set according to the recommendations of WHO. Also, we determined serum levels of 25(OH)D and CTX-1. Statistical analysis was performed with a software package Statistica 12.0.

**Results:** Both groups were matched for age (56,4 [47,5-60,7] vs. 56,4 [48,4-62,8] years respectively,  $U=1391.5$ ;  $p=0.41$ ), menopause status (73,9% vs. 82,3% respectively, Yates  $\chi^2=0.56$ ;  $p=0.45$ ), years after menopause (9,3 [5,6-15,9] vs. 6,8 [3,4-11,6] years respectively,  $U=709.0$ ;  $p=0.09$ ) and BMI (27,5 [23,4-31,8] vs. 26,4 [23,4-29,3] kg/m<sup>2</sup> respectively,  $U=1379.5$ ;  $p=0,37$ ). Group 1 had lower 25(OH)D levels (48,5±16,3 vs. 130,7±38,4 nmol/l respectively,  $t=-16.47$ ;  $p<0.001$ ) and were comparable in CTX-1 levels (0,62 [0,42-0,81] vs. 0,69 [0,51-0,88] ng/ml respectively,  $U=1361.5$ ;  $p=0.318$ ). Weak to moderate inverse correlation was observed between L1-L4 ( $r=0,30$ ,  $p=0,005$ ), femoral neck ( $p=0,31$ ,  $p=0,004$ ), wards triangle ( $r=0,25$ ,  $p=0,020$ ), greater trochanter ( $p=0,27$ ,  $p=0,010$ ) and total hip ( $p=0,26$ ,  $p=0,014$ ) BMD zones with 25(OH)D levels and there was no correlation with CTX-1 levels. However, in group 2 there was no correlation between BMD and 25(OH)D levels, but inverse correlation between CTX-1 levels with L1-L4 ( $\rho=-0,48$ ,  $p=0,003$ ) and wards triangle ( $\rho=-0,34$ ,  $p=0,049$ ) BMD zones.

**Conclusion:** Patients with RA had lower 25(OH) levels compared with healthy controls. BMD of patients with RA was inversely correlated with 25(OH)D levels in lumbar and femoral zones. In group of healthy controls BMD inversely correlated with CTX-1 levels in L1-L4 and Wards triangle zones.

P303

### PHARMACOKINETICS AND PHARMACODYNAMICS OF PROPOSED DENOSUMAB BIOSIMILAR AND REFERENCE DENOSUMAB IN POSTMENOPAUSAL OSTEOPOROSIS: THE ROSALIA STUDY

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**Objective:** To demonstrate similar pharmacokinetics (PK) and pharmacodynamics (PD), which are critical parameters in determining biosimilarity of GP2411, a proposed Sandoz denosumab biosimilar, and reference denosumab in postmenopausal women with osteoporosis.

**Methods:** The ROSALIA (NCT03974100) international, double-blind, parallel-group integrated Phase I/III study randomised subjects (1:1) to receive 60 mg s.c. of GP2411 or EU-authorized reference denosumab every 26 weeks. The study enrolled 527 postmenopausal women with osteoporosis, aged 55-80 years, with body weight  $\geq 50$  kg and  $\leq 90$  kg at screening. PK endpoints included the area under the serum concentration-time curve extrapolated to infinity ( $AUC_{inf}$ ) and maximum drug serum concentration ( $C_{max}$ ) after the first dose. PD endpoints included the area under the effect-time curve (AUEC) of the percentage change from baseline (%CfB) in serum C-terminal crosslinked telopeptide of type I collagen (CTX) after the first dose, and CTX and procollagen I N-terminal propeptide (PINP) serum concentration up to Week 52.

**Results:** In the enrolled 527 patients, similarity in PK and PD was demonstrated between GP2411 and reference denosumab after the first dose, as the 90% CIs (for PK parameters) and 95%CI (for the PD parameter) of the geometric mean ratios were fully contained within the prespecified equivalence margins [0.80, 1.25] (Table 1). Changes from baseline to up to Week 52 in serum concentrations of CTX and PINP were similar between the treatment groups.

**Table 1.** Overview of selected PK and PD endpoints after the first dose.

	Adjusted geometric mean		Geometric mean ratio GP2411 vs reference denosumab	
	GP2411 (n)	Reference denosumab (n)	PE	(95% CI) or (90% CI)*
<b>PD parameter</b>				
AUEC %CfB in CTX (% * day)	15,800 (228)	15,800 (213)	1.00	(0.98, 1.01)
<b>PK parameters</b>				
AUC <sub>inf</sub> (day* ng/mL)	366,000 (247)	369,000 (246)	0.99	(0.93, 1.05)
C <sub>max</sub> (ng/mL)	6,910 (260)	7,120 (258)	0.97	(0.92, 1.03)

AUC<sub>inf</sub>, area under the serum concentration-time curve extrapolated to infinity; C<sub>max</sub>, maximum drug serum concentration; CTX, carboxy-terminal crosslinked telopeptide of type I collagen; n, number of subjects with evaluable parameters; PD, pharmacodynamics; PE, point estimate; PK, pharmacokinetics.

\*95% CI is presented for PD parameter; 90% CI for PK parameters.

**Conclusion:** The ROSALIA study demonstrated similar PK and PD profiles between GP2411, a proposed Sandoz denosumab biosimilar, and reference denosumab after the first dose in postmenopausal women with osteoporosis.

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AbbVie, Amgen, Genentech, Regeneron, UCB, Horizon, and GSK. AK has participated in a data safety monitoring board for AbbVie and Amgen. He has been part of a board or advisory board for AbbVie, Bendcare, Boehringer Ingelheim, ChemoCentryx, Flexion, Gilead, Grunenthal, Horizon, Eli Lilly, Janssen, Pfizer, Regeneron, UCB, and Novartis. AK has stock or stock options in Pfizer, GSK, Gilead, Novartis, and Amgen. JJB reports consulting fees from Cole Biopharma, Sandoz, and UCB. RE reports consulting fees from Sandoz, Samsung Bioepis, Biocon Pharma Limited, and Amgen. AN, BV, NK, MB are employees of Sandoz Biopharmaceuticals.

### P304

#### ULTRASTRUCTURE OF TIBIA REGENERATE IN RATS AFTER 60-DAY ADMINISTRATION OF SODIUM BENZOATE AND JUSTIFICATION OF SODIUM SELENITE EFFECTIVENESS

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**Objective:** Sodium benzoate is widely used in the food and pharmaceutical industries to extend shelf life and reduce spoilage. However, studies have shown that sodium benzoate intake is associated with the following adverse effects: genotoxicity, the induction of allergic reactions, nephrotoxicity and hepatotoxicity. It is reported that sodium benzoate causes changes in the ultrastructure of the bone regenerate, but the methods of correcting the above-mentioned changes are not presented. The aim of this work is to study the effectiveness of sodium selenite as a corrector of untoward changes in bone regenerate ultrastructure caused by the 60-day sodium benzoate administration.

**Methods:** The experiment was performed on 120 white male mature rats. In groups 1 and 2, rats were injected with 1 ml of sodium benzoate solution at a dose of 500 mg/kg and 1000 mg/kg through a feeding tube for 60 days, following which a perforation of the tibias in the proximal third of the body was performed. Under the same conditions, the rats of groups 3 and 4 received intramuscular injections of sodium selenite at a dose of 40 µg/kg. The X-ray diffraction method was used to study the ultrastructure of the bone mineral. Numerical results were processed by methods of variation statistics with the use of the Statistika 5.1 program.

**Results:** In group 3, we detected a reduction in size of unit cells along the axis a on the day 15 by 0.15%, and along the axis c from day 15 to 24 by 0.16%, 0.14%. There was also a decrease in crystallite size by 4.94%, 4.67% and an increase in the microtexturing coefficient from day 15 to 45 by 4.02%, 3.79%, 4.23%. This trend held in group 4 – the size of unit cells along axes a and c decreased from day 15 to 24 by 0.15%, 0.11% and by 0.13%, 0.13%, the crystallite size decreased by 5.15%, 4.81%, 4.60% from day 15 to 45, and the microtexturing coefficient increased by 5.06%,

5.73%, 5.78%, 4.23% (all  $p < 0.05$ ) from day 10 to 45.

**Conclusion:** Administration of sodium selenite in association with the 60-day sodium benzoate administration causes restoration of the bone regenerate mineral ultrastructure by the late terms of the experiment.

### P305

#### VALIDATION OF THE EGYPTIAN CLINICAL GUIDELINES AND IMPLEMENTING FRACTURE RISK CENTRIC APPROACH AS INTERVENTION THRESHOLD

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**Objective:** 1. To validate the effectiveness of the Egyptian clinical guidelines in identifying postmenopausal women and men at increased risk of primary and secondary osteoporosis. 2. To validate the effectiveness of FRAX thresholds as an interventional assessment tool for identifying and treating postmenopausal women at increased risk of developing fragility fracture(s).

**Methods:** A cross-sectional multi-center study which included patients identified on primary screening or presenting with low trauma hip, spine or other major osteoporosis fractures. Diagnosis of osteoporosis was defined based on T-score  $< -2.5$  or less at either lumbar spine, femoral neck, or total hip. Interventional therapy was considered based on FRAX thresholds ( $\geq 3\%$  at the hip or  $\geq 20\%$  for major osteoporosis fracture) as per Egyptian clinical guidelines for osteoporosis management [1]. The ability of FRAX to be used as an interventional tool was evaluated using receiver operating characteristic (ROC) curve analysis, which plots sensitivity against (1-specificity). The area under the curve (AUC), calculated using logistic regression, was used to compare the diagnostic performance of the two tests; AUC values  $> 0.75$  are generally considered to represent good performance. Sensitivity was defined as the proportion of women with osteoporosis (T-scores  $\leq -2.5$ ) that tested positive (using FRAX), and specificity was defined as the proportion of women without osteoporosis who tested low on FRAX (hip  $< 1\%$  and Major osteoporosis fracture  $< 10\%$ ). A p-value  $< 0.05$  was considered statistically significant.

**Results:** 236 (69 males, 167 females) diagnosed to have low trauma hip, spine or other major osteoporosis fracture were recruited for this study. 83.9% of the postmenopausal women and 40.3% of the men included in this work had high or very high fracture risk calculated without BMD prior to the occurrence of the index fracture. 85% were diagnosed to have osteoporosis based on BMD

assessment and T-score  $< -2.5$ . 17.6% of the women and 56.5% of the men had moderate FRAX score without BMD, however, after including the BMD in the FRAX calculation they were eligible for osteoporosis therapy. There was significant positive correlation between FRAX values and BMD T-score at different sites ( $p < 0.01$ ). The ROC for the FRAX index for femoral neck, total hip and L1-L4 lumbar spine were 0.821 ( $p < 0.001$ ), 0.817 ( $p < 0.001$ ) and 0.785 ( $p < 0.01$ ) respectively. The sensitivity of the threshold of  $\geq 3\%$  for prediction of hip fracture ranged from 88.7-93.5%, whereas the sensitivity of threshold  $\geq 20\%$  for prediction of major osteoporosis fracture ranged from 51.7-59.7%. The overall concordance between pre-BMD FRAX and BMD, expressed through the kappa index, was 0.918. When using BMD measurement, T-score  $\leq -2.5$ , at either neck/hip of the femur or lumbar spine, the sensitivity for the prediction of hip fracture ranged from 49.8-57.6%, whereas the sensitivity for the prediction of incident MOF ranged from 42.8-50.5% and PPV ranged from 21.5-28.6%.

**Conclusion:** The pre-BMD FRAX score efficiently predicted postmenopausal patients who are at potential risk of sustaining a fragility fracture and might require treatment. Using interventional thresholds, 83.9% were eligible for osteoporosis therapy which was not significantly different from those diagnosed to have osteoporosis based on DXA scans (85%). Simple non-invasive diagnostic tools, such the FRAX, for predicting fracture risks in postmenopausal women, can be used as an interventional tool, particularly considering the high osteoporosis treatment gap in Egypt (which has been rated as high at 81.2%). Interventional strategy for osteoporosis management based on fracture risk discrimination was comparable to the diagnostic approach based on DXA scans, however, it was able to identify that cohort at very high fracture risk.

**Reference:** 1. El Miedany Y et al. Egypt Rheumatol Rehabil 2021;48:5.

### P306

#### HEALTH ECONOMICS IN THE SECONDARY PREVENTION OF FRAGILITY FRACTURES: COST-EFFECTIVENESS ANALYSIS OF FRACTURE LIAISON SERVICES COMPARED TO STANDARD FRACTURE CARE IN EGYPT: AN INITIATIVE BY THE EGYPTIAN ACADEMY OF BONE HEALTH

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**Objective:** To assess the cost-effectiveness of a Fracture Liaison Service (FLS) compared to standard fracture care for the secondary prevention of fragility fractures in Egypt.

**Methods:** The national clinical standards for fracture liaison service [1] set the basic standards to identify pharmacoeconomic evaluations of FLS and the main inputs required. Patients, aged 60 years and older, diagnosed to have osteoporotic fragility fracture, who were candidates to initiate osteoporosis treatment, were included in this study. Clinical, economic, and quality of life parameters were estimated from the literature and the Egyptian clinical practice. 412 patients with fragility fractures were included in this study. Disease progression was simulated through seven health states (with and without osteoporosis treatment, subsequent hip, vertebral, forearm and humerus fracture, and death). Patients with standard management followed the usual pathway after a fracture, that is emergency department, orthopedics and, in some cases physical therapy. In contrast, FLS consisted of an active identification of patients with fragility fracture and, after agreeing to participate, patients were clinically assessed and followed-up.

**Results:** 40% of the women and 27% of the men included in this work had imminent fracture risk, whereas 32.7% of the women and 35.3% of the men had history of fragility fracture. Under standard fracture service, 17.9% initiated a treatment to prevent subsequent fractures. Setting up FLS for the secondary prevention of fragility fractures in Egypt provided better osteoporosis treatment initiation rates and persistence. The FLS model was associated with reduced mortality (HR 0.61 over 2 years), increased assessment of BMD (relative risk [RR] 2-3), increased treatment initiation (RR 1.7-4.48) and adherence to treatment (78% at 1 year). As far as cost effectiveness, over a cycle length of one year, FLS cost was 4,120,000 (\$137,838) in comparison to direct cost of hip fractures of 31,724,000 (\$1,061,358).

**Conclusion:** Results support that FLSs is beneficial for both patients and health care providers. The introduction of FLS for the secondary prevention of fragility fractures in Egypt is a cost-effective strategy for both women and men who have suffered an osteoporotic fragility hip fracture. The potential benefits are likely to increase over time with aging population. This would reduce subsequent fragility fractures, disabilities and deaths.

**Reference:** 1. Gadallah N, El Miedany Y. Egypt Rheumatol Rehabil 2022;49:11.

P307

### HEALTH ECONOMICS: COST OF HOSPITALISATION FOR OSTEOPOROTIC HIP FRACTURE: FINDINGS FROM THE EGYPTIAN HIP FRACTURE DATABASE – AN INITIATIVE BY THE EGYPTIAN ACADEMY OF BONE HEALTH

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**Objective:** To identify the direct annual cost of inpatient care for hip fracture in Egypt 2021–2022 in terms of bed days and direct hospital costs.

**Methods:** This was a cross-sectional descriptive study. The Database is a clinically led, extranet-based system where data are collected as part of the national Fracture Liaison Service (FLS) in Egypt. The national clinical standards for fracture liaison service [1] were the standards against which the post fracture care services are benchmarked. Inclusion criteria included: 1. Age 60 years or older; 2. Admission under the diagnosis of low trauma fragility hip fracture. The extracted data were anonymised and used for analysis. Patients' demographic information (age, gender, marital status, place of residence, education status, employment status, and health insurance coverage status) were gathered in addition to clinical information regarding the nature of the fracture, history of osteoporosis diagnosis or management, and history of previous osteoporotic fractures. In addition, information was collected regarding current medications, and comorbidities as well as assessment for fracture risk, falls risk and sarcopenia. Activity-based funding was calculated considering duration of in-hospital admission, The price assigned to the type of surgical interference, plus extra indirect non-surgical costs (medical costs) for the entire episode of care from admission to discharge (investigations, medications and rehabilitation). Length of stay was measured as the number of calendar days from admission to discharge from hospital. The annual number of bed days in the acute hospital was calculated by multiplying the mean length of stay by the absolute number of hip fracture cases in the given year. Direct hospital costs were calculated using the 2022 price list. All costs were converted to USD using the average exchange rate in 2022 (1 USD=24.70 Egyptian pound).

**Results:** The study included 412 hip fracture cases (270 women and 142 men) from 3 centers covering north and south of Egypt. The study period was from December 2021–December 2022. Fractures were more common in women than in men. BMD was assessed in 141 patients, and DXA scan revealed osteoporosis in

120/141 (85.1%) of the patients. Mean FRAX 10-year probability of major of osteoporosis fracture was 18.37±10.1 with 40.4% at moderate risk and 35.3% at high risk. Mean 10-year probability of hip fracture was 8.08±7.1 with 22.1% at moderate risk and 74.9% at high risk. Falls risk was moderate in 14.1% of patients while 38.2% were at a high risk of fall. Sarcopenia was evident in 44% of patients. Hip fracture incidence was 5.4%. Time to surgery was 2.2±0.5 days. The mean length of stay for hip fractures surgery was 5.2 days accounting for 4142 bed days. Hospitalisation for hip fracture cost was 8,240,000 (\$275,401) whereas the average direct cost of the surgical management was 20,600,000 (\$688,502). Indirect medical costs were 2,884,000 (\$96,390). 4.5% of the patients passed away with mean duration of 2.3±0.4 months after surgery. All the patients required home care after hospital discharge.

**Conclusion:** Hip fracture places a considerable clinical and financial burden on the patients as well as the healthcare system, with acute hospitalisation accounting for a substantial proportion of the costs incurred. Timely surgery can impact length of stay and reduce the cost of admission. Due to the increase in life expectancy and the percentage of the elderly population, the incidence and prevalence of osteoporosis and associated fractures are increasing which would result in higher costs in the future. Pre-surgical assessment of bone health status may help in selecting the most cost-effective surgical intervention approach.

**Reference:** 1. Gadallah N, El Miedany Y. Egypt Rheumatol Rehabil 2022;49:11.

P308

### THE HYBRID BIODEGRADABLE NANOCOMPOSITE POROUS IMPLANT AS A NEW POSSIBILITY OF BONE DEFECT REPLACEMENT

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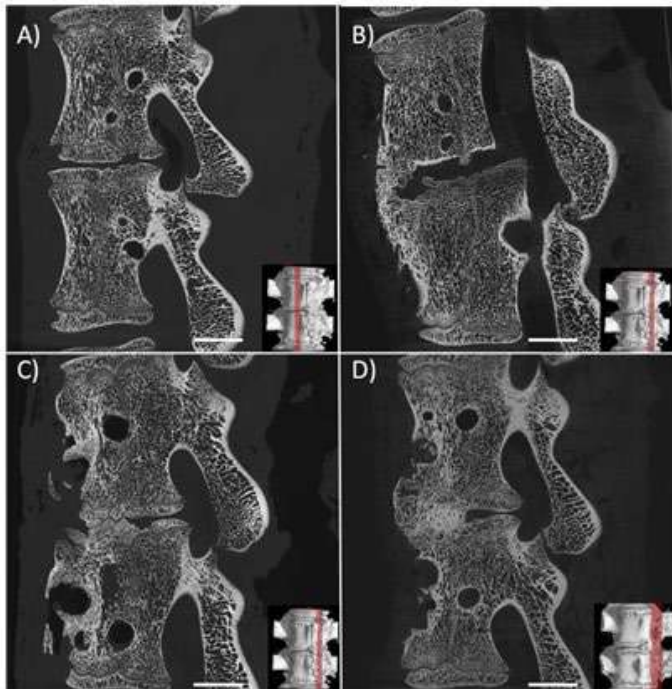
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**Objective:** The use of lumbar fusion procedures has rapidly increased in the USA and Europe over the last decade. A large number of these procedures involve the use of bone grafts. The most frequent indications for lumbar fusion involve degenerative spinal diseases leading to chronic pain, comminuted fractures of the vertebral body, congenital spine malformations, and bone defects after tumour resection. Autografting has been considered the gold standard for bone graft, but is associated with short and long-term morbidity as well as deformity, scarring and other surgical risks. Main goal of this experimental study was to compare newly developed hybrid biodegradable nanocomposite porous implant (HBNPI) against bone graft from iliac crest as a new possibility of bone defect replacement.

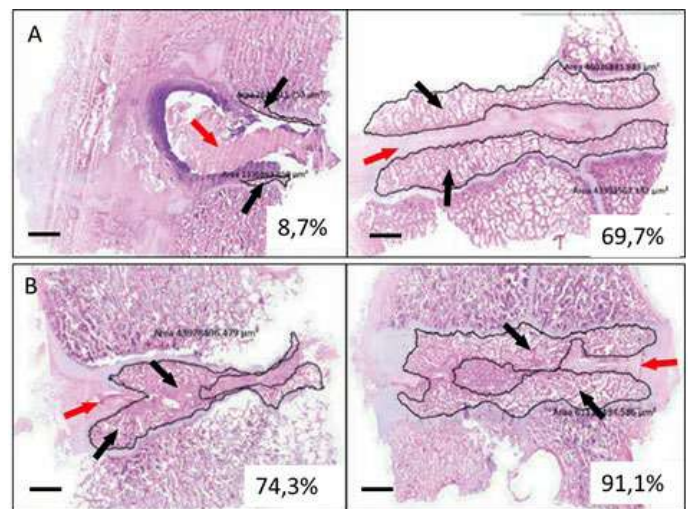
**Methods:** The 24 small male pigs 4 months old were included, two groups depending on fusion method. A group – 12 pigs underwent lateral lumbar interbody fusion (L2/3) with implantation of iliac crest bone graft. B group - 12 pigs underwent same procedure with newly developed HBNPI. After sacrifice (8 and 16 week after operation), the lumbar spines were taking out and mi-

cro-CT, biomechanical testing and histomorphological analysis in all groups were performed to evaluate a quality of intervertebral fusion.

**Results:** The operations lasted between 50-90 min in A group, 35-72 min in B group. All of the pigs from group A could stand up and were mobile within 20 h (range 7-20). Biomechanics evaluation showed much higher flexural stiffness [Nm/deg] of lumbar spine after 16 weeks in pigs treated with HBNPI (B16) compared with pigs treated only 8 weeks (B8) and with autologous iliac crest bone graft insertion (A8,A16) and native lumbar spine (N). Biomechanical evaluation supported findings on micro CT (Figure 1) and histological specimens (Figure 2), both adjacent vertebrae were completely fused in groups B, unlike in group A.



**Figure 1.** The examples of bone graft samples sorted into the groups according to the quality of the fusion Grade I, II, III, IV, respectively. A) no fusion observe; B) fusion of the vertebrae is visible but it is not in the area of bone graft; C) fusion in the area of the bone graft is presented but it is not completed, D) fusion is visible and entirely joins the vertebrae in the area of bone graft.



**Figure 2.** Histomorphological analysis of the intervertebral fusion area after 16 weeks in subgroup A2 (bone autograft) (A) and B2 (bioresorbable hybrid implant) (B). Red arrows depict fibrocartilage tissue in the area of the implementation site. Marked area with black arrows represent newly formed trabecular bone tissue having visible bone marrow with trilineage hematopoiesis in the newly bone formation. Scalebar of 2 mm in each image.

**Conclusion:** New HBNPI represents new possibility how to treat the bone defects and could improve and accelerate bone healing process against standard procedures.

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### P309

#### OSTEOPOROSIS AND KIDNEY STONE DISEASES IN UKRAINIAN POPULATION: RESULTS OF RETROSPECTIVE COHORT STUDY

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**Objective:** Osteoporosis (OP) remains an epidemic of the 21st century, given the increased morbidity and mortality due to low-energy fractures. Among the unsolved issues of prevention and treatment of osteoporosis, the problem of insufficient intake of calcium and vitamin D remains unsolved. Among numerous factors, it is caused, in particular, by caution regarding the possible development or exacerbation of the course of kidney stone disease (KSD). Many studies confirmed the association between a decreased BMD, the presence of low-trauma fractures and KSD. Still, this topic has not previously been studied in detail in Ukraine. The aim of the research was to study the relationship between BMD, the presence of low-trauma fractures and CKD in

the Ukrainian population.

**Methods:** In a retrospective cohort study conducted at the Ukrainian Center of Osteoporosis, the data of 4,420 subjects aged 50-94 (64.2±8.3) years (4,088 women and 332 men) were analyzed. The BMD was measured by DXA ("Hologic Discovery"), using the ISCD-2019 criteria to divide the examinees into groups (osteoporosis, osteopenia, normal). The presence of KSD was confirmed using available medical documentation and anamnesis data of the subjects.

**Results:** In the studied cohort, the share of persons with osteoporosis was higher in women (35.4%) compared to men (24.1%,  $p<0.05$ ). KSD was established in 14.6% of females and 13.0% of males. Osteoporosis in women with KSD was diagnosed in 36.2%, osteopenia in 47.7%, and normal BMD in 16.1%. The distribution did not differ from that similar in men (27.9; 44.2, and 27.9%). In persons without KSD, the proportion of patients with osteoporosis was higher in women compared to men (35.2 and 23.5%;  $p<0.05$ ), and the share of persons with normal BMD was smaller (16.3 and 32.5%;  $p<0.05$ ). In the group of women with osteoporosis, KSD was diagnosed more often (14%) compared to men (1.3%,  $p<0.001$ ). Similar differences were obtained in subjects with osteopenia (13.4 and 3.3%, respectively,  $p<0.001$ ), while there were no significant differences in the group with normal BMD. The proportion of KSD did not depend on the presence of osteoporosis or osteopenia in women, but in men with normal BMD was significantly higher (11.3%) compared to men with osteoporosis (1.3%). Previous low-trauma fractures were found in 43.8% of women with KSD and 41.6% of females without nephrolithiasis (the corresponding indices in men were 37.2 and 31.9%).

**Conclusion:** Our results showed that the share of KSD in subjects 50-94 years old consisted of 14.6% of females and 13.0% of males. Our study requires a future detailed analysis of the relation between KSD and bone state depending on calcium and vitamin D supplementation for adequate preventive therapy in patients with osteoporosis.

### P310

#### OSTEOPOROSIS IN YOUNG WOMEN WITH AMENORRHEA

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**Objective:** At fertile age, the influence of sex hormones on bone tissue dominates. Therefore, with a deficiency of these hormones in amenorrhea, both the formation of peak bone mass (PBM) is disturbed, and osteopenia and osteoporosis develop. The state of BMD and methods of correction were studied in detail. The problem of bone loss in amenorrhea of various etiologies is less studied, the awareness of patients suffers [1]. The purpose of the study was to assess the state of bone tissue depending on the age and duration of amenorrhea.

**Methods:** We present a retrospective analysis of 46 women aged 20 to 40 years with amenorrhea of various etiologies: premature ovarian failure (POF), ovarian dysgenesis (OD), hypogonadotropic amenorrhea (HTA) (General Hospital El-Kubra). The average age of the patients was 30.8±0.4 years, the average duration of amenorrhea was 8.7±1.8 years. The state of BMD was assessed using DXA on a Lunar densitometer in the lumbar spine. According to the WHO criteria, the diagnosis of osteoporosis in postmenopausal women is carried out according to the t-test (Evidence level A), and the use of the Z-test is recommended for young women, but we considered it appropriate to use the t-test, because according to our data, the use of the Z-score is not suitable for the early diagnosis of decreased BMD in women with amenorrhea.

**Results:** In the group of 23 women with POF, the mean age was 35.8 years, BMI - 23.6 kg/m<sup>2</sup>, duration of amenorrhea - 5.3 years, age of onset of amenorrhea - 26.6 years. Among 18 patients with OD, mean age was 28.4 years, BMI was 22 kg/m<sup>2</sup>, duration of amenorrhea was 15.2 years, age of onset of amenorrhea was 15.3 years. Among 5 women with HTA, the mean age was 28.2 years, BMI - 19.6 kg/m<sup>2</sup>, duration of amenorrhea - 5.7 years, age of onset of amenorrhea - 19.3 years. The examined women were divided into 2 groups: up to and over 30 years old. This division was due to the age of the final formation of peak bone mass.

An analysis of the distribution of BMD in patients with amenorrhea depending on age showed that the highest frequency of osteoporosis in patients younger than 30 years old with DU was in 29.8% of cases ( $p<0.05$ ) and in patients with HTA - in 18.2% of women. Unchanged BMD was more common in patients older than 30 years with POF - 18.2% ( $p<0.05$ ), while in OD - in 4.2% and 7.2% of patients with HTA. Osteopenia was more common in patients with POF older than 30 years - 47.9%, and in patients with HTA up to 30 years - in 34.8% of patients.

**Conclusion:** In case of premature ovarian failure and hypogonadotropic amenorrhea, BMD in patients with amenorrhea duration less than 5 years has less pronounced changes compared to BMD in patients with amenorrhea duration of more than 5 years.

**Reference:** 1. Lammert A et al. *Annals Rheum Dis* 2021;80:1458.

### P311

#### ONE LABORATORY RETROSPECTIVE OBSERVATIONAL STUDY: THE LEVEL OF VITAMIN D IN LATVIA 2021–2022 COMPARED TO 2015–2016

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**Objective:** Vitamin D is a fat-soluble nutrient critical for bone health, the immune system, and general well-being. Individuals of risk groups, according to age and gender, need to check the level of vitamin D (25(OH)D). The study aimed to analyze the improvement in 25(OH)D tests after increasing public awareness

campaigns of the importance of vitamin D.

**Methods:** We analyzed the electronic database of one of the largest laboratories in Latvia – E.Gulbja Lab. 264 670 vitamin D tests were performed and analyzed using descriptive statistics. The 25(OH)D test results were divided into two groups. Persons from group 1 were examined from 01/06/2015 to 31/05/2016 and from group 2 – from 01/06/2021 to 31/05/2022.

**Results:** In group 1, 40384 tests were done (of which 78% (n=31636) were women. In group 2, 224286 tests were performed (of which 71% (n=158411) were women. The number of tests done had increased five times among females and seven times – among males (p<0.001). The median age in both groups was similar (in group 1, it was 53 yrs [65–33], vs. in group 2, it was 48 yrs [18–100]). Group 1 and group 2 were compared according to their 25(OH)D levels: vitamin D deficiency <19 ng/mL (in group 1, it was 41% vs. 11% in group 2), insufficiency 20–30 ng/mL (respectively 37% vs. 29%), normal >30 ng/mL (respectively 22% vs. 41%) and additionally >45 ng/mL as optimal vitamin D level (respectively 3% vs. 19%). Vitamin D testing in group 2 was distributed by season: during the winter season – 24% (there were 78% women with a mean age of 47 yrs, and the vitamin D mean level was 33.2 ng/mL); spring – 27% (there were 71% women with the mean age of 49 yrs and the vitamin D mean level 33.9 ng/mL); summer – 23% (there were 72% women with a mean age of 48 yrs, and the vitamin D mean level was 35.5 ng/mL); autumn – 26% (there were 71% women with a mean age of 48 yrs, and the vitamin D mean level was 36.1 ng/mL).

**Conclusion:** More laboratory tests for vitamin D were performed following awareness campaigns on the importance of vitamin D for bone health. There is a significant improvement in vitamin D levels in all seasons. There were no significant differences between the mean vitamin D levels by season in group 2. These results demonstrate the importance of electronic database analyses concerning vitamin D levels.

P312

**ELEVATED 11B-HSD1 IN OSTEOBLAST IMPAIRED GLUCOSE UPTAKE AND OSTEOGENESIS TO EXACERBATE HIGH-FAT DIET-INDUCED OBESITY AND BONE LOSS**

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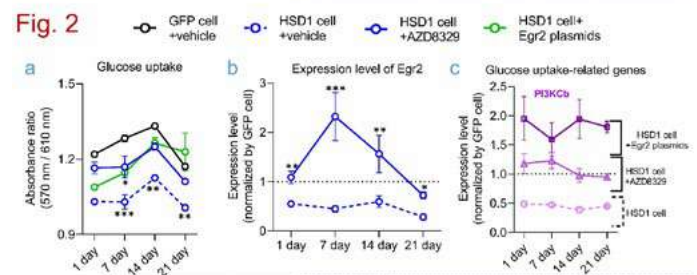
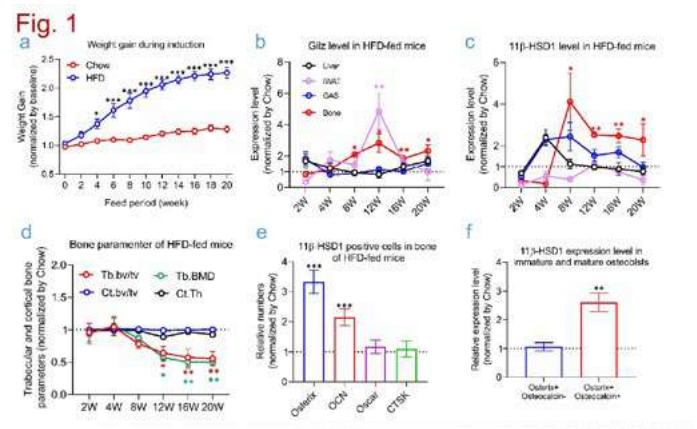
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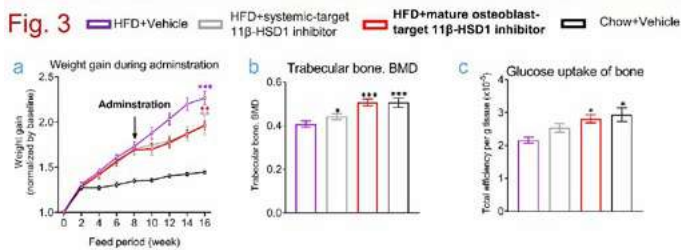
**Objective:** Abnormal glucocorticoid (GC) activation in bone aggravated high-fat diet (HFD)-induced obesity and bone loss. 11β-hydroxysteroid dehydrogenase type 1 (11β-HSD1) is the key enzyme intracellularly converting inactive GC to its active form. In

this work, we aim to investigate whether intraosseous 11β-HSD1 contributes to HFD-induced obesity and bone loss.

**Methods:** We assessed the effects of HFD on bodyweight, glucose handling, activated GC, bone loss using weight measurement, OGTT, ITT, RT-PCR and micro-CT, respectively. To examine cellular mechanisms, we established 11β-HSD1 overexpressed-osteoblasts and performed RNA-seq, ATAC-seq, glucose uptake test, osteogenic test and RT-PCR in vitro. We also developed systemic-target 11β-HSD1 inhibitor and mature osteoblast-target 11β-HSD1 inhibitor to examine the effects of inhibiting mature osteoblastic 11β-HSD1 in HFD-fed mice.

**Results:** The activated GC level (Fig. 1b) and elevated 11β-HSD1 gene expression (Fig. 1c) were consistently found in bone, dominantly in mature osteoblasts (Fig. 1e&f), rather than other metabolic organs as early as the 8<sup>th</sup> weeks with HFD. Interestingly, it was coincident with the notably impaired glucose handling at the 8<sup>th</sup> weeks with HFD but ahead of the obvious bone loss (Fig. 1a&d) observed at the 12<sup>th</sup> weeks with HFD. However, the circulating activated GC levels did not alter during HFD induction, indicating that the activated GC in mature osteoblasts was associated with HFD-induced obesity and bone loss. Mechanistically, elevated 11β-HSD1 in osteoblast repressed Egr2, a pro-osteogenic transcriptional factor, to inhibit glucose uptake and osteogenesis in vitro (Fig. 2a&b). Further study revealed that Egr2 mediated the transcription of PI3KCb to impair glucose uptake (Fig. 2c). By pharmacological approach, we found that osteoblastic 11β-HSD1 inhibition could not only reduce body weight (Fig. 3a) and improved glucose handling, but also ameliorated intraosseous glucose uptake (Fig. 3b) and prevent bone loss (Fig. 3c) in HFD-fed obese mice.





**Fig. 1.** Elevated mature osteoblastic 11 $\beta$ -HSD1 was associated with HFD-induced obesity and bone loss. (a) Weight gain, (b)&(c) expression level of intraosseous Gilz and 11 $\beta$ -HSD1, and (d) bone parameters during HFD-feeding. (e)&(f) Expression level of 11 $\beta$ -HSD1 of osteoblasts and osteoclasts in HFD-fed mice.

**Fig. 2.** Elevated 11 $\beta$ -HSD1 in osteoblasts impaired glucose uptake and repressed Egr2 expression in vitro. (a) Glucose uptake, (b) Egr2 expression and (c) PI3KCb expression in osteoblasts during osteogenic differentiation.

**Fig. 3.** Inhibiting osteoblastic 11 $\beta$ -HSD1 by pharmacological approach attenuated HFD-induced obesity and bone loss. (a) Body weight, (b) trabecular BMD and (c) glucose uptake in bone after administrating osteoblastic-specific 11 $\beta$ -HSD1 inhibitors from week 8 to week 16 during HFD feeding.

**Conclusion:** Elevated 11 $\beta$ -HSD1 in osteoblast impaired glucose uptake and osteogenesis to exacerbate HFD-induced obesity and bone loss. Targeting osteoblastic 11 $\beta$ -HSD1 could combat HFD-induced obesity and bone loss.

**Acknowledgments:** Theme-based Research Scheme (T12-201/20-R) and General Research Fund (12136616 and 12103519) of the Research Grants Council of Hong Kong SAR. The 2020 Guangdong Provincial Science and Technology Innovation Strategy Special Fund (Guangdong-Hong Kong-Macau Joint Lab, No: 2020B1212030006), Interdisciplinary Research Clusters Matching Scheme of Hong Kong Baptist University (RC-IRCS/17-18/02)

## P313

### INFLUENCE OF AGE ON CONSERVATIVE TREATMENT OF SUBACROMIAL IMPINGEMENT SYNDROME

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**Objective:** Chronic shoulder pain is a common reason for seeking medical attention. Subacromial impingement syndrome (SIS) is one of the most common problems in the development of chronic shoulder pain. Quite often there are cases of ineffectiveness of non-steroidal anti-inflammatory drugs (NSAIDs) and glucocorticoids, despite their high therapeutic potential. It should be noted their rather short action, and they also have a number of side reactions. PRP and HA injections are widely used for shoulder pain.

However, a unified concept of their application has not yet been developed. We aimed to compare the efficacy and safety of PRP and HA in patients with chronic shoulder pain in terms of age and the presence of risk factors that may affect the outcome of treatment.

**Methods:** We evaluated conservative therapy in 100 patients with SIS, 54% of them were men and 46% were women, mean age was 51.5 $\pm$ 15.1 years. Patients had chronic shoulder pain of  $\geq$ 3 months duration induced with SIS. Patients  $\geq$ 45 years 66%, <45 years 34%. In the study, patients were randomly divided into 2 groups of 50, group 1 received 3 subacromial injections of PRP 7 days apart. Group 2 received 2 subacromial injections of HA 7 days apart. Pain was assessed using a 100 mm visual analogue scale (VAS), functional impairment according to ASES (American Shoulder and Elbow Surgeon Assessment) and CSS (Constant Shoulder Assessment), reduced need for NSAID use 6 months after treatment. Efficacy was assessed according to the age of patients.

**Results:** Both groups were equally effective in reducing VAS pain intensity and dysfunction. Pain VAS decreased from 56.0 $\pm$ 14.6 to 31.8 $\pm$ 26.3 (PRP) and from 57.6 $\pm$ 17.8 to 30.2 $\pm$ 26.3 (HA) ( $p=0.768$ ), ASES increased from 54.8 $\pm$ 13.8 to 74.6 $\pm$ 22.4 and 54.7 $\pm$ 15.1 to 77.3 $\pm$ 22.5 ( $p=0.552$ ), CSS from 59.2 $\pm$ 14.4 to 66, 9 $\pm$ 17.4 and 47.8 $\pm$ 16.9 to 65.6 $\pm$ 19.3 ( $p=0.245$ ). Pain reduction and function gains were significantly higher in patients <45 years of age than in patients  $\geq$ 45 years of age. VAS for pain after 6 months was 22.4 $\pm$ 26.3 and 35.5 $\pm$ 26.2 ( $p=0.022$ ), A SS 83.3 $\pm$ 20.9 and 72.1 $\pm$ 22.6 ( $p=0.017$ ), CSS 76.2 $\pm$ 16.1 and 63.2 $\pm$ 18.2 ( $p=0.001$ ). We evaluated patients with a good (VAS <40 mm) response to therapy considering their physiological characteristics: 52.1% of men, 55.6% of women, 59.4% of BMI <30 kg/m<sup>2</sup>, 50.2% of BMI >30 kg/m<sup>2</sup>, 58.2% lesion of one tendon, 50.7% more than one lesion of the tendon, VAS at baseline <50 mm 56.9%, VAS >50 mm 51.2%. All assessed factors did not affect the outcome of therapy. There were no cases of serious adverse reactions during the treatment with PRP and HA.

**Conclusion:** The efficacy of PRP and HA does not differ in the treatment of patients with SIS. In patients under the age of 45, the effectiveness of the use of PRP and HA was higher. Gender, BMI, baseline pain level, number of affected tendons did not affect the effectiveness of treatment

## P314

### TREATMENT DURATION AND DRUG ADHERENCE OF DENOSUMAB AFTER HIP FRACTURES WERE ASSOCIATED WITH PATIENTS' ALL-CAUSE MORTALITY

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**Objective:** Treatment duration and drug adherence of anti-osteoporosis medications (AOMs) were thought to be closely associated with therapeutic effects. Recently, denosumab had become a popular option for AOMs, but limited studies discussed the treatment duration and drug adherence of denosumab. Therefore, our

study evaluated the influence of denosumab's treatment duration and drug adherence on patients' all-cause mortality rate after hip fractures.

**Methods:** We conducted the cohort study using data from the National Health Insurance Research Database (NHIRD). Participants newly diagnosed with osteoporosis and hip fracture from 2008 to 2019, receiving denosumab treatment were identified in our study. We analyzed the association between treatment duration, drug adherence, other parameters, and all-cause mortality rate using Cox proportional hazard model. The drug adherence was measured by drug interval.

**Results:** Treatment duration of 1-2, 2-3, and over 3 years had lower overall mortality rates compared to a treatment duration of <1 year. Among these groups, a treatment duration of over 3 years had the lowest mortality risk (HR 0.29). Besides, a drug interval of fewer than 7 months also attributed to more reduction of mortality risk compared to the interval of over 7 months (HR 0.60).

**Conclusion:** Longer treatment duration and better drug adherence to denosumab lead to a lower all-cause mortality rate in patients after hip fractures. Besides medication prescription, patient education about receiving treatment on time was also important for improving their prognosis.

### P315

#### GLUCOCORTICOIDS IN RHEUMATIC DISEASES: WHAT DO WE KNOW?

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**Objective:** In the treatment of rheumatic diseases (RD), intra-articular injections of glucocorticoids (IAI GCs) are widely used. However, there are relatively few data on duration of effect and safety. The purpose of the study was to evaluate the effectiveness of IAI GC in RD.

**Methods:** The study involved 290 patients with osteoarthritis (OA) and rheumatoid arthritis (RA) (31.0% of men and 69.0% of women, mean age 55.6±12.6 years). All received IAI GC in the knee joint according to strict indications determined by the attending physician. Control group - 112 patients with OA (28.6% of men and 71.4% of women, aged 59.3±14.6 years). They received a course of IAI hyaluronic acid (HA). The result was evaluated according to a telephone survey after 2 weeks, 1 and 3 months.

**Results:** After VSI GC in 2 weeks, 1 month, and 3 months, pain decreased (numerical rating scale (NRS 0-10), Me [25%; 75%]) from 6.0 [4.0; 8.0] to 1.0 [0; 2.0], 2.0 [1.0; 4.0] and 2.5 [1.0; 4.0] respectively (p<0.001). After 3 months 63.8% of patients with no/mild pain (<4 by NRS), 30.3% with complete/almost complete absence of pain (≤1 by NRS). The effect of IAI HA was higher in RA than in OA - pain after 3 months. -4.0 [-2.0; -6.0] and -2.0 [-1.0; -5.0], p=0.003. The effectiveness of ISI GC and HA in OA did not

differ: pain after 3 months. was -2.0 [-1.0; -5.0] and -3.0 [-1.0; -5.0] p=0.869. No adverse reactions were noted during IAI.

**Conclusion:** IAI GC is an effective and safe method of temporary treatment of patients with RD.

### P316

#### CLINICAL AND LABORATORY PREDICTORS OF THE DEVELOPMENT OF CHRONIC PAIN AND EARLY STAGES OF POSTTRAUMATIC OSTEOARTHRITIS AFTER KNEE INJURY

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**Objective:** Chronic pain and post-traumatic arthritis are common complications of trauma, causing suffering, loss of function, and disability. To date, no clear predictors of these complications have been identified. We aimed to determine the clinical and immunological factors associated with the development of chronic pain and early stages of post-traumatic osteoarthritis after knee injury.

**Methods:** From August 2022 to January 2023 in V.A. Nasonova examined 50 people, including 25 women and 23 men with an average age of 26.95±11.64 years, with an average BMI of 26.95±4.99, who had suffered a knee joint injury with persistent pain for a month and more. All patients agreed to the study, which is confirmed by informed voluntary consents. Patients underwent a clinical examination, laboratory methods were performed (KLA, highly sensitive CRP). A survey was conducted on the NRS, KOOS, HAQ, CSI, BPI, Pain DETECT, FACIT-F, FIRST, HADS scales, and an MRI study was performed using a Philips, MULTIVA 1.5T device).

**Results:** According to the results of the study, it was found that pain during movement along the NRS averaged 5.21±1.30, pain at rest according to the NRS averaged 1.72±1.74, night pain according to the NRS averaged 1.55±1.84. Functional impairment according to NRS was 4.44±1.79. Assessment of knee joint function: total KOOS was 52.02(13;87), KOOS symptoms 62.26(4;56), KOOS pain 60.58(25;92), KOOS activity 68.97(22;100), KOOS sport 28.92(0;95), KOOS quality of life 41.02(0;100). The value on the Pain DETECT scale, which assesses the presence of signs of neuropathic pain, averaged 6.26±4.79. According to the FIRST questionnaire, the scores are from 0-5 (on average from 0.93±1.26), which indicates the presence of concomitant fibromyalgia in some patients. According to the CSI questionnaires, the mean values were 23.55±13.38. According to the catastrophization scale 13.54±11.20. According to the HADS scales assessing the level of depression and anxiety, the values were 4.37±4.01 - depression and HADS anxiety with an average value of 5.42±4. According to laboratory research methods, hemoglobin values averaged 116±179 g/l. The hsCRP level was 0.2±15.3 mg/l, and the ESR level was 2±23.

**Conclusion:** Many patients who have had a knee injury more than



1 month ago experience severe pain and joint dysfunction. A number of patients (15 out of 50) have signs of neuropathic pain, central sensitization, psycho-emotional disorders and fibromyalgia, which aggravates the course of the post-traumatic period. Patients with chronic pain after an injury need further follow-up to clearly identify predictors of the occurrence of this condition in order to predict the occurrence of post-traumatic osteoarthritis and form the correct treatment tactics.

### P317

#### RASCH ANALYSIS OF THE QUALITY OF LIFE AND INCONTINENCE IMPACT QUESTIONNAIRE IN KOREAN MIDDLE-AGED WOMEN WITH URINARY INCONTINENCE

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**Objective:** The pelvic floor muscle (PFM) is crucial for supporting the pelvic organs and managing the pelvic outlets in the urogenital system. It is well known that the hormonal changes brought on by menopause in middle-aged women cause the symptoms of urine incontinence (UI) to appear or worsen. This occurs because the pelvic organ system, which includes the muscular and connective tissue support that surrounds the pelvis, is estrogen-responsive. Patients with UI and their caregivers must clearly identify the elements that contribute to and develop UI in order to obtain adequate care. The Incontinence Quality of Life (I-QOL) and the Incontinence Impact Questionnaire (IIQ) were developed to assess UI. This study investigated the extent to which the questionnaires satisfy the Rasch model.

**Methods:** A total of 250 women between 40-69 years of age participated in this survey. Data were gathered using the convenience technique and an online research platform. Every questionnaire was filled out online. To examine whether the I-QOL and IIQ each fits the Rasch model, the Winsteps program was used to assess item difficulty, scale unidimensionality, item separation, and linearity.

**Results:** Both the I-QOL and IIQ were unidimensional, had adequate item separation, and had a long range of linearity. However, several items had a high information weight fit statistic, indicating poor fit to the model. These items included "I worry about coughing and sneezing.", "I have a hard time getting a good night's sleep." and "I worry about my incontinence getting worse as I grow older."

**Conclusion:** The I-QOL and IIQ generally satisfy the requirements of Rasch item response theory, and is an appropriate measure of UI. Although some individual items do not fit well, it is not likely that removing such items would result in more than overall minimal differences.

### P318

#### PERIPHERAL BLOOD MONONUCLEAR CELL APOPTOSIS IN A COHORT OF LIMB GIRDLE MUSCULAR DYSTROPHY PATIENTS WITH HIGH CREATINE KINASE LEVELS: A PILOT STUDY IN SOUTH AFRICA

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**Objective:** Limb girdle muscular dystrophies (LGMDs) are a heterogeneous group of genetic diseases caused by mutations in proteins that mainly constitute the sarcolemma and the cytosol of muscle fibers. A shared feature of LGMDs is inflammation but there are differences in the constituting inflammasome, molecular and signaling pathways in circulation and tissue. Recently, the role of lymphocytes (and other immune cells) infiltrates in Duchenne muscular dystrophy and the role in muscle regeneration have come into the spotlight.

**Methods:** In this pilot study, we assessed peripheral blood mononuclear cell (PBMC) apoptosis in relation to circulating creatine kinase (CK) in LGMD patients from a tertiary hospital in KwaZulu-Natal, South Africa. Following ethical approval, whole blood (10 ml in lithium-heparin vacutainers) was drawn by venipuncture 18 consenting patients. Density gradient centrifugation was used to isolate PBMCs using Histopaque-1077. Early apoptosis was assessed by flow cytometric analysis of mitochondrial membrane potential ( $\Delta\Psi_m$ ), and luminometric analysis of caspase-8 and caspase-9 activity. Late apoptosis was assessed by quantifying phosphatidylserine externalization by flow cytometric analysis of annexin V (Ax) staining, and luminometric analysis of caspase-3/7 activity.

**Results:** Patients and markers of apoptosis were stratified based on CK levels within the normal range (men: 200-395 U/L and women up to 207 U/L; n=9) and above the normal range (n=9). Although there was a lack of statistical significance, both early and late markers of apoptosis:  $\Delta\Psi_m$ , caspase -8, -9, -3/7 and Ax were higher in LGMD patients with elevated CK levels.

**Conclusion:** A higher level of CK is indicative of greater muscle damage, thus a high level of apoptosis of PBMC in this group of patients may indicate compromised availability of healthy T-cells required for the infiltration and regeneration of skeletal muscle. A larger sample size, muscle biopsies and quantification of immune cell infiltrates is required to validate these findings.

P319

**SERUM PTH IS ASSOCIATED WITH MORTALITY IN OLDER MEN: THE STRAMBO STUDY**P. Szulc<sup>1</sup>, R. Chapurlat<sup>1</sup><sup>1</sup>INSERM UMR1033, University of Lyon, Hospices Civils de Lyon, Lyon, France

**Objective:** Data on the association between serum PTH and mortality in men are discordant. The positive link was found mainly in elderly men and only for cardiovascular (CV) mortality. Our aim was to study whether the link between serum PTH and mortality in older men varies with age and with the cause of death.

**Methods:** Men (n=825) aged 60-87 yr were followed for 12 yrs. Information on death (date, cause) obtained from a proxy was confirmed by a health professional. Data was analysed using a multivariate Cox model.

**Results:** Among 791 men who had baseline PTH measures and took no vitamin D supplement, 248 deaths occurred (CV 71, cancer 87, other 90). After adjustment for confounders, higher serum PTH was associated with higher all-cause mortality (HR=1.18 /SD, 95%CI: 1.05-1.32, p<0.01). Higher PTH levels were associated with higher CV mortality (HR=1.32 /SD, 95%CI: 1.10-1.59, p<0.005) and higher mortality from other causes (HR=1.26 /SD, 95%CI: 1.05-1.51, p<0.05), but not with the cancer mortality. In 396 men aged <72.3 yr (median), higher PTH levels (upper vs. lowest quartile) were associated with lower cancer mortality (31 deaths, HR=0.17, 95%CI: 0.05-0.60, p<0.01) and lower mortality from other causes (15 deaths, HR=0.08, 95%CI: 0.01-0.81, p<0.05), but not with the CV mortality (16 deaths, HR=1.38 /SD, 95%CI: 0.92-2.08; p=0.12). In 395 men aged >72.3 yr, higher PTH level was associated with higher all-cause mortality (186 deaths, HR=1.25 /SD, 95%CI: 1.11-1.41, p<0.001). Higher PTH levels were associated with higher CV mortality (55 deaths, HR=1.32 /SD, 95%CI: 1.06-1.63, p<0.005) and higher mortality from other causes (75 deaths, HR=1.39 /SD, 95%CI: 1.15-1.67, p<0.001), but not with the cancer mortality (56 deaths, HR=1.08 /SD, p=0.57).

**Conclusion:** In older home-dwelling men, serum PTH predicts mortality, mainly in the oldest men. The relationship depends on the cause of mortality, suggesting a causal biological pathway.

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**A CASE REPORT OF THORACIC SPONDYLODISCITIS**J. López Díez<sup>1</sup>, C. Celada Roldán<sup>2</sup>, M. J. Sánchez Sánchez<sup>2</sup>, M. A. Cerezuela Abarca<sup>2</sup>, F. Rider Garrido<sup>2</sup>, J. A. López Díez<sup>1</sup><sup>1</sup>Canteras Health Care Center, <sup>2</sup>San Antón Health Care Center, Cartagena, Spain

**Objective:** Spondylodiscitis is an infection of the body and vertebral disc whose early detection and treatment can prevent future relevant pathologies, such as compressive myelopathy. It is important to perform a detailed physical examination and com-

plementary tests that avoid a late diagnosis that increases the comorbidity of the condition. We present a case of 63-year-old male who presented with back pain and diagnosed to have spondylodiscitis.

**Methods:** A 63-year-old male with no medical comorbidities, with 4 months history of upper back pain and intermittent fever of up to 39°C coinciding with the same. Associated morning stiffness was present. He has received analgesic treatment without improvement. Dorso-lumbar X-ray: vertebral degenerative changes. Laboratory analysis revealed high acute inflammatory parameters and nuclear magnetic resonance of thoracic spine revealed signs of osteomyelitis in the disc-vertebral body complex D8-D9 with a large anterior paravertebral and epidural abscess causing severe dorsal stenosis with spinal cord compression and signs of compressive myelopathy. Blood cultures: Staphylococcus aureus positive.

**Results:** Based on collected results, we have concluded that diagnosis was infectious spondylodiscitis with left paravertebral abscess and antibiotic therapy was performed. The patient is currently without back pain or fever.

**Conclusion:** Early diagnosis of bacterial spondylodiscitis remains a challenge due to the nonspecific signs and symptoms reported by the patient and the wide variability of laboratory results and imaging. The basis for early diagnosis remains the clinical suspicion at the time of initial treatment.

P321

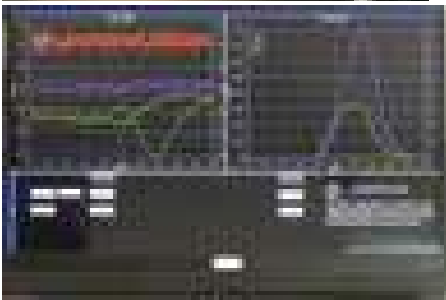
**QUANTIFICATION OF ASWORTH SCALE WITH THE USE OF PRESSURE SENSORS**A. Triantafyllou<sup>1</sup>, G. Papagiannis<sup>1</sup>, M. Kyriakidou<sup>1</sup>, P. Gkrilias<sup>1</sup>, G. Georgoudis<sup>2</sup>, K. Matsopoulos<sup>3</sup>, I. Kouris<sup>3</sup>, D. Tselikas<sup>4</sup>, N. Zestas<sup>4</sup>, C. Protopappas<sup>5</sup>, K. Malizos<sup>5</sup>, V. Potsika<sup>6</sup>, N. Tachos<sup>6</sup>, A. Pardalis<sup>6</sup>, I. Fotiadis<sup>6</sup>

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**Objective:** The Ashworth Scale (AS) has been used to evaluate the spasticity in neurological patients. First, the healthcare practitioner extends the patient's limb from the point of maximum flexion and vice versa (1). The score is then estimated based on the muscle tone (quality of resistance felt) throughout the test performance (2). This study aims to quantify the Ashworth Scale Score by using pressure sensors applied at an elastic glove-passive exoskeleton system (PES) and compare these data to the clinician's assessment.

**Methods:** The PES is the component of the Rehabotics Platform responsible for recording and evaluating the patient's hand fine motor skills throughout prescribed rehabilitation exercises. It

includes an advanced sensor glove and a local graphical user interface (GUI). The glove utilized by the Rehabotics Platform is Captoglove. Captoglove uses multiple sensors to effectively monitor the required movements, including bend and pressure sensors, one on each finger, and a device called captosensor that is mounted on the wrist and has a triple axis gyroscope, accelerometer, and magnetometer. Five Stroke patients were evaluated by a healthcare professional (3,4). The actual resistance felt during the test execution (qualitative measure) was simultaneously assessed by the gloves' sensors (quantitative measure).



**Results:** All data proceeded for statistical analysis using an independent t-test, one-tailed distribution, and two-sample unequal variance. The mean AS score for the clinician was 1.42 (SD=0.49), whereas the mean measurement score for the glove was 1.71 (SD=0.45). There were no statistically significant differences between clinician and glove data (P-value=0.15).

**Conclusion:** In daily practice, the Ashworth Scale procedure is quick, straightforward, and a popular and valuable clinical tool for evaluating abnormal muscle tone. In several patient groups, including those with stroke, multiple sclerosis, and spinal cord injury, moderate-to-good intra-rater reliability and poor-to-moderate inter-rater reliability of the scale were reported, possibly due to the qualitative nature of the scale (5,6). The quantification of this widely utilized test using a simple wearable sensor technology could provide more reliable and valid data for clinical practice and research.

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## P322

### A CASE REPORT OF ADULT ONSET STILL'S DISEASE

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**Objective:** Adult Onset Still's disease (AOSD) is an inflammatory disorder characterized by quotidian (daily) fevers, arthritis, and an evanescent rash. It is a rare inflammatory disorder of unknown etiology. Due to lack of definitive diagnostic test, the diagnosis of AOSD can only be made after exclusion of other causes. We present a case of adult onset Still's disease.

**Methods:** An 82-year-old woman with two weeks history of fever, polyarthritis with edema in both hands, sore throat and erythematous macular rash on the arms, neckline and back that did not improve despite conservative treatment. Exploration and complementary tests: Good general condition with good vital signs. Highlight the lung auscultation crackles in the right base, with rest unremarkable exploration. Hemogram with predominantly polymorphonuclear leukocytosis, elevated acute phase reactants, ferritin, and transaminases. Referred for hospital admission. Negative blood cultures, urine antigen detections, and autoimmunity. Chest, hands, wrists, lumbar spine, pelvis, and sacroiliac X-rays with marked signs of generalized degenerative osteoarthritis without lytic or blastic lesions. Chest CT showing bilateral pleural effusion and minimal pericardial effusion.

**Results:** When infectious and tumor processes were ruled out, treatment with high-dose steroids was started, associating weekly methotrexate. Clinical judgment: AOSD. She is doing well and is completely symptom free.

**Conclusion:** Adult Still's disease is a systemic inflammatory pathology with a prevalence of 1/100,000 people, whose diagnosis and etiology remain unclear, and may be related to viral infections, a certain seasonality in the symptoms, as well as activity factors and prognosis, the concentration of interleukin 1 and the increase in serum ferritin. Since the delay in its diagnosis leads to a worsening in the prognosis of patients (40% will have a chronic course), it is essential a high clinical suspicion based on the Yamaguchi criteria (fever with evening peaks, rash, inflammatory arthralgia, intense sore throat, and leukocytosis with a predominance of polymorphonuclear cells and hyperferritinemia) for optimal and early treatment.

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### ASSESSMENT AND REHABILITATION OF HAND DEFICITS WITH THE USE OF BOX AND BLOCK TEST IN AUGMENTED REALITY ENVIRONMENT

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**Objective:** The Box and Block Test (BBT) is used to evaluate unilateral gross manual skill. It is a simple, easy, and affordable test. It is applicable to a broad spectrum of populations, including those with neurologic conditions such as stroke, multiple sclerosis, spinal cord injury (SCI), neuromuscular disorders, and geriatric patients in general (1-3). This study aimed to create a box-and-block test for assessing hand impairments in an augmented reality (AR) environment.

**Methods:** MediaPipe Hands was utilized for hand and finger tracking. BBT's virtual environment was created using the OpenCV library, which offers quick processing times and a solid way to draw the required virtual elements and execute the necessary computations on each captured frame (4,5). Five Stroke patients were evaluated with AR-BBT. The mean age was 67.2 years (SD=10.62), and the mean time since the stroke was 4.85 months (SD=1.64).

**Results:** The patients score a mean of 8,14 blocks on the AR-BBT (SD=2,099).



**Conclusion:** This implementation is a virtual replacement for the real-world process, including all the original assessments' directions into an interactive computer vision experience that employs cutting-edge technology. Our findings are consistent with virtual

reality BBTs cited in the literature. AR-BBT could be utilized as an easy-to-use clinical tool for evaluating the hand dexterity of Stroke patients (6-8).

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### PERIPHERAL INVOLVEMENT IN SPONDYLOARTHRITIS: PREVALENCE AND IMPACT

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**Objective:** Spondyloarthritis (SpA) is a chronic inflammatory rheumatic disease that can have several phenotypic presentations (axial, peripheral, with or without extraarticular manifestations). The prevalence of peripheral manifestations is rather unclear and varies according to the subtype of SpA. Our objective is to determine the prevalence of peripheral involvement in a cohort of SpA and to evaluate its impact on the disease and the quality of life of the patients.

**Methods:** Our study is cross-sectional, prospective, having focused on 230 patients with SpA meeting the ASAS criteria. The clinical, biological, radiological and evolutionary parameters were collected for each patient. We have reported the existence of peripheral manifestations (osteoarthritis, enthesitis, dactylitis).

**Results:** We collected 230 patients, 120 (52%) presented a peripheral manifestation. Peripheral involvement alone was present in 11 patients (4.7%) and associated with axial involvement in 75 patients (32.6%). Arthritis in 190 patients (82.6%). Enthesitis in 150 patients (65.2%). Dactylitis in 5 patients (2.1%). Of the patients who met peripheral ASAS criteria, 70 (30.4%) met CASPAR criteria, 75 (32.6%) had Inflammatory bowel disease (or IBD). Peripheral involvement was inaugural in 41 patients (17.8%), concomitant with axial involvement in 3 patients (1.3%), following axial involvement in 49 patients (21.3%) with an average time to onset (3±1.6 years). Arthritis was noted in 190 patients. It was monoarthritis in 5 patients (2.1%), oligoarthritis in 32 patients (13.9%), polyarthritis in 45 patients (19.6%), arthralgia often accompanied this shape. Peripheral enthesitis is noted in 150 patients, mainly in the heel (110 patients), the other sites are represented by the trochanters (10 cases), the epicondyle (25 cases) and the tibia (5

cases). in the female sex ( $p < 0.0001$ ), associated with psoriasis, had a juvenile onset, associated with the inflammatory syndrome and was treated with biotherapy. It is more common in HLAB27 negative subjects. It is not associated with uveitis or smoking or inflammatory bowel manifestations. Functional impact ( $p < 0.01$ ) and disease activity ( $p < 0.01$ ) are greater in peripheral forms.

**Conclusion:** Peripheral involvement appears with a prevalence of 39.7%. Its occurrence increases with the duration of the disease. Its presence is associated with high activity, significant functional impact and a long diagnostic delay and greater recourse to biologicals.

### P325

#### A STUDY ASSESSING IBEX BH AS A DEVICE FOR OPPORTUNISTIC SCREENING FOR OSTEOPOROSIS

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**Objective:** To compare two methods of measuring areal BMD (aBMD): a) a fully automated inverse problem-solving method applied to wrist digital radiographs; IBEX BH and b) the reference standard - DXA.

**Methods:** 261 participants over the age of 50 were recruited in this single-centre, nonrandomised, prospective study. Participants underwent FRAX assessment, bilateral posterior-anterior wrist radiographs, and DXA scans of the wrists, hips and lumbar spine. IBEX BH and DXA were compared using linear regression, logistic regression and area under the receiver operating characteristic curve (AUC).

**Results:** Regression analysis of prediction of DXA aBMD using IBEX BH at the ultra-distal and distal third regions of interest (ROIs) produced models with an adjusted R-squared value of 0.881 (99%CI [0.849, 0.91]) and 0.884 (99%CI [0.862, 0.906]) respectively. A logistic regression risk prediction model for predicting osteoporosis at the femoral neck had an AUC of 0.83 (99%CI [0.745, 0.917]).

**Conclusion:** IBEX BH provides a clinically useful i) risk prediction model of osteoporosis and ii) prediction of aBMD at the two clinically relevant wrist ROIs. This provides evidence that IBEX BH applied at the wrist can provide an i) aBMD measure at the wrist and ii) probability of osteoporosis at the hip. IBEX BH is designed to be used as an opportunistic screening tool with minimal impact to clinical workflow. Therefore, all processing and ROI selection is performed automatically to reduce the impact on radiographers. Therefore, this technology could facilitate opportunistic screening at an earlier stage in the clinical pathway and has the potential to improve patient outcomes and reduce healthcare costs.

**Disclosures:** This study was funded by Ibex Innovations Ltd. The co-authors, IBEX Innovations Ltd., hold the intellectual property rights over the IBEX BH technology and has a vested interest in the adoption of this technology into clinical practice.

### P326

#### OSTEOPOROSIS IN PATIENTS WITH CHRONIC AUTOIMMUNE THYROIDITIS

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**Objective:** Thyroid hormones have an important role in the development and growth of the bones, as well as in maintaining bone turnover. Chronic autoimmune thyroiditis is an autoimmune inflammatory condition characterized by an increase in the titer of anti-thyroid antibodies, as well as appears usually as a diffusely hypertrophic gland with hypoechoic aspect, heterogeneous or a fine micronodular pattern on ultrasound examination. Previous studies have shown that thyroid dysfunction affects the skeleton. Our study aimed to evaluate the correlation between the level of TPOAb, TSH and FT4, BMD and FRAX in the studied population, resident in Transylvania.

**Methods:** Our study included 160 postmenopausal women, 90 of whom were normothyroid, 70 with subclinical hypothyroidism. All patients in the study were evaluated from the point of view of medical history, clinical examination and thyroid parameters TSH, FT4, TPOAb and BMD and FRAX score were measured. Two groups of patients were defined according to the presence of TPOAb (group with TPOAb positive and another group with TPOAb negative).

**Results:** The statistical processing by multivariate logistic regression demonstrated that the TPOAb value was statistically significantly correlated with the fracture risk independently of the TSH values ( $p = 0.011$ ; OR=6.700; 95%CI 1.311-41.516). The presence of TPOAb in postmenopausal euthyroid women was associated with lower BMD and FRAX score for hip and osteoporotic fractures in an unadjusted regression model. The correlation between the TSH level and the risk of fracture assessed with the FRAX score showed that TSH is a statistically better predictor of fracture for patients with subclinical hypothyroidism, when only TSH is slightly elevated and FT4 is within normal parameters.

**Conclusion:** Our study demonstrates that the increased TPOAb titer is statistically correlated with a higher risk of fracture in postmenopausal women, a fact demonstrated both at the BMD level at the lumbar spine and at the hip level. Compared to the impact of TPOAb on fracture risk in patients with subclinical hypothyroidism, TSH is statistically significantly more correlated with the FRAX score.

P327

### BONE MINERAL DENSITY IN PATIENTS WITH RHEUMATOID ARTHRITIS: RESULTS AT 1 YEAR AFTER TREATMENT WITH ETANERCEPT

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**Objective:** Osteoporosis (OP) is more common in rheumatoid arthritis (RA) compared to the general population. It is due to systemic inflammation, corticosteroids and immobilization.

OP is the cause of pain, loss of height and lead to falls causing fractures, disability with impact on quality of life. Role of TNF $\alpha$  in the pathogenesis of RA as well as in bone loss. Work describing the effect of TNF alpha in vivo on the inhibition of bone loss in RA has been limited to infliximab. We aimed to explore the effects of Etanercept treatment on BMD in patients with RA.

**Methods:** Prospective cross-sectional study including 70 patients with RA (ACR/EULAR 2010 criteria), active (DAS 28  $\geq$ 3.2) treated with Etanercept (50 mg s/c per week)

All patients were on MTX with prednisone  $\leq$ 10 mg/d one month before the start of the study. Continuation of the anti-OP TRT was permitted. Disease activity assessed by DAS28 at W4, W16, W28, W40, W52. Collection of demographic data and characteristics of the disease by questioning. Clinical examination: duration of disease, disease activity by DAS 28 (disease activity score) immunological assessment including rheumatoid factor and ACPA. CRP and Sedimentation Rate (ESR). The BMD was measured by DXA (Hologic) at the level of the lumbar spine and the femoral neck was measured before and one year after the start of treatment.

**Results:** 80% are women, the average duration of the disease is 7 years. 69% of patients have bone erosion, 62% have a positive RF and 71% with ACPA+. The average dose of MTX is 17 mg/s. Mean baseline lumbar BMD was 0.891 (0.18) (g/cm<sup>2</sup>) and 0.71 (0.12) (g/cm<sup>2</sup>) at the femoral neck. Only 8 (11%) patients in the sample studied have osteoporosis. Osteopenia was found in 22 (32%) patients at the lumbar and femoral level and 8 patients only at the lumbar level. Men had significantly higher femoral neck BMD than women ( $p=0.013$ ) with a similar trend for the lumbar spine ( $p=0.073$ ). There was a significant inverse correlation between BMD and age, and as expected, disease activity at baseline and disease duration were inversely correlated with BMD at the femoral neck (respectively  $r=-0.34$ ,  $p=0.019$  and  $r=-0.39$ ,  $p=0.013$ ). Lumbar BMD was also inversely correlated with DAS28 and disease duration ( $r=-0.41$ ,  $p=0.002$  and  $r=-0.37$ ,  $p=0.021$ ). Interestingly, only femoral BMD was correlated with weight ( $r=0.451$ ,  $p=0.001$ ). There was no difference between baseline BMD between prednisone users and non-users. A difference was however found in the baseline BMD of the lumbar spine and the femoral neck related to the use of calcium, vitamin D and bisphosphonates (BSP) with lower baseline BMD values for patients on anti-TRT. OP. When comparing the presence or absence of erosions, rheumatoid factor, or anti-CCP positivity, we found no relationship with BMD before treatment. There was no significant change in mean BMD at lumbar level between baseline (0.891 (0.182)) and

after 1 year (0.913 (0.204)) (+0.22%). The mean BMD value at the femoral neck also remained unchanged with a mean of 0.713 (0.124) before biotherapy compared with 0.810 (0.117) after 1 year of etanercept (+ 0.25%). An association was found between the decrease in serum CRP levels at week 16 and the increase in BMD at the femoral neck after one year of etanercept with a Pearson correlation coefficient  $r=-0.2287$ ,  $p=0.037$ ). A borderline association was also found at week 52 between the increase in serum CRP and BMD at the femoral neck with  $r=-0.274$ ,  $p=0.048$ .

**Conclusion:** Our results confirm those found with infliximab in RA. Our work shows stabilization of bone mass under etanercept. a multicenter study should confirm this result

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### TUMOUR-INDUCED OSTEOMALACIA (TIO) IN A PATIENT WITH MULTIPLE FRACTURES AND SEVERE HYPOPHOSPHATEMIA: THE FIRST CASE REPORT FROM LATVIA

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**Objective:** Tumour-induced osteomalacia is a rare disease usually caused by a benign mesenchymal phosphaturic peptide FGF23 secreting tumour, leading to frequent bone fractures, bone pain, muscle weakness, and hypophosphatemia. This case, the first in Latvia, describes the process of diagnostics and treatment in a young female patient with TIO.

**Methods:** This is a case report. The patient agreed to the anonymous use of her medical records.

**Case report:** In 2015 a 28-year-old woman (H 166 cm, W 60 kg) presented to an endocrinologist in RECUH Outpatient Clinic with complaints about height loss of 5 cm, multiple vertebral and rib fractures, bone pain and muscle weakness. The patient had fractures of both femoral necks followed by prosthetic replacement of both hip joints. The patient had a total of 24 fractures. The serum phosphate level was low at 0.42 mmol/L (N:0.8–1.6), total serum calcium was normal at 2.26 mmol/L (N:2.1–2.6), 1.25-OH-Vitamin D was low at 5 pg/ml (N:19.6–54.3) and alkaline phosphatase (ALP) was elevated at 236 U/L (N:<117). Urine biochemistry revealed hyperphosphaturia (62.2 mmol/24h) and hypocalciuria (0.6 mmol/24h). The diagnosis of X-linked hypophosphatemia or other hypophosphatemic rickets or syndrome is suspected. The patient was prescribed phosphorus substitution, high doses of cholecalciferol, and 1-hydroxycholecalciferol. A bone biopsy confirmed the diagnosis of osteomalacia. The genetic testing of genes from the hypophosphatemic Rickets Panel (incl. ALPL, CLCN5, CYP27B1, CYP2R1, DMP1, ENPP1, FAH, KL, SLC34A1, SLC4A3, VDR, FGF23, PHEX (Blueprint Genetic)) didn't detect any known disease-causing mutation or novel variant considered harmful in 2018. Exceedingly high serum level of FGF23 >5000 pg/mL

(N:23–95) was found in 2021. The skeletal scintigraphy showed increased  $^{99m}\text{Tc}$ -MDP uptake in multiple bones. Still, Somatostatin receptor scintigraphy (SRS) with  $^{99m}\text{Tc}$ -Tektrotyd and SPECT/CT revealed a pathologic focus of 3.0 cm in the head of the right fibula in 2021. The MRI scan with contrast showed a mass with a mixed signal intensity of 2.5X2.6X2.5 cm in the right fibula. The next step was total surgical resection of the fibula tumour, and histological analysis revealed a benign phosphaturic mesenchymal tumour. The Ki-67 index – 2%. After surgical treatment in 2021, the serum phosphate and FGF23 level normalised, the serum calcium level was slightly elevated – 2.62 mmol/L, PTH was 39.8 pg/ml, and ALP was 100 U/L. One year after the surgery patient felt well, new fractures didn't happen, she had no bone pain, and her muscle strength increased.

**Conclusion:** Despite its benign cause, TIO can have disabling consequences. Surgical treatment is curative for the pnt with a resectable tumour. Genetic testing, determination of FGF23 and scintigraphy of somatostatin receptors are crucial in the differential diagnosis.

### P329

#### ETIOLOGICAL PROFILE OF RHEUMATOLOGICAL EMERGENCIES: EXPERIENCE OF THE CENTRAL HOSPITAL OF ALGIERS

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**Objective:** Rheumatological emergencies are potentially life-threatening and/or functional syndromes and diseases. They therefore require immediate diagnosis and treatment. The aim of our study was to determine the etiological profile of rheumatological emergencies in hospitals.

**Methods:** Retrospective study conducted in the emergency department of the central hospital of Algiers where observations of patients with syndromes or rheumatological diseases considered as emergencies were collected between January 2015 and July 2020. For each observation, the demographic data, the type of emergency and the evolution under treatment were analyzed.

**Results:** We collected 338 observations, in 138 male patients (40.8%) and 220 female patients (59.2%), with an average age at diagnosis of 52.8 years, extreme between 18-95 years. The emergencies were: 142 cases of hyperalgesic or paralytic lumbosciatalgia due to herniated disc, 43 cases of microcrystalline arthritis attacks, 15 cases of atloido-axoid involvement complicated by spinal cord compression, 138 cases of septic pathologies including 30 bacterial osteoarthritis (25 non-tuberculous and 5 tuberculosis) and 108 infections during systemic diseases including 25 viral infections by HBV or C, 15 infections by mycobacteria, 08 parasitic infections such as acute dysentery, and 60 cases of systemic diseases complicated by severe initial visceral involvement or progressive including 09 heart diseases, 10 pleuropneumopathies, 09 neuropathies (including 04 central neuropathies), 12 haemopathies (including 04 macrophage activation syndromes and 08 tumoral haemopathies), 09 nephropathies, 02 cases of

uveitis, 3 cases of serious digestive disorders, 06 cases of symptomatic hypercalcemia.

**Conclusion:** Rheumatological pathologies are most often chronic. However, they can generate vital or functional emergencies, as demonstrated by our study in accordance with data from the literature, hence the need to consider them in principle in current practice.

### P330

#### A STUDY OF PERIOPERATIVE COMPLICATIONS IN 74 SPINE SURGERY PATIENTS AGED 85 YEARS AND OLDER

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**Objective:** In Japan, which has the world's most aged population, we have many opportunities to treat very elderly patients suffering from pain and nerve palsy due to spinal degenerative diseases and fragility fractures. While conservative treatment is the basic policy in consideration of age, there are cases in which surgery is performed at the request of the patient and family, knowing the risks involved. It is an urgent issue to clarify the outcomes of spine surgery for the very elderly.

**Methods:** We conducted a study of all patients aged 85 years or older who underwent spine surgery at our hospital between December 2017 and July 2020, describing age, gender, causative disease, surgical procedure, underlying disease, cognitive decline, and preoperative gait function as background information, and describing surgical time, intraoperative blood loss, perioperative systemic and local complications, and improvement in gait function (3 months after surgery) as treatment outcomes. The outcome was surgical time, intraoperative blood loss, perioperative systemic and local complications, and the degree of improvement in walking function (3 months postoperatively). Gait function was assessed as difficulty sitting:1 sitting:2 walking with a walker or silver car:3 walking with a cane:4 walking alone:5 and improvement of at least one level was defined as "improvement. Continuous variables were expressed as median (interquartile range).

**Results:** A total of 74 patients (27 men, age 87 [86-89] years), all with underlying disease and 10 with cognitive decline: 7 with CSM, 1 with thoracic myelopathy, 36 with LSS (13 with a history of a classic vertebral fracture), 30 with vertebral fracture (7 with spinal palsy, 5 with DISH), 28 with posterior decompression, 14 with TLIF/PLIF 14 cases, LLIF 14 cases, BKP 24 cases (7 cases with PPS), PPS alone fixation 3 cases, and vertebral body replacement 2 cases. Operating time was 123 minutes (64-163), intraoperative blood loss was 20 g (5-100), and ambulatory function improved in 51 patients (69%), remained unchanged in 21 patients (28%), and worsened in 1 patient. Systemic complications occurred in 15 patients (20%): urinary tract infection in 4, delirium in 3, decreased appetite in 2, and pneumonia, enteritis, prostatitis, ureteral stones, Parkinson's syndrome, and metal allergy in 1 each. Local complications occurred in 10 patients (14%): 3 cases of postoperative epidural hematoma, 6 cases of vertebral fracture,

and 1 case each of SSI and PPS loosening.

**Conclusion:** Perioperative systemic complications occurred in approximately 20% of spinal surgery patients aged 85 years or older, but were less clinically serious. Gait function improved in about 70% of patients, and surgical treatment for the very elderly may be a treatment option.

**P331**  
**COMPARISON OF FRACTURE REDUCTION EFFECTIVENESS OF DENOSUMAB VS. ALENDRONATE, IBANDRONATE AND ZOLEDRONATE IN A REGISTRY-BASED, REAL-WORLD COHORT STUDY**

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**Objective:** To analyse the fracture risk of patients with osteoporosis receiving bisphosphonates or denosumab in a real-world setting.

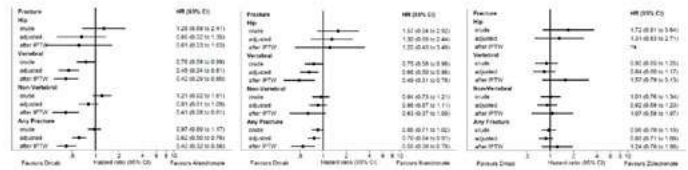
**Methods:** This registry-based cohort study evaluated patients taking denosumab, bisphosphonates or both sequentially. Fractures were analysed using rates, rate ratios and hazard ratios (HRs), and included both therapies as time-varying co-variables. Fracture risk hazards were adjusted (aHR) for age, baseline T-Scores and trabecular bone score (TBS), and were additionally analysed with inverse probability of treatment weighting.

**Results:** A total of 3068 patients (89% female; median age at treatment onset, 69 years [63 to 76]) received denosumab (median duration 2.8 years, [2.2 to 4.7]), bisphosphonates (3.4 years, [2.1 to 5.7]) or both sequentially. Thus, 11,078 subject-years were assessed for bisphosphonates (41% alendronate, 36% ibandronate, 23% zoledronate) and 4216 for denosumab. Moreover, 48,375 subject-years were evaluated before treatment onset, in addition to 2593 years of drug holidays. A total of 1481 vertebral fractures (435 under therapy), 1508 non-vertebral fractures (499 under therapy) and 202 hip fractures (67 under therapy) occurred after age 50. The risks of vertebral, non-vertebral and hip fractures were significantly lower under any bisphosphonate, denosumab and drug holidays than before treatment onset (all  $p < 0.001$ ). Crude HRs revealed no significant differences between denosumab and bisphosphonates in fracture risk reduction, but after adjusting for bone density and age, denosumab was associated with lower risk than alendronate and ibandronate for vertebral fractures (aHR 0.45 [0.34 to 0.61] and 0.66 [0.50 to 0.86],  $p < 0.001$  and  $p = 0.009$ , respectively) and any fractures (aHR 0.62 [0.50 to 0.76] and 0.76 [0.64 to 0.91],  $p < 0.001$  and  $p = 0.004$ ), but not for hip fractures. No difference in fracture risk reduction was found between zoledro-

nate and denosumab.

**Conclusion:** When adjusting for disease severity, denosumab was associated with significantly greater risk reduction than alendronate and ibandronate for vertebral fractures, but not for hip fractures. No difference in fracture risk reduction was found between zoledronate and denosumab.

**Disclosures:** HB: Novartis. HJH: Amgen, Sandoz, Eli Lilly and Labatec. HRZ: Abbvie, Celgene, Amgen and Mylan/Viatrix. US: Sandoz, Pfizer, Janssen Pharmaceutica, Novartis and Amgen.

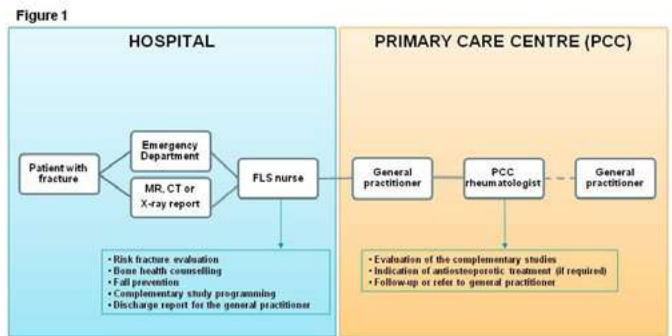


**P332**  
**PRELIMINARY ANALYSIS OF SECONDARY PREVENTION OF FRACTURE FOLLOWING THE IMPLEMENTATION OF A FRACTURE LIAISON SERVICE**

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**Objective:** Fracture Liaison Services (FLS) identify, evaluate, treat and monitor patients with a recent fragility fracture (Fx). We aimed to analyse the secondary prevention of Fxs after implementing a FLS adapted to the current resources in our Rheumatology Dept. (Figure 1).



**Methods:** We included the first 100 patients (87 females: 13 males) evaluated in our FLS (May 2021-December 2022). We revised the clinical characteristics of the patients: sentinel fracture(s) and localization, previous Fxs and antiosteoporotic treatment (AOT). We evaluated the time to performing complementary studies (CSs) (blood analyses, densitometry [DXA] and dorsal-lumbar X-ray), if evaluated, AOT prescribed in the primary care centre (PCC) after FLS assessment and adherence.

**Results:** The mean age was 72.6±9 years [52-91]. Sentinel Fxs included: distal radius (n=34), proximal humerus (n=31), verte-



bral (n=27), femur (n=11), pelvis (n=1) and distal fibula (n=1) (5 patients had >1 Fx). In the FLS visit 34/100 patients presented previous Fxs [1-4] and 17/100 were receiving/had received AOT (6 at the time of the sentinel Fx), the most frequent being oral bisphosphonates (BPs) [70.6%]. The time from the sentinel Fx to the FLS visit was 75.4±66 days. 75% of patients underwent blood analysis, 69% X-ray and 62% DXA; the time to undergoing the CSs was 63.4±65, 69.8±71 and 158.5±85 days, respectively. After FLS evaluation 44% of patients began AOT and 15% continued previous treatment: oral BPs (30.5%), zoledronate (6.8%), denosumab (6.8%), teriparatide (18.6%) or only calcium and/or vitamin D (37.3%); the remaining 41% had not received any AOT at the time of the study. 45/59 (76.3%) treated patients reported good adherence, 2/59 irregular adherence and 12/59 (»20%) did not follow the prescribed AOT. The time from FLS evaluation to AOT onset (n=44) was 163.4±116.7 days. The reasons for non-prescription were (n=41): lack of PCC evaluation and/or visit (n=29), CSs not performed (n=8), no AOT due to normal CSs (n=3) or transfer to another region (n=1).

**Conclusion:** Despite evaluation, CSs programming and a report recommending the start of AOT in the PCC, with our FLS model only 34% of patients were evaluated and correctly treated. The lack of follow-up after CSs and treatment adherence reinforcement demonstrate the importance of patient monitoring until FLS pathway completion.

### P333

#### FACTORS RELATED TO GLUCOCORTICOID-INDUCED OSTEOPOROSIS AND FRAGILITY FRACTURES IN YOUNG SUBJECTS

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**Objective:** Glucocorticoid (GC) treatment is the most frequent cause of osteoporosis (OP) in young subjects. However, the factors related to the development of glucocorticoid-induced osteoporosis (GIOP) and fragility fractures (FF), and consequently, the therapeutic approach to GIOP in young populations is not well established. We aimed to analyse the prevalence of GIOP and FF in GC-treated patients and compare the risk factors related to their development according to age (< and ≥50 years).

**Methods:** 127 patients (62±18 years) receiving chronic GC treatment were included (≥5 mg/d of prednisone, >3 months). The clinical data collected included: dose and duration of GC treatment,

disease activity, previous FF, anthropometric data, bone metabolism parameters (including bone turnover markers and the presence of hypogonadism), BMD (by DXA; defining densitometric OP: T-score ≤-2.5 or Z-score ≤-2, depending on the age of the patient), trabecular bone score (by DXA), and vertebral fractures (X-ray). GIOP was defined as densitometric OP and/or FF. Results were compared between subjects < and ≥50 years old.

**Results:** The prevalence of GIOP was similar in both age groups: <50 (n=36) 44.4% vs. 46.1% ≥50 years (n=91). Five subjects <50 (13.8%) and 30 ≥50 years (33%) presented FF (p=0.05). Young subjects with FF tended to be >40 years, have a higher BMI (25.4 vs. 23.3, p=n.s.), and inflammatory disease activity (CRP 0.90 vs. 0.06mg/dL, p=0.06). When analyzing the differential risk factors related to FF depending on age, a higher BMI (29.63 vs. 26.95, p=0.048) and inflammatory disease activity (PCR -0.87 vs. -2.51 [log scale], p=0.03) were observed in young subjects, while low lumbar T-scores (-1.08 vs.-0.06 DE, p=0.003) and higher cumulative GC-doses (9.11 vs. 8.56 g, p=0.03) were differential factors in subjects over 50. Hypogonadism was a risk factor independent of age (OR 4.89; 95%CI 1.36-17.59), being associated with the presence of FF in both age groups.

**Conclusion:** More than 40% of the patients receiving GC developed GIOP, with a similar prevalence in both age groups (< and ≥50 years); however, FF are less common in young subjects. Hypogonadism is a determining risk factor for FF independent of age. In addition, young subjects with FF tend to be older, with a higher BMI and disease activity, and, thus, evaluation of these risk factors can improve the identification of subjects at increased risk of fracture.

### P334

#### LONGITUDINAL ASSOCIATIONS BETWEEN BODY MASS INDEX AND DISEASE ACTIVITY, AND RADIOGRAPHIC PROGRESSION IN RHEUMATOID ARTHRITIS PATIENTS UNDER TNF BLOCKAGE

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**Objective:** Current literature suggests that obese patients with rheumatoid arthritis (RA) have increased disease activity but decreased radiographic progression. Therefore, we aimed to assess longitudinal associations between BMI and DAS28-esr, and radiographic joint damage (Rau scores) in RA patients under weight-dosed TNF inhibition (TNFi).

**Methods:** We included all infliximab users with an RA diagnosis in the Swiss Clinical Quality Management of Rheumatic Diseases (SCQM) [1997-2020]. Two cohorts were identified: 1) starting from a first BMI or DAS28-esr score, and 2) from a first BMI or Rau score. We evaluated the coefficient and 95%CI of BMI with changes in mean DAS28esr (cohort 1) and in mean Rau scores (cohort 2) using generalized estimation equations (GEE), overall, and stratified by BMI categories.

**Results:** Cohort 1 comprised 412 patients (74% women, mean age 53 years, mean BMI 25 kg/m<sup>2</sup>, mean DAS28-esr 4.0). Overall, we found no change in mean DAS28-esr with increasing BMI (adj. BMI coeff.: 0.00, 95%CI 0.02 – 0.02). We observed a most extreme result in underweight patients, where an increase of 1 in BMI resulted in a non-significant decrease of 0.14 in mean DAS28esr (adj. BMI coeff.: -0.14, 95%CI -0.28 – 0.01). Cohort 2 comprised 187 patients very similar to those in cohort 1. We found a statistically significant decrease of 1.05 in mean Rau scores for every increase of 1 in BMI (adj. BMI coeff.: -1.05, 95%CI -1.92 – -0.19). Results were statistically non-significant across BMI categories.

**Conclusion:** Our longitudinal analyses suggest that, under weight-dosed TNFi, BMI increases do not lead to changes in mean DAS28-esr. Conversely, a decrease in mean radiographic joint damage with increasing BMI suggests a protective effect not limited to the obese population.

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**Disclosures:** KL discloses relations with Pfizer, Viatrix, Celltrion; AF with AbbVie, Astra-Zeneca, BMS, Lilly, Pfizer, UCB, Galapagos; TH with Pfizer, AbbVie, Novartis, Janssen, Eli Lilly, Menarini.

### P335

#### RISK FACTORS FOR HIP FRACTURE IN OCTAGENARIANS

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**Objective:** Investigate risk factors for osteoporotic hip fracture in the octogenarian population.

**Methods:** Case-control study of a patient >79 years with hip fracture compared with controls. Epidemiological, clinical, anthropometric, and analytical data were analyzed as well as sarcopenia assessment and osteoporosis assessment. Univariate and multivariate logistic models were used to estimate odds ratio (OR) with their 95% CIs to assess the association of risk factors and fracture.

**Results:** 95 patients per group were analyzed with a mean age of 82 years and 74% were women. The factors that were statistically significant in the univariate ( $p < 0.05$ ) were included in the multivariate analysis: Barthel Index, nutritional assessment using the CONUT tool, folic acid and vitamin D deficiency, the presence of previous fractures, falls in the past year, loss of visual acuity, bicipital circumference, sarcopenia (Gould's formula) and osteoporosis densitometry in the neck of the femur. Malnutrition (OR: 0.08 [0.01-0.61]), folic acid deficiency (OR 0.32 [0.1-1]) and loss of visual acuity (OR 33.16 [2.91-377.87]) were associated with a higher risk of hip fracture.

**Conclusion:** An adequate nutritional status as well as improving geriatric syndromes (visual loss) can help reduce the risk of fracture in this population group.

### P336

#### RELATIONSHIP OF GROWTH IN FIRST FIVE YEARS OF LIFE AND RISK OF LONG BONE FRACTURE

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**Objective:** Birth size and early childhood growth can affect peak bone mass and later risk of osteoporosis and fracture. We examined the relationship between growth trajectory in the first 5 y of life and the risk of long bone fracture in childhood, adolescence, and early adulthood.

**Methods:** We conducted a population-based, case-control study of infants born to residents of Olmsted County, Minnesota, USA between 1976-1982. Of 10,938 in the birth cohort, 7892 had at least 1 visit after age 10 y. Cases (n=1612) with long bone fractures after age 6 y were identified. We abstracted childhood weights and heights prior to age 5.5 y from a stratified random sample of 825 fracture cases in childhood (6-12.9 y), adolescence (13- 17.9 y), or adulthood ( $\geq 18$  y; n=275 in each group). Control subjects, who had not had a prior fracture were matched 1:1 with cases for age (within 6 m) and sex. Weights and heights were categorized in 8 age-group bins between birth and 5.5 y.

**Results:** Among the 825 fracture cases, 696 matched sets of cases and controls had weight measurements at birth and in at least 2 age-group bins; 467 matched case-control sets had height measurements in at least 3 age-group bins. Two optimal weight-for-age and height-for-age trajectory solutions were identified: one sustained above the median (Cluster 1) and one sustained below the median (Cluster 2). Maternal age, race, socioeconomic status, birth weight, gestational age at birth, and delivery type were not associated with fracture risk. Compared with appropriate-for-gestational-age birth size, small-for-gestational age (SGA) was associated with reduced risk of fracture (OR 0.50; 95%CI 0.28- 0.88). Cluster 1 weight-for-age trajectory was not associated with subsequent fracture (1.17; 0.95-1.44 vs. Cluster 2). The stratified analysis by fracture age group had similar results, but the relationship with SGA was only significant in the childhood group. Cluster 1 height-for-age trajectory was not associated with subsequent fracture (1.10; 0.85-1.44 vs. Cluster 2).

**Conclusion:** Weight and height growth trajectories in the first 5 y of life were not associated with subsequent fracture risk. SGA infants had a lower fracture risk between 6 and 13 y of age.

### P337

#### MALE PRIMARY AND SECONDARY OSTEOPOROSIS (MOP) STUDY

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**Objective:** Analysis of differences in BMD, biology, risks, evolution, treatments (tt) between primary (I) and secondary (II) MOP.

**Methods:** Cohort of the CREER group: 35 liberal rheumatologists (Rh), 108 men (I=II), average age 68 (I=II), 45% >70 years, 58% diagnosis (dg) in less than 5 years, 57% normal weight (I=II), height loss I=5.6 cm, II=3.1 cm (significant), referred by general practitioner 77%.

**Results:** 83% of the II have only 1 cause: 41% iatrogenic (6/10 steroids), 32% endocrine (1.2/10 hypogonadism). Inaugural: vertebral compression (I 54%/II 45%), peripheral fracture (I 24%/II 18%). MOP discovery by BMD 13%. Habitus (%): smoking 28/33, alcohol 17.5 (I=II), coffee 6/15, sedentary lifestyle 37/50 (significant). 100% MOP have BMD at dg and 80% after 6 years. Results TS BMD before/after tt=for MOP I spine - 2.97/-2.48 (significant), hip -2/-1.9; for MOP II spine - 2.66/-1.7(significant) hip -2/-1.59; FRAX: I 6%/II 7.3; TBS: I -2.7/II -2.4. Bio: subnormal vit D (23-27 ng/ml); serum CTX @ 0.47. Dietary calcium intake @ 529 mg/24h. Tt: MOPI and MOPII under Ca+vitD (87%/77%), bisphosphonates per os 63%, teriparatide 23%, denosumab 0% (not reimbursed for MOP in Fr). Secondary (2d) causes treated 42%. Risk of falls in 26%/40% and 46% >70 years, of neurological origin 20%, locomotor 20%, despite good quadriceps 9/10 and monopodal balance 6/10. Consultation dedicated to MOP for 87% of Rh with lifestyle and dietary approach 97% and attention on compliance with tt 84%; Rh prevents risk of falls: especially vision, bio monitoring (markers 53%) and BMD; Rh more attentive to MOP II with referral to endocrinologist 45%. Tolerance to tt excellent 91%, few 2d effects I=II. Satisfactory clinical and biological results.

**Conclusion:** This study reflects the practices of a group of Ile-de-France Rh patients with MOP I and II. It shows some differences, 3 of which are significant: sedentary lifestyle, height loss and post-tt lumbar BMD between these 2 groups.

### P338

#### BREAST CANCER (K) AND ITS TREATMENTS (TT): IMPACT ON BONE CAPITAL

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**Objective:** The rheumatologist (rh) of CREER group, specialist in osteoporosis (Op) follows up women suffering from breast cancer for bone densitometry (BDM). We aimed to study BDM follow-up of breast K of postmenopausal women with or without anti-aromatase (AA) treatment, and role on fracture risk.

**Methods:** 96 women; average (av) age 68; av height loss 2 cm; av BMI 24 (35%>25); av age menopause 50; hormone replacement therapy (HRT) not ¾ stop 4 years before K breast; 1/3 active; ¼ smokers stop 3 years before K; 43% invasive, 8% ductal, 7.3% lobular, 41.7% ?

**Results:** Av age diagnosis (dg) K 60; left 51%, bilateral 5%; metastases not ¼ (if yes to bone 10%); other K before dg of 6 years av (5.5/10 breast, 3/10 contralateral); K breast family history 30%.

Now study on only on invasive type: tt: surgery 100%; Rxtt 90%, chemo 48%, corticosteroids 18%, antiestrogens 18%, AA 82%; smokers 34%; fractures 24% (2 major/1 minor, 1 year av after K); BMD1: 2 years median (md) before dg: Ts spine -1,6/femoral neck -1,67 bur Op 39%/21%; BMD2: 2 years md after dg -1,8/-1,88 but Op 38%/32%; BMD3: 4 years md after dg -2,18/-1,94. Therefore, decreasing trend of Ts at the spine after tt. Conduct: Ca + vit D 95%; anti Op tt 38% including bisphosphonates (Bp) 86% (1/3 on AA), denosumab and teriparatide <2%; only 40% of Op under AA have an anti-Op tt; duration of AA tt 28 months before BDM3; duration of anti-Op tt 30 months before BDM3; the number of osteopenic patients to Op increases (spine=femoral neck) with or without AA, but fracture risk increases in women with AA.

**Conclusion:** In this study, on invasive K there is:

An increased risk of fracture (major+) from the 1<sup>st</sup> year after dg; A decrease in BDM of the spine=femoral neck with evolution toward Op with or without AA tt;

In patients with Bp, 50% are in Op on AA and in the others ½ are treated by Bp preventively because on AA;

The risk of fracture increases under AA.

These results are consistent with recent studies.

### P339

#### EXPLORING THE EFFECTS OF FGF19 ON BONES AND BONE CELLS IN PRECLINICAL MODELS OF OSTEOSARCOPENIA

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**Objective:** To determine FGF19 action on bone in an osteosarcopenia mouse model (aging) and to determine if FGF19 can signal directly to bone cells.

**Methods:** 22-month-old mice were injected with FGF19 (0.1 mg/kg) or vehicle daily for 3 weeks (n=32); bone femur microarchitecture was assessed (cortical diaphysis and trabecular distal metaphysis) by microCT at 10.5 µm isotropic cubic resolution. Bone cell lines or mouse primary cells were differentiated into osteoblasts or osteoclasts under different FGF19 concentrations (0, 0.5, 5 or 50 ng/ml) and their differentiation assessed by enzymatic activity (ALP or TRAP) and RT-PCR.

**Results:** FGF19 has known anti-sarcopenic activities, including in aged mice (Benoit et al., 2017). MicroCT analysis of our new experiments show a clear increase in the cross-sectional area of the femur distal metaphysis of treated mice (median: Vehicle: 3.4 mm<sup>2</sup>; FGF19: 3.7 mm<sup>2</sup>, P=0.006), confirmed by 2D slice by slice analysis, indicating a beneficial effect on bone. FGF19 also increases cortical porosity and decreases cortical thickness, leaving open the question of the overall biomechanical impact. Trabecular bone and mid-cortical bone are not affected. Histomorphometry on femur sections shows no effect on osteoblasts and a non-significant decrease in osteoclast number (p=0.06).

For osteoblasts, there is no difference in ALP expression or marker gene expression, regardless of the FGF19 concentration. With osteoclasts, preliminary results are more heterogeneous and need to be repeated to ensure reproducibility.

**Conclusion:** In aged mice, FGF19 injections improve not only muscle physiology but also increase bone cross-sectional area at femur distal metaphysis, showing a potential as an anti-osteosarcopenia agent. At the cellular level, a direct effect of FGF19 on bone cells remains to be shown. Positive impacts of FGF19 on bone may be indirect and secondary to muscle effects.

### P340

#### A PLACEBO-CONTROLLED, SINGLE BLIND EXTENSION STUDY (OA-07) EVALUATING THE SAFETY AND EFFICACY OF LORECIVIVINT IN SUBJECTS WITH SEVERE OSTEOARTHRITIS OF THE KNEE: RADIOGRAPHIC AND PAIN OUTCOMES AT 24 AND 30 MONTHS

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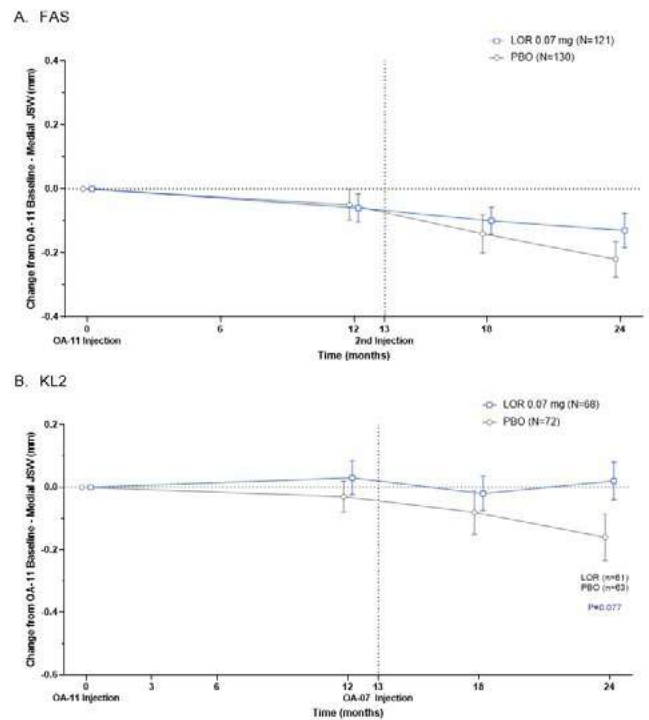
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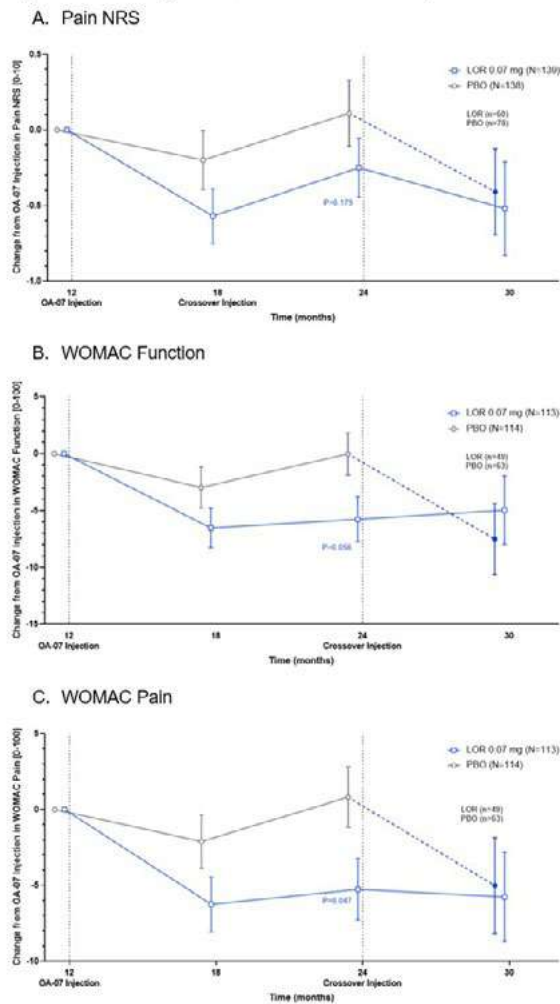
**Objective:** Knee osteoarthritis (OA) is the most common joint disorder with unmet need for safe and efficacious symptomatic and disease modifying treatments. Lorecivivint (LOR), a novel intra-articular (IA) CLK/DYRK inhibitor thought to modulate Wnt and inflammatory pathways, has previously appeared safe, demonstrated patient-reported outcome (PRO) improvements compared with placebo (PBO), and maintenance of radiographic medial joint space width (mJSW). Interim results from OA-07 (NCT04520607), an ongoing 4-year extension study from a parent, Phase 3 study (OA-11) of LOR safety and efficacy, are presented.

**Methods:** Participants who completed the parent 13 month OA-11 LOR trial were enrolled into the extension. At the beginning of the single-blind Year 1 of the extension, participants received a repeat injection according to the randomized treatment received initially (LOR or PBO). In Year 2 and annually thereafter, all subjects (LOR and PBO) received an open-label 0.07 mg, IA LOR injection. The extension trial commenced in July 2020 and is planned to continue over a 4-year period with clinic visits every six months capturing mJSW (mm) and PROs.

**Results:** 277 subjects (mean age 61.0±8.2 years, BMI 31.8±4.9 kg/m<sup>2</sup>, female 62.8%, KL3 45.5%, 67.1% bilaterally symptomatic, mean baseline mJSW 2.63±0.69 mm, 68.6% mJSW <3 mm) were enrolled. LOR appears safe and well-tolerated, consistent with its previously observed safety profile. At 24 months, the LOR treatment arm shows reduced mJSW loss compared to placebo for FAS and KL2 (Fig. 1). Average change from extension baseline to 24 months in PROs were seen in Pain NRS, WOMAC Function, and WOMAC Pain (Fig. 2), with additional improvement seen at 30 months for PBO participants receiving unblinded IA injection of LOR. Larger improvements in PROs were observed in the KL2 subgroup.

Figure 1: Change in Medial Joint Space Width in OA-07 from OA-11 Baseline



**Figure 2: Change in PROs from OA-07 LOR Injection from OA-07 Baseline**

P-value reported from OA-07 injection-adjusted ANCOVA at timepoint. Observed mean change from baseline  $\pm$  standard error shown. Data from open database.

FAS: Full Analysis Set; LOR: Lorecivivint; PBO: Placebo; NRS: Numerical Rating Scale

**Conclusion:** LOR continues to appear safe and well tolerated. A potential benefit of LOR 0.07 mg compared with PBO in mJSW is observed 12 months after the extension baseline (second overall) injection. Potential LOR benefit compared to PBO is also seen across PROs. Within this structurally advanced knee OA cohort, both mJSW and PROs treatment effects appear enhanced in earlier/less advanced KL2 knee OA subjects relative to those with more advanced KL3 graded knees. This study is ongoing.

### P341

#### THE BOOSTER EFFECT OF A QUARTERLY HYALURONIC ACID IN MILD TO MODERATE SYMPTOMATIC KNEE OSTEOARTHRITIS: FIVE-YEAR RESULTS OF A REGISTRY-BASED STUDY

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**Objective:** Viscosupplementation by hyaluronic acid (HA) is well established non-surgical treatment of knee osteoarthritis (KOA).

This registry-based study investigated the booster effect of a quarterly intra-articular single knee injection (30 mg/2ml) for 5 years.

**Methods:** Sixty patients, including 29 males and 31 females, with a mean $\pm$ SD age 61.07 $\pm$ 9.15 with Kellgren-Lawrence grade I-III KOA, have been selected from a registry of interventional treatments for musculoskeletal pain conditions. To be eligible, patients had to be treated with a single quarterly intraarticular injection of HA with a follow-up of at least five years and assessed with WOMAC and Numeric Rating Scale (NRS) at baseline and after each HA injection in the first 24 months and at 36, 48, and 60 months.

**Results:** Sixty of 63 patients enrolled in this study completed the 60 months of follow-up. Patients had a marked improvement in knee function and pain, expressed by the significant reduction in WOMAC (T0 48.62 $\pm$ 8.95 vs. T11 10.75 $\pm$ 4.36;  $p < 0.0001$ ) and NRS scores (6.38 $\pm$ 1.06 vs. T11 0.95 $\pm$ 0.89  $p < 0.0001$ ) from the baseline to the end of the follow-up period.

No major complications were observed; only 5 patients reported local pain in the injection site successfully treated with local ice application. None of them needed painkillers or non-steroidal anti-inflammatory drugs. No pseudo-septic or septic arthritis was registered during the study period.

**Conclusion:** A quarterly injection of HA provides a rapid, safe, and stable long-term reduction of pain and improvement of function in elderly people with mild to moderate knee osteoarthritis along a 5-year period of treatment and follow-up. The reason that a quarterly injection of HA may achieve such a good and stable outcome for stage I~III OA knees might be that the effect span of a single HA injection may be less than, or no longer than 3 months and the reason why we decided to do a quarterly injection is to "boost" the effect that otherwise would give the joint the potential time of exposure to wear and tear. The results obtained from this prospective observational study, therefore, seem to support this hypothesis. Further investigations are necessary to confirm these findings.

### P342

#### CLINICAL CHARACTERISTICS, INCLUDING HISTORY OF MYOCARDIAL INFARCTION AND STROKE, AMONG US PMO WOMEN INITIATING TREATMENT WITH ROMOSUZUMAB AND OTHER ANTIOSTEOPOROSIS THERAPIES

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**Objective:** This ongoing FDA postmarketing requirement study (2020–24) assesses the impact of the boxed cardiovascular (CV) warning on romosozumab (Romo) treatment and informs feasibility of a future comparative safety study.

**Methods:** This retrospective study uses repeated analyses within five 1-year blocks since Romo approval (2019) and includes women ( $\geq 55$  years) newly initiating Romo, denosumab (DMab),

intravenous zoledronate, PTH analogs, or oral bisphosphonates. From data identified using Optum and Medicare databases, we compared baseline demographics and clinical characteristics (including myocardial infarction [MI] or stroke within 1 year before treatment initiation and history of CV, fracture, and other CV risk factors) in patients initiating Romo vs. other osteoporosis (OP) treatments (clinically significant difference=absolute standardized mean difference [SMD] >0.10). We also conducted propensity score matching (PSM) of clinical characteristics (referent Romo). **Results:** From April 2019 to September 2021, we identified 16475 Romo users (Optum 1879; Medicare 14596). The proportion of patients with a history of an MI or stroke was very low (0.1–0.2%) in both Optum and Medicare databases and was numerically lower in patients initiating Romo vs. other OP treatments (all absolute SMDs <0.10) (Table). Patients initiating Romo vs. other treatments (except DMAB) were older, and a higher proportion (except PTH users) had prior baseline healthcare utilization and OP-related history (fractures, OP treatment). The proportion of patients with a history of other CV risk factors were similar between Romo and other treatment groups. Romo was most frequently administered by rheumatologists in the Medicare population (34.9%). All baseline clinical characteristics were balanced after PSM

**Table: Baseline CV and OP History and CV Risk Factors in Optum and Medicare Populations Before PSM**

n (%) (unless otherwise noted)	Optum					Medicare		
	Romo N = 1879	DMAB N = 39020	IV Zol N = 16630	PTH analogs N = 3152	Oral BPs N = 9629	Romo N = 14596	DMAB N = 18219	IV Zol N = 74850
Age, mean (SD)	73.2 (8.2)	74.4 (7.9) SMD -0.15	72.8 (7.7) SMD 0.05	70.5 (8.4) SMD 0.32	72.3 (7.6) SMD 0.11	75.7 (7.2)	76.2 (7.5) SMD 0.07	74.8 (6.9) SMD 0.13
<b>CV history</b>								
MI (recent) <sup>1</sup>	2 (0.1)	117 (0.3) SMD -0.04	43 (0.3) SMD -0.04	8 (0.3) SMD -0.03	249 (0.3) SMD -0.04	22 (0.2)	587 (0.3) SMD 0.04	195 (0.3) SMD 0.02
Stroke (recent) <sup>1</sup>	3 (0.2)	150 (0.4) SMD -0.04	53 (0.3) SMD -0.03	10 (0.3) SMD -0.03	270 (0.3) SMD -0.03	17 (0.1)	628 (0.3) SMD 0.05	206 (0.3) SMD 0.04
MI (history) <sup>2</sup>	94 (5.0)	2728 (7.0) SMD -0.08	970 (5.9) SMD -0.04	241 (7.6) SMD -0.11	5555 (5.8) SMD -0.03	510 (3.5)	8326 (4.6) SMD 0.05	2641 (3.5) SMD <0.01
Stroke (history) <sup>2</sup>	137 (7.3)	3326 (8.5) SMD -0.05	1112 (6.7) SMD 0.02	255 (8.1) SMD -0.03	5857 (6.1) SMD 0.05	590 (4.1)	7715 (4.2) SMD 0.04	2534 (3.4) SMD <0.01
TIA	64 (3.4)	1631 (4.2) SMD -0.04	569 (3.4) SMD <0.01	137 (4.3) SMD -0.05	2869 (3.0) SMD 0.02	301 (2.1)	4460 (2.4) SMD 0.03	1562 (2.1) SMD <0.01
Heart failure	215 (11.4)	4775 (12.2) SMD -0.02	1491 (9.0) SMD 0.08	405 (12.8) SMD -0.04	8451 (8.8) SMD 0.09	1282 (8.8)	19340 (10.6) SMD 0.06	3360 (7.2) SMD 0.06
<b>OP-related history</b>								
OP diagnosis	1620 (86.2)	27884 (71.5)*	11581 (70.1)*	2656 (84.3)	26167 (27.2)*	11553 (77.8)	95727 (52.3)*	40967 (54.7)*
Hip fracture	243 (12.9)	2422 (6.2)*	755 (4.6)*	352 (11.2)	3352 (3.5)*	1604 (11.0)	9637 (5.3)*	2798 (3.7)*
Vertebral fracture	426 (22.7)	4086 (10.5)*	1405 (8.5)*	741 (23.5)	4043 (4.2)*	2942 (20.2)	13997 (7.7)*	4697 (6.3)*
Other fractures	428 (22.8)	5597 (14.3)*	1980 (12.0)*	752 (23.9)	8822 (9.2)*	2268 (15.5)	14641 (8.0)*	4768 (6.4)*
History of fall	619 (17.5)	16115 (10.8)*	5658 (8.2)*	1553 (17.6)	N/A (6.6)*	N/A	N/A	N/A
Oral BPs	213 (32.9)	2821 (41.3)**	70 (34.2)	208 (42.9)**	806 (8.3)*	1214 (19.9)	10132 (27.5)*	7254 (22.5)
IV BPs	529 (11.3)	N/A	1863 (11.3)*	541 (17.2)*	2863 (3.0)*	4820 (33.0)	N/A	7254 (9.7)*
DMAB	204 (10.9)	1423 (3.6)*	505 (3.1)*	N/A	499 (0.5)*	794 (5.4)	4894 (2.7)*	1828 (2.4)*
PTH analogs	204 (10.9)	1423 (3.6)*	505 (3.1)*	N/A	499 (0.5)*	794 (5.4)	4894 (2.7)*	1828 (2.4)*
<b>CV risk factors</b>								
Hypertension	1206 (64.2)	27688 (71.8)**	10774 (65.2)	2036 (64.6)	63776 (66.3)	9130 (62.6)	123000 (67.1)	44842 (59.9)
Type II diabetes	350 (18.6)	8968 (23.0)**	3233 (19.6)	679 (21.5)	22985 (23.9)**	2908 (13.8)	33797 (18.5)*	11434 (15.3)
CKD without dialysis	456 (24.3)	10386 (26.6)	3350 (20.3)	733 (23.3)	19791 (20.6)	2736 (18.7)	37992 (20.8)	10728 (14.3)
CKD with dialysis	4 (0.2)	97 (0.2)	12 (0.1)	3 (0.1)	91 (0.1)	63 (0.4)	1523 (0.8)	170 (0.2)
Arrhythmia	324 (17.2)	6811 (17.5)	2514 (15.2)	531 (16.8)	11853 (12.3)*	2932 (20.1)	36577 (20.0)	12740 (17.0)
Smoking	633 (33.7)	12507 (32.1)	5378 (32.5)	1136 (36.0)	28914 (30.0)	3067 (21.0)	33433 (18.3)	13310 (17.8)

BP, bisphosphonate; CKD, chronic kidney disease; CV, cardiovascular; DMAB, denosumab; IV, intravenous; MI, myocardial infarction; N/A, not applicable; OP, osteoporosis; PSM, propensity score matching; PTH, parathyroid hormone; Romo, romosozumab; SD, standard deviation; SMD, standardized mean difference; TIA, transient ischemic attack; Zol, zoledronate.  
<sup>1</sup>Within 1 year before treatment initiation. <sup>2</sup>Using all available historical data. \*Significant pre-matching imbalance, based on SMD > 0.10 with romosozumab vs. comparator. \*\*SMD < -0.10 signaling pre-matching imbalance with romosozumab vs. comparator.

**Conclusion:** Romo initiating patients were mostly older and had a greater history of fractures and OP treatment, similar history of hypertension, type II diabetes, arrhythmia, and smoking, and similarly low or numerically lower rates of MI or stroke before Romo initiation compared with patients initiating other OP treatments. These data suggest the FDA-required boxed CV warning continues to have its intended effect on patient selection.

**Acknowledgment:** Funding from Amgen Inc, UCB Pharma.  
**Disclosures:** TCL, HCC, MO, and DB are employees and stockholders of Amgen; JRC has received grant support and consulting fees from Amgen and Lilly.

**P343**  
**IS THE RATE OF RESPONDERS TO HYALURONIC ACID INJECTION FOR PATIENTS WITH KNEE OSTEOARTHRITIS STABLE OVER TIME? POST HOC ANALYSES OF A 6-MONTH FOLLOW-UP STUDY**

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**Objective:** Recently, a study showing the non-inferiority of a single injection of sodium hyaluronate plus sorbitol (Synolis VA<sup>®</sup>) compared to hylan G-F20 (Synvisc-One<sup>®</sup>) over a 24-week period was published. The objective of the present study is to assess if a short term response to a single injection of sodium hyaluronate plus sorbitol can be maintained over a 6 month-period and if the maintenance of the response to treatment is dependent on the functional status at baseline. **Methods:** Responders to treatment at Day 28, Day 84 and Day 168 were evaluated according to the responder criteria proposed by the OMERACT-OARSI. WOMAC function index was used to assess functional status at baseline. All analyses were adjusted for age, gender, BMI and baseline WOMAC total score, using data from the intention-to-treat (ITT) population. **Results:** Out of the 96 patients included in the study who were receiving Synolis VA, 59.38% were responders at Day 28 according to the OMERECT/OARSI responder criteria, 59.78% at Day 84 and 64.52% at Day 168. Among the responders at D28, the probability of being responder at D84 and D168 was significantly higher than among non-responders, with corresponding odds ratio (95%CI) of 2.85 (1.07-7.59) and 7.28 (2.53-20.93), respectively. Patients with a poorer physical function at baseline were more likely to respond to the treatment at all time-points, compared to those with a better physical function (OR 3.74 [1.37-10.21]). **Conclusion:** An early response of a single injection of sodium hyaluronate plus sorbitol is predictive of the long term response, up to 24 weeks. Patients with a poorer physical function may best benefit from the treatment.

P344

### OUR EXPERIENCES IN TREATMENT ON POSTMENOPAUSAL OSTEOPOROSIS WITH PHYSICAL THERAPY

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**Objective:** Osteoporosis is a multifactorial progressive skeletal disease characterized by a decrease in bone density and disruption of bone microarchitecture, predisposing the bone to fracture. These fractures are very often associated with increased morbidity, mortality, loss of function, and high economic cost. We aimed to assess the effectiveness of physical therapy in the treatment of pain and BMD of the spine in patients with primary osteoporosis.

**Methods:** The research included 92 patients diagnosed with osteoporosis who signed an informed consent to participate in the study. A numerical pain scale was used to assess pain. BMD was determined by DXA. Quality of life was determined by Qualeffo-41, specific for osteoporosis. The patients were followed for one year.

**Results:** The results showed that 83.69% of respondents have deformity, i.e. 58.69% have kyphosis. After one year, the results of the biochemical analyzes showed a significant decrease in  $\beta$ -CrossLaps ( $p < 0.001$ ) and a significant increase in the average vitamin D in the blood ( $p < 0.001$ ). After one year, pain in female patients was significantly reduced ( $p = 0.002$ ). KMG showed a significant difference after one year from lumbar spine treman ( $p = 0.001$ ).

**Conclusion:** Physical therapy and rehabilitation have a significant role in reducing pain and improving BMD and improving the quality of life in patients with osteoporosis.

P345

### TUMOR-INDUCED OSTEOMALACIA. A CASE SERIES FROM MEDIUM INCOME COUNTRY

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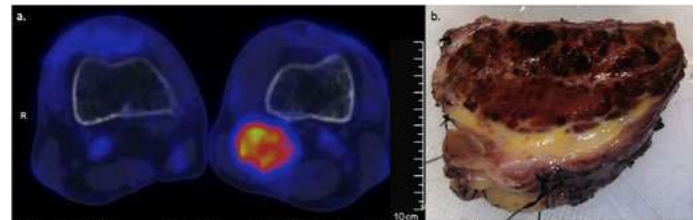
<sup>1</sup>Hospital Pablo Tobon Uribe. Universidad Pontifica Bolivariana, <sup>2</sup>Universidad de Antioquia-Clinica Somer, <sup>3</sup>Hospital Pablo Tobón Uribe, <sup>4</sup>Universidad de Antioquia-Hospital Universitario San Vicente Fundación, Medellín, Colombia

**Objective:** Tumor-induced osteomalacia (TIO) is a rare paraneoplastic syndrome secondary to mesenchymal tumors, presenting with bone pain, osteomuscular deformity, fractures, and occasionally weight and height loss. The main laboratory findings are hypophosphatemia, phosphaturia, and elevated alkaline phosphatase. It is caused by elevated serum levels of FGF23, secreted by these types of tumors, leading to renal inhibition of phosphorus

reabsorption, resulting in urinary losses and altered bone metabolism. There are few reports from Latin America and limited information regarding diagnostic difficulties in medium-income countries from Latin America. Here, we present our experience with TIO in Colombia

**Methods:** A multicentric retrospective chart review of surgically treated TIO patients was performed and was approved by all participants centers. An invitation was sent to Colombian endocrinologist to participate.

**Results:** We found 4 cases of TIO, three women and one man, with an average age at diagnosis of 47 years and an average time between symptom onset and diagnosis of 4.75 years. These patients presented with osteomuscular symptoms and significant sequelae. Hypophosphatemia, phosphaturia, and elevated FGF-23 were highlighted in the studies. Complementary functional and anatomic studies allowed tumor localization. Surgical resection was complete, with normalization of phosphorus and FGF-23 levels and functional clinical improvement.



**Paciente 3:** (a) Imagen de PET-CT con 18F-FDG, identifica lesión sólida ubicada sobre el cóndilo femoral medial, con SUVmáx de 5,46, mide 3x4cm. (b) Espécimen quirúrgico, al corte es color café explicado por hemosiderina en su interior; rodeado por pseudocápsula de tejido conectivo.

Case 3: 18F-FDG PET CT showing a soft tissue mas. SUVMAX 5.46 Size 3\*4 cm. Macroscopic photograph of the specimen

**Conclusion:** TIO is a rare paraneoplastic syndrome that can present with significant bone and muscle symptoms. The diagnosis is based on laboratory findings such as hypophosphatemia, phosphaturia, and elevated FGF23 levels. The localization of the tumor is crucial for treatment, and surgical resection is necessary for a complete recovery, with normalization of laboratory values and improvement in clinical symptoms. There is an important delay (4.75 years) to diagnose TIO. These cases emphasize the importance of early diagnosis and prompt intervention in TIO.

**Disclosure:** ARG and JG have received honoraria from Ultragenyx.

P346

### ASSOCIATIONS BETWEEN OSTEOPOROSIS AND THE SEVERITY OF SARCOPENIA IN VETERAN HOMECARE SENIORS IN TAIWAN

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**Objective:** To investigate the relationship between sarcopenia staging and BMD according to the Asian Working Group for Sarcopenia (AWGS) 2019 definitions in veteran homecare older patients in Taiwan.

**Methods:** BMD (DXA), appendicular lean mass (DXA), handgrip strength (hydraulic dynamometer) and gait speed (over 4-m) were used to screen for osteoporosis and sarcopenia. Participants were categorized as osteoporotic according to the WHO definition (T score  $\leq$  - 2.5), and classified with probable sarcopenia or confirmed sarcopenia according to the AWGS 2019 definitions.

**Results:** A total of 249 long-term care older adults (81.9% men) with a median age of 82.23 years were included in this study. The prevalence of osteoporosis increased across sarcopenia staging by 24.4% in non-sarcopenia, 38.2% in probable sarcopenia, 44.4% in confirmed sarcopenia, and 49.4% in severe sarcopenia. Osteoporosis was associated with a greater risk of severe sarcopenia (OR 2.955, 95%CI 1.106, 7.893,  $p=0.031$ ) after adjusting for age, sex, and BMI. When considering the associations between the components of sarcopenia (ALM, handgrip strength, and gait speed) and the prevalence of osteoporosis, only gait speed was associated with osteoporosis in our study. (OR 2.669, 95%CI 1.261, 5.650,  $p=0.01$ )

**Conclusion:** With the extremely high prevalence of sarcopenia and osteoporosis in institutionalized older individuals, health care professionals must evaluate these diseases together in this group of patients.

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### ASSESSING THE PREDICTIVE CAPABILITY OF SERUM BIOMARKERS AND FRAILTY IN HIP FRACTURE PATIENTS: A PROSPECTIVE COHORT STUDY EXAMINING SHORT- AND LONG-TERM OUTCOMES

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**Objective:** Hip fracture is a public health problem worldwide. Traditional prognostic models do not include blood biomarkers, such

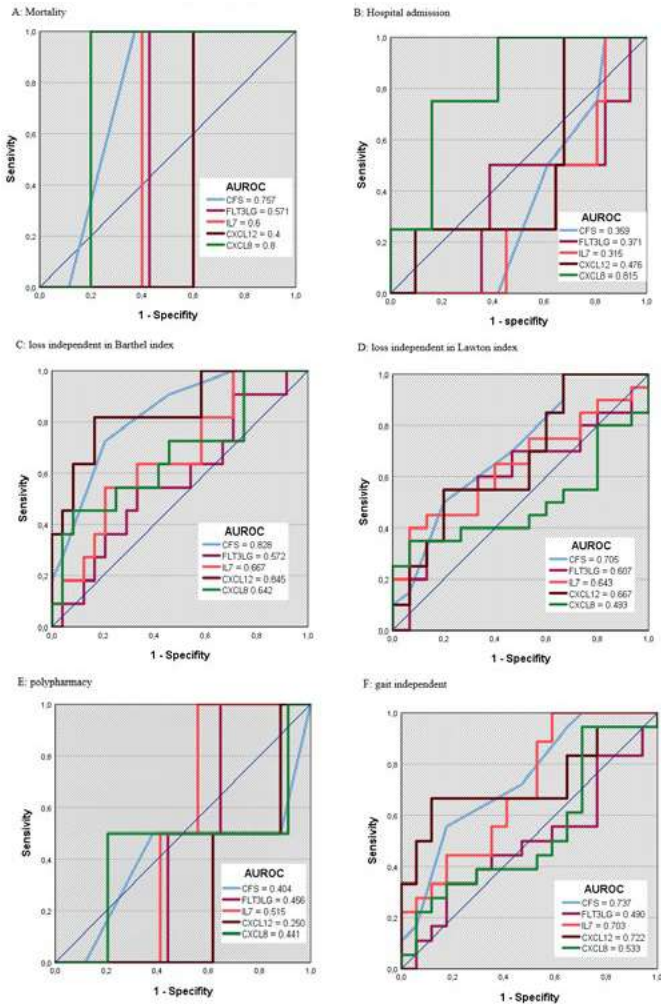
as those obtained by proteomics. In this prospective cohort study, we aimed to explore the role of a targeted proteomic approach in better characterizing frailty in older adults with hip fractures. Moreover, we sought to identify molecular features that could be useful in improving the prognosis of this group of patients. We hypothesized that levels of inflammatory biomarkers could be associated with the Clinical Frailty Scale (CFS) and health outcomes at one and three months after discharge

**Methods:** A total of 45 patients aged 75 or older who were admitted for hip fracture were recruited. At admission, a Comprehensive Geriatric Assessment (CGA) was conducted, which included a frailty assessment using the Clinical Frailty Scale (CFS). Blood samples were collected prior to surgery. Participants were followed up at one and three months after discharge. The levels of 45 cytokines were analyzed using a high-throughput proteomic approach. Binary logistic regression was used to determine independent associations with outcomes such as functional recovery, polypharmacy, hospital readmission, and mortality.

**Results:** When biomarkers were analyzed independently from CFS, CXCL-12 levels showed a less marked but still significant association with loss of independence in Barthel index at three-months (OR=0.97 95%CI 0.95-0.99,  $p=0.011$ ) compared to CFS. IL-7 levels was associated with loss of gait independence (OR=0.66 95%CI 0.46-0.94,  $p=0.022$ ) while the association with loss of independence was close to significance ( $p=0.070$ ). Conversely, CXCL-8 levels were associated with increased risk of hospital readmission at 3 months (OR=1.07 95%CI 1.01-1.14,  $p=0.019$ ) while the association with loss of independence in Barthel index was close to significance (OR=1.05 95%CI 1.00-1.10,  $p=0.058$ ). No association with mortality and polypharmacy were found for any of the candidate biomarkers assessed. AUROC analyses were shown in Figure 2.

**Figure 2:** Performance of different biomarkers in prediction of A: mortality, B: hospital admission, C: independence in Barthel index, D: independence in Lawton index, E: polypharmacy and F: gait independence. Receiver operating characteristic (AUROC), Clinical Frailty Scale (CFS)





**Conclusion:** CXCL-12, IL-7 and CXCL-8 may have a potential role as prognostic biomarkers for adverse outcomes related to hip fractures, such as loss of independence in ADLs, functional recovery, and hospital readmission at three-months follow-up, independently of frailty status.

**P348**  
**ASSOCIATION OF SERUM BIOMARKERS IN PREDICTION FRACTURES IN OLDER ADULTS**

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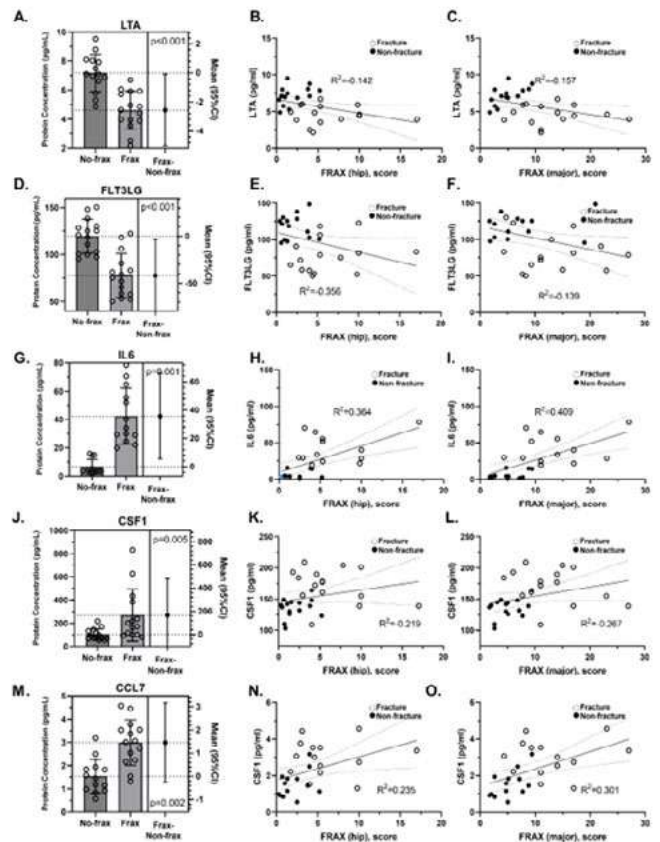
**Objective:** The clinical screening of hip fracture risk is complicated due to the limitations of the reference tools (i.e., bone turnover markers, BMD, FRAX) but with new biomarkers could provide bet-

ter information for this risk. The present study described emerging biomarkers of the risk of hip fractures with different biomarkers in serum and compare to reference risk tool (FRAX).

**Methods:** Cross-sectional observational study. Patients with sub-capital hip fracture candidates to hip arthroplasty (fracture group, n=20) were compared to patient with osteoarthritis of the hip candidates to hip arthroplasty (non-fracture group, n=20). Clinical, functional status and BMD were also compared. Serum was collected and 46 biomarkers were analysed in serum analysis on the Olink platform.

**Results:** Changes were observed in the five proteins included: IL-6, lymphotoxin-alpha (LT-α) or TNFβ, Fms-related tyrosine kinase 3 ligand (FLT3LG), Colony stimulating factor 1 (CSF1), also known as M-CSF, and chemokine (C-C motif) ligand 7 (CCL7). Moderate but significant (p<0.001) positive correlations IL-6 level with risk of mayor fracture (R<sup>2</sup>=0.409). CSF1 (R<sup>2</sup>=0.267) and CCL7 (R<sup>2</sup>=0.301) levels have a weak correlation between their level and the risk of fracture. LTA and FLT3LG has a negative correlation with fracture risk (range R<sup>2</sup>=-0.139 to -0.157).

**Conclusion:** We identified five biomarkers that could help the screening of hip fracture risk in frail older adults and have correlation to the reference risk tool (FRAX), providing a clinical resource for diagnosis in this population. This opens a new line of investigation and future longitudinal studies should investigate the potential of these biomarkers as predictors for hip fracture.



**Figure 1.** Group difference (fracture vs. non-fracture) and their association with FRAX (hip and major) score with significant plasma biomarkers. Panel A, D, G, J and M shown violin plots of the five

proteins with the most significant changes in protein expression levels following t-tests between fracture vs. non-fracture groups. Panel B, C, E, F, H, I, K, L, N, and O figures, shown the lineal regression between fracture vs. non-fracture groups with FRAX (hip and major) score with significant plasma biomarkers. Solid lines: estimation; dashed curved lines: 95%CI limits. Lymphotoxin-alpha (LT- $\alpha$ ) or TNF $\beta$ , Fms-related tyrosine kinase 3 ligand (FLT3LG), IL-6, colony stimulating factor 1 (CSF1), also known as M-CSF, and chemokine (C-C motif) ligand 7 (CCL7).

### P349

#### THE IMPACT OF COVID-19 ON POPULATION-LEVEL DRUG UTILISATION OF ALENDRONATE IN FIVE EUROPEAN COUNTRIES: AN INTERRUPTED TIME SERIES ANALYSIS

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**Objective:** To quantify the impact of the COVID-19 lockdown on the prescription of new users of alendronate [ALN] in five European countries and six independent databases.

**Methods:** We included all patients aged  $\geq 18$  years and registered for  $\geq 1$  year in primary care records: Clinical Practice Research Datalink (CPRD GOLD and AURUM, UK), Health Search Database (HSD, IT), Integrated Primary Care Information Project (IPCI, NL), Sistema d'Informació per al Desenvolupament de la Investigació en Atenció Primària (SIDIAPI, ES); and in Nationwide Danish Registries (NDR). The number of new users of ALN was obtained from prescription or dispensation records between 01/2018 and 12/2021. Monthly incidence rates (IR) were calculated as all new ALN users in a given calendar month, divided by person-months (PM) of all people available in the dataset that month who had not used ALN in the previous year. Changes in IR over time were analysed using interrupted time series analysis before, during, and after the first lockdown restrictions imposed in 03/2020 due to COVID-19 and the subsequent lifting of restrictions in 06/2020.

**Results:** In 01/2018, IR of new ALN use (per 10,000 PM) ranged

from 1.9-3.3, across databases. Prior to the lockdown, IR of new ALN use was stable in all databases. During the lockdown, we observed a significant monthly reduction of IR for all databases, ranging from 0.3-0.5 compared to the pre-lockdown period. However, after the lifting of restrictions, IR increased in all countries, at a monthly rate of 0.3 to 0.6 relative to the lockdown period.

Rates were higher in older age groups in all databases. Generally, there was a sharper decrease in the IR during the lockdown, particularly in patients  $>60$  years, with a greater reduction in older age groups (ranging from 0.4-2.2). After the lifting of restrictions, IR increased in most age groups. In older age groups, we observed that the increasing slope in IR post-COVID-19 restrictions was smaller than the decreasing slope in IR during lockdown.

**Conclusion:** Following the COVID-19 pandemic lockdown in 03/2020, the initiation of ALN therapy declined in the immediate months in six databases. Older patients were more affected, with a lower recovery of ALN treatment initiation compared to the decrease during the lockdown.

**Acknowledgments:** This project was funded by UCB Pharma and Amgen Inc.

### P350

#### THE ASSOCIATION BETWEEN LOOP DIURETICS, HYPERPARATHYROIDISM, AND OSTEOPOROSIS: RESULTS OF A LARGE OBSERVATIONAL COHORT STUDY

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**Objective:** Loop diuretics are commonly used in older adults but may be associated with secondary hyperparathyroidism which could lead to increased bone turnover, reduced BMD and impaired bone microarchitecture. Here we describe the association of loop diuretics with hyperparathyroidism and osteoporosis.

**Methods:** Study participants were from a large cross-sectional study of older Irish adults. Patients with an eGFR  $<30$  ml/min and serum calcium  $>2.5$  mmol/L were excluded to avoid hyperparathyroidism due to renal impairment and primary hyperparathyroidism. We also excluded participants on teriparatide, denosumab, and activated forms of vitamin D. Hyperparathyroidism was defined as a PTH  $>65$  pg/ml. Multivariate logistic regression models were used to analyse the relationship between loop diuretic use and hyperparathyroidism. In a subset of participants who had BMD measured (but where not on osteoporosis therapy and had no prior diagnosis of osteoporosis) the relationship between loop diuretics and risk of osteoporosis was examined.

**Results:** There were 4116 participants with 530 (13%) taking a loop diuretic. Those on loop diuretics were older (78.5 vs. 72.9 yrs,  $p<0.001$ ) but there was no difference in sex (65% female). Hy-

perparathyroidism was more likely in users of loop diuretics who were on calcium supplements (OR 2.24, CI 1.28-3.91,  $P=0.005$ ) or not on calcium supplements (OR 2.46, CI 1.51-4.01,  $p<0.001$ ) after adjusting for age, sex, BMI, serum vitamin D, eGFR, timed up and go, dairy intake, heart failure, vascular disease, diabetes mellitus, smoking, glucocorticoid, and bisphosphonate use. In subgroup analysis ( $n=1793$ ), loop diuretics were also associated with an increased risk of osteoporosis of the hip (OR 4.33, CI 1.81-10.34,  $p=0.001$ ) but not the spine.

**Conclusion:** Loop diuretics were associated with approximately a 4-fold higher risk of osteoporosis. The association may be mediated by greater urinary calcium excretion due to loop diuretics leading to secondary hyperparathyroidism. This is supported by our finding of a more than a 2-fold higher risk of secondary hyperparathyroidism in loop diuretic users. These findings have significant implications given the widespread use of loop diuretics in older adults.

### P351

#### A SIMPLE FRACTURE RISK SCORE FOR OLDER TYPE 2 DIABETES PATIENTS: A DERIVATION, COMPARISON, AND RISK-STRATIFICATION STUDY

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**Objective:** To develop and validate two simple scores for stratification of the risks of 1) any fragility (AF) and 2) major osteoporotic fracture (MOF) in elderly type 2 diabetes (T2D) patients; we also compared the performance of these scores with that of the fracture risk assessment tool (FRAX) and its adjustments.

**Methods:** In this longitudinal cohort study, 1,258 older patients with T2D were enrolled from January 2015 to August 2019. Cox proportional hazards regression was used to model the 5-year risk of AF and MOF. These scores were internally validated using a bootstrap resampling method of 1,000.

**Results:** During a median follow-up of 5 years, 113 (8.98%) cases of AF and 89 (7.07%) cases of MOFs were identified. Both the C-index and calibration plots indicated improved identification performance using the newly established scores. Furthermore, these scores also showed improved outcomes regarding the decision curve analysis and area under the curve compared to the widely used FRAX and its derivatives. More importantly, these scores and their plus scores successfully separated older T2D patients into risk groups according to significant differences in fracture incidence.

**Conclusion:** These novel scores enable simple and reliable fracture risk stratification in older T2D patients. Future work is needed to validate these findings in external cohort(s).

### P352

#### FACTORS ASSOCIATED WITH BACK PAIN IN THE GAMBIA; FINDINGS FROM THE FRACTURES-E3 STUDY

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**Objective:** Back pain has not been widely studied in Sub-Saharan Africa. This study aimed to understand the epidemiology of back pain and associated factors, in particular vertebral fractures (VF), in the Gambian population.

**Methods:** A population-based cross-sectional survey of urban-dwelling men and women, aged 40 years and above, was conducted in the Gambia as part of the Fractures-E<sup>3</sup> Study. Back pain and mental health symptoms were self-reported via a researcher-administered questionnaire and iDXA used for lateral vertebral assessments to identify VF. Researchers measured height and weight. Comparisons were made between those with and without recent back pain using t-tests, chi-square or Fishers exact tests.

**Results:** In 473 adults recruited to date, 50.7% reported back pain in the past 48 hours and 14.4% had  $\geq 1$  detectable VF. Comparisons between those with and without back pain is shown in Table 1. Of those with back pain 65.0% were female ( $p=0.09$ ), more likely to have VF ( $p=0.05$ ), and to report symptoms of depression or anxiety ( $p<0.001$ ).

Table 1

	Back Pain (n=233)	No back pain (n=240)	P-value
Age in yrs, mean (SD)	59 (11.8)	58 (11.4)	0.20
Sex, n (%)	Female	156 (65.0)	134 (57.5)
	Male	84 (35.0)	99 (42.5)
BMI in kg/m <sup>2</sup> , mean (SD)	26.5 (5.7)	26.1 (5.7)	0.43
Presence of VF, n (%)	Absent	198 (82.5)	207 (88.8)
	Present	42 (17.5)	26 (11.6)
Depression, n (%)	Absent	82 (34.2)	163 (70.0)
	Present	158 (65.8)	70 (30.0)

**Conclusion:** These preliminary findings suggest back pain is very common in the urban Gambian population, this is a concern given the limited access to standard analgesics. Back pain was associated with prevalent VF and reported anxiety/depression. In the Gambia, where access to routine healthcare is limited, these conditions will normally go undiagnosed and untreated, posing a significant burden on individuals and society. These findings highlight the need to better understand the epidemiology of back conditions in the Gambia to inform prevention and management

strategies.

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### P353

#### RELATION BETWEEN BONE CHARACTERISTICS AND HIP OSTEOARTHRITIS IN A COHORT OF POSTMENOPAUSAL WOMEN: THE QUALYOR STUDY

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**Objective:** Hip osteoarthritis (OA) is a major public health concern. The determinants of hip OA, however, are not as well understood as those of other OA sites, such as the knee. In recent years, the role of subchondral bone in the pathogenesis of OA has been emphasized but data are lacking in hip OA. Therefore, we aimed to determine what bone characteristics were associated to hip OA.

**Methods:** We have made a cross-sectional analysis of 1537 postmenopausal women included in the QUALYOR prospective cohort. At baseline, we measured areal BMD by DXA at the lumbar spine and the hip, hip volumetric BMD and geometry by QCT scan using the Bone Investigational Toolkit (BIT) software, as well as microarchitecture at the distal radius and tibia by HR-pQCT. We built a hip OA score (CT OA score) with images from the hip CT, based on the depiction of the four major signs of osteoarthritis: subchondral bone sclerosis, joint space narrowing, osteophytes and subchondral cysts. The severity of each of these four signs was graded as absent, mild, moderate or severe (semiquantitative score ranging from 0-3 for each sign) in three different regions of the hip, leading to a total score ranging from 0-36. Women were followed-up during five years and we have prospectively assessed the onset of osteoporotic fractures. Women with and without hip OA were compared using t-tests and multivariable modeling.

**Results:** The mean age was 65.9 and the mean BMI was 24.6. Among these 1537 women, 601 had an OA score of 0; 756 between 1 and 4 (mild OA); and 180 greater than 4 (severe OA). Women with hip osteoarthritis had lower trabecular hip BMD (125 vs. 129,  $p < 0.01$ ). Cortical hip BMD did not differ between women with and without hip OA (966.5 vs. 963.5,  $p$  n.s.). Patients with hip OA also had larger femoral neck volume (11.55 vs. 11.27,  $p < 0.001$ ). Only small differences in trabecular bone were observed in peripheral bone microarchitecture between hip OA patients and non-OA individuals. The BIT analysis showed greater bone resistance to bending (CSMI min with 6.03 vs. 5.6 and Z polar with 7.98 vs. 7.59,  $p < 0.05$ ) at the femoral neck in patients with hip OA. These differences were greater in patients with high-

er OA CT scores compared to patients without hip OA. Of note, during the five years of follow-up, women with hip OA compared to those without had higher osteoporotic fracture risk, with OR = 1.47 CI95% [1.03-2.09]  $p < 0.05$  and for hip fracture specifically OR = 0.32 CI95% [0.06-1.6]  $p$  n.s (n=6).

**Conclusion:** Women with hip OA have larger femoral neck and lower trabecular bone parameters, suggesting a sizeable role of bone geometry and remodeling in the pathophysiology of hip OA.

### P354

#### AN INJECTABLE, PROTEIN-FREE BIOMIMETIC PROTEOGLYCAN GRAFTED WITH CHONDROITIN SULPHATE WITH POTENTIAL APPLICATION FOR TREATING OSTEOARTHRITIS

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**Objective:** Osteoarthritis is a pathology with a lifetime prevalence of close to 30% according to the EPISER2020 study. Currently, the treatment recommended when the pharmacological route is not effective is the intra-articular injection of hyaluronic acid (viscosupplementation) or corticosteroids (anti-inflammatory), but it is a measure that requires persistent applications every few weeks to be effective. In our work, we aimed to create a synthetic biomimetic proteoglycan based on a hyaluronic acid hydrogel without protein component, to avoid potential rejection reactions. In addition, the design of the hydrogel is intended to include the property of being gellable under physiological conditions in order to administer it in liquid form, as well as to serve as a vehicle for the release of chondroprotective biomolecules such as chondroitin sulphate.

**Methods:** A synthesis procedure based on EDC/NHS chemistry was selected to confer the hyaluronic acid the ability to gel in contact with the joint tissue and a chondroprotective cue in the same straightforward reaction. Rheometric assays allowed optimizing the environmental conditions to form stable gels after injection, which were compared to current commercial alternatives. For biological characterization, chondrocyte cell cultures served as the basis of our in vitro model. Cell viability and cellular proliferation were determined by MTT and LIVE-DEAD assay.

**Results:** The hyaluronic acid with grafted chondroitin sulphate remained in solution until exposed to physiological pH and/or enough oxygen available in the medium. The SOL-GEL transition was fast (seconds to few minutes) and the gels remained stable over time once formed. While the resulting gels are softer than

similar alternatives, the high molecular weight of the hyaluronic acid, the crosslinks and the grafted chondroitin sulphate suggest a long-term, anti-inflammatory, beneficial effect on the joint native cells. The latter was assessed with the viability assay, proving no cytotoxic effect, and its currently under further study.

**Conclusion:** It is possible to create a synthetic biomimetic proteoglycan that can turn into a hydrogel on an osteoarthritic joint without the need of a protein component.

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### P355

#### UNDERSTANDING PATIENT VIEWS AND ACCEPTABILITY OF IBX BH SOFTWARE

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**Objective:** The OFFER1 study is an ongoing research collaboration between the University of Exeter and Ibx Innovations with the aim of testing a predictive software (PS) Ibx BH. Research into patient (pt) views on predictive software and its use in healthcare is relatively new and needs further investigation. This study aimed to understand pt view on predictive softwares in general, the Ibx BH software, Ibx BH integration into health care.

**Methods:** A qualitative study using focus groups (FG) was conducted. with participants aged over 50 years, based in England and able to attend in person. FGs were run utilising a semistructured guide based on the theoretical framework of acceptability. FGs were audio-recorded, transcribed, and anonymised. Data were analysed using reflexive thematic analysis approach. the researchers compared data from the two focus groups and cases within each group

**Results:** Two FGs were conducted with a total of 14 pts. Pts ages ranged from 50-85. Pts indicated positive perceptions of PS and Ibx BH. They saw these technologies as being 'empowering' and that they 'should make things faster'. Concerns were raised about how the results of such tests are acted on. One pt indicated they wouldn't want to be recommended medication on the bases of Ibx BH. Other concerns related to potential knock-on costs to the NHS and impact on GPs time. There was a strong indication that patients still wanted face to face discussion about the results of such test, 'there has to be a human element' one participant stressed.

**Conclusion:** Patients are generally happy with the use of PS in healthcare. However, thought and care needs to be taken when integrating these into practice. Focusses on empowering patients, providing information on processes and results are key.

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### P356

#### HANDGRIP STRENGTH (HGS) AND C REACTIVE PROTEIN (CRP) IN OLDER HOSPITALIZED PATIENTS

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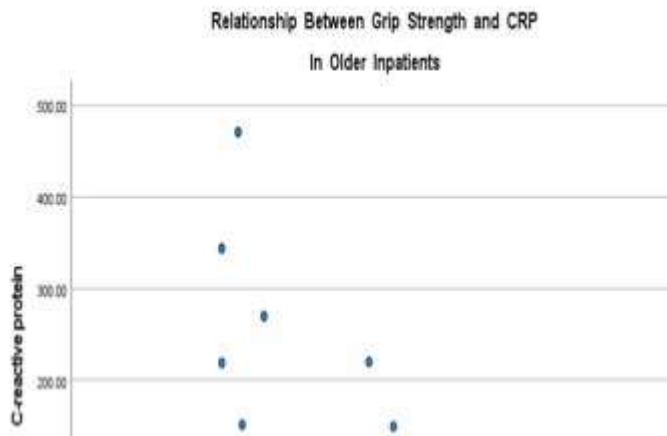
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**Objective:** Handgrip strength (HGS) is an indicator of overall strength and general health. Decline in HGS is associated with increased morbidity and all-cause mortality. Studies have shown that CRP was an independent predictor of HGS, and higher HGS was associated with lower levels of inflammation. We aimed to assess the relationship between HGS and CRP in older hospitalized patients, and to determine the effect of gender on this relationship.

**Methods:** A cross-sectional, observational analysis of consecutive patients 60 years and over admitted to a UK hospital. CRP was done within 72 h of admission. HGS was measured using the hand held JAMAR dynamometer. The Southampton protocol was used. Patients with missing data were excluded. IBM SPSS 28 software package was used for statistical analysis. Descriptive statistics were used for baseline characteristics and Pearson's correlation coefficient and linear regression was used to determine correlation.

**Results:** 134 patients were analysed; 51 males and 83 females. Mean age for all cases was 82.8 years (SD 8.51); mean age for males was 81.8±9.9 and 83.7±7.5 for females. Mean total CRP was 46.38 (SD 70.8); mean CRP for males was 43.9 (SD 63.0) and 47.1 (SD 75.7) for females. There was statistically significant negative correlation between HGS and CRP in all cases ( $r=-.217$ ;  $p=.01$ ). However this correlation was stronger in males than in females where it was statistically nonsignificant ( $r=-.301$ ;  $p=.03$ , and  $r=-.215$ ;  $p=.05$  respectively). Limitations of the study: The admission diagnosis and past medical history were not collected. The decreased HGS associated with the elevated CRP could be a temporary association in acute illness or more prolonged in chronic disease.

**Conclusion:** HGS is negatively correlate with C-reactive protein in older hospitalized patients. This correlation is stronger in male patients than in female patients.



P357

### PREVALENCE AND RISK FACTORS OF OSTEOPOROSIS IN A BELGIAN COHORT OF LUNG TRANSPLANT CANDIDATES: THE PROGRES STUDY

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**Objective:** To evaluate the prevalence and therapeutic management of osteoporosis (OP) in lung transplant (LT) candidates; and to determine the OP risk factors.

**Methods:** We included 198 patients (103 women) out of 388 screened for LT at CHU UCL Namur between January 1998 and December 2020. We collected data on BMD, measured by DXA (Hologic) at the lumbar spine, total hip and femoral neck, fragility fracture (FF), and OP risk factors along with other factors suspected of affecting BMD such as inhaled (i) glucocorticoids (GCs) use, pulmonary function tests, hypoxemia and pulmonary disorder type.

**Results:** OP (T-score  $\leq$  2.5 SD and/or FF) was observed in 118 patients (59.6%) from whom 54 (45.8%) had a T-score  $\leq$  -2.5 SD and 36 (30.5%) had an FF, from whom 77.8% a vertebral fracture. OP patients were older (median (IQR)) (59.0 vs. 57.0 y, 54.2-62.0 vs. 53.0-62.0) and had a lower BMI (mean $\pm$ SD) 22.2 $\pm$ 4.6 vs. 24.3 $\pm$ 4.6 kg/m<sup>2</sup> that non-OP ones. 78 OP patients (66.1%) achieved the 10-year probability of major osteoporotic fracture intervention threshold, of whom 53 (67.9%) received calcium and/or vitamin D; and 42.3% received: bisphosphonates (n=23, 69.7%) or denosumab (n=4, 12.1%). 36 OP patients (30.5%) were untreated. OP patients had more chronic obstructive pulmonary disease (COPD, n=102, 86.4%) than interstitial lung disease (n=33, 16.3%). Further, OP patients had higher iGCs use, COPD, reduced forced vital capacity (FVC) and severely impaired forced expiratory volume in one second/FVC ratio. Oral GCs treatment was associated with FF, regardless of the daily dosage.

**Conclusion:** Most of LT candidates had OP. OP pre-transplantation diagnosis in these patients is crucial for a better management of their bone fragility risk after transplantation. GCs use is a major OP risk factor in this category.

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Patrick Evrard, Benoit Rondelet & Jean-Pierre Devogelaer: None declared, Yves Boutsen Speakers bureau: UCB, Grant/research support from: Viatrix, Galapagos, Biogen, Amgen

**Table OP Risk Factors**

Risk factors	Odds ratio	Confidence Interval	p-value
Body mass index	0.43	0.20-0.92	0.03
Oral glucocorticoids use	1.31	0.66-2.57	0.44
Inhaled glucocorticoids use	2.23	1.13-4.48	0.02
Forced vital capacity	0.49	0.25-0.94	0.03
Forced expiratory volume in one second/Forced vital capacity ratio	0.38	0.17-0.86	0.02
Chronic obstructive pulmonary disease	3.62	1.83-7.42	0.0003

P358

### DENOSUMAB OR ALENDRONIC ACID AFTER A FULL COURSE OF TERIPARATIDE TREATMENT IN SEVERE POSTMENOPAUSAL OSTEOPOROSIS WITH A FIRST FRAGILITY FRACTURE

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**Objective:** To compare BMD and the occurrence of a second fragility fracture after 24 months of treatment with denosumab or alendronic acid 70 mg in postmenopausal women with severe osteoporosis after stopping teriparatide therapy.

**Methods:** We retrospectively analysed 330 postmenopausal women (mean age, 71.8 years) with severe osteoporosis with a first fragility fracture who had been treated with teriparatide for 24 months at our osteoporosis clinic in a Alnoor specialist hospital between 2018-2020. After stopping teriparatide therapy, they continued treatment with denosumab 60 mg or alendronic acid 70 mg while receiving daily vitamin D and calcium. BMD at the lumbar spine (LS), total hip (TH), and femoral neck (FN) was measured by DXA when teriparatide therapy was discontinued (baseline) and after 24 months of further treatment. Multivariate linear regression models were used to identify the predictors of BMD gain.

**Results:** After stopping teriparatide therapy, 160 women continued treatment with alendronic acid 70 mg and 170 received denosumab. LS, BMD gain was significantly greater in the Denosumab group than in the alendronic acid group at 24 months. BMD gains at the TH and FN were negatively associated with pretreatment BMD gains at the same site. 11 cases had a second fragility fracture in the alendronic acid group and only one case of denosumab group had a distal radius fragility fracture.

**Conclusion:** Twenty-four after stopping teriparatide therapy, followed by denosumab treatment appeared to have a higher additional BMD gain and a fracture prevention on average compared with alendronic acid treatment.

P359

### OUTCOME AND PROGNOSIS OF SYNOVIAL SARCOMA: EXPERIENCE OF A TERTIARY CARE CENTRE OF INDIA

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**Objective:** Synovial sarcoma represents 8% of all soft tissue sarcoma (STS). It is a high grade STS, and 50% of patients develop metastasis. It is characterized by local invasiveness and a propensity to develop distant metastases. The aim was to study the demographic pattern and perform survival analysis with evaluation of factors effecting the survival outcome.

**Methods:** An observational analysis of 39 biopsy proven primary resectable metastatic or non-metastatic synovial sarcoma cases was performed. Patients with resectable lung nodules, dimension greater than 5 cm dimension, margins <1 cm/ involved were offered adjuvant Adriamycin based chemotherapy and/or local radiation therapy.

**Results:** Mean age of 39.6 years, no sex predilection observed. Extremity and lower limb sarcomas and deep location and more than 5 cm of dimension were more common. 15% cases were metastatic all at presentation with lung nodules. 85% underwent wide local excision and 15% amputation. 69% had <1 cm nearest free margin and 1 with margins involved. Overall survival (OS) at 5 years using log rank test was evaluated. The survival rate in the distant only and distant with local recurrence group was <5% whereas 60% survival rate in the local alone recurrence group. 23 patients had recurrence, 15 with distant and 4 with local and 4 with both local and distant recurrence. Local recurrence was significantly higher in lesions of deep location or nearest free surgical margin <1 cm. Size, location or neoadjuvant chemotherapy or radiotherapy had no significant effect on OS. Adjuvant chemotherapy (p value- 0.467) and radiotherapy (p value- 0.682) also had no significant effect on OS.

**Conclusion:** In nonmetastatic or resectable metastatic lung nodules in synovial sarcoma cases early surgical excision with wide margins was found to be most effective treatment. To establish the role and indications of Neo adjuvant and adjuvant therapies further studies with larger sample size is required.

P360

### BONE FRACTURES CAUSED BY TOPICAL CORTICOSTEROID THERAPY FOR PSORIASIS

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**Objective:** We present a case of a 57-year-old man diagnosed with psoriasis at the age of 23 who had applied topical clobetasol

propionate ointment on his whole body 3-4 times a week for 20 years.

**Case report:** Physical examination showed abdominal distension, atrophy all over the skin, psoriatic plaques on the trunk, and extremities and multiple striae on the shoulders and legs. Morning plasma cortisol level and ACTH stimulation test confirmed the diagnosis of hypothalamic insufficiency. Bone mineral densitometry showed severe osteoporosis. The patient was not known to have other chronic conditions that could have justified the bone damage and the blood tests at admission were normal. Multiple bone fractures in the vertebrae and costa were detected on lumbar MRI, the (99)Tc MDP whole-body bone scan, and thoracoabdominal computerized tomography imaging.[1-15]

**Conclusion:** Topical corticosteroid therapies have possible local and/or systemic side effects such as atrophy, telangiectasia, hypertrichosis, and suppression of pituitary-adrenal axis. We present an interesting case with multiple bone fractures caused by long-time topical corticosteroid use.

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P361

### EXTRASKELETAL EWING SARCOMA: EXPERIENCE IN A TERTIARY CANCER CARE CENTRE OF INDIA

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**Objective:** Ewing sarcoma can arise in either bone or soft tissue. Extra skeletal Ewing sarcoma (EES) is an uncommon primary tumor of the soft tissues, accounting for 2030% of all reported cases of ES. The aim was to investigate demographic distribution, survival analysis and factors effecting the survival and recurrence in patients of EES.

**Methods:** Retrospective study of 19 biopsy proven EES was performed. Overall survival (OS) using log rank test and factors affecting OS and local recurrence (LR) were evaluated for the entire cohort.

**Results:** patients with EES had a mean age of 19.5 and was more commonly seen in male (63%). Axial location (58%) and solitary presentation (84%) were more common. Average size was 11 cm,

3 of 19 were metastatic at presentation with lung being the most common site for metastasis. 17 received NACT, 16 with VAC-IE regimen and 1 underwent second line with GEM/DOCE regimen. Unplanned surgery was done in 2 of 19. 3 patients received definitive RT and 13 underwent surgical wide local excision. 2 of 13 showed good response to NACT. 10 patients required readmission out of which 6 patients had chemotherapy related complications, 2 had surgical site complications and one patient developed secondary AML post completion of treatment. Total of 4 patients had recurrence. One had local recurrence alone, one had distant recurrence alone and 2 patients had distant and local recurrence both. Tumor size >10 cm, axial location, previous unplanned surgery was associated with higher LR rate. The mean overall survival was 32 months (2.66 years), with higher rates seen in non-metastatic and non-recurrent setting.

**Conclusion:** Early and accurate diagnosis is the key to the management of EES with promising results were seen via NACT and RO resection regimen. But further studies with larger study groups are needed to standardize the treatment protocol and evaluate its efficacy.

### P362

#### COMPARISON OF THE DIAGNOSTIC PERFORMANCES OF CORE-NEEDLE BIOPSY IN MYXOID VS. NON-MYXOID TUMORS

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**Objective:** Despite the overall diagnostic utility of core needle biopsy (CNB) comparable to incisional biopsy, increased diagnostic errors have been suggested of CNB for myxoid soft tissue tumors. This study compared the diagnostic performance of CNB between myxoid and non-myxoid soft tissue tumors.

**Methods:** 369 patients who underwent ultrasound-guided CNB prior to resection for soft tissue tumors were classified into two groups according to resection pathology; myxoid group (n=75) and nonmyxoid group (n=294). 193 patients were male and the median age of the patients was 40 years. 263 tumors were malignant.

**Results:** CNB correctly diagnosed malignancy in 84% (58 of 69) for the myxoid group and 95% (184 of 194) for the non-myxoid group. For diagnosing histologic grade of soft tissue sarcoma, CNB correctly identified high grade in 78% (18 of 23) for the myxoid group and 74% (94 of 128) for the non-myxoid group. Correct diagnosis rate of histological type was significantly lower in the myxoid group (63% [47 of 75] in the myxoid group and 83% [242 of 294] in the non-myxoid group, p=0.013).

**Conclusion:** Our study suggests that CNB is useful for myxoid soft tissue tumors of the extremity, with regard to diagnosing malignancy and histologic grade. However, CNB was less useful for identifying histologic subtype in myxoid tumors than in non-myxoid tumors.

### P363

#### VASCULARIZED FIBULA WITH AND WITHOUT EXTRACORPOREAL RADIOTHERAPY FOR LIMB SALVAGE SURGERY IN INDIAN PATIENTS

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**Objective:** Reconstruction of segmental bone defects following resection of bone sarcomas is a challenging procedure. Vascularised fibula grafts alone or in combination with extracorporeal radiotherapy and reimplantation of tumor bone have long been established as a method of reconstruction of such defects, with satisfying results. Prompted by paucity of data on Indian patients, we report our experience with vascularised fibula graft for patients undergoing limb salvage surgery for sarcomas of bone.

**Methods:** A total of 25 patients underwent the procedure from December 2008 to December 2014. Femur was the commonest site and osteosarcoma was the commonest diagnosis. Intercalary resection was done in 19 patients and arthrodesis in 6 patients. Vascularised fibula was used in combination with extra corporeally irradiated bone in eight patients, and alone in 17 patients.

**Results:** All but one limb could be salvaged, and all but three patients had united at final follow up. Combination of extracorporeal radiotherapy and reimplantation with vascularised fibula fared better than vascularised fibula alone in terms of time to union (9.6 vs. 12.2 months) and rate of graft related complications (14.2 vs. 62.5%).

**Conclusion:** Reconstruction with VFG with or without ECRT has a good and predictable functional outcome. Though manageable with active intervention, complications were more commonly seen with vascularised fibula alone than a combination of the two techniques.

### P364

#### C-PEPTIDE: A MARKER TO DIFFERENTIATE PATIENTS WITH DIABETES

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C-peptide should be measured in combination with insulin and proinsulin as part of the nondiabetic hypoglycemia process to differentiate insulin-dependent hypoglycemia (high C-peptide levels) from insulin-independent hypoglycemia (low C-peptide levels).

In combination with serum and/or urine sulfonylurea screening, C-peptide testing can help differentiate between hypoglycemia due to exogenous insulin use (low C-peptide level, high insulin level) and sulfonylurea intoxication (high C-peptide level).[1-15]

C-peptide can also be used for the following:

- Monitoring pancreatic function after pancreatic transplant or



pancreatectomy

- To monitor beta-cell function in a patient with early stage type 1 diabetes mellitus receiving immunomodulatory therapy to slow disease progression

- To differentiate between type 2 diabetes mellitus and latent autoimmune diabetes in adults (LADA)

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### P365

#### PERIODONTAL CHANGES IN ENDOCRINE DISEASES

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In endocrine diseases there is damage to the tooth consisting of changes in the dentin, enamel, cementum, but also in the dental pulp. Periodontal disease is a real problem in endocrine diseases, with chronic inflammation of periodontal structures leading to destruction of periodontal ligaments and alveolar bone through resorption, ultimately resulting in tooth loss.

In endocrine diseases, both the periodontium lining, represented by the gingival fibromucosa, and the supporting or apical periodontium, consisting of cementum, alveolar bone and periodontal ligament, are affected, leading to chronic periodontitis. An important role in the onset of periodontitis in endocrine diseases is played by local factors in the oral cavity, but also by an exaggerated immune response in the periodontium leading to destructive processes.[1-15]

The dental pulp is affected in chronic periodontitis in endocrine diseases because of its communication with periodontal structures at the apex of the tooth on the one hand, but also via the dentinal canals through which inflammatory processes in the periodontium can diffuse to the pulp. The following aspects will be followed by us at the level of the dental pulp: changes in its volume, possible narrowing or widening; presence of an inflam-

matory infiltrate and establishment of the cellular profile in the infiltrate; possible presence of fibrosis; presence or absence of pulp necrosis and possible destruction of odontoblasts in its context; changes in the vascular device, with follow-up of the angiogenesis process or degenerative changes.

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### P366

#### PREVALENCE OF CARIOUS LESIONS IN PATIENTS WITH ENDOCRINE DISEASES

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**Methods:** In the first group 8 molars and premolars with carious processes classified as ICDAS criteria 1 and 2 were included. On histological examination, all teeth showed histological score 1 (enamel demineralization limited to the outer half). In the second group 12 molars and premolars with carious processes classified as ICDAS criteria 3 were included. In the histological examination, 7 teeth showed histological score 1 and 5 others showed histological score 2. In the third group 10 molars and premolars were included showing carious processes classified as ICDAS 4. On histological examination, 6 teeth showed histological score 2 and 4 others showed histological score 3. In the fourth group, 18 molars and premolars showing carious processes classified as ICDAS criteria 5 and 6 were included. On histological examination, 2 teeth showed histological score 3 and 4 others showed histological score 4. All data were statistically processed.

**Results:** The correlation between radiological scores in retroalveolar radiography and histological scores was calculated; the value of 0.78 of the correlation coefficient means that there is a significant correlation between these scores.

**Conclusion:** There is a strongly significant correlation between clinical ICDAS scores and histological scores, this is demonstrated by the value of the correlation coefficient  $r$  which is 0.78.

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**P367****INFLUENCE OF GROWTH HORMONE THERAPY ON SELECTED DENTAL AND SKELETAL SYSTEM PARAMETERS**

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**Objective:** One of the primary reasons for growth hormone therapy is growth hormone deficiency (GHD). This disease has a bone age delay relative to chronological age as one of its traits. Pituitary dysfunction has a negative impact on a child's jaw and tooth development as well as growth. Growth, development, and gender distinction are all governed by endocrine gland secretion. Additionally, it manages the development of bones and teeth as well as the metabolism of proteins, lipids, carbohydrates, calcium, and phosphate. The pituitary gland, which produces the hormone somatotropin, is the main player in the endocrine system. The growth and development of long bones in the body are negatively impacted by pituitary gland dysfunction, and a child's maxilla, mandible, and dentition may also suffer. There is some evidence in the literature that children with short height have delayed dental ages, delayed replacement of deciduous teeth with permanent teeth, and frequent orthodontic therapy for newly erupted permanent teeth. The process of replacing teeth is positively impacted by the use of hormone therapy. In order to determine how long growth hormone treatment should last for children with GH deficiency, the study set out to evaluate the children's bone and dental ages as well as their dentition.

**Methods:** 98 kids (28 boys and 70 girls) who were being treated for somatotropin hypopituitarism at the endocrinology and diabetes department made up the study's sample population. The standard deviation was 2 years and 6 months, while the average birth age was 12 years (156 months) (30 months). 38 children (group beginning treatment) received growth hormone therapy,

while 60 children (group continuing therapy) had begun treatment 2-3 years earlier (group in the course of treatment). The control group was made up of 31 typically healthy kids (15 males and 16 females) who were hospitalized at the Dept. of Paediatric issues such hypoacusis and a condition after nasal damage. The standard deviation was 2 years and 4 months, with the mean age being 10 years and 6 months (126 months). The parents gave their informed consent.

**Conclusion:** 1. In proportion to birth age, children with hypopituitarism exhibit delayed skeletal and dental ages. 2. Children in the control group had dental ages that were older than their chronological ages, which is evidence of the acceleration phenomenon. 3. Growth hormone therapy works better on the cranial-facial complex when it is administered for a longer duration. This advantageous impact helps to lessen jaw size differences and prevents the development of occlusion problems.

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**P368****VITAMIN D INDUCED MUSCLE MODIFICATIONS**

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It is now commonly acknowledged how important it is that skeletal muscle mass and function decline with aging. But given that multiple medications have negative impacts on health and quality of life, it is appropriate to use non-pharmacological measures to promote healthy aging. This presentation will include current findings that advance our knowledge of the function of vitamin D in the pathophysiology of musculoskeletal illnesses, as well as the theory behind recent discouraging findings in randomized controlled trials. In fact, 25-hydroxyvitamin D, the most accurate indicator of vitamin D status, has been found to be low in people with a variety of musculoskeletal illnesses, including osteoporosis, sarcopenia, and frailty. Low vitamin D status is consistently linked to a higher risk of negative outcomes, according to the ma-

jority of prospective research.[1-15] However, the precise function of vitamin D in the treatment of musculoskeletal problems has not yet been thoroughly confirmed by the findings of randomized controlled trials.

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### P369

#### EFFECTS OF IL-37 ON DKK-1 PRODUCTION AND RUNX2 GENE EXPRESSION IN JURKAT CELLS, HUMAN CD4+ T CELLS

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**Objective:** Inhibition of bone formation is one of the mechanisms of bone loss in inflammatory rheumatic diseases. Dickkopf-1 (DKK-1) acts as inhibitor of Wnt signal by preventing expression of Runx2, a transcription factor for differentiation of osteoblast. In the inflammatory condition, the increased level of DKK-1 will decrease the production of Runx2. The aim of this study is to clarify the regulatory mechanisms of IL-37 in the pathogenesis of inflammatory rheumatic diseases by regulating the expression of DKK-1 and Runx2 in CD4+ T cells.

**Methods:** Jurkat T cells were cultured with IL-37 (10 ng/ml) upon the stimulation with or without anti-CD3 antibody (10 mg/ml) and TNF- $\alpha$  (10 ng/ml) for four days. The expression levels of IL-1R8 (receptor for IL-37) and Runx2 were analyzed by FACS and qPCR, respectively. The amount of DKK-1 in the culture supernatants was measured by ELISA.

**Results:** FACS analysis showed that IL-1R8 was expressed in Jurkat cells. The level of DKK-1 from Jurkat cells with no stimulation was 105 pg/ml and with CD3 stimulation increased to 190 pg/ml. Interestingly, DKK-1 production by CD3-stimulated Jurkat cells was suppressed by the addition of IL-37 into the culture. Moreover, qPCR analysis revealed that the expression level of Runx2 in Jurkat cells was decreased by CD3 stimulation and was recov-

ered when the cells were cultured in the presence of IL-37.

**Conclusion:** Addition of IL-37 to stimulated Jurkat cells decreased the level of DKK-1 and increased expression of Runx2. Our data indicate that IL-37 may ameliorate the activated condition of CD4+ T cells through the Wnt signal pathways.

### P370

#### OSTEOPOROSIS AND TEETH

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In chronic marginal periodontitis, a major role is played by general systemic factors such as osteoporosis (OP), with menopausal osteoporosis being the most common, but there are also other pathological conditions occurring in young women that are determinants of osteoporosis. Although the involvement of osteoporosis in marginal periodontitis alteration is relatively little studied in the literature, some studies have shown that there are clinical and etiopathogenetic correlations between them, the presence of osteoporosis inducing severe forms of periodontal disease, the most common form being dystrophic periodontitis. The caseload is represented by 35 patients, aged between 45-79 years. These patients were divided into two groups: a group with osteoporosis and periodontal disease comprising 25 patients and a control group without osteoporosis and periodontal disease with 10 patients.

We assessed the GI gingival inflammation index and evaluated BMD for the diagnosis of osteopenia/osteoporosis by DXA and T-score values. We also calculated the BMI which is a statistical indicator of body weight used for adults.[1-15] From the analysis of correlation coefficients, significant correlations were found between BMI and T-score and between BMI and IG indicating that BMI is a predictor of T-score and IG. Otherwise positive correlations are not significant.

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**ENDOCRINE-METABOLIC INTERFERENCE IN THYRO-GONADAL INSUFFICIENCY**

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It is known that through genetic, embryonic and functional similarity, the hypothalamic-pituitary-gonadal system has close correlations with the hypothalamic-pituitary-thyroid axis. Recent research has suggested interactions between gonadal and thyroid functional capacity. The study was conducted on 72 cases admitted to the Endocrinology Clinic between 2015-2016, whose age ranged from 16-45 years. We correlate the clinical picture with the peculiarities of thyro-gonadal function objectified by hormonal and metabolic explorations performed in the context of specific paraclinical investigations of each clinical case. We mention that all cases included in the study, presented a weight gain in varying degrees. The results of the hormonal explorations obtained by us show that in the overweight patients included in the study, the functional capacity of the ovary and thyroid are clearly diminished. The reduction in urinary elimination of oestrogens, together with the decrease in plasma concentration of thyroid hormones, explains the increase in serum cholesterol and  $\beta$ -lipoproteins, and the decrease in progesterone, leads to a progressive increase in lipemia.[1-15] In view of the interrelationship between endocrinology and gynaecology, a complex approach to the endocrine-metabolic correlative study of thyro-ovarian insufficiency is required in order to adopt a pathogenically differentiated therapeutic approach.

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**HTA CAUSE - THERAPEUTIC ATTITUDES**

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Hypertension is the most prevalent cardiovascular disease in the mass population and one of the most important public health problems. It is recognised as a major risk factor for atherosclerosis, with coronary, cerebral and renal localization in particular, and a leading cause of cardiovascular and general morbidity and mortality in most industrialised countries. Our study was carried out on 89 patients with endocrine disorders (hypercortisolism, acromegaly, hyperthyroidism, hypothyroidism) admitted to the Endocrinology Clinic, in whom the time of onset of hypertension was evaluated and the evolution of hypertension was monitored in relation to the evolutionary stage of the endocrine disorder. The objective diagnosis of endocrine disorders was based on correlative investigations: hormonal, imaging, electrophysiological and metabolic.[1-15] The following conclusion with practical implications was drawn: the early diagnosis of endocrine disease and the establishment of appropriate etiological therapy is a fundamental condition for the prophylaxis and monitoring of cardiovascular complications.

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**GLYCOREGULATION DISORDERS IN SOME ENDOCRINE DISORDERS**

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Glycoregulatory disorders in endocrine pathology are common, with excess of certain hormones leading to deregulation of carbohydrate metabolism by various mechanisms. The study was conducted in the Endocrinology Clinic during 2015-2016, on 78 patients with: acromegaly, hyperthyroidism, hypothyroidism and hypercortisolism. Inclusion criteria in the study were: newly diagnosed patients, patients who were not following treatments with drugs that could have induced hyperglycemia (adrenaline, glucocorticoids, oral contraceptives etc.), absence of hereditary history of diabetes.[1-15] The oral glucose tolerance test with 75 g of glucose pulvis, with glucose evaluation 1 h and 2 h after glucose ingestion, allowed the detection of diabetes in varying proportions in the patients included in the study. Thus, glycolytic disorders were present in 41% of patients with acromegaly, 50% of hyperthyroid, 36% of hypothyroid and 51% of hypercortisolism. The alteration of carbohydrate metabolism was directly proportional to the level of hormonal excess, by type of condition studied. Treatment of endocrine disorders improves the glycoregulation disorder occurring in the context of hormonal dysfunction.

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**HYPOGONADAL OSTEOPOROSIS THERAPEUTIC MANAGEMENT**

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Hypogonadal osteoporosis can develop early, is for a long time asymptomatic and the aetiological diagnosis is sometimes laborious. Early diagnosis of gonadal insufficiency requires prophylactic measures to prevent bone changes from the prepubertal, pubertal or postpubertal stage to ensure maximum bone mass appropriate to sex and age. The case history is represented by 48 patients, of which with: late puberty (25 cases) and premature ovarian failure (23 cases). Clinical and paraclinical criteria were used to elucidate the etiological diagnosis.[1-15] The paper suggests two major objectives in the therapeutic strategy of hypogonadal osteoporosis: a) early diagnosis of gonadal insufficiency, in order to adopt prophylactic measures of bone changes; b) oestrogenic/androgenic replacement associated with antiresorptive or pro-forma medication.

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**TRUE PRECOCIOUS PUBERTY -IDIOPATHIC: CASE REPORT**

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Early sexualisation defines the appearance of any sign of sexual maturation at an age less than 2SD from the average, i.e. under 8 years in girls and 9 years in boys. True precocious puberty is always isosexual, the sexualisation programme is carried out in accordance with the subject's genetic and gonadal sex. The entire gonadal functional system is involved: hypothalamus-hypophysis-gonad-receptors, and the gonad is fully activated both hormonogenetically and gametogenetically. We present the case of a girl - (7 years and 5 months) whose sexual characteristics were early (telarha - 5 years) and menarche at 6 years with cyclical (monthly) evolution until the time of admission. The diagnostic algorithm we used (FSH, LH assessment and GnRH test) pleads for true precocious puberty and the imaging investigation (MRI - brain) does not show signal changes or gadophilia in the pituitary parenchyma, which is why it is labeled idiopathic. Premature puberty causes two reducible complications: stature and bone age advancement, which compromise final waistline through premature fusion of growth plates, and emotional disturbances resulting from the development of sexual characters in the absence of adequate somatic and intellectual maturation.[1-15] Therefore, we instituted treatment with LH-RH agonist analogues (Triptorelin 3.75 mg/month) to reduce gonadotropin levels and downregulate LH-RH receptors. After 6 months of treatment, menses was discontinued and the statural jump was only 1 cm.

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**CREATINKINASE - MARKER IN ENDOCRINE MYOPATHIES**

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Creatine kinase (CK) is a dimeric molecule composed of M and/or B subunits. Two protein subunits are formed in 3 different isozymes: CK-MM, CK-MB and CK-BB. CK-MM and CK-BB are found abundantly in skeletal muscle and brain respectively. CK-MB is predominantly found in myocardium (accounting for 15-30% of CK in heart muscle), while a much smaller proportion is found in skeletal muscle (accounting for only 5-7% of CK in skeletal muscle). Because CK is found in the inner mitochondrial membrane and cytoplasm, it can be released into the blood by disruption and death of the cell membrane. Since the greatest amount of CK is found in skeletal muscle, CK is a useful marker of skeletal muscle damage.[1-15] Therefore, CK is frequently used for diagnosis and monitoring of patients with neuromuscular disorders, including the following: inflammatory myopathies such as polymyositis, dermatomyositis; infarction, myopathies, dystrophies such as Duchenne and Becker muscular dystrophy; rhabdomyolysis, drug-induced myopathies - statins, fibrates, colchicines, antimalarials and cocaine; neuroleptic malignant syndrome; endocrine myopathies such as hypothyroidism. Increased CK is predominantly used to diagnose neuromuscular diseases, but also in myopathy from hypothyroidism and diabetes.

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### NO SIGNIFICANT SKELETAL CHANGES FOUND IN A PATIENT AFTER LONG-TERM RETINOID THERAPY

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**Objective:** Long-term systemic retinoid therapy has been associated with skeletal side effects. There have been reports of diffuse idiopathic skeletal hyperostosis (DISH) syndrome, calcification of ligaments, and osteoporosis occurring in patients on chronic high-dose isotretinoin, etretinate, and acitretin therapy. Low-dose acitretin has been used for many years as monotherapy or in combination with other systemic therapies for psoriasis and other dermatologic conditions. Evidence to date suggests that bony effects occur rarely in such patients who undergo retinoid therapy at a lower dosage.[1-15] We aimed to present the radiologic findings of a patient on long-term, low-dose acitretin and to review the literature on the radiologic evidence of skeletal side effects during retinoid therapy.

**Methods:** Case report and literature search.

**Results:** A patient on low-dose acitretin had no significant radiologic abnormalities associated with retinoid use after 6 years of treatment. A review of the literature revealed conflicting results whether long-term retinoid treatment would eventually lead to skeletal abnormalities.

**Conclusion:** The evidence to date does not show a clear link between radiologic skeletal abnormalities and long-term, low-dose acitretin or etretinate therapy, similar results as shown in our case report.

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### OSTEOPOROSIS IN PATIENTS WITH PEMPHIGUS VULGARIS

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Pemphigus vulgaris (PV) is often complicated by osteoporosis. Although corticosteroid therapy undoubtedly plays a causative role, inflammation associated with PV may also contribute to osteoporosis. This study was designed to determine the prevalence of osteoporosis in patients with PV before corticosteroid therapy and to compare these findings with those reported previously in healthy volunteers. Newly diagnosed patients with PV, who had not received systemic corticosteroids, were enrolled. BMD was measured both in the lumbar spine (L1-L4) and hip region. Data were compared with those of a healthy population. The association between the disease duration and severity and BMD was evaluated. A total of 32 patients (14 women) with a mean age of 38.6±10.5 years were enrolled.[1-15] Osteoporosis was seen in 5 patients, 2 women, 3 men, and in both genders it was more common when compared to the population of healthy control group (5.3% in women and 4.4% in men). Osteopenia was found in 14 patients, 7 women and 7 men. Although both osteopenia and osteoporosis were more common in severe disease, neither the duration nor the severity of PV showed a statistically significant association with osteopenia or osteoporosis.

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**GLUCOCORTICOID-INDUCED OSTEOPOROSIS: OVERVIEW**

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Glucocorticoid (GC)-induced osteoporosis (GCOP) represents the most common cause of iatrogenic osteoporosis (OP). The prevalence of fractures in patients on chronic GC therapy varies in most studies from 30 to 50%. Most of the epidemiological data associating fracture risk with GC therapy are from the use of oral GCs, but nevertheless, there had been various case reports of osteoporosis induced by long-term topical glucocorticoid use. The process of bone remodeling is complex, regulated by an intricate network of local and systemic factors. With prolonged GC administration, cortical bone becomes increasingly affected and long bones show increased fragility. As some patients on a low GC dose show bone loss at a much higher rate than others on a higher GC dose, it was assumed that genetics may play a role in determining this difference. Any patient that is treated with long-term GCs should be suspected as suffering from GCOP. Laboratory evaluation for GCOP should include total blood cell count, markers of renal and liver function, serum electrophoresis, serum and 24-hr urine calcium, serum levels of 25-hydroxyvitamin D, alkaline phosphatase, TSH and PTH, estradiol in women and total and free testosterone in men. [1-15]. Most chronic dermatologic conditions are usually treated with systemic glucocorticoids. Some, such as pemphigus vulgaris, are corticosteroid-dependent diseases and stopping treatment leads to relapses. However, the risk-benefit ratio must be taken in consideration for these patients given the fact that this therapy does not come without adverse effects.

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**MUSCLE PARAMETERS IN FRAGILITY FRACTURE RISK PREDICTION IN OLDER ADULTS: A SCOPING REVIEW**

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**Objective:** Half of FF occurs in patients with normal bone density or medium/low estimated risk. The effect of muscle parameters on FF occurrence and prediction is abundantly studied but remains unclear. We aimed to review the association between muscle health (muscle mass, strength, or function) and incident fragility fractures (FF); and to give insights into their clinical use for FF prediction.

**Methods:** This scoping review follows the PRISMA-ScR guidelines for reporting. We retrieved 13,434 references from Medline Ovid SP, EMBASE, Web of Science and Google Scholar, using a search strategy based on the 3 overarching concepts of "muscle measurements", "fragility fractures" and "risk". We included original and prospective studies analysing an association between at least one muscle parameter and incident FF. We systematically extracted 17 items including methodology, general characteristics and results. Data were summarized in tables and graphically in stacked Forest plots.

**Results:** From the 67 included articles, 2,8 million person-years (M) were reported in multiple analyses, including 60 muscle parameters and 320 fracture risk ratios. Medians (IQR) of each characteristic were: 1642(921-5756) participants, age: 71.7(65-75) years, follow-up: 10(4.35-12) years, incident FF number: 166(88-277). Lower muscle mass was negatively/not/positively associated with incident FF in 10(2,3M), 64(2,5M) and 28(2,0M) analyses, lower muscle strength in 0, 57(1.7M), and 53(1.3M) analysis, and lower muscle function in 0, 45(1.0M), and 63(1.9M) analysis (partial summary in table 1). The most replicable result is a slow gait speed: positively associated with MOF in the 8 studies that analyzed it (cf. Table 2). Our in-depth analysis shows how each single muscle parameter was associated with each fragility fractures subtypes (all, hip, MOF, vertebral, humeral, forearm) using multiple stacked forest plots.

**Conclusion:** Muscle strength and function are the best muscle parameters to predict FF. These parameters' tests need further investigations in fracture risk quantification models. Muscle mass fails to predict FF. Further research should focus on its indexes and derivatives.

**Table 1.** Deteriorated muscle parameter assessment and their negatively/not/positively associated analysis with incident fragility fracture.



Muscle		All fragility fractures	Hip fractures	MOF	TOTAL
Mass	DXA	0/18/6	7/21/3	1/6/6	8/45/15
	US	0/1/0	-	-	0/1/0
	CT	-	0/5/3	-	0/5/3
Strength	Handgrip	0/11/14	0/18/13	0/3/6	0/32/33
	Triceps	-	0/0/1	-	0/0/1
	Quadriceps	0/4/5	0/4/5	0/1/0	0/9/10
Function	Gait Speed	0/7/9	0/5/14	0/0/8	0/12/31
	Walk / chair tests	0/4/9	0/3/6	0/1/3	0/8/18
	Balance	0/3/1	0/0/6	0/1/1	0/4/8

**Legend:** results are expressed as lower risk/no difference/higher risk of fracture for a low value of each parameter. **DXA:** Dual-X-Ray Absorptiometry, **BIA:** body impedance analysis, **US:** Ultrasound, **CT:** computed tomography scan, **eGFR:** estimated glomerular filtration rate, **MOF:** major osteoporotic fractures.

**Table 2.** Association of lower gait speed or DXA-derived muscle mass parameters with incident MOF.

Parameter	Date	Author	Sample	Hazard Ratio	Confidence interval	Comparison
Gait speed	2022	Harris	5995 ♂	1.89	(1.34-2.67)*	1 SD decrease
Gait speed	2022	Fujita	1686 ♂	2.52	(1.07-5.94)*	Q1 vs Q4
Gait speed	2021	Alajlouni	5665 ♂	1.17	(1.06-1.29)*	1 SD decrease
Gait speed	2020	Lam	1693 ♂	1.39	(1.16-1.67)*	1 SD decrease
Gait speed	2018	Harvey	5660 ♂	1.2	(1.11-1.3)*	1 SD decrease
Gait speed	2018	Buehring	5834 ♂	1.45	(1.16-1.8)*	<1m/s
Gait speed	2020	Lam	1518 ♀	1.27	(1.1-1.45)*	1 SD decrease
Gait speed	2017	Lundin	351 ♀	1.33	(1.03-1.72)*	1 SD decrease
DXA - ALM	2022	Harris	5995 ♂	1.16	(0.95-1.4)	1 SD decrease
DXA - ALM/weight	2020	Lam	1693 ♂	0.98	(0.83-1.18)	1 SD decrease
DXA - ALM/weight	2020	Lam	1518 ♀	0.85	(0.74-0.97)**	1 SD decrease
DXA - ALM/height	2020	Lam	1693 ♂	1.25	(1.05-1.49)*	1 SD decrease
DXA - ALM/height	2020	Lam	1518 ♀	0.95	(0.83-1.09)	1 SD decrease
DXA - ALM/ht2	2018	Harvey	5660 ♂	1.09	(1.01-1.18)*	1 SD decrease
DXA - ALM/ht2	2018	Buehring	5834 ♂	1.21	(1.01-1.45)*	Baumgartner
DXA - ALM/ht2	2021	Harvey	13187 ♀	1.04	(0.97-1.09)	1 SD decrease
DXA - ALM/ht2	2017	Sornay-Rendu	595 ♀	1.37	(1.03-1.82)*	1 SD decrease
DXA - ALM/BMI	2020	Lam	1693 ♂	1.05	(0.88-1.27)	1 SD decrease
DXA - ALM/BMI	2020	Lam	1518 ♀	0.95	(0.83-1.1)	1 SD decrease
DXA - Δ Lean mass	2020	Leslie	9622 ♂ ♀	1.11	(1.01-1.22)*	1 SD decrease
DXA - Lean mass/ht2	2017	Sornay-Rendu	595 ♀	1.37	(1.03-1.85)*	1 SD decrease

■ : person x years, DXA: Dual-X-Ray-Absorptiometry, ALM: Appendicular Lean Mass, ht2: height<sup>2</sup>, BMI: body mass index, SD: standard deviation, Δ difference

### P381 SARCOPENIA PREVALENCE, INCIDENCE, AND ASSOCIATION WITH 6 YEARS INCIDENT FRAGILITY FRACTURES IN SWISS POSTMENOPAUSAL WOMEN

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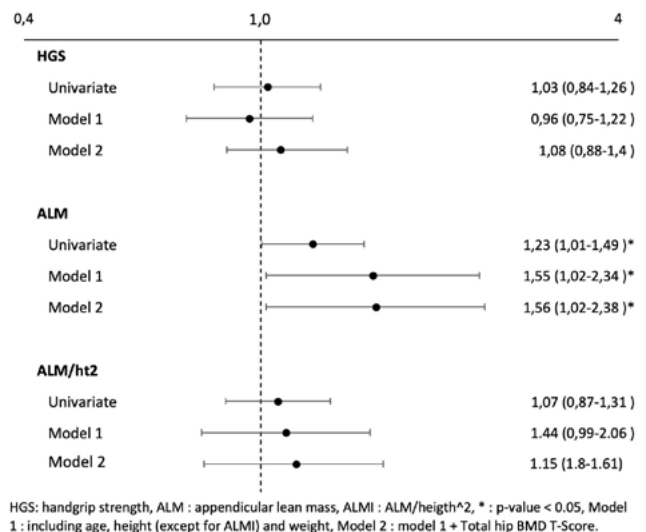
**Objective:** Sarcopenia is a progressive and age-related generalized loss of skeletal muscle mass, strength and function, leading to falls and fractures. We aimed to assess the prevalence and incidence of sarcopenia as based on its different definitions and the association of its components with 6 years incident fragility fractures.

**Methods:** Postmenopausal women from the OsteoLaus cohort

(Lausanne, Switzerland) underwent body composition (Lunar iDXA) and handgrip strength (HGS) assessment at baseline. Sarcopenia was defined based on HGS and appendicular lean mass (ALM)/height<sup>2</sup> (EWGSOP-ALMI-2019/2009); HGS and ALM (EWGSOP-ALM-2019, FNIH-ALM-2017); HGS and ALM/BMI (FNIH-BMI-2017/2014); ALM/height<sup>2</sup> (IWG); or HGS (EWG-SOP-HGS-2019). Incident major osteoporotic fractures (MOF) that occurred between the baseline and the 6 years follow-up were assessed. We created univariate and multiple logistic regression adjusted for age, weight, height (except for ALMI) and BMD to study the incident MOF association with one standard deviation increase of ALM, ALMI or HGS.

**Results:** We included 1179 participants with both DXA and HGS measures (mean±SD: age 69.13±8.64 years, BMI 26.07±4.21 kg/height<sup>2</sup>, HGS 24.16±5.68 kg, ALM 16.89±2.56 kg, ALMI 6.52±0.73 kg). As based on the EWGSOP-ALMI-2019, EWGSOP-ALMI-2009, EWGSOP-ALM-2019, FNIH-ALM-2017, FNIH-BMI-2017, FNIH-BMI-2014, IWG and EWGSOP-HGS-2019 definitions: 17(1.4%), 34(2.9%), 46(3.9%), 67(5.7%), 103(8.7%), 15(1.3%), 168(14.2%) and 107(9.1%) women were sarcopenic. After the follow-up (5.9±0.5 years), from the 880 remaining participants, 99(11.3%) had an incident MOF. Incidence rates of sarcopenia were 0.3, 0.7, 0.9, 1.1, 1.9, 0.2, 0.8 and 1.8 per 100 person-years, as based on the same definitions. In the adjusted models, the odds ratios for a MOF (95%CI) for 1 standard deviation increase of: HGS was 1.08(0.88-1.4), ALM 1.56(1.02-2.38) and ALMI 1.15(1.8-1.61).

**Conclusion:** Up to 5-fold variations were seen in both prevalence and incidence rates of sarcopenia as diagnosed by the various definitions. The explanatory models show contra-intuitive results since a higher muscle mass was associated with a higher risk of MOF. The lack of a robust sarcopenia definition is at the center of the debate and the association with fractures should be further studied.



**Figure 1.** Odds ratios for incident major osteoporotic fractures for 1 standard deviation increase in strength or lean mass.

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## BODY COMPOSITION COMPARISON BETWEEN HOLOGIC A SYSTEM AND LUNAR iDXA: THE OSTEOLAUS COHORT

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**Objective:** DXA is one of the reference techniques for the assessment of body composition thanks to its reliability, low irradiation, and the capacity to measure regional and total fat, lean and bone parameters. As DXA measurements vary among different devices, it is crucial to assess their similarities and differences. We aimed to compare body composition measures between two different devices of latest generation: Horizon A System™ (Hologic, Waltham, MA, USA) and Lunar iDXA™ (GE Healthcare, Madison, WI, USA).

**Methods:** Postmenopausal women from the 5<sup>th</sup> visit of the OsteoLaus cohort underwent total body DXA assessment with both devices in the same day, within one hour. Two technicians: one for Horizon A and one for Lunar iDXA performed all the scans. We compared total fat mass (TFM) and percent fat (TPF), total lean mass (TLM), appendicular lean mass (ALM), total bone mineral content (BMC) and density (BMD) between the two DXAs with T-test for means, correlation (r) and with a complete Bland Altman analysis (regression, constant agreement, relative agreement).

**Results:** 805 participants were analyzed (age 72.9±6.8 years, BMI 25.5±4.5 kg/cm<sup>2</sup>). Compared to Lunar iDXA, Horizon A measures higher (p<0.001) mean values for TFM +1418.1 g. (r=0.99), TPF +0.91% (r=0.99) and TLM +1090.3 g (r=0.96). Horizon A measures lower (p<0.001) mean values for ALM -749.7 g. (r=0.97), BMC -216.3 g. (r=0.85) and BMD -0.050g/cm<sup>2</sup> (r=0.81). The Bland Altman analysis shows different relative and constant agreement for each comparison between the devices (cf. Figures).

**Conclusion:** A trend of higher soft tissues values were seen for Horizon A System™, and of bone for Lunar iDXA™. These results suggest the presence of systematic differences, calibration differences and potential confounders between these two devices. These between-devices differences might be particularly impactful on the use of these parameters' cut-offs in clinical setting. Further in-depth analysis with cross-calibration equations is planned. This effort is beneficial for the diagnosis and clinical follow-up of diseases that rely on DXA-derived parameters.

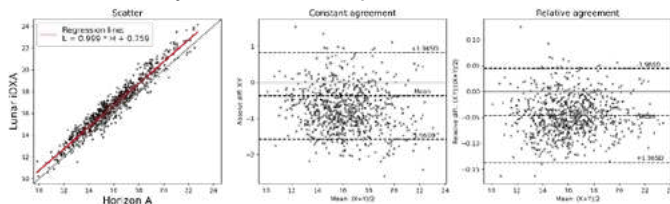


Figure 1. ALM

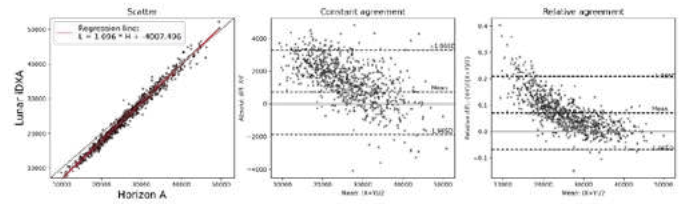


Figure 2. TFM

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## BASAL GANGLIA CALCIFICATION IN HYPOPARATHYROIDISM: ROLE OF CALCIUM AND VITAMIN-D DYSREGULATION

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**Objective:** Basal ganglia calcification (BGC) is an interesting example of ectopic calcification in 72% of idiopathic hypoparathyroidism (IH) patients (1). Pathogenesis and predilection of basal ganglia to calcification are not clear. We reported an association of hyperphosphatemia with occurrence and progression of BGC in IH (2). In a previous study, we showed over-expression of calcification-promoting and under expression of mineral-resorbing molecules (3,4). We have developed an *ex vivo* model of BGC using rat-striatal cell culture and showed that 10.0 mmol/L of  $\beta$ -glycerophosphate induced striatal cell calcification and that treatment with PTH(1-34) could inhibit such calcification. However, the effect of 1,25(OH)<sub>2</sub>D, calcium, and milder phosphate excess on BGC in hypoparathyroidism was not assessed. This study describes two modified *ex vivo* models investigating pathogenesis of BGC in 'drug-naïve' and after 'calcium-vitaminD (Ca-VD) treated' hypoparathyroid state.

**Methods:** The first model involved striatal cells cultured in low concentration 1,25(OH)<sub>2</sub>D (16.0 pg/mL), ionized calcium (0.99 mmol/L), hPTH(1-34) (6.0 pg/mL), and clinically observed phosphate of 2.68 mmol/L (8.3 mg/dL) akin to 'drug-naïve' state for 24 days. In second model, striatal cells were exposed to 46.0 pg/mL of 1,25(OH)<sub>2</sub>D, ionized calcium of 1.17 mmol/L, and 2.20 mmol/L (6.8 mg/dL) of phosphate as observed in 'Ca-VD treated' state.

**Results:** The drug-naïve-model showed that 16.0 pg/mL of 1,25(OH)<sub>2</sub>D enhanced the calcification. In 'Ca-VD treated' model, striatal-calcification was enhanced in 54% cases over 'drug-naïve' state. Calcification in 'Ca-VD treated' state further increased on elevating phosphate to 8.3 mg/dL, suggesting importance of phosphatemic control in IH. Striatal cells in 'drug-naïve' state showed increased mRNA expression of pro-osteogenic *Wnt3a*, *Cd133*, *Vglut-1*-neuronal phosphate-transporters, calcium-ion channel-*Trpv2*, *Alp*, and *Collagen-1a* and decreased expression of *Ca-II*.

**Conclusion:** These models suggest that in 'drug-naïve' state, 1,25(OH)<sub>2</sub>D increases the expression of pro-osteogenic molecules to induce BGC. Although normalization of calcium in 'Ca-VD treated' state increased the expression of *Opg*, *Osterix*, *Alp*, and *Cav2*, calcification increased only in a subset, akin to

variation in progression of BGC in hypoparathyroid patients on conventional therapy.

#### References:

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- 2) Goswami et al. Clin Endocrinol (Oxf). 2012;77:200.
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- 4) Kar & Goswami. Endocrinology 2021;162:bqab024.

### P384

#### COMPARISON BETWEEN HORIZON A SYSTEM AND LUNAR IDXA IN BONE ASSESSMENT AND OSTEOPOROSIS DIAGNOSIS: THE OSTEOLAUS COHORT

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**Objectives:** DXA is the standard bone imaging technique used for BMD assessment and the osteoporosis diagnosis as based on the BMD T-score. We aimed to compare the values of BMD T-score between two DXA devices of the latest generation: Horizon A System® (Hologic, Waltham, MA, USA) and Lunar iDXA® (GE Healthcare, Madison, WI, USA), as measured in the total hip (TH), femoral neck (FN) and lumbar spine (LS).

**Methods:** Postmenopausal women of the 5<sup>th</sup> visit of the Osteolaus Cohort underwent DXA assessments with both devices in the same day, within one hour. Two technicians: one for Horizon A and one for Lunar iDXA performed all the scans. T-tests were used to compare the TH, FN and LS BMD T-scores between the two DXAs. Participants were classified as osteoporotic (lowest BMD T-score  $\leq -2.5$  SD), osteopenic ( $\leq -1.0$  SD) or normal ( $> -1$  SD), separately for each DXA device. A contingency table was used to compare this classification between the lowest BMD T-score of femoral neck, total hip and spine of the two devices.

**Results:** 789 participants were analyzed (age 72.6 $\pm$ 6.9 years, BMI 25.8 $\pm$ 4.9 kg/cm<sup>2</sup>). As expected, Lunar iDXA measured higher mean values in g/cm<sup>2</sup> of TH and LS BMD (statistically significant ( $p < 0.001$ ), and of FN BMD (not significant), as compared to Horizon A. Regarding the BMD T-Scores, Lunar iDXA measured lower mean values for FN (-0.116 $\pm$ 0.288), TH (-0.179 $\pm$ 0.255) and LS (-0.191 $\pm$ 0.426) compared to Horizon A. The prevalence of densitometric osteoporosis was 26,6% on Lunar iDXA and 22,7% on Horizon A, with an overall agreement of 82% (cf. contingency table).

**Conclusion:** BMD values were higher as measured by the Lunar iDXA than by the Hologic A System. Interestingly, BMD T-Scores were lower as measured by the Lunar iDXA than by the Hologic A System. At the individual level, these differences impact the diagnostic of densitometric osteoporosis. Further studies including the presence of fragility fractures are planned to analyze how these DXA devices discriminate fragility fractures.

**Table.** Bone density assessment in between DXA devices.

		Lunar iDXA		
		Normal	Osteopenia	Osteoporosis
Horizon A System	Normal	108	50	0
	Osteopenia	14	382	56
	Osteoporosis	1	24	154

### P385

#### IMPORTANCE OF MEASURING BALANCE IN ASSESSMENT IN RISK OF FALLING AND FRACTURES IN ELDERLY WOMEN

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**Objective:** With age, prevalence of osteoporosis is increasing and is higher in women. Osteoporosis is associated with falls and fractures. Due to muscle weakness, spine kyphosis, decreased postural control and low physical activity, women with osteoporosis have higher risk of falls<sup>1</sup>. Fracture strength due to osteoporosis is the main reason due to which falls easily result in fractures. We aimed to observe the differences in balance among groups of fallers and non-fallers in elderly women.

**Methods:** In this cross-sectional study, data were collected related to the fracture (number and localization). Balance abilities were measured using tandem walking (TW) test. An older adult who cannot walk eight tandem steps without losing balance (TW test) is at increased risk of falling. Differences were analyzed using the  $\chi^2$  test.

**Results:** In this study, 440 women were included with 119 (24.8%) being over 64 years old. A far greater percentage of falls in the same level was registered among older participants (74.8 vs. 39.1%). In the comfortable group over 64 years old, 40.3% of them experienced a fracture due to minor trauma, while the percentage in the younger group is 15.5% ( $\chi^2=36,218$ ;  $df=1$ ;  $p=0.000$ ). The TW test can be performed by 55% of the total number of subjects. The possibility of performing the test in relation to age groups was observed. A statistically significant difference was found in the ability to perform the TW test in relation to years of life ( $\chi^2=128,282$ ;  $df=1$ ;  $p=0.000$ ). Namely, participants, who are younger than 65 years old, are able to perform this test in 64.3% of cases, while only 26.9% of the participants older than 65 performed the test successfully. Among the women who did not have a fracture, 64.1% of them could perform this test, while in the subgroup with a fracture only 33.2% of them could ( $\chi^2=51,699$ ;  $df=1$ ;  $p=0.000$ ). Almost 68% of participants with vertebral and 85.2% with vertebral and non-vertebral fractures cannot perform this test, while those values for non-vertebral fractures are 57.2% ( $\chi^2=14,233$ ;  $df=2$ ;  $p < 0.001$ ). Moreover, 76.2% of women who had a hip fracture in the past cannot perform this test. ( $\chi^2=9,458$ ;  $df=1$ ;  $p < 0.002$ ).

**Conclusion:** Impaired balance is associated with risk of fall among elderly women. In everyday practice, evaluation of balance should be incorporated in fracture risk assessment.

**Reference:** 1. Aleksic J et al. Menopause 2018;25:444.

### P386

#### IMPACT OF URBANIZATION ON ADHERENCE TO ANTI-OSTEOPOROSIS MEDICATIONS AFTER RESTRAINED REIMBURSEMENT POLICY IN TAIWAN

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**Objective:** To examine the adherence trend of anti-osteoporosis medication (AOM) users after the implementation of BMD criteria by the Bureau of National Health Insurance in Taiwan, with a focus on the impact of urbanization.

**Methods:** Utilizing Taiwan's National Health Insurance Research Database, this study identified new users of anti-osteoporosis medications, including denosumab, zoledronate, ibandronate, alendronate, raloxifene, and risedronate, as the study population. The cohort entry date was defined as the first prescription date of AOMs, and adherence rates were evaluated within one year of initiation. The yearly adherence was indicated by the medication possession ratio (MPR). The yearly adherence rate was classified into four groups,  $MPR \geq 75\%$ ,  $50 \sim <75\%$ ,  $25 \sim <50\%$ , and  $<25\%$ . The level of urbanization in areas where AOMs were prescribed was categorized as high, moderate, or low based on the criteria defined by Taiwan's National Health Research Institutes

**Results:** The study found a significant increase in high adherence ( $\geq 75\%$ ) to AOMs within the first year after the implementation of the new reimbursement scheme in 2011. High adherence rates rose from 31.8% in 2008 to 41.7% in 2011 and 54.2% in 2018. Conversely, low adherence ( $<25\%$ ) decreased from 38.8% in 2008 to 14.6% in 2018. The highest proportion of high adherence was observed in high-urbanization areas, with a 2-fold increase from 30% in 2008 to 60% in 2018. The proportion of high adherence to AOMs was lowest in the low urbanization area, however, the proportion increased also nearly doubled from 20% in 2008 to 40% in 2018.

**Conclusion:** The 2011 implementation of new reimbursement criteria led to an increase in adherence to AOMs, with the greatest impact seen in high-urbanization areas.

**Acknowledgments:** Ministry of Health and Welfare for providing administrative support and the Taiwan Osteoporosis Association for financial support

### P387

#### THE COST AND EFFECTIVENESS OF DIFFERENT ADHERENCE TO ANTI-OSTEOPOROSIS MEDICATION: A POPULATION-BASED COHORT STUDY

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**Objective:** To assess the cost and the effectiveness relationship of different adherence to anti-osteoporosis medication (AOM) therapy under the real-world National Health Insurance reimbursement scenario in Taiwan.

**Methods:** The study used Taiwan's National Health Insurance Research Database to identify patients who initiated AOMs (alendronate and denosumab) between 2008-2017. The study population was categorized into 4 groups according to the different levels of adherence to their AOMs therapy: Medication possession ratio (MPR)  $\geq 75\%$ ,  $50 \sim <75\%$ ,  $25 \sim <50\%$ , and  $<25\%$ . The direct medical cost and the occurrence of subsequent fractures within three years were estimated, and the failure probability of composite osteoporotic fracture was estimated by the Kaplan-Meier method. The concept of the incremental cost-effectiveness ratio was adopted to evaluate the relationship between the cost and effectiveness of AOM treatment at different adherence levels.

**Results:** 166,187 new hip fracture patients who started alendronate between 2008-2017. Among those with higher adherence to AOM had a lower event rate of composite osteoporotic fracture within 3 years. The risk was 9.12%, 10.36%, 11.60%, and 12.29% for patients with MPR  $\geq 75\%$ ,  $50 \sim <75\%$ ,  $25 \sim <50\%$ , and  $<25\%$ , respectively. Simultaneously, those with higher adherence to AOM utilized fewer medical resources in the national insurance health-care system. The total medical cost for 3 years was 8120, 9151, 8932, 9217 USD for patients with MPR  $\geq 75\%$ ,  $50 \sim <75\%$ ,  $25 \sim <50\%$ , and  $<25\%$ , respectively.

**Conclusion:** Overall, under Taiwan's national health insurance, higher adherence to AOMs was cost-saving. The finding of this research was valuable for policymakers in considering healthcare policy and resource allocation.

**Acknowledgments:** Ministry of Health and Welfare for providing administrative support and the Taiwan Osteoporosis Association for financial support

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### SECULAR TREND OF ANTI-OSTEOPOROSIS MEDICATION INITIATION IN TAIWAN BETWEEN 2008 AND 2018: AGE MATTERS

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**Objective:** To examine the 11-year trend of anti-osteoporosis medication (AOM) usage and its impact on fractures in Taiwan.

**Methods:** This study utilized a nationwide cohort from the National Health Insurance Research Database in Taiwan. Patients who started a new AOM between 2008-2018, including denosumab, zoledronate, ibandronate, alendronate, raloxifene, and risedronate were included. Patients under 50 years old, with pathological fractures, missing data, or receiving two AOMs were excluded. The subsequent fragility fractures within 3 years were estimated.

**Results:** 336,229 patients with a mean age of 73.3 years meet the inclusion criteria, and 80% were female. The number of AOM initiators fluctuated, from 32606 in 2008 to 36580 in 2018. An immediate drop in AOMs prescription after the implementation of a new stricter reimbursement policy in 2011 (AOM users was 23226 in 2011). It took 5 years, until 2017, for the annual number of AOM prescriptions to return to its 2008 level (34,190 in 2017). When compared with 2008, the number of patients who initiated AOMs increased by 37% and 23% for those aged between 60-69 and aged older than 80 years old, respectively. While the number of AOM users decreased by nearly 6% and 4% among those aged 50-59 and 70-79, respectively. Both subsequent fragility fracture rates within 3 years showed a slight increase after 2014 (from 13.42% in 2008 to 13.44% in 2014), then decreased after 2017 (12.18% in 2017).

**Conclusion:** Although the population aging fast in Taiwan, only a slight increase in the number of AOM users between 2008-2018 in Taiwan. The number of AOM users even decreased among those aged 50-59 and 70-79 years old. Fortunately, the overall fragility fracture rate decreased.

**Acknowledgments:** Ministry of Health and Welfare for providing administrative support and the Taiwan Osteoporosis Association for financial support

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### EFFECT OF ORAL NUTRITIONAL SUPPLEMENTATION ON OUTCOMES IN OLDER ADULTS WITH HIP FRACTURES AND FACTORS INFLUENCING COMPLIANCE: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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**Objective:** Hip fractures are a major cause of morbidity and mortality, and malnutrition is a critical determinant of these outcomes. This systematic review and meta-analysis aims to determine whether oral nutritional supplementation (ONS) improves postoperative outcomes in older patients with hip fracture.

**Methods:** A systematic literature search was conducted in August 2022. Randomized trials documenting ONS in older patients with hip fracture (aged 50+) were included. Two reviewers evaluated study eligibility, data extraction and assessed study quality.

**Results:** There were 812 studies identified of which 18 studies involving 1,512 patients met the inclusion criteria. The overall meta-analysis demonstrates that ONS was associated with a significant risk reduction in infective complications (odds ratio (OR) 0.54, 95%CI 0.38, 0.76), pressure ulcers (OR 0.54, 95%CI 0.33, 0.88), total complications rate (OR 0.57, 95%CI 0.42, 0.79). Length of hospital stay (LOS) was also significantly reduced (weighted mean difference (WMD) -2.01, 95%CI -3.52, -0.5), particularly in the rehabilitation LOS (WMD -4.17, 95%CI -7.08, -1.26). There was a tendency towards lower risk in mortality (OR 0.93, 95%CI 0.62, 1.4) and readmission (OR 0.52, 95%CI 0.16, 1.73), though statistical significance was not achieved. The overall compliance to ONS ranged from 64.1-100%, but no factors influencing compliance were identified.

**Conclusion:** This systematic review was the first to quantitatively demonstrate that ONS reduces half the risk of infective complications, pressure ulcers, total complication rate and reduces LOS. ONS should be a regular and integrated part of medical practice, especially given that the compliance to ONS is acceptable.

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### NUTRITION RISK ASSESSED BY NUTRITIONAL RISK SCREENING 2002 IS ASSOCIATED WITH IN-HOSPITAL MORTALITY IN OLDER PATIENTS WITH COVID-19

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**Objective:** Although numerous studies have been performed to determine predictors of coronavirus disease 2019 (COVID-19) mortality, studies that address the geriatric age group are limited.

The aim of this study was to investigate the utility of the Nutritional Risk Screening 2002 (NRS-2002) and the Geriatric 8 (G8) screening tools in predicting clinical outcomes in older adults hospitalized with COVID-19.

**Methods:** Patients aged  $\geq 60$  years who were hospitalized with COVID-19 in the second wave of the pandemic were included in the study. COVID-19 infection was demonstrated by a positive real-time reverse transcriptase polymerase chain reaction on nasopharyngeal swab or positive radiological findings. Disease severity was determined as defined by the National Institutes of Health. Patient demographics, laboratory values on admission, comorbidities, and medications were recorded. The NRS-2002 and the G8 screening tools were performed for all patients by the same geriatrician. Primary outcome was in-hospital mortality.

**Results:** A total of 121 patients were included. Mean age was  $75 \pm 9$  years, and 51% were female. Mean BMI was  $27 \pm 4.5$  kg/m<sup>2</sup>. 69% of the patients had nutrition risk according to the NRS-2002. 89% of the patients had a G8 score  $\leq 14$ . In-hospital mortality occurred in 26 (22%) patients. Older age and having nutrition risk as determined by the NRS-2002 were independently associated with a higher risk of in-hospital mortality in older patients with COVID-19.

**Conclusion:** The NRS-2002 tool provides rapid assessment for risk stratification in hospitalized older patients with COVID-19.

### P391

#### A CASE OF GERODERMA OSTEODYSPLASTICA AND LONG-TERM RESPONSE TO ZOLEDRONIC ACID INFUSIONS

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**Objective:** Geroderma osteodysplastica (GO) is a rare autosomal recessive connective tissue disease due to mutation of the GORAB gene<sup>(1)</sup>. It is characterized by premature aged appearance, prominent forehead, eyelid and cheek droop, mandibular hypoplasia, wrinkly skin, hyperextensible joints craniofacial abnormalities, severe osteoporosis, and spontaneous fractures<sup>(1)</sup>. The response to bisphosphonate therapy has been inadequately documented.

**Case report:** We report a 22-year-old Saudi woman who is the offspring of consanguineous parents, presented at age of 17 with low trauma L1 severe vertebral compression fracture. She exhibited features of aged appearance, wrinkly lax skin, blue sclera and dental crowding with many unerupted teeth. Laboratory investigations revealed serum calcium 2.23 mmol/L, 25-hydroxyvitamin D 73 nmol/L, phosphate 1.1 mmol/L, alkaline phosphatase 54 U/L, creatinine 54  $\mu$ mol/L and PTH 7.2 pmol/L. The rest of her laboratory results were unremarkable. Baseline bone density (L2-L4) lumbar spine Z-score was -3.7, L1 was excluded due to endplate degenerative changes. Genetic testing by whole exome sequencing revealed a mutation of the GORAB gene, which is consistent with the diagnosis of (GO). GORAB gene mutation was also identified in her 2 younger siblings (a 7-year-old boy and a 12-year-old

girl) who had low BMD but lacked the phenotype appearance of GO. Annual IV zoledronic acid infusion (0.05 mg/kg) was initiated in addition to calcium and vitamin D supplementations. She sustained a wrist fracture two years following zoledronic acid administration. To date, a total of 5 doses of annual zoledronic acid were received. The patient's BMD has improved significantly with a lumbar spine Z-score -3.3 (increased by 12.3%) and there were no further incidents of fracture.

**Conclusion:** This case demonstrates the rare clinical presentation of GO in a young adult. The long term follow up documents the clinical and densitometric response to Zoledronic Acid. These findings may guide the clinicians to seek genetic evaluation of suspected individuals, early intervention, and initiation of bisphosphonate therapy to avoid detrimental outcomes of the disease.

**Reference:** 1. Alotaibi M et al. Glob Med Genet 2021;9:175.

### P392

#### CORRELATION BETWEEN THE WAY OF TAKING AND ADHERENCE TO DRUGS FOR OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN

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**Objective:** To investigate the correlation between the way of taking and adherence to drugs for osteoporosis in postmenopausal women.

**Methods:** The prospective analysis is performed from October to November 2022 in the Special Hospital for Rheumatic Diseases. It involved 58 postmenopausal women with osteoporosis diagnosed by DXA. Each patient filled in a specially designed questionnaire. Assessment of adherence to drugs for osteoporosis was done with the Morisky scale. In the statistical analysis we used the SPSS program v. 20. The central tendency measures, ANOVA test, and T-test were used for statistical analysis.

**Results:** Average age of participants was  $59 \pm 5.3$  years. The duration of osteoporosis was 7.5 years. We examined whether subjects who take drugs for osteoporosis differ in adherence in order to the way of taking drugs. It was found that there is a statistically significant difference between subjects who take drugs for osteoporosis orally, subcutaneously, or intravenously (likelihood ratio=12.15, df=2, p=0.002, p<0.01). Most of those who take drugs for osteoporosis through tablets (95%) have low adherence according to the Morisky scale and all subjects (100%) who take drugs for osteoporosis by subcutaneous injections have low adherence, and all subjects who take osteoporosis drugs intravenously have a medium level of adherence.

**Conclusion:** Adherence to drugs for osteoporosis is not high among postmenopausal women with osteoporosis. Duration of osteoporosis, the price of drugs and a number of other medications are the main reasons for lower adherence.

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### THE RELATIONSHIP OF LEPTIN WITH CLINICAL MANIFESTATIONS OF OSTEOARTHRITIS

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**Objective:** To investigate the associations between leptin and clinical, laboratory parameters in knee osteoarthritis (OA).

**Methods:** We conducted a clinical study included 116 women, aged 40-75 y.o. with knee OA, baseline KL grade I-III, who signed an informed consent form. The average age was 55.4±10.6 y.o. (from 40 to 75), BMI - 30.3±6.5 kg/m<sup>2</sup>, duration of the OA- 5.5 (1-11) years. An individual card was filled in for each patient, including anthropometric parameters, medical history and clinical examination data. Statistical analysis was done in SPSS version 10.

**Results:** We identified that leptin increased (>27.6 ng/ml) in 65 patients – 56%. Table 1 shows the main differences in knee OA patients with and without hyperleptinemia. The statistical significant difference between the two groups was the higher disease duration, BMI and WC value's, in the hyperleptinemia group (p<0.05). Patients in the hyperleptinemia group had harder knee OA: higher pain intensity by VAS, PGA, total WOMAC and all its components, DN4, worsen KOOS score (p<0.05); We found statistically significant differences in groups for knee and hip clinical-detected synovitis, more often for hyperleptinemia group; higher prevalence of hyperuricemia, hypertension and metabolic syndrome. Spearman correlation analysis showed significant relationships between leptin concentrations and disease duration of knee OA (r=0.27, p=0.005), pain on walking by VAS (r=0.4, p=0.0002), total WOMAC (r=0.33, p=0.002), WOMAC pain (r=0.4, p=0.0002) and FI (r=0.32, p=0.003), KOOS (r=-0.35, p=0.002), PGA (r=0.34, p=0.002), synovitis (r=0.43, p<0.0001), hip OA (r=0.29, p=0.007). There was also a significant positive relationship between hyperleptinemia and BMI (r=0.8, p<0.0001), WC (r=0.58, p<0.0001), hypertension (r=0.35, p=0.001), hyperuricemia (r=0.27, p=0.006) and metabolic syndrome (r=0.44, p<0.0001) and laboratory parameters: CRP (r=0.56, p<0.0001), IL-6 (r=0.24, p=0.01), COMP (r=0.21, p=0.02), vitamin D (r=-0.25, p=0.007), insulin (r=0.53, p<0.0001), glucose (r=0.38, p=0.0003), ALT (r=0.5, p<0.0001), TG (r=0.47, p<0.0001), HDL (r=-0.38, p=0.004), uric acid (r=0.36, p=0.0006).

**Table 1.** Comparative characteristics of patients with OA who had and did not have hyperleptinemia

Parameter	Patients with hyperleptinemia (n=65)	Patients without hyperleptinemia (n=51)	p
Age, Me	58 (50 – 67)	53 (45-61)	0.06
Duration OA, years, Me	7 (3-15)	2 (1-9)	0.002
BMI, kg/cm <sup>2</sup>	33.9±6.04	25.8±3.8	<0.0001
WC, cm	97.4±14.1	85,6±9.7	0.0004
VAS pain score, mm	50 (28-69)	39 (3-50)	0.0002
WOMAC pain, mm	217.5 (132.5-260)	125 (30-170)	0.0007
WOMAC functional impairment (FI), mm	675.5 (330.5-980)	345 (69-663)	0.006
Total WOMAC, mm	968 (469-1347.5)	530 (101-1035)	0.004
KOOS, points	44.5 (33- 73)	70.5 (56.5-86)	<0.0001
DN4, points	2 (1-4)	1 (0-2)	0.02
PGA, mm, Me	50 (30-65)	30 (10-46)	0.0005
Hip OA,%	66.7	37.5	0.01
Clinical-detected synovitis,%	63.6	20.5	0.0004
Hyperuricemia,%	38.9	15.9	0.0002
Metabolic syndrome,%	68.9	25	0.009
Hypertension,%	67.4	32.5	<0.0001

**Conclusion:** The hyperleptinemia is aggravating predictor of clinical course not only metabolic syndrome associated disease like hypertension, obesity, dyslipidemia, insulin resistance, but also OA. High value of leptin associated with higher intensity of pain by VAS and WOMAC index (total and all components), worsen points of PGA, DN4 and KOOS, highly prevalence of synovitis and hip OA, higher concentrations of cartilage degradation markers. Potentially, treatment interventions lead to decrease of leptin level may improve course of knee OA.

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### THE RELATIONSHIP OF LEPTIN AND OSTEOARTHRITIS: INSTRUMENTAL CHARACTERISTICS

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**Objective:** To distinguish the associations between leptin and instrumental characteristics in knee osteoarthritis (OA).

**Methods:** At prospective study were enrolled 116 women, aged 40-75 y.o. with knee OA, baseline KL grade I-III, who signed an informed consent form. The average age was 55.4±10.6 y.o. (from 40 to 75), duration of the OA- 5.5 (1-11) years. Mean BMI -

30.3±6.5 kg/m<sup>2</sup>. An individual card was filled in for each patient, including anthropometric parameters, medical history and clinical examination data, standard knee X-ray, ultrasound of OA and MRI (WORMS), DXA three sites the L1-L4 lumbar spine, femoral neck, and total hip. Statistical analysis was done in SPSS version 10.

**Results:** We identified that leptin increased (>27.6 ng/ml) in 65 patients – 56%. Table 1 shows the main differences in knee OA patients with and without hyperleptinemia. Baseline average age was comparable between groups. The statistically significant difference between the two groups was the harder knee OA by instrumental data in hyperleptinemia group: at MRI was more frequent confirmed of osteitis of the medial femoral condyle (OR=6.3 (95%CI 1.06-37.8), p=0.04), higher risk to identify KL grade III by knee X-ray (OR=15.1 (95%CI 1.9 – 122), p=0.002), smaller narrow of medial joint space, greater size of osteophytes on the femoral medial surface and smaller ultrasound thickness of the cartilage. BMD in all sites: L1-L4 lumbar spine, femoral neck and total hip was also higher at DXA at hyperleptinemia group (p<0.05 for each). Spearman correlation analysis confirmed associations between hyperleptinemia and harder course of knee OA: in instrumental examination more frequently was identified progressed stages of OA (r=0.37), osteitis of medial condyle of femur (r=0.41), smaller medial joint space narrow (r=-0.32) and greater osteophytes on the medial surface of femur (r=0.41) and tibia (r=0.36); Higher values of BMD in sites L1-L4 (r=0.35), femur neck (r=0.21) and total hip (r=0.41), (p<0,05 for each).

**Table 1.** Comparative characteristics of patients with OA who had and did not have hyperleptinemia

Parameter	Patients with hyperleptinemia (n=65)	Patients without hyperleptinemia (n=51)	p
Leptin, ng/ml, Me	44.4 (33.9-70.8)	17.2 (10.5-21.5)	<0.0001
Age, Me	58 (50 – 67)	53 (45-61)	0.06
X-ray grade K-L			
I,%	31.8	62.2	0.002
II,%	38.6	35.1	
III,%	29.5	2.7	
Medial knee joint space, mm, M±SD	2.77±1.2	3.48±1.06	0.001
Osteophytes on the femoral medial surface, mm, Me	4.5 (2.3-6.1)	1.7 (1.15-3.1)	0.015
Cartilage thickness in posterior-medialis area of knee joint, Me	1.4 (0.9-1.6)	1.5 (1.4-1.6)	0.04
Cartilage thickness in posterior-lateralis area of knee joint, mm, Me	1.4 (1.2-1.7)	1.7 (1.55-1.7)	0.02
Osteitis in medial condyle of femur,%	40	9.5	0.04
Osteitis in medial condyle of tibia,%	28.6	4.8	0.07
BMD L1-L4, g/cm <sup>2</sup> , M±SD	1.07±0.16	0.96±0.16	0.01
BMD femur neck, g/cm <sup>2</sup> , M±SD	0.81±0.16	0.74±0.1	0.05
BMD total hip, g/cm <sup>2</sup> , M±SD	0.95±0.15	0.86±0.1	0.006

**Conclusion:** In complex instrumental examination was demonstrated that the increased value of leptin is associated with most major structural changes in the knee at OA: higher prevalence of K-L III grade, greater osteophytes, higher frequency of osteitis in medial condyles of femur and tibia, higher BMD in three sites.

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#### OUTPATIENT REHABILITATION IN SARCOPENIC PATIENTS

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**Objective:** Sarcopenia is a progressive and generalized skeletal muscle disorder that affects the elderly and is associated with an increased risk of various disabilities falls, functional decline, frailty. Today, therapeutic exercise is the widely recommended nonpharmacological intervention in patients with sarcopenia. We evaluated the efficacy of a complex 12 weeks outpatient rehabilitation program (TENS, laser therapy - applied 3 times a week, the first 4 weeks, and functional task-oriented and aerobic exercises – 3 times a week, 12 weeks) for reducing symptoms and improving the quality of life in sarcopenic patients.

**Methods:** The study was a randomized controlled trial including two groups of old patients (G1 – study group, who followed complete rehabilitation program and G2 – control group, who received only TENS and laser therapy, applied 3 times a week, the first 4 weeks), homogeneous in terms of biographical, clinical and functional features. All patients were complete assessed – clinical, imagistic (DXA) and functional (Up and Go test, 6 MWD and SARC-F screening tool, consisting of five questions: Strength - S, Assistance walking - A, Rising from a chair - R, Climbing stairs - C, and Falls -F on a scale of 0 to 2.).

**Results:** We found that for the G1 there were very significant differences between the initial and the final values for all studied parameters (with Mann-Whitney test, p<0.05 for Up and Go test, 6 MWD and SARC-F), while for the control group the differences were not significant. Comparing, at baseline, we found that the differences are almost non-existent for all parameters. Finally, differences between lots become significant, with a Mann-Whitney test result pMW=0.011. Also, G1 patients obtained an improvement over a 20% minimal response to intervention that are functional important and not just statistically significant.

**Conclusion:** Standard physiotherapy procedures combined with kinetic program may considerably improve the level of pain and overall functional performance in sarcopenic patients. All kinetic recommendations should focus on patient preferences and daily needs. We consider that the association of physical therapy with the kinetic program facilitates the sensory-motor response by restoring the functioning and improving functional capacity and quality of life in sarcopenic patients.



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**GAIT ASSESSMENT IN KNEE OSTEOARTHRITIS FEMALES**O. Fugaru<sup>1</sup>, C. Kamal<sup>1</sup>, D. Kamal<sup>2</sup>, R. Traistaru<sup>1</sup><sup>1</sup>University of Medicine and Pharmacy, <sup>2</sup>Filantropia Hospital, Craiova, Romania

**Objective:** The most prevalent chronic joint disorder, knee osteoarthritis (KOA) is one of the main sources of gait related disabilities worldwide. All KOA females have reduced ability to perform activities of daily living and limited individuals' capacity to participate in social life. Despite individual gait patterns being characterized by significant variation, only three essential requirements are necessary for efficient locomotion: progression, postural control, and adaptation. This study aimed to determine the reference values of gait parameters as measured by a plantar pressure platform and inertial systems in KOA females.

**Methods:** We assessed 28 females with KOA and ages between 50-75 years. Gait performance was measured by P-WALK modular platforms system and BTS G-WALK. By using the G-WALK with a 5 minutes test, we obtained spatio-temporal parameters, the Walking Quality Index (WQI - a synthetic index that evaluate the correct maintenance of the correct proportions of stance and swing), Symmetry index (SI - the patient's ability to have an identical model of acceleration and deceleration of their centre of mass) and propulsion (the patient's ability to accelerate the centre of mass forward during the single left and right support phase).

**Results:** The prevalence of reporting knee pain was significantly greater in old women. Stride and step length, step width, and average foot pressure were significantly larger in the age group 50-60 years. There was a significant difference in the WQI and the SI between women under and over 65 years. By comparing the right and left value, we highlighted a lack of symmetry in the gait execution between the two sides.

**Conclusion:** The BTS G-WALK gives important information to plan rehabilitation in KOA female gait performing in real time. Thanks to the comparison tool, it is then possible to make a pre-post rehabilitation evaluation or follow the effects of a given therapy in the time.

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**AXIAL PSORIATIC ARTHRITIS: NEW ENTITY OR CLINICAL PHENOTYPE?**S. Abdellaoui<sup>1</sup>, S. Lefkir-Tafiani<sup>1</sup><sup>1</sup>Issad Hassani Beni Messous Hospital, Algiers, Algeria

**Objective:** The latest literature data increasingly emphasizes the axial involvement of psoriatic arthritis (PsA). The clinical and radiographic characteristics suggest that it is a new entity compared to the axial involvement of ankylosing spondylitis (AS), while therapeutic advances and cytokine targets suggest that it is a clinical form only. The objective of our study is to compare the characteristics of patients with axial PsA (axPsA) and axial

AS (axAS).

**Methods:** Patients 18 years old, with axPsA or axAS, during registration in the prospective monocentric register, between August 2012 and August 2022. A rheumatological investigation including clinical, laboratory and genetic assessments as well as imaging with conventional radiography of pelvic and spine was performed.

**Results:** Of 250 patients (58 PsA vs. 192 AS) with axial involvement, isolated axPsA patients were older at diagnosis (age of diagnosis of axial involvement was 35.8 vs. 29.4). Patients with isolated axPsA were more likely to have: Less clinical inflammatory back pain compared with patients with isolated axAS: less limited Schöber index (10/14 vs. 10/12), finger-to-ground distance often equal to 0 cm in axPsA, less contracture of the paravertebral muscles, less reduction in thoracic expansion (4 vs. 2 cm). Less limitation of inguinal pain (hip flexion 100 vs. 70), a higher dactylitis count  $\pm$ SD (0.3 $\pm$ 1.2 vs. 0.1 $\pm$ 0.8), more nail lesions which could suggest looking for an association between nail damage and the presence of dactylitis in PsA, less extensive skin psoriasis [PASI=2-13] and less presence of uveitis (18.96% (11/58) vs. 23.95% (46/192)). Human Leucocyte Antigen (HLA-B\*27) positivity was negatively associated with isolated axPsA disease (20 vs. 78%). AxPsA were less frequently had radiographic sacroiliitis with unilateral/asymmetric pattern [On the X-ray, the SI were either normal or slightly modified, deliberately asymmetrical, rarely grade 4, the syndesmophytes were most often asymmetrical, coarse and of lumbar location, the heels were affected in less severe involvement, most often represented by simple shielding] and average patients showed slight spinal/pelvic radiographic progression (OR: 0.14; 95%CI: 0.01, 0.58). Finally, AxPsA had lower BASDAI and HAQ scores (OR 0.10, 95%CI 0.01 to 0.47/ OR 0.03, 95%CI 0.00 to 0.17) and lower PRO evaluation (PRO spine pain 39.65 vs. 49.47% and PRO fatigue 50 vs. 52.6%).

**Conclusion:** Isolated axial PsA and AS are uncommon, axPsA has different clinical and radiographical characteristics when compared to AS. AxPsA is largely independent of HLAB27, it was associated with distinct radiographic ax AS features, increased spinal progression and low grade radiographic sacroiliitis as well as lower disease activity and impact scores.

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**A CASE OF ELDERLY PELVIC FRACTURE TREATED WITH ROBOT-ASSISTED MINIMALLY INVASIVE SURGERY UNDER LOCAL ANESTHESIA**L. Songyang<sup>1</sup>, L. Shen<sup>1</sup>, L. Yonghui<sup>1</sup>, W. Xing<sup>2</sup><sup>1</sup>Aerospace Center Hospital, <sup>2</sup>Aerospace, Beijing, China

**Objective:** Elderly pelvic fractures are a common orthopedic injury that can lead to significant morbidity and mortality. Minimally invasive surgery with the assistance of robotic system have gained popularity for treating these fractures. However, most of these surgeries were performed under lumbar or general anesthesia, which takes a long time and has high risks. Here, we present a case of a 96 year-old female patient with osteoporosis who sustained a pelvic fracture at home due to accidental fall and

was successfully treated with robotic-assisted minimally invasive surgery under local anesthesia.

**Methods:** The patient underwent a computed tomography (CT) scan, which revealed a displaced superior ramus of pubis and right ilium. The patient was deemed an appropriate candidate for minimally invasive robotic-assisted surgery under local anesthesia. A 3D-printed pelvic model was created to aid in preoperative planning and intraoperative navigation. Under local anesthesia, the robotic arm was used to guide the placement of percutaneous screws to achieve reduction and stabilization of the fractures.

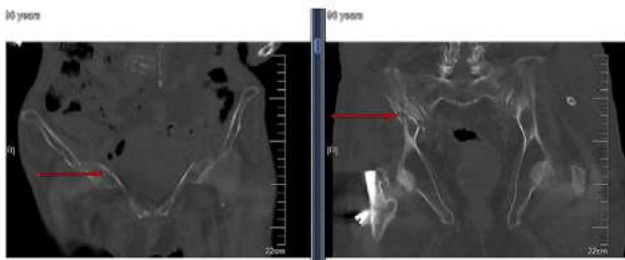
**Results:** Postoperatively, the patient reported decreased VAS score of 7 and was able to bear weight on the affected side with the assistance of crutches. Radiographic follow-up revealed satisfactory reduction of the fractures, and the patient had no post-operative complications.

**Conclusion:** Minimally invasive treatment of pelvic fractures using robotic assistance under local anesthesia is a safe and effective treatment option for selected patients. This is the first patient with a pelvic fracture treated under local anesthesia. The robot system can aid in preoperative planning and intraoperative navigation, which sets the stage for local anesthesia. The procedure significantly improves the accuracy and safety while reducing surgery time.

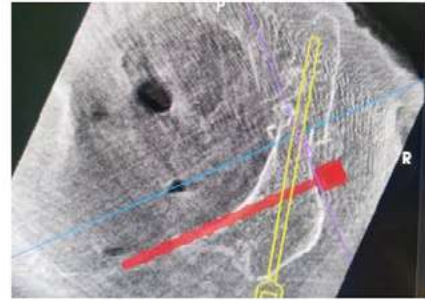
**Case presentation: 96y, female  
Preoperative X-ray demonstrate pelvic fracture**



**Preoperative CT revealed a displaced superior ramus of pubis and right ilium**



**Preoperative 3D CT plan by Ti-robot system**



**Intraoperative guidance**



**Postoperative Confirmation**



**One day after surgery**



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### TH9 CELLS ENHANCE RANKL MEDIATED OSTEOCLASTOGENESIS AND AUGMENTS BONE LOSS IN POSTMENOPAUSAL OSTEOPOROSIS

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**Objective:** Th9 cells are the most recently identified subset of T-helper cells which is recognized by its robust production of interleukin-9 (IL-9) cytokine. Various studies reported the potent role of Th9 cells in several pathological and auto-immune diseases including rheumatoid arthritis (RA), T1D etc. due to the pleiotropic nature of its signature IL-9 cytokine. However, the role of Th9 cells in modulating osteoclastogenesis and in the progression and development of osteoporosis has not been defined yet. The present study aims to examine the role of Th9 cells on osteoclastogenesis under estrogen-deficient osteoporotic conditions.

**Methods:** Firstly, to investigate the bone health modulating potential of Th9 cells co-culture between bone marrow cells (BMCs) and Th9 cells was carried out. TRAP staining was performed to evaluate the presence of multinucleated TRAP-positive osteoclasts. For *in vivo* experiments, C57BL/6 mice were divided into two groups: Sham (ovaries intact) and ovariectomy (Ovx-ovaries removed bilaterally). After 45 days, bone marrow (BM) and spleen, along with bones and blood were collected for assessing several osteo-immune parameters. Lastly, flow cytometry was done to evaluate the percentage of CD4<sup>+</sup>IL-9<sup>+</sup> Th9 cells in both BM and spleen. ELISA was done for serum cytokine analysis.

**Results:** Our *in vitro* BMCs and Th9 cell co-culture assays suggested that Th9 cells enhanced RANKL-mediated differentiation of osteoclasts in a cell ratio-dependent manner. Moving ahead we further explored whether Th9 cells plays any role in mediating inflammatory bone loss in ovariectomy-induced postmenopausal osteoporotic mice model (Ovx). Remarkably, we observed enhanced frequencies of CD4<sup>+</sup>IL-9<sup>+</sup> Th9 cells in both bone marrow (BM: prime site of osteoclastogenesis) and spleen thereby suggesting a pivotal role of Th9 cells in osteoporosis. Moreover, our serum cytokine data further suggests that levels of IL-9 cytokine were found to be profoundly enhanced in the case of osteoporotic mice with respect to control/sham mice. Additionally, our Pearson correlation analysis revealed that IL-9 cytokine levels are observed to be negatively correlated ( $r=-0.6$  &  $p<0.01$ ) with BMD. Moving ahead, we next determined the percentage of CD4<sup>+</sup>IL-9<sup>+</sup> Th9 cells in PBMCs of osteoporotic patients and our flow cytometry data clearly demonstrated a significant enhancement in the number of Th9 cells in postmenopausal osteoporotic patients which were positively correlated with the bone resorbing biochemical marker (TRAP). Altogether, both our pre-clinical and clinical data clearly establish the osteoclastogenic and osteoporotic role of Th9 cells under estrogen-deficient conditions.

**Conclusion:** The present study for the first time demonstrates the osteoclastogenic role of Th9 cells under estrogen-deficient osteoporotic conditions, thereby further attesting to the growing involvement of the immune system in the pathophysiology of os-

teoporosis, i.e., "immunoporosis" (a field coined and proposed by our group in 2018).

**Acknowledgment:** This work was financially supported by DBT(BT/PR41958/MED/97/524/2021) and an Intramural project (A-939) from the All-India Institute of Medical Sciences (AIIMS), New Delhi-India sanctioned to RKS.

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### LABORATORY ABNORMALITIES BUT NOT CLINICAL PRESENTATION CAN HELP DIFFERENTIATE MULTIPLE MYELOMA FROM MONOCLONAL GAMMOPATHY OF UNCERTAIN SIGNIFICANCE AT PRESENTATION WITH VERTEBRAL COMPRESSION FRACTURE

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**Objective:** Both multiple myeloma (MM) and its precursor monoclonal gammopathy of uncertain significance (MGUS) can present with compression fracture. This study examines factors that differentiate MGUS and MM at the time of presentation with subacute vertebral compression fracture (SVCF).

**Methods:** Retrospective chart review of clinical and laboratory parameters of patients presenting to an outpatient osteoporosis clinic that were diagnosed with either MGUS or MM at the time of presentation with SCVF.

**Results:** There were 55 patients with MGUS and 11 with MM. The average age of MGUS patients was 79.9 years (70-96) with 56% female and in the MM group 75 years (63-80) with 45% female. In the MGUS group 18 had a history of cancer, 17 had a previous major osteoporotic fracture, 12 presented with multiple fractures, 12 were above T-8, 12 were spontaneous, compared to 2, 1, 4, 4, 4, in the MM group. These differences were not statistically significant. 5 of the MM patients had either anemia, hypercalcemia or elevated creatinine compared to 7 MGUS ( $p<0.014$ ), but there was no significant difference when comparing individual abnormalities in calcium, creatinine, or anemia in the two groups. No MGUS patient had a total protein  $>8.5$  g/dl, total globulin  $>4$  g/dl, albumin/globulin (A/G) ratio  $<1.1$ , an M-spike  $>2$  g/dl, or a suppressed immunoglobulin class. Among MM patients: 8 had M-spike  $>2$  g/dl, 5 had total protein  $>8.5$ g/dl, 7 had abnormal A/G ratio, and 7 had suppressed immunoglobulins. All these values differed statistically  $p<0.0003$  (Fisher's exact test). Only 1 MM patient did not have one of these distinguishing lab abnormalities. Despite negative pathology at the time of kyphoplasty, a diagnosis of MM was pursued due to clinical suspicion based on age 63 years, IgA paraprotein, and fracture location at T5. The diagnosis of MM was subsequently made with bone marrow aspiration. One patient had light chain myeloma.

**Conclusion:** Abnormalities found on serum protein electrophoresis and suppression of immunoglobulin class can differentiate between MM and MGUS presenting at the time of SVCF. Immunofixation is the appropriate test to rule out MGUS and MM in patients with SVCF. Despite all these predictive laboratory val-

ues differentiating MM and MGUS at the time of clinical presentation with SCVF, there remains a role for clinical judgment.

## P401

### EFFICACY OF REPETITIVE PERIPHERAL MAGNETIC STIMULATION ON PAIN REDUCTION IN KNEE OSTEOARTHRITIS

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**Objective:** To study the efficacy of repetitive peripheral magnetic stimulation (rPMS) on pain reduction in knee osteoarthritis

**Methods:** Study design: double-blind randomized controlled trial. Setting: physical medicine and rehabilitation outpatient clinic of Ramathibodi hospital. Participants: 28 patients with primary knee osteoarthritis, Kellgren-Lawrence classification (KL) 2-3, and Visual analog scale (VAS) more than 4 out of 10. Patients were randomized into 2 groups, 14 patients each. rPMS group received 3 sessions of magnetic stimulation 6,000 pulses, frequency 20 Hz, intermittent protocol with 10s on and 30s off time, total time 20 min at knee joint. Control group received 3 sessions of sham magnetic stimulation at knee joint. Both groups received instruction about exercise and lifestyle modification. VAS and Thai version of modified WOMAC were measured before treatment and one week after complete 3 sessions treatment.

**Results:** 28 patients participated in this study with mean aged (SD) of 62.67 (6.30) years, KL 2 and 3 were 14 patients equally. Baseline characteristic data (age, sex, BMI, duration, severity, baseline VAS and modified WOMAC) were no statistically significant difference between group. At the end of the study showed statistically significant improvement of VAS and modified WOMAC in both groups. However, when compared efficacy of treatment between rPMS and control group, measured by the decrement of VAS and WOMAC score showed no statistically significant difference. The mean(SE) decrement of VAS between baseline and one week after treatment of rPMS and sham group were 2.01(0.41) and 1(0.40) respectively. The mean(SE) decrement of modified WOMAC between baseline and one week after treatment of the rPMS and sham group were 42.06(9.85) and 24.69(9.53) respectively. Exercise compliance and pain medication showed no statistically difference between group.

**Conclusion:** Three sessions rPMS intermittent stimulation 6,000 pulses, frequency 20 Hz, 20 min can improve pain and function in primary knee osteoarthritis patient but no statistically difference when compared to sham group.

## P402

### EFFICACY OF OSTEOPOROSIS TREATMENTS IN MEN: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** To systematically identify and review efficacy of osteoporosis interventions in men.

**Methods:** The electronic databases Medline (via Ovid) and Cochrane CENTRAL were searched up to September 2022 for any randomized controlled trial evaluating the efficacy of osteoporotic treatment on the evolution of BMD and incidence of fractures of men suffering from primary osteoporosis. Study selection and data extraction were carried out by two independent researchers. Quality of individual studies was measured using the Cochrane Risk of Bias tool 2.0 and strength of evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) tool. If at least two studies using the same pharmacological treatment and evaluated the same outcome were available, a random effect model meta-analysis was applied to reported pooled mean difference (MD) and 95%CI. Heterogeneity was measured using Cochran's Q and I<sup>2</sup> statistics. The Egger's regression asymmetry test was used to detect publication bias.

**Results:** From the 1,124 studies identified through bibliographic search, 21 RCTs fitted the inclusion criteria. Studies were rated with uncertain or low risk of bias. Bisphosphonates (k=10, n=2,992 men with osteoporosis; alendronate k=5, risedronate k=2, zoledronic acid k=2, ibandronate k=1) improved all three BMD sites compared to placebo; lumbar spine: MD +4.75% (95%CI 3.45,6.05); total hip: MD +2.72% (95%CI 2.06;3.37); femoral neck: MD +2.26% (95%CI 1.67;2.85). Publication bias were not detected (Egger test p>0.05). Denosumab (k=2, n=242), teriparatide (k=2, n=309) and abaloparatide (k=2, n=248) also produced significant improvement of all sites BMD compared to placebo (p-values of MD <0.05). Romosozumab was only identified in one study (reporting significant improvement compared to placebo) and was therefore not meta-analysed. Incidence of fractures was reported in 16 RCTs but only four of them reported fractures as the primary outcome. Treatments were associated with a lower incidence of fractures (median of vertebral fracture risk of 1.7% in the treatment group vs. 4.1% in the placebo group).

**Conclusion:** Medications used in the management of osteopo-

rosis in women appear to provide a similar benefit in men with osteoporosis. Therefore, the algorithm for the management of osteoporosis in men could be identical to the one previously recommended for the management of osteoporosis in women, i.e. anti-resorptive agents in men at high risk of fracture and bone forming agents followed by anti-resorptive agents in men at very high risk of fracture.

**P403**  
**A PROSPECTIVE STUDY TO EVALUATE PATIENT-REPORTED QUALITY OF LIFE PRIOR TO AND AFTER ASFOTASE ALFA TREATMENT IN ADULTS WITH PEDIATRIC-ONSET HYPOPHOSPHATASIA**

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**Objective:** To evaluate the impact of asfotase alfa (AA) on patient-reported outcomes (PROs) in adults with pediatric onset hypophosphatasia (HPP).

**Methods:** A longitudinal telephone-based survey was administered to adults with pediatric onset HPP at baseline (BL, prior to AA initiation) and follow-up (3 [3M] and 6 months [6M] post-initiation). Demographics and PROs (Patient Health Questionnaire-9 [PHQ-9], Patient-Reported Outcomes Measurement Information System [PROMIS-29], Routine Assessment of Patient Index Data 3 [RAPID3], and Work Productivity and Activity Impairment - Specific Health Problem [WPAI-SHP]) were assessed. McNemar's or Cochran-Mantel-Haenszel tests or paired t-test were performed, as appropriate.

**Results:** Among 50 enrolled patients, 40 were evaluable at 6M. Mean age at BL was 46 (±15.4) years; 80% were female. At 6M, there was a statistically significant improvement from BL for PHQ-9 total score (10.6 at BL vs. 4.7 at 6M, p<0.0001), PROMIS-29 domain scores (physical functioning: 38.0 vs. 44.6, p<0.0001; anxiety: 57.5 vs. 49.4, p<0.0001; depression: 52.6 vs. 46.6, p=0.0005; fatigue: 63.3 vs. 51.9, p<0.0001; sleep disturbance: 58.8 vs. 52.3, p=0.0002; social roles and activities: 42.6 vs. 50.4, p<0.0001; pain interference: 63.8 vs. 56.7, p<0.0001), and RAPID3 domain scores (functional status: 2.7 vs. 1.6, p=0.001; pain tolerance: 6.0 vs. 3.6, p<0.0001; global health estimate: 5.1 vs. 3.1, p<0.0001). WPAI-SHP domains showed significant improvement at 6M in absenteeism (4.7% vs. 0%, p=0.025), presenteeism (39.6% vs. 14.1%, p<0.0001), activity impairment (64% vs. 28.1%, p<0.0001), and work productivity loss (41.9% vs. 14.1%, p<0.0001). Most patients (84.1%) remained on AA at 6M.

**Conclusion:** These data illustrated the benefits of AA in reducing patient burden and relevance of PROs in practice.

Overview of Patient-Reported Outcomes Questionnaires Collected in the Study				
Information	Patient Health Questionnaire-9 (PHQ-9)	Patient-Reported Outcomes Measurement Information System (PROMIS-29)	Routine Assessment of Patient Index Data 3 (RAPID3)	Work Productivity and Activity Impairment - Specific Health Problem (WPAI-SHP)
Concept of Interest	Depression	Health-related quality of life	Disease activity	Functional productivity and activity impairment
Recall period	Last 2 weeks	<ul style="list-style-type: none"> <li>Physical Functioning (4 items)</li> <li>Anxiety (4 items)</li> <li>Depression (4 items)</li> <li>Fatigue (4 items)</li> <li>Sleep Disturbance (4 items)</li> <li>Ability to participate in Social Roles and Activities (4 items)</li> <li>Pain Interference (4 items)</li> <li>Pain Intensity (3 items)</li> </ul>	<ul style="list-style-type: none"> <li>Over the last week for Physical Function and Pain</li> <li>At this time for Patient Global Estimate</li> </ul>	Last 7 days
Domains covered	Unidimensional	<ul style="list-style-type: none"> <li>Physical Functioning (4 items)</li> <li>Anxiety (4 items)</li> <li>Depression (4 items)</li> <li>Fatigue (4 items)</li> <li>Sleep Disturbance (4 items)</li> <li>Ability to participate in Social Roles and Activities (4 items)</li> <li>Pain Interference (4 items)</li> <li>Pain Intensity (3 items)</li> </ul>	<ul style="list-style-type: none"> <li>Physical Function (3 items)</li> <li>Pain (1 item)</li> <li>Patient Global Estimate (1 item)</li> </ul>	<ul style="list-style-type: none"> <li>Work Productivity (7 items)</li> <li>Daily Activities (3 items)</li> </ul>
Score range	<ul style="list-style-type: none"> <li>Range: 0-27</li> <li>PHQ severity categories: minimal (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), severe (20-27)</li> </ul>	Standardized T-score with a mean of 50 and a standard deviation of 10	<ul style="list-style-type: none"> <li>Range: 0-10</li> <li>RAPID3 qualitative descriptive categories: none/minimal (0-3), low severity (1, 2, 3), moderate (2, 3, 4), high (4, 5, 6, 7, 8)</li> </ul>	Scores are multiplied by 100 to be expressed as impairment percentages
Directionality	Higher = More severe symptoms	Higher = Better health-related quality of life	Higher = More severe symptoms	Higher = Greater impairment

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**P404**  
**RESULTS OF REHABILITATION OF MULTIPLE SCLEROSIS PATIENTS**

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**Objective:** 110 multiple sclerosis patients were examined

**Methods:** Long term results of treatment of multiple sclerosis were studied. The dynamic monitoring of 110 patients over the period of 1 to 1.5 years following the successful in-hospital treatment of MS was carried out. Clinical methods, CT and MRI of cerebrum and spinal cord, and a patented radioimmunobiological assay of the myelinotoxic activity (MTA) of blood serum were used.

**Results:** Four groups of patients were distinguished: group 1 (36 patients; 32.7%) - patients with low MTA level (4.56±0.7 units) after successful hormone therapy. No rehabilitation was required out afterwards. Group 2 included 41 patients (37.3%) with low MTA level (3.76 ±0.81) after hormone and corrector therapy; a rehabilitation course was carried out at a later stage. Group 3 consisted of 22 patients (20.0%) that required long term immunomodulating therapy due to a higher rate of demyelination (MTA=19.2±0.43). The remaining 11 patients (group 4, 10.0%) with moderate rate of demyelination (16.4\*0.52) were prescribed general health improvement therapy and rehabilitation based on intensive motional activity and physical exercise.

**Conclusion:** Hormone therapy helps to reduce the demyelination rate to acceptable level within 2-4 months. The subsequent rehabilitation helps to achieve the extended remission period. However, long time after treatment of acute MS the hormone therapy is not justified.

P405

### PROMOTION OF SELF-MANAGEMENT IN PATIENTS WITH CHRONIC CONDITIONS, INCLUDING MUSCULOSKELETAL CONDITIONS, AND MEDICATION ADHERENCE: A REFLECTIVE STUDY

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**Objective:** The population worldwide is aging. Chronic diseases, such as hypertension, strokes, diabetes, cancer, and musculoskeletal diseases like arthritis and osteoporosis, are estimated to cause the majority of premature deaths and disability among working-age people. According to the patient's perspective, intentional nonadherence to medication is the most prevalent. Intentional nonadherence is considered a process in which the patient actively decides not to take medication, presumably having weighed the costs and benefits of treatment. Even if patients with musculoskeletal conditions have a lower likelihood of poly-pharmacy than those with cardiometabolic conditions, increased monitoring for adverse drug interactions is also recommended in this group. Chronic condition self-management has grown significantly in importance in recent years, as it has become increasingly recognised as a strategy that may assist struggling healthcare systems in cutting costs. The aim of this study was to examine educational practices for self-management in patients with chronic conditions, including medication adherence, that health care professionals (physicians, nurses, and pharmacists) can implement in their daily practice to empower their patients and improve their knowledge and ability.

**Methods:** A reflective research approach was used to review the self-management literature in order to find and determine the best way to implement affordable methods and strategies that promote self-management among chronic patients, with the goal of reducing the effects of intentional nonadherence to medication.

**Results:** There is a wide range of data available on techniques that encourage self-management of chronic illnesses and can be quickly implemented to increase drug adherence in settings with limited resources. We chose the health coaching approach since the teach-back technique resulted in a cost-effective instrument for health education and because it significantly improved patient health.

**Conclusion:** To improve medication adherence in chronic conditions, different and individualised educational approaches should be used.

P406

### CLINICAL AND EXPERT ASSESSMENT OF SLEEP DISORDERS IN PATIENTS WITH DISCIRCULATORY ENCEPHALOPATHY

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**Objective:** 105 patients with dyscirculatory encephalopathy (hypertonic, atherosclerotic, mixed) of various age groups of stages 1, 2, 3 (initial level) of the disease were examined; 71 (68.0%) men and 34 (32.0%) women who had sleep disorders in their clinical picture.

**Methods:** Clinical and expert study of sleep disorders.

**Results:** In 24.7% of cases, insomnia symptoms occurred 3 times a week, in 75.3% - more than three times. Dissatisfaction with the quality of sleep was noted in 36.2% of the examined, 61.9% of patients regularly used sleeping pills. In 62.9% of cases, sleep disorders were accompanied by organic anxiety disorder, organic anxiety-depressive disorder. Sleep disturbances, manifested as difficulty falling asleep, frequent nocturnal awakenings, early awakening, or feeling of inadequate sleep (despite its normal duration) were among the constant complaints of patients in the first and second stages of encephalopathy, in the third stage the significance of this symptom decreased. Patients with encephalopathy, in the genesis of which arterial hypertension lay, fell asleep with difficulty, superficial sleep, with disturbing dreams; constant lack of sleep was accompanied by a feeling of weakness, headache, fatigue, bad mood. With dominant atherosclerotic dyscirculatory encephalopathy, patients were characterized by early morning awakenings; sleep disturbances were associated with drowsiness, fatigue during the daytime, and a decrease in social daily activities. With the progression of encephalopathy (primarily aggravation of vertebralbasilar insufficiency, chronic ischemia of the reticular formation of the brain stem), in addition to diagnosable insomnia, the sleep circadianity is disturbed, accompanied by irresistible daytime sleepiness.

**Conclusion:** A clinical and expert study of sleep disorders related to persistent subjective symptoms of vascular encephalopathy, which is not a violation, which is the basis for the establishment of disability.

P407

### ASSESSMENT OF THE RISK OF DISABILITY FORMATION IN PATIENTS WITH TRAUMATIC AND COMPRESSION-ISCHEMIC NEUROPATHIES

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A clinical and functional study of 42 patients was carried out. First of all, such factors as the presence and high functional class (FC>1) of the severity of the main (deficit) neurological syndrome, low dynamics of restoration of impaired functions during treatment and rehabilitation had a high significance in the development of disability in the late recovery period; inability to perform professional work in their previous profession. In the course of the study, it was found that the significance of individual factors in different periods of the disease is unequal, if in the acute and recovery period of the disease the significance of medical factors is higher, then in the long-term period the role of social (professional) factors is higher. In a number of cases, patients had difficulties in implementing an individual rehabilitation program in terms of fulfilling labor recommendations, which was especially true for individuals. employed in labor with a high role of physical labor, forced position of the body, prescribed pace of work. The psychological characteristics of patients played a certain role in reducing the rehabilitation potential and prolonging disability. In cases of psychopathological disorders caused by situational influence (injury as a result of a traffic accident, occupational disease) with FC1 and above, as the pathological process stabilized due to damage to nerve structures, the pain process gradually became chronic, the role of psychopathological and psychovegetative disorders in the formation of disability increased. The factors determining the reduction of the rehabilitation potential and the formation of disability in patients with traumatic and compression ischemic neuropathies at different periods of the disease are established.

P408

### THE PROGRAM OF REHABILITATION TRAINING OF THE HAND USING AN EXPANDER IN PATIENTS WITH TRAUMATIC AND COMPRESSION-ISCHEMIC NEUROPATHIES

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**Objective:** 34 patients with flaccid peripheral paresis of varying severity were examined.

**Methods:** Assessment of stato-dynamic violations using codes ICF.

**Results:** The complex includes a number of sequentially performed exercises: simple alternate dynamic compression of the expander with a brush; squeezing the expander with a brush is tonic (squeezing the expander with a brush with a delay-pause for 5s

at the moment of compression); extensor training (the expander is squeezed with a brush, then in the position of the compressed expander, flexion and extension movements are performed in the wrist joint); yielding holds (the expander is squeezed with a brush, then slowly unclenched for 5 seconds); finger training (the expander is held and compressed using only the terminal phalanges of the fingers, the fingers of the hand are as far apart as possible); holding the expander for the maximum time (the expander is compressed with a brush and held compressed for the maximum time). For training, various types of expanders are used (according to the material of manufacture, shape, surface, various degrees of resistance to compression), which are selected by a specialist at the stage of rehabilitation diagnostics of the hand function. The exercise is performed alternately - with a healthy and affected hand. The pace of movements is slow, with the transition to the average after the 5th workout (selected individually); the number of repetitions is from 5-10 times in the first classes to 10-20 times in the future. Breathing is arbitrary. Rest after each exercise with an expander for 1-2 minutes.

**Conclusion:** A program has been developed for rehabilitation trainings of the hand using an expander in patients with a mild severity of peripheral flaccid paresis caused by traumatic and compression-ischemic neuropathies.

P409

### SOME ASPECTS OF REHABILITATION FOR PATIENTS WITH LOW BACK PAIN

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**Objective:** Examination of 78 patients with myotonic (MT) syndrome of lumbar osteochondrosis. Aim: aspects of rehabilitation for patients with low back pain. **Methods:** Patients went through the clinical estimation of neurologic status, manual testing of muscles, CT and MRI of back bone lumbar department, interferential and needle electromyography of the most damaged muscular groups, dosed loading veloergometry, revasography of feet, and shins. **Results:** It was established for the first time, that among MT-syndrome patients 54 (69,2%) an associated damage of two or more muscles prevailed. The most damaged ("key") muscles appeared to be gastrocnemius muscle (43; 55,1%), gluteus medius (42; 53,82%), quadriceps femoris (36; 46,2%), rectus abdominis and external oblique (32; 41,1%), peroneal muscle (29; 37,2%), piriform muscle (29; 37,2%), lumbar quadratus muscle (28; 35,9%), gluteus maximus (19; 24,3%), gluteus minimus (16; 20,5%), adductor (14; 17,9%) and abductor (9; 11,5%) thigh muscles. Medical-rehabilitation complex on damaged extremity was approbated in 27 patients with MT syndrome. The complex included oral reception of katadolon (100 mg 3 times a day for 10 d), tractions on Fintrac-471 table (with force from 3 to 55 kg, a course of 8-10 sessions) and also acupuncture with use acupuncture points of general action with vascular autonomic nervous system orientation (G14, MJ6, E36, RP6, TR5, V40) and locally-segment-

ed points on the most damaged muscular groups (AT60, VB30 with deep introduction to piriform muscle; VB 34, VB41, F3)  
**Conclusion:** After treatment damaged extremity pain has completely disappeared in 19 patients.

## P410 REHABILITATION AND DIAGNOSTIC ASSESSMENT OF HAND FUNCTION IN PATIENTS WITH NEPHROPATHIES

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We evaluated the function of the hand in 34 patients with the presence of flaccid peripheral paresis of varying degrees of severity. For each patient, a profile was compiled for assessing the hundred-todynamic disorders using the codes of the "International Classification of Functioning, Disability and Health" and quantitative ranking by functional classes (FC). The assessment of the topographic localization showed that the median nerve lesion was most often noted (16 people; 47.1%), neuropathy was somewhat less frequent elbow (10 people; 29.4%) and radial (8 people; 23.5%) nerves. Evaluation of static-dynamic disorders included a quantitative assessment of proprioceptive function (b260), the functions of touch (b265), sensory functions related to temperature and other stimuli (b270), sensation of pain (b280), the functions of the mobility joint (b710), muscle strength (b730), muscle tone (b735), combined motor and reflex functions (b750). Additionally, the results of dynamometry were evaluated, the patient's ability to perform daily activities using brushes: the ability to touch with fingers, pinch, lift, hold, move an object, etc.

Patients with mild disorders – 14 people, 41.2% (FC1), practically did not differ from healthy individuals and did not experience difficulties with ball, cylindrical, pinch grip, rough movements. In a group of 18 patients (52.9%) with moderate motor disorders (FC2), difficulties occurred when necessary a pinch grip using the 4th and 3rd finger, with the use of a cylindrical grip associated with holding and manipulating an object larger than 200 g (in some cases, if it is necessary to hold cylindrical objects with a diameter of less than 2 cm), with a ball grip and holding objects with a diameter of more than 5 cm and weighing more than 200 g. Patients with severe motor disorders – 2 people. 5.9% (FC3) experienced severe difficulties with all types of grips (ball, cylindrical, pinch), could not carry out rough movements associated with palm manipulation. Among all types of capture, there was a tendency to implement cylindrical capture of objects with a diameter of more than 4 cm, but long-term and strong retention of objects was significantly difficult. The proposed method can be used both to solve medical examination issues and to assess the effectiveness of rehabilitation. **Conclusion:** A method for assessing the manipulative function of the hand in patients with traumatic and compression-ischemic neuropathies has been developed. Clinical and functional diagnostics of 34 patients with the presence of flaccid peripheral paresis of various degrees of severity was performed. It is advis-

able to use the assessment method to solve the issues of medical expertise, as well as to assess the effectiveness of rehabilitation

## P411 ASSESSMENT OF GAIT STEREOTYPE FUNCTION IN PATIENTS WITH TRAUMATIC AND COMPRESSION ISCHEMIC NEUROPATHIES

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A clinical and functional analysis of the function of the gait stereotype (b770) was carried out in 36 patients using quantitative criteria of the "International Classification of Functioning, Disability and Health" and quantitative ranking. The assessment of topographic localization showed that the most often there was a lesion of the fibular nerve (18 people, 50.0%), somewhat less often neuropathy of the tibial (10 people, 27.7%) and sciatic (8 people, 22.3%) nerves. The following data were obtained during the study: - b770.0. No violations (0-4%). Patients complained of a slight violation of walking (on an uneven surface, 131 accelerated steps). Objectively, there are no visible violations of walking (including on the toes and heels, tandem). The number of single steps per 100 m is 80-120 steps, the number of steps per 1 minute - 80-100 steps, the duration of a double step (the time for which the patient carries and puts his foot) is 1-1.3 seconds, the walking rhythm coefficient is 0.94-1.0 seconds. The speed of movement is 4-5 km/h. - b770.1. Minor violations (5-24%). Visually, there is a limp on the paretic leg. An increase in the number of steps when walking 100 meters to 150-160, an increase in the duration of a double step to 1.5-1.7 seconds, a decrease in the pace of walking to 64-70 steps per minute, a decrease in the rhythm of walking to 0.85-0.90, reduced travel speed to 3.0 km/h. Walking on toes and heels is slightly difficult. - b770.2. Moderate violations (25-49%). Visually, a paretic gait is noted. An increase in the number of steps when walking 100 meters to 170-190, an increase in the duration of a double step to 2.0-3.0 seconds, a decrease in the pace of walking to 50-60 steps per minute, a decrease in the rhythm of walking to 0.82-0.75, a moderate decrease in the speed of movement to 2.0 km / h. It is impossible to walk on toes and heels. - b770.3.1. Severe violations (50-75%). Paretic gait. An increase in the number of steps when walking 100 meters to 204-226, an increase in the duration of a double step to 2.6-3.6 seconds, a decrease in the pace of walking to 29-46 steps per minute, a decrease in the walking rhythm coefficient to 0.52-0.58, a decrease in the speed of movement to 1.0 km / h. Orthosis or orthopedic shoes are used to fix the limb and facilitate movement. - b770.3.2. Severe violations (76-95%). Gait is grossly impaired with significantly slower movement. Orthosis or orthopedic shoes are used to fix the limb and facilitate movement, support during movement, or partial support accompanying person (when turning, moving from office to office through the threshold). - b770.4. Absolute violations (96-100%). The patient does not move independently. **Conclusion:** A clinical and functional analysis of the gait stereotype function was carried out in 36 patients with traumatic and



compression-ischemic neuropathies using quantitative criteria for the purpose of medical examination and rehabilitation diagnostics.

## P412

### PATHOGENESIS OF COGNITIVE NEUROSIS-LIKE DISORDERS IN PATIENTS WITH INITIALLY CHRONIC VIRAL ENCEPHALITIS

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**Methods:** Brain MRI, research of cerebrospinal fluid and its dynamic, definition of a spectrum of 20 basic amino acids in blood serum and liquor.

**Results:** 126 patients with initial chronic viral encephalitis were surveyed. The most significant and informative appeared the decrease in free amino acids: serine ( $5,12 \pm 0,15$  mg/l;  $P < 0,01$ ), glycine ( $6,59 \pm 0,2$  mg/l;  $P < 0,001$ ), histidine ( $5,11 \pm 0,12$  mg/l;  $P < 0,05$ ), alanine ( $12,93 \pm 0,12$  mg/l;  $P < 0,001$ ), arginine ( $5,62 \pm 0,09$  mg/l;  $P < 0,001$ ), tyrosine ( $5,08 \pm 0,09$  mg/l;  $P < 0,001$ ), methionine ( $2,19 \pm 0,12$  mg/l;  $P < 0,001$ ), phenylalanine ( $3,36 \pm 0,14$  mg/l;  $P < 0,001$ ), lysine ( $6,94 \pm 0,17$  mg/l;  $P < 0,001$ ), leucine ( $4,64 \pm 0,14$  mg/l;  $P < 0,001$ ), threonine ( $6,2 \pm 0,14$  mg/l;  $P < 0,001$ ), glutamic acids ( $2,99 \pm 0,16$  mg/l;  $P < 0,001$ ) at simultaneous increase in concentration of tryptophan ( $7,36 \pm 0,12$  mg/l;  $P < 0,001$ ). Among the connected amino acids in CMK the reliable increase, in comparison with control group healthy participants was observed, glycine ( $11,44 \pm 0,13$  mg/l;  $P < 0,001$ ), histidine ( $6,12 \pm 0,11$  mg/l;  $P < 0,001$ ), methionine ( $5,86 \pm 0,07$  mg/l;  $P < 0,01$ ), lysine ( $19,42 \pm 0,16$  mg/l;  $P < 0,001$ ), leucine ( $18,94 \pm 0,14$  g/l;  $P < 0,01$ ), threonine ( $18,94 \pm 0,14$  mg/l;  $P < 0,001$ ), glutamic acids ( $9,69 \pm 0,17$  mg/l;  $P < 0,001$ ).

**Conclusion:** In pathogenesis of cognitive neurosis like disorders in patients with initial chronic viral encephalitis the great importance has the decrease in content of the majority free and bonded amino acids in cerebrospinal fluid and blood serum (alanine, glycine, glutamic acids, leucine, methionine, threonine, tryptophan, phenylalanine) at simultaneous increase of tryptophan, that it must be considered at carrying out of therapeutic actions.

## P413

### COMPARISON OF THE TASTE AND ACCEPTABILITY OF A NEW HIGH PROTEIN ICE CREAM (NOTTINGHAM-ICE CREAM) WITH STANDARD HOSPITAL MILKSHAKE ORAL NUTRITIONAL SUPPLEMENT IN OLDER PEOPLE WITH FRAGILITY FRACTURES

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**Objective:** Oral nutritional supplement (ONS) prescription is commonly recommended to malnourished patients in hospital. However, compliance is often low. Ice cream may be a promising nutritional intervention. However, standard ice cream in hospital is low in energy and protein. There is no ice cream nutritional supplement available for patients in the UK. Therefore, we developed our own. We aimed to compare the acceptability of new high protein, fortified, ice cream called Nottingham-Ice Cream (N-ICE CREAM) with routinely prescribed milkshake ONS.

**Methods:** Fifty older ( $\geq 65$  years) inpatients with hip or spine fractures were recruited from Queens Medical Centre, Nottingham. Patients were randomised into two groups, receiving two days of N-ICE CREAM (one 80 g tub comprising 155 kcal, 15.4 g protein) and milkshake ONS day (one bottle comprising 125 ml, 300 kcal and 18 g protein). Group A received N-ICE CREAM first and Group B, milkshake ONS first. We measured compliance, acceptability (hedonic characteristics; rating 0 dislike a lot to 7 like a lot), attitudes towards length of prescription (rating 0 very unconfident to 4 very confident) and preference.

**Results:** Mean (standard deviation, SD) age of patients was 80.6 (7.7) years. The majority ( $n=21$ , 67.7%) preferred N-ICE CREAM. Mean compliance to N-ICE CREAM was greater in both Groups (Group A ( $n=22$ ) 69.9 (30.0)% and Group B ( $n=26$ ) 56.3 (39.3)%) compared to the milkshake ONS (Group A ( $n=22$ ) 43.4 (4.7)% and Group B ( $n=26$ ) 53.6 $\pm$ (40.2)%). This was statistically significant in Group A ( $p < 0.05$ ). Mean hedonic ratings were higher for N-ICE CREAM with an overall impression score of 5.8 compared with 4.6 for milkshake ONS. Confidence score for both products decreased with increasing time length. Both had an overall confidence score of 2.9.

**Conclusion:** High protein N-ICE CREAM is more accepted and preferred by older patients with a hip or spine fracture compared to standard milkshake ONS. Further, research should explore optimal timing for N-ICE CREAM administration and long-term compliance, as well as clinical outcomes.

## P414

### IMPROVING FRACTURE PREDICTION IN PATIENTS WITH OSTEOPOROSIS USING MACHINE LEARNING TECHNIQUES: A NATIONWIDE, REGISTRY-BASED COHORT STUDY

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Switzerland

**Objective:** Fracture prediction is essential for the adequate treatment of patients with osteoporosis and might be improved by using machine learning techniques. The aim of this study was to analyse the performance of different machine learning models and to identify the most relevant clinical factors for fracture prediction.

**Methods:** This prospective, multicentre cohort study analysed a prognostic fracture risk- prediction model using clinical risk factors, T-scores, trabecular bone score (TBS) and treatment information from subjects in the nationwide Osteoporosis Registry of the Swiss Society of Rheumatology. Survival analysis was used to predict the 2-year risk of vertebral, hip, wrist and any fractures in a training subset. The C-index was estimated in the test set to evaluate the quality of the model using cumulative or dynamic areas under the curve, and was compared with the performance of state-of-the-art machine learning techniques such as Random Survival Forest and eXtreme Gradient Boosting with an accelerated failure time model.

**Results:** A total of 15,383 postmenopausal women (mean age 68±9 years) with 26,986 DXA scans and clinical visits were enrolled between January 2015 and October 2022. Of these women, 6,202 were followed-up for a median of 4.1 years [2.7 to 6.0]. During follow-up, 1,227 women suffered a fragility fracture, including 902 fractures within 2 years of follow-up. The C-index for fracture prediction for this 2-year follow-up period reached 0.68 for vertebral fracture, 0.76 for hip fracture and 0.67 for any fracture, and further increased with longer follow-up periods of up to 7 years. In comparison, the 10-year fracture prediction C-index calculated with FRAX® Switzerland was 0.61 for major osteoporotic fracture and 0.66 for hip fracture. The five most important variables in the Lasso-Cox model were age, bone density and prevalent fracture. In addition, TBS was relevant for vertebral and wrist fractures, while the number of falls was an important predictor of hip and wrist fractures. The T-score at the lumbar spine predicted vertebral fracture, while the T-score at the hip predicted vertebral, hip and wrist fractures.

**Conclusion:** Fracture risk prediction by FRAX can be improved by modifying fracture prediction models to include the T-score at the lumbar spine, TBS, number of falls and recent fractures. Age, low BMD and prevalent fracture were the strongest predictors of both vertebral and non-vertebral fractures in this cohort of postmenopausal women.

**Table 1.** Top five features of the Lasso-Cox model. These features were obtained by performing incremental feature selection, where the lasso algorithm was limited to five features only. Thus, it represents which variables were considered most important in the model. "Recent fracture" is a subgroup of "previous fracture", defined as a fracture that occurred within 2 years before study entry.

**Top 5 Features of the Lasso-Cox model**

	Vertebral Fx	Hip Fx	Wrist Fx	Any Fx
1	Age	Previous Fx	Previous Fx	Previous Fx
2	Previous Fx	T-Score Hip	T-Score Total Hip	Age

3	TBS	Age	Number of Falls	T-Score Hip	Total
4	T-Score LS	Recent Fx	GC ≥7.5mg/d	Number of Falls	
5	T-Score Neck	Number of Falls	TBS	T-Score Neck	

Abbreviations: Fx: fracture, GC: Glucocorticoids, LS: lumbar spine, TBS: trabecular bone score.

**Disclosure:** HJH: Amgen, Sandoz, Eli Lilly and Labatec. OD: KOWA (unrelated to this research).

P415

**ANALYSIS OF SARCOPENIA AND HANDGRIP STRENGTH IN PATIENTS WITH NEW STROKE**

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**Objective:** To assess body composition, muscle strength, and prevalence of pre-sarcopenia and sarcopenia in patients suffering from stroke.

**Methods:** We evaluated 54 patients (29 women and 26 men) in a period of rehabilitation after the first ischemic stroke. The average age of patients was 76.1±9.2 years. We performed bioelectrical impedance analysis for the evaluation of body composition. Muscle mass (MM) was calculated by the following equation: MM (kg)=0.566·FFM (fat free mass). Muscle mass index (MMI) was calculated as MM (kg)/height (m)<sup>2</sup>. Muscle strength was measured using a wrist dynamometer.

**Results:** The mean BMI was 27.2±4.7. The mean weight was 86.4±21.7 kg in men, 66.3±14.1 kg in women. The mean fat mass value was 20±SD 9.9 kg, fat free mass mean was 53.5±11.4 kg. Handgrip strength in men was 30.9±14.6 kg, in women 15.8±7.0 kg. According to the European Working Group on Sarcopenia in Older People consensus, 16 out of 29 women and 12 of 26 men had values lower than the cutoff. Mean MM in men was 36.1±5.2 kg, in women 25.9±4.4 kg. MMI in men was 12.2±1.2 kg/m<sup>2</sup> and 10.5±1.6 kg/m<sup>2</sup> in women. In our study no one met European Working Group on Sarcopenia in Older People criteria for sarcopenia diagnosis. 28 patients demonstrated low handgrip strength.

**Conclusion:** Elderly patients with new stroke assessed with bioelectrical impedance analysis and handgrip strength did not demonstrate high prevalence of sarcopenia in our study. The low handgrip strength was not associated with low MM or low MMI.

P416

### MOBILITY AND HEALTH-RELATED QUALITY OF LIFE IN ADULTS WITH PAEDIATRIC-ONSET HYPOPHOSPHATASIA TREATED WITH ASFOTASE ALFA: INTERIM ANALYSIS FROM THE UK MANAGED ACCESS AGREEMENT

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**Objective:** To describe effects of asfotase alfa on mobility, pain, and HRQoL in adults with hypophosphatasia.

**Methods:** This analysis used data from the UK Managed Access Agreement to assess mobility and HRQoL in adults with paediatric-onset HPP treated with asfotase alfa. Data were collected at enrolment, 3 and 6 months after enrolment, and every 6 months thereafter. Asfotase alfa was initiated after enrolment. Interim results are presented as median (min, max; n); change from baseline to Month 24 is reported as median (95%CI).

**Results:** Of 25 adults enrolled, 17 with >6 months of exposure were included in the study population (12 women, 5 men); 21 who received ≥1 dose of asfotase alfa were evaluated for safety. Age at enrolment was 44.0 (22.0, 60.0) years. Treatment duration was 1.5 (0.5, 3.2) years. Bleck score improved from a baseline of 6.0 (2.0, 9.0; n=17) by 2.0 (1.3, 2.7; n=8). The 6MWT distance walked improved from a baseline of 130.0 (28.0, 360.0; n=10) by 160.0 (2.5, 290.9; n=5) m. Pain severity score improved from a baseline of 8.0 (4.3, 10.0; n=16) by -3.2 (-5.6, 0.9; n=7). EQ-5D-3L utility score improved from a baseline of 0.1 (-0.3, 0.5; n=17) by 0.3 (0.1, 0.5; n=8). Of 13 adults prescribed opioids, 2 stopped and 5 reduced use after starting asfotase alfa. One vertebral (1 patient) and 2 metatarsal (1 patient) fractures occurred 1 week and 13.5 months, respectively, after initiating asfotase alfa. Serious AEs were infrequent (n=3, 4 events), with 2 AEs related to asfotase alfa (injection site reaction, dysaesthesia). No patients discontinued asfotase alfa.

**Conclusion:** Asfotase alfa improved mobility, pain, and HRQoL in adults with paediatric-onset HPP, with a favourable benefit/risk profile.

**Acknowledgment:** Funding from Alexion, AstraZeneca Rare Disease, Boston, MA.

**Disclosures:** KEM and RK received compensation for advisory board participation and/or presentation from Alexion, AstraZeneca Rare Disease. AZ and SF are employees of and may own stock/options in Alexion, AstraZeneca Rare Disease.

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### FUNCTIONALLY COMPROMISED REGULATORY B CELLS (BREGS) AUGMENT INFLAMMATORY BONE LOSS UNDER ESTROGEN DEFICIENT OSTEOPOROTIC CONDITIONS

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**Objective:** In 2002, a subset of B cells has been identified named as regulatory B cells "Bregs". Several pieces of evidence suggest that Bregs plays a vital role in inflammatory disease conditions. Nevertheless, no study to date has revealed the significance of Bregs in modulating osteoclastogenesis and its probable contribution to bone loss associated with postmenopausal osteoporotic conditions. To our knowledge, this study for the first time investigated the anti-osteoclastogenic potential of Bregs. We aimed to determine the immunoporotic potential of Bregs in postmenopausal osteoporosis.

**Methods:** Firstly, to investigate the bone health modulating potential of Bregs co-culture between bone marrow cells (BMCs) and differentiated Bregs was carried out. TRAP staining was performed for evaluating the presence of multinucleated TRAP-positive osteoclasts. Transwell and IL-10 neutralization assay was performed. Lastly, for in vivo experiments, C57BL/6 mice were divided into two groups: Sham and ovariectomy (Ovx-ovaries removed bilaterally). After 45 d, bone marrow (BM), spleen, bones, and blood were harvested for assessing several osteo-immune parameters. ELISA was done for serum cytokine analysis. PBMCs were next isolated and cultured in the presence of Bregs stimulating conditions (CpG and CD40L) for 5 h and 48 h. Lastly, flow cytometry was done to evaluate the percentage of Bregs.

**Results:** Our in vitro BMCs and Bregs co-culture assays suggested that Bregs suppressed the RANKL-mediated differentiation of osteoclasts in a cell-ratio-dependent manner. Furthermore, transwell and neutralizing antibody experiments revealed that Bregs inhibited osteoclastogenesis in an IL-10 cytokine-dependent manner. Our F-actin ring polymerization assay clearly indicated that along with suppressing osteoclastogenesis, Bregs exhibit the potential of inhibiting the functional activity of mature osteoclasts. Moving ahead in our study, we further explored whether Bregs play any role in mediating inflammatory bone loss in the ovariectomy-induced postmenopausal osteoporotic mice model (Ovx). Interestingly, our in vivo data suggest that frequencies of both total B cells (CD19<sup>+</sup>IL-10<sup>+</sup>) and B10 Bregs (CD19<sup>+</sup>CD1d<sup>hi</sup>CD5<sup>+</sup>IL-10<sup>+</sup>) were significantly reduced in BM (major site of osteoclastogenesis) and in the spleen (prime site for Bregs differentiation) of Ovx mice in comparison to sham or healthy group. In addition, our serum cytokine analysis data indicated towards significant reduction of IL-10 cytokine levels in the serum of Ovx mice thus, supporting our observations. Of note, CFSE suppression assay indicated that Bregs harvested and generated from Ovx mice (under chronic inflammation) showed a reduced tendency to suppress the proliferation of CFSE labelled effector T cells in comparison to the sham group thus suggesting towards the compromised

immunosuppressive potential of Bregs in PMO. In consistent to this, our in vitro data further demonstrated that the exogenous addition of 17 $\beta$ -estradiol significantly enhanced the percentage of IL-10-producing Bregs and its efficacy to modulate the immune cells. Lastly, we observed that the percentage of Bregs (CD19<sup>+</sup>CD38<sup>hi</sup>D27<sup>hi</sup>IL-10<sup>+</sup>) was found to be significantly reduced in the PB-MCs of postmenopausal osteoporotic patients in comparison to the healthy control.

**Conclusion:** Thus, altogether our research demonstrates Bregs direct involvement in inhibiting osteoclastogenesis. Furthermore, our pre-clinical and clinical data revealed that numerical defect in the percentage of Bregs along with its reduced potential to produce IL-10 cytokine and compromised immunosuppressive potential further enhance bone loss in Ovx mice and in osteoporotic patients. Altogether, our study for the first time explores the "immunoporotic" role of Bregs in bone health.

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## P418

### ASSOCIATION BETWEEN TNF $\alpha$ AND ANXIETY AND DEPRESSION SYMPTOMS IN RHEUMATOID ARTHRITIS PATIENTS: A CROSS-SECTIONAL STUDY

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**Objective:** Rheumatoid arthritis (RA) patients have a greater prevalence of anxiety and depression. TNF $\alpha$  is an important inflammatory cytokine in RA and is associated with disease activity. Previous researches showed that disease activity correlates with anxiety and depression. We aim to evaluate the association between TNF $\alpha$  as a marker of systemic inflammation and anxiety and depression symptoms in RA patients.

**Methods:** This is a cross-sectional study conducted at the outpatient rheumatology clinic of Cipto Mangunkusumo General Hospital (Jakarta, Indonesia). Patients were divided into active disease and remission groups that were matched by age and gender. 31 patients were included in this study: 16 patients with active disease activity and 15 patients in remission state. Disease activity was assessed using Disease Activity Score of 28 joints (DAS28) – CRP (C-reactive protein). Anxiety and depression symptoms were assessed using the Hospital Anxiety and Depression Scale. TNF $\alpha$  level was measured using ELISA.

**Results:** Among 31 patients, ten patients showed anxiety symptoms, 19 patients showed depression symptoms, and two displayed mixed symptoms. Serum TNF $\alpha$  level was significantly higher in active disease than in the remission group (p-value 0.006). TNF $\alpha$  was significantly higher in patients with anxiety in the ac-

tive disease group compared to the remission group (11.67 vs. 9.61 pg/ml, p-value 0.003). Likewise, TNF $\alpha$  was also significantly higher in patients with depression in the active disease group compared to the remission group (11.45 vs. 9.69 pg/ml, p-value 0.006).

**Conclusion:** There is association between TNF $\alpha$  level and anxiety and depression symptoms RA patients with active disease. Our data indicate that disease activity and systemic inflammation may play a role in both anxiety and depression symptoms in RA patients.

## P419

### DISTAL RADIUS FRAGILITY FRACTURES: OPPORTUNITY TO DIAGNOSE ASYMPTOMATIC VERTEBRAL FRAGILITY FRACTURES? "A KEY TO PREVENTION OF FUTURE MORBIMORTALITY IN OSTEOPOROTIC PATIENTS IN DEVELOPING COUNTRIES"

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**Objective:** Vertebral fractures (VF) are the most common site for osteoporotic fracture, although they are frequently undiagnosed. Both clinical and radiological VF have been associated with increased morbimortality rates and predict future hip fractures.

Radius distal end fractures (RDUC) occur approximately 15 years before the hip fracture, and RDUC, which occurs after minor trauma, is an important indicator of an increased risk of a hip fracture by approximately 50%. We aim to determine the prevalence of asymptomatic VF in patients with fragility distal radius fracture and to characterize VF location, type and severity.

**Methods:** This cross-sectional study was conducted on patients aged 45 and above that presented in the emergency department with low-energy distal radial fractures from 2021-22. a thoracic and/or lumbar spine radiological imaging were obtained. Demographic, lifestyle behaviours and FRAX data were collected. An independent, blinded orthopaedist reviewed the images for VF and quantified severity using the Genant semiquantitative method. Data was analysed using SPSS version 20.

**Results:** From a total of 512 patients screened for eligibility with a mean age of 55.3 $\pm$ 35.22 years, there were 448(87.5%) females and 64(12.5%) males. all of these patients had radiological imaging available for analysis. Radiological VF were present in 211 patients (41.21%), but only 12 (2.34%) were taking osteoporotic treatment. Out of 211 VF, lumbar spine 91 (43.12%) was the most frequently affected location, followed by the Thoracic spine 69 (32.7%). Multiple thoracolumbar spine fractures were observed in near quarter of patients 51(24.17%). The most prevalent VF was wedgetype, followed by biconcave and crush, respectively. Most of the identified VF were classified as (25-40% height loss) followed by severe (>40%) by the Genant's grading system. No statistically significant differences were found between patients with and without VF regarding to smoking, alcoholism, BMI and FRAX score.

**Conclusion:** Near half (41.21%) of distal radius fracture patients have osteoporotic vertebral fractures. Lumbar spine was the most frequently involved location and wedge fracture the most common fracture type. For this reason, this group of patients is considered as high-risk and should require robust evaluation for risk of fall and appropriate treatments to help improve BMD and strength.

## P420

### COMBINED CHOLECALCIFEROL 2000 IU AND CALCIUM 600 MG IS AN EFFECTIVE AND SAFE TREATMENT FOR VITAMIN D DEFICIENCY: RESULTS FROM DOSTEO STUDY

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**Objective:** To evaluate vitamin D (VD) status following treatment with calcium (Ca) 600 mg and cholecalciferol (D<sub>3</sub>) 2000 IU under clinical practice settings.

**Methods:** This multicenter, retrospective, observational study included 302 adult patients receiving Ca 600 mg/D<sub>3</sub> 2000 IU orodispersible tablets, daily for ≥24 weeks. The primary outcome was 25-hydroxyvitamin D [25(OH)D] plasma levels following treatment. Key secondary outcomes included changes in 25(OH)D and other bone metabolism (BM) parameters, safety and tolerability. The protocol was approved by a Research Ethics Committee.

**Results:** 285 patients were evaluated (mean age [SD]: 67.4 [12.6] years old; 88.4% women; basal 25(OH)D: 20.0 [8.6] ng/ml); 80.7% reported previous history of osteoporosis/osteopenia and 37.2% had received other VD and/or Ca treatments prior to inclusion. Median treatment duration was 38.5 weeks [range 24.0-82.4], once daily; 93.3% patients were reported as compliant. Overall, 94.4% of patients increased plasma 25(OH)D following treatment, to a mean of 36.3 [11.8] ng/mL (p<0.001 vs. baseline). 73.0% and 95.4% of patients reached levels ≥30 or ≥20 ng/mL, respectively. Patients with basal VD deficiency (VDD) significantly increased plasma 25(OH)D to a mean over 30 ng/mL; no significant change found in patients with basal 25(OH)D ≥30 ng/mL (Table 1). PTH was significantly reduced after treatment, with no clinically relevant effect on other BM parameters (serum Ca or phosphate). Three treatment-emergent adverse events were reported.

Table 1.

Patients	25(OH)D, mean [SD] (ng/mL)			
	Basal	Final	Change	p
Basal 25(OH)D <20 ng/mL (N=153)	14.0 [4.3]	34.2 [11.2]	20.2 [11.3]	<0.001
Basal 25(OH)D ≥20 & <30 ng/mL (N=108)	24.4 [2.7]	38.3 [11.9]	13.9 [12.2]	<0.001
Basal 25(OH)D ≥30 ng/mL (N=24)	38.1 [9.0]	41.1 [12.6]	3.0 [14.7]	0.322

**Conclusion:** Treatment with Ca 600 mg/D<sub>3</sub> 2000 IU for at least 24 weeks is effective and safe. Patients with VDD significantly increase plasma 25(OH)D to optimal range for bone health, with no clinically relevant changes on other bone metabolism parameters rather than PTH reduction. The magnitude of 25(OH)D increase directly correlates with severity of VDD, with no effect in basally repleted patients.

## P421

### THE EFFECT OF VITAMIN D SUPPLEMENTATION ON SERUM URIC ACID LEVEL IN PATIENTS WITH IMPAIRED GLUCOSE TOLERANCE AND HYPERURICEMIA

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**Objective:** To determine the effect of vitamin D supplementation on serum uric acid level in patients with impaired glucose tolerance and hyperuricemia.

**Methods:** We conducted a randomised controlled trial to determine the effect of vitamin D supplementation on serum uric acid concentration in patients with impaired glucose tolerance and hyperuricemia. The participants were randomised to two groups: a vitamin D<sub>3</sub> (cholecalciferol) group, and a control (no vitamin D treatment) group. 45 participants were included and randomly assigned to receive vitamin D<sub>3</sub> (28,000 IU weekly, n=25), or control (no vitamin D, n=20) for 12 weeks. Compliance was assessed by tablet counting at the end of the study and is reported as the percentage of the tablets missing taken. There were no significant differences in the age, baseline uric acid concentration or 25(OH)D concentration between the vitamin D supplementation group and controls.

**Results:** After 12 weeks of vitamin D supplementation, 25(OH)D levels significantly increased to 36.7±1.9 ng/ml (p<0.001) in vitamin D supplementation group whereas there was no change in 25(OH)D levels in control group (23.1±1.4 ng/ml, p=0.29). After 12 weeks, vitamin D supplementation was associated with a reduction in serum uric acid concentration in participants with baseline uric acid concentration >0.101 μmol/l (p<0.05), but no significant change was observed in controls. The change in serum 1,25-dihydroxyvitamin D concentration negatively correlated with the change in serum uric acid concentration during vitamin D supplementation. The statistical significance of this relationship persisted after controlling for age, body mass, baseline uric acid concentration, vitamin D supplementation, and the change in

25(OH)D concentration.

**Conclusion:** Vitamin D supplementation lowers serum uric acid in patients with IGT and hyperuricaemia, and supplementation might be considered to help alleviate hyperuricaemia in these patients.

## P422

### NO ASSOCIATION OF WEIGHT LOSS AND WEIGHT GAIN WITH STRUCTURAL DEFECTS AND PAIN IN HAND OSTEOARTHRITIS: DATA FROM THE OSTEOARTHRITIS INITIATIVE

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**Objective:** Prior studies found an association between obesity and hand osteoarthritis (OA), but the association between weight change and hand OA is unknown. Therefore, we aimed to define the association between weight change and hand OA.

**Methods:** We used data from the Osteoarthritis Initiative. Our exposure of interest was percentage weight change from baseline to follow-up at 4 years. As outcomes, we investigated the structural defects of hand OA as assessed by radiography and hand pain. We investigated the incidence and progression of structural defects separately, and the development and resolution of hand pain separately. Additionally, we investigated worsening joint space narrowing (JSN) and osteophytes of the hand joints. As a sensitivity analysis, while our exposure was weight change, we also performed a sensitivity analysis to investigate any association between abdominal adiposity (for which abdominal circumference is a proxy) and the outcomes between baseline and 4-year follow-up. Logistic regression analyses were performed to investigate the association between exposure and outcomes, adjusting for major covariates.

**Results:** There was a total of 3,309 participants. There was no association between weight change and any outcomes investigated. The odds ratios (95%CI) for the incidence and progression of structural defects of hand OA were 0.89 (0.67-1.18) and 0.94 (0.86-1.02), respectively, for each 5% weight loss; and 1.12 (0.85-1.48) and 1.07 (0.98-1.17), respectively, for each 5% weight gain. The odds ratios (95%CI) for the development and resolution of hand pain were 0.93 (0.86-1.02) and 0.93 (0.83-1.04), respectively, for each 5% weight loss; and 1.07 (0.98-1.16) and 1.07 (0.95-1.20), respectively, for each 5% weight gain. There was no evidence of an association between weight loss and weight gain with the odds of worsening JSN and osteophytes of hand joints by the 4-year follow-up. The sensitivity analysis showed no evidence of an association between abdominal circumference change and any of the outcomes. The results were independent of sex and BMI.

**Conclusion:** Our findings suggest that weight loss may not be beneficial, and weight gain may not be detrimental, to hand OA over 4 years.

## P423

### THE RELATIONSHIP BETWEEN VITAMIN D DEFICIENCY AND CARDIOVASCULAR RISK FACTORS, AND GLUCOSE HOMEOSTASIS IN OBESE ADOLESCENTS

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**Objective:** The prevalence of obesity has increased dramatically among children and adolescents in different countries and is becoming an important medical problem globally. Many outcomes of obesity have traditionally been viewed as adult problems. However, many of these conditions may begin in childhood and adolescence. The aim of the study was to investigate the associations between vitamin D status and individual components of metabolic syndrome, and insulin resistance in obese adolescents. **Methods:** 25 obese and 20 non-obese adolescents (between 14-18 years of age) were evaluated at Ukrainian Scientific and Practical Center of Endocrine Surgery, Transplantation of Endocrine Organs and Tissues. The following characteristics were recorded: height; weight; BMI; total body fat content; fasting glucose, insulin, and lipid levels; basic biochemical parameters; complete blood count; bilateral carotid intima media thickness; liver ultrasound results; and left ventricular wall thickness were recorded. 25-hydroxyvitamin D levels were measured from serum.

**Results:** The serum 25(OH)D level was low in 37 adolescents (82.2%). The 24-h ambulatory blood pressure measurements, carotid intima-media thickness, and the prevalence of vitamin D deficiency were different between obese and non-obese adolescents ( $P < 0.05$ ). The incidence of dyslipidemia was not statistically different between obese and non-obese children ( $P > 0.05$ ). Plasma 25(OH)D concentrations were negatively correlated with age, BMI, total body fat content, 24-h ambulatory blood pressure, and carotid intima-media thickness ( $P < 0.05$ ), HOMA-IR, triglycerides, low-density lipoprotein cholesterol. Plasma 25(OH)D levels were not correlated with fasting plasma glucose, total cholesterol, and high-density lipoprotein cholesterol ( $P > 0.05$ ).

**Conclusion:** Vitamin D deficiency is more prevalent in obese adolescents. Serum 25(OH)vitamin D was significantly associated with several cardiometabolic risk factors. There was no relationship between abnormal glucose homeostasis with vitamin D deficiency in obese adolescents.

P424

### BONE MICROARCHITECTURE, BONE MINERAL DENSITY AND VERTEBRAL FRACTURES IN PRIMARY HYPERPARATHYROIDISM: A PROSPECTIVE COHORT STUDY

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**Objective:** To assess the bone microarchitecture in primary hyperparathyroidism (PHPT) using the trabecular bone score (TBS) and BMD at baseline and at six months and one year after successful parathyroidectomy and compare the same with that in healthy controls. We also assessed the prevalence of vertebral fractures (VF) in PHPT and healthy controls at baseline.

**Methods:** PHPT (n=140) and healthy controls (n=80) matched for age and sex, were recruited for our study. TBS and BMD were done at the baseline and at six months and one year after successful parathyroidectomy. Vertebral fractures were assessed using vertebral fracture assessment software on the same DXA machine, at baseline. Healthy controls were not followed up.

**Results:** The mean age of PHPT was 44.0±16.0 years. In PHPT, the mean lumbar spine, femoral neck, total hip, and distal radius BMD were significantly lower than that in healthy controls (all p<0.001). The mean absolute TBS at baseline was 1.260±0.116 which was again significantly lower than that in healthy controls (p<0.001). After one year of successful parathyroidectomy, there were significant improvements in the lumbar spine (11.9%), femoral neck (10.7%), and total hip BMD (13.6%), but no significant improvement was noted in either distal radius BMD (1.7%) or TBS (1.6%). The prevalence of vertebral fractures in PHPT was 46.7% vs. 2% in healthy controls.

**Conclusion:** Although PHPT is a disease that is classically said to involve cortical bone, our study showed deterioration of trabecular bone microarchitecture with a high prevalence of vertebral fractures and very low TBS. After successful parathyroidectomy, greater improvements were appreciated in the trabecular bone than in cortical bone densitometry and TBS.

P425

### LEVEL OF PHYSICAL ACTIVITY AFTER TOTAL HIP ARTHROPLASTY AND IMPLANT FAILURE IN PEOPLE UNDER 65 YEARS

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**Objective:** Physical activity (PA) after total hip arthroplasty (THA) is a crucial outcome for recipients. Although high impact activities were traditionally discouraged, clinical advice has become

less restricted over the years. We sought to assess the effect of level of post-operative PA on implant failure in a cohort of arthroplasty recipients.

**Methods:** We identified people from the Geneva Hip Arthroplasty Registry aged below 65 who underwent unilateral THA between 1996-2012. We excluded emergency operations; those with a femoral head>36mm and unknown exposure to PA after arthroplasty; and THR revision surgery due to infection. PA was prospectively collected using the University of California Los Angeles (UCLA) activity score at intervals of 5 years post-operatively. Unadjusted and adjusted Cox Proportional Hazard Models were fitted to calculate associations between high, moderate, and low level of PA and risk of THR revision.

**Results:** 968 out of the 1,383 eligible participants underwent THA at a mean age of 58 (IQR: 52 - 61). There were 505 men (52%), and primary OA was the main indication for arthroplasty. At a mean follow-up of 15.7 years (SD±5) 81 people had undergone THA revision. Cumulative risk of revision at 10-year follow-up was: 1.13% (95%CI 0.37-3.48) for the low level of PA group, 3.36% (95%CI 2.10-5.35) for the moderate level of PA group, and 6.15% (95%CI 3.45-10.83) for the high level of PA group. After adjusting for sex, age at primary surgery and type of bearing surface there was an increased risk of THA revision in the moderate PA group (HR: 1.96 95%CI 1.02-3.79) and in the highest activity group (HR:2.65 95% I 1.29-5.48) compared with the low activity group.

**Conclusion:** Level of PA, especially intense activity, may increase the risk of undergoing THR revision surgery in the long-term, however the health benefits from PA outweigh the overall small risk of revision surgery. More research into specific high impact sports and occupations with high physical demands occupations would be necessary to advise patients preoperatively.

P426

### POSTMENOPAUSAL OSTEOSARCOPENIA

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**Objective:** Analysis of literature data and the results of our own research on the problem of osteosarcopenia in postmenopausal women: pathophysiological mechanisms of development, risk factors, approaches to diagnosis, treatment, predicting the risk of fractures and their prevention.

**Methods:** The study involved 65 women aged (55.7±0.6) years, postmenopausal with osteoporosis. Assessment of the state of the musculoskeletal system and the risk of falls were studied using functional tests, ultrasound examination of the main ultrasound parameters m. quadricepsfemoris on Toshibaaplio 300.

**Results:** Postmenopausal osteosarcopenia, the development of which is caused by genetic factors, changes in body composition, low physical activity, estrogen and vitamin D deficiency, leads to a decrease in muscle mass, strength, functionality, as well as a decrease in BMD, which is realized in an increase in the frequency of fractures, disability and mortality. Currently, there is no specific treatment for sarcopenia, the primary one is prevention. Function-

al tests: impaired coordination, stability and Frax All (R=-0.67), impaired coordination, stability, risk of falls and Frax All (R=0.64), dynamometry and Frax All (R=-0.77), dynamometry and Frax hit (R=-0.70). Muscle ultrasound parameters: muscle echo and muscle width (R=0.78), muscle echo and pennation angle (R=0.99). Osteosarcopenia is often observed in women in the postmenopausal, leading to a decrease in muscle mass, strength, functional capabilities, as well as a decrease in BMD, which worsens the quality of life, contributes to an increase in the frequency of falls and, accordingly, the risk of fractures.

**Conclusion:** Functional tests of the state of skeletal tissue are highly informative in terms of predicting the risk of fractures. Ultrasound measurement of muscle parameters is a tool for early diagnosis and monitoring of the treatment of sarcopenia. Early diagnosis of osteosarcopenia, predicting the risk of fractures and their prevention is the way to preserve the quality and independence of a woman's life.

## P427

### PATIENT PERCEPTIONS OF OSTEOPOROSIS MANAGEMENT PATIENT ADVISORY GROUP: A QUALITATIVE PILOT STUDY

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**Objective:** The management of osteoporosis (OP) has declined in recent years despite the actions of the learned societies concerned with this disease. The objective of this pilot study was to investigate patients' perceptions of osteoporosis, their treatment pathways and behavior, and how information is obtained.

**Methods:** The Association Française de Lutte Anti-Rhumatismale (AFLAR) constituted an advisory group of 7 patients (mean age: 63.7 years [54-74 years]) and representative of the diversity of stages of OP (6 fractured OP, diagnosis from a few weeks to 15 years) apart from the very old and men. A qualitative, anonymized study was conducted with an open-ended semistructured questionnaire.

**Results:** The onset of OP was most often sudden, with the fracture "bursting" into their lives in a context of global and profound misunderstanding of OP and its severity by both the general public and physicians. The patients have confidence in the physician, almost exclusively the rheumatologist, who talks about the disease and initiates the treatment. However, adherence to treatment is variable, the main cause of non-adherence being major fears and uncertainties about the treatments. Medical information is insufficient, or poorly understood, with a trend to perceive the same undesirable effects for the different treatments. The media and other nonmedical sources of information appear to be as import-

ant as or even more important than information from healthcare providers. Negative information has the most impact, even if the sources seem unreliable, such as media having possible links to interests or of doubtful ethics. There is no trust in pharmaceutical companies and the ethics of physicians are in question. The impact of OP on day-to-day life is major, with a need for help from family and friends as soon as the first fracture occurs, a pronounced fear of falling and of losing freedom, and the feeling of being confined. Treatments stabilize this altered quality of life without returning to the "old condition". Mistrust of treatments persists over the long term with multifactorial non-compliance (fear of side effects, poor tolerance of treatments, constraints related to taking treatments). Telehealth and digital communication do not yet have a role for OP.

**Conclusion:** This IOF/GRIO/AFLAR Patient Advisory Group pilot study illustrates the experience and the many barriers to effective management. This initiative will continue to enable stronger and more effective interactions between IOF, GRIO and patients. In addition to information for the general public, complete and sustained medical information, especially at the time of diagnosis and initiation of treatment, seems essential to counteract the contradictory information, which are exclusively negative.

## P428

### PERCEPTION OF THERAPEUTIC GOALS AND OUTCOMES IN OLDER HIP FRACTURE PATIENTS AND THEIR MEDICAL CAREGIVERS: A CROSS-SECTIONAL STUDY

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**Objective:** Hip fracture patients (HFP) frequently have multiple-underlying conditions, necessitating that agreed-upon goals take these complications into consideration. The medical-caregiver's (MC) role is to generate a shared decision-making process with HFPs regarding goals and expected health-outcomes. Others reported that physicians were unable to identify the most important individual health domains (HD) of patients. This topic has yet to be explored in HFPs. Our aim was to investigate whether HFPs and their multi-disciplinary MCs agree upon target health-outcomes and important HD.

**Methods:** This cross-sectional study, of HFPs and their multidisciplinary MCs, took place at the Dept. of Orthopedics or Rehabil-



itation, at Hadassah and Sheba medical-centers. We utilized the SF12 questionnaire, that consists of eight HDs: physical-functioning, physical role-limitation, bodily-pain, general-health, vitality, social-functioning, emotional role-limitation and mental health. HFPs and MCs were asked to rate their top three most important goals for rehabilitation from the SF12 HDs and indicate their expected outcome from rehabilitation. Descriptive statistics and mixed-effect logistic regression were used to compare concordance of the ratings. Agreement between patients and MCs was assessed using interclass coefficients (ICCs).

**Results:** 378 ratings were collected from 52 patients, 12 nurses, 12 physicians and 6 paramedical-personnel. Each patient had between 3-9 raters. Patients considered physical-function and physical role-limitation more important than did MCs. Physicians and nurses emphasized the importance of bodily pain while patients referred to it as less significant. The ICC for the comparisons of expected-outcomes was low (2%) indicating poor agreement. With the exception of PF, MCs predicted a less optimistic outcomes in all the HDs in comparison to the HFPs expectations.

**Conclusion:** Effective intervention in HFPs requires constructive communication between MCs and patients. The study suggests that MCs have an insufficient understanding of the expectations of HFP. More effective communication channels are required in order to better understand HF patients' needs and expectations.

## P429

### THE SUITABILITY OF THE SHORT-FORM 36 QUESTIONNAIRE IN MEASURING PATIENT REPORTED OUTCOMES IN OLDER ADULTS FOLLOWING HIP FRACTURE: A QUALITATIVE APPROACH

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**Objective:** Hip fractures (HF) in older adults are associated with poor outcomes and high costs. Measuring quality of care and outcomes of patients with HF has focused on clinical definitions rather than on measuring outcomes that are meaningful to the patient. The ageing of the population worldwide and the predictable increase in the incidence of HF, emphasizes the need to measure patient reported outcome (PROs) in this population. This study explored whether the Short Form (SF)36 is sufficient for PROs

evaluation in HF patients. The aims of this study were to: (1) understand the perspective of the patient's experience following HF, (2) to select the appropriate PROs tools to best measure the outcomes and (3) timing for questioning.

**Methods:** A qualitative approach was used. HF patients were recruited from the Hadassah and Sheba medical centers. The inquiry was done utilizing a semi-structured interview in two parts: (1) open questions and (2) specific questions relating to SF36's PRO suitability.

**Results:** Fifteen patients were interviewed. Three major themes and thirteen categories were identified. Categories and themes emerging from their responses were similar to the eight domains of the SF36 questionnaire. In part 2, participants agreed that the SF36 reflected common issues and served as an adequate measure for personal-goal setting and provided feedback regarding suggested time of questioning

**Conclusion:** This study underlines the importance of PROs in patients after HF and the SF36 questionnaire is a suitable tool for this purpose. Healthcare systems focus on clinical outcome indicators and does not reflect how the patient views his outcomes. This study ameliorates patient-centered care in older adults recovering from a HF.

## P430

### WHAT MATTERS TO YOU? UTILIZING PATIENT REPORTED OUTCOMES FOR SETTING STRUCTURED GOALS IN REHABILITATION AFTER A HIP FRACTURE

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**Objective:** Hip fracture patients (HFP) frequently have multiple-underlying conditions, necessitating that agreed-upon goals, take these complications into consideration. Communication regarding goals between medical-personnel and patients is not always effective. Patient reported outcomes (PROs) can outline personal-goals and help promote quality healthcare in HFP. Limited research has been published regarding the use of PROs for this purpose in HFP. The aim of this study was to outline the process of using PROs for goal-oriented care (GOC) among HFPs.

**Methods:** During December 2021-July 2022 HFP were recruited from the Dept. of Orthopedics or Rehabilitation, at the Hadassah and Sheba medical-centers. PROs were measured using the SF36

questionnaire three times post-surgery: 1-7 days, 2 weeks, and 3 months. During the first questioning HFPs were asked "what matters most to you" vis-a-vis during the rehabilitative process. Accordingly, agreed upon goals were incorporated into the HFPs rehabilitative process. Goals were determined according to SF36's eight topics: physical-functioning, physical-role limitation, bodily-pain, general-health, vitality, social-functioning, emotional role-limitation and mental-health.

**Results:** 41 patients were recruited. 73.7% were female and the mean age was 80.39 (SE=1.43). About half had undergone external fixation, 42.1% bipolar and 2.6% total hip replacement. Patients specified 3-4 topics that mattered most to them and accordingly set personal objectives. Most of their goals related to functional aspects of rehabilitation, however, patients described social, mental and emotional objectives as well. Patients indicated that the PROs helped them articulate their desires and introduced them to new areas of care.

**Conclusion:** Shifting from asking "what's the matter" to "what matters most to you" can improve the understanding of HF patients' priorities, promote quality outcomes and enhance patient centered care. Using PROs as a guide for GOC can better the process and make sure it includes all the patients' health-determinants and needs.

### P431

#### COMPARISON OF PATIENT REPORTED OUTCOME MEASURES IN HOME REHABILITATION VS. HOSPITAL REHABILITATION OF PATIENTS FOLLOWING A HIP FRACTURE

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**Objective:** In recent years there has been a growing need of rehabilitation following a hip fracture (HF) together with an increase in the referral of patients to rehabilitation at home vs. hospitals. Research that compares the two settings has focused primarily on clinical outcomes and not on patient reported outcomes (PROs). The aim of this study is to evaluate PROs of HF patients in the two rehabilitation settings: home and inpatient-hospital facilities. **Methods:** A longitudinal observational multi-center trial of HF patients. PROs were measured using the SF36 questionnaire three times: 24-48 h after surgery, 2 weeks, and 3 months later. The

first questioning was retrospective and reflected pre-fracture health-quality and functionality. Descriptive statistics and mixed effect logistic-regression were used to compare the two settings. **Results:** A total of 86 HF patients participated in the study: 45 inpatient and 41 home. With the exception of bodily pain, no statistically significant ( $P<0.05$ ) differences were found in the comparison of the improvement from the pre-fracture status to recovery, 3 months post fracture, in both groups. In both groups, the physical and the mental score plummet 2 weeks after the HF, in comparison to the pre-fracture status. The patients' health status improved somewhat three months after the fracture, but did not return to the pre-fracture score.

**Conclusion:** PROs of home rehabilitation vs. inpatient rehabilitation are similar and suggest that for suitable patients rehabilitation at home can be as effective as hospital rehabilitation. PROs enable for a richer and comprehensive understanding of health-care outcomes of HF patients in different rehabilitation settings. This process, of patient centered care, can improve quality health-care in a growing population of patients.

### P432

#### A COMPLEX CLINICAL CASE ASSOCIATING ISCHEMIC STROKE, RHEUMATOID ARTHRITIS, BILATERAL KNEE ARTHROPLASTY, AND CARDIOVASCULAR CONDITION

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**Objective:** To highlight the effects of rehabilitation management and also the evolution in a patient with ischemic stroke, rheumatoid arthritis, bilateral knee arthroplasty, carotid atherosclerotic disease, hypertension, history of pericardial effusion, and recurrent urinary tract infections.

**Methods:** In this report, we are presenting the case of a 63 years old male, with left hemiparesis, locomotion, and self-care deficit, sensory loss of the left hemi body, and pain of the left shoulder 7/10 VAS. From the functional point of view, the patient is able to proceed on his own in bed transfers, is in need of help to perform transfers at the edge of the bed and in a wheelchair, to use the wheelchair, and to fulfill all of his daily activities. The patient was assessed functionally using the following scales: Visual Analogue Scale, modified Ashworth Scale, Medical Research Council, Independence Assessment Scale in Daily Activities (ADL/IADL), and Life Quality Assessment (QQL).

**Results:** The patient received a complex neuromuscular rehabilitation program including treatment for his chronic diseases and restorative care of the somatic, motor, and neurogenic dysfunctions, including analgetic myorelaxant electrotherapy, trophic massage, and kinetotherapy.

**Conclusion:** The overall evolution after 2 weeks of hospitalization was favorable from the functional point of view, quality of life as well as for decreasing the pain level in his left shoulder. The patient requires surveillance and long-term care facilities.

### P433

#### BENEFITS OF THE REHABILITATION PROGRAM IN CASE OF A PATIENT WITH BILATERAL KNEE REPLACEMENT, RHEUMATOID ARTHRITIS, AND OSTEOPOROSIS

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**Objective:** This case report aims to detect the importance of a rehabilitation program in a complex patient following 4 weeks of therapy.

**Methods:** We present the case of 65-year-old female, in-patient, accusing locomotion and self-care deficit, right knee walking instability, and 5/10 right knee pain. Medical history includes bilateral knee arthroplasty, rheumatoid arthritis, osteoporosis, chronic renal failure, hypertension, and hyperlipidemia. The local knee exam reveals chronic inflammatory changes, quadriceps hypotrophy, active and passive crepitus, varum deformity increased when walking, local hyperthermia, limited active and passive range of motion for flexion for the right knee and active and passive for the left one, limited movement of the patella with a negative patellar tap test. The patient is able to walk without any walking assistance (although she has the recommendation to use a crunch on the left side), using two dynamic knee braces, but limping and presenting right knee instability. The rehabilitation program included active and passive physical therapy.

**Results:** After 4 weeks of the rehabilitation program, the pain was reduced from 5/10 to 2/10, increasing the overall strength of the lower limbs, especially the quadriceps muscle, and improving the gait pattern with decreasing knee instability.

**Conclusion:** Rehabilitation has improved dynamic balance, active mobility, and pain but the whole dysfunctional condition of the patient remains a long-term care issue.

### P434

#### AN 8-YEAR EXPERIENCE WITH THE ROBOTIC ARM-ASSISTED MAKO SYSTEM FOR MEDIAL UNICOMPARTMENTAL KNEE RECONSTRUCTION SURGERY

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**Objective:** Accurate pre-operative surgical plan execution is ensured with the use of the robotic-assisted surgery. Regarding medial unicompartamental knee arthroplasty (UKA), precise implant positioning is of utmost importance for prolonged prosthesis survival. The aim of the present prospective study was to present implant survivorship, complications, and clinical outcomes following robotic arm-assisted UKA from the first cohort originating in Greece.

**Methods:** 80 consecutive patients undergoing UKA with the use of the robotic arm-assisted system between 2014-2016 were enrolled in the study. Implants' survivorship, surgery-related complication and revisions, all well as functional outcomes with the use of WOMAC scores were evaluated.

**Results:** The minimum follow-up of the study was 6 years (mean follow-up 83.6±3.8 months). One revision surgery was performed due to tibial prosthesis aseptic loosening. The average of total WOMAC score and each score's component were significantly improved following the indicated operation.

**Conclusion:** Robotic-arm assisted UKA offers precise implant positioning, while it offers excellent clinical outcomes, at intermediate follow-up, along with excellent survival of implants and almost none operation-related complications.

### P435

#### AN INNOVATIVE SUTURE STABILIZATION METHOD IN TWO DIMENSIONS FOR THE FIXATION OF TRAUMATIC ANTERIOR STERNOCLAVICULAR JOINT DISLOCATION

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**Objective:** Anterior sternoclavicular joint dislocation (SCJ) represents a relative rare injury. The purpose of the present study is to report clinical outcomes from a case series undergoing a novel suture technique for treatment of anterior SCJ traumatic dislocation.

**Methods:** Patients presenting with traumatic anterior SCJ disruption in our institution were included in the study. Surgical technique consisted of two bone tunnels drilled in vertical direction from the anterior to the posterior cortex of the manubrium. Analogous to the sternal side of the clavicle, two vertical bone tunnels were drilled from the anterior cortex towards the posterior cortex. A non-absorbable suture was passed through the four holes in a parallel configuration. Then, by pulling the free suture edges the posterior translation of the clavicle was performed. Two additional drill holes, the first in manubrium and the second in clavicle

were performed from the anterior cortex to the posterior between the previous bone tunnels. A non-absorbable suture was placed in a simple configuration in order to stabilize the SCJ in the superior–inferior direction. The final follow up was 28.2 months. The mean QuickDASH was used for functional assessment.

**Results:** Seven patients (6 males and 1 female) with average age of 34,8 years were included in the present study. Two patients suffered from concomitant medial clavicle fracture. At final follow-up none of the patients had experienced any symptoms of instability of SCJ, no side-to-side difference was observed, while the Mean QuickDASH score was 4.85.

**Conclusion:** The reported technique for SCJ reconstruction in traumatic anterior SCJ dislocations with two sutures has theoretical advantages, since it stabilizes the SCJ in the antero–posterior, as well as the supero- inferior direction. Outcomes from this small case series are favorable. However, it is of note that more research is needed to compare different techniques and to conclude to the optimal surgical treatment.

### P436

#### FUNCTIONAL AND SUBJECTIVE PATIENT-REPORTED OUTCOMES FOLLOWING TOTAL KNEE ARTHROPLASTY WITH THE USE OF THE ROBOTIC ARM-ASSISTED MAKO SYSTEM

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**Objective:** Total knee arthroplasty with the use of the robotic arm assisted MAKO system has been relatively recently introduced and has exhibited promising results. The purpose of this cohort is to evaluate prosthesis' survivorship, to present operation-related complications and to report patients' subjective satisfaction's rates and functional outcomes of this procedure.

**Methods:** A consecutive 100 patients undergoing robotic arm-assisted total knee arthroplasty (RATKA) were prospectively enrolled in this study. Demographics, including age and gender were recorded, while the Oxford Knee score was documented preoperatively and at least two years following the operation. Subjective satisfaction rates and procedure-related complications, as well as revisions were recorded.

**Results:** A total of 75 females and 25 males mean age=70.4 years were studied. The mean follow-up was 32.6 months, while one revision, due to prosthetic joint infection was performed. Statistically significant improvement of the Oxford Knee score were evident recorded. Furthermore, regarding patients' satisfaction rates, 99.4% of patients reported to be "very satisfied" or "satisfied" with the operation.

**Conclusion:** RATKA offers precise implant positioning, making it safe and reproducible procedure, with favorable mid-term out-

comes. The present study revealed that excellent overall satisfaction rates, clinical outcomes and implant survivorship should be expected, while more data and longer follow-up, along with the expansion of the procedure are needed for further investigation and possible superiority over the traditional manual total knee arthroplasty.

### P437

#### THE USE OF THREADED CUPS IN PATIENTS OVER 65 YEARS OF AGE UNDERGOING TOTAL HIP ARTHROPLASTY: AN ANALYSIS OF 120 CASES

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**Objective:** Limited data exist regarding long-term survivorship of threaded cups. Threaded coated cups, offer immediate mechanical stability. The purpose of the present study is to report the clinical outcomes as well as the complications from the use of the porous coated threaded EcoFit<sup>®</sup> SC cup by ImplantCast.

**Methods:** The EcoFit SC cup was implanted in a total of 120 consecutive patients over 65 years of age, undergoing total hip arthroplasty with the modified anterolateral minimal invasive (ALMIS) from 2012 to 2014. Implant survivorship, functional (Harris hip score) and patient-related outcomes and complications were recorded.

**Results:** The mean follow-up of the patients was 8.8 years ( $\pm 0.8$ ). The studied population mean age was 76.3 ( $\pm 4.5$ ), while 83 (69.2%) of them were females. The mean postoperative Harris hip score was 89.4, while the mean satisfaction rate (1-10) was 9 (SD 0.5). Two revision surgeries have been performed, one due to prosthetic joint infection and the other due to acetabulum intra-operative fracture.

**Conclusion:** Coated threaded cups seem to lead to favorable outcomes at mid-term. The initial immediate mechanical stability that threaded cups offer may prove beneficial for elderly patients, most of which suffering osteopenia. More data and research are needed in clarifying this issue.

### P438

#### FUNGAL WOUND INFECTION COMPLICATING OPEN FRACTURE OF THE TIBIA

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**Objective:** Necrotizing skin and soft tissue infection (NSSTIs) consists of a variety of gangrenous infection syndromes of the skin as well as and subcutaneous tissues. Their progression through the skin and soft tissues is extremely rapid, resulting to tissue necrosis. A quite rare case of NSSTI after an open tibia fracture in a 36-year-old male caused by *Syncephalastrum* spp. and *Fusarium solani* species complex (SC) is reported, with the aim of reporting infection due to rare species combination causing life-threatening conditions.

**Methods:** The clinical, radiologic and laboratory findings, as well as the clinical course of the patient are presented.

**Results:** A 36-year-old male, with unremarkable background, appeared to the Emergency Dept. after a motorcycle accident. The patient was suffering a Gustilo-Anderson type IIIA open tibia fracture. Urgent surgical debridement in the operating room was performed and a hybrid external fixation was placed. Postoperatively intravenous antibiotics were started. On the 10th postoperative day, a skin and soft tissue necrotic lesion at the anterior tibia was developed, arising from the surgical wound. A fungal infection caused by *Syncephalastrum* spp. and *Fusarium solani* species complex was diagnosed through direct microscopy, cultures and histology. The patient underwent a total of seven consecutive surgical debridements, while appropriate antifungal treatment was initiated, including liposomal amphotericin B and voriconazole. Gradual recovery was accomplished and after a 4-year follow-up he is completely functional.

**Conclusion:** High suspicion, especially in necrotic lesions in trauma patients, is crucial for timely diagnosis, leading to lower mortality and amputation rates. Definite diagnosis through microscopy, histology and/or cultures are extremely important, while PCR testing could also be useful.

P439

### ORTHOGERIATRIC ASSESSMENT FOR ELECTIVE ARTHROPLASTY CASES: MOVING FORWARD

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**Objective:** The PPF (Periprosthetic Fracture) Study: A national retrospective review of femoral periprosthetic fracture management the study stated that: Projection models estimate that periprosthetic fractures are expected to rise by 4.6% every decade over the next 30 years. The rising incidence of femoral periprosthetic fractures presents a clinical burden requiring expert care and an economic impact. The mean cost of treating a single patient with a periprosthetic fracture in a UK teaching hospital was estimated to be £23,469 (range of £615–£223,000).

**Methods:** We conducted a retrospective cohort study analyzing 245 patients admitted to three NHS centers with PPF following an elective total hip or total knee replacement during the period from 2019-2022 with strict inclusion criteria. 240 patients did

not receive an orthogeriatric assessment on admission, and 102 patients has a previous fragility fracture in their life. Fall assessment and osteoporosis treatment have not been provided for 184 patients during hospitalization or after discharge.

**Conclusion:** The increased hospital readmission rate following periprosthetic fractures is remarkable. We recommend that the management of patients with periprosthetic fractures should be monitored in a similar way to that of patients sustaining hip fractures, using national standards (NHFD) and data collection to evaluate the performance and prognosis. Putting into consideration that preoperative osteoporosis treatment alone may not decrease the risk of postoperative complications.

P440

### A COMPARATIVE RANDOMIZED INTERVENTION TRIAL OF THE EFFICACY OF DEER MILK AND AN ORAL NUTRITIONAL SUPPLEMENT FOR IMPROVING NUTRITIONAL STATUS, MUSCLE MASS AND PHYSICAL PERFORMANCE IN OLDER ADULTS

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**Objective:** To compare the effectiveness of deer milk (DM) for improving nutritional status, muscle mass and physical performance with that of a commercially available oral nutritional supplement (ONS) in older women.

**Methods:** This study was a 11-week randomised, double-blind, controlled, parallel group study. Healthy women (N=120) aged 65-80 years, the majority having a BMI <25 kg/m<sup>2</sup> were recruited. The women were randomly assigned to either 200 ml DM or a commercial ONS for 11 weeks. Data on habitual macronutrient intake, nutritional status (Mini Nutrition Assessment-Short Form, MNA-SF; ≤7 malnourished, 8-11 at risk of malnutrition, ≥12 normal nutrition), anthropometrics/body composition, and physical performance were collected. Blood samples were collected for metabolic markers.

**Results:** 102 women (DM 45, ONS 57) completed the study, of whom 29% had a dietary protein intake of <1 g/kg body weight per day, and 38% at risk of malnutrition. There were no between group differences in percentage change in MNA-SF score and body composition (P>0.05), but a trend for a difference in handgrip strength (DM 11.7±49.8% vs. ONS -2.42±17.9%, P=0.06). Further exploratory analysis showed that there was a trend for a between group difference in percentage change in MNA-SF score, favouring DM (DM 7.72±13.0% vs. ONS 0.63±9.25%, P=0.06) only in women at risk of malnutrition. There was also a between group difference in percentage change in muscle mass (DM 1.68±2.77% vs. ONS -0.18±2.81%, P=0.02) in women with BMI ≥25 kg/m<sup>2</sup> and in handgrip strength (DM 10.6±23.6% vs. ONS -5.03±18.1%, P<0.01) in women with BMI <25 kg/m<sup>2</sup>. Total cholesterol, LDL and LDL:HDL ratio did not change over time (P>0.05), but there was a between

group difference in percentage change in these markers (total cholesterol: DM  $3.01 \pm 6.97\%$  vs. ONS  $-2.65 \pm 9.92\%$ ,  $P < 0.01$ ; LDL: DM  $4.22 \pm 14.9\%$  vs. ONS  $-6.05 \pm 17.6\%$ ,  $P < 0.01$ ; LDL:HDL ratio: DM:  $2.27 \pm 16.4\%$  vs. ONS:  $-5.78 \pm 18.2\%$ ,  $P = 0.02$ ).

**Conclusion:** Baseline nutritional status and BMI may modulate nutritional status, muscle mass and physical performance response to DM (as compared with ONS), suggesting DM may improve nutritional status and physical performance in women at risk of malnutrition and/or with lower BMI, and improve muscle mass in women with higher BMI.

## P441

### CLINICAL CHARACTERISTICS AND OUTCOMES OF PATIENTS WITH SPINAL EPIDURAL ABSCESS ASSOCIATED WITH INFECTIOUS SPONDYLODISCITIS

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**Objective:** Spinal epidural abscess (SEA) associated with spondylodiscitis is a rare but severe clinical condition. The purpose of this study was to describe the clinical characteristics and outcomes of patients with SEA associated with spondylodiscitis.

**Methods:** A retrospective study was conducted from June 2010 to December 2022, including 42 patients with clinically and radiologically suspected spondylodiscitis. The characteristics and outcomes of patients were retrospectively examined.

**Results:** 42 patients (23 men, 19 women) with spondylodiscitis were recruited. The mean age was 57.2 years (standard deviation  $\pm 15.7$ ). 29 patients (72.5%) had SEA. All patients had varying degrees of focal spinal pain. Fever appeared in 18 patients. 10 patients (34.7%) presented with neurological deficits. In addition, 20 cases (69%) involved the lumbar column, 6 cases (20.7%) the thoracic column, and 3 cases (10.3%) the cervical column. The location of the abscess was anterior in 14 cases (48.3%), posterior in 5 cases (17.2%), and circumferential in 10 cases (34.5%). Among the 11 patients with SEA, 12 cases (41.4%) presented with infection caused by Mycobacterium tuberculosis, 8 cases presented with infection caused by brucellosis, 5 cases presented with infection caused by Staphylococcus aureus, one case presented with infection caused by Staphylococcus coagulase negative, one case presented with infection caused by Escherichia coli, one case presented with infection caused by Candida albicans, and one case presented with infection caused by Enterococcus faecalis. All patients received conservative treatment, of which two improved symptoms. Five cases underwent surgical treatment, of which one presented improvement of symptoms. Four cases presented motor and sensory dysfunction of the left limb.

**Conclusion:** SEA associated with spondylodiscitis is a severe clinical condition that presents with various symptoms such as pain, fever, and neurological deficits. The location and cause of the abscess varied, and the management of this condition requires a multidisciplinary approach. The study highlights the im-

portance of early diagnosis and treatment of SEA associated with spondylodiscitis to prevent serious neurological complications.

## P442

### PREDICTORS OF LENGTH OF HOSPITAL STAY AND MORTALITY IN ROMANIAN HIP FRACTURE PATIENTS

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**Objective:** Annual mortality estimates related to osteoporotic fractures are higher in Romania (148/100.000) than the European average (116/100.000). Length of stay (LoS) and mortality vary according to patient and treatment characteristics. The influence of LoS on mortality is controversial based on previous studies. Our aim was to determine patient- and hospital related variables, affecting hospital LoS and mortality.

**Methods:** We used hospital reports of hip fractures from the National School of Statistics. We included 24,950 patients with an ICD-10 code of femoral neck fracture, pertrochanteric or subtrochanteric femoral fracture. To investigate factors - possibly explaining - LoS we used OLS (ordinary least squares) and regressed LoS and mortality on a number of variables that include gender, age and residence of the patients, the type of the hospital where the intervention was performed, the established diagnosis and applied procedure.

**Results:** LoS was higher in patients living in urban areas ( $p < 0,01$ ), those with subtrochanteric fractures ( $p < 0,001$ ); treated in municipal hospitals vs. teaching clinics ( $p < 0,001$ ) and patients undergoing hemiarthroplasty ( $p < 0,001$ ). In-hospital mortality (4.5%) rates were 1,34 times higher among patients living in urban areas ( $p < 0,01$ ) and 1,7 times higher among men vs. female ( $p < 0,001$ ). Each age year increased mortality risk with 6.9%. Although postmenopausal women have had a higher risk of developing fractures (67,4 vs. 32,6;  $p < 0,001$ ), older men tended to have a worse prognosis after a fracture (5.6 vs. 4%;  $p < 0,001$ ), particularly of the femur.

**Conclusion:** LoS was significantly associated with patients' residence, diagnosis, hospital-, and procedure type, whereas mortality was significantly associated with LoS, gender, age, residence and procedure. Improving understanding - with implications on Romanian health policy plans for osteoporosis (OP) and related hip fractures - will help to efficiently address and prioritise identified issues, especially hospital types, specific procedures and residence as risk factors.

P443

### THE EFFECTIVENESS OF A COMPREHENSIVE REHABILITATION WITH THE INCLUSION OF BALANCE THERAPY WITH BIOFEEDBACK AND KINESIHYDROTHERAPY PROGRAM ON THE INDICATORS STABILOMETRY IN PATIENTS WITH OBESITY

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**Objective:** The study of the influence of a new complex method of physical therapy with the inclusion of balance therapy with biofeedback and kinesihydrotherapy on the human balance function.

**Methods:** The study included men and women aged 40 to 65 years with a BMI  $\geq 30$  kg/m<sup>2</sup>. Research methods included anthropometry, stabilometry. The patients were further divided into two groups by simple randomization. Patients of both groups underwent a two-week course of medical rehabilitation. Patients of the main group received 4 methods of physical therapy: balance therapy, group classes in kinesihydrotherapy, group classes in a special complex of therapeutic exercises in the hall, aerobic exercises on a stationary bike or treadmill. The patients of the comparison group were treated only with the use of aerobic exercises and therapeutic exercises in the hall according to the same methodology and with the same number of procedures as in the main group. Dynamic observation was carried out at the beginning and after 14 d.

**Results:** According to the data, we obtained an improvement in the balance function on the 14th day of the study in terms of spread along the front ( $p=0.028$ ) and the spread along the sagittal ( $p=0.043$ ). Significantly improved indicators in the main group in terms of the average speed of movement of the center of pressure ( $p=0.018$ ) and the speed of movement of the statokinesiogram ( $p=0.028$ ), indicators of the area of the ellipse ( $p=0.018$ ).

**Conclusion:** The new comprehensive program, including aerobic and strength physical training, kinesihydrotherapy and balance therapy, showed a more significant effect on the balance function after completion of the rehabilitation, rather than the standard rehabilitation method.

P444

### THE EFFECTIVENESS OF A COMPREHENSIVE REHABILITATION PROGRAM IN WEIGHT LOSS AND CHANGING THE BODY COMPOSITION IN PATIENTS WITH OBESITY

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**Objective:** To evaluate the effectiveness of a new comprehensive rehabilitation program including balance therapy with biofeedback and kinesihydrotherapy on weight dynamics and body com-

position indicators using different methods after the rehabilitation stage and long-term results.

**Methods:** The research includes men and women aged 40-65 with a body weight index more than 30 kg/m<sup>2</sup>. The Research methods consist of anthropometry, measuring the thickness of the fat fold, the study of body composition using bioimpedancemetry and air-replacing body platysmography. The patients were split into 2 random groups. Patients in both groups underwent a two-week course of medical rehabilitation on a low calorie diet. Patients of the main group (Group 1) received 4 methods of physical therapy: balance therapy (sensory-motor training), group sessions of kinesihydrotherapy, group sessions with a special complex of therapeutic exercises in the hall, aerobic exercises on a bike or treadmill. Patients of the comparison group (group 2) were treated only with the use of aerobic exercises and therapeutic exercises in the hall according to the same methodology and with the same number of procedures as in the main group. Dynamic observation was carried out immediately after the completion of the course, after 3 and 6 months.

**Results:** According to the data obtained, in both groups, after the completion of the treatment phase, body weight significantly decreased in both groups,  $p=0.0001$ , waist circumference ( $p=0.0001$  in group 1 and  $p=0.005$  in group 2) and hip circumference ( $p=0.0001$  in group 1 and  $p=0.0003$  in group 2). In the main group, the thickness of the triceps fat fold decreased significantly ( $p<0.05$ ) after 14 d, 3 and 6 months, respectively (from 36.0 [28.0; 39.5] to 32.0 [24.0; 46.0] to 28.0 [20.5; 37.5] to 29.0 [19.0; 45.0] mm, respectively), the thickness of the abdominal fat fold decreased after 14 d, 3 and 6 months (from 67.5 [50.0; 77.5] to 56.0 [50.0; 68.0] to 46.0 [37.0; 50.0] to 50.0 [38.0; 70.0] mm, respectively). We received a significant ( $p<0.05$ ) decrease in fat mass according to bioimpedancemetry in the main group after 14 d and 3 months, respectively (from 65.7 [49.2; 72.1] to 60.9 [42.2; 66.7] to 55.3 [39.3; 62.2] kg, respectively). In group 1, the decrease in adipose tissue according to the data of air-replacing body platysmography also significantly ( $p<0.05$ ) differed after 14 days, 3 months, respectively (from 56.8 [41.3; 77.5] to 49.7 [40.1; 57.1] to 44.4 [34.4; 64.4] kg, respectively). The data of the analysis of body composition in dynamics, with special complex programs of physical training in reducing the weight.

**Conclusion:** The new complex program, including aerobic and strength physical training, kinesihydrotherapy and balance therapy in combination with a low calorie diet, showed a more significant effect than the standard rehabilitation method on reducing body weight, reducing the thickness of fat folds, as well as changing the composition of the body, including 3 and 6 months follow-up.

P445

### MINIMAL SHORT-TERM DECLINE IN FUNCTIONAL PERFORMANCE AND LIFE QUALITY PREDICTS BETTER LONG-TERM OUTCOMES FOR BOTH IN OLDER TAIWANESE ADULTS AFTER HIP FRACTURE SURGERY: A PROSPECTIVE STUDY

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**Objective:** In this study, we investigated whether the level of short-term postoperative decline in activity of daily living (ADL) performance and quality of life (QoL) can predict the 1-year outcomes for both following hip fracture surgery in older Taiwanese adults.

**Methods:** This prospective cohort study included 427 older adults ( $\geq 60$  years) who underwent hip fracture surgery at a single tertiary medical center in Taiwan between November 2017 and March 2021. We collected baseline data, including the patients' demographics, Charlson comorbidity index (CCI) scores, and responses to a questionnaire (Short Portable Mental State Questionnaire [SPMSQ]) for dementia screening. Moreover, their scores on the EuroQoL-5D questionnaire (for evaluating QoL) and Barthel Index (for assessing ADL performance) were collected at pre-fracture status and 3 and 12 months after surgery. Changes in ADL and QoL three months post-surgery compared to pre-fracture status were evaluated, and the associations of these parameters (and other potential factors) with 1-year outcomes for ADL and QoL were investigated.

**Results:** We analyzed the data of 318 patients with hip fracture and complete follow-up data regarding ADL performance and QoL 3 and 12 months after surgery. After adjusting for covariates, multivariate logistic regression revealed that changes in ADL and QoL 3 months post-surgery from pre-fracture status were positively and significantly correlated with 1-year outcomes for both ( $p < .001$  for both). Furthermore, baseline CCI and SPMSQ scores were independent predictive factors associated with 1-year ADL outcomes ( $p = .042$  and  $< .001$ , respectively).

**Conclusion:** Patients who exhibit a smaller decline in functional ability and quality of life three months after hip fracture surgery from pre-fracture status are likely to have improved long-term ADL and QoL. Our results provide valuable clinical insights for future research aimed at enhancing ADL and QoL in older patients after hip fracture surgery by advocating for early postoperative interventions.

Variable	B	p value	95%CI	
			Lower limit	Upper limit
BI at 1-year follow-up ( $R^2 = .439$ ; adjusted $R^2 = .417$ )				
Age (years)	-0.065	0.711	-0.410	0.280
BMI	0.505	0.158	-0.196	1.207
Fracture type (Ref: FNF)	-2.326	0.431	-8.136	3.485
Pre-fracture residence (Ref: household)	-2.673	0.288	-7.615	2.269
SPMSQ score	-3.374	<0.001	-4.244	-2.504
Handgrip strength (kg)	0.173	0.367	-0.204	0.550
Charlson comorbidity index score	-2.602	<0.001	-4.579	-0.625
Preoperative Hb level (g/dL)	-1.508	0.085	-3.224	0.208
Albumin level (g/dL)	6.200	0.134	-1.917	14.317
Surgical delay (day)	-0.007	0.281	-0.019	0.005
Short-term change in BI	0.452	<0.001	0.330	0.573
EQ-5D-3L at 1-year follow-up ( $R^2 = .289$ ; adjusted $R^2 = .263$ )				
Age (years)	-0.090	0.145	-0.005	0.001
Fracture type (Ref: FNF)	-0.082	0.128	-0.088	0.011
SPMSQ score	-0.297	<0.001	-0.027	-0.012
Handgrip strength (kg)	0.113	0.056	0.000	0.006
Charlson comorbidity index score	-0.058	0.367	-0.026	0.010
Preoperative Hb level (g/dL)	-0.066	0.243	-0.023	0.006
Albumin level (g/dL)	0.046	0.408	-0.041	0.100
Surgical delay (day)	-0.061	0.243	-0.004	0.001
Short-term change in EQ-5D-3L score	0.204	<0.001	0.111	0.328
ADL, activity of daily living; BMI, body mass index; FNF, femoral neck fracture; Ref, reference; SPMSQ, Short Portable Mental Status Questionnaire; Hb, hemoglobin; BI, Barthel Index; EQ-5D-3L, EuroQoL-5D-3L; QoL, quality of life; and CI, confidence interval.				



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### POST-OPERATIVE PAIN DEVELOPMENT IS ASSOCIATED WITH HIGH RATE OF GLYCOLYSIS AND UNCOUPLING ACTIVITY IN THE PERIPHERAL BLOOD MONONUCLEAR CELLS OF PATIENTS WITH END-STAGE KNEE OSTEOARTHRITIS PRIOR TO SURGERY

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**Objective:** To reveal pre-operative metabolic differences in patients with knee osteoarthritis (KOA) associated with post-operative pain development aiming to find intrinsic causes of chronic post-operative pain.

**Methods:** Peripheral blood of 26 healthy volunteers (55±8.3 years) and 40 end-stage KOA patients (56.5±8.9 years) undergoing knee joint replacement surgery was examined prior to surgery and 6 months' post-surgery. Nociceptive pain was assessed using VAS index whereas neuropathic pain, using DN4 and PainDETECT questionnaires prior to surgery. Functional activity was assessed by WOMAC. Pain indices after surgery according to VAS of 30% and higher were considered. Protein levels were quantified by ELISA. Total RNA was isolated from whole blood. Relative gene expression examination was performed with quantitative real-time RT-PCR prior to surgery.

**Results:** Out of 40 patients pain complaints were obtained from 9 patients (22,5%) after 6 months' post-surgery. Prior to surgery all the examined genes were significantly upregulated in all the examined patients compared to healthy controls. However, no difference in the clinical pain-related and functional indices in the examined subsets of patients was observed at baseline. Prior to surgery patients who developed postoperative pain demonstrated significantly higher expression of glycolysis related genes (PKM2, LDHB), major regulator of energy metabolism (AMPK $\alpha$ ), and higher uncoupling of oxidation and phosphorylation evidenced by higher expression of UCP2 compared with those who were satisfied with therapy. At the same time no difference in the expression of PDH and TCA related genes (IDH, SDHB, MDH2), as well as ATP synthase in both examined subsets was noted.

**Conclusion:** Post-operative pain development is associated with higher rate of glycolysis and energy shortage presumably due to higher uncoupling activity which can be observed prior to surgery.

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### SYNOVIAL CYTOKINE VARIATIONS IN PATIENTS WITH KNEE OSTEOARTHRITIS AFTER OPEN WEDGE HIGH TIBIAL OSTEOTOMY WITH PLATELET-RICH PLASMA OR STROMAL VASCULAR FRACTION POST-TREATMENTS

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**Objective:** To examine functional outcomes and synovial fluid (SF) cytokine concentrations in response to platelet-rich plasma (PRP) or stromal vascular fraction (SVF) post-treatments following open wedge high tibial osteotomy (HTO).

**Methods:** Six weeks after surgery, the knees of 10 patients with knee osteoarthritis were injected with autologous PRP (PRP subgroup), while another 10 patients were injected with autologous SVF (SVF subgroup) and monitored for 1.5 years. Pain assessment (VAS score) and functional activity (KOOS, KSS, Outerbridge, Koshino scores) were applied. SF was collected before and one week after PRP or SVF injections and tested for concentrations of 41 cytokines (Multiplex Assay).

**Results:** PRP subgroup performed better compared with the SVF subgroup according to KOOS, KSS, and VAS scores, while the SVF subgroup demonstrated superior results in Outerbridge and Koshino testing. In the PRP subgroup, a significant decrease in IL-6 and CXCL10 synovial concentrations was accompanied by an increase in IL-15, sCD40L, and PDGF-AB/BB amounts. The SVF subgroup demonstrated a significant decrease in synovial TNF $\alpha$ , FLT-3L, MIP-1 $\beta$ , RANTES, and VEGF concentrations while SF concentrations of MCP-1 and FGF2 increased.

**Conclusion:** Intra-articular administration of SVF produced more pronounced improvements related to cartilage regeneration while PRP post-injection resulted in a better functional outcome and pain control. Both post-treatments have a potential for increased tissue regeneration, presumably due to the downregulation of inflammation and augmentation of synovial growth factor concentrations.

**Acknowledgment:** This study was funded by Russian Ministry of Education and Science (Project no. 1021062512064-0).

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## RISK PREDICTION OF SECOND HIP FRACTURE BY BONE AND MUSCLE DENSITY OF THE HIP VARIES WITH TIME AFTER FIRST HIP FRACTURE: A PROSPECTIVE COHORT STUDY

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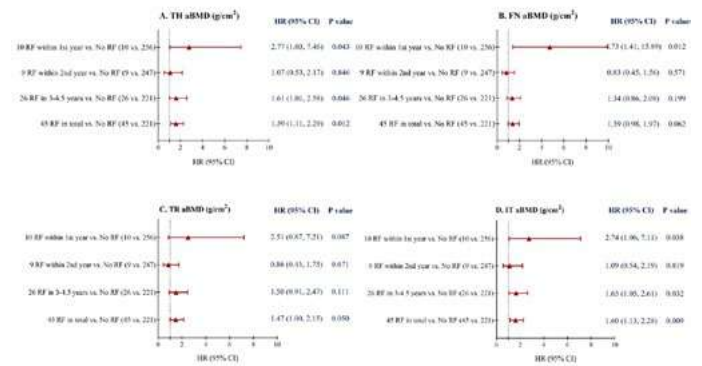
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**Objective:** Predictors of 'imminent' risk of second hip fracture (SF) are unknown. The aims of the study were to explore strength of hip areal BMD (aBMD), and muscle area and density for predicting SF at different time intervals.

**Methods:** Data of the Chinese Second Hip Fracture Evaluation were analyzed, a longitudinal study to evaluate the risk of SF (of the contralateral hip) by using CT images obtained immediately after first hip fracture. Muscle cross-sectional area and density were measured of the gluteus maximus (G.MaxM) and gluteus medius and minimus (G.Med/MinM) and aBMD of the proximal femur at the contralateral unfractured side. Patients were followed up for a median time of 4.5 years. Separate Cox models were used to predict SF risk at different time intervals after first event adjusted for age, sex and diabetes.

**Results:** The mean age of subjects with imminent (within 1st or 2nd year) SF was 79.80±5.16 and 81.56±3.64 years. In the 1st year after the first hip fracture, femoral aBMD predicted second hip fracture (TH HR 2.77; 95%CI, 1.03-7.46), IT HR 2.74; 95%CI, 1.06-7.11 and FN HR 4.73; 95%CI, 1.41-15.89). However, in the remaining years of follow-up after 1st year, muscle density predicted SF (G.MaxM HR 1.80; 95%CI, 1.13-2.88, G.Med/MinM HR 1.90; 95%CI, 1.22-2.95). Over the entire 4.5 years of follow-up, all muscle and bone parameters with the exception of FN aBMD significantly predicted SF.

**Conclusion:** Hip aBMD is an important predictor for second hip fracture within the first year and therefore suggest supports the importance concept of early and rapid-acting bone-active drugs to increase hip BMD. In addition, the importance of muscle density predicting second hip fracture after the first year suggest post hip fracture rehabilitation and exercise programs could also be important to reduce muscle fatty infiltration.



**Figure 1.** Hazard ratios (HR) of second hip fracture per one SD decrease of TH aBMD(A), FN aBMD (B), TR aBMD (C), and IT aBMD (D). All HR were adjusted for age, sex, and diabetes. SD, standard deviation; TH, total hip; FN, femoral neck; TR, trochanter; IT, intertrochanter; aBMD, areal BMD.

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## VERTEBRAL OSTEOPOROTIC FRACTURES: ASSESSMENT OF THE COMBINED TREATMENT OF DENOSUMAB + STABILIZATION OF THE SPINE WITH FUNCTIONAL DYNAMIC ORTHOSIS

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**Objective:** Osteoporotic vertebral fracture accounts for 24% of osteoporotic fractures. In Spain there are between 900-1800 fractures of this type per 100,000 inhabitants per year. It is the most frequent of osteoporotic fractures. Many times to diagnose it, it goes unnoticed since it is not related to low-energy trauma. Radiological studies in women over 60 years of age offer 14% of osteoporotic vertebral fractures, and only 1.8% are diagnosed as such.

**Methods:** The present study refers to the assessment and treatment of 50 vertebral osteoporotic fractures, after carrying out complementary diagnostic tests in each of them, such as: BMD, conventional Rx, blood analysis (calcemia, Vitamin D) and in some cases CT and bone scintigraphy. We assess non-modifiable risk factors (age, sex, race, hormonal factors, and family history) and modifiable factors (weight, smoking, alcohol, physical exercise, and diet). In all of them, the administration of Denosumab at a dose of 60 mg/d for 12 months by subcutaneous injection, associated with 800 mg/d of vitamin D, was protocolised. The remodeling of the osteoporotic microfractures of the vertebral bodies and the increase in BMD were evaluated. Patients were associated with rehabilitation treatment in order to reduce the pain picture and its inhibitory effect on the statics and mobility of the spine, facilitating functional recovery in the shortest possible time. The dorsal-lumbar spine orthosis was used, which reduces the mobility of the facet joints and flexion-extension movements,

contributing to pain control.

**Results:** After the described period of 12 months, it has been possible to verify the clinical improvement of the pain picture, observing an increase in mineral density and bone trabeculation after radiological controls at 3, 6 and 9 months.

**Conclusion:** The use of the stabilization corset of the spine must be limited in time since it is accompanied by atrophy of the paravertebral musculature with the consequences that derive from it; hence the importance of associating physiotherapy at the same time of treatment. The use of this type of orthosis is always recommended to reduce pain caused by hyperkyphosis secondary to the fracture. There is a correlation between the number of vertebral fractures and the increase in mortality in this type of patients, especially due to pulmonary and cardiovascular complications. For this reason, vertebral osteoporotic fractures are the most frequent, accompanied by significant morbidity and mortality. Rehabilitation treatment should be aimed at reducing pain and its inhibitory effect on static and mobility, facilitating functional recovery in the shortest possible time. The kyphosis produced by a vertebral fracture is the cause of chronic pain and alters the kinetics of the paravertebral musculature, progressively reducing the extension force, further favoring the development of kyphosis and the imbalance of the flexion-extension forces of the spine. Today we know that the strength of the extensor muscles in women with hyperkyphosis is lower than that of normal women of the same age, with two conditioning factors: muscle weakness and spinal deformity in the sagittal plane.

#### P450

### SARCOPENIC PHENOTYPE OF BODY COMPOSITION, PHYSICAL ACTIVITY AND NUTRITIONAL STATUS IN WOMEN WITH RHEUMATOID ARTHRITIS

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**Objective:** To assess association of the sarcopenic phenotype of body composition with physical activity (PhA) and nutritional status in women with rheumatoid arthritis (RA). **Methods:** 104 women (median age 60.5 [51.1; 66.0] years) with RA underwent clinical and laboratory examination, DXA of whole body. Sarcopenic phenotype was diagnosed if appendicular muscle mass index was  $<5.5 \text{ kg/m}^2$ . The level of physical activity (PhA) was assessed using the International Physical Activity Questionnaire (IPAQ) and nutritional status using the Mini Nutritional Assessment (MNA) and daily calcium intake questionnaires. **Results:** Sarcopenic phenotype was diagnosed in 39 (37.5%) of patients. Moderate and low PhA levels were detected in 46 (44.2%) and 8 (7.7%) women, respectively. 52 (50%) of the examined persons had risk of malnutrition or malnutrition. In multivariate logistic regression analysis, independent factors associated with the sarcopenic phenotype were determined: the frequency of vigorous PhA

less than 3 times a week (OR 5.12 (95%CI 1.15-22.94),  $p=0.011$ ), walking  $<1 \text{ h/d}$  (OR 4.98 (95%CI 1.14-21.74),  $p=0.033$ ), malnutrition by MNA  $<24$  points (OR 4.13 (95%CI 1.12-15.32),  $p=0.034$ ), BMI  $<25 \text{ kg/m}^2$  (OR 8.11 (95%CI 1.86-35.32),  $p=0.006$ ) and daily calcium intake  $<500 \text{ mg}$  (OR 4.62 (95%CI 1.06-20.08),  $p=0.041$ ).

**Conclusion:** 50% of patients with RA were at risk of malnutrition and 52% had moderate or low PhA level. The risk of sarcopenic phenotype increased with a low frequency of vigorous PhA, low walking time, risk of malnutrition, BMI  $<25 \text{ kg/m}^2$  and insufficient calcium intake.

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### OSTEOPOROSIS AND NUTRITIONAL STATUS IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To evaluate the nutritional status and its relationship with osteoporosis in women with rheumatoid arthritis (RA).

**Methods:** The study included 104 women aged 40-75 years with RA according to ACR/EULAR criteria (2010). A questionnaire, laboratory examination and DXA of whole body, lumbar spine and proximal femur were conducted. Nutritional status was assessed using a Mini Nutritional Assessment (MNA) questionnaire.

**Results:** Risk of malnutrition or malnutrition according to the MNA were detected in 52 (50%) of patients with RA. These patients differed from those with normal nutritional status with a higher risk of osteoporotic hip fracture according to FRAX ( $p=0.035$ ), lower appendicular muscle mass (AMM) ( $p=0.048$ ) and lower quality of life according to visual analog scale ( $p=0.012$ ). A positive correlation was established between the nutritional status by MNA and BMI ( $r=0.28$ ,  $p=0.007$ ), as well as total muscle mass ( $r=0.28$ ,  $p=0.008$ ), AMM ( $r=0.32$ ,  $p=0.002$ ) and AMM index ( $r=0.28$ ,  $p=0.009$ ). In multivariate logistic regression analysis, age  $>55$  years (OR 7.76; 95%CI 2.17-27.69), nutritional status by MNA (OR 0.68; 95%CI 0.51-0.92) and AMM index  $<6 \text{ kg/m}^2$  (OR 3.43; 95%CI 1.16-10.21) were independent factors associated with osteoporosis in RA patients.

**Conclusion:** Malnutrition and risk of malnutrition occurred in 50.0% of RA patients. Women at risk of malnutrition had a higher 10-year probability of hip fracture according to FRAX. Age and AMM index were positively associated, while nutrition status according to MNA was negatively associated with osteoporosis.

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### ALLOPATHIC MEDICAL AND TRADITIONAL BONE SETTER FRACTURES SERVICE AVAILABILITY AND READINESS IN THE GAMBIA

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**Objective:** To identify and quantify hip fracture service availability and readiness in The Gambia (adult population: 1.2million).

**Methods:** All health care facilities to which a person with a hip fracture could present were identified through Gambian Government Ministry of Health, regional directorates and health service-related networks; traditional bonesetters (TBS) were included as medical pluralism is common in The Gambia. From Oct2021-Dec2022 all facilities completed a modified WHO Service Availability & Readiness Assessment, in person with a trained fieldworker (5% completed by phone), with data captured in RED-Cap. Capacity per 100,000 adults  $\geq 18$  years in the population was quantified using global burden of disease population estimates 2010-2019 extrapolated to 2022 assuming linear growth.

**Results:** Nationally, 152 medical facilities were identified, 3 declined to participate. Of 149 participating facilities, 99 were public (41 community health centres, 19 rural or district hospitals, 6 regional or provincial hospitals, 3 central hospitals), 14 private and 36 either non-governmental organisations, religious services, or research facilities. These 149 facilities provided a total of 2470 inpatient beds, 198.2 per 100,000 adults, of which 195 beds were trauma & orthopaedic (15.6/100,000). There were 426 doctors (34.2/100,000) of which just 9 were orthopaedic and trauma surgeons (0.8/100,000). Seven (4.7%) facilities had available and functional radiography facilities, with 28 radiographers reported across all facilities (2.2/100,000). Five (3.4%) facilities could provide diagnostic investigation and surgery for hip fractures (0.4/100,000), only one was a public facility. These 5 facilities reported 155 hip fractures in 2020. Of the 42 TBS identified, 35 (83.3%) chose to participate. Most (91.4%) had been trained by another TBS family member. The median period worked as a TBS was 20 years (range 2-72). 71.4% reported being able to set a hip fracture, and 25.7% had treated a hip fracture in the previous year.

**Conclusion:** Health services provision for diagnosis and treatment of hip fractures in The Gambia is low, and likely similar in the wider West Africa region. As lifespans increase so will the number of fragility fractures; fracture services, potentially including TBS, will need to expand to meet demand.

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### DEVELOPMENT OF TWO INNOVANT PERFORMANCE-BASED OBJECTIVE MEASURES IN FELINE OSTEOARTHRITIS: THEIR RELIABILITY AND RESPONSIVENESS TO ANALGESIC TREATMENT

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No gold standard to objectively evaluate osteoarthritis (OA) cat's physical functioning has been validated. Feline podobarometric gait analysis (PGA) has been developed<sup>[1]</sup>. We designed the innovant PGA-Effort Path (EP), as well as a Stairs Assay Compliance (SAC) to trigger the fatigue usually associated to the OA condition in cats.

Neutered geriatric cats with naturally occurring OA (n=32) were randomly distributed in 4 groups according to Firocoxib dosage (Gr. A: 0.40, B: 0.25, C: 0.15 and D: 0.00 mg/kg). After acclimation, cats were evaluated twice during each 3-weeks period, i.e., baseline (BSL), treatment with daily oral administration (Tx), and recovery (Ry). The PGA-EP consisted of an initial trotting ramp, a jump down and a passage over a pressure-sensitive mattress, before a jump up on a second ramp. Analysis included velocity and peak vertical force (PVF). For SAC, over a 4-minute period, cats were encouraged to climb up and down a 16-steps staircase: the median value of up or down passages for the whole colony was calculated during BSL, and the percentage of cats reaching this value (defined as "finish line") was assessed under Tx and Ry. Degree of reliability between BSL measurements was acquired using the intraclass coefficient correlation (ICC), and the within-time and comparative analysis used a generalized linear mixed model. During BSL, ICC was very good to moderate for summated fore- and hind-limbs values, respectively [PVF: 0.82 (95%CI 0.66-0.91) and 0.55 (95%CI 0.25-0.75)]. The sum of hind-limbs PVF was stable over time for Gr. D (P=0.931), but significantly changed for the pooled Tx (P=0.033). Interestingly, the PVF increase waned during Ry for the Gr. C, but was sustained for both Gr. A and B. Furthermore, the velocity, before and over the pressure-sensitive mattress, was stable over time for Gr. D (P=0.204, and P=0.833, respectively), whereas it improved for treated cats under Tx, before coming back to initial level during Ry (P<0.001, and P=0.005, respectively), except for Gr. A maintaining its increased velocity during Ry. The percentage of cats crossing the finish line was stable for Gr. D (25-38%), responsive to treatment from BSL (38%) to Tx (71%; P=0.017, and different to Placebo P=0.014), and maintained during Ry (67%; P=0.038).

The PGA-EP and SAC are promising outcomes (being reliable, sensitive and responsive to treatment) to better diagnose feline OA pain and precisely detect analgesic effect.

Reference: 1. Moreau M et al. Res Veterinary Sci 2013;95:219.

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### CHANGES IN HIP FRACTURE INCIDENCE IN BRAZIL AND IMPLICATIONS FOR FRAX

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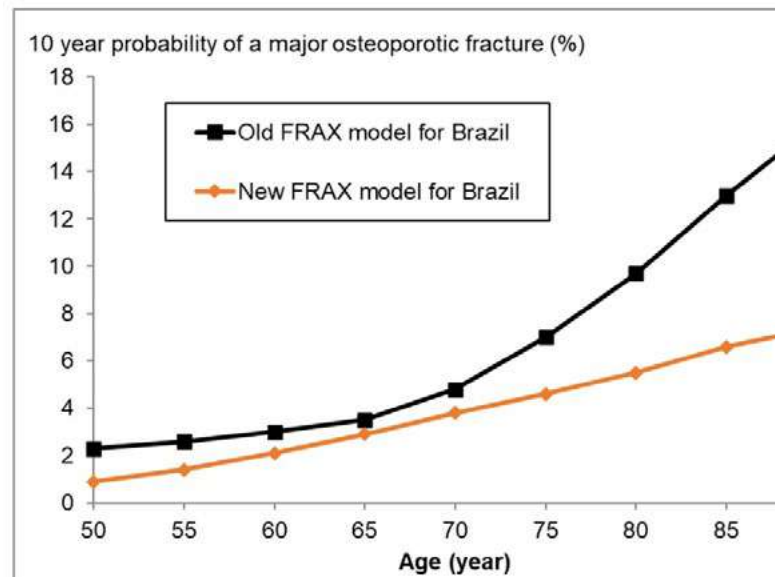
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**Objective:** The construct for FRAX model outputs depends on country-specific fracture incidence and mortality. The current FRAX model for Brazil is based on hip fracture data from four regional estimates from the period between 1994-2002 [1]. Recent publications of Brazilian hip fracture incidences from 2010-2012, have shown a lower hip fracture incidence for all ages for men and women [2,3]. The aim of the present study was to examine the impact of these more recent data on the FRAX probability outputs for Brazil.

**Methods:** Hip fracture incidences from three cities (Belem, Joinville and Vitoria) from representative geographic areas of Brazil from 2010-2012, were weighted according to the relative population size in Brazil. The hip fracture incidence and mortality data from the United Nations (UN) for Brazil in 2015-2019 were used to build a new FRAX model for Brazil. The new FRAX model for Brazil was compared to the old model which was derived using hip fracture data from before 2002 combined with UN mortality data from 2009. For both the old and new models, a ratio (to incidence of hip fracture) from Malmö, Sweden, was used to calculate the incidence of clinical spine, forearm, and humerus fractures. The 10-year probability of a major osteoporotic fracture (MOF) was used when comparing the old and new FRAX models. An example is given for a woman with no clinical risk factors and BMI 25 kg/m<sup>2</sup>, where the BMD was not known.

**Results:** For all ages, the new 10-year probability was lower than the original model (Figure). From the age of 75 years, the difference between the old and new model was greater, with the new model having lower probabilities. The largest difference between the old and new model was seen for age 90, where the difference was 8.6% points (16 vs. 7.4%).

**Conclusion:** The use of the more recent hip fracture incidence data impacts the outputs from FRAX, leading to lower probabilities for all ages compared to the old model. These findings support the need for an updated FRAX model for calculating fracture probabilities in Brazil.



**Figure** The 10 year probability of a major osteoporotic fracture (%) for a woman with no clinical risk factors, BMI 25 kg/m<sup>2</sup> where the BMD was not known.

References:

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### A SURROGATE FRAX MODEL FOR PERU

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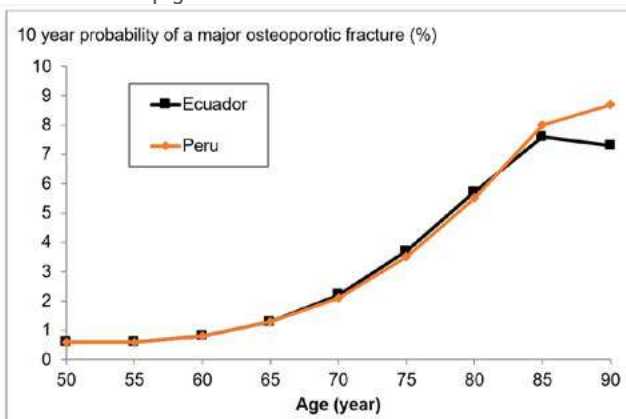
**Objective:** FRAX® models are frequently requested for countries with little or no data on the incidence of hip fracture. In such circumstances, the International Society for Clinical Densitometry and International Osteoporosis Foundation have recommended the development of a surrogate FRAX model, based on country-specific mortality data but using fracture data from a country, usually within the region, where fracture rates are considered to be representative of the index country. This abstract describes the development and characteristics of a surrogate FRAX model for Peru.

**Methods:** The FRAX model used the ethnic-specific incidence of hip fracture in men and women living in Ecuador, combined with the death risk for Peru (United Nations (UN), 2015-2019). The 10-year probability of major osteoporotic fracture (MOF) was used

when comparing the surrogate model for Peru with the FRAX model for Ecuador. An example is given for a woman with no clinical risk factors and BMI 25 kg/m<sup>2</sup>, where the BMD was not known. The hip fracture incidence and UN population data were used to calculate estimated number of fractures 2020 and 2050.

**Results:** The surrogate model gave similar 10-year fracture probabilities for men and women compared to the model for Ecuador. There were very close correlations ( $r=0.99$ ) in fracture probabilities between the surrogate and authentic models, so that the use of the Peru model had little impact on the rank order of risk (see figure). When fracture incidence from Ecuador was used to the population of Peru it was estimated that 4836 hip fractures arose in 2020 in individuals over the age of 50 years in Peru, with a predicted increase by more than 3 times to 15,634 in 2050.

**Conclusion:** The surrogate FRAX model for Peru provides an opportunity to determine fracture probability within the Peruvian population and help guide decisions about treatment.



**Figure** The 10-year probability of a major osteoporotic fracture (%) for a woman with no clinical risk factors, BMI 25 kg/m<sup>2</sup> where the BMD was not known.

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### EVALUATION OF THE COMBINED TREATMENT OF ALENDRONIC ACID AND OXYCODONANALOXONE IN VERTEBRAL OSTEOPOROTIC FRACTURES

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**Objective:** To assess the efficacy of the combined treatment of alendronic acid and oxycodone-naloxone in patients with postmenopausal osteoporosis reflected in vertebral crush-fractures in the thoracolumbar spine.

**Methods:** Carried out the treatment in a group of 50 patients affected by this pathology, administering a dose of alendronic acid of 70mg/week orally for 24 weeks associated with 6 months of analgesic treatment (opioids) of oxycodone-naloxone at an initial dose of 5/2.5 mg/d increasing the dose up to 20mg/5 mg/d after 3 months of treatment. In all cases we stabilize spinal fractures

using dynamic spinal orthosis and perform functional physiotherapy treatment.

**Results:** In all the patients vertebral wedges of 2 or 3 segments were observed in the thoracic-lumbar spine, which in many cases evidenced crushing of the upper and lower vertebral endplates, but with the placement of the functional orthosis we were able to prevent the possible complications of this type of fracture (paralytic ileus, DVT, etc.). We value an improvement in pain at 6-8 weeks, with a stabilization of the fractures in 70% of the cases without progression of the deformity and without significant residual pain.

**Conclusion:** In most cases we must wait for the callus of the fracture and the decrease in the algic picture to occur. Normally it occurs around 8-10 weeks, although in a high percentage the deformity will not increase and it will not affect residual pain.

## P457

### OBSERVATIONAL STUDY OF THE ADMINISTRATION OF A FOOD COMPLEX, FOR THE IMPROVEMENT OF BONE QUALITY IN PATIENTS WITH A DIAGNOSIS OF OSTEOPENIA OR OSTEOPOROSIS WITHOUT INDICATION OF PHARMACOLOGICAL TREATMENT FOR THE CONTROL OF OSTEOPOROSIS

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**Objective:** To assess the efficacy of treatment by administering food supplements that contain, in addition to vitamin D and calcium, other components that have demonstrated efficacy in improving bone quality, and that with respect to current therapy in osteoporosis, do not present adverse effects. With this study we want to know the sensitivity, specificity and predictive values of ultrasonography (USF) compared to DXA.

**Methods:** We have developed two control groups, A and B. Group A will measure the BMD osteopenia criteria between -1 and -2.5. Group B will measure osteoporosis criteria (T-score less than -2.5). We measured 30 patients in each group, with a treatment duration of 48 weeks, with three control visits to the patient at the beginning of treatment, at 24 weeks and at 48 weeks. Prescribing is osteopenia one sachet a day of the drug for 48 weeks and in osteoporosis two sachets a day (every 12 hours) for 48 weeks. The drug used is Colbone Plus R powder sachets for oral suspension. The composition of the drug is based on collagen, magnesium, chondroitin sulfate, delphinidins, calcium, vitamin D, maca (*lepidium mellenii*), silicon, zinc, manganese, vitamin C, vitamin K2 and Vitamin B1, B2, B6, B12. and folic acid. The set of natural compounds that make up the drug activates bone metabolism. This is intended to delay the use of some pharmacological treatments indicated to reduce the risk of fractures and that cause important side effects. We have used phalanx ultrasonography (USF), which, although it does not measure BMD directly, does measure the speed of ultrasound attenuation (in m/seconds) and is highly

predictive of future fracture risk. Automatically provides osteonometric analyzes (quantitative of the bone mineral state) and osteosonographic (qualitative of the homogeneity of the architecture and elasticity of the bone tissue).

**Results:** The controls of the patients of both groups have been carried out at visit zero (at the beginning), at 24 weeks (visit 1), and at 48 weeks (final visit). The USF (ultrasonography) has been performed in the distal region of the first phalanx of the last 4 fingers of the dominant hand, which is where there is the greatest bone turnover. We have performed analytical controls: Hemogram, Basic Biochemistry, Calcium, Phosphorus, Total Alkaline Phosphatases, Bone Alkaline Phosphatases, Creatinine, Urea, Glomerular Filtration (GFR), AST, ALT, Albumin, Total Proteins, 25-OH, Vitamin D, PTH and CTX. We have used the Morisky-Green test to assess the regimen and follow-up of taking the drug. We have observed a significant improvement in cases of osteopenia and postmenopausal osteoporosis compared to USF and DXA after treatment administration at 48 weeks. Analytically, a normalization of the values of Calcium, Vitamin D and alkaline phosphatases has been observed after the analytical controls carried out at 24 and 48 weeks of treatment. After performing the Morisky-Green test, patients have correctly taken the drug in 75-80% of cases.

**Conclusion:** There have been no adverse side effects after the use of the drug, and in general terms it has been well tolerated by the patients and the administration guidelines have been met. In most cases of osteopenia and postmenopausal osteoporosis, an improvement is seen after taking the drug at 48 weeks, assessed by analytical controls and DXA vs. USF. We have observed a normalization of the analytical deficit parameters of Calcium, Phosphorus, alkaline phosphatases and collagen.

**Disclosure:** We used the drug Colbone Plus from Arafarma laboratories.

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### A SURROGATE FRAX MODEL FOR MYANMAR

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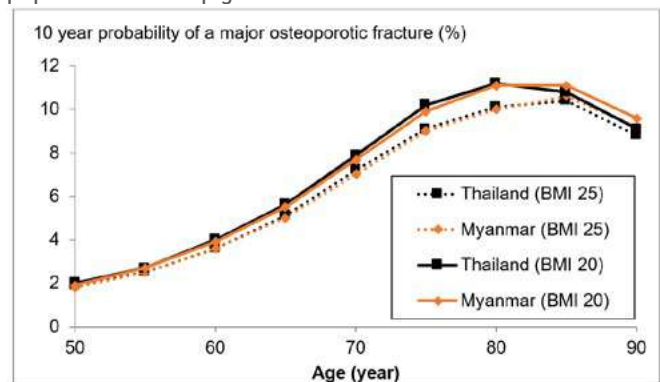
**Objective:** FRAX models are frequently requested for countries with little or no data on the incidence of hip fracture. In such circumstances, the International Society for Clinical Densitometry and International Osteoporosis Foundation have recommended the development of a surrogate FRAX model, based on coun-

try-specific mortality data but using fracture data from another country, usually within the region, where fracture rates are considered to be representative of the index country. This abstract describes the development and characteristics of a surrogate FRAX model for Myanmar.

**Methods:** The FRAX model used the ethnic-specific incidence of hip fracture in men and women living in Thailand, combined with the death risk for Myanmar (United Nations (UN), 2015-2019). The 10-year probability of a major osteoporotic fracture (MOF) was used when comparing the surrogate model and the FRAX model for Thailand. Examples are given for a woman with no clinical risk factors and BMI 20 and 25 kg/m<sup>2</sup> where the BMD was not known. The hip fracture incidence and UN population data were used to calculate estimated number of fractures 2020 and 2050.

**Results:** The surrogate model gave similar 10-year fracture probabilities for men and women compared to the model for Thailand. There were very close correlations ( $r=0.99$ ) in fracture probabilities between the surrogate and authentic models, so that the use of the Myanmar model had little impact on the rank order of risk. When the fracture incidence from Thailand was used to the population of Myanmar, it was estimated that 15,432 hip fractures arose in 2020 in individuals over the age of 50 years, with a predicted increase by approximately 2.5 times to 38,433 in 2050.

**Conclusion:** The surrogate FRAX model for Myanmar provides an opportunity to determine fracture probability within the Myanmar population and help guide decisions about treatment.



**Figure 10** The 10-year probability of a major osteoporotic fracture (%) for a woman with no clinical risk factors, BMI 20 and 25 kg/m<sup>2</sup> where the BMD was not known.

**Acknowledgment:** Asia Pacific Consortium on Osteoporosis (APCO) for assistance and collaboration

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### KNEE OSTEOARTHRITIS AND ADVERSE HEALTH OUTCOMES: AN UMBRELLA REVIEW OF META-ANALYSES OF OBSERVATIONAL STUDIES

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**Objective:** Knee osteoarthritis (OA) is a common condition, associated with a high rate of disability and poor quality of life. Despite the importance of such evidence in public health, no umbrella review (i.e., a review of other systematic reviews and meta-analyses) has systematically assessed evidence on association between knee OA and adverse health outcomes. We therefore to map and grade all health outcomes associated with knee OA using an umbrella review approach.

**Methods:** The search was made across several databases up to 22 April 2022. We used an umbrella review of systematic reviews with meta-analyses of observational studies assessing the effect sizes, based on random effect summary, 95% prediction intervals, heterogeneity, small study effects, and excess significance bias. The evidence was then graded from convincing (class I) to weak (class IV).

**Results:** Among 3,847 studies initially considered, five meta-analyses were included for a total of five different outcomes. Three adverse outcomes were significantly associated with knee OA (i.e., cardiovascular mortality, falls, and subclinical atherosclerosis). The presence of knee OA was associated with a significantly higher risk of cardiovascular mortality (odds ratio, OR=1.17; 95%CI, confidence intervals: 1.02-1.34), falls (RR=1.34; 95%CI: 1.10-1.64), and conditions associated with subclinical atherosclerosis (OR=1.43; 95%CI: 1.003-2.05). The certainty of each of this evidence was weak.

**Conclusion:** Our umbrella review suggests that knee OA can be considered as putative risk factor for some medical conditions, including cardiovascular diseases and falls, however, it is important to note that the evidence is affected by potential biases.

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### ASSOCIATION BETWEEN POLLUTION AND FRAILITY IN OLDER PEOPLE: A CROSS-SECTIONAL ANALYSIS OF THE UK BIOBANK

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**Objective:** Frailty is a relevant issue in older people being associated with several negative outcomes. Increasing literature is reporting that pollution (particularly air pollution) can increase the risk of frailty, but the research is still limited. We aimed to investigate the potential association between pollution (air, noise) with frailty and pre-frailty among 60 years old and over participants of the UK Biobank study.

**Methods:** Frailty presence was ascertained using a model including five indicators (weakness, slowness, weight loss, low physical activity, and exhaustion). Air pollution was measured through residential exposures to nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM<sub>2.5</sub>, PM<sub>2.5-10</sub>, PM<sub>10</sub>). The average residential sound level during the daytime, the evening and night was used as an index for noise pollution.

**Results:** A total of 220,079 subjects, aged 60 years old and over, was included. The partial proportional odds model, adjusted for several confounders, showed that the increment in the exposure to NO<sub>x</sub> was associated with a higher probability of being in both the pre-frail and frail category (odds ratio, OR=1.003, 95%CI=1.001-1.004). Similarly, the increase in the exposure to PM<sub>2.5-10</sub> was associated with a higher probability of being pre-frail and frail (OR=1.014, 95%CI=1.001-1.036), such as the increment in the exposure to PM<sub>2.5</sub> that was associated with a higher probability of being frail (OR=1.018, 95%CI=1.001-1.037).

**Conclusion:** Our study indicates that the exposure to air pollutants as PM<sub>2.5</sub>, PM<sub>2.5-10</sub> or NO<sub>x</sub> might be associated with frailty and pre-frailty, suggesting that air pollution can contribute to frailty and indicating that the frailty prevention and intervention strategies should take into account the dangerous impact of air pollutants.

**Acknowledgment:** This work was supported by an unrestricted grant of the University of Palermo, Premio Angelo Ferrante.

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### THE PREVALENCE OF OSTEOPOROSIS, ITS RISK FACTORS AND THEIR ASSOCIATION WITH SELF-ASSESSMENT OF HEALTH IN RURAL WOMEN OF THE URALS

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**Objective:** To reveal the prevalence of osteoporosis (OP) and assess the associations of its risk factors with the level of self-assessment of health and its prospects among women over 50 living in rural population of Urals.

**Methods:** During 2021-2022 a cross-section population-based study was carried out in the village Kalinovo, Nevyansky district, 66 km to the North from Yekaterinburg. The source for the sample was the lists of the attached population to the general practice (2240 people). Inclusion criteria were female gender, age 50 and older, and residence in the village. The examination was carried out during the visits of the doctor-researcher to the house and when the residents of the village applied for medical help for any



reason. The assessment tool was the FRAX calculator (<https://www.sheffield.ac.uk/FRAX/tool.aspx?country=13>), which was used to calculate the absolute 10-year risk of major osteoporotic fractures (MFRs). A FRAX value higher than the Russian age-dependent therapeutic threshold without introducing BMD data into the model was considered high risk. The analyzed parameters also included data of short clinical examination, the presence of behavioral risk factors for major chronic non-communicable diseases (CNCD), waist circumference (cm), BMI (kg/m<sup>2</sup>), plasma glucose and cholesterol levels, self-assessment health score on the SF36 scale.

**Results:** 576 women matched the inclusion criteria; of these; but 17 did not live in this village for a long time, and 25 refused participation. The response rate was 95.5%. The mean age of the participants was 67.7 years, median 67 years [IQR 61;73]. Twenty-four women (4.5% [95%CI 2.7-6.3], mean age 73.3 years) had a history of confirmed multiple low-energy fractures or a high 10-year risk of main osteoporotic fractures (MOF) exceeding the Russian age-dependent intervention threshold without the introduction of densitometry data. They were considered as persons with clinically confirmed OP. The numbers of women with probability of osteoporosis higher than the diagnostic threshold i.e. were required BMD assessment reached 152 (28.5% [95%CI 26.7-30.3], mean age 68.9 years). Densitometry was performed in 5 of them (3.2%). The risk of fractures below the Russian diagnostic threshold by FRAX, allowed to exclude OP, was in 356 women (66.7% [95%CI 64.5-68.9], mean age 66.8 years). There were no significant differences in glycaemia level, blood pressure, plasma cholesterol concentrations in women with different risks of OP. The mean waist circumference in patients without OP, with OP risk above the diagnostic threshold, and women with clinically confirmed OP was 91.4 cm, 90.9 cm, and 90.3 cm, respectively ( $p>0/05$ ). Non-significant differences in comorbidity rate were obtained in women of these three categories. Thus, 53.7% of rural women elder 50 years without OP, 51.3% of women with an OP risk above the diagnostic threshold, and 54.2% of women with confirmed OP, respectively, suffered from clinically manifested osteoarthritis. ( $p>0/05$ ). Arterial hypertension was in 70.2%, 80.9% and 75.0% of women with these three categories of OP risk ( $p>0/05$ ), coronary heart disease - 16.6%, 17.8 and 20.8% respectively. ( $p>0/05$ ). Among participants 53% [95%CI 49.9-57.4] rated their health as "mediocre" and 5.5% [95%CI 3.7-7.3] as poor independently on their risk of main osteoporotic fractures level. The results obtained demonstrate significantly lower rates of OP prevalence than Russian rates obtained among the urban residents. However, the rate of AP in rural population is probably higher if take into account the lack of mineral density indexes in the vast majority of women who had had one low-energy fracture or had risk factors for AP but have not reached the therapeutic intervention threshold. It could be also assumed impact of higher mortality in the early stages after a hip fracture and a shorter life expectancy in Russian countryside people as a whole.

The revealed absence of significant differences in indicators of health self-assessment among women of different levels of risk of fractures would be accounted by a high level of comorbidity and a burden of other risk factors for major NCDs in rural women

in the Urals.

**Conclusion:** The prevalence of OP among women in the rural medical district of the Urals was lower than in the urban population. However, the high rate of OP risk factors, the low availability of densitometers for rural regions may underestimate the real burden of osteoporosis for the rural population. Regardless of the risk level of OP, rural residents over 50 years were characterized by a high level of risk factors for the main NCDs, and low self-esteem of health and its prospects.

## P462

### USE OF MINERALIZED DENTIN GRAFT IN AUGMENTATION OF DIFFERENT INDICATION AREAS IN JAW BONES WITH POSSIBILITY TO USE IN THE ENTIRE BONE SKELETON

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**Objective:** Extracted teeth are still considered a clinical waste and therefore being discarded. It is evident that obtained and prepared autogenous dentin graft (ADG) may be used for Guided Bone Regeneration because of similar biochemical characteristics to human bone. We aimed to present a novel procedure in a clinical setting that employs freshly extracted teeth that are processed into a bacteria-free particulate dentin, and then grafted immediately into bone defects (postextraction, cystic or osteoporotic bone defects). Monitoring and proving the high inductive potential of ADG in the regeneration of the bone structure of the jaw bones.

**Methods:** The protocol of the Israeli biologist Itzhak Binderman was applied to reach the aim. A Smart Dentin Grinder (SDG) was used to obtain a mineralized dentin matrix, with dental particles of 300 to 1,200 microns. Clinical measurements were performed using a questionnaire for monitoring the postoperative clinical manifestation, and bone measuring calipers for measuring the horizontal changes of the alveolar ridge. In addition, paraclinical-radiological examinations were conducted to check and compare the bone density.

**Results:** During the following period of 6 months, clinical measurements of post-extraction dimensional changes of the alveolar ridges show minimal horizontal and vertical bone resorption with preserved alveolar ridge volume, and an accelerated bone regenerative process without any particular postoperative complications. Great collaboration was established at the Japanese University of Hokkaido between the Oral Regenerative Dentistry (Md Arafat Kabir, Masaru Murata) and the Dept. of Orthopedic Surgery (Katsuhisa Yamada) at the Medical Faculty. As a result of the excellent regenerative results obtained in the field of regenerative surgery of the jawbones, there were scientific tests carried out on animals (sheep) to test and monitor the augmentation of dentine graft material in bone defects in the iliac bone. The tests demonstrated an excellent bone regeneration, bio-absorption,

and integration of the dentine block graft in the created bone defect in the iliac bone.

**Conclusion:** Dentin particulate grafted immediately after extractions should be considered as the gold standard due to its osteogenic, osteoinductive and osteoconductive effects on bone tissue regeneration. By using mineralized dentin matrix, we get maximum utilization of our own biological potential without the use of any other artificial graft materials. There is a wide indicative potential in the field of bone regenerative dentistry, but there is also potential for implementation in orthopedic surgery.

### P463

#### ATTRACTIVE TRAINING IN INTERVENTIONAL REHABILITATION: HOW TO IMPROVE?

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**Objective:** There is growing interest in our specialty in ultrasound-guided interventionism. We have extensive online / face-to-face training with courses taught by different specialists. In most but there is no option to practice the techniques learned. We believe that courses taught by expert rehabilitation specialists in cadaveric interventionism are very attractive because they are focused on our type of patients and facilitate the performance of techniques in situ. We organized an ultrasound-guided upper extremity intervention course with cadaveric practice for rehabilitators. A questionnaire was sent to the attendees after a week. The objective was to know the degree of satisfaction.

**Methods:** Registry of variables: sex, age, workplace and 10 satisfaction questions (0/10): General, Face-to-face format, educational nature, scientific rigor, quality of speakers, duration, organization, usefulness, interest, innovation. course. The variables: are presented in means and percentage. Satisfaction: in Net Promoter Score (NPS=% of scores from 9 to 10 -% scores from 1 to 6) and averages (P).

**Results:** N=20 attendees, 80% participation in the survey, 62.5% women. Age: 81.25% (35-55 years), 75% from Barcelona. Satisfaction: 81.25%, P: 9.19 In-person: 87.5%, Formative: 87.5%, Rigor: 81.25%, Quality: 87.5%, Duration: 37.5%, Organization: 81.25%, Profit: 100%, Interest: 100%, Innovation: 81.25%, Recommended: 93.75%, P: 9.69.

**Conclusion:** In our sample, we observed high interest in this course by physiatrists/rehabilitation doctors, because of its usefulness in their daily practice and because of the interest in content and innovation. The majority demand was to increase the duration of the practice. 93.75% would recommend this type of course.

### P464

#### ONE-YEAR MORTALITY RATES FOLLOWING FRACTURE OF THE FEMORAL NECK TREATED WITH HIP ARTHROPLASTY IN AN AGING SAUDI POPULATION: A TRAUMA CENTER EXPERIENCE

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**Objective:** Femoral neck fracture is a common problem in elderly patients, and it is managed with either total hip arthroplasty or hemiarthroplasty with very good outcomes. However, the reported 1-year mortality rate is as high as 33%. The primary aim of this study was to estimate the morbidity and mortality rates at 30 days and 1 year following hip arthroplasty in patients with fractures of the femoral neck. Also, we aimed to determine major complications and factors influencing mortality.

**Methods:** This study was a retrospective cohort study. The electronic patient records were searched for all physiologically old patients with displaced femoral neck fractures that were managed with either hemiarthroplasty or total hip arthroplasty.

**Results:** From January 2017 to December 2018, a total of 99 patients were included in the study. Of those, 57 were female patients. The mortality rate was 15.2%. The significant predictors of death included the age at the time of surgery, readmission within 30 days of initial admission, acute renal impairment, and the need for preoperative medical intervention. Patients treated with total hip arthroplasty had lower mortality rates than those treated with hemiarthroplasty (P=.017).

**Conclusion:** To the best of our knowledge, this study reported detailed perioperative-related complications and outcomes following neck of femur fractures. The results of our study confirm the persistently high morbidity and mortality associated with this patient group. Efforts should be aimed at optimizing preoperative medical management, which is vital to ensure early identification of medically unfit patients.

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### CHARACTERIZATION OF PORTUGUESE PATIENTS WITH PROXIMAL FEMUR FRAGILITY FRACTURE: DATA FROM RHEUMATIC DISEASES PORTUGUESE REGISTER, REUMA.PT

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**Objective:** To characterize patients with proximal femur fragility fracture (PFFF) registered in the module of the Rheumatic Diseases Portuguese Register (Reuma.pt/osteoporotic fractures).

**Methods:** An observational retrospective cohort study with data from module Reuma.pt/osteoporotic fractures, between October 2022 and January 2023, was conducted. Adult patients with 65 years old or older with PFFF referred from the Orthopaedics Inpatient Dept. to a Portuguese Fracture Liaison Service were included. Sociodemographic, clinical, laboratory and bone densitometry data were assessed.

**Results:** 92 patients with PFFF, 90% female, median age of 83.7[76.3-87.9] years old, were included. Table 1 summarizes patients' characteristics.

**Table 1.** Main patients' characteristics (Reuma.pt/osteoporotic fractures).

Characteristics (N=92)	
Osteoporotic risk factors	n (%)
Vertebral fracture (n=72)	20(27.8)
Familiar history of hip fracture	6(6.5)
Menopause <40 years (n=83)	1(1.1)
BMI <19 kg/m <sup>2</sup>	1(1.1)
Habits	
- Smoking	4(4.3)
- Alcoholic (current consumption)	9(9.8)
Falls risk	
≥1 last 12 months	21(22.8)
Risk factors(N=92)	
- Hearing loss	18(19.6)
- Decreased vision	14(15.2)
- Lower extremity weakness	49(53.3)
- Balance changes	45(48.9)
- Gait disturbances	62(67.4)
- Drugs that alter state of consciousness	16(17.4)
Drug-induced OP	
Corticosteroids	2(2.2)
Anticonvulsants	1(1.1)
Selective serotonin reuptake inhibitors	13(14.1)
Aromatase inhibitors or chemotherapy	4(4.3)

Furosemide	2(2.2)
Proton pump inhibitors	30(32.6)
Disease-induced OP	
Inflammatory rheumatic disease	1(1.1)
Inflammatory bowel disease	1(1.1)
HIV	1(1.1)
Hyperthyroidism	1(1.1)
Primary hyperparathyroidism	2(2.2)
Hypogonadism	1(1.1)
Diabetes Mellitus	24(26.1)
Chronic liver disease	1(1.1)
Gastric bypass surgery	1(1.1)
Hematologic disease	2(2.2)
Chronic kidney disease	7(7.6)
Laboratory parameters	
Ionized calcium(mg/dL)	4.8(4.7-5)
Inorganic phosphate(mg/dL)	3.5(3.15-3.8)
25-OH-vitamin D(ng/mL)	37(27-50)
<b>Total Femur T-score (Mean±SD)</b>	<b>-2.31±1.15</b>

**Conclusion:** A complete register and characterization of patients with PFFF constitutes a challenge in clinical practice. In the last year, the module Reuma.pt/osteoporotic fractures was developed. This register is a useful tool to characterize Portuguese osteoporotic patients in order to decide the best way to monitor and manage these patients.

P466

### THE ROLE OF TRANSILIAC BONE BIOPSY IN BONE DISORDERS: INDICATIONS AND MAIN HISTOMORPHOMETRY FEATURES

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**Objective:** To explore the indications for BB and histomorphometry parameters in a Portuguese Rheumatology Centre.

**Methods:** An observational retrospective cohort study with data from 2017 to 2022 was conducted. Adult patients aged 18 years or older from a Portuguese Rheumatology Centre who underwent a transiliac tetracycline-labelled BB were included. The indications for BB, quality of bone specimens, histomorphometry parameters, Turnover, Volume, Mineralization (TVM) classification system and fluorescent microscopy were assessed.

**Results:** A total of 17 patients (65.4±16.6 years old; 64.7% female) were included. The indications of BB were patients with fragility fracture and stage 4-5 chronic kidney disease (64.7%),

suspicion of osteomalacia (29.4%) and atypical femoral fracture (5.9%). Concerning specimens' quality, 12 of specimens were reported by the osteopathologist to be good and 5 to be reasonable. Table 1 summarizes the main BB parameters analyzed.

**Table 1:** Histomorphometry parameters.

Histomorphometry parameters, N=17	n (%)
<b>Cortex</b>	
<b>Thickness</b>	
Reduced	16 (94.1)
Normal	1(5.9)
<b>Porosity</b>	
Increased	11(64.7)
Normal	6(35.3)
<b>Osteoid volume</b>	
Reduced	7(41.2)
Normal	2(11.7)
Increased	8(47.1)
<b>Trabecular volume</b>	
Reduced	12(70.6)
Normal	4(23.5)
Not determined	1(5.9)
<b>Peri trabecular fibrosis</b>	5(29.4)
<b>Erosion surface</b>	
Reduced	7(41.2)
Normal	5(29.4)
Increased	4(23.5)
Not determined	1(5.9)
<b>Active osteoblasts(≥1)</b>	9(52.9)
<b>Active osteoclasts(≥1)</b>	8(47.1)
<b>Fluorescent microscopy, n=8</b>	
Absent	2 (25)
Few	4 (50)
Some	2 (25)
<b>TMV, n=9</b>	
<b>Turnover</b>	
Low	6(66.7)
Normal	1(11.1)
High	2(22.2)
<b>Mineralization</b>	
Normal	8(88.9)
Abnormal	1(11.1)
<b>Volume</b>	
Low	8(88.9)
High	1(11.1)
<b>Histopathological diagnosis, n=17</b>	
Osteomalacia	5(29.4)
Adynamic bone disease	8(47.1)
Hyperparathyroidism bone disease	3(17.6)
Osteoporosis	2(5.9)

**Conclusion:** Bone histomorphometry through quantitative analysis of transiliac bone remains the only method for the pathophysiology analysis of the of metabolic bone diseases. Recently, there has been a controversy on performing BB, its indications and correct interpretation. In our study the most common indication and histopathological diagnosis were renal osteodystrophy and adynamic bone disease, respectively. Future research is needed to explore the implications of BB findings for monitoring and therapeutic decisions.

P467

#### WORTH OF MEASURING BONE MINERAL DENSITY IN THE RADIUS FOR PATIENTS WITH ANKYLOSING SPONDYLITIS

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**Objective:** Ankylosing spondylitis (AS) is a chronic rheumatic disease that can lead to bone loss and secondary osteoporosis. Bone density measurement (BMD) is an important tool for assessing fracture risk in patients with AS. However, traditional measurement sites, such as the lumbar spine and femur, have limitations in detecting early osteoporosis in this population. BMD measurement may be limited by the site of evaluation, which may influence the results of the measurement. The aim of this study was to assess the validity of BMD measurement at the distal radius in patients with AS.

**Methods:** A retrospective study was carried out in patients with AS. The BMD was measured using DXA method at the lumbar spine, femur, and distal radius. The results of the BMD measurements were analyzed statistically to determine the validity of the measurement at each site.

**Results:** A total of 60 patients diagnosed AS were included. The study population was comprised of 57 male patients (95%) and 5 female patients (5%) with a mean age of 46.09±12.75 years. The average BMI was 25.83±5.14 kg/m<sup>2</sup>, and the average disease duration was 15.97±9 years. The prevalence of osteoporosis was 29.2%, with a mean spine T-score of -0.533±1.85 standard deviations (SD). The mean T-score for the femur was -1.56±1.45 SD, and for the radius was -0.833±0.963 SD. BMD measurement at the radius diagnosed osteoporosis in 6.6% of cases and osteopenia in 30% of cases. Statistical analysis of the different parameters of validity of the BMD measurement at the radius has shown a sensitivity of 0.75, a specificity of 0.95, a positive predictive value of 0.91, and a negative predictive value of 0.81.

**Conclusion:** This study has shown good sensitivity and specificity of radius BMD measurement in detecting bone loss in SA patients. This leads us to conclude that this diagnostic test is valid for evaluating bone status in patients with SAA, particularly in cases of advanced disease with significant osteoformation or technical difficulties with positioning patients on the examination table due to hip and sacro-iliac ankylosis.

P468

### PREVALENCE AND ROLE OF TERIPARATIDE IN MANAGEMENT OF VERTEBRAL FRACTURE SECONDARY TO STEROID INDUCED OSTEOPOROSIS IN DEVELOPING COUNTRY

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**Objective:** Long-term use of glucocorticoids (GCs) is the main cause of nontraumatic vertebral fracture (VF) in patients with respiratory and autoimmune inflammatory diseases such as systemic lupus erythematosus (SLE) and rheumatoid arthritis (RA). Vertebral fracture leads to significant morbidities such as unremitting pain, spinal deformities and reduced mobility, leading to diminished quality of life. As vertebral fracture is a strong risk factor for further fragility fractures and mortality, it should be treated appropriately. We aim to determine the prevalence of asymptomatic VF in patients with long-term users of glucocorticoids and to characterize VF location, type and severity. Evaluate the role of teriparatide in management of these fractures.

**Methods:** This cross-sectional study was conducted on patients who had received glucocorticoids for at least 3 months secondary to systemic disease from 2020-22. a thoracic and/or lumbar spine radiological imaging were obtained. Demographic, lifestyle behaviors and FRAX data were collected. An independent, blinded orthopedist reviewed the images for VF and quantified severity using the Genant semiquantitative method.

**Results:** From a total of 415 patients on long term steroid were screened for eligibility with a mean age of 45.3±25.12 years, there were 229(55.18%) females and 186(44.81%) males. all these patients had radiological imaging available for analysis. Radiological VF were present 271 patients (65.30%). Out of 271 VF, thoracic spine 141 (52.02%) was the most frequently affected location, followed by the lumbar spine 73 (26.93%). Multiple thoracolumbar spine fractures were observed in patients 57(20.03%). The most prevalent VF was wedge type, followed by biconcave and crush, respectively. Most of the identified VF were classified as mild (less than 25 height loss) followed by moderate and severe respectively by the Genant's grading system. The relationship between prior fractures and risk of new fractures was evaluated in this study with prevalent vertebral fractures randomized to daily placebo or teriparatide (20 µg) in the Fracture Prevention Trial. The median observation time was 18 months. Significant reduction in new VF observed in teriparatide group as compared to placebo group. Prior fracture healing was also observed, by reduction of pain scores and improvement of quality of life significantly in teriparatide group as compared to placebo group. Total Hip and vertebral Changes from baseline in BMD differed significantly between the study groups by 12 months (P=0.01), when the first post-baseline measurement was performed. At 18 months, the change from base line was 3.9±0.6% in the teriparatide group and 2.6±0.6% in the placebo group, with a between group difference of 1.3 percentage points (95% confidence interval [CI], 0.4 to 2.4; P=0.005).

**Conclusion:** This study shows a high prevalence of VF among patients on long term GC with an increase of risk for new VF and non-VF. In our study, teriparatide was associated with greater increases in BMD at the spine and hip and with significantly fewer new vertebral fractures, with no significant differences between groups in the incidence of nonvertebral fractures or serious adverse events.

P469

### PREVALENCE OF VERTEBRAL FRACTURE AMONG POSTMENOPAUSAL PATIENTS COMING WITH BACKACHE AND ROLE OF TERIPARATIDE IN MANAGEMENT OF VERTEBRAL FRACTURE IN DEVELOPING COUNTRY

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**Objective:** With rapid ageing of the Asian population, osteoporosis has become one of the most prevalent and costly health problems. vertebral is one of the most frequent fractures and it has been shown to be associated with an increased risk of further fractures. Vertebral fractures (VF) are the most common site for osteoporotic fracture, although they are frequently undiagnosed. Both clinical and radiological VF have been associated with increased morbimortality rates and predict future non-vertebral fragility fractures.

We aim to determine the prevalence of previous VF in outpatient's department of two tertiary care hospital of Karachi Pakistan in postmenopausal patients with persistent, nonspecific backache without history of trauma.

**Methods:** This cross-sectional study includes 200 postmenopausal patient age range b/w 45 and above years presented consecutively between June 2020 and dec 2022 with persistent, nonspecific backache to the OPD. The relationship between prior fractures and risk of new fractures was evaluated postmenopausal women with prevalent vertebral fractures randomized to daily placebo or teriparatide (20 µg) in the Fracture Prevention Trial. The median observation time was 24 months.

**Results:** Among 200 patients, age ranging from 45-85 years, mean 65±14.14SD. Radiological VF were present 112 patients (56%). Among 112, the most prevalent VF was wedge type, thoracic spine 51 (45.53%) was the most frequently affected location, followed by the lumbar spine 34 (30.35%). Multiple thoracolumbar spine fractures were observed in patients 27(24.10%). Most of the identified VF were classified as mild (less than 25 height loss) followed by moderate and severe respectively by the Genant's grading system.

Out of 112 VF, patients are randomized to daily placebo or teriparatide (20 µg) and followed for 24 months. In the teriparatide-treated group, there was no significant increase in vertebral or nonvertebral fracture risk in these subgroups. As compared to placebo group developed vertebral fractures (by Cochran-Armitage trend test, P<0.001) 15% developed moderate or severe vertebral fractures (P<0.001) and 9% developed non vertebral fracture.

**Conclusion:** Postmenopausal patients with persistent, nonspecific backache are at high risk for the consequences of unrecognized and untreated VF. Also, the number and severity of prevalent vertebral fractures independently predicted the risk for new vertebral fractures, and the number of prior nonvertebral fractures predicted the risk for new nonvertebral fractures.

## P470

### TARGETED OPTIMUM CARE APPROACH FOR OSTEOPOROSIS: RISK STRATIFICATION TO REDUCE FALLS AND FRAGILITY FRACTURE – AN INITIATIVE BY THE EGYPTIAN ACADEMY OF BONE HEALTH

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**Objective:** Older adults are prone to natural decline of the tissue composition and physiological function of different systems. In addition to impairment of vision, hearing, muscle strength, and response speed; gait disorder, walking instability, and balance impairment caused by a decline in the structure and functioning of the central nervous system, peripheral nerves and osteoarthritis are relatively common findings in older adults. These represent important risk factors for the occurrence of falls and consequently sustaining a fragility fracture in this population cohort. Aims: 1. To assess the potential for stratifying the people at risk of sustaining a fragility fracture aiming at providing targeted optimum care for them; 2. To identify the most appropriate assessment tools for screening and follow up interventions.

**Methods:** This was a multicenter, cross-sectional, observational study. Both men and postmenopausal women, admitted with an osteoporotic fracture (whether major osteoporosis or hip fracture) were consecutively recruited for this work and managed under Fracture Liaison Service (FLS). All the patients were assessed for their Fracture risk (FRAX), falls (Falls Risk Assessment Score FRAS) and sarcopenia (SARC-F) risks as well as functional disability (HAQ). Blood tests for bone profile as well as DXA scan were offered to all the patients.

**Results:** Total number of the patients who met the study criteria and accepted to share in the study was 236 (69 males, 167 females). Mean age was 70.1 (SD=9.2) years. 47% of the patients were above 70 years old, 34.3% above 60 years old whereas 18.6% were above 50 years old. The prevalence of falls was high in 69% of the patients presenting with major osteoporosis fracture and 61.8% in those with hip fracture. The incidence of fragility fracture was negatively correlated with the activities of daily living (ADL, represented by HAQ score)  $P=0.01$ , but was positively correlat-

ed with the SARC-F score ( $P=0.021$ ) and falls risk ( $P=0.001$ ). The results also revealed that Falls risk score was positively correlated with FRAX score ( $P=0.001$ ). 70% of the osteopenia patients who sustained fragility fracture had high falls risk and/or SARC-F score. Diabetes mellitus was the commonest comorbidity reported in the patients (34%) followed by hypertension 29.4%.

**Conclusion:** Falls risk assessment, sarcopenia risk (SARC-F) as well as sarcopenia measures (grip strength, Timed up and go, walking speed, the functional disability assessment score, comorbidity assessment as well as FRAX) can simply and effectively be used to stratify the patients and assess the risk of new falls and fragility fractures in the older adult population, and their use should be widely adopted in the community. Targeted osteoporosis management, optimization of food and exercise program should be included in the Targeted Optimum Care Approach.

## P471

### TARGETING TO TREAT: PROTOCOL FOR A POPULATION-BASED INTERVENTION FOR FRACTURE PREVENTION – AN INITIATIVE OF THE EGYPTIAN ACADEMY OF BONE HEALTH AND THE EGYPTIAN FOOD BANK

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Annually, osteoporosis results in about 482000 fractures in Egypt and approximately 9 million fractures worldwide. In addition to the fact that osteoporosis remains hugely underdiagnosed in Egypt, the big treatment gap (82.9%) as well as the underestimated social and economic burden of fragility fractures represent major challenges in the care of bone health in older adults in Egypt.

**Oversight of the project:** A survey compassing target population in almost all Egyptian governorates. Delivery of this service improvement project is through a Joint Working agreement between the Egyptian Academy of Bone health and the Egyptian Food Bank. The first phase of the program involves engagement with the local leads for bone health and collaborative working with local nongovernmental organizations and care homes in the Egyptian governorates.

**Objective:** Primary target: To set up and evaluate a "Targeting to Treat" service based on population screening for fracture risk in both postmenopausal women as well as men as a rational step in reducing the burden of osteoporotic fractures. National Target: to reduce the incidence of osteoporosis-related hip and vertebral fractures by 25% by the year 2025. Secondary target: to support proactive fragility fracture, falls and sarcopenia risk assessment

in addition to optimizing bone health through appropriate food supplementation and treatment for high-risk patients.

**Methods:** The clinical cohort bone health program is quite pragmatic in its approach, considering that the variable geographical locations may require different approaches and priorities. Older adults, both men and women, living in care homes will be invited to participate in the work and, following informed consent they will be enrolled in the program. Every patient will complete a self-reported questionnaire enquiring about: History of fracture (hip, spine, wrist, or other osteoporosis-related fractures) after the age of 50, menstruation history (for women only), Fracture Risk assessment using FRAX questionnaire, Falls risk assessment using FRAS questionnaire, short questionnaire to assess for reasons and mechanism of falling, history of osteoporosis medications, current medications, assessment of sarcopenia using SARC-F questionnaire, as well as functional disability using Arabic HAQ questionnaire. Every patient will have BMD assessment and blood check for calcium, vitamin D, alkaline phosphatase and creatinine.

**Intervention:** based on the pre-identified intervention thresholds, the patients will be treated according to the Egyptian Guidelines for osteoporosis management. A program for falls management will be implemented. Management of sarcopenia, as well as exercise program together with optimization of nutritional supplements will be offered to every patient tailored to the individual's needs.

**Evaluation of the outcomes:** These include BMD at baseline and after 2 years of management, Fracture risk assessment: FRAX at baseline and after 2 years of management (including BMD assessment), Falls risk assessment, Functional disability & QoL score at baseline and after 1- and 2 years, objective measures of sarcopenia assessment at baseline and after 1 and 2 years (Grip strength, Chair stand test, Time up and go, Gate speed), as well as incidence of low trauma fracture over 2 years.

## P472

### ASSOCIATION BETWEEN HANDGRIP STRENGTH AND TYPE 2 DIABETES MELLITUS IN MONGOLIAN POSTMENOPAUSAL WOMEN

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**Objective:** Handgrip strength (HGS) is a simple and reliable measurement of muscle strength. It is an important tool for diagnosing sarcopenia and chronic diseases in postmenopausal women. To investigate the HGS in postmenopausal women with type 2 diabetes mellitus (T2DM) in Ulaanbaatar city's hospital.

**Methods:** The study was conducted using cross-sectional analysis and included 186 postmenopausal women over 50 who had T2DM. Patients completed a questionnaire on their lifestyles and clinical information within 20-30 minutes from June 2022 to No-

vember 2022. HGS was measured by a handheld dynamometer with maximum effort; two attempts were made with each hand. HGS was defined according to the Asian Working Group for Sarcopenia (AWGS) criteria as low handgrip strength (<18 kg for females). Multivariate logistical regression analyses were used to identify low and normal HGS predictors.

**Results:** The study involved 186 postmenopausal women with T2DM, with an average age of 63.07±8.64. Of the subjects, 121 (65.1%) had low HGS and 65 (34.9%) had normal HGS. Age, BMI, diabetic leg wound, and diabetes duration were significantly associated with HGS in postmenopausal women. Also, high and low-level glucose was significantly associated with HGS in females. But regular exercise, alcohol consumption, and smoking status had not significantly associated with HGS. After adjusting for age, odds ratios (OR) for low hand grip strength remained significantly associated with BMI in postmenopausal women with T2DM (OR, 1,74; p=0.001; 95%CI (0,62-1,03). Also showed OR for absolute handgrip strength and diabetic leg wound had a significant effect on the hand grip strength in T2DM (OR, 1,34; p=0.001; 95%CI (1,47-1,54).

**Conclusion:** Low HGS is associated with the BMI of postmenopausal women in diabetic patients. Therefore, these findings provide epidemiological evidence for the early intervention of reducing muscle strength in postmenopausal women with T2DM.

## P473

### APPLICATION OF THE INTERNATIONAL OSTEOPOROSIS FOUNDATION 2012 GUIDELINES FOR THE MANAGEMENT OF GLUCOCORTICOID-INDUCED OSTEOPOROSIS IN POLYMYALGIA RHEUMATICA: A SINGLE-CENTER COHORT STUDY

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**Objective:** Polymyalgia Rheumatica (PMR) is relatively common in adults over the age of 50. Glucocorticoids (GC) are the first-line treatment of PMR and carry a well-known risk for osteoporosis<sup>1</sup>. In 2012, the International Osteoporosis Foundation (IOF) emitted practical guidelines for the management of glucocorticoid-induced (GCI) osteoporosis, useful in this clinical context<sup>2</sup>. We aimed to evaluate clinicians' adherence to IOF 2012 guidelines for the management of GCI osteoporosis in PMR patients.

**Methods:** Single-center, retrospective study including randomly selected patients with PMR fulfilling the 2012 PMR EULAR/ACR classification criteria, lastly evaluated in our department between June 2022 and January 2023. Patient records were searched for demographic, clinical, and laboratory data. According to the IOF 2012 guidelines, indications for anti-osteoporotic treatment were any of the following: (i) age ≥70 years; (ii), previous fragility fracture; or (iii) prednisolone ≥7.5 mg daily (or equivalent) for ≥3 months. Descriptive analysis used mean and standard deviation for continuous data and frequency counts and percentages for categorical variables.

**Results:** 98 patients were enrolled, with a mean age of 73.0±8.5 years. 59 patients were women (60.2%). According to the IOF guidelines, all patients should have been offered anti-osteoporotic treatment. The most frequent reason was age ≥70 years (n=65; 66.3%), followed by prednisolone ≥7.5 mg daily for ≥3 months (n=97; 99.0%), and previous fragility fracture (n=9; 9.2%). Only 57.1% of the patients (n=56) were started on antiresorptive treatment.

**Conclusion:** PMR patients often require prolonged treatment with GC, thereby augmenting fracture risk. In this study, the rate of clinicians' application of the IOF guidelines for the management of GCI osteoporosis was low, despite the high prevalence of high-risk patients in this cohort. Special attention must be given to the prevention of GCI osteoporosis in PMR patients.

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### P474

#### TUMOR INDUCED OSTEOMALACIA FROM INTRACRANIAL TUMOR

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**Objective:** Tumor induced osteomalacia (TIO) is a rare disease characterized by elevations in fibroblast growth factor 23 (FGF 23), leading to hypophosphatemia, low BMD and insufficiency fractures. We report a patient presenting with severe muscle weakness, fractures and bone pain, found to have hypophosphatemia with FGF23 producing intracranial tumor.

**Case report:** A 48-year-old female was referred for bony pain and muscle weakness of 2 years duration. She had multiple insufficiency fractures and was confined to a wheelchair. Initial chemistries showed calcium 2.5 mmol/l, PTH 11.3 pmol/l, phosphate 0.5 mmol/l, 25 OH vitamin D level 109 nmol/l and eGFR 119. The calculated fractional phosphate excretion was 19.7%. BMD Z-score at lumbar spine was -2.6 and at the femoral neck was -4.2. Trabecular bone score (TBS) was severely deteriorated. FGF23 was 376 RU/ml (normal<180). DOTATOC PET CT showed uptake over a right frontal intracranial mass; MRI confirmed a 3.3 cm mass adhering to bone, with mild mass effect and midline shift. She was treated with oral phosphate, awaiting surgery. She underwent en block resection of the tumor and the inner table of skull was removed with a burr. Pathology showed a mesenchymal neoplasm compatible with phosphaturic mesenchymal tumor. Postoperatively, phosphate supplements were gradually reduced and FGF23 normalized. 6 weeks postoperatively, off all phosphate supplements, FGF23 was 168 RU/ml and serum phosphate was 1.17. Follow up BMD 6 months post-operatively showed lumbar spine BMD increased by 26.1% and total hip BMD increased by 35.2%. Body composition by DXA showed decreases in total body fat (40.1% preoperative to 38.4% postoperative) and increases in

total body lean mass (37916.1 g preoperative to 38661.6 g post-operative). TBS improved from 0.993 to 1.127. Our case was characterized by a delayed clinical diagnosis, an unusual location for FGF23 secreting tumor, and remarkable short-term postoperative improvements in BMD, body composition and chemistries.

**Conclusion:** This case underscores the importance of serum phosphate determination in patients with insufficiency fractures and muscle weakness.

### P475

#### IS HYPOALBUMINEMIA CORRELATED WITH HYPOVITAMINOSIS D IN ELDERLY WITH HIP FRACTURE WITH OR WITHOUT DIABETES MELLITUS TYPE 2?

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**Objective:** To identify if there is correlation between hypoalbuminemia and hypovitaminosis d in elderly with hip fracture. Additionally, this study aims to clarify if diabetic subjects among elderly with hip fracture are correlated with more severe hypoalbuminemia.

**Methods:** We retrospectively studied 113 elderly patients (>65 years old) with low energy hip fractures, with and without history of diabetes mellitus type 2 (T2DM), treated in our department the last two years, between January 2021 and January 2023. We measured the values of albumin (alb), 25 OH vitamin D (25OH VD) and hemoglobin A1c (HbA1c). The glycemic status of each patient was based on HbA1c (normal <5.7%, prediabetes 5.7-6.4%, diabetes >6.4%).

**Results:** Mean value of VD was 10,06±5,22 ng/ml, while mean value of albumin was 2,94±0,53 g/dL. Elderly with impaired glycemic status (either prediabetes or diabetes) had mean value of VD 9,83±4,85 ng/ml, while albumin was 2,93±0,54 g/dL. Their counterparts with normal glycemic status had mean value of VD 10,23±5,52 ng/ml, while albumin was 2,96±0,56 g/dL. Correlation of albumin levels between subjects with normal (<5.7%) and abnormal glycemic status (>5.7% either prediabetes or diabetes) didn't show statistical significance according to independent T-test (p=0,804). The VD levels were 11,12±5,75 ng/ml, when albumin was in normal range (29/113), while in cases of hypoalbuminemia (84/113), VD values were 9,69±5,00 ng/ml. Correlation of albumin levels between subjects with severe (<10 ng/ml) and less severe (>10 ng/ml) VD deficiency didn't reveal any statistical significance based on independent T-test (p=0,709).

**Conclusion:** Hypoalbuminemia was found to be prevalent among elderly patients with hip fracture, while VD deficiency and abnormal glycemic status were identified as risk factors for even lower levels of albumin. Decreased albumin should alert physicians for



possible malnutrition and subsequent lower VD levels. VD deficiency, hypoalbuminemia and impaired glycemic status consist elements of a circle, demanding a holistic management of elderly patients with low energy hip fracture.

## P476

### GENETIC SULFATE WASTING AND WIDESPREAD INTERVERTEBRAL DISC DISEASE

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**Objective:** Loss of function SLC13A1 variants cause failure to reabsorb sulfate in proximal tubule, reduced serum sulfate, and intervertebral disc disease, possibly via glycosaminoglycan abnormalities. A rheumatology patient was found to be homozygous for SLC13A1, explaining her spinal phenotype.

**Methods:** The homozygote is a 45-year-old female (second-generation British-Pakistani family), who was only 14 when her already severe degenerative disc disease necessitated her first laminectomy, with a second performed 4 years later. Her lumbar and thoracic range of motion is greatly reduced. She suffers from back pain and widespread chronic pain. Whole genome sequencing identified the patient to be homozygous for stop-gained SLC13A1 variant on chromosome 7 (GRCh37,7:122839967:G:A), c.34C>T, p.(Arg12Ter). We measured her radiographic intervertebral disc heights to compare with matched reference values from other studies and older controls from previous Cambridge studies. Informed consent was obtained.

**Results:** Radiograph measurements showed her widespread loss of disc height, as in the Table. The proband's brother is also under our care for multiple musculoskeletal (MSK) problems; he is heterozygous for SLC13A1 but has normal disc heights. He has chronic lung disease and MSK sequelae of long term prednisolone. The inheritance of both mutated alleles might suggest a history of family consanguinity. Serum and urinary sulfate analyses are awaited.

**Table 1.** Intervertebral disc heights of homozygous patient and controls

Disc level	Female middle intervertebral disc heights (mm)			
	Patient	Machino et al.	Bach et al.	Previous Cambridge studies
	N=1	N=50	N=18	N=20
	Age 38 years	Ages 30-39 years	Ages 30-39 years	Ages 55-71 years
T10-11	4.7	6.2 ± 1.2	-	2.7 ± 1.2
T11-12	4.3	7.0 ± 1.1	-	3.7 ± 1.6
T12-L1	6.1	7.3 ± 1.0	5.9 ± 0.8	4.5 ± 1.7
L1-L2	4.4	8.3 ± 1.3	7.0 ± 0.9	5.9 ± 1.8
L2-L3	3.5	9.7 ± 1.8	8.2 ± 1.3	6.4 ± 1.9
L3-L4	5.6	10.5 ± 1.9	9.1 ± 1.5	7.3 ± 2.0
L4-L5	4.4	10.5 ± 1.9	10.0 ± 1.3	6.9 ± 2.0
L5-S1	5.9	8.9 ± 2.0	9.8 ± 1.6	6.8 ± 1.9

**Conclusion:** How renal sulphate wasting results in intervertebral disc degeneration in SLC13A1 homozygotes is unclear. Studying such patients might provide an avenue for therapeutic intervention to target widespread disc disease.

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## P477

### SHOULD ELDERLY WITH HIP FRACTURE BE SCREENED FOR UNDIAGNOSED DIABETES MELLITUS TYPE 2?

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**Objective:** To highlight the impact of undiagnosed diabetes mellitus type 2 (T2DM) in elderly patients with hip fracture and define if this is correlated with more severe hypovitaminosis D or more severe fracture patterns.

**Methods:** We studied retrospectively 62 elderly patients (>60 years old) with osteoporotic hip fractures, treated between January 2021 and January 2022 without history of T2DM. We measured the values of PTH, 25-OH-vitamin D (25OH VD) and hemoglobin A1c (HbA1c). The glycemic status of each patient was based on the values of HbA1c (normal <5.7%, prediabetes 5.7%-6.4%, diabetes >6.4%). We defined severe subcapital fractures those with grade 3 or 4 according to Garden classification, while severe intertrochanteric fractures those with grade A2.2, A2.3 and all A3 fractures according to AO/OTA classification.

**Results:** We found out 17/62 (27.4%) patients with undiagnosed abnormal values of HbA1c. More specifically, 21% (13/62) had

undiagnosed prediabetes and 6,5% (4/62) undiagnosed diabetes. Elderly patients with hip fracture and normal glycemic status had  $9,55 \pm 5,16$  ng/ml VD and  $85,65 \pm 59,37$  pg/mL PTH values. In this group the unstable fractures were 32 (71,1%), while the stable fractures were 13 (28,9%). Their counterparts with hip fracture and abnormal glycemic status had  $10,94 \pm 6,47$  ng/ml VD and  $63,07 \pm 50,20$  pg/mL PTH values. In this group, the unstable fractures were 10 (58,8%), while the stable 7 (41,2%). Comparison of VD levels revealed statistically significant difference at the 0,01 level (Pearson,  $p=0,004$ ), while PTH values and fracture severity weren't statistically significant ( $p=0,528$  and  $p=0,484$ , Pearson).

**Conclusion:** Bone fragility should be recognized as a new complication of T2DM, especially in elderly patients. The elderly patients are even more vulnerable to T2DM-induced bone fragility due to additional factors, such as senile osteoporosis, severe VD deficiency, comorbidities, insulin usage, diabetes-related complications and especially diabetic neuropathy and retinopathy, predisposing to falls. Undiagnosed T2DM should be investigated to eliminate an additional risk factor for poor bone quality and all the well-known complications of T2DM.

#### P478 EPIDEMIOLOGY AND POSTOPERATIVE COMPLICATIONS OF HIP FRACTURE DURING COVID-19 PANDEMIC IN SOUTH KOREA

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**Objective:** This study aims to analyze the changes in epidemiology and the postoperative outcomes in patients with hip fractures during the COVID-19 pandemic compared to non-pandemic period.

**Methods:** According to the date of declaration of "mandatory social distance", we separated patients into 2 groups over a 1-year period: Period A and period B. We assessed the overall time to surgery, delay in surgery (>24 h, >36 h, and >48 h), reason of delay, length of hospital stay, type of surgery, and postoperative complications.

**Results:** The number of operated hip fractures and other trauma decreased in period B compared with period A by 17%, and 23%, respectively. The number of patients with delay in surgery by >24 h and >36 h was significantly higher in period B compared to that in period A ( $P=0.035$ ,  $P=0.012$ , respectively). However, no

significant difference in the number of delay in surgery >48 h and mean overall time to surgery between the 2 groups was observed ( $P=0.856$ ,  $P=0.399$ , respectively). There was no difference in the duration of hospital stay, type of surgery, and postoperative complications between periods A and B.

**Conclusion:** During the COVID-19 pandemic, the decrease in hip fractures was relatively fewer compared to the decrease in orthopedic trauma. Although hip fracture surgeries were delayed for over 24 h and 36 h, there was no increase in delay for over 48 h and postoperative complications.

#### P479 CHANGES IN THE MICROSTRUCTURAL AND MECHANICAL PROPERTIES IN THE MEDIAL CONDYLE OF HUMAN DISTAL FEMUR IN ADVANCED OSTEOARTHRITIS

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**Objective:** To analyze and compare the micro-structural and mechanical properties of subchondral trabecular bone of non-osteoarthritic and osteoarthritic distal femur using micro-images based on finite element analysis.

**Methods:** Twenty distal femurs were harvested from 10 cadavers. The subchondral trabeculae were obtained from the middle of the articular surface of the medial femoral condyle of distal femurs. A total of 20 specimens were scanned using the microCT system. MicroCT images were converted to micro-finite element model using the mesh technique, and micro-finite element analysis was then performed for assessment of the mechanical properties.

**Results:** According to the results, trabecular bone of osteoarthritic distal femur showed a decrease in trabecular thickness, bone volume fraction, structure model index, and yield stress and an increase in trabecular separation and structure model index.

**Conclusion:** Results of bone morphometry index and strength showed greater deterioration of microstructure and decreased mechanical strength in subchondral trabeculae of the osteoarthritic group.

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### THE EFFECT PREOPERATIVE DISCONTINUATION OF ANTIPLATELET AGENT ON BLOOD LOSS AND BLEEDING RELATED COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY FOR OSTEOARTHRITIS

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**Objective:** To investigate the effects of discontinuing antiplatelet agents before total knee arthroplasty for osteoarthritis on postoperative blood loss and bleeding related complications.

**Methods:** A database of all patients undergoing total knee arthroplasty between 2018-2021 was analyzed. Demographic, surgical and complete blood workup data were collected. Retrospectively, total 452 cases of total knee arthroplasty were enrolled within our inclusion criteria and classified into 327 patients of discontinuing antiplatelet agent group (acetylsalicylic acid: 213 patients, thienopyridine: 114 patients) and 115 patients of continuing group (acetylsalicylic acid: 81 patients, thienopyridine: 34 patients). For another analysis, we investigated preoperative bleeding time and patients were classified into 139 abnormal bleeding time (ANBT) group and 313 normal bleeding time (NBT) group (normal range: Bleeding time 81-192 sec). We examined hemoglobin concentration and hematocrit at three points in time preoperatively, 24 h and 48 h postoperatively. We compared groups of patients in terms of total blood loss, postoperative drained blood loss, hidden blood loss, visible blood loss and thrombocytopenia (platelet count  $<100 \times 10^3/\mu\text{L}$ ) and investigated whether patients had had any gastrointestinal bleeding, hematuria, nasal bleeding, hematoma requiring re-operation due to bleeding.

**Results:** There were no significant differences between the discontinuing group and continuing group in the hemoglobin concentration at 24 h and 48 h postoperatively ( $p=0.171$ ,  $p=0.247$ ), hematocrit at 24 h and 48 h postoperatively ( $p=0.128$ ,  $p=0.225$ ). No statistically significant differences between these two groups in the postoperative drained blood loss ( $p=0.281$ ), the visible blood loss ( $p=0.323$ ), hidden blood loss ( $p=0.245$ ) and total blood loss ( $p=0.526$ ) were found. There were no significant differences between NBT group and ANBT group in the hemoglobin concentration at 24 h and 48 h postoperatively ( $p=0.198$ ,  $p=0.183$ ), hematocrit at 24 h and 48 h postoperatively ( $p=0.101$ ,  $p=0.293$ ). No statistically significant differences between these two groups in the postoperative drained blood loss ( $p=0.281$ ), the visible blood loss ( $p=0.125$ ), hidden blood loss ( $p=0.121$ ) and total blood loss ( $p=0.526$ ) were found. Of the 452 cases, eleven (3.336%) deep vein thrombosis were found in the discontinuing groups and four cases (3.478%) in continuing group. 12 (3.846%) deep vein thrombosis were found in the NBT group and 3 (0.7%) cases in ANBT group. There were one (0.869%) case of upper gastrointestinal bleeding in continuing group and there no case of hematuria, nasal bleeding, or hematoma requiring reoperation.

**Conclusion:** Discontinuing or continuing anti-platelet agents undergoing TKA has no effect on postoperative blood loss and bleeding related complication. Our data support perioperative continuation of aspirin or clopidogrel intake in patients undergoing TKR.

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### ONE, TWO AND THREE-YEAR PERSISTENCE TO OSTEOPOROSIS TREATMENTS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS: A POPULATION-BASED COHORT STUDY

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**Objective:** Patients with type 2 diabetes mellitus (T2DM) have an increased risk of fragility fractures. Contrarily, the tendency is to underestimate their risk, hence there is a lower prescription of osteoporosis drugs (OPD) compared to non-diabetics. In addition, persistence to OPD is generally low. We aimed to assess whether there are differences in the persistence to OPD in patients with T2DM compared to non-diabetics.

**Methods:** Population-based cohort study conducted in the primary care setting. All subjects who initiated an OPD between 2012-2016 were selected from the SIDIAP database which contains anonymized clinical information of >5.5 million patients in Catalonia. Those who had received an OPD in the previous 12 months, with a history of neoplasia, Paget's disease or HIV infection were excluded. Subjects were followed until death, the end or switch to another OPD or end of the study (31/12/2018). Persistence was calculated as the ratio of the number of defined daily doses (NDDD) to the treatment duration time, measured from the first billing to the last billing with a gap non-greater than 3 or 6 months, as appropriate. Non-parametric techniques were used to detect differences in the drug persistence between T2DM and non-diabetics and according to the type of OPD.

**Results:** We identified 45,020 subjects who started a OPD (6,072 with T2DM and 38,948 non-diabetics), of whom 89.8% were women, mean age (SD) 69.1 (10.5) years. 80.6% received an oral bisphosphonate (BF), 9.7% denosumab (DMAB), 6.3% raloxifene/bazedoxifene (SERM) and 3.4% teriparatide (TPD). Considering a 3-month gap for all OPD, drug persistence 1 year was 47.6%, 2 years 31.2% and 3 years 21.9%. For a 6-month gap, it was 54.7%, 38.3% and 28.2%, respectively (no significant differences between T2DM vs. non-diabetics). When considering the different treatments, the drug with the best persistence was denosumab. In subjects with T2DM, lower persistence was observed with sig-

nificant differences ( $p < 0.05$ ) compared to non-diabetics in those treated with DMAB in all periods and with SERM and TPD at 2 years (Table 1).

Table 1: Adherence to osteoporosis treatments in patients with type 2 diabetes mellitus and non-diabetics

Gap 3 months	Overall	PATIENTS WITH T2DM						PATIENTS NON-DIABETICS						
		ONE YEAR		TWO YEAR		THREE YEAR		ONE YEAR		TWO YEAR		THREE YEAR		
		n	Percentage	n	Percentage	n	Percentage	n	Percentage	n	Percentage	n	Percentage	
	6,072	2,876	47.36	1,644	30.37	1,237	20.34	30,548	15,581	47.74	12,171	31.31	8,422	21.40
	5,130	2,396	46.70	1,384	27.00	1,115	21.73	31,379	14,802	47.18	9,665	30.80	5,826	18.60
	196	806	40.62	176	89.28	66	33.17	3,885	2,569	66.16	1,614	42.19	1,181	29.19
	105	31	29.52	28	26.67	23	21.90	2,676	1,000	37.37	640	23.91	469	17.53
	296	133	44.93	56	18.78			1,212	612	50.50	349	28.79		
Gap 6 months	Overall	PATIENTS WITH T2DM						PATIENTS NON-DIABETICS						
	6,072	3,293	54.23	2,308	38.01	1,646	27.11	38,348	21,390	55.77	14,911	38.92	10,800	27.79
	5,130	2,779	54.17	1,987	38.73	1,485	29.13	31,079	16,681	53.67	11,073	35.63	7,767	24.99
	196	320	63.24	307	60.99	131	25.89	3,885	1,772	45.61	1,931	49.72	1,418	36.54
	105	42	39.58	37	35.24	30	28.57	2,676	1,215	45.39	811	30.32	615	22.98
	296	152	51.01	77	25.84			1,212	656	54.12	371	30.58		

**Conclusion:** Overall, persistence to OPD in subjects with T2DM is low and similar to that of non-diabetic subjects. In patients treated with DMAB, SERM and TDP, lower persistence is observed in the T2DM2group. In these patients, strategies are needed to help improve persistence to these drugs.

## P482 SARCOPENIA AND OSTEOPENIA OR OSTEOPOROSIS IN PATIENTS WITH CHRONIC RENAL DISEASE

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**Objective:** The prevalence of sarcopenia on patients with end-stage renal disease has been scarcely investigated. The aim of this study is to investigate the association between sarcopenia and osteopenia/osteoporosis, and the factors associated with low BMD in patients with chronic renal diseases.

**Methods:** Data of 65 patients with chronic renal diseases who underwent DXA were included in the study. Sarcopenia was assessed with the appendicular skeletal mass index (ASMI) and osteopenia or osteoporosis with the T-score. Lumbar and femoral BMD measurements were obtained. Osteoporosis was defined as a T-score  $< -2.5$  SD and osteopenia as a T-score  $< -1.0$  SD in at least 1 region of measurement. Statistical analyses were carried out using SPSS version 20.0. A P value of  $< 0.05$  was considered significant.

**Results:** Regression analyzes showed a significant positive correlation between appendicular skeletal muscle mass and BMD ( $P < 0.001$ ). Additionally, as the severity of renal failure increased, sarcopenia prevalence increased and as the degree of sarcopenia became severe, osteopenia/osteoporosis prevalence increased. Sarcopenia was independently associated with an increased risk of low BMD in patients with chronic renal diseases ( $P < 0.001$ ). Old age and low fat mass were significantly associated with low BMD in both sarcopenic and non-sarcopenic participants. Exercise and dietary intake were associated with a reduced risk of low BMD only in the non-sarcopenic participants.

**Conclusion:** Sarcopenia is closely correlated with osteopenia or osteoporosis in patients with chronic renal diseases. Moreover, different factors are associated with low BMD according to the

presence/absence of sarcopenia in that population. The lean mass, compared to fat mass, has a greater positive influence on the BMD. This result suggests the importance of the increase in lean mass for the bone health of patients with chronic renal diseases.

## P483 COVID-19 INFECTION AND BONE MINERAL DENSITY

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**Objective:** To evaluate whether COVID-19 illness affect the BMD of surviving hospitalized patients. There are insufficient data about the lasting effects of COVID-19 on bone health.

**Methods:** We assessed the BMD of hospitalized COVID-19 patients before COVID-19 infection and follow-up visits. Data were retrospectively collected from medical records. Variables collected included: age, sex, comorbidities, use of high flow oxygen therapy, use of noninvasive mechanical ventilation, length of hospital stay, BMI, serum calcium level, lactate dehydrogenase (LDH) level, creatinine level, C-reactive protein and ferritin level, peripheral oxygen saturation, the cumulative corticosteroid dose. Comorbidities included heart, lung, kidney, liver diseases, diabetes mellitus, cancer, osteoporosis, autoimmune diseases, smoking, and alcohol use. We used DXA to detect changes in BMD. The initial BMD and post-COVID-19 BMD were compared by paired t-test. Vitamin D levels were measured in 26 patients.

**Results:** 48 hospitalized COVID-19 patients (46 female, 2 male) were included in the study. The mean age of patients was  $69.8 \pm 11.4$  years. BMD at follow-up decreased by a mean of  $7.4 \pm 5.5\%$  compared with BMD measured before ( $84.32 \pm 33.76$  d) COVID-19 illness. The follow-up measurements of BMD occurred at a mean of  $192.14 \pm 81.48$  d after hospital discharge. All tested patients had vitamin D deficiency. 21 patients (43.75%) were hypocalcemic and 27 (56.25%) were normocalcemic. Serum calcium level was significantly correlated with inflammatory markers. It was positively correlated with lymphocyte count ( $p < 0.05$ ) and negatively correlated with LDH ( $p < 0.005$ ) and CRP value ( $p < 0.05$ ). The median length of hospital stay for hypocalcemic patients was  $18 \pm 8.3$  d, which was significantly longer than that of normocalcemic. The proportion of osteoporotic patients increased significantly at follow-up visit. The decrease in BMD in patients who were treated with a cumulative steroid dose greater than 500 mg was significantly higher than that treated with a lower steroid dose ( $p < 0.05$ ). The change in BMD after COVID-19 hospitalization was negatively correlated with length of hospital stay ( $p < 0.05$ ).

**Conclusion:** The bone health status of patients surviving COVID-19 hospitalization should be monitored closely at follow-up visits, to facilitate the prevention and early treatment of osteoporosis complications.

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### RORγT+ PTREGS PLAY A PIVOTAL ROLE IN AMELIORATING POSTMENOPAUSAL OSTEOPOROSIS

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**Objective:** Osteoporosis is an inflammatory bone disorder that increases a person's risk of fracture due to lower BMD and decreased bone strength. The role of various immune cells in osteoporosis has been termed by our group as "Immunoporosis" i.e., immunology of osteoporosis. Tregs are reported to have a very crucial role in the regulation of bone health. Tregs are anti-osteoclastogenic cells and control the development of osteoclasts through several mechanisms. However, to date, the role of different subsets of Tregs (periphery-derived Tregs-pTregs or thymus-derived Tregs-tTregs) in regulating bone health is not known. pTregs (Tregs that express RORγT), contribute substantially to regulating Th1/Th17 inflammation. Data suggest that RORγT expression in Tregs contributes to an optimal suppressive capacity during immune responses, rendering pTregs as an important effector Treg subset. Based on these facts we are interested in investigating the role of RORγT<sup>+</sup> pTregs in a preclinical model of osteoporosis (ovx). We aimed to investigate the effect of RORγT<sup>+</sup> pTreg cell population in regulating bone health in the osteoporotic mice model (ovx).

**Methods:** Female C57BL/6 mice were divided into two groups: sham and ovx (6 mice per group). After 45 days mice were sacrificed and the RORγT<sup>+</sup> pTregs population in the bone marrow and large intestine was analyzed in both groups through flow cytometry. To determine the extent of bone loss/osteoporosis in the collected bone samples (femur, tibia, and lumbar vertebrae) scanning electron microscopy (SEM) and μCT analysis was done. High performance liquid chromatography (HPLC) was performed on the collected fecal samples of mice from all groups to determine the SCFA levels. Furthermore, in vitro Treg differentiation assay was done to assess the potential of SCFAs in inducing RORγT<sup>+</sup> pTregs development.

**Results:** Ovariectomized condition led to bone loss in female mice as confirmed by the SEM and μCT data. Excitingly, we observed that the percentage of CD4<sup>+</sup>Foxp3<sup>+</sup> RORγT<sup>+</sup> Treg cells (pTregs) was significantly decreased in both large intestine and bone marrow (prime site of osteoclastogenesis) in the ovx mice as compared to the sham mice. Moreover, serum cytokine analysis revealed that OvX mice had significantly decreased level of IL-10 (key cytokine of Tregs) with respect to the sham group. HPLC data further confirmed that ovx mice had significantly lower levels of SCFAs (acetate, propionate, and butyrate) as compared to the sham group. Interestingly, in vitro, Treg differentiation and osteoclastogenic co-culture assays further revealed that SCFAs (butyrate) significantly enhanced the differentiation of RORγT<sup>+</sup> pTregs confirming the role of SCFAs in regulating these Tregs.

**Conclusion:** Taken together our results for the first time establish that the RORγT<sup>+</sup> pTregs get dysregulated during postmenopausal

conditions. These results thereby open a novel front to manipulate RORγT<sup>+</sup> pTregs as a therapeutic target in inhibiting bone loss under inflammatory postmenopausal osteoporotic conditions.

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### EFFECTIVENESS OF REHABILITATIVE INTERVENTIONS ON PAIN IN ARTHROGENOUS TEMPOROMANDIBULAR JOINT DISORDER: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

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**Objective:** This systematic review with meta-analysis aimed to assess the role of conservative interventions in pain relief in patients with intracapsular temporomandibular disorders (TMD).

**Methods:** PubMed, Scopus, and Web of Science were systematically searched until January 1st, 2022 to identify randomized controlled trials (RCTs) involving patients with a diagnosis of intracapsular TMD (Group IIa IIb, IIc, IIIa, III, IIIc); treated with rehabilitative approaches such as physical therapy, TENS, laser therapy, ultrasound therapy, occlusal splints, and oxygen-ozone therapy; and evaluated as pain intensity, using a visual analog scale (VAS) or numerical rating scale (NRS). The risk of bias in the RCT was estimated using Version 2 of the Cochrane risk-of-bias tool for randomized trials (RoB 2). A network meta-analysis was performed to underline the direct and indirect comparisons of the rehabilitative approaches aiming to reduce pain in TMD patients.

**Results:** Out of 3372 papers, 13 RCTs were included, with 844 study participants. Regarding the study designs, there were 7 two-arm RCTs and 6 multi-arms RCTs. Most of them (n=7) investigated the efficacy of splint appliances, 5 therapy, 3 physical therapy, and 1 oxygen-ozone therapy. Meta-analysis revealed that rehabilitative interventions had a significant overall effect size of 0.75 [0.17, 1.34], reporting splint appliance and laser therapy as significantly effective treatments. Nevertheless, only 5 out of 13 RCTs demonstrated a low risk of incurring bias.

**Conclusion:** Taken together, findings of the systematic review with network meta-analysis indicated a significant efficacy of conservative approaches in pain alleviation in arthrogenous TMD patients. Furthermore, there was a significant pain relief after treatment with occlusal splints (modified stabilization splint, soft splint, anterior repositioning splint, stabilization splint, MRI-based splint, and NTItss splint) and laser therapy (LLLT and HILT). Nonetheless, the low number of included studies and their moderate risk of bias should be taken into consideration. Therefore, despite a wide number of therapeutic strategies, the treatment for TMJ disorders may be still considered a challenge that further high-quality studies should overcome in the coming years

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### CORRELATION BETWEEN TEMPOROMANDIBULAR DISORDERS AND VITAMIN D DEFICIENCY: A SYSTEMATIC REVIEW

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**Objective:** This systematic review aimed at characterizing the current literature assessing the linkage between vitamin D deficiency and temporomandibular disorders (TMDs).

**Methods:** A systematic search was performed on PubMed, Scopus, and Web of Science up to 10<sup>th</sup> September 2022, to identify studies that had assessed patients with TMDs. The primary outcome of this review was the relationship between hypovitaminosis D and TMDs. The secondary outcomes were the relationship between vitamin D serum levels and physical function, the relationship between dental diseases, vitamin D serum levels, biomarkers expression, and vitamin D receptor (VDR) polymorphism.

**Results:** Out of the 329 studies identified, 13 studies were included in this systematic review. The relationship between vitamin D and TMDs was assessed in 7 studies, showing lower vitamin D serum levels in patients with TMDs. Moreover, VDR polymorphisms might have a role in TMDs' development. However, the quality assessment revealed that just one study did not present a serious risk of bias.

**Conclusion:** Altogether, the findings of this systematic review suggested that vitamin D serum levels might be lower in patients with TMDs. However, further good-quality studies are necessary to confirm the relationship between vitamin D deficiency and TMDs to better characterize the role of vitamin D supplementation in counteracting these disabling diseases.

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### BONE BIOMARKERS MONITORING AFTER REHABILITATION IN NON-METASTATIC BREAST CANCER PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** This systematic review and meta-analysis aimed at

summarizing the effects of rehabilitation on bone health biomarkers in patients with non-metastatic breast cancer (BC).

**Methods:** A systematic search was performed on PubMed, Scopus, Web of Science, Cochrane, and PEDro up to 2<sup>nd</sup> May 2022, in order to identify RCTs published in English language. The studies were assessed by the following PICO model: P) Participants: women with non-metastatic BC. I) Intervention: any physical rehabilitation intervention; C) Comparator: any comparator; O) Outcome: bone biomarkers modifications. Jadad scale was used to perform the quality assessment.

**Results:** Out of the 352 records identified, 10 RCTs were included in this systematic review, for a total of 873 patients. The quality assessment through the Jadad scale revealed 8 studies were considered high-quality studies. The meta-analysis underlined significant effects of rehabilitation in overall mean difference percentage of collagen type 1 cross-linked N-telopeptide (NTX) serum level [ES: -11.65 (-21.13, -2.17), p=0.02] and bone-specific alkaline phosphatase (BSAP) levels [ES: +6.09 (1.56, 10.62)].

**Conclusion:** To date, albeit there is a growing research on cancer treatment-induced bone loss, the management in women with non-metastatic BC remains challenging. This systematic review showed a positive impact of rehabilitation on bone biomarkers that might provide future insight for a precision medicine approach in BC women. Further evidence is needed to characterize the role of bone biomarkers monitoring in tailored rehabilitation approaches to cancer treatment-induced bone loss.

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### WHICH CORRELATION AMONG SARCOPENIC DYSPHAGIA, MALNUTRITION, AND ORAL FRAILITY IN ELDERLY? A LITERATURE OVERVIEW

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**Objective:** To summarize the correlation among sarcopenic dysphagia, malnutrition, and oral frailty, underlining their overlapping features to propose a multitarget intervention in elderly frail subjects.

**Methods:** Scientific literature research was performed on PubMed, Scopus, CENTRAL, PEDro, and Web of Science, using the following MESH terms: "Frailty", "Frail Syndrome", "Malnutrition", "Nutritional Status", "Sarcopenia", "Dysphagia", "Sarcopenic Dysphagia", "Oral Health", "Oral Frailty". We considered only studies assessing older adults. A qualitative method has been used for the data extraction and the data synthesis.

**Results:** Sarcopenia and dysphagia are two common conditions affecting frail older adults. Their coexistence has been defined "Sarcopenic dysphagia" and crucially affects functional and nutritional status. Concurrently, a poor oral health status frequently characterizes older adults due to physical and cognitive impairment that might affect ability to perform adequate oral hygiene.

On the other hand, poor oral health might affect nutrient intake, leading to malnutrition. In this scenario, sarcopenia, dysphagia, and oral health showed to be closely linked and should be effectively identified in to perform an early and tailored intervention

**Conclusion:** A comprehensive management of frail older people should include oropharyngeal rehabilitation, oral health treatment, nutritional supplementation, and rehabilitation. It is crucial to target the multidimensional mechanisms that could promote the frailty syndrome. Future studies are needed to characterize the role of a transdisciplinary approach to sarcopenic dysphagia and oral frailty in elderly.

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### CATHEPSIN G IN SERUM AND SYNOVIAL FLUID IN PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** Cathepsin G (CTSG) is a member of the serine protease family (1). CTSG is stored in primary granules of myeloid cells, dendritic cells, plasma cells, and others, and when cells are stimulated by immune complexes, pharmacological agents, or phagocytosis (2). CTSG plays an important role in the development of inflammation, as it promotes the migration of neutrophils, monocytes, and antigen-presenting cells by changing chemokines and converting prochemerin to chemerin, and by activating cell surface receptors (3). We aimed to examine the level of CTSG in the serum and synovial fluid of patients with knee osteoarthritis.

**Methods:** The level of CTSG in the serum and synovial fluid of 50 patients with knee Osteoarthritis was studied (26 (52%) of the patients were women, 24 (48%) were men with an average disease duration of 6.2±2.23 years. The patients have 2-3 degrees of damage to the knee joint according to the Kellgren-Lawrence scale and do not take analgesics and NSAID medications. Control groups included 90 patients with psoriatic arthritis (56 of them with DAPSA ≤14, 10 with DAPSA ≥14.1≤28, and 24 with DAPSA ≥28.1) and 10 healthy volunteers. The serum sample was taken in the morning on an empty stomach. The synovial fluid was taken by arthrocentesis by an experienced rheumatologist, after signing the informed consent of all persons examined and observing the principles of good clinical practice. The study was conducted in the Immunology Laboratory of the Bulgarian Academy of Sciences, Sofia through ELISA. Statistical processing includes descriptive and correlation analyses, with statistical significance p<0.05.

**Results:** The level of CTSG in the serum of patients with knee osteoarthritis is 1,01±0.39 (ng/ml) (x±Sd), the level of CTSG in the synovial fluid is 0.072±0.76 (ng/ml) (x±Sd) (t=7.23 (df 155), Sig. (2-tailed)=.000. The level of CTSG in the serum of patients with psoriatic arthritis is 1,14±0.47 (ng/ml) (x±Sd), the level of CTSG in synovial fluid of patients with psoriatic arthritis and effusion is

0.152±0.01 ng/ml and in healthy controls is 0.072±0.01 ng/ml in serum. The level of CTSG in the synovial fluid of patients with psoriatic arthritis was higher than that of patients with gonarthrosis and healthy controls (p<0.05). The level of CTSG in the synovial fluid of patients with knee osteoarthritis correlated positively with the disease activity assessed by WOMAC (Rx,y=0.91).

**Conclusion:** The level of CTSG in the serum and synovial fluid of patients with knee osteoarthritis is significantly higher in patients with high disease activity according to the WOMAC scale, which is associated with more severe joint destruction.

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### FIBROBLAST GROWTH FACTOR-23, CARDIOVASCULAR RISK AND BONE STATUS IN PATIENTS WITH CHRONIC KIDNEY DISEASE

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**Objective:** To analyze bone status and cardiovascular risk (CVR) in a cohort of patients with chronic kidney disease (CKD) and its possible relationship with intact FGF-23 (iFGF-23)

**Methods:** A prospective observational study including adults with CKD (stages 2-4) was performed. Laboratory parameters related to bone metabolism; iFGF-23 (DiaSorin); bone quantitative(DXA) and qualitative parameters(TBS); vertebral fractures; assessment of fracture risk (FRAX, with/without TBS) and CVR by carotid ultrasound (intima-media thickness -IMT- and atheromatous plaques) were evaluated.

**Results:** 62 patients were included (mean age: 62.7±10.5 years; 82.5% males; 17.7% have CKD stage 2 CKD, 64.5% stage3 and 9.6% stage4). The main etiology was vascular (25%) and diabetes (22%). 11% of patients had previous major cardiovascular disease (MACE). In relation to bone status, 8/55 (14.5%) had osteoporosis, 23/55 (41.8%), osteopenia and 24/48 (50%), altered bone trabecular microarchitecture (TBS). Serum iFGF-23 levels were 80.4±25.6, 95.5±20.4, 118.8±22.7 and 134.9±50.4 (p=0.053) pg/mL in stages 2, 3a, 3b and 4, respectively. An inverse correlation was observed between iFGF-23 and glomerular filtration rate (Rho Sp:-0.390,p=0.003), lumbar BMD (r:-0.267, p=0.049) and TBS (r:-0.396,p=0.005). In 46 patients (74.2%) with carotid ultrasound performed (Table 1), 38% showed decreased BMD and 43%, an altered TBS. When comparing patients with and without subclinical CVR (SCVR) and/or MACE (35 vs. 11), no differences were ob-

served in bone metabolism parameters, BMD, TBS, fragility fractures (14.3 vs.18.%2) or in FRAX risk with/without TBS (p>0.05). IMT in patients with CVS and/or CVD showed direct correlation with lumbar BMD (r:0.59,p<0.001) and PTH (r:0.34,p=0.046) and inverse correlation with calcidiol (Rho Sp:-0.37,p=0.031). No correlation was observed with iFGF-23, femoral BMD, TBS and FRAX (p>0.05) in any of the groups.

**Conclusion:** In patients with CKD, altered bone microstructure (TBS) is frequent. Increased iFGF-23 associated with impaired renal function and bone quality parameters and calcidiol levels, with parameters of subclinical vascular damage.

**Table 1. Demographic characteristics, laboratory results, ultrasound for cardiovascular risk assessment, BMD and TBS parameters stratified by groups according to the presence or absence of subclinical cardiovascular risk and or major cardiovascular events.**

Characteristics	Total N=60	SCVR and/or MACLE N=35	No SCVR and/or MACLE N=11	p-value
Male gender, n/N (%)	38/48 (79.2%)	30/35 (85.7%)	6/11 (54.5%)	0.029
Age (years), median (IQR)	64.5 (59.5-72.5)	64.5 (61.2-73.4)	63.8 (58.2-69.1)	0.041
BMI (kg/m <sup>2</sup> ), median (IQR)	27.9 (25.4-31.1)	27.9 (25.6-30.5)	28.7 (24.3-34.5)	0.876
Hypertension n/N (%)	33/48 (68.7%)	29/35 (82.9%)	4/11 (36.4%)	0.008
Dyslipidemia, n/N (%)	31/48 (64.6%)	25/35 (71.4%)	7/11 (63.6%)	0.824
MACE, n/N (%)	7/48 (14.6%)	4/35 (11.4%)	3/11 (27.3%)	0.346
Serum creatinine (umol/L), median (IQR)	1.59 (1.3-1.9)	1.5 (1.3-1.9)	1.8 (1.5-2)	0.509
sCRP CKD-KPI, median (IQR)	41.5 (34.2-57.5)	42.95 (35-59)	37 (24-50)	0.643
CKD Estadio 2	9/46 (19.6%)	8/35 (22.9%)	1 (9.1%)	
CKD Estadio 3	32/40 (80.0%)	23/35 (65.7%)	9 (81.8%)	
CKD Estadio 4	5/46 (10.9%)	4/35 (11.4%)	1 (9.1%)	
Serum calcium (mmol/L), median (IQR)	9.7 (9.5-10)	9.7 (9.5-10)	9.7 (9.6-10.2)	0.509
Serum phosphate (mmol/L), median (IQR)	3.2 (3.1-4.2)	3.3 (3.1-3.7)	3.3 (3.1-4.3)	0.542
iPTH (ng/L), median (IQR)	92.4 (82.3-135)	92.4 (88.9-135.9)	89 (83.4-134.7)	0.98
25 (OH) Vitamin D (ng/ml), median (IQR)	29.5 (23-42)	30 (23-42)	29 (23-38)	0.819
Alkaline phosphatase (U/L), median (IQR)	74 (57-92.3)	73 (55-92)	78 (60-125)	0.373
iFGF-23 (ng/L), median (IQR)	113 (80.9-146.3)	111 (82.1-145)	116.4 (84-149.3)	0.8
Right carotid IMT, median (IQR)	0.739 (0.6-0.82)	0.758 (0.70-0.85)	0.828 (0.7-0.7)	0.002
Left carotid IMT, median (IQR)	0.753 (0.62-0.835)	0.771 (0.70-0.86)	0.8 (0.6-0.88)	0.005
Average carotid IMT, median (IQR)	0.754 (0.64-0.82)	0.764 (0.72-0.82)	0.809 (0.7-0.7)	0.001
Carotid plaques, n/N (%)	35 (76.1%)	35 (100%)	0%	0.000
IMT >0.9 mm, n/N (%)	5/48 (10.4%)	5/35 (14.3%)	0%	0.194
Bone densitometry				0.525
Normal, n/N (%)	28/42 (66.9%)	21/32 (65.6%)	5/10 (50%)	
Osteopenia, n/N (%)	11/42 (26.2%)	7/32 (21.9%)	4/10 (40%)	
Osteoporosis, n/N (%)	5/42 (11.9%)	4/32 (12.5%)	1/10 (10%)	
PF BMD (g/cm <sup>2</sup> ), median (IQR)	0.889 (0.8-1.2)	0.898 (0.8-1.03)	0.876 (0.79-1.03)	0.613
PF Z-Score, median (IQR)	0.2 (-0.3-0.7)	0.2 (-0.3-0.8)	0.2 (-0.8-1.08)	0.988
LS BMD (g/cm <sup>2</sup> ), median (IQR)	1.14 (1.02-1.31)	1.174 (1.02-1.34)	1.06 (1.01-1.26)	0.248
LS Z-Score, median (IQR)	0.05 (-0.1-0.85)	0.05 (-0.8-1.3)	-0.25 (-0.8-0.8)	0.288
Trabecular bone score, median (IQR)	1.36 (1.23-1.44)	1.354 (1.22-1.44)	1.372 (1.23-1.48)	0.453
TBS				0.951
Normal, n/N (%)	30/35 (85.7%)	13/36 (36)	5/9 (55.6%)	
Partially degraded, n/N (%)	12/35 (34.3%)	8/26 (30.8%)	3/9 (33.3%)	
Degraded, n/N (%)	3/32 (9.4%)	1/26 (3.8%)	1/9 (11.1%)	
Major FRAX	2.8 (1.7-4.7)	3 (1.7-4.7)	2.1 (1.35-4.5)	0.405
Hip FRAX	0.55 (0.2-1.1)	0.6 (0.2-1.4)	0.3 (0.1-1.05)	0.328
Major FRAX TBS	2 (1.8-4.9)	3 (2.1-4.8)	1.0 (1.1-7.5)	0.596
Hip FRAX-TBS	0.7 (0.2-1.5)	0.7 (0.2-1.5)	0.2 (0.1-1.5)	0.635
Fractures:				
Of any aetiology, n/N (%)	18/46 (39.1%)	13/35 (37.1%)	5/11 (45.5%)	0.607
Clinical fragility fractures, n/N (%)	5/46 (10.9%)	4/35 (11.4%)	1/11 (9.1%)	0.828
Vertebral morphometric fractures, n/N (%)	3/46 (6.5%)	4/35 (11.4%)	1/11 (9.1%)	0.828
Vertebral clinical and morphometric, n/N (%)	7/46 (15.2%)	5/35 (14.3%)	2/11 (18.2%)	0.754

Abbreviations: BMI: body mass index; SCVR: subclinical cardiovascular disease; MACE: major cardiovascular events; CKD: chronic kidney disease; PTH: parathyroid hormone; iFGF-23: intact Fibroblast growth factor-23; IMT: intima-media thickness; aIMT: Mean right and left carotid value; PF: proximal femur; LS: lumbar spine; BMD: bone mineral density; TBS: Trabecular bone score; FRAX: fracture risk assessment tool.

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**PHYLOBONE: A NEW RESOURCE FOR OSTEOPOROSIS RESEARCH**

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**Objective:** To develop a resource for osteoporosis research based on the identification of putative bone extracellular matrix (ECM) proteins in human and model organisms.

**Methods:** We have used state-of-the-art bioinformatics analysis to identify 255 proteins potentially expressed in the bone ECM of human, zebrafish, sika deer, and other 28 species of vertebrates. Protein sequences and functional annotations were obtained from public repositories including GenBank, Uniprot and InterPro. In order to facilitate the research of new drugs for osteoporosis

treatment, each protein was mapped with existing drugs based on data from KEGG and DrugBank databases.

**Results:** The Phylobone resource is freely accessible at <https://phylobone.com> and includes: 1) sequence and phylogenetic analyses, 2) functional analyses, and 3) an analysis of proteins as potential drug targets. The phylogenetic analysis of orthologous proteins across vertebrates allows the identification of potential model organisms to study molecular mechanisms in bone regeneration (e.g. some species have known orthologs for more than 90% of the proteins in the dataset, including human, rat, mouse, pig, and rabbit). Bone ECM proteins are highly inter- and intra-connected, e.g. the amyloid beta precursor (known for its importance in the regulation of bone formation and regeneration through signaling pathways) interacts with 1,747 proteins. A total of 214 functional protein domains define functions of bone ECM proteins. As expected, collagen is the most common domain. In addition, domains such as leucine-rich repeats (LRR), laminin, epidermal growth factor (EGF), and von Willebrand factor (VWF) are highly frequent. LRR has a key role in bone formation and homeostasis, VWF is important for the inhibition of osteoclastogenesis, and EGF can stimulate bone resorption.

**Conclusion:** The Phylobone database is the most comprehensive resource of bone ECM proteins in model organisms and can be relevant in osteoporosis research. Understanding the role of collagen has been the goal of osteoporosis research for decades. However, our study, in agreement with other studies from the literature, indicates that several non-collagenous proteins are determinant to regulate bone formation and regeneration via signaling pathways.

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**RADIUS BIPOLAR FRACTURE: RARE AND UNIQUE INJURY**

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**Objective:** Simultaneous ipsilateral distal radius and radial head fractures referred as radius bipolar fracture seems to be unique. Few cases of injury have been reported and its incidence rate is unknown. This lesion can be caused by an axial force fall on an outstretched hand with the elbow on valgus stress. We aimed to enlighten one of the rarest fracture in the field of traumatology.

**Case report:** We report the case of 32-year-old healthy male patient who visited our emergency department with right elbow and wrist pain after slipping and falling on the stairs, without any other injuries. He was unable to move the elbow and wrist, whilst finger movement and sensation were normal. Plain radiography revealed a radius bipolar fracture with a Mason type I radial head fracture and an AO type C1 distal radius fracture. Initially cast was



applied above elbow for the purpose of pain relief, then patient went for surgery 18 hours after injury. Traction with counter traction was given and reduction of distal radius was achieved. After that, fixation was done by percutaneous K-wire fixation. The radial head fracture was undisplaced and was treated conservatively.



Cast with forearm in mid-prone position was applied above elbow. The elbow was freed three weeks after surgery, and gradually mobilized. Two weeks after, rest of the cast and K-wires were removed and wrist motion was allowed. A 6 month follow up showed that good range of motion was achieved for both wrist and elbow.



**Conclusion:** There are currently no guidelines for treatment of this specific type of injury. The authors speculate that we should start by treating the distal radius fracture if open reduction and internal fixation is planned for the radius head fracture. Most importantly, radial length should be preserved to optimize the outcome.

### P493

#### ABDOMINAL OBESITY AS A RISK FACTOR FOR THE INCIDENCE OF VITAMIN D INSUFFICIENCY AND DEFICIENCY

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**Objective:** To investigate whether abdominal obesity is associated with the incidence of vitamin D (25(OH)D) insufficiency and deficiency in individuals aged 50 years or older, and whether the vitamin D supplementation modifies this association.

**Methods:** A longitudinal study involving 2459 participants from the English Longitudinal Study of Ageing (ELSA) with 25(OH)D sufficiency (>50 nmol/L) at baseline. Abdominal obesity was defined as waist circumference >88 cm for women and >102 cm for men. Serum 25(OH)D levels were reassessed after 4 years, to verify the incidence of vitamin D insufficiency (>30 and ≤50 nmol/L) or deficiency (≤30 nmol/L). Multinomial logistic regression models controlled for sociodemographic, behavioral, clinical, and biochemical characteristics were performed.

**Results:** Abdominal obesity increased the risk of incidence of serum 25(OH)D insufficiency by 36% (RRR=1.36; 95%CI: 1.01-1.83 p=0.043) and deficiency by 64% (RRR=1.64; 95%CI: 1.05-2.58 p=0.031). Moreover, the risks of serum 25(OH)D insufficiency (RRR=1.38; 95%CI: 1.02-1.88 p=0.037) and deficiency (RRR=1.62;

95%CI: 1.02-2.56 p=0.040) were maintained when excluding individuals who used vitamin D supplementation.

**Conclusion:** Abdominal obesity is associated with the risk of 25(OH)D insufficiency and deficiency, and the effect of this association appears to be confirmed by excluding individuals who took vitamin D supplementation. Furthermore, our work supports that waist circumference seems to be an adequate tool to predict a potential risk of individuals with abdominal obesity to develop these conditions.

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## P494

### DEVELOPMENT AND METHODOLOGY OF THE FEMFRAC: MEXICAN HIP FRACTURE REGISTRY

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**Objective:** Hip fracture is a growing problem affecting 8.5% of the population over 50. The incidence of HF is expected to grow by 240% by 2050. Considering that Hip Fracture (HF) has a mortality rate of 20% in the first year and a complication rate above 50%, this could negatively impact the healthcare system in the coming years. The REMFRAC (Registro Mexicano de fracture de Cadera) was born to have a national and trustworthy database that could show the current situation in Mexico regarding Hip Fracture (HF) epidemiology and healthcare. Also, to analyze HF quality indicators that allow the country to do healthcare policy improvement projects in the HF treatment protocols.

**Methods:** The registry will consist of a National multicentric observational epidemiologic study with a patient follow-up of 30-45 days. The registry will include all the low-energy trauma HF patients above 65 years old. Coordinated by FEMECOT, the registry will be nourished and incorporated by the other 7 National Societies (AMG, AMEC, AMMOM, CMIM, CMO, CMR, and CONAMEGER).

**Conclusion:** The REMFRAC has a replicable, auditable, and accessible access structure and platform that will be universalized along the country after a pilot phase of 6 months, where the results could improve the decision-making in hip fracture care policy.

## P495

### IMPACT OF COVID-19 PANDEMIC ON THE FREQUENCY OF HYPOVITAMINOSIS D IN CENTRAL MEXICO

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**Objective:** Hypovitaminosis D is extremely common. We previously reported it in 71% of patients measured in our setting<sup>1</sup>. Vitamin D (VD) deficiency has been associated with a higher frequency and severity of COVID-19 and therefore, VD supplements are commonly prescribed and adopted spontaneously by the public<sup>2</sup>. May this practice impact on frequency of hypovitaminosis D? We aimed to compare the frequency of hypovitaminosis D in a population sample in central Mexico, before and during the COVID-19 pandemic.

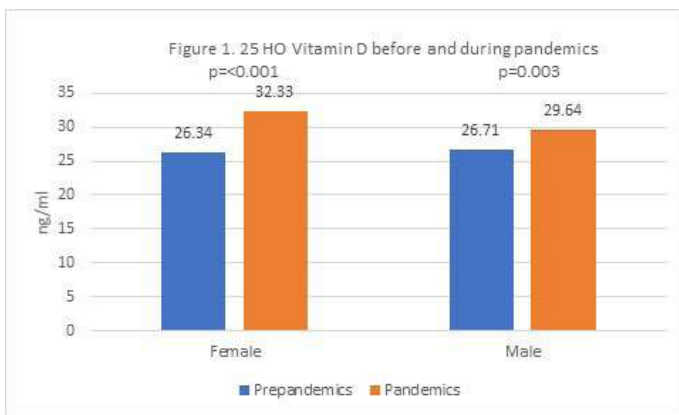
**Methods:** This observational, descriptive study included all the 25(OH)Vitamin D measurements performed at the laboratory of a tertiary hospital from June 19, 2012, to September 19, 2017 by chemiluminescent microparticle immunoassay (Abbott Diagnostics, USA) and compared the values to those found between March 2020 and November 2022, in the same setting. We considered hypovitaminosis D in those below 30 ng/ml. We report descriptive and analytic statistics.

**Results:** We identified 5071 measurements, 2165 before the pandemic (1795 women, 370 men), with a mean 25(OH)Vitamin D of 26.6 ng/ml and 2906 during the pandemic (2268 Women and 638 men) with a mean value of 31.7 ng/ml (<0.01). Both female and male patients, showed significant increments in 25(OH)Vitamin D values during the pandemic, as shown in figure 1. Hypovitaminosis D was found in 71% of patients before the pandemic, decreasing to 53% during the pandemic.

**Conclusion:** Hypovitaminosis D remains common in both female and male population in this population, but the tendency to improve apparently associated with factors that modify supplementation patterns suggests options for educational interventions in this field.

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P496

### THE FRACTURE LIAISON SERVICES (FLS) PROGRAM IN THE NATIONAL TAIWAN UNIVERSITY HOSPITAL (NTUH) HEALTHCARE SYSTEM

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**Objective:** Since 2014, the National Taiwan University Hospital (NTUH) Healthcare system established 5 fracture liaison services (FLSs). We aimed to compare the characteristics and 1-year outcomes of the 5 programs.

**Methods:** Totally 1160 patients (including 473 from main hospital, 127 from Bei-Hu Branch, 234 from Hsin-Chu Branch, 143 from Chu-Tung Branch and 183 from Yun-Lin Branch) were enrolled, with unified protocol adapted from the 13 best practice framework (BPF) standards published by the International Osteoporosis Foundation. We performed baseline assessments and provided follow-up care for 1-year outcomes. Patients with new hip fractures or newly identified vertebral fractures received osteoporosis-related evaluations, treatments, consultations on diet, medications, exercise, fall preventions provided mainly by care managers at baseline. Patients were followed by telephone every 4 months for one year.

**Results:** The mean age for the entire cohort was 78.2±9.7 years with 74.8% female. At baseline, there were significant differences in many characteristics. In fracture type, there were more than 40% hip fractures in main hospital, Hsin-Chu Branch and Yun-Lin Branch, but there were 0% in Bei-Hu Branch and 16.8% in Chu-Tung Branch. In medication prescribing pattern, there were more than 20% no used in main hospital and Bei-Hu Branch, but there were

under than 10% no used in Chu-Tung Branch and Yun-Lin Branch. One-year mortality was 8.5%. There were significant differences between 5 hospitals in overall mortality (NTUH 11.2%, Bei-Hu Branch 0.8%, Hsin-Chu Branch 9.8%, Chu-Tung Branch 5.6% and Yun-Lin Branch 7.7%, p<0.001) and mortality with spine fracture (NTUH 10.0%, Bei-Hu Branch 0.8%, Hsin-Chu Branch 9.8%, Chu-Tung Branch 5.0% and Yun-Lin Branch 8.9%, p=0.01), but not significant differences in hip fractures. The annual recurrent fracture rate was 2.7% without significant differences observed among 5 hospitals.

**Conclusion:** The differences of 5 hospitals were demonstrated in some baseline characteristics. After one year of service, patients had significant differences among 5 hospitals in overall mortality and mortality with spine fractures.

P497

### HEALTH DETERMINANTS OF INFORMAL CAREGIVERS AGED 65 YEARS AND OVER

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**Objective:** Informal caregivers (i.e. family and relatives) are often concerned about the health of the people they help but their own health status and its determinants have been little understood. Therefore, this study aimed to fill this gap by comparing the health determinants of older informal caregivers with those of the older population.

**Methods:** An online survey was designed to investigate the health determinants of people aged 65 years and older, and in particular informal caregivers. The Zarit scale of caregiver burden was collected only for those being informal caregiver. Then, socio-demographic data, quality of life (SF-12), access to technology and level of physical activity (IPAQ) were assessed and compared between informal caregivers and the others.

**Results:** A total of 111 volunteers participated in the survey. The mean age was 70±3.83 years and 71.2% of them were women. The majority of respondents (91.8%) were Belgian. One third of the respondents identified themselves as informal caregiver and declared to have severe burden (61.9±15.2/88). Sociodemographic characteristics and access to technology were similar between informal caregivers and their non-caregivers counterparts. However, informal caregivers had a lower SF-12 score in the mental score domain (44.3±10.2 vs; 50.7±7.0; p=0.004) and

a lower level of physical activity (434±312 vs.1126±815; p=0.01) than their counterparts.

**Conclusion:** Informal caregivers reported lower quality of life and lower level of physical activity than their peers. As having a high level of physical activity is recognised to be a determinant of healthy living, this survey highlights the need for solutions to promote physical activity among older informal caregivers.

## P498

### DEVELOPMENT AND VALIDATION OF NEW EXERCISES TO PROMOTE PHYSICAL ACTIVITY IN NURSING HOME SETTINGS, THROUGH QUALITATIVE METHOD

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**Objective:** The GAMotion is a giant physical activity boardgame intended to improve the level of physical activity and a broader array of physical and psychological outcomes among nursing home residents. The aim of the present study is to develop and validate new balance, flexibility, muscle strength and walking exercises to be included in the GAMotion.

**Methods:** A two-steps qualitative study combining Focus group and Delphi method was conducted among healthcare professionals divided into two independent samples of experts. The first sample was asked to develop exercises during a focus group. The second sample participated in a two-round Delphi method. During the first round, participants were asked to rate the exercises developed during the focus group on a 4-point Likert scale (from 1: not adapted at all to 4: very adapted). The exercises that did not reach consensus were removed (consensus established: median ≥3 in the Likert scale and at least 75% of experts rating the exercises as « adapted » or « very adapted »). During the second round, it was asked to rank the exercises selected at the end of the first round from most suitable to least suitable.

**Results:** The Focus group developed 9 balance, 12 flexibility, 12 strength and 9 walking exercises. Following the first round of the Delphi method, 2 exercises in each category did not reach the consensus and were then removed. In the second round, the remaining 7 balance, 10 flexibility, 10 strength and 7 walking exercises were ranked by the experts and this classification allowed us determined the 4 most suitable exercises from each category to be included in the GAMotion.

**Conclusion:** A consensus based approach among healthcare professionals allowed us to contribute to the development of new exercises to promote physical activity in nursing homes. These validated exercises can be included in the GAMotion boardgame.

## P499

### EFFECTS TRAINING WITH OSTEOSTRONG COMPARED TO PHYSICAL TRAINING IN INDIVIDUALS AT HIGH FRACTURE RISK: A STUDY PROTOCOL FOR A RANDOMISED CONTROLLED TRIAL

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**Objective:** To compare the effects of OsteoStrong-training to physical training on bone health.

#### Methods:

Design: Randomised controlled trial

Population: Postmenopausal women, 65-79 years old, with osteopenia or osteoporosis.

Treatment arm A: OsteoStrong. This is a high-intensity isometric loading training performed in four different machines, combined with balance training on vibration platforms. The training is performed individually with help from an instructor once a week and takes 20 minutes to complete. The training will be carried out for 9 months.

Treatment arm B: Physical training. This is a moderate- to high-intensity training based on the current recommendations on physical activity for people with osteoporosis. The training is performed in a group with the help from an instructor twice a week and takes 60 minutes to complete. The training will be carried out for 9 months.

Primary outcome: Bone material strength index.

Secondary outcomes: DXA, bone biomarkers, physical tests, questionnaires.

Follow-ups: Baseline and post-intervention (9 months).

Analysing method: Intention-to-treat with a mixed linear model.

**Results:** We randomised 194 women to the study, 96 in treatment arm A, and 98 in treatment arm B. Both treatment arms will finish their training in May 2023. Primary results is estimated to be ready in the first quarter of 2024.

**Acknowledgments:** Fundings for this study has come from Stockholm County Healthcare Services, OsteoStrong and a private donor.

P500

### THE RELATIONSHIP BETWEEN THE CONCENTRATION OF FETUIN-A AND MARKERS OF BONE DESTRUCTION IN PATIENTS WITH OSTEOPOROSIS ON THE BACKGROUND OF RHEUMATOID ARTHRITIS

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**Objective:** To study the relationship between the level of fetuin-A (FA) and laboratory markers of bone tissue degradation in the blood serum of patients with osteoporosis (OP) in the presence of rheumatoid arthritis (RA).

**Methods:** We observed 114 patients with OP that developed against the background of RA. The control group consisted of 30 healthy individuals. The group of patients with RA and the control group were comparable in terms of gender ( $p=0.121$ ), age ( $p=0.078$ ) and BMI ( $p=0.321$ ). BMD was assessed using DXA. Diagnosis of OP according to the recommendations of the International Society for Clinical Densitometry. The level of FA in the blood serum was determined once by enzyme immunoassay using commercial test systems.

**Results:** We have assessed the level of FA in healthy individuals and in patients with OP against the background of RA. The level of normal FA value in healthy individuals, calculated as  $M \pm 2\sigma$ , ranged from 653.55  $\mu\text{g/ml}$  to 972.19  $\mu\text{g/ml}$ . The FA level was normally distributed ( $K-S d=0.062$ ,  $p>0.2$ ). Depending on the level of FA, all patients with OP were divided into two groups: with a normal level of FA (88 people) and a low level (26 patients). We studied the relationship between the level of FA and indicators of bone metabolism. In patients with low FA levels, the average level of C-terminal telopeptide of type I collagen (CTX-1) was 51 ng/ml, in patients with normal FA levels, the average level of CTX-1 was 35 ng/ml ( $t=-2.42$   $p=0.016$ ). Thus, in the group of patients with reduced FA concentration, the level of CTX-1 was significantly higher.

**Conclusion:** According to the obtained data, in patients with normal FA levels, the level of CTX-1 is significantly lower. Considering that CTX-1 is a marker of degradation of cartilage and bone collagen, it can be assumed that FA has chondro- and osteoprotective properties, however, this issue requires further study.

P501

### AUTOMATED DETECTION AND LOCALIZATION OF VERTEBRAL COMPRESSION FRACTURES FOR EARLY IDENTIFICATION AND INITIATION OF MANAGEMENT

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**Objective:** To develop a deep learning based image analysis software for the automated detection, localization and grading of vertebral compression fractures on lateral chest & lumbar spine radiographs that aids in management of osteoporosis. To follow up with a day rehabilitation service model in enabling better bone health management and achieving secondary prevention through ambulatory fracture liaison service.

**Methods:** We use a structured hierarchical segmentation method for opportunistic identification of vertebral fractures from routine imaging (Chest & Lumbar Spine radiographs) performed for other clinical indications and which include the spine in the field of view. A three-part hierarchical method is used: 1) spine localization, 2) segmentation of thoracic and lumbar vertebra, and 3) fine-tuning of segmentation, combining both M-net and level-set methods for the detection and evaluation of vertebral compression fractures. This segmentation results are followed by automatic grading of such fractures, if found. Patients thus identified are recruited to our One Stop Multidisciplinary Day Rehabilitation Clinic under a new ambulatory fracture liaison service model consisting of 13 weekly half day sessions that include assessment and review by our team of doctors, nurses, dietitians, physiotherapists, and occupational therapists.

**Results:** Our validation study showed that early identification of asymptomatic vertebral compression fractures is feasible and reliable, providing a clear and reproducible definition of such fractures. Timely initiation of multidisciplinary management, including doctor's consultation, nurse consultation, dietitian consultation, physiotherapy, and occupational therapy provided an integrated service to this group of patients, with early implementation of osteoporosis and sarcopenia management.

**Conclusion:** Our artificial intelligence algorithm provides an automated computer-aided diagnostic tool for silent vertebral fractures, without the need to take extra X rays. As vertebral compression fractures are powerful predictors of future osteoporotic fractures, their early identification is important to ensure that patients are commenced on appropriate bone protective therapy and secondary prevention programmes in a timely manner.

P502

### SEASONAL VOLUME OF 25-HYDROXYCALCIFEROL IN OSTEOPOROSIS PATIENTS

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**Objective:** To study the seasonal fluctuations of 25-Hydroxycalciferol (vit D) in patients with osteoporosis (OP).

**Methods:** We observed 396 patients diagnosed with OP aged 24 to 93 years (94.95% women and 5.05% men). Assessment of BMD was carried out by the method of DXA. The diagnosis of OP was made on the basis of WHO recommendations. Vitamin 25(OH)D3 levels were determined using a commercial ELISA kit.

**Results:** The maximum mean vit D levels were observed in patients in June (90.38 nmol/l), while the minimum values were recorded in January and December (50.85 and 55.83 nmol/l). The vit D level in the summer months did not differ significantly from the vit D level in the autumn months. The highest percentage of patients with vit D deficiency was observed in April and reached 16.67%. In the period from June to September, the frequency of hypovitaminosis was significantly lower and amounted to 1.92-3.7%. Despite the lowest average values of vit D, in January and December there were no patients with a deficiency of this indicator. With increasing age of patients, a gradual decrease in the level of vit D blood is observed ( $r=-0.099$ ,  $p=0.049$ ). We did not find significant differences between the sex of patients and the value of vit D (in men  $62.1 \pm \sigma$ , in women  $66.8 \pm \sigma$ ).

**Conclusion:** Based on the results obtained, patients with OP are recommended to carry out planned prevention of vitamin D deficiency, which is especially important for older people. Prevention should be carried out from September to May, in accordance with international guidelines. Note that there were no statistically significant differences between the average values of vitamin D levels in the summer months, accompanied by high solar activity (July-August) and the average values in the autumn months (September-November). Perhaps this fact is explained by the short time spent outdoors on hot summer days.

P503

### FREQUENCY OF DIFFERENT PHENOTYPES OF CALCIUM PYROPHOSPHATE CRYSTAL DEPOSITION DISEASE DEPENDING ON BMI

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**Objective:** To determine the frequency of different phenotypes of calcium pyrophosphate crystal deposition disease (CPPD) de-

pending on BMI.

**Methods:** The prospective single center study included 305 patients (pts) with CPPD: 115 (37.70%) men, 190 (62.30%) women. The average follow-up period was  $3.9 \pm 2.7$  yrs. CPPD diagnosis was based upon 1961 McCarty criteria. During the observation period questioning and examination was carried out twice. The examination included anthropometric parameters (height, weight, BMI), questioning included collection of information about the affected joints and about the dynamics of the symptoms of the disease. In accordance with the recommended terminology (EULAR, 2011), 4 phenotypes were determined: acute CPP crystal arthritis, chronic CPP crystal arthritis, osteoarthritis with CPP crystals and asymptomatic CPPD.

**Results:** The mean age at inclusion was  $58.9 \pm 12.5$  yrs. 289 patients were available for follow-up. BMI  $\geq 30$  kg/m<sup>2</sup> was diagnosed in 108 (37.3%) pts: 38 (35.2%) men and 70 (64.8%) women. Among obese patients, the phenotypes of CPPD, depending on the prevalence, are as follows: chronic CPP crystal arthritis in 63 (58.3%) pts, osteoarthritis with CPP crystals in 20 (18.5%) pts, asymptomatic CPPD in 14 (13.0%) pts, acute CPP crystal arthritis in 11 (10.2%) pts. Both women and men with obesity demonstrated chronic arthritis (38 (54.3%) and 25 (65.8%) pts) predominantly. Pts with normal BMI in their majority (85 (47.0%) pts) showed symptoms of chronic CPP crystal arthritis and osteoarthritis with CPP crystals (48 (26.5%) pts). Fewer patients met the criteria for asymptomatic CPPD (19 (10.5%) pts).

**Conclusion:** BMI did not affect the incidence of chronic CPP crystal arthritis and osteoarthritis with CPP crystals.

P504

### ASSOCIATION BETWEEN THE PRESENCE OF RISK FACTORS AND THE DEVELOPMENT OF OSTEOPOROSIS IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To study the relationship between risk factors and the presence of osteoporosis (OP) in patients with rheumatoid arthritis (RA).

**Methods:** We examined 110 patients diagnosed with RA. The mean age of patients was 57 [47-63] years. DXA was used to evaluate BMD. We divided all patients into 2 groups: with the presence of OP (53 people) and without signs of OP (57 people). In addition to the standard laboratory examination, we determined the level of 25(OH) vitamin D in the blood, the N-terminal propeptide of procollagen I (P1NP).

**Results:** It was found that in patients with RA suffering from OP, erosive changes in the joints are more common (43 patients (39.1%) with erosive changes and 34 patients (30.9%) with no erosive changes, ( $X^2=6.04$ ;  $p=0.014$ )), patients with AP are char-

acterized by a longer course of RA (14.0 [7.0-18.0] years and 6.0 [3.0-15.0] years ( $Z=-2.25$ ;  $p=0.024$ )) and lower weight (69.6±14.6 (69.4-76.5) kg and 76.5±14.7 (68.9-77.8),  $t=2.45$ ;  $p=0.014$  kg)). Patients with OP had lower levels of vitamin D (43.9 [30.5-57.2] and 58.2 [45.6-64.4],  $Z=3.29$ ;  $p=0.001$ ) and higher levels of N-terminal propeptide procollagen I (52.7 [44.4-71.2] and 45.3 [39.2-52.1],  $Z=-3.08$ ;  $p=0.002$ ). Note that the level of P1NP in both groups did not exceed normal values. Patients with RA who developed OP took corticosteroids for a longer period of time, had a higher cumulative dose in history (6.5 [1.2-13.5] g and 3.26 [0.15-7.2] g,  $Z=-3.05$ ;  $p=0.002$ ) and the higher dose of corticosteroids currently taken (8.0 [5.0-10.0] mg and 1.5 [0.0-7.5] mg,  $Z=-3.42$ ;  $p=0.0006$ ).

**Conclusion:** The data obtained indicate the dependence of the incidence of AP in patients with RA on the duration of the disease, the presence of erosive changes in the joints, the weight of patients, as well as the duration of administration and dose of corticosteroids.

## P505

### ESTABLISHING A RELATIONSHIP BETWEEN OMEGA-3 SUPPLEMENTATION AND PHYSICAL PERFORMANCE, FRAILITY AMONG ELDERLY HYPERTENSIVE, OSTEOPOROTIC MEN

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**Objective:** Identify relationship and evaluate the effects of long chain polyunsaturated fatty acids (LC-PUFA) supplementation on frailty and physical performance in elderly men with co-morbidities.

**Methods:** Randomized, double blind pilot study. Geriatric men (>60 yrs old) with known hypertension and osteoporosis were divided into 2 groups randomly. Intervention groups was given fish oil supplement (1.2 g EPA and DHA) once a day for 6 months, vs. placebo (peppermint oil capsules) group. All participants, additionally received the same calcium and Vit D supplements. RBS-DHA levels, frailty assessment, hand grip strength, 6 min walk, body composition, medical history and co-morbidities, and nutrient intake (food frequency questionnaire) taken at baseline and 6 months. No physical activity intervention was initiated.

**Results:** At baseline, those with greater red blood cell (RBC) DHA and DHA/arachidonic acid (AA) presented with less frailty ( $r=-0.238$ ,  $p=0.005$  and  $r=-0.249$ ,  $p=0.006$ , respectively). There was no significant change in blood pressure levels in both groups. Fish oil supplementation resulted in higher RBC DHA and lower AA compared to baseline and placebo ( $p<0.001$ ) and an improvement in walking speed compared to placebo (3.3±14.8 vs. -3.8±14.2,  $p=0.02$ ). Handgrip strength in non-dominant hand was significantly better in non-intervention group. A linear regression model included age, dietary antioxidant intake (selenium and vitamin C), osteoporosis, frailty phenotype (weakness, slow walking speed, unintentional weight loss, exhaustion, and low physical activity). The model explained 21.4% of the variance in the change

in walking speed. Change in DHA/AA ( $p=0.01$ ), and selenium intake ( $p=0.02$ ) had the greatest contribution to change in walking speed.

**Conclusion:** Physical performance, measured by a change in walking speed, was significantly affected by fish oil supplementation. Dietary intake of antioxidants (selenium and vitamin C) also contributed to change in walking speed suggesting LC-PUFA may interact with antioxidants to impact physical performance.

## P506

### HAND GRIP STRENGTH TEST AND SHORT PHYSICAL PERFORMANCE BATTERY VS. FRAX®: WHICH CORRELATION IN THE FRACTURE RISK? A MACHINE LEARNING STUDY

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**Objective:** FRAX is an algorithm for fracture risk assessment useful for the primary prevention of osteoporosis, albeit it might present some limitations. It should be considered that the hand grip strength test (HGS) might be an important prognostic factor in case of hip fracture in postmenopausal women. Furthermore, the physical performance assessment through the short physical performance battery (SPPB) plays a key role in predicting falls, disability, and hospitalization. There is still no agreement on the role as predicting factors of these functional outcomes. Therefore, aim of our study was to evaluate the role of HGS and SPPB in correlation with FRAX to predict fragility fractures in naïve postmenopausal women.

**Methods:** In this cross-sectional study we included postmenopausal women aged >50 years never treated with anti-osteoporotic drugs. Outcomes measures were: HGS, for muscle strength, SPPB for performance, FRAX major and hip, for the risk of fracture. A correlation analysis with Pearson's  $r$  and odds ratios (OR) was performed to correlate HGS<16 kg, SPPB ≤8, and the combination of them with FRAX major ≥20 and/or hip ≥3. This latter index was then compared to HGS<16 kg, SPPB ≤8 with a decision boundaries plot using a machine learning approach with a Decision Tree model.

**Results:** Out of 33 women included (mean aged 63.8±10.7 years), 47.0% with HGS<16 kg, 44.1% with SPPB≤8 and 29.4% with HGS<16kg and SPPB≤8. SPPB was negatively correlated with FRAX major ( $r=-0.40$ ;  $p<0.001$ ) and hip ( $r=-0.49$ ;  $p<0.001$ ). Concerning the fracture risk (FRAX major ≥20 and/or hip ≥3), women with HGS<16 kg had OR=1.76 ( $p=0.017$ ), SPPB≤8 had OR=2.69 ( $p=0.001$ ), and with a combination of the two conditions had OR of 3.53 ( $p=0.001$ ). Furthermore, the Decision Tree model with an accuracy of 0.667, a F1 score of 0.748, and a Matthews correlation coefficient of 0.447 provided a decision boundary map relating SPPB and HGS values to the presence or no risk of fracture.

**Conclusion:** Therefore, the assessment of HGS and SPPB might help in the screening of postmenopausal women providing important information on the potential risk of fracture. Further prospective studies might provide additional data.

## P507

### THERAPY OF CALCIUM PYROPHOSPHATE CRYSTAL DEPOSITION DISEASE IN REAL CLINICAL PRACTICE

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**Objective:** To study the frequency of prescribing non-steroidal anti-inflammatory drugs (NSAIDs), colchicine (COLCH), hydroxychloroquine (HCQ), methotrexate (MTX) and corticosteroids (CSS) in patients with calcium pyrophosphate crystal deposition disease (CPPD).

**Methods:** The study included 305 patients (pts) with CPPD: 115 (37.70%) men, 190 (62.30%) women. CPPD diagnosis was based upon 1961 McCarty criteria. According to EULAR, 2011 classification, 4 phenotypes were determined: acute CPP crystal arthritis, chronic CPP crystal arthritis, osteoarthritis with CPP crystals and asymptomatic CPPD. The average follow-up period was 3.9±2.7 yrs. Prescribed drugs were recorded during the observation period. The prescription of NSAIDs, COLCH, HCQ, MTX, CSS was carried out by the physician.

**Results:** 289 pts were available for follow-up. The need for drug therapy in patients with different phenotypes of CPPD is shown in the Table. From most to least commonly prescribed drugs: NSAIDs were prescribed to 200 (69.2%) pts, COLCH – to 93 pts, MTX – to 55 pts, HCQ – to 45 pts, CSS – to 33 pts.

CPPD phenotype, n (%)	NSAIDs, n (%)	COLCH, n (%)	HCQ, n (%)	MTX, n (%)	CSS, n (%)	P
Chronic CPP crystal arthritis, 148 (51.2%)	114 (77.0)	54 (36.5)	28 (18.9)	36 (24.3)	20 (13.5)	<0.05
Osteoarthritis with CPP crystals, 68 (23.5%)	53 (77.9)	22 (32.4)	13 (19.1)	11 (16.2)	8 (11.8)	<0.05
Acute CPP crystal arthritis, 40 (13.8%)	30 (75.0)	17 (42.5)	4 (10.0)	8 (20.0)	5 (12.5)	<0.05
Asymptomatic CPPD, 33 (11.5%)	3 (9.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	<0.05

**Conclusion:** NSAIDs and colchicine were the most commonly prescribed drugs, regardless of the phenotype of the CPPD.

## P508

### BONE HEALTH IN ADULTS WITH CYSTIC FIBROSIS IN THE REPUBLIC OF NORTH MACEDONIA

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**Objective:** The term cystic fibrosis bone disease (CFBD) is used to describe low BMD and/or fragility fractures in CF patients. We decided to carry out a bone health screening of adult patients with CF in the Republic of North Macedonia and establish their current status.

**Methods:** We conducted a prospective study which comprised a sample of 30 individuals with CF above the age of 18, of the population of ~50 adults with CF in North Macedonia. The sex, age, height and weight (later converted to BMI kg/m<sup>2</sup>) were recorded, blood sample analysed for serum levels of calcium, free calcium, phosphate, PTH and 25(OH)D. We conducted an interview with all subjects regarding additional risk factors. All subjects underwent DXA scan, by measuring the BMD at the lumbar spine and proximal hip.

**Results:** approximately half of the adults with CF have low BMD and about a quarter of them also have osteoporosis. 33,3% of the patients had history of fragility fractures, the mean BMI was lower than the recommended values, vitamin D deficiency was found in 60% and continuous use of glucocorticoids was recorded in 30% of the subjects.

**Conclusion:** Our findings align with those of other studies. The most effective method for evaluating BMD in adult CF patients is DXA scanning and monitoring regularly.

## P509

### ULTRASOUND IMAGING OF SODIUM MONOURATE CRYSTALS IN PATIENTS WITH VARIOUS STAGES OF HYPERURICEMIA

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**Objective:** To study the frequency of detection of sodium monourate crystals (SMC) in patients (pts) with various stages of hyperuricemia (HU).

**Methods:** This is a prospective study of pts with asymptomatic HU and gout. Gout was diagnosed according to the 2015 ACR/EULAR gout classification criteria. Pts who did not meet these criteria were diagnosed with asymptomatic HU (AHU). Pts examination included: anthropometric data (height, weight, BMI); level of uric acid determination; ultrasound of the knee joints and feet (Voluson-I (Germany)). 3 types of pathological changes were recorded according to ultrasound: double contour sign, snowstorm appearance and tophus.

**Results:** Results for 112 patients with HU. 57 (49.1%) patients



with AHU were included, of which 31 (54.4%) were men and 26 (45.6%) were women, and 55 (50.9%) patients with gout, the vast majority of whom were men 51 (92.7%). The frequency of detection of SMC deposition signs based on knee joints and feet ultrasound is shown in the Table. SMC were found in the knee joints in 25 (22.3%) pts and in feet in 32 (28.6%) pts. In patients with gout in the knee joints, snowstorm appearance and double contour sign were equally often determined (5 (9,1%) pts). On the feet ultrasound, tophi were more often visualized (11 (20,0%) pts). Pts with AHU were more likely to show snowstorm appearance in the knee joints (9 (15,8%) pts) and double contour in the feet (8 (14,0%) pts).

	AHU, n=57	Gout, n=55	p
SMC in knee joints, n (%)	12,0 (21,1)	13,0 (23,6)	-
Snowstorm appearance, n (%)	9 (15,8)	5 (9,1)	<0.05
Double contour sign, n (%)	3 (5,3)	5 (9,1)	<0.05
Tophus, n (%)	0 (0,0)	3 (5,5)	<0.05
SMC in feet, n (%)	10,0 (17,5)	22,0 (40,0)	-
Snowstorm appearance, n (%)	2 (3,5)	5 (9,1)	<0.05
Double contour sign, n (%)	8 (14,0)	6 (10,9)	<0.05
Tophus, n (%)	0 (0,0)	11 (20,0)	<0.05

**Conclusion:** Signs of SMC deposition are detected already at the stage of AHU. Further research on a larger sample is needed.

## P510 MUSCLE STRENGTH, PHYSICAL PERFORMANCE AND PAIN IN WOMEN WITH RHEUMATOID ARTHRITIS

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**Objective:** To study the association of muscle strength, physical performance and pain in women with rheumatoid arthritis (RA).

**Methods:** 158 patients aged 40 to 75 years with confirmed RA (ACR/EULAR, 2010) were included in the study. Inclusion criteria: signed informed consent, absence of aseptic bone necrosis, joint endoprostheses, cross syndromes, severe organ complications of RA or concomitant diseases, diseases with a negative myotropic effect, memory disorders. Musculoskeletal pain using a visual analog scale (VAS), handgrip strength and strength of low extremities using "Chair stand test" (CST) were assessed. Physical performance (PhP) was determined by "Gate speed test" (GST) and "Timed Up and Go test" (TUG). Univariate logistic regression analysis was used to assess associations between pain severity and muscle status.

**Results:** The median age, duration of RA and pain according to VAS were 60 [52; 64] years, 8 [4; 14] years and 41 [23; 56] mm, respectively. Handgrip strength and the CST result corresponded to reduced muscle strength (median 12 [8; 15] kg and 17.6 [13.4; 24.5] s, respectively) in majority of the examined persons. 123 (78%) patients had low muscle strength of upper extremities, and 104 (66%) had low muscle strength of lower extremities. 139

(88%) individuals had low muscle strength on at least one test. The median GST was 0.8 [0.7; 1.0] m/s; TUG - 10 [8; 12] s. The PhP was low in 88 (56%) patients. The presence of pain syndrome increased the probability of low muscle strength of the lower extremities (OR 2.72 95%CI 1.29-5.75, p=0.009) and a decrease in PhP (OR 3.19 95%CI 1.40-7.26, p=0.006).

**Conclusion:** The majority (88%) of the examined persons with RA had low muscle strength, more than half (56%) patients had low PhP. Musculoskeletal pain associated with low muscle strength of the lower extremities and a decrease in PhP.

## P511 ISCHEMIC STROKE IS ASSOCIATED WITH REDUCED SCLEROSTIN EXPRESSION IN HUMAN ATHEROSCLEROTIC PLAQUES

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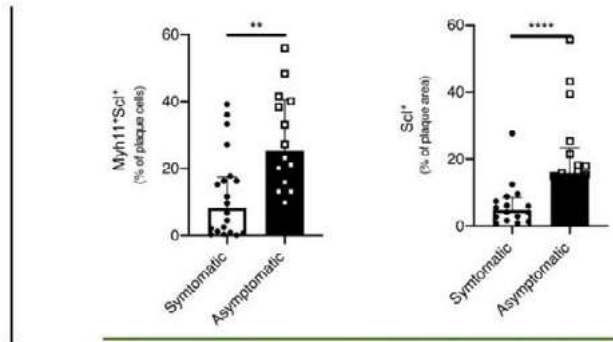
**Objective:** Sclerostin (Scl) expression levels have been linked to vascular calcification (VC) of atherosclerotic plaques. In osteoporotic women, Scl inhibition with romosozumab has been associated with a higher incidence of major adverse cardiovascular events (MACE) compared to alendronate. This increases in MACE call into question the safety of romosozumab use, particularly in patients with cerebrovascular and cardiovascular history or at high cardiovascular risk. However, whether sclerostin expression levels in VC or atherosclerotic plaques are associated with clinical ischemic events remains unknown. Here we explored the association between Scl expression in human atherosclerosis plaques and the extend of VC, vascular smooth muscle cells (VSMCs) phenotypic switch to osteoblast-like cells (OBL), and its correlation to clinical cerebrovascular events.

**Methods:** Carotid plaque specimens of symptomatic (ischemic stroke) and asymptomatic patients undergoing endarterectomy for severe carotid stenosis were co-stained with VSMCs specific marker (Myh11), OBL marker (RUNX2), microcalcification sensitive fluorescent imaging probes (OsteoSense) and Scl and used for quantification analyses.

**Results:** Carotid plaque specimens from asymptomatic patients exhibited a significantly higher percentage of VSMCs expressing Scl (Myh11+Scl<sup>+</sup>) in parallel with a greater Scl<sup>+</sup> area vs. symptomatic patients. A negative correlation was observed between the percentage of Myh11+Scl<sup>+</sup> cells and the extent of microcalcification (OsteoSense) as well as between the percentage of total Scl<sup>+</sup> cells and induction of VSMCs phenotype switch to osteoblast-like cells (quantified as RUNX positive area).

**Conclusion:** In atherosclerotic plaques of patients with ischemic stroke, total and VSMCs -specific Scl expression levels were reduced as compared to asymptomatic patients. Furthermore, reduction in Scl levels was positively associated with

the extent of microcalcification, and VMSCs phenotypic switch to OBL. The presented findings suggest that sclerostin expression in human atherosclerotic plaques could contribute to plaque stabilization and be protective against ischemic stroke.



## P512 PREVENTING POST-DENOSUMAB BONE LOSS WITH ZOLEDRONATE: A RANDOMIZED TRIAL IN POSTMENOPAUSAL WOMEN WITHOUT AND WITH PRE-EXPOSURE TO BISPHOSPHONATES

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**Objective:** To evaluate the effects of Zol administration and the need for multiple injections to prevent bone loss after stopping denosumab in long-term users, and the influence of previous bisphosphonates (BPs) exposure therein.

**Methods:** 44 postmenopausal women treated with denosumab >2 yrs (median 4.7 yrs, range 3.6-5.7) for primary osteoporosis and reaching BMD T-scores >-2.5 at spine and hip were included. Those without pre-denosumab BPs were randomized to Zol at 6 months (gr.1, n=12) or 9 months (gr.2, n=11) after the last denosumab, or to an observational group receiving Zol if CTx >644 ng/ml, -i.e. 50% above the upper normal pre-menopausal value- (gr.3, n=11). Those exposed to BPs during ≥1yr pre-denosumab (gr.4, n=10) also received Zol if CTx >644 ng/ml. In addition, Zol was re-administered in all a groups if subsequent CTX >644 ng/ml at any time or BMD decreased >5% at 6 months after Zol. In this interim analysis, median LS BMD changes from baseline to 12 months after the end of the last denosumab dose and to 12 months after the initial Zol infusion are reported.

**Results:** Mean age (±SD) was 69.5 ±6.6 yrs, baseline spine and hip BMD T-scores -1.41 ±0.77 and -1.33 ±0.61 respectively, without differences between groups. Mean pre-Zol CTx values were 160±163, 718±381, 888±163, and 778±281 ng/ml in gr. 1-4 respectively. Most patients randomized to gr- 1-3 received multiple

Zol injections according to the CTx criteria (median=2 Zol, range 1-5), whereas 8 out of 10 patients in gr. 4 (previous BPs) received Zol, only 3 requiring more than one injection. Median LS BMD changes 12 months post-Zol were similar between groups (-4.71, -4.77, -3.15, and -3.03%, respectively in gr. 1-4). However LS BMD changes 12 months after the end of the last denosumab dose tended to be greater in gr. 2 (-8.25%) and 3 (-8.13%) than in gr. 1 (-4.71%) and 4 (-4.62%) (ns).

**Conclusion:** Most patients treated long-term with denosumab require more than one Zol injection to counteract the post-treatment bone turnover rebound, unless previously treated with BPs. In BPs-naïve patients, administering the first Zol 6 months post-denosumab may provide better protection against bone loss than delaying Zol injections.

**Acknowledgment:** Trial sponsored by AMGEN.

## P513 TYPE 2 DIABETES MELLITUS AND RISK OF OSTEOPOROTIC FRACTURES IN OLDER ADULTS

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**Objective:** Patients with type 2 diabetes mellitus (T2DM) have a higher risk of fragility fractures. In the Ecuadorian population, the risk of osteoporotic fractures in patients with diabetes has not been evaluated. We set out to evaluate the risk of fractures in older adults with and without T2DM using the specific FRAX model of the Ecuadorian population.

**Methods:** Observational study in 293 patients with T2DM and 301 non-diabetic controls. The members of each study group were selected from among the participants in the SABE Ecuador population-based survey. Demographic data, anthropometric measurements, smoking, alcoholism, history of previous fractures, and time from diagnosis of T2DM were obtained from the responses recorded in the survey questionnaire. Fracture risk assessment was estimated with the FRAX model specific for the Ecuadorian population (version 4.1). We expressed the results as absolute numbers and proportions for continuous variables and as means and standard deviations for categorical variables. We performed the comparison of the groups with the t-test for 2 independent samples. Statistical calculations were performed with the Epidat 4.2 software. The significance level was set at p<0.05.

**Results:** No significant differences were found in the distribution by age and sex between the groups. BMI was significantly higher in the T2DM group (p<0.001). Fractures were more frequent in the non-diabetic control group. FRAX score for MOF and HF is lower in the T2DM group compared to non-diabetic controls. Table 1 shows descriptive characteristics of the participants in the results of the study groups.

Table 1. Descriptive characteristics and differences in outcomes of the study groups

	T2DM (n =293)	Non-T2DM (n= 301)	p value
Sex	n (%)	n (%)	
Male	101 (34.5)	104 (34.6)	0.98
Female	192 (65.9)	197 (65.4)	0.98
	Mean (SD)	Mean (SD)	
Age (years)	70.6 (7.3)	70.6 (7.5)	0.97
Weight (kg)	63.9 (12.4)	57.2 (12.3)	<0.001
Height (m)	151.7 (8.9)	149.3 (8.8)	0.001
BMI (kg/m <sup>2</sup> )	27.7 (4.9)	25.6 (4.5)	<0.001
Prior fracture n (%)	11 (3.8)	16 (5.3)	<0.001
Current smoking n (%)	14 (4.5)	25 (8.3)	<0.001
Alcohol consumption n (%)	3 (1.0)	5 (1.7)	<0.001
Time from diagnosis (years)	7.8 (8.9)	--	--
FRAX*			
MOF probability, %	2.3 (2)	4.0 (3.3)	<0.001
HF probability, %	1 (1.3)	1.6 (1.7)	<0.001

\* Without BMD; T2DM, Type 2 Diabetes mellitus; Major osteoporotic fracture; HF, hip fracture

**Conclusion:** The FRAX score in patients with T2DM is lower than in non-T2DM individuals. The FRAX tool underestimates the risk of fracture in older adults with diabetes. T2DM status should be considered as an independent risk factor for osteoporotic fractures.

### P514 MUSCLE ELASTOGRAPHY AND MUSCLE QUALITY INDEX IN PATIENTS WITH POSTCOVID-19 CONDITION WHO UNDERWENT ASYMPTOMATIC TO MILD COVID-19

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**Objective:** Persistent fatigue and muscle weakness are the most frequent symptoms of postCOVID-19 condition. These manifestations have been related to direct involvement of muscle by SARS-COV-2 and the immune response, which can generate a fibrotic process that could condition biomechanical alterations that modify muscle function. We aimed to compare biomechanical parameters through shear wave elastography (SWE) of the rectus femoris with muscle performance of quadriceps in postCOVID-19 condition adult patients.

**Methods:** We performed a cross-sectional analytical study in patients over 18 years old with history of asymptomatic to mild COVID-19 three months earlier, treated as outpatients, divided in cases patients with postCOVID-19 condition and controls asymptomatic subjects. Assessment included ultrasound at the distal third of thigh, isokinetic concentric/eccentric test and dual DXA body composition. Registered outcomes were cross-sectional area of rectus femoris, fascia thickness, muscle thickness, and SWE at 3 different depths, concentric and eccentric peak of torque, work and power, appendicular lean mass (ALM) and mus-

cle quality index (MQI) [isokinetic peak torque (converted to kg) / ALM (kg)]. Statistical analysis was performed with central tendency and dispersion, frequencies, inferential analysis included Man-Whitney U, Chi-squared and correlation tests.

**Results:** We included 30 patients (22 women), 17 with post-COVID-19 condition. Statistical differences were observed for BMI, resulting higher in cases (p=0.03). No differences were observed in SWE characteristics between groups. Isokinetic performance was significantly lower in cases (p<0.05). MQI was lower in cases (p=0.03). A moderate negative correlation was observed between muscle quality index and BMI in controls (r=-0.397; p=0.03) and cases (r=-0.559; p=0.02).

**Conclusion:** MQI helps to identify patients with postCOVID-19 condition with muscle involvement who wouldn't be identified if considering strength and ALM separated.

### P515 THE EFFECT OF SELECTING RHEUMATOID ARTHRITIS AS THE EQUIVALENT VARIABLE OF TYPE 2 DIABETES IN FRAX TOOL IN ECUADORIAN OLDER ADULTS

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**Objective:** The FRAX tool underestimates the risk of fracture in patients with type 2 diabetes mellitus (T2DM). Several alternatives have been proposed to correct the prediction of fracture risk based on FRAX in patients with T2DM. We proposed to set out the risk of fractures in older adults with T2DM by selecting rheumatoid arthritis (RA) as the T2DM equivalent variable in the FRAX tool.

**Methods:** 293 patients with T2DM were selected among the participants in the survey based on the population SABE Ecuador. Demographic data, anthropometric measurements, smoking, alcoholism, history of previous fractures, and time since diagnosis of T2DM were extracted from the responses recorded in the survey questionnaire. The risk assessment of major osteoporotic fracture (MOF) and hip fracture (HF) was calculated with the specific FRAX model of the Ecuadorian population (version 4.1). We enter the variable RA as variable T2DM equivalent to calculate the adjusted FRAX score. We expressed the results as absolute numbers and proportions for categorical variables and as means and standard deviations for continuous variables. We performed the comparison of the groups with the t-test for 2 paired samples. The statistical calculations were performed with the Epidat 4.2 software. The significance level was set at p<0.05.

**Results:** n=293 (66% women), mean age 71(7) years, BMI 28(5), Prior fracture 11(3.8)%, Time from diagnosis 7.8 (8.9) years. The FRAX score for MOF and HF is lower in unadjusted FRAX compared with adjusted FRAX for RA. Adjusted FRAX for RA increased 1.5 and 1.7 times the prediction of fracture risk for MOF and HF

respectively. Table 1 presents the characteristics and differences in outcomes for patients with T2DM.

Table 1. The effect of adding AR as a risk factor in the calculation of the FRAX score in patients with type 2 diabetes mellitus

FRAX* probability,%	MOF	HF
	mean (SD)	mean (SD)
Non adjusted FRAX	2.3 (2)	1 (1.3)
Adjusted-RA FRAX	3.44 (3.05)	1.70 (2.16)
% Change	68%	59%

\* Without BMD; RA, Rheumatoid Arthritis; MOF, Major osteoporotic fracture; HF, hip fracture

**Conclusion:** In individuals with T2DM, the unadjusted FRAX score is lower than the adjusted FRAX score for RA. The addition of the RA variable in the estimation of the FRAX score increases the predictive capacity of the FRAX tool in Ecuadorian older adults with T2DM.

## P516

### MUSCLE QUALITY ASSESSMENT IN POSTCOVID-19 CONDITION

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**Objective:** Muscle quality refers to the ability of muscle tissue to accomplish its functions, its assessment can be carried out through two specific measures: morphological and neuromuscular quality. Since fatigue and weakness are two of the main symptoms reported in postCOVID-19 condition it is important to include muscle quality in the assessment because it provides integration of muscle mass and strength and reflects performance. We aimed to assess neuromuscular muscle quality in patients with postCOVID-19 condition.

**Methods:** We performed a cross-sectional descriptive and comparative study with approval of research and ethics committee (43/20). Healthy subjects (controls) and patients with postCOVID-19 condition (cases) were included. Concentric-eccentric isokinetic quadriceps test, body composition (DXA) and thigh ultrasound at the distal third were tested. Registered outcomes: Isokinetic peak torque, power and work, appendicular lean mass, rectus femoris cross sectional area and quadriceps thickness, and muscle neuromuscular muscle quality (isokinetic peak torque (converted to kg)/appendicular lean mass (kg)). Statistical analysis: Variables were synthesized with central tendency and dispersion, inferential analysis was performed with t student or Mann-Whitney U and linear correlations, associations were done with chi-square.

**Results:** We included 65 controls and 18 subjects. The mean age of controls was 38.5 ( $\pm 12.1$  SD) and controls 42.6 ( $\pm 10.6$  SD)( $p=0.2$ ). BMI was associated with postCOVID-19 condition

( $p=0.005$ ). Cases had lower isokinetic performance and lower muscle quality index ( $p<0.05$ ), and was negatively correlated with BMI ( $r=-0.498$ ;  $p=0.05$ ). No differences were observed in ultrasound outcomes.

**Conclusion:** Neuromuscular quality (muscle quality index) is affected in patients with postCOVID-19 condition. Even though muscle mass was not affected, the assessment through this index allowed the identification of functional impairment. This information could be relevant for diagnostic and therapeutic decisions, therefore further research is convenient.

## P517

### SARCOPENIA AND FALLS IN OLDER ADULTS AFTER 1 YEAR OF A MAJOR OSTEOPOROTIC FRACTURE

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**Objective:** Sarcopenia compromises muscle quantity, quality and physical performance. Muscle weakness is considered a predictor of adverse health-related outcomes, which conditions mobility limitation, increases risk of falls, disability and mortality. Our aim was to identify sarcopenia in older adults who sustained a mayor osteoporotic fracture (MOF) in the previous year, and to establish if sarcopenia was associated with falls.

**Methods:** We carried out a cross-sectional study, we included patients of 65 and older age, who sustained a MOF, and underwent clinical and functional assessment to integrate sarcopenia diagnosis according to European Working Group on Sarcopenia in Older People 2. Assessments were made through hand-grip for strength, muscle lean mass index (DXA) for muscle quantity and normalized echogenicity of rectus femoris for muscle quality.

**Results:** We included 25 patients, mean age of 77 ( $\pm 11.5$ ) years, 88% were women. Probable sarcopenia was established in 14 patients and was confirmed in 10 patients through low muscle quantity and in 3 through low muscle quality. We found a statistical association with sarcopenia and falls in the first 12 months after the index fracture ( $p=0.004$ ; size effect=0.78; statistical power 95%).

**Conclusion:** It is advisable to screen for sarcopenia in elderly population at risk of fragility fractures to identify areas of potential intervention in a multidisciplinary approach, in order to reduce risk of falls and subsequent fractures.

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### VALUATION OF LOST PRODUCTIVITY OF ADULTS WITH X-LINKED HYPOPHOSPHATAEMIA AND OSTEOGENESIS IMPERFECTA

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**Objective:** To estimate and compare the cost of lost productivity of adults with X-linked Hypophosphataemia (XLH) and Osteogenesis imperfecta (OI) using the Valuation of Lost Productivity (VOLP) instrument.

**Methods:** The VOLP was completed by participants of the UK Rare Undiagnosed Diseases Study (RUDY) cohort study from 2020-22. Adults aged 18 or over with a self-reported diagnosis of OI or XLH and a completed baseline VOLP instrument were included. The VOLP measures lost unpaid work, absenteeism, presenteeism, and unemployment due to ill-health as components of total cost of lost productivity to society over three months. We estimated paid work, unpaid work, and total cost of lost productivity by employment status for each disease.

**Results:** The sample comprised of 41 adults with XLH and 44 with OI, with a median age of 48 (range 22-82) and 51 years (range 23-77) respectively. Of those with XLH, 22 were employed, 7 retired, and 12 were unemployed, of which 7 reported being unemployed due to their ill-health. Of the 44 adults with OI, 23 were employed, 11 retired, and 10 were unemployed, of which 8 reported ill-health being the reason for this. Employed participants with OI and XLH reported similar levels of total lost productivity costs (XLH=£1,036 vs. OI=£1,067 over the 3 months prior). For those retired or unemployed, total cost of lost productivity was higher for participants with OI (XLH=£200 vs. OI=£331 for retired, and XLH=£6,128 vs. OI=£8,686 for unemployed). The cost of lost productivity for both rare diseases is predominately driven by unemployment due to ill-health (XLH=£5,487 and OI=£7,524 over 3 months). For every 100 adults with XLH and OI, the estimated annual productivity loss is £953,444 and £1,045,836 respectively.

**Conclusion:** Having XLH or OI leads to significant productivity losses for the individual with the disease, their family, and society. We found total cost of lost productivity to be similar for adults with XLH and OI but those with OI report greater costs when retired or unemployed. More research with larger sample sizes is needed to confirm these differences.

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### ESTIMATION OF APPENDICULAR SKELETAL LEAN MASS THROUGH RECTUS FEMORIS THICKNESS MEASURED BY ULTRASOUND

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**Objective:** Appendicular lean mass (ALM) is a necessary component for the diagnostic construct of muscular pathology. The standard reference used for its calculation is based on DXA, not widely accessible in clinical contexts. Indirect methods have been proposed for its estimation, some consider musculoskeletal ultrasound (MSKUS). We aimed to develop an indirect quantitative method through a prediction model for the estimation of ALM derived from DXA measures, and based on assessment of the anterior thigh by MSKUS in healthy Mexican adults.

**Methods:** We performed an analytical observational cross-sectional study. Population were subjects of any sex, self-reported as healthy (not known pathology) who agreed to participate through informed consent. ALM was extracted from body composition analysis with DXA. Ultrasound images of anterior distal third of the thigh in transverse and longitudinal plane were obtained, cross sectional area of the rectus femoris (RFCSA) and muscle thickness were measured.

**Results:** A total of 62 individuals were included, of which 36 were women, with a men age of 38 ( $\pm 12$ ) years. In the analysis by sex, we obtained significant statistical differences for DXA body composition and MSKUS variables ( $p < 0.05$ ). MSKUS images had a high intra and interrater reliability ( $ICC = 0.991; p = 0.001$ ). Correlation between analyzed variables of the two methods had statistical significance ( $p < 0.05$ ). The stronger correlations were observed for ALM and right RFCSA ( $r = 0.719; p = 0.001$ ). The model with stronger percentage of prediction (84.4%) of ALM (kg) was  $0.148 * \text{weight (kg)} + 0.215 * \text{height (cm)} + 0.834 * \text{RRFCSA (cm}^2\text{)} - 31.824$ , with standard error estimation of 2.1 kg ( $p = 0.001; 1 - \beta = 1$ ).

**Conclusion:** An accessible and non-invasive prediction model with high prediction percentage is proposed for ALM estimation in Mexican healthy population, considering height, weight and RFCSA measured through MSKUS. For reference standard, DXA body composition was used.

P520

**GENETICALLY DETERMINED CAFFEINE INTAKE AND BONE MINERAL DENSITY: A TWO-SAMPLE MENDELIAN RANDOMIZATION STUDY**

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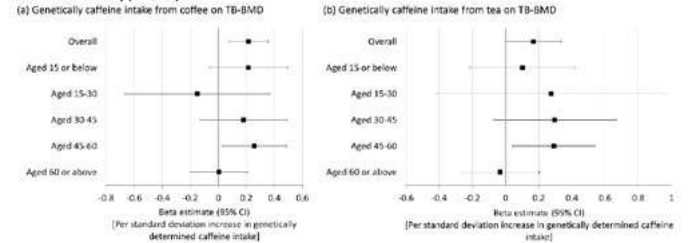
**Objective:** Amid the contradictory findings from published literature, we previously demonstrated that coffee consumption was positively associated with BMD. Metabolites involved in caffeine metabolism were also associated with BMD. It remains unknown if caffeine intake from coffee and tea would have similar association with BMD. Using Mendelian randomization (MR) approach, we aim to evaluate the causal effects of genetically determined caffeine intake from coffee and tea on overall and age-specific BMD.

**Methods:** Publicly available summary statistics were retrieved from the largest possible genome-wide association studies of caffeine intake from coffee (exposure; n=373,522) and tea (exposure; n=395,866), as well as DXA-derived total body BMD (TB-BMD) along the life course (outcome; n=66,628). Two-sample MR approach was adopted, with the inverse-variance weighted (IVW) method as the main analysis. The weighted median, contamination mixture, MR-Egger and MR pleiotropy residual sum and outlier (MR-PRESSO) methods were applied as the sensitivity analyses.

**Results:** The IVW results are presented in the Figure. Genetically determined caffeine intake from coffee had a positive causal relationship with overall TB-BMD in the main IVW analysis ( $\beta=0.216$ ; 95%CI: 0.078-0.354;  $p=0.002$ ). Similar estimates were obtained from the contamination mixture and MR-PRESSO methods, but not the weighted median and MR-Egger methods. Genetically determined caffeine intake from tea was also positively linked to overall TB-BMD but the association was weaker than that for coffee, with marginally significant association observed in IVW (beta=0.168; 95%CI: 0.002-0.333;  $p=0.047$ ) and contamination mixture methods, but not other sensitivity analyses. Age-specific analysis suggested that genetically determined caffeine intake from both coffee and tea were positively associated with TB-BMD at 45-60 years, but not for other age subgroups. Particularly, such age-specific association was found in both the IVW and various sensitivity analyses for caffeine intake from tea.

**Conclusion:** Genetic susceptibility to higher caffeine intake from coffee and tea may be protective to bone health. An age-specific association was observed for 45-60 years. Whether the beneficial effects of genetically determined caffeine intake on overall TB-BMD was driven by the 45-60 age group requires further investigation.

Figure. Inverse-variance weighted analysis for genetically determined caffeine intake from (a) coffee and (b) tea on total body bone mineral density (TB-BMD).



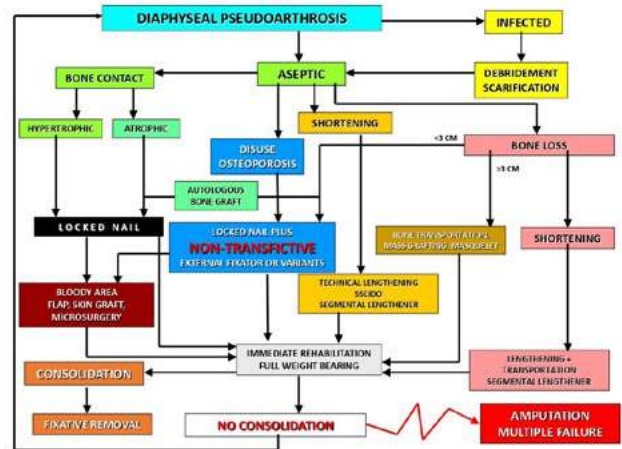
P521

**DIAPHYSEAL PSEUDOARTHROSIS ALGORITHM**

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A Therapeutic Guide of Diaphyseal Pseudoarthrosis is presented with the different degrees of pseudoarthrosis, from the simplest to the great bone loss, mentioning the type of treatment that should be followed to obtain better results.



P522

**ONE-HORN BULL'S HEAD: A CASE REPORT OF THE PATIENT WITH UNUSUAL ASYMMETRICAL MANIFESTATION OF SAPHO SYNDROME**

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**Objective:** SAPHO (synovitis-acne-pustulosa-hyperostosis-osteitis) syndrome is an inflammatory musculoskeletal disorder. It is dominated by osteitis and hyperostosis, ossification of ligaments, synovitis of the joints and is more frequently associated with skin disease such as palmoplantar pustulosis and acne conglobate. Osteitis most often affects the anterior chest wall (sternum, medi-

al ends of the clavicles and ribs) and vertebrae. Synovitis usually affects the joint adjacent to the affected bone (the sternoclavicular, sternocostal and manubriosternal joints) and may be erosive. The 'bull's head' image during bone scintigraphy is specific for the SAPHO syndrome. In the X-ray image, the osteolytic areas are initially dominant, and gradually osteosclerosis and hyperostosis become more dominant.

**Case report:** The 37-year-old female patient, diagnosed with SAPHO syndrome 6 years ago was referred for rheumatological care in 2015 for the first time. She had permanent pain of the sternal manubrium and in the region under the right clavicle. Only a mild CRP elevation (6.8 ng/L) was pathological in blood tests. The sternal manubrium impairment was atypically asymmetric with predominant involvement of the right half which, together with synovitis of the first sternocostal articulation and calcifications of ligaments, formed the "bull's head sign" with only one horn in the skeletal scintigraphy scan. The disease was characterized by very slow progression. No impairment of sternoclavicular joints and clavicles developed even after 13 years of follow-up (2009–2022). The pain responded very well to NSAIDs (meloxicam). Repeated 2-month administration of NSAIDs was sufficient to induce a 1–2-year remission during which the patient was free of pain and without any therapy. Two-month sulfasalazine therapy had no effect. Given that the patient was in her fertile age, IV bisphosphonates and methotrexate were not administered.

**Conclusion:** In the SAPHO syndrome, anterior thoracic wall involvement may be asymmetric, resulting in a "single horned bull" sign in the skeletal scintigraphy scan, and the clavicles and sternoclavicular joints may not be involved even after 13 years of disease duration. NSAIDs, sulfasalazine and TNF inhibitors can be used as therapy in female patients in their fertile age.

## P523

### OSTEOPOROSIS TREATMENT ATTRIBUTES AND LEVELS FOR AN ONLINE DECISION-MAKING TOOL FOR PATIENTS: FINDINGS FROM ADAPTIVE CHOICE-BASED CONJOINT ANALYSIS

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**Objective:** Assess individual preferences among osteoporosis (OP) patients (pts) to inform an online decision-making tool for OP treatment.

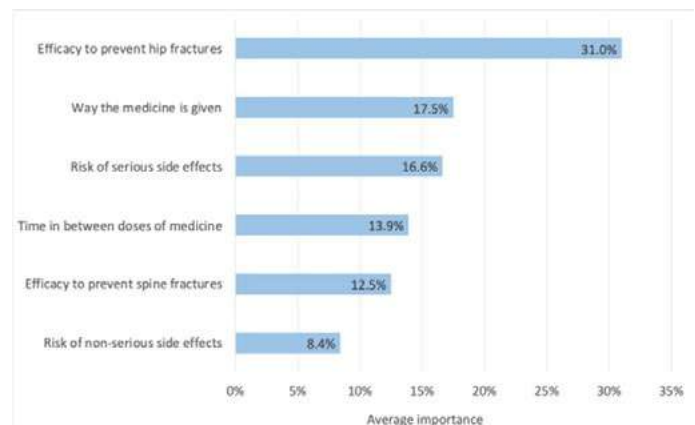
**Methods:** An adaptive choice-based conjoint (ACBC) analysis survey was developed to quantify the relative importance of 6 OP medication attributes. Pts from Cedars-Sinai academic medical center were invited to complete the online conjoint exercises. The conjoint software determined each pt's preferences by cal-

culating importance scores for each medication attribute (higher=more important). Results of the conjoint exercise were used to develop an online treatment decision-making tool for OP.

**Results:** A total of 304 pts completed the ACBC survey. Based on importance score, the most important attributes in the decision-making process were efficacy at preventing hip fractures (31.0%), way the medicine is given (17.5%), and risk of serious side effect (16.6%) (Figure 1). Attributes and levels for the final decision-making tool were based on results of the ACBC survey and informed by currently available treatment options and iterative feedback from providers and drug manufacturers. We also pilot tested the website and tool with OP pts to improve functionality. Effectiveness to improve BMD was added as an attribute to reflect currently available OP treatments that demonstrate improvement in BMD but lack clinical data demonstrating effectiveness to prevent fractures. The decision-making tool with final list of attributes and levels is being developed and disseminated by a patient advocacy organization.

**Conclusion:** Pts with OP may benefit from identifying personal preferences using an online treatment decision-making tool developed with input from pts, providers, and researchers. A publicly available tool such as this may facilitate productive patient-provider conversations and foster shared decision-making for OP therapies in fracture liaison services and other clinical settings.

**Acknowledgments:** Study supported by Amgen Inc., UCB Pharma



**Figure 1.** Average medication attribute importance score based on part-worth utilities<sup>1</sup> for osteoporosis patients (N=304)

<sup>1</sup>Part-worth utility calculated from the adaptive choice-based conjoint to determine relative value for each level of the conjoint attributes. Importance scores add up to 100%.

P524

### IS INTRA-ARTICULAR INJECTION OF AUTOLOGOUS MICRO-FRAGMENTED ADIPOSE TISSUE EFFECTIVE IN HIP OSTEOARTHRITIS? A THREE-YEAR FOLLOW-UP

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**Objective:** Recently, increased attention on regenerative medicine and biological injective treatments have been proposed to restore native cartilage. Micro-fragmented adipose tissue (MFAT) has been studied for its anti-inflammatory, paracrine, and immunomodulatory effects. The long-term effects of MFAT are still poorly understood: the aim of the present study is to demonstrate how hip articular injections with autologous MFAT can have an impact on clinical outcomes.

**Methods:** 71 consecutive patients affected by early hip osteoarthritis underwent an ultrasound-guided hip injection of autologous MFAT between June 2017 and December 2018. Patients were divided into four groups according to the Oxford Hip Score. All patients received 4 mL of autologous micro-fragmented adipose tissue under an ultrasound guide. A clinical evaluation was done between 29 and 41 months after the initial treatment. During this follow-up period, we recorded any new treatment the patients had done, whether that be injection or arthroplasty surgery.

**Results:** The study included 55 patients. Out of 55 patients, 28 saw benefits and were in no need of further treatment. Moreover, the score between the beginning and control increased by 6.9 points. Ten patients underwent a new articular injection: the mean time between the two injections was 635.7±180 days. Seventeen patients underwent total hip replacement: the mean period between the autologous MFAT injection and the surgery was 495 days.

**Conclusion:** This study found that intra-articular injections with autologous MFAT achieve beneficial clinical results in patients affected by early to moderate hip osteoarthritis, with an OHS between 48 and 30. Furthermore, these subjects are the ideal patients for whom this treatment obtains good clinical results.

P525

### AUTOLOGOUS FAT TRANSPLANTATION FOR THE TREATMENT OF TRAPEZIOMETACARPAL JOINT OSTEOARTHRITIS

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Rhizarthrosis is a progressive and disabling pathology affecting the carpometacarpal joint. It's very common in elderly patients and typically affects postmenopausal women. The diagnosis of rhizarthrosis is mainly made by using different physical examination tests and by evaluating the type of pain and it's then confirmed by imaging. Over the last few years increasing attention has been devoted to the assessment of new treatment techniques for rhizarthrosis. In this context intra-articular injection of autologous fat grafting for cartilage regeneration has demonstrated promising results in experimental settings as an alternative to open surgery procedures. The aim of this study was therefore to sum up the evidences available so far on autologous fat grafting as an emerging treatment for patients affected by carpometacarpal rhizarthrosis. An electronic literature research was carried out on PubMed, Google Scholars and Cochrane Library using "fat grafting", "fat graft", "adipose", "fat transfer" and "lipoaspirate" as search terms. Authors believe autologous fat grafting is an interesting technique, that hand surgeon should keep in mind especially in early stages of rhizarthrosis where pain has not been solved with non-surgical treatment.

P526

### FRACTURE RISK ASSESSMENT IN POSTMENOPAUSAL WOMEN: A SINGLE CENTRE EXPERIENCE IN SERBIA

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**Objective:** To assess the prevalence of risk factors and their association with a 10-year fracture risk, assessed through the FRAX (Fracture Risk Assessment) calculator.

**Methods:** The study analyzed a group of postmenopausal women (a total of 201 participants) whose BMD and fracture risk were assessed at the metabolic bone center of the Institute "Niška Banja". After a DXA examination, which was performed using the LUNAR device, the 10-year probability of developing a major osteoporotic fracture (MOF) and hip fracture was calculated for all participants using the FRAX calculator. The data was processed using descriptive and analytical statistical methods using SPSS Statistics 22.0 statistical software.

**Results:** The study showed that the most common DXA finding in the tested group was osteopenia (54% of the participants). Normal bone density was found in 36% of the participants, while osteoporosis was present in 10% of the participants. The most prevalent risk factor in the study group was a prior fracture (31.34% of the participants), followed by a family history of fracture (28.86%) and smoking (26.37%). Thirteen participants (6.47%) had a high risk of MOF, while 39 (19.4%) participants had a high risk of hip fractures. In the group with osteopenia, 25 (23.15%) participants had a high risk of developing osteoporotic fractures (18.5% for



hip fractures and 4.6% for MOF). No high FRAX risk was recorded in participants with normal bone density. We compared the group with a high and low 10-year probability of fracture and found a significant association between prior fracture, family history of fracture, and glucocorticoid therapy with a high fracture risk.

**Conclusion:** Adequate assessment of clinical risk factors, timely referral of patients to DXA screening (before the occurrence of a fracture), and use of the FRAX calculator improve the assessment of long-term risk for postmenopausal women with osteopenia and affect the decision-making concerning timely pharmaceutical therapy.

## P527

### BONE METASTASIS IN FRANCE: A HUGE AND RISING ISSUE

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**Objective:** Bone metastases (BM) are responsible for severe skeletal complications associated with altered quality of life and drug interruption. BM require dedicated care. Progress in oncology has considerably improved patient prognosis but there is no reliable recent BM epidemiology data in France. OPTIMOS study aimed to assess and describe incident BM patients in France over a 10-year period (from 2009-2018).

**Methods:** We accessed the EGB (Echantillon Généraliste des Bénéficiaires) French National Health Insurance database corresponding to 1/97 of the whole population. The algorithm identified BM patients either through the BM CIM-10 hospitalization code or through the onset of a skeletal-related event (SRE) in patients with cancer: pathologic fracture, cementoplasty, spondyloplasty, spinal cord compression, palliative radiotherapy, orthopaedic surgery (preventive or curative) and malignant hypercalcemia. Inclusion period spanned between 2009-2018. Patients below 18, not affiliated to the general health scheme (about 20% of the French population), patients with primary sarcoma or with prevalent bone metastasis during the 3 years preceding inclusion date, have been excluded.

**Results:** We identified 6,663 new BM patients over 10 years. Sex ratio was balanced (47% of female). Mean (std) age was 69.7 yrs (13.2) and Charlson index was high ( $\geq 5$ ) in 83% of patients. The most frequent primary cancer sites were breast (15.8%), prostate (13.4%), lung (12.6%), and digestive organs (10.6%). The median [Q1-Q3] follow-up was 1.3 yrs [0.3-3.4] mainly interrupted by death (63.5%) or end of the study (35.6%). Among BM patients, 4,737 patients with SRE at inclusion or over the follow-up were

identified. Incidence tended to increase over time from 401 patients in 2009 to 908 in 2018 (x 2.3) mainly because of SRE (from 176 to 681 (x3.9)). By comparison, the number of patients included through BM diagnosis code was stable (236/year in average).

**Conclusion:** Despite the huge progress in oncology over the last 10 years, BM concern a high number of patients estimated to 775,573 new cases over 10 years in the whole French population. The burden of SRE (x3.9) is preoccupant and urges the development of specific strategies to fight this issue and improve oncology patients.

## P528

### EFFECTION OF ERAS ASSISTED MIPPO IN THE TREATMENT OF PROXIMAL HUMERAL FRACTURE

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**Objective:** To investigate the effect of ERAS combined with MIPPO in the treatment of proximal humerus fracture.

**Methods:** 32 patients with proximal humerus fractures were randomly divided into ERAS combined with MIPPO group and simple MIPPO group that have 16 cases each. These two kind of groups have same operation while the treatment before and after operation were very different. The VAS score, the incidence of complications, the average hospitalization days and cost, the time of beginning to walk postoperatively and functional exercise were compared between these two groups.

**Results:** Compared with MIPPO group, the VAS score of ERAS combined with MIPPO group was lower than that of MIPPO group. The incidence of nausea and vomiting was 12.5% vs. 43.75%. The average hospitalization day was 5.7 $\pm$ 1.3 d vs. 8.2 $\pm$ 1.4 d, the average hospitalization cost was 3.1 $\pm$ 0.8 w vs. 3.9 $\pm$ 0.6 w. The time of beginning to walk postoperatively was 6.2 $\pm$ 0.8 h vs. 24.2 $\pm$ 2.7 h while the time of beginning functional exercise after operation was 2.1 $\pm$ 0.4 d vs. 7.2 $\pm$ 1.2 d (P<0.05).

**Conclusion:** ERAS combined with MIPPO can alleviate postoperative pain, reduce postoperative complications, shorten average hospitalization days and cost, bring forward days of walking and functional exercise, which is better for patients' recovery and is worthy for clinical application.

## P529

### APPLICATION OF 3D PRINTING COMBINED WITH MINMICS SOFTWARE IN THE ELBOW FRACTURE

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**Objective:** To explore the application of 3D printing combined with Minmics software in the elbow fracture.

**Methods:** Twenty patients with elbow fracture were randomly divided into 3D printing combined with Minmics software group

and routine operation group, each group includes 10 cases. 3D printing combined with Minmics software group accurately prints the fracture site, understands the situation of the broken end. Uses the Minmics software to simulate reduction and fixation, and determines the operation plan. The routine operation group determines the operation plan according to the imaging data. The incision length, bleeding volume, operation time, fluoroscopy times, hospital stays, Mayo score and elbow motion were compared between the two groups.

**Results:** There was no statistical difference in incision length [(13.1±1.65) cm vs. (13.9±1.27) cm] and hospital stays [(14.7±0.6) d vs. (15.1±1.1) d] between the two groups, but there was statistical difference in bleeding volume [(153.3±23.9) mL vs. (246.3±34.7) mL], operation time [(2.1±0.3) h vs. (2.9±0.4) h] and fluoroscopy times (8.7±1.6 vs. 11.1±1.2). Mayo score of the two groups increased significantly at 3 months (67.7±6.4 vs. 56.7±4.1), 6 months (87.6±4.3 vs. 71.9±5.1) and 12 months (89.2±2.7 vs. 74.4±3.9) after operation, and there was statistical significance compare to pre-operation (33.2±3.7 vs. 31.7±6.7). Compare to the routine group, Mayo score in 3D printing combined with Minmics software group were higher than routine group at each time point after operation, which is the same as elbow motion at aspects of flexion (120.7±3.2 vs. 104.5±4.6)°, straighten (9.4±3.1 vs. 17.3 ±2.79)°, pronation (73.6±2.9 vs. 64.3±4.2)° and supination (76.4±2.1 vs. 67.2±3.3)° at 12 months after operation.

**Conclusion:** 3D printing combined with Minmics software group can make individualized operation plan according to different people. It can shorten the operation time, reduce the amount of bleeding, reduce the number of fluoroscopy, and improve the elbow function after operation. It is worthy of clinical application.

## P530

### EXPLORING THE KEY FACTORS OF SHARED DECISION-MAKING THROUGH AN INFLUENTIAL NETWORK RELATION MAP: THE ORTHOPEDIC NURSE'S PERSPECTIVE

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**Objective:** Few studies have used quantitative methods to explore the key factors affecting shared decision-making (SDM) in nursing decision-making from the perspective of orthopedic nurses. We aimed to understand the intercorrelations among shared decision-making questionnaire-nurse (SDM-Q-NUR) factors and identify key factors for clinical nursing care decisions in orthopedics.

**Methods:** In May 2021, this study investigated the interdependence of the SDM-Q-NUR scale and developed an influential

network-relation map (INRM) from the clinical experience of 13 trained orthopedic nurses using the Decision-making Trial and Evaluation Laboratory method.

**Results:** The INRM results showed that the nine criteria corresponded to three stages: preparation, discussion, and decision. "I helped my patient or patient's family understand all the information" (C<sub>5</sub>) and "I wanted to know from my patient or patient's family how they want to be involved in making the nursing care decision" (C<sub>2</sub>) are the main key factors for the beginning of nursing decision. In the discussion and decision stages, the corresponding key factors are "I made it clear to my patient or patient's family that a nursing care decision needs to be made" (C<sub>1</sub>) and "I asked my patient or patient's family which nursing care option they prefer" (C<sub>6</sub>). The result's statistical significance confidence and gap error were 98.106% and 1.894%, respectively.

**Conclusion:** When making nursing decisions with patients, orthopedic nurses need to have detailed information about how patients are involved in SDM and all relevant information. Nurses should also inform patients and their families regarding the purpose of the discussion, namely, to help one understand the content, advantages, and disadvantages of the nursing care options, and finally, make a decision.

P531

### A RARE CASE OF OSTEOPETROSIS IN A PATIENT WITH LYMPHOPLASMACYTIC LYMPHOMA

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**Objective:** Osteopetrosis (OP) is a rare genetic bone disease characterized by impairment of osteoclast formation or function, which results in dense bones. Lymphoplasmacytic lymphoma (LPL) is an uncommon form of B-cell non-Hodgkin's lymphoma (NHL). There is increasing interest in the interaction between bone cells and hematologic cells; osteoclasts are formed from circulating mononuclear cells. To our knowledge there have previously been two cases of associated OP and NHL reported in the literature.

**Case report:** A 67-year-old man of Chinese ethnicity was diagnosed with OP in his early 40's after abnormal spine radiographs. He has not had fragility fracture. He was diagnosed with left optic nerve B-cell lymphoma at the age of 49 and was treated with whole brain radiation. Two years later, he presented with fatigue and chronic anemia. Bone marrow biopsy confirmed a diagnosis of LPL. He received 6 cycles of systemic therapy with fludarabine, rituximab and dexamethasone followed by maintenance rituximab. He has not had bone pain, hearing loss, infections, renal insufficiency, or parathyroid abnormalities. Family history was negative for metabolic bone disease; he has a fraternal twin brother with sarcoma. He has persistent neutropenia and elevated LDH. Post treatment bone marrow biopsy shows hypocellularity with no recurrence of lymphoma. Lumbar spine bone density T-score was +11.3 and total hip bone density T-score was +4.4. Spine imaging shows "rugger jersey spine" and CT of pelvis and proximal

femur shows patchy sclerotic lesions. WBC 1.9, neutrophil 0.8, hemoglobin 133, platelets 159, creatinine 89, calcium 2.36, LDL 316, IgM kappa 0.1 g/L, gamma globulin 3 g/L.

**Conclusion:** We report a rare case of OP in a patient with LPL. Our patient has radiographic and DXA evidence of OP without fracture. We do not have bone biopsy data confirming the nature of his osteoclast defect but will have genotypic analysis which will help to differentiate an osteoclast formation defect vs. a functional defect. Neutropenia may be the result of compromised bone marrow space characteristic of osteopetrosis. This rare association of OP and LPL may indicate interactions between the bone marrow environment, osteoclast dysfunction, and hematologic cells.

## P532

### COMPARISON OF THE EFFECTIVENESS OF THE IMPLEMENTATION OF THE FLS CARE MODEL AND THE PERCEPTION OF QUALITY OF LIFE OF PATIENTS OVER 50 YEARS OF AGE WHO PRESENTED A HIP FRACTURE DUE TO BONE FRAGILITY-CLINICAL TRIAL

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**Objective:** The fracture liaison service (FLS) has been described through observational studies. It has recently been shown that FLS models improve screening rates with DXA and prescription of pharmacological treatments, as well as decreased rates of second fractures and mortality. However, there are few clinical trials that consider fractures as the primary outcome, and that evaluate the efficacy of implementation in the public context in Mexico. We aimed to evaluate the effectiveness of the implementation of the FLS program to reduce the risk of second fractures and improve functionality after an incident hip fracture, and secondarily to evaluate the perception of quality of life in patients older than 50 years.

**Methods:** Open clinical trial (2014-2022), population of the Dario Fernandez Hospital, ISSSTE (Mexico City). Patients >50 years with fragility hip fracture. Patients who received interventions using the FLS model were compared with patients who received treatment as usual. Follow-up was performed 1,3,6,9 and 12 months after the fracture. Presentation of second fractures, functionality (Barthel) and quality of life (WHOQOL-old) were evaluated. Statistical analysis: measures of central tendency and dispersion for quantitative variables; frequencies and percentages for qualitative variables. Inferential statistics with Student's t-test and chi-square/Fisher's Exact.

**Results:** 779 patients were included. A difference was observed between the age of both groups [FLS (n=317)=70.8±10.2 years; control (n=462)=72.4±11.4 years; p=0.05]. No differences in func-

tionality were observed in the pre-surgical period (FLS 61.4±13.1 vs. control 60.09±12.7 points; p=0.13), if in the 12-month post-surgical FLS 72.2±4.09 vs. control 70.6±6.7 points; p=0.001). For second fractures, 18 were observed in the FLS group (2 corresponded to refractures) and 96 in the control group (46 corresponded to refractures), p=0.152. In quality satisfaction, 100% of the FLS group reported moderate to fully satisfied satisfaction, while 84.6% of the control between moderate and satisfied, with 15.4% not very satisfied (p=0.001).

**Conclusion:** The application of the FLS model has shown to reduce the incidence of second fractures, improve functionality and satisfaction with quality of life in a second level care unit in Mexico City.

## P533

### EFFECTS OF BONE METABOLISM ON BLOOD TRAITS: AN INTEGRATED MENDELIAN RANDOMIZATION AND EPIDEMIOLOGICAL OBSERVATION ANALYSIS

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**Objective:** To evaluate the relationship of bone metabolism on blood cell traits.

**Methods:** A two-sample Mendelian randomization (MR) study was conducted to evaluate the genetic causal relationship using the genome-wide significant and independent genetic instruments of DXA-derived BMD and blood cell traits. Statistical methods such as inverse-variance weighted, weighted median and contamination mixture methods were applied. The finding from the MR study was further validated using a real-world pharmacoepidemiology study. Patients aged ≥50 with first ever diagnosed hip fracture between 2013-2020 were identified. Patients receiving alendronate and zoledronate were included and matched by propensity score (PS) generated using 27 variables. The cohort was followed until 31 December 2021. Hazard ratio (HR) and 95%CI were estimated using Cox proportional hazard regression and competing risk regression analysis.

**Results:** MR analysis and sensitivity analysis consistently showed a positive association of BMD with five reticulocyte-related traits (high light scatter reticulocyte count and percentage, immature reticulocyte fraction, reticulocyte count and percentage). Conversely, an inverse association with haematocrit, haemoglobin, and red blood cell count was observed. Among 46727 hip fracture patients, 1464 alendronate users with 860 zoledronate users were matched using PS. Zoledronate use was associated with a higher incidence of anaemia when compared with alendronate use (30.89 vs. 23.89 per 1000 person-years). In the Cox regression

analysis, zoledronate use was associated with an increased risk of anaemia compared to alendronate use (HR:1.45; 95%CI:1.26-1.68). Findings were consistent in the competing risk regression analysis.

**Conclusion:** This study suggested that BMD and anti-osteoporosis drugs affect red blood cell traits and the risk of anaemia.

### P534

#### THE EFFECT OF POST-ISOMETRIC RELAXATION ON THE SEVERITY OF PAIN IN ADOLESCENTS DIAGNOSED WITH ANKYLOSING SPONDYLITIS

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**Objective:** The debut of ankylosing spondylitis often occurs in childhood (juvenile AS). At the same time, in adolescence, the pathology of the hip joints (coxitis) significantly predominates in patients over the symptoms of axial lesions. Subsequently, the clinic of the disease becomes more typical for AS. The purpose of the study was to compare the effectiveness of the treatment of juvenile forms of AS with the use of the post-isometric relaxation technique in the treatment program.

**Methods:** In the Republican Hospital of Cheboksary, 68 boys and girls aged 11 to 14 years old with a confirmed diagnosis of ankylosing spondylitis were treated. The diagnosis was exposed from 6 months to one and a half years ago. The exclusion criteria for patients was the presence of other diseases, joints and/or spine, which aggravated the course of the underlying disease. All children were randomly divided into two groups: 49 children received a combined treatment including massage, acupuncture and exercise and post-isometric relaxation techniques (G1). 19 children of the 2nd group (G2) received the program except for the methods of post-isometric relaxation. All children received treatment 5 times a week, the rehabilitation course was 14 days. The therapeutic program for G1 included an acupuncture session, a general massage session and 45 minutes of exercise with a physical therapist, as well as individual sessions with post-isometric relaxation of the long back muscles. The visual analogue scale (VAS) was used as a method of assessing the effectiveness, which was assessed at the beginning of the study, at the ninth and final clinic visit.

**Results:** 67 patients (99%) completed the protocol: 49 (100%) in G1 and 18 (97%) in G2. The mean G1 VAS score at the start of the study was 5.8 and dropped to 2.4 after the tenth session. A significant reduction in pain was also recorded in the G2 group (from 5.8 at baseline to 3.5 at the end of treatment). There was a statistically significant difference ( $p < 0.05$ ) between different groups. To assess the time period during which the effect of the treatment is maintained, all patients were asked to send a subjective VAS score to the attending physician after completion of treatment

every month for 12 months. Patients in group G1 had lower VAS scores compared to patients in group G2 for 4.3 months longer.

**Conclusion:** The results indicate the high efficiency of post-isometric relaxation of the back muscles in the complex treatment of patients with established ankylosing spondylitis.

### P535

#### PATIENTS' THOUGHTS ABOUT FRACTURE RISK ASSESSMENT USING FRAX IN A DENTAL CLINIC: A QUALITATIVE INTERVIEW STUDY

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**Objective:** The purpose was to explore patients' thoughts about fracture risk assessment using the FRAX-tool in a dental clinic. Half of Swedish women and one fourth of Swedish men will have a fragility fracture, a condition that often could be prevented if high-risk patients were identified and treated. The most used method for risk assessment is FRAX, a validated instrument for calculation of having a fragility fracture within ten years. Most of the Nordic adults have a regular contact with their dentist, which could be a way of reaching a large part of the population.

**Methods:** A qualitative inductive approach of content analysis with individual, semi-structured interviews, was used. Ten patients at the Public Dental Service of Stockholm, 65-75 years old men and women, were interviewed and assessed with FRAX for ten-year fracture risk.

**Results:** An overarching theme was that patients were positive to doing FRAX in the dental clinic, but doubted if the dentists would have the interest, time, and knowledge to do it. The patients' thoughts were in three main categories: 1. The patients had little knowledge or experience of osteoporosis and fragility fractures; 2. They were positive to the FRAX assessment, and if they were found to have a high risk, they expected collaboration between their dentist and their doctor for further investigation and advice; 3. In general they thought medical risk assessment in a dental setting would be a good service, if the patient fee would be equivalent to the fee in primary care.

**Conclusion:** The patients had mainly positive thoughts about doing FRAX in the dental clinic. Yet they had concerns that need to be considered before introducing FRAX in a dental setting

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### MEASURING HEALTH-RELATED QUALITY OF LIFE IN MEN WITH OSTEOPOROTIC FRACTURE IN A GENERAL POPULATION

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**Objective:** Osteoporotic fracture worsens health-related quality of life (HRQoL). This is a serious health problem poorly studied in male population. The aim is to evaluate the loss of HRQoL in men with osteoporotic fracture (OP) in a Spanish population OP cohort (FROCAT).

**Methods:** An observational study of men aged  $\geq 50$  years old randomly obtained from the FROCAT general population cohort (n=867). EQ-5D questionnaire on general HRQoL was phone-addressed to the participants. Excluding criteria were Paget's disease, bone cancer, informed consent not given. Statistical analysis using the Chi-square test.

**Results:** 237 randomized men, 122 (51,47%) fulfilled the inclusion criteria (5 excluded, 41 not contacted, 19 deaths, 50 not consent) with a mean age of  $74 \pm 5$ . 55.7% retired, 11.4% with disability, 25.4% actively employed and 7.3% unemployed. During follow up a total of 27 any osteoporotic fractures occurred (2 spine, 6 hip, 7 forearm, 3 shoulder, 9 others). When stratifying the different categories of the EQ-5D, on the one hand 1 (I have no problem) and on the other 2+3 (I have some or many problems), no significant differences are observed between with/without fractures globally. 27 (22.13%) describe some or many problems in the dimension of mobility, 16 (13.11%) in self-care, 21 (17.21%) in usual activities, 42 (34.42%) pain/discomfort, 24 (19.67%) anxiety/depression and 78 (63.93%) Visual Analogue Scale score  $\geq 7$ . When doing the analysis in age subgroups, those  $< 65$  years with fractures are related to a significantly better score compared to  $\geq 65$  years in the domain of mobility (p 0.04), self-care (p 0.04), usual activities (p 0.04), anxiety/depression (p 0.01), and those  $\geq 65$  years with worse score in the pain/discomfort (p 0.04) domain.

**Conclusion:** Our analysis has shown statistically significant worse HRQoL related to prior fracture in males when comparing  $< 65 / \geq 65$  y. Further studies including comorbidities may be required to study the different involvement of the domains according to age.

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### OSTEOMYELITIS IN CHILDREN IN CAMBODIA

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**Objective:** Osteomyelitis is one of the most prevalent musculoskeletal infections in children. Bone infection is most commonly caused by *Staphylococcus aureus* and can occur as a haematogenous infection or after a direct inoculation of bacteria, for instance, due to surgery or open fractures. It now has a high mortality and morbidity rate in children. Cambodia is also one more Asian country where we are currently meeting many cases, especially in Angkor Hospital for children. Our study aims to identify the common cause pathogen and the variety of causes in children diagnosed with osteomyelitis and treated at Angkor Hospital for Children in order to make an early diagnosis and proper management, as well, as how changes in the pathogen and antibiotics respond to organisms to reduce mortality and morbidity in Cambodian children.

**Methods:** A retrospective study and chart review were performed on 143 patients admitted to the surgical unit at Angkor Hospital for Children between 2017-2022, and who were under the age of 16.

**Results:** Among 143 patients, 50 were excluded by our criteria, and 93 of the remaining patients had pus cultures grown in 99% of cases, with the majority of these being *Staphylococcus aureus* (87%), of which 77.5% were MSSA and 9.5% were MRSA. Furthermore, *Streptococcus* group A (4%) and *Streptococcus constellatus* (1%), in addition to gram-positive bacteria that cause disease, gram-negative bacteria such as *Pseudomonas aeruginosa* (4%) and *E. coli* (1%), and *Enterococcus* species and *Enterococcus faecalis* (1%), were found. 77.5% of the gram-positive MSSA were sensitive to 99% of the antibiotics: cloxacilline, erythromycin, and cotrimoxazole. MRSA, on the other hand, remains a concern, accounting for 9.5% of all cases in which patients were only sensitive to vancomycin and 99% of the above antibiotics were resistant. According to the history of reviewing, boys were 2 times more common than girls for all of them, who are under the age of 16 and commonly seen between the ages of 6 and 15 years, and the most common cause of death was trauma (80%) rather than hematogenously (20%). Long bones, such as the tibia (39%), femur (23%), and humerus (13%), are the most affected. In addition, ulna and radius were discovered in 7% and 6% of the cases, respectively. Mandible 4%, clavicle 3%, calcaneus 3%, sternum 4%, phalangeal 2%, carpometacarpal 2%, and tarsal bone 2% were found in the short bone.

**Conclusion:** Trauma is not only the cause of any fracture in children but also a major cause of pediatric osteomyelitis in our study, so addressing trauma should be the first priority in order to prevent an incident of it. The pathogen in this study is the same as in the literature review, but we noticed that nearly 10% of community-acquired MRSA should be a concern for future increases in antibiotic resistance; they mostly used inappropriate antibiotics without advice at home before coming to the hospital.

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### PHARMACEUTICAL GRADE CHONDROITIN SULFATE REVERSES GENE EXPRESSION INVOLVED IN OSTEOARTHRITIS AND REDUCES APOPTOSIS OF HUMAN CHONDROCYTES

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**Objective:** Osteoarthritis (OA) affects more than 300 million adults worldwide and can be treated by the symptomatic slow-acting drugs for osteoarthritis (SYSADOAs), among them chondroitin sulfate (CS). CS is found in cartilage and extracellular matrix of joints, but its mechanism of action has not been fully elucidated. This work aimed at determining target genes and functional pathways of human chondrocytes (HC) which are regulated by CS during OA.

**Methods:** The transcriptomic profile of HC from a human osteoarthritic donor (HC-OA) was compared to that of healthy chondrocytes (HCH) using Affymetrix® platform and RT-qPCR. Apoptosis was evaluated by flux cytometry (annexin V/propidium iodide staining) on HC-OA stimulated with IL-1 $\beta$  + sodium nitroprusside (SNP). Assay of CS in pharmaceutical grade and food supplement products was performed by photometric titration with cetylpyridinium chloride as titrant and their comparative efficacy was evaluated on apoptosis.

**Results:** Transcriptomic analysis showed typical features of osteoarthritis in HC-OA that could be partially reversed by a 96-hour treatment with CS of pharmaceutical grade (drug1) (proteoglycan expression, chondrocyte proliferation, apoptotic pathways): downregulations of aggrecan, proteoglycan-4, osteomodulin and adrenoceptor alpha-2A genes, and updownregulation of stanniocalcin-1 and hyaluronan synthase-3 genes. IL-1 $\beta$  and SNP alone induced apoptosis in HC-OA with a synergistic effect in combination. IL-1 $\beta$ +SNP-induced apoptosis could be counteracted by a 24-hour treatment with drug1 in a concentration-dependent manner associated with an increase of living HC-OA up to 3-times vs. control. However, the three food supplements (drugs2-4) had no significant effect. These effects were related to CS concentration and its pharmaceutical grade.

**Conclusion:** This experimental model recapitulates several modulations of genetic pathways and dysregulation of biological processes in OA. Only CS pharmaceutical grade managed to reverse these processes with no effect of all tested food supplements whatever their CS concentration. These effects may relate to the chondroprotective properties of SYSADOAs to slow down or shift back the pathological changes in osteoarthritic joints, limiting the progression of the disease.

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### CHANGES OF BONE TISSUE METABOLISM IN CONGENITAL ARTERIOVENOUS MALFORMATIONS OF THE LOWER LIMB

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**Objective:** To evaluate the bone tissue metabolism in patients with congenital arteriovenous malformations (AVM) of the lower leg.

**Methods:** 13 patients with AVM of lower leg were examined. The age of the patients was 16.6 $\pm$ 13.6 years. All patients underwent surgeries to correct venous hypertension. The level of P1NP,  $\beta$ -CTx and osteocalcin (OC) in blood serum was studied. The clinical class of chronic venous disease (CVD) was assessed according to the CEAP classification; patients were divided into a general (13 patients) group, in which 2 subgroups were distinguished: the first - CVD C1-C3 (9 patients, patient age 8.8 $\pm$ 2.9 years), the second - CVD C4-C6 (4 patients, age 34 $\pm$ 12.3 years).

**Results:** In the general group, multidirectional changes in bone formation were noted in 5 patients (38.4%), changes in P1NP from 93.4 to 1127 ng/ml; osteoresorption increased in 11 patients (84.6%), increase  $\beta$ -CTx from 0.69 to 4.24 ng/ml; the rate of remodeling is increased in 7 patients (54%), the level of osteocalcin (OC) increase from 15.2 to 211.6 ng/ml. The increase in  $\beta$ -CTx was bigger in subgroup I (average by 0.951 ng/ml) in relation to subgroup II (average by 0.325 ng/ml), which indicates a significant dependence between the class of CVD and the change in  $\beta$ -CTx (SMD=0,76). There is an established increase in osteoresorption in subgroup I and its gradual decrease in subgroup II, which is associated with surgical correction of venous hypertension of AVM and changes in the hormonal background of patients with age.

**Conclusion:** Changes in bone markers in most patients show the violation in bone metabolism, imbalance between the processes of bone formation and osteo resorption. It has been proven the need to correct the bone tissue metabolism in patients with AVM in the early clinical stages of the disease.

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### TREATMENT GAP AND MEDICAL COSTS IN PATIENTS WITH AN OSTEOPOROTIC (OP) HIP FRACTURE IN ITALY: A RETROSPECTIVE DATABASE ANALYSIS

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**Objective:** To estimate the proportion of patients not treated within 6 months of OP hip fracture (primary) and the direct medical costs of OP hip fracture (secondary).

**Methods:** Using Italian healthcare claims (2015-2017; hospitalizations, outpatient drug prescriptions and visits, and their respective costs) from the Local Unit Umbria 2 (resident population: 390,000) and Campania Region (5,800,000) we analyzed patients  $\geq 50$  years old hospitalized due to OP hip fracture (index event, identified from ICD-9-CM codes). Patients with other OP fractures, bone related disease, malignancy (ICD-9-CM codes), or receiving an OP treatment (ATC codes) in the 12 months before their index hip fracture were excluded. Outcomes included the proportion of patients not initiating OP treatment within 6 months of index hip fracture hospitalization (primary) and direct medical costs of all resources utilized during index event and 12 months follow-up period (secondary). Costs were analyzed overall and by treatment adherence (medication possession ratio  $>80\%$ ) and persistence (permissible gap  $<2$  months).

**Results:** Of 21,847 patients hospitalized due to OP hip fracture, 87% did not initiate OP treatment within 6 months, with a numerically higher treatment gap in males vs. females (Fig.1). Mean costs per index hospitalization and during follow-up were €6,550 and €5,456, respectively (Fig.2). Most (77%) follow-up costs were due to all-cause hospitalizations. Mean follow-up costs were numerically higher in non-persistent when compared to persistent (€6,522 vs. €6,173) and non-adherent with respect to adherent (€6,413 vs. €5,684).

**Conclusion:** Over 80% of Italian patients hospitalized for OP hip fracture did not initiate OP treatment within 6 months for secondary fracture prevention. Direct medical costs in the 12 months post-fracture were mostly due to hospitalizations. Direct medical costs were higher in non-persistent and non-adherent patients. Increasing treatment adherence/persistence could reduce the economic and clinical burden of OP fractures.

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### MICROBREAK EXERCISE INTERVENTIONS ON MIDDLE-AGED OFFICE WORKERS: A SYSTEMATIC REVIEW

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**Objective:** Office workers worldwide experience a range of occupational musculoskeletal disorders. The aim of the current systematic review was to investigate the effectiveness of workplace exercise intervention on the oldest age group of office workers who have been reported in the literature so far, in terms of workability and well-being.

**Methods:** The current Systematic Review was conducted by using Randomized Controlled Trials and followed the methodological guidelines of PRISMA. The keywords used were: office workers, older, exercise intervention, workplace, microbreaks, workability and well-being. The databases searched were: PubMed, PEDro, ResearchGate, CINAHL, PsychINFO and Science Direct. The quality of the included articles was determined using the assessment scales of PEDro and MPSE. This systematic review was registered with PROSPERO (ID: CRD42022329656).

**Results:** Five studies (total number of participants: 1190, min age: 35, max age: 57, mean age: 46,4) met the inclusion criteria and their quality scores were deemed to be moderate to high. Workplace microbreak exercise interventions result in decreasing musculoskeletal pain, disability, sick-leave from work and in the improvement of quality of life and physical activity of the middle-aged office workers, without negative impact on their workability. A microbreak exercise intervention that is most positively effective for the workability and well-being may constitute of gradually increased strengthening and moderate stretching exercises, isometric positioning and postural reminders, either with or without supervision and with preferable frequency of either 20 minutes 3 times per week or about 12 minutes daily.

**Conclusion:** There is a knowledge gap due to research absence in the field of microbreak exercise interventions in the group of older office workers. The present systematic review is the first that reports on the oldest age group of office workers that has been investigated so far and, specifically, the effect of workplace exercise intervention on them. According to participants' age, the results of this systematic review correspond to middle-aged office workers. Future research trials on the effect of workplace microbreak exercise interventions adapted to middle-aged and older office workers needs to be conducted.

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### PATIENT RECOVERY FOLLOWING HIP FRACTURE IS ASSOCIATED WITH MULTIPLE MODIFIABLE COMPONENTS OF HOSPITAL SERVICE DELIVERY IN ENGLAND AND WALES: THE REDUCE RECORD-LINKAGE COHORT STUDY

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**Objective:** Despite standards and guidelines substantial variation remains in hip fracture care delivery across the UK. We aimed to identify modifiable hospital-level organisational factors that predict adverse patient outcomes following hip fracture and develop implementation tools to improve national service delivery.

**Methods:** We used a national record-linkage cohort of 178,757 patients ( $\geq 60$  years) with a hip fracture in England & Wales (2016-2019). We linked patient-level hospital admissions, National Hip Fracture Database and mortality data with 231 metrics from 18 hospital-level organisational audits and reports. Multilevel models identified organisational factors, adjusted for patient case-mix, associated with patient outcomes: length of hospital stay, emergency 30-day readmission, 120-day mobility recovery, days in hospital and health costs over 1 year, and mortality (30- and 365-day) in 172 hospitals across England & Wales.

**Results:** Over 1 year patients with mean(SD) age 83(8.6) years, spent 31.7(32.1) days in hospital, costing £14,642 (£9,017), and 50,354 (28.2%) died. We identified 46 key organisational factors independently associated with one or more patient outcome, of which 14 were (a) associated with cost and/or bed-day savings over 1 year, (b) consistently associated with other positive patient outcomes, and (c) potentially modifiable. These included weekend physiotherapy provision (mean saving per patient/year: £676 [95%CI: £67-1285]), orthogeriatrician assessment (£529 [£148-910]), direct admission to a hip fracture ward (3.4 [-0.36-7.07] days), regular feedback of audit data to staff (0.85 [0.30-1.39] days). These data informed a new hospital-specific cost-benefit calculator, model business cases for service improvement, specialty checklists, audit and 'how to' guides for complex care delivery.

**Conclusion:** We found multiple, potentially modifiable, organisational factors associated with important patient outcomes post hip fracture. Our freely-available practical toolkit should help reduce variation in service delivery.

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### THERAPEUTIC EFFECT OF CONDITIONED MEDIUM FROM MESENCHYMAL STEM CELLS IN AN IN VITRO MODEL OF OSTEOARTHRITIS

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**Objective:** There is an urgent medical need for therapies that can reduce and possibly stop the course of osteoarthritis (OA), a complex multi-target disease and degenerative joint condition. The entire joint structure is affected by OA. The causes of the inflammatory processes linked to OA have received a lot of attention from authors. Mesenchymal stem cell-derived conditioned medium (MSC-CM) is a promising free cell-based therapy for the treatment of OA. Our aim was to develop an in vitro pro-inflammatory OA model to test MSC-CM as treatment of osteoarthritic chondrocytes. In order to achieve this, we investigated how CM affects the regulation of cytokines and a number of the elements that contribute to inflammation in OA.

**Methods:** TNF-inflamed chondrocytes served as the basis of our in vitro model. Inflamed chondrocytes were treated with whole CM to evaluate the therapeutic potential of the substance, and levels of extracellular matrix indicators, metalloproteinases (MMPs), and pro-inflammatory cytokines were evaluated.

**Results:** Our results showed CM had immunomodulatory effects to treat degenerated cartilage. In-vitro application of CM to TNF-inflamed chondrocytes suppresses the NF- $\kappa$ B pathway, which mediates the anti-inflammatory and anti-catabolic actions. The reduction of hypertrophic markers as well as increases in extracellular matrix components synthesis suggest further protective effects of CM on cartilage.

**Conclusion:** In this in-vitro test, CM is demonstrated to be an anti-inflammatory agent that is also capable of boosting the formation of proteoglycan on the one hand while suppressing the production of metalloproteinases, numerous inflammatory mediators, and chondrocyte catabolism on the other. CM thus seems to be a potential choice for tissue treatment.

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P544

### EFFECT OF PROINFLAMMATORY CYTOKINES ON THE MINERALIZATION OF PRIMARY HUMAN OSTEOBLASTS IN VITRO

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**Objective:** Proinflammatory cytokines play an important role in the regulation of osteogenesis and presumably also in the pathogenesis of osteoporosis, so that in the present study we use an in vitro model to investigate the influence of IL-1 $\beta$ , IL-6, IL-8, TNF $\alpha$ , and IFN $\gamma$  on the osteogenic mineralization of the extracellular matrix of primary human osteoblasts (OBs).

**Methods:** The study included non-osteoporotic OBs isolated from hip heads of 15 patients with hip replacement due to arthritis and fracture. The cell cultures were treated with the cytokines at concentrations of 3 to 250 units in an osteogenic induction medium for 21 days. Subsequently, Alizarin Red S staining was performed to quantify the amount of calcium phosphate. Cell viability was determined using the MTT assay.

**Results:** We observed the most significant and concentration-dependent effect with IL-1 $\beta$  and TNF $\alpha$  with about 35-fold and 20-fold higher mineralization values, as compared to control cultures maintained in the absence of the cytokines. Additionally, the described IL-1 $\beta$  effect was accompanied by a proliferation-stimulating impact (n=2). In contrast, the treatment with IL-6, IL-8, and IFN $\gamma$  led to a 5- to 6-fold higher mineralization with tendentially reduced OB proliferation at the same time.

**Conclusion:** In this study, we could confirm the published role of IFN $\gamma$  in promoting osteogenesis in various cell models. While the effect of TNF $\alpha$  is mainly described as osteogenesis inhibiting, our finding suggest an increasing effect on the mineralization of primary OBs. The cytokines IL-1 $\beta$ , IL-6, or IL-8 have previously been ambiguously described as osteogenic activating and inhibiting, however, we observed that the treatment with these resulted in promoting the mineralization. For further characterization, other important osteogenesis markers should be analyzed. The study could contribute to a better understanding of the role of inflammation in the pathogenesis of osteoporosis.

P545

### SERUM AND SYNOVIAL FLUID LEVELS OF TNF-A AND INTERLEUKIN-17A IN PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** Knee osteoarthritis is the most common form of arthritis causing pain and disability. It is characterized by loss of articular cartilage and formation of osteophytes with synovial inflammation present in a significant proportion of patients (1). Proinflammatory interleukins have been shown to play important roles in the destruction of cartilage, synovitis, and pain (2,3). The aim of the study is to assess the serum and synovial fluid levels of TNF- $\alpha$  and IL-17A in patients with knee osteoarthritis.

**Methods:** Serum and synovial fluid levels of TNF- $\alpha$  and IL-17A of 50 patients with knee osteoarthritis were studied (26 (52%) of the patients were women, 24 (48%) were men with an average disease duration of 6.2 $\pm$ 2.23 years. The patients have 2-3 degrees of damage to the knee joint according to the Kellgren-Lawrence scale and do not take analgesics and NSAID medications. Control groups included 90 patients with psoriatic arthritis (56 of them with DAPSA $\leq$ 14, 10 with DAPSA $\geq$ 14.1 $\leq$ 28, and 24 with DAPSA $\geq$ 28.1) and 10 healthy volunteers. The serum sample was taken in the morning on an empty stomach. The synovial fluid was taken by arthrocentesis by an experienced rheumatologist, after signing the informed consent of all persons examined and observing the principles of good clinical practice. The study was conducted in the Immunology Laboratory of the Bulgarian Academy of Sciences, Sofia through ELISA. Statistical processing includes descriptive and correlation analyses, with statistical significance p<0.05.

**Results:** The level of TNF- $\alpha$  in the serum of patients with knee osteoarthritis is 6,01 $\pm$ 0.54 (ng/ml) (x $\pm$ Sd), the level of TNF- $\alpha$  in the synovial fluid is 17.089 $\pm$ 0.85 (ng/ml) (x $\pm$ Sd) (t=4.54 (df 49), Sig. (2-tailed)=.000. The level of IL-17A in the serum of patients with knee osteoarthritis is 4,23 $\pm$ 0.23 (ng/ml) (x $\pm$ Sd), the level of IL-17A in the synovial fluid is 11.231 $\pm$ 0.9 (ng/ml) (x $\pm$ Sd) (t=4.87 (df 49), Sig. (2-tailed)=.000. The level of TNF- $\alpha$  in the serum of patients with psoriatic arthritis is 42.707 $\pm$ 0.216 (ng/ml) (x $\pm$ Sd), the level of TNF- $\alpha$  in synovial fluid of patients with psoriatic arthritis and effusion is 61,84 $\pm$ 81,21 ng/ml and in healthy controls is 0.82 $\pm$ 0.01 ng/ml in serum. The level of TNF- $\alpha$  and IL-17A in the synovial fluid of patients with psoriatic arthritis was higher than that of patients with gonarthrosis and healthy controls (p<0.05). The level of TNF- $\alpha$  and IL17A in the synovial fluid of patients with knee osteoarthritis correlated positively with the disease activity assessed by WOMAC (Rx,y=0.92).

**Conclusion:** Serum and synovial fluid levels of TNF- $\alpha$  and IL-17A in patients with knee osteoarthritis are significantly higher in patients with high disease activity according to the WOMAC scale, which is associated with more severe joint destruction.

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P546

### INVESTIGATION OF THE FACTORS ASSOCIATED WITH THE INCIDENCE AND SEVERITY OF COVID-19 IN NURSING HOME. RESULTS FROM THE SENIOR COHORT

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**Objective:** Since the beginning of the pandemic, nursing homes have been severely affected with a significant number of infections and deaths. Particularly because of the difficulty in accessing nursing homes during the pandemic, few studies have examined the factors associated with the incidence of COVID-19 in these settings. To investigate the relation between frailty, nutritional status, muscle strength and the COVID-19 incidence and severity among nursing home residents.

**Methods:** In the SENIOR (Sample of Elderly Nursing Home Individuals: An Observational Research) cohort, frailty, nutritional status and muscle strength were assessed according to Fried's criteria, Mini Nutritional Assessment and grip strength, respectively, during the last two years of follow-up (i.e., 2018-2019). COVID-19 data were collected retrospectively from participants' medical records in 2022. Logistic regressions, adjusted for covariates, were performed to assess the potential association between these three geriatric conditions and COVID-19.

**Results:** 191 participants of the SENIOR cohort were still alive at the beginning of the pandemic, of these 116 were excluded from this study due to insufficient data (59.7%) and loss of follow-up (1%). In total, 75 participants were included with a mean age of 87±9.93 years and a proportion of 74.7% women. Among them, 42 older people were tested positive for COVID-19 and 18 experienced severe symptoms or died from it. No association between frailty, nutritional status, grip strength and the COVID-19 incidence and severity was highlighted.

**Conclusion:** No variable was significantly associated with the incidence of COVID-19 in nursing homes. The findings of our investigation must be considered with great caution due to some methodological limitations (i.e., small sample size, specific population, missing confounding variable). Further research is needed to clarify the role of these factors in the context of COVID-19.

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### THE ASSOCIATION BETWEEN ANTIRESORPTIVE THERAPY, FRACTURE RISK AND MORTALITY IN OSTEOPOROTIC PATIENTS WITH CONCURRENT TYPE II DIABETES MELLITUS: A LARGE, POPULATION-BASED COHORT STUDY

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**Objective:** Despite having higher BMD, patients with type 2 diabetes mellitus (T2DM) are at an increased risk of fracture. Anti-resorptive therapies are the mainstay of osteoporosis (OP) management, however, evidence of their efficacy in the T2DM population is limited. We aimed to assess the association between anti-resorptive treatment and the risk of major osteoporotic fracture (MOF) and all-cause mortality in osteoporotic patients with T2DM.

**Methods:** A population-based cohort in a large state-mandated health fund in Israel including patients with OP and T2DM was conducted. We extracted patient demographic data, DM history, OP history and presence of comorbidities known to increase fracture risk. Demographic data were expressed as means±standard deviation and differences were analyzed using student's t-test and chi<sup>2</sup>. Standardized fracture risks were assessed using the Cox proportional hazard model.

**Results:** Our cohort consisted of 27503 diabetic and osteoporotic patients, 68% were female. The mean follow up was 10.6±9.8 years. The mean age at DM diagnosis was 65.8±8.8 years and mean age at OP diagnosis was 71.38±9.54 years, with a mean duration of diabetes of 6.9±5.4 years, and a mean HbA1c of 6.8±0.8 at OP registry entry. The mean BMI was 29.3±5.5, mean FN BMD T-score -1.8±1.2, HIP BMD T-score -1.3±3.3, and LS BMD T-score -1.2±1.6. The Charlson Comorbidity Index (CCI) was 3.6± 2.5. A total 13343 (45.5%) patients received anti-resorptive treatment; 30.2% were treated with alendronic acid, 14.3% with risenedronic acid, 2.3% with zoledronic acid and 1.8% with denosumab. A total of 14719 (46.4%) patients sustained a MOF, 62.5% non-treated patients vs. 37.5% treated patients (p<0.001). A multivariate analysis showed a significant fracture risk reduction in treated patients HR 0.495 (0.477-0.514, P<0.001) after adjustment for age, BMI, BMD, CCI, HbA1c levels, duration of diabetes and insulin treatment. There was also a significant reduction in all-cause mortality (HR 0.679, 0.586-0.787) and cardiovascular events (HR 0.824, 0.755-0.900) in patients with HbA1c under 8%.

**Conclusion:** Our data suggests that anti-resorptive treatment significantly reduces the incidence of major osteoporotic fractures in diabetic patients, independently of HbA1c levels and diabetes duration. It was associated with a significant reduction in cardiovascular events and mortality in patients with HbA1c under 8%.

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### ASSOCIATION BETWEEN CYP2C19 GENOTYPES AND OSTEOPOROTIC FRACTURES IN LONG-TERM PROTON PUMP INHIBITORS USERS: A HOSPITAL-BASED STUDY

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**Objective:** Proton pump inhibitors (PPIs) are widely used for peptic ulcer disease, symptomatic gastro-esophageal reflux disease, Barrett's esophagus, and prevention of non-steroidal anti-inflammatory drug-induced ulcers. We aimed to study the association between the CYP2C19 phenotype, the risk of osteoporotic fractures in long-term PPI users in a hospital-based population.

**Methods:** This is a retrospective cohort study enrolled patients with long-term PPIs use at the Taichung Veterans General Hospital (TCVGH) using data extracted from the Taiwan Precision Medicine Initiative (TPMI) between January 2010 to April 2021. Data on the CYP2C19 phenotype, comorbidities, and fractures of PPIs users were analyzed.

**Results:** From the 58,091 patients in the TCVGH-TPMI cohort, we selected 1,518 long-term PPIs users and there were 571 (38%), 727 (48%), and 220 (14%) CYP2C19 extensive metabolizers, intermediate metabolizers and poor metabolizers, respectively. Among these, 49 (3.2%) patients developed fractures in one-year follow-up period, and there were 20 (3.5%) fractures in EMs, 24 (3.3%) in IMs, and 5 (2.3%) in PMs, respectively. There was no significant difference between CYP2C19 phenotype and fracture rate.

**Conclusion:** The results of this real-world, hospital-based study demonstrate that CYP2C19 PMs/IMs are not associated with a greater risk for osteopathic fractures among long-term PPIs users.

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### IMPLICATIONS OF NICOTINAMIDE ADENINE DINUCLEOTIDE METABOLISM IN CARTILAGE DEGENERATION AND OSTEOARTHRITIS

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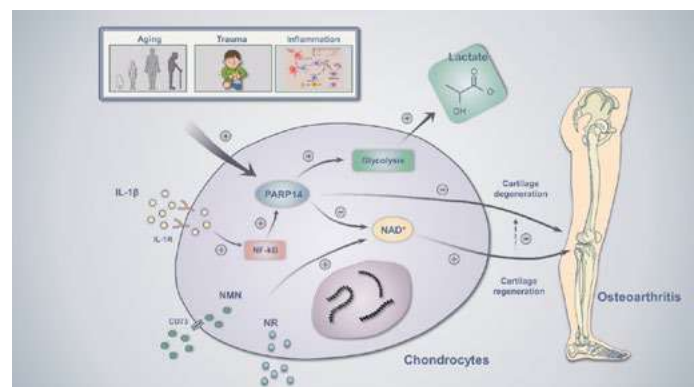
**Objective:** NAD<sup>+</sup> (nicotinamide adenine dinucleotide) deficiency

has been linked to several age-related diseases. However, as the most common articular joint degeneration disease, it is unclear whether NAD<sup>+</sup> homeostasis is involved in the pathogenesis of osteoarthritis (OA). We investigated the role of NAD<sup>+</sup> in chondrocytes in regulating the progression of OA in this study.

**Methods:** NAD<sup>+</sup> metabolite levels were recorded by colorimetric assay and mass spectrometry in human OA cartilage tissue samples, followed by gene expression and protein levels of both NAD<sup>+</sup> biosynthetic and NAD<sup>+</sup> consuming enzymes. To test the causative role of NAD<sup>+</sup> levels on OA progression, NAD<sup>+</sup> was elevated by treating with its precursors nicotinamide mononucleotide (NMN) and nicotinamide riboside (NR) in vivo and in vitro. Finally, we used human chondrocytes and ex vivo bovine cartilage organ culture to uncover the signalling pathways that link NAD<sup>+</sup> dependent enzymes to OA.

**Results:** NAD<sup>+</sup> levels were lower in damaged compared to undamaged OA cartilage. In OA, expression of both the NAD<sup>+</sup> biosynthetic enzyme NAMPT and the NAD<sup>+</sup> consuming enzyme poly (ADP-ribose) polymerase 14 (PARP14) increased. In the mouse ageing model, rat surgery OA model (meniscectomy), and NMNAT1 transgenic mouse model, ageing and trauma accelerated cartilage degeneration, whereas NAD<sup>+</sup> supplementation and NMNAT1 overexpression suppressed cartilage disruption. Furthermore, increased PARP14 expression in OA cartilage contributed to NAD<sup>+</sup> decline and promoted cartilage degeneration via the NF- $\kappa$ B pathway.

**Conclusion:** We show that declining NAD<sup>+</sup> levels due to activation of the NAD<sup>+</sup> consuming enzyme PARP14 is a new mechanism for OA pathogenesis that is amenable to therapeutic intervention.



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### LONG-TERM EFFECTS OF INTRA-ARTICULAR CORTICOSTEROID INJECTIONS AMONG KNEE OSTEOARTHRITIS PATIENTS: AN INSTRUMENTAL VARIABLE AND PROPENSITY SCORE ANALYSIS

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**Objective:** To assess the long-term effect of intra-articular corticosteroid injection (IACI) use on pain medication prescriptions and subsequent joint replacement among people with incident

knee osteoarthritis (OA).

**Methods:** We conducted a cohort study using UK primary-care (CPRD GOLD) and linked hospital data (Hospital Episode Statistics (HES)). Patients  $\geq 20$  years old with a first diagnosis of knee OA during 2005 to 2019 were included. Those with a prior orthopaedic surgery referral were excluded. Primary outcomes were incident pain medication prescriptions, and joint replacement. Among those who received joint replacement, secondary outcomes included: complications (stroke, myocardial infarction, thrombosis, joint infection), re-operation and patient reported outcome measures. Instrumental variable (IV) analyses were conducted using two-step Poisson regression. Index date was six months after OA diagnosis date and IV was defined as practice preference for IACI use in the year prior to the index date (single and recurrent use considered separately). Outcomes were measured over five years from the index date. For primary outcomes, propensity score (PS) matching and inverse probability weighting (IPW) were carried out in sensitivity analyses.

**Results:** Of 114,528 eligible patients, 100,871 (88.1%) were retained in prescription analyses and 45,171 (39.4%) in joint replacement analyses (requiring HES). Patient characteristics were well balanced (SMD  $\leq 0.1$ ) across IV groups. IACI was associated with lower 5-year cumulative incidence of most pain medications, e.g. for partial opioids a relative risk (RR) of 0.63 [95%CI 0.41, 0.97] and 0.23 [0.10, 0.54] for single and recurrent IACI, respectively. There were 4,351 joint replacements over five years follow-up, with single and recurrent IACI associated with lower cumulative incidence: RR 0.61 [0.41, 0.92] and RR 0.31 [0.15, 0.65], respectively. PS matching and IPW suggested lower incidence of joint replacement over the short-term (incidence rate ratio (IRR) 0.55 [0.36, 0.85] at 6 months), but indicated higher incidence over the long-term (IRR 2.10 [1.86, 2.36] at 5 years). IACI had no adverse impact on secondary outcomes after joint replacement.

**Conclusion:** Our findings suggest IACI use for knee OA may reduce the subsequent need for analgesics and delay joint replacement with no adverse effect on outcome. However, results were not consistent in sensitivity analyses, therefore further investigation is required.

## P551

### DEVELOPMENT OF A COMMUNITY PHARMACY-BASED OSTEOPOROSIS MEDICATION ADHERENCE INTERVENTION: A DELPHI STUDY AND WORKSHOP TO DEFINE CONTENT AND DISCUSS IMPLEMENTATION

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**Objective:** To obtain expert consensus on the content and discuss the workflow involved in the development and implementa-

tion of a community pharmacy-based osteoporosis medication adherence intervention.

**Methods:** An online Delphi study was conducted using questionnaires. Professional and personal networks were used to recruit healthcare professionals involved in the care and support of osteoporosis patients. Healthcare professionals who work in industry or academia were excluded. Round one consisted of open and closed questions and aimed to obtain a list of statements to be rated for importance in subsequent rounds. Round two consisted of 87 three-point Likert scales and multiple-choice questions. Questions were grouped under stages of the intervention related to access, content and behaviour. A mean score equating to  $>70\%$  consensus was required for a component to be included. The proposed intervention was presented and discussed in an online workshop to healthcare professionals and a patient public member.

**Results:** Twenty-four out of 28 of healthcare professionals invited, completed the round one questionnaire. Participants included pharmacists, nurses, general practitioners, occupational therapists and physiotherapists. 24 additional factors were recommended to be considered for inclusion as part of the proposed community pharmacy-based osteoporosis medication adherence intervention. 22 (82%) of respondents continued to complete round two, which was sufficient to achieve  $>70\%$  consensus for 84/ 87 statements. Workshop discussions revealed healthcare professionals were open to working together and acknowledged the need for a new service to meet osteoporosis patients' requirements. Referrals to a new service could be modelled on existing referral systems from general practice to community pharmacy or new referral routes from the fracture liaison service to community pharmacy. Access to existing primary care electronic healthcare systems could facilitate this. Participants wanted training requirements and methods to be defined. Reimbursement and commissioning processes need to be investigated and initiated.

**Conclusion:** This work demonstrates that community pharmacists are ideally placed to deliver a new service and support existing services to improve adherence to osteoporosis medication. It also highlights considerations to be taken into account.

## P552

### THE FREQUENCY OF OSTEOPOROTIC FRACTURES IN PERSONS WITH DIABETES MELLITUS OF MIDDLE AND ELDERLY AGE IN THE SIBERIAN POPULATION

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**Objective:** To study the frequency of osteoporotic fractures (OF) over the past 12 months in middle-aged and elderly people with type 2 diabetes mellitus (T2DM) and without carbohydrate metabolism disorder (CMD) in Novosibirsk.

**Methods:** A representative population sample was examined in the frame of the international HAPIEE Project, Novosibirsk in

2003-2005 (9360 people aged 45-69 y). The current analysis included 7363 men and women aged 50-69 years (only postmenopausal women were included). Using a structured questionnaire, information was collected on the prevalence of OF over the past 12 months, the presence of T2DM. Statistical analysis was performed by SPSS program (v.13.0).

**Results:** Among 7363 examined persons with DM2 - 11.8% (n=871), among them 3.0% (26 persons) had OF, fractures occurred in women 2 times more often than in men (3.8% and 2.0%, respectively), without reaching significant differences,  $p=0.111$ . Among individuals without DM (n=6492), OF occurred in 3.7% (241 people): in 4.0% of women and 3.4% of men,  $p=0.171$ . There was no difference when comparing the incidence of fractures in people with and without T2DM for both men (2.0 vs. 3.4%,  $p=0.138$ ) and women (3.8 vs. 4.0%,  $p=0.850$ ). Among people with T2DM in different age subgroups who had OF, no significant differences were found both between men and women, and with increasing age. Women without T2DM in the subgroup 65-69 years of age had the highest incidence of OF than men ( $p=0.041$ ).

**Conclusion:** In studied Siberian population sample aged 50-69, the frequency of OF among people with T2DM and without DM was comparable (3.0%, 3.7%, respectively). There were no differences in the incidence of fractures in men and women with and without T2DM. However women 65-69 years without diabetes suffered fractures more often than men.

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## P553

### CLINICAL THRESHOLDS FOR CORTICAL AND TRABECULAR DENSITIES MEASURED BY 3D-DXA IN CAUCASIAN POPULATION

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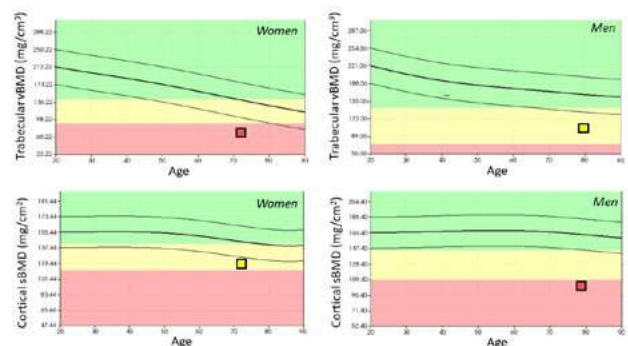
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**Objective:** 3D-DXA software provides 3D assessment of the cor-

tical and trabecular compartment using standard hip DXA scans. Thresholds are needed for use of 3D-DXA measurements in clinical practice. The purpose of the present study is to determine thresholds for cortical and trabecular densities measured by 3D-DXA in Caucasian population.

**Methods:** 120 subjects (44 men and 76 women) aged 22 to 75 years were scanned using an iDXA (GE-Lunar) and a Discovery W (Hologic) bone densitometer. BMD T-score at the total hip was assessed using NHANES reference data (NHANES III database). 3D-DXA analyses were performed using 3D-SHAPER<sup>®</sup> software (v2.11.2, 3D-SHAPER Medical, Spain) to compute cortical surface BMD (CortsBMD) and trabecular volumetric BMD (TrabvBMD). Regression analysis was used to determine the relationships between areal BMD (aBMD) T-score and 3D-DXA measurements. High threshold (HT) and low threshold (LT) for CortsBMD and TrabvBMD were calculated for men and women using the values corresponding to -1 and -2.5 aBMD T-score. HT and LT were plotted onto the age-related reference data obtained in Spain using a cohort of 2051 women and 883 men (SEIOMM - 3D-DXA project). The study was approved by the Institutional Review Board and written informed consent was obtained from all study subjects.

**Results:** Coefficients of determination ( $R^2$ ) was 0.83 between aBMD T-score and TrabvBMD, and 0.92 between aBMD T-score and CortsBMD, at the total hip. CortsBMD and TrabvBMD thresholds in men were higher than those obtained in women (+13 mg/cm<sup>2</sup> and +16 mg/cm<sup>3</sup> respectively). Thresholds and age-related reference data (mean±SD) for CortsBMD and TrabvBMD in men and women are shown in the figure below. The regions with values higher than HT are shown in green; the regions with values lower than LT are shown in red; and the region with values between HT and LT are shown in yellow. Values from one male and one female subject from the reference cohort are included in the graphs, as an example. The age-related reference data show that HT for CortsBMD and TrabvBMD in women were reached at 77 and 70 years respectively.



**Conclusion:** Thresholds for cortical and trabecular densities measured by 3D-DXA in Caucasian population were determined using an aBMD T-score equivalence approach, providing a three-category classification: higher than HT, between HT and LT, below LT. Further studies are needed to evaluate the clinical performance of the use of thresholds and age-related reference data for 3D-DXA measurements in fracture risk prediction or treatment monitoring.

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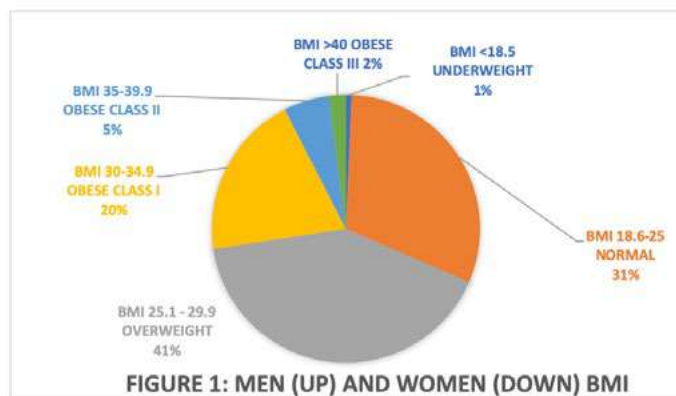
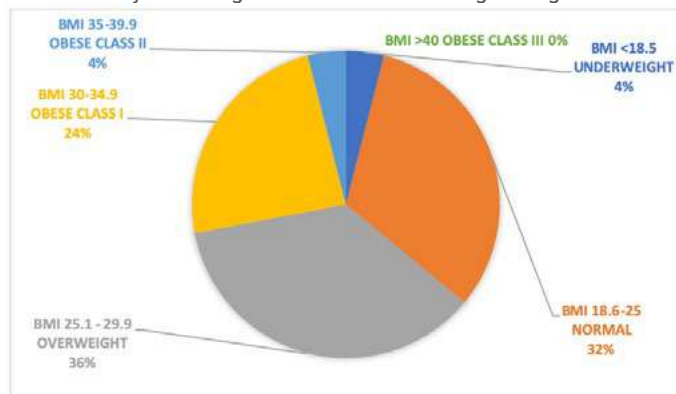
**OBESITY IN PATIENTS WITH VERTEBRAL FRAGILITY FRACTURES: GENDER DIFFERENCES**M. J. Montesa<sup>1</sup>, J. Sacramento<sup>1</sup>, N. Montesino<sup>1</sup>, B. González<sup>1</sup><sup>1</sup>Hospital Universitario Nuestra Señora de Candelaria, Santa Cruz de Tenerife, Spain**Objective:** To describe the differences in BMI between genders in patients who have suffered a vertebral fragility fracture.**Methods:** Observational, descriptive, cross-sectional, single-center study. Consecutively included patients  $\geq 50$  years seen from January 2017 to December 2023 in patients referred to a Fracture Liaison Service (FLS) for recent fragility vertebral fracture (during the last year).**Results:** 171 patients were included, 85.38% women, with a mean age of 71.96 ( $\pm 9.03$ ) years. The mean time from fracture occurrence to assessment was 152.12 ( $\pm 82.08$ ) days. There were more men than women (see Figure 1) with insufficient BMI ( $< 18.5$ ) but they were similar. Most patients, specifically 64% of males and 68% of females, were overweight or obese.**Conclusion:** In our cohort of patients with vertebral fractures, we found mostly overweight or obese BMI among both genders.

FIGURE 1: MEN (UP) AND WOMEN (DOWN) BMI

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**SERUM LEVELS OF HOMOCYSTEINE, LEPTIN AND NEOPTERIN AS MARKERS OF DISEASE ACTIVITY IN RHEUMATOID ARTHRITIS PATIENTS**M. Ahmed<sup>1</sup>, A. M. Gazar<sup>2</sup>, M. Ghait<sup>3</sup><sup>1</sup>rheumatology Dept. Dubai Hospital, Dubai, United Arab Emirates, <sup>2</sup>Rheumatology Dept. Al-Azhar University, Cairo, Egypt, <sup>3</sup>Rheumatology Dept. Al-Azhar University, Cairo, Egypt**Objective:** To investigate the relationship between serum levels of homocysteine, leptin and neopterin with clinical & laboratory parameters of disease activity in patients with rheumatoid arthritis.**Methods:** This study included 80 RA patients and age- and sex-matched 80 healthy controls. RA patients were divided into two groups (A&B) depending on the presence or absence of extra-articular manifestations. There was 40 with extra-articular manifestations (9 patients with cutaneous vasculitis, 7 with nodules, 6 with neuropathy, 5 with Reynaud's phenomenon, 7 with secondary Sjogren, 2 with Fealty's syndrome, 2 with interstitial nephritis, 2 with interstitial lung disease).**Results:** In the RA group (A+B), mean serum homocysteine, leptin and neopterin levels were (11.79 + 8.72  $\mu\text{mol/L}$ ), (22.43 $\pm$ 7.37 ng/ml) & (3.83 $\pm$ 1.84 nmol/L) respectively with No statistically significant difference was found between RA and control groups regarding serum leptin ( $p=0.674$ ). While a significant difference was found between RA and control groups regarding serum neopterin ( $<0.001$ ) & homocysteine. ( $<0.001$ ). Also, In RA groups (A, B) there was a statistically significant difference regarding serum neopterin ( $p<0.03$ ) and DAS 28 ESR ( $p<0.05$ ). there was a Positive significant correlation between serum (neopterin - Hcy) and ESR, TNF $\alpha$ , IL-6, and DAS-28 ( $p<0.05$ ) while no significant correlation was found between serum (neopterin-homocysteine) and CRP ( $p>0.05$ ).**Conclusion:** Serum leptin cannot be considered of value as an marker of disease activity in RA patients. Serum neopterin can be used as a sensitive marker for assaying inflammation and disease activity in RA patients while serum homocysteine can be used as a predictor of RA extra articular complications.**References:**Willers J, Hahn A. Rheumatol Int 2012;32:3741.  
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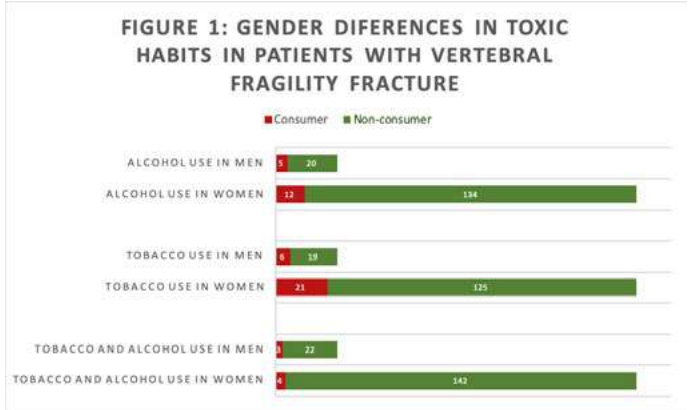
**SMOKING AND ALCOHOL IN VERTEBRAL FRAGILITY FRACTURES: GENDER DIFFERENCES**M. J. Montesa<sup>1</sup>, N. Montesino<sup>1</sup>, J. Sacramento<sup>1</sup>, B. González<sup>1</sup><sup>1</sup>Hospital Universitario Nuestra Señora de Candelaria, Santa Cruz de Tenerife, Spain

**Objective:** To examine differences in toxic habits, both smoking and alcohol consumption, between genders in patients who have suffered a vertebral fragility fracture.

**Methods:** Observational, descriptive, cross-sectional, single-center study. Consecutively included patients  $\geq 50$  years seen from January 2017 to December 2023 in patients referred to a Fracture Liaison Service (FLS) for recent fragility vertebral fracture (during the last year).

**Results:** 171 patients were included, 85.38% women, with a mean age of 71.96 ( $\pm 9.03$ ) years. The mean time from the occurrence of the fracture to assessment was 152.12 ( $\pm 82.08$ ) days. 15.79% of the patients were smokers, 9.94% consumed alcohol (men at doses  $>20$  g/d and women at  $>10$  g/d) and 7% of the sample consumed both intoxicants (see Figure 1). No statistically significant differences were found between men and women in smoking ( $\chi^2=1.48$ , p-value 0.22, significant if  $p>0.05$ ) or alcohol consumption ( $\chi^2=3.30$ , p-value 0.07). However, statistically significant differences were obtained when men and women consumed both intoxicants ( $\chi^2=4.66$ , p-value of 0.03).

**Conclusion:** In our cohort of patients with vertebral fragility fractures men were more likely than women to be smokers and alcohol consumers.



**P557**  
**RESISTIN BIOMARKER DURING FLARE UPS AND REMISSION IN HAND OSTEOARTHRITIS**

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**Objective:** The data from such studies may provide evidence that blocking resistin activity during OA flare ups may have the potential to decrease inflammation and cartilage degradation and thereby slow the progression of OA.

**Methods:** The level of serum resistin was measured in samples from 60 non obese patients (BMI  $<25$ ) during hand osteoarthritis flare up by using The Australian/Canadian osteoarthritis hand index AUSCAN  $\geq 100$  mm and from 15 controls. After the remission was achieved according to AUSCAN  $<30$  mm in absence of pain and stiffness domains completely. The level of resistin was remeasured in serum samples.

**Results:** The resistin level was distinctly higher in OA patients (9.66 $\pm$ 5.21) ng/ml as compared to controls (2.45 $\pm$ 1.04) ng/ml. The level of serum resistin in flare ups (9.66 $\pm$ 5.21) ng/ml was higher in comparison to remission (5.68 $\pm$ 3.22).

**Conclusion:** This study suggests an important involvement of resistin in OA patients even without obesity considering their high serum level compared to controls. Resistin is elevated in primary osteoarthritis of the hand during flare up and decreases during remission. Resistin can be used as marker of disease activity.

**P558**  
**BIOCHEMICAL MARKERS OF BONE TURNOVER IN TREATMENT WITH TERIPARATIDE AND TERIPARATIDE IN COMBINATION WITH DENOSUMAB**

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**Objective:** To assess the response of markers of bone turnover PINP and C-telopeptide (CTX) to treatment with teriparatide (TPTD) alone and teriparatide in combination with denosumab.

**Methods:** We conducted a retrospective study of 36 patients with osteoporosis and vertebral fractures (VF), who have received treatment with teriparatide alone or combination therapy of teriparatide with denosumab. Bone markers have been measured at baseline and at 6 months of treatment. They have been subdivided into 4 groups, depending on the current treatment only with teriparatide or combined treatment and the previous treatment: none, bisphosphonates (BP) or denosumab. Laboratory methods for PINP and C-telopeptide: ECLIA, Roche. The percentage change of both markers during treatment has been calculated (incr).

**Results:** Of the 36 patients, 29 (80%) were women with a mean age of 72.8 $\pm$ 8 years and 7(20%) men with a mean age: 71 $\pm$ 12.7 years. 32 (64%) patients had multiple VFs and 5 (13.8%) had received corticosteroids.

Table1. Marker data

	PINP (ng/ml)	CTX (ng/mL)
<b>TPTD. No BP previous. N=14</b>		
Median (max-min). Baseline.	53.6 (21.9-181.3)	0.428 (0.205-0.723)
Median (max-min). Treat	112.45 (49.2-401.3)	0.632 (0.137-1.3)
Incr (%)	92% (7 to 228)	68 (-64 to 294)
<b>TPTD. BP previous N=7</b>		
Median (max-min). Baseline.	26.7 (16,7-72.5)	0.218 (0.0385-0.752)
Median (max-min). Treat	98.2 (44.1-188.8)	0.397 (0.245-1.04)
Incr (%)	158 (21 to 659)	89 (-31 to 721)

<b>TPTD+Dmab. No Dmab previous N=8</b>		
Median (max-min). Baseline	114.5 (48 to 181.3)	0.674 (0.272 to 1.28)
Median (max-min). Treat	61.6 (13.0 to 333.2)	0.058 (0.019 to 1.17)
Incr (%)	-17 (-90 to 129)	-79% (-98 to 211)
<b>TPTD+Dmab. Dmab previous N=7</b>		
Median (max-min). Baseline	21.9 (11,2 to 33.6)	0.070 (0.018 to 0.099)
Median (max-min). Treat	29.9 (13 to 310)	0.051 (0.019-3.89)
Incr (%)	-1 (-11 to 35)	+5 (-48 to 3829)

**Conclusion:** Treatment with teriparatide shows an increase of more than 90% in PINP (about 1.5 times the increase in CTX) in patients without prior BP. Those who have previously taken BP have lower values of both markers at base, but the increase with treatment is greater, mainly that of PINP. In patients with combined and no treatment with denosumab, there is a slight decrease in PINP and a marked decrease in CTX, while in those who did not have previous denosumab the variation of both markers is minimal.

### P559

#### HIGH PROPORTION OF ADULTS WITH RAISED BONE TURNOVER AFTER STOPPING DENOSUMAB DESPITE RECEIVING ZOLEDRONIC ACID: PREDICTED BY BASELINE OSTEOPOROTIC T-SCORES

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<sup>1</sup>The Mercer's Institute for Research on Ageing, St James's Hospital, <sup>2</sup>The Mercers Institute for Research on Ageing, St James's Hospital, Dublin, Ireland

**Objective:** Denosumab is commonly used to treat osteoporosis, but drug holidays are not an option, with a risk of rebound bone loss and vertebral fractures on stopping. Recent guidelines suggest treatment with zoledronic acid (ZA) if stopping denosumab, with consideration for a second dose based on subsequent bone turnover markers (BTM). We aimed to assess BTM of patients transitioned to ZA after stopping denosumab and to investigate predictors of same.

**Methods:** Patients who received ZA 6 months after their last and final denosumab injection were identified at our bone health clinic. We assessed BTM at approximately 4 months post ZA administration. BTM measured was cross linked C-telopeptide of type I collagen (CTX) (ng/ml). The proportion of patients who had CTX >0.300 was identified as this is generally considered to represent

a subtherapeutic response to antiresorptive therapy. We also explored for predictors of CTX >0.300.

**Results:** There were 78 patients, 95% female and mean age was 68 years. Median duration of denosumab therapy was 5 years with 53% having prior bisphosphonate exposure. 40% had osteoporosis and 56% osteopaenia based on standard DXA criteria at time of transitioning. CTX measured at about 4 months (median 122 days) after ZA was 0.276. However, 48% had a CTX >0.300 and in those patients the median value was 0.410. Osteoporosis of the spine independently predicted CTX >0.300 after adjusting for age, duration of denosumab therapy and prior bisphosphonate exposure (OR 3.83, CI 1.20-12.22, p=0.024). However, duration of denosumab therapy or other factors were not predictive before or after multivariate adjustment.

**Conclusion:** A high proportion of patients (nearly half) had a CTX above a therapeutic range 3-6 months post ZA and in whom further ZA may be considered. Of note, patients with osteoporosis of the spine (T score <2.5) at the time of transition off denosumab were more likely to have higher BTM after receiving ZA. Given that lower T-scores already predict higher risk of fracture, the results support the optimisation of bone density before switching from denosumab to ZA. The study may not have had adequate power to evaluate other predictors of higher CTX levels such as duration of denosumab.

### P560

#### DENOSUMAB BEYOND OSTEOPOROSIS: EFFECTS ON INSULIN RESISTANCE

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<sup>2</sup>Santa Maria University Hospital, <sup>3</sup>Lisboa Faculty Medicine, Lisboa, Portugal

**Objective:** Denosumab (Dmab) inhibits RANK/RANKL pathway, which is also expressed in both liver and  $\beta$  pancreatic cells. Studies suggest that the inactivation of this pathway can improve both hepatic insulin sensitivity and glycemia. We aimed to evaluate the effect of Dmab on the insulin resistance and glycemic metabolism of a population with severe osteoporosis.

**Methods:** Retrospective study of patients on Dmab treatment for at least 6 months with a minimum of 2 biochemical evaluations: the first one before starting Dmab treatment (T0), the second one after it (T1). Demographic and clinical data were studied including fasting glycemia and insulinemia. HOMA-IR [(insulin- $\mu$ U/mL x glucose-mg/dL/405)] was calculated. We considered: insulin resistance (IR), higher probability of IR and normal sensitivity to insulin, if HOMA-IR >2,5, between 1 and 2,5 and <1, respectively. Adequate statistical tests were used and considered significant results for P<0,05.

**Results:** Eighteen patients (15 postmenopausal women) with 75,5 $\pm$ 9,1 years-old (58-91), 2 with obesity and type 2 diabetes mellitus (DM2), 1 with DM2 and 1 with obesity, with a Dmab treatment time of 23,7 $\pm$ 10,1 months. In T0, 10 patients had higher probability of IR and 8 IR; In T1, 9 had higher probability of IR, 7



IR and 2 normal insulin sensitivity. Subsequently, the total group was divided in group 1 (without DM2 nor obesity, n=14) and group 2 (with obesity and/or DM2, n=4). After Dmab, all the parameters analysed reduced (Table 1). There were no correlations between HOMA-IR and the Dmab treatment time ( $r=-0,09$ ;  $p=0,74$ ).

	Total (n=18)			Group 1 (n=14)		
	T0	T1	P value	T0	T1	P value
HOMA-IR - mean $\pm$ SD	2.5 $\pm$ 0.5	2.3 $\pm$ 1.4	0.43	2.5 $\pm$ 0.6	1.9 $\pm$ 0.2	0.01
Glucose (mg/dL) - mean $\pm$ SD	98.6 $\pm$ 23.6	93.6 $\pm$ 18.5	0.04	91.4 $\pm$ 10.9	88.2 $\pm$ 10.8	0.2
Insulin ( $\mu$ U/mL) - mean $\pm$ SD	10.8 $\pm$ 5.3	9.4 $\pm$ 4.8	0.1	10.5 $\pm$ 5.1	8.7 $\pm$ 4.9	0.09

**Conclusion:** Dmab treatment of this group of patients with severe osteoporosis improved IR and glycemia. We hypothesize that Dmab could have a beneficial role in prevention / treatment of osteoporotic diabetic patients. A future study with a bigger number of patients may validate these preliminary results.

## P561

### THERAPEUTIC RESPONSE OF ONCE MONTHLY IBANDRONATE TREATMENT ON SERUM APELIN, VISFATIN, IRISIN AND ASPROGIN IN POSTMENOPAUSAL FEMALES WITH AND WITHOUT FRACTURE: A QUASI EXPERIMENTAL STUDY

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**Objective:** Osteoporosis is a multifactorial disorder and is a major cause of fractures, especially in postmenopausal females. Adipokines have a dynamic role in various metabolic processes of the body, including bone metabolism. Therefore, the present study was designed to see the effect of ibandronate therapy on serum apelin, visfatin, irisin and asprosin in postmenopausal females with and without fracture history.

**Methods:** 54 postmenopausal osteoporotic females (PMOF) were included. BMD was assessed by DXA scan. Serum levels of apelin, visfatin, irisin and asprosin were analyzed by ELISA method at baseline and after six months of treatment with ibandronate 150 mg. Results were analyzed using SPSS 24.

**Results:** Serum apelin levels were significantly decreased ( $p<0.001$ ) while serum irisin levels were significantly increased ( $p=0.040$ ) in PMOF after giving ibandronate treatment. This difference of serum apelin remained significant in PMOF with fracture history ( $p=0.001$ ) and with no previous fracture history ( $p=0.001$ ). Serum irisin ( $p=0.015$ ) and asprosin ( $p=0.018$ ) were significantly raised in post-treatment group in PMOF with and without fracture history respectively.

**Conclusion:** There was a significant increase in serum irisin and

asprosin levels after 6 months of ibandronate treatment implicating their protective role whereas the lower levels of apelin signify its role in the development of osteoporosis.

**Acknowledgment:** This project is part of the Johns Hopkins University - Afghanistan Pakistan international collaborative trauma & injury research training program, funded by Fogarty International Center of the National Institutes of Health USA, held jointly by the Aga Khan University, Pakistan, Johns Hopkins University and the George Washington University, USA.

## P562

### ASSOCIATION OF SERUM APELIN, VISFATIN, IRISIN AND FIBRILLIN WITH BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN

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**Objective:** Adipokines and myokines are hormonally active molecules which are thought to play a key role in the regulation of bone metabolism. Osteoporosis is a major health issue in postmenopausal women (PMW). Therefore the present study was designed to find out the association of serum apelin, visfatin, irisin and fibrillin with BMD in PMW.

**Methods:** The comparative study was conducted on PMW (n=108) between 50-70 years. The PMW were divided into two groups, non-osteoporotic (n=54) and osteoporotic (n=54). BMD was assessed by DXA scan. Serum levels of apelin, visfatin, irisin and fibrillin were analyzed by ELISA method. Results were analyzed by using SPSS 24. Mann-Whitney U test was used for comparisons and logistic regression analysis was applied to rule out the predictors of BMD.

**Results:** Serum visfatin ( $p=0.004$ ), irisin ( $p<0.001$ ), and fibrillin ( $p=0.001$ ) levels were significantly high in normal as compared to osteoporotic group. The odds of having low BMD increases with decreased serum fibrillin levels (OR=0.152, CI=0.03-0.69,  $p=0.015$ ). No significant association of apelin was found with BMD.

**Conclusion:** It is concluded that serum levels of visfatin and fibrillin may prevent the progression and development of osteoporosis. Moreover, with low levels of fibrillin there are more chances of decrease BMD and increased risk of fracture in postmenopausal females.

**Acknowledgment:** This project is part of the Johns Hopkins University - Afghanistan Pakistan international collaborative trauma & injury research training program, funded by Fogarty International Center of the National Institutes of Health USA, held jointly by the Aga Khan University, Pakistan, Johns Hopkins University and the George Washington University, USA.

P563

## PROBIOTIC SUPPLEMENTATION IMPROVES SYMPTOMS OF ARTHRITIS AND INDUCES BONE DENSITY IN MICE WITH COLLAGEN ANTIBODY INDUCED ARTHRITIS (CAIA)

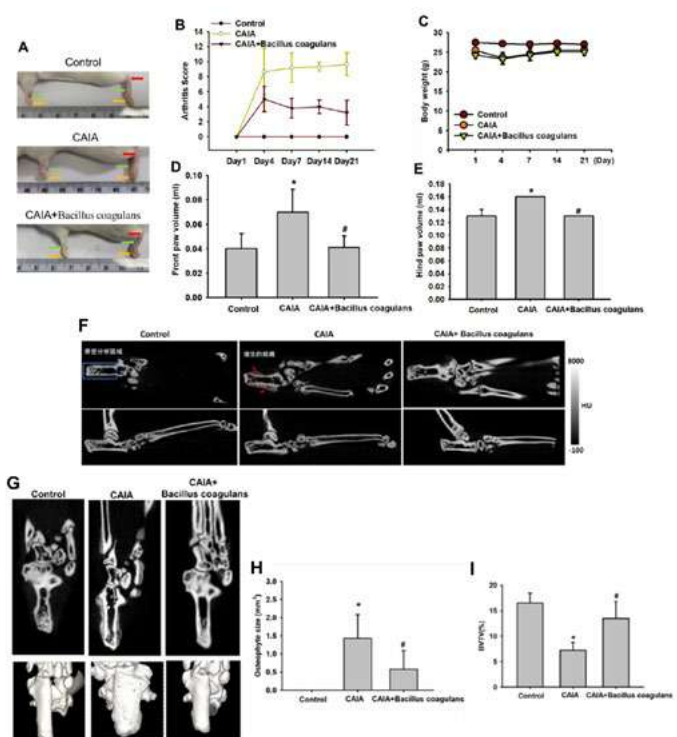
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**Objective:** Multiple studies have indicated the potential benefits of probiotic supplementation on bone health in both healthy and pathological states [1]. *Bacillus coagulans* is a strain of lactic acid bacteria that can withstand the low pH of stomach acid is activated in the intestines to modulate the gut microflora and the immune response [2]. Adjunctive treatment with *Bacillus coagulans* probiotic appeared to be a safe and effective for patients suffering from RA. In addition, probiotics could considerably improve the global and femur area in ovariectomized rats. In the case of global BMD, *Bacillus coagulans* lysate and supernatant significantly increased BMD [3]. However, the mechanisms of *Bacillus coagulans* effects on bone function in a collagen antibody induced arthritis (CAIA) experimental model are still under investigation.

**Methods:** The collagen antibody-induced arthritis model (CAIA) was performed with thirty DBA/1 J mice and were assigned to the control group, CAIA, CAIA + *Bacillus coagulans*. All mice were subjected to micro-computed tomography (micro-CT) and histological inspections of the knee joint for evidence of structural changes in articular bone, cartilage and synovium.

**Results:** After 5 weeks, resulted in a significant reduction in swelling, arthritis scores, hind paw and forepaw thicknesses compared with CAIA alone (Figure 1A-E). Analysis of the  $\mu$ -CT images (Figure 1F-I) revealed that *Bacillus coagulans* treatment ameliorated the bone destruction and increased in BMD and bone volume/tissue volume (BV/TV).



**Figure 1.** *Bacillus coagulans* ameliorated paw swelling, bone destruction and increased in BMD in CAIA mice.

**Conclusion:** Our study has demonstrated that in mice with CAIA-induced arthritis, the *Bacillus coagulans* protects the articular cartilage from arthritis damage, with an accompanying reduction in the loss of bone content. *Bacillus coagulans* is a potential supplement to the disease process in RA for relieving symptoms of rheumatoid arthritis.

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Montazeri-Najafabady N et al. BMC Complement Med Ther 2021;21:155.

**Acknowledgment:** This work was supported by a grant from the Ministry of Science and Technology of Taiwan (NSTC111-2320-B-038-038)

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## INCIDENT OF LOWER LIMB FRAGILITY FRACTURE IN A TERTIARY HOSPITAL IN MALAYSIA

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**Objective:** One-third of fractures involved lower limbs, which are common and are a leading cause of morbidity and mortality in the aging population. The objective of this study was to outline the epidemiology of osteoporotic lower limb fractures in men and women aged 50 years or above who were receiving care at a ter-

tiary university hospital.

**Methods:** Data was collected from January 2022 to December 2022 in Hospital Canselor Tuanku Muhriz, Malaysia from a prospectively designed orthopaedic database through Fracture Liaison Services (FLS). The medical records, first radiographs and CT-scans of the patients were examined. Individuals with severe trauma, known malignancy and atypical fractures were excluded from the study.

**Results:** A total of 194 patients (153 women and 41 men) were included in this study with an average age of 77.4 years. The incidence of lower limb fractures ranged from about 17.6% in the age group below 70 to about 82.4% in the over 70 age group. The majority of patients were Chinese (51.2%), followed by Malays (36.7%), Indians (10.6%) and others (1.5%). Fractures were found from the hip (83.2%) being the most discovered location, followed by femur (6.1%), tibia-fibula (4.1%), ankle (3.6%) and others such as patella and periprosthetic (3%). 73.7% of patients were initiated with anti-osteoporotic medications, while 92.8% were on calcium and Vitamin D supplements.

**Conclusion:** The prevalence of osteoporotic lower limb fractures increased in both women and men with age. Most fractures occurred at the hip. FLS is a secondary fracture prevention service that evaluates and improves the bone health of patients in an effort to prevent future fragility fractures. Awareness of health strategies that promote calcium and vitamin D intake, early diagnosis of osteoporosis and prevention of bone loss should be taken into account. It is crucial to maintain a healthy body weight to avoid low trauma fractures in the elderly population, especially in women.

## P565

### DIAGNOSTIC PERFORMANCE OF RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY COMPARED TO DUAL ENERGY X-RAY ABSORPTIOMETRY FOR OSTEOPOROSIS DIAGNOSIS ON ADULT AND ELDERLY POPULATION: A SYSTEMATIC REVIEW

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**Objective:** Osteoporosis is the most common metabolic bone disease. DXA is the gold standard to diagnose osteoporosis but it has several issues in terms of the radiation generated, lack of portability, and possibility of incorrect accuracy measurement of BMD due to degenerative artifacts, such as osteoarthritic osteophytes or bone fractures. Recently, a non-ionic modality named radiofrequency echographic multispectrometry (REMS) that analyses the spectra of unfiltered ultrasound waves, emerged as a new method to evaluate axial bone. Therefore, we aim to critically examine the REMS performance on adult and elderly population based on the diagnostic agreement value and other diagnostic parameters compared to DXA to diagnose osteoporosis.

**Methods:** Inclusion criteria for this review were subjects aged more than 18 years, examined for REMS and DXA, no significant impairment, emergency or deambulation (such as patients in wheelchairs) or severe bone disorders, or any difficulty for the subject to perform DXA and REMS exams. Literature search was conducted in four databases: PubMed, Cochrane, Scopus, and ProQuest, resulting in 4 selected cross sectional studies and 1 prospective cohort study.

**Results:** These studies showed that the accuracy of REMS with DXA reached a diagnostic agreement between 75%-89%. The sensitivity and specificity of REMS were 84-92% and 92-94% respectively on lumbar examination, and were 90-92% and 92-96% respectively on femoral examination. The positive predictive value (PPV) and negative predictive value (NPV) of this test were 82-86% and 97%, respectively. REMS showed slight average difference, -0.0001 to 0.01 g/cm<sup>2</sup>, compared with DXA measurement. In addition, both the agreement (k) and correlation (r) test between these two modalities are high.

**Conclusion:** REMS had high accuracy, sensitivity, specificity, and diagnostic agreement compared to DXA. These data showed that REMS could be used as alternative for DXA to diagnose osteoporosis.

## P566

### FREQUENCY AND FACTORS ASSOCIATED WITH LOST TO FOLLOW UP IN NEWLY DIAGNOSED RHEUMATOID ARTHRITIS PATIENTS: A SINGLE CENTRE STUDY

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**Objective:** To determine the frequency of lost to follow up and the possible associated factors in newly diagnosed rheumatoid arthritis (RA) patients in rheumatology outpatient clinic Cipto Mangunkusumo General Hospital, Indonesia.

**Methods:** This is a retrospective cohort study of newly diagnosed RA patients that came to our rheumatology outpatient clinic since May 2021 to November 2022. Those who did not attend their scheduled appointment for more than 3 months were defined as lost to follow up (LTFU). We took age-matched routinely-followed up (RFU) patients from the same population as control group. We used likert scale online-based questionnaire to explore the perception and the possible reasons of LTFU. The patients were contacted by phone to obtain the questionnaire. Mann Whitney test was used to see the difference between LTFU patients and controls.

**Results:** A total of 260 newly diagnosed RA patients came to our clinic from May 2021 to November 2022. There were 65 patients (25%) that were LTFU. We were able to contact 34 of them, 3 died, and the other were either not having functioning phone number or did not respond to our calls. We then took 34 age-matched

routinely-followed up patients as controls. The reasons of loss to follow up were distance from house to hospital constraints (40%), busy with their work thus were not able to visit our clinic (29.23%), transportation constraints (20%), dissatisfaction with the outpatient clinic service (10.77%), lack of information about their disease (9.23%), having other comorbidities that compelled them to go to other department's clinic (7.69%), difficulties understanding clinic registration flow system (4.62%), and only having minimal symptoms (3.08%). Using the Mann Whitney test we found that distance constraints, transportation constraints, minimal symptoms, having other comorbidities, and lack of information about the disease were significantly different between LTFU and routinely-followed up patients (p-value 0.047; 0.035; 0.016; 0.007; 0.002).

**Conclusion:** The frequency of LTFU in newly diagnosed RA patients is 65 patients (25%). Distance constraints, transportation constraints, minimal symptoms, having other comorbidities, and lack of information about the disease were associated factors of LTFU of newly diagnosed RA patients in this study.

## P567

### MOBILEE® PROMOTES MUSCLE HEALTH AND PROTECTS FROM SARCOPENIA IN CULTURED MYOCYTES

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**Objective:** Western societies are aging, which implies a progressive raise in the population suffering sarcopenia. Usually, physical activity is considered the most effective strategy for managing sarcopenia. However, new strategies are necessary for the prevention and treatment of this pathology. Mobilee, a hyaluronic acid matrix containing a high concentration of hyaluronic acid (60-75%), polysaccharides (>10%) and collagen (<5%), has demonstrated its beneficial effects for joint health and it has been approved by the European Commission as a novel food. The aim of this study was to evaluate the effect of Mobilee on muscle health using in vitro models of health or sarcopenia.

**Methods:** 80 mg of Mobilee were digested in an in vitro simulated gastrointestinal digestion model before testing in L6-myocytes. Myocytes were treated for 24 h with the digested Mobilee (6 µg/mL). Improvement of muscle function (proliferation and differentiation of myocytes), and protection against senescence induced by TNFα (15 ng/mL) or H<sub>2</sub>O<sub>2</sub> (30 µM) were assessed by biochemical, qPCR and fluorescence microscopy techniques.

**Results:** Digested Mobilee promoted myocyte hyperplasia (increased 7%); proliferation (>20%), myogenic differentiation (Foxo1 gene expression upregulated 80%) and protected against muscle atrophy (Murf1 gene expression downregulated 40%), muscle damage (Creatinine kinase activity decreased 21%) and

apoptosis (LDH release decreased 22%). In contrast, Mobilee did not promote myocyte regeneration.

**Conclusion:** In an in vitro gastrointestinal digestion and subsequent treatment of myocytes, Mobilee is effective for balancing muscle cell turnover and protects against the most relevant aspects in sarcopenia, such as chronic inflammation induced by TNFα and oxidative stress induced by hydrogen peroxide. Results of the present project suggest that Mobilee can be beneficial for the treatment of muscle degeneration and the promotion of muscle health. Clinical studies will be necessary to corroborate these findings.

## P568

### ADVANCING OSTEOPOROSIS TREATMENT IN RURAL AREAS: THE ESSENTIAL ROLE OF MULTICOMPONENT INTERVENTION

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**Objective:** To assess the effectiveness of a multicomponent intervention in increasing the willingness and treatment rate of anti-osteoporosis medication (AOM) in a rural community.

**Methods:** A total of 567 patients were randomly assigned to one of three groups: Multicomponent integrated care (MIC), Osteoporosis care only (OC), and Delayed care (DC). Five interventions were applied in MIC and OC groups, including professional and specialist support, increasing knowledge about the disease, peer support, transportation, and case management. The former two interventions were applied in the DC group only.

**Results:** Among the participants in the MIC group, 116 were recommended to go to the hospital for further treatment. After all interventions, 73.3% (85 people) arrived at the hospital, and 58.6% (68 people) received AOM. In the DC group, only 4.1% (6 people) arrived and received AOM out of the 146 participants recommended to go to the hospital after screening. A significant difference was found between the MIC group and the DC group in terms of the proportion of participants who arrived at the hospital (p<0.001) and the proportion who received AOM (p<0.01). Similar results were found in the OC group and the DC group. In the OC group, 153 participants were recommended to go to the hospital for further treatment, and 81% (124 people) actually arrived after the intervention. Of these, 69.3% (106 people) received AOM. The results were also significant when the OC group was compared to the DC group (p<0.001).

**Conclusion:** Our study highlights that a multicomponent intervention is needed to increase the treatment rate of osteoporosis in rural areas. Both the MIC and OC groups had significantly higher proportions of participants who arrived at the hospital and received treatment compared to the DC group. These findings demonstrate the importance of integrating professionals and specialists, increasing knowledge about the disease, and providing support to patients in accessing healthcare services.

P569

### EXPECTED IMPACT OF FRACTURE LIAISON SERVICE IMPLEMENTATION IN COLOMBIA: FINDINGS FROM A MICROSIMULATION MODEL

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**Objective:** We set out to estimate the patient benefit and budget impact over five years of Fracture Liaison Services (FLS) implementation in Colombia as compared to current practice.

**Methods:** A microsimulation model was used to model the pathway of individual men and women over the age of 50 with a fragility fracture under current practice and under a scenario of wider FLS implementation. Data inputs were sourced from the literature, current FLS reports, and consensus by local experts. The key outputs following one year of patients presenting with a fragility fracture were fractures avoided, quality-adjusted life years (QALY) gain, savings in health and social care use and costs, and FLS-related resource use and cost investment required over the following 5 years.

**Results:** At least 4,090 hip, spine and other subsequent fractures would be avoided during the first five years of FLS implementation in Colombia. This would result in a gain of at least 3,694 QALYs as well as 2,568 surgeries avoided, 10,293 bed days freed, 16,053 fewer clinic consultations, and 499 patient years of social care not needed. Avoided health care resources would lead to health-care savings of at least 33.1 billion Colombian pesos (COP) or US\$6.9 million over the period, whilst social care savings would reach COP 14.1 billion (US\$2.9 million). For this, an additional investment of COP 496 billion (US\$103 million) in FLS services, 95% of which for anti-osteoporosis medication, would be needed. This equates to an incremental cost-effectiveness ratio of US\$25,492 per QALY. Health benefits and budget impact would vary depending on FLS configuration such as expected identification rates, treatment initiation, medication prescription, and adherence. Results are highly sensitive to estimates of sex- and site-specific subsequent fracture rates.

**Conclusion:** FLS implementation in Colombia would lead to substantial reduction in subsequent fractures and quality of life gain, whilst lowering the burden on the health and social care systems and generating saving that would help pay for the required investment.

**Acknowledgment:** Funding received from the International Osteoporosis Foundation

P570

### USE OF 3D DXA-DERIVED MEASURES FOR ASSESSMENT BONE STRUCTURE IN PATIENTS WITH CHRONIC KIDNEY FAILURE: CROSS-SECTIONAL ANALYSIS

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**Objective:** DXA represents a gold standard for the diagnosis of osteoporosis, but its use is limited due to lack of possibility to measure trabecular and cortical characteristics and interference of aortic calcifications with BMD among subjects with chronic kidney disease (CKD). Specific information about bone microstructure and turnover could be obtained by bone biopsy, but this is limited due to methods invasiveness. We aimed to assess non-invasive 3D-DXA measurements in subjects across all CKD stages.

**Methods:** 89 (38 females; 69.5 years) subjects were included. Based on glomerular filtration rate (GFR) and KDIGO classification, subjects were divided in 2 groups as follows: earlier (G1 - G3a) and later (G3b - 5) CKD stages. Areal(a) BMD at lumbar spine (LS) and proximal femur (total hip and neck) was analyzed. Proximal femur 3D-DXA parameters such as cortical and trabecular volumetric(v) BMD, cortical thickness (CTh) and surface(s) BMD were analyzed by 3D-Shaper-research v. 2.12.1.

**Results:** Significant differences in total hip (TH) aBMD (0.991 vs. 0.859 g/cm<sup>2</sup>), cortical vBMD at TH (831 vs. 795 mg/cm<sup>3</sup>) and neck (837 vs. 788 mg/cm<sup>3</sup>), TH cortical sBMD (170 vs. 146 mg/cm<sup>2</sup>) and TH Cth (2.03 vs. 1.92 mm) (all p<0.05) in earlier stages in comparison to later stages of CKD were observed. No significant change in trabecular parameters were observed. Among all subjects, strong positive associations between GFR and cortical parameters (neck/TH vBMD and TH Cth) were observed (p<0.01).

**Conclusion:** This study showed lower cortical bone parameters, as assessed by 3D-Shaper software, in later stages of CKD. Cortical parameters were associated with GFR, showing possible relationship between kidney and bone. These results are in agreement with previous findings provided by bone histomorphometry. 3D-Shaper software, as non-invasive method, could potentially be used for assessment of fracture risk in CKD subjects especially in later stages of the disease.

P571

### LEVERAGING REGISTRY DATA TO IMPROVE PATIENT-CLINICIAN COMMUNICATION ABOUT TOTAL HIP ARTHROPLASTY: THE CASE OF "PATIENTS LIKE ME" INFORMATION TOOL

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**Objective:** Arthroplasty registries are an invaluable source of knowledge about benefits and risks of operations, but they are rarely used to facilitate communication between patients and sur-geons and to support decision making. The aim of this work was to develop an information tool based on registry data that makes the experience of previous patients with total hip arthroplasty (THA) meaningful and specific to prospective patients and their surgeons.

**Methods:** "Patients like me" is a tool built on the knowledge gathered from the Geneva Arthroplasty Registry, about patients undergoing THA since 1996. A sample of patients was surveyed about benefits and harms of living with an operated hip. Fifteen outcomes of interest were identified and grouped into five main domains: pain relief, activity improvement, complication, and risk of subsequent surgeries. Classification algorithms were devel-oped using Conditional Inference Tree (CIT) analysis to identify trajectories of relevant outcomes and patients' clusters at one, five and ten years postoperatively. An information leaflet with in-fographics and a digital visualisation tool were produced.

**Results:** 6836 operations were included in the analysis and a to-tal of forty-three CITs were generated. The type and number of predictors changed markedly for each outcome across the three time points. For example, for the outcome measuring patients' ability to put on socks, whilst patient clusters at one year were generated based on preoperative self-rated health (SRH), WOMAC function score, body-mass index, and the number of comorbidities, by year ten only SRH and SF12 physical interference were sig-nificant predictors. Outcomes profiles varied by clusters: 79.4% of patients with good to excellent SRH and less than moderate night pain before THA reported no night pain one year after the operation, whilst among those with fair/poor SHR night pain was found in 49.8%.

**Conclusion:** "Patients like me" uses a novel approach to making registry data accessible, understandable, and useful to those un-dergoing THA. The tool has received positive feedback from both patients and surgeons.

**Acknowledgments:** This project was funded by the Fondation

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P572

### HOME-BASED REHABILITATION TREATMENT AFTER TOTAL HIP AND KNEE ARTHROPLASTIES: FUNCTIONAL RESULTS UNDER FAST-TRACK PROGRAMS

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**Objective:** Our physical medicine and rehabilitation department treats patients in the basic health areas of the Eixample Esquerre, Barcelona; assisting a population of approximately 150,836 in-habitants, in which more than 21% are over 65 years of age. Our study aims to analyze the functional outcome of total hip arthro-plasty (THA) and total knee arthroplasty (TKA) under a fast-track program, performed as a home-based rehabilitation treatment (HRT) during 2021.

**Methods:** Prospective descriptive study. From January to October 2021. N=132. Patients under home based rehabilitation for THA and TKA (January-October 2021). Variables: age, sex, Barthel index (previous, initial and discharge), functional improvement (Barthel increase) and rehabilitation sessions performed (num-ber). Descriptive data analysis. Qualitative variables are showed as absolute frequency and percentage (%), and quantitative vari-ables are showed as mean and standard deviation (SD).

**Results:** Of the 934 patients assessed under HRT, 127 were THR and TKA. THR: n=37, women 59.52%, mean age 73.91 (SD 9.18) and 40.48% men, mean age 74.33 years (SD 8.02). Average Barthel: initial 66.42, at discharge 91.19, mean functional improvement 24.76 points, with a mean of rehabilitation sessions 12.33 (SD 2.01). TKA: n=90, women 70.30%, mean age 80.01 (SD 9.18) and 29.70% men, mean age 74.2 years (SD 11.02). Average Barthel: initial 71.23, at discharge 96.93, average functional improvement 25.69 points, with an average of sessions of rehabilitation 12.20 (SD 1.91).

**Conclusion:** HRT under a fast-track program for THA and TKA achieves an efficient functional outcome (Barthel increase >20 points) with an adjusted number of sessions, similar to that ac-complished at the outpatient level, avoiding the complications and costs derived from the patient's displacement to the rehabil-itation center.

P573

### BILATERAL ACROMION FRACTURE IN A PATIENT WITH OSTEOPOROSIS FOLLOWING REVERSE SHOULDER ARTHROPLASTY: CASE REPORT AND LITERATURE REVIEW

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**Objective:** 1. Describe an unusual case of bilateral acromion fracture in an osteoporotic patient after reverse shoulder arthroplasty (RSA). 2. Discuss the need to optimize osteoporosis management prior to performing this surgery.

**Case report:** A 79-year-old female patient with history of hypothyroidism and osteoporosis, with a FRAX risk of 27% of major osteoporotic fracture (MOP) and 16% of risk hip fracture, underwent asynchronous bilateral RSA (left side 12/2020; right side 5/2022) secondary to rotator cuff arthropathy (RCA). Three months after left RSA and 2 months after right RSA an acromion fracture was diagnosed (Figure 1 and 2). Both were managed conservatively and evolved with good function, despite the right side evolving with non-union.

Figure 1



Figure 2



**Conclusion:** RCA is a common indication for RSA. Acromion fractures are a potentially debilitating complication following RSA (1). Osteoporosis is a well-known risk factor for this complication (1-3), with a prevalence of ~26% in patients undergoing this surgery (2). Prevention, early diagnosis and treatment in high-risk patients may reduce the risk of fractures after RSA (2-3). The International Society for Clinical Densitometry recommends DXA screening in all patients with osteoporosis risk factors and those with a history of fracture >50 years undergoing total joint arthroplasty (4). However, different scientific societies recommend using the FRAX tool for the assessment of MOP or hip fracture risk in the next 10 years. A FRAX risk for hip fracture  $\geq 3\%$  or  $\geq 7.5\%$  for a MOP fracture ( $\geq 10\%$  without DXA) is considered to be at high risk of fracture and indicative of initiating treatment (5). To conclude, this unusual case of a woman with untreated osteoporosis presenting bilateral post-RSA acromion fracture, one of which evolved into pseudarthrosis demonstrates the need to assess (with DXA or FRAX) and treat osteoporosis in patients undergoing RSA to reduce the risk of complications.

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P574

### ENZYMATIC PATTERN OF CIRCULATING XANTHINE OXIDOREDUCTASE DEPENDING ON SYSTEMIC LUPUS ERYTHEMATOSUS ACTIVITY

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**Objective:** According to modern concepts, the basis of systemic lupus erythematosus (SLE) pathogenesis is a generalized immune inflammatory process which accompanied by metabolic disorders. One of the enzymes responsible for the development of pathophysiological reactions in SLE is xanthine oxidoreductase (XOR). XOR is represented by interconvertible forms (xanthine oxidase (XO), EC 1.17.3.2 and xanthine dehydrogenase (XDG), EC 1.17.1.4). We aimed to evaluate the changes of XO and XDG activities in blood of SLE patients depending on disease activity.

**Methods:** Diagnosis of SLE was verified using the SLICC criteria (2012). Three subgroups of patients were formed using a classification based on clinical manifestations [1]. The SLEDAI 2K index was used to assess disease activity. Activities of XO and XDG were measured in plasma, lysed WBC and lysed RBC by spectrophotometric method [2].

**Results:** 56 adult SLE patients (mean age 35 (31; 42) years; mean disease duration was 8 (5; 11) years) were enrolled in this study. The SLEDAI 2K index was 4 (2; 5) points in the subgroup of patients with low clinical activity of SLE; 9 (7; 9) points in the sub-

group with moderate activity; 12 (11; 14) points in the subgroup with high activity. Relationships between the levels of XDG activity and the SLEDAI 2K index, the levels of XO activity and the SLEDAI 2K index were revealed. An increase in the levels of  $XO_{pl}$  ( $p=0.88$ ,  $p<0.001$ ),  $XDG_{RBC}$  ( $p=0.75$ ,  $p<0.001$ ) and a decrease in the levels of  $XDG_{pl}$  ( $p=-0.88$ ,  $p<0.001$ ),  $XO_{WBC}$  ( $p=-0.83$ ,  $p<0.001$ ),  $XDG_{WBC}$  ( $p=-0.90$ ,  $p<0.001$ ),  $XO_{RBC}$  ( $p=-0.81$ ,  $p<0.001$ ) were determined on the background of an increase in disease activity.

**Conclusion:** According to our data, changes in the balance of XO and XDG activities in plasma, lysed WBC and lysed RBC determined the profiles of blood in different degrees of SLE activity. It can be assumed that in the implementation of the pathophysiological effects of XOR in SLE, all its inherent catalytic activities are manifested.

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### P575

#### ERADICATION OF POLYMICROBIAL KNEE PROSTHETIC JOINT INFECTION, COMPLICATED BY CANDIDA LUSITANIAE WITH ARTHRODESIS AS FINAL TREATMENT

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**Objective:** Fungal prosthetic joint infections (PJIs) are relatively rare. The most commonly isolated fungi in these cases are *Candida albicans*. However, non-*albicans* *Candida* PJIs are reported much rarer in the literature. Such infections represent a severe major surgery-related complication.

**Methods:** An extremely rare fungal case of PJI, following revised total knee replacement (TKR) caused by *Candida lusitanae* PJI is presented. All diagnostic and therapeutic approaches are analyzed.

**Results:** A 74-year-old female having undergone primary total knee replacement arthroplasty 10 years ago and a revision surgery 3 weeks ago, presented with signs and symptoms of PJI. In addition to methicillin-resistant *Staphylococcus aureus* (MRSA), methicillin-resistant *Staphylococcus epidermidis* (MRSE) and *Morganella morganii*. *C. lusitanae* was eventually isolated from the periprosthetic tissue, with the MALDI-TOF VitekMS – bioMérieux technic. While multiple strategies of managing this fungal PJI were performed and finally the patient was treated successfully with an intramedullary arthrodesis system, as well as proper antimicrobial and antifungal treatment including linezolid, ceftriaxone and fluconazole. The patient received a total of 4 months antifungal treatment. She is followed-up a total of 11 months after treatment cessation with no signs or symptoms of infection.

**Conclusion:** Multidisciplinary approach is of utmost importance

for diagnosis and treatment of these infections. Intramedullary arthrodesis seems to represent a viable solution, for eradicating the infection, in persistent cases and in those that revision surgery is extremely difficult to perform. Therapeutic management of fungal PJIs still remains vague. Thus, more research is needed, especially on proper treatment so that optimal strategy in treating these severe infections may be established.

### P576

#### FEATURES OF THE MORPHOLOGICAL PICTURE OF OSTEOARTHRITIS IN PATIENTS AFTER HIP ARTHROPLASTY

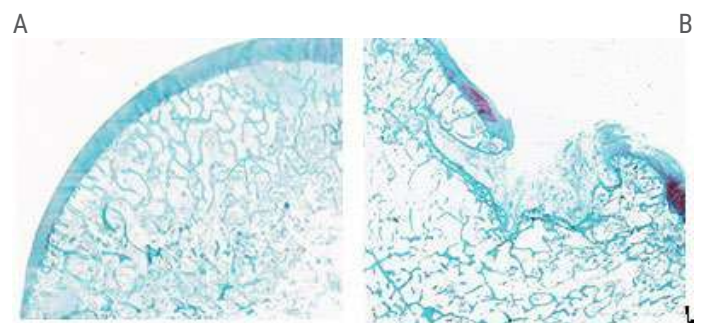
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**Objective:** In recent years, the number of publications devoted to the unjustified conduct of hip replacement surgeries (HR) has been increasing. In our work we analysed the data of a morphological study of removed hip joints in patients operated on for osteoarthritis in order to determine the validity of arthroplasty.

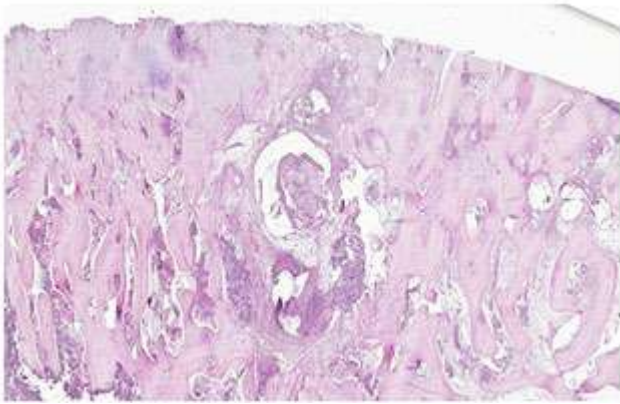
**Methods:** Materials from 30 patients aged 28-88 years were taken by random sampling for morphological research. The production of histological preparations was carried out according to the standard procedure for bone tissue, the studied bone fragments were decalcified in an electrolyte decalcifying solution (Biovitrum, Russia). Histological wiring, filling, and microtomy with a slice thickness of 5 microns were carried out according to the standard procedure. The preparations were stained with review dyes (hematoxylin and eosin, H&E) and safranin O.

**Results:** Among the 30 morphological studies conducted, 3 (10%) patients had stage I-II (OOCHAS) verified (Fig.1); 9 (30%) cases were diagnosed III-IV stage (OOCHAS), and 18 (60%) –V-VI stages (OOCHAS) (Fig.2).



**Figure 1.** Femoral head with osteoarthritis A-stage II OOCHAS B-III OOCHAS stained with safranin O.





**Figure 2.** Femoral head with osteoarthritis stage V (OOCHAS) stained with H&E

**Conclusion:** According to the morphological study, 12(40%) clinical cases who underwent arthroplasty had stage I – IV OOCAS of hip joint. Thus, it cannot be ruled out that these patients underwent premature hip arthroplasty. To form a clinical guidelines and strategy for the treatment of patients with OA of hip joint, it is necessary to develop an algorithm for interaction between different specialists.

### P577

#### WHAT THE AMERICAN SOCIETY OF ANESTHESIOLOGISTS CLASSIFICATION SCORES TELL US AFTER A HIP FRACTURE: A MONOCENTRIC COHORT STUDY

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**Objective:** Osteoporotic hip fractures have a major impact on health systems with long-term consequences in terms of disability and mortality. Several factors seem to influence the return to an optimal functional level after hip surgery. The American Society of Anesthesiologists (ASA) classification scores is a scoring system for the evaluation of the patients' health and comorbidities before an operative procedure. The purpose of this study was the evaluation of the prognostic value of the ASA score as a predictive factor for peri and postoperative outcomes and complications in geriatric patients with hip fractures.

**Methods:** Retrospective cohort study that involved patients ( $\geq 65$  years old) with a hip fracture between 1 January 2019 to 1 January 2022 with a follow-up study over a one-year period. Socio-demographic, clinical data and patients' outcomes were collected. A general descriptive analysis was performed, p-value  $< 0.05$  was statistically significant.

**Results:** A total of 499 patients were included (405 females and 94 males) averaging  $82.18 \pm 8.99$  years old. Most frequent comorbidities included arterial hypertension (75.2%), dyslipidaemia

(44.9%), depressive syndrome (31.9%) and diabetes mellitus (28.7%). Regarding the ASA score, 1.9% had ASA I, 24.1% ASA II, 68.2% had ASA III and only 5.8% had ASA IV. The average hospital stay was  $9.07 \pm 6.34$  days, and 56.1% had complications during hospitalization (57.9% with anemia, 1.8 with respiratory/urinary infection, 0.4% with decompensated heart failure). During the follow-up period, 35.7% had readmission, 12% suffered a new fragility fracture and 23.9% died. We found a statistically significant relationship between the ASA score and earlier surgical approach [OR 0.491 (95%CI 0.304, 0.792),  $p=0.004$ ], the hospitalization days [OR 1.25 (95%CI 0.357, 0.809),  $p=0.042$ ] and mortality [OR 2.31 (95%CI 1.292, 4.162),  $p=0.005$ ] during the follow-up. There was no difference between the ASA score and complications during hospitalization, readmission, and new fractures at follow-up ( $p>0.05$ ).

**Conclusion:** We verified that higher ASA scores are related to a delay in performing the surgery and prolonged hospital stay, which are related to post-fracture functional recovery. These patients should be identified so that they can start early postoperative rehabilitation.

### P578

#### VALIDATION OF TOTAL KNEE ARTHROPLASTY IN PATIENTS WITH OSTEOARTHRITIS

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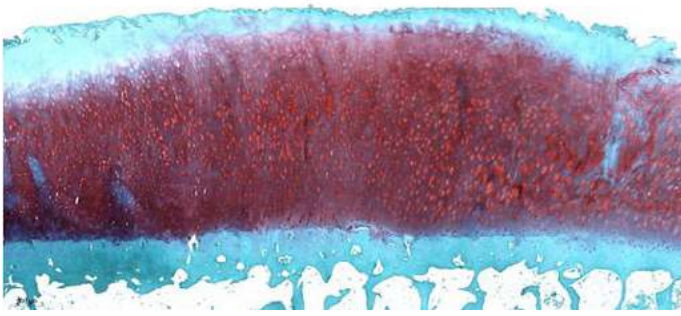
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**Objective:** Total knee arthroplasty is the treatment of choice in orthopedic practice for patients with late –stage knee osteoarthritis. However, arthroplasty has not only benefit results.

**Methods:** In the clinic of traumatology and orthopedics of Mechnikov St. Petersburg State Medical Academy from 01.01.2022 to 15.12.2022, 187 total knee arthroplasty (TKA) in patients with osteoarthritis were performed. Materials from 30 patients aged 40 to 76 years (19 women, 11 men) were taken by random sampling for morphological examination. The production of histological preparations was carried out according to the standard procedure for bone tissue, the studied bone fragments were decalcified in an electrolyte decalcifying solution (Biovitrum, Russia). Histological wiring, filling, and microtomy with a slice thickness of 5 microns were carried out according to the standard procedure. The preparations were stained with review dyes (hematoxylin and eosin) and safranin O.

**Results:** Only 48 (25.7%) patients before the TKA were at least once on a course of inpatient conservative or minimally invasive surgical treatment for osteoarthritis (OA) of knee joint. Intraoperative and postoperative complications were noted in 18 (9.6%) patients. Among the 30 morphological studies conducted, 3 (10%) patients had stage I-II OOCAS verified (Fig.1); 8 (26.7%) cases were diagnosed III-IV stage OOCAS (Fig.2), and 19 (63.3%) – V-VI stage OOCAS (Fig.3).



**Figure 1.** Articular cartilage and subchondral bone of the medial condyle of the femur of the patient with osteoarthritis stage II OoCHAS after TKA. Stained with safranin O.



**Figure 2.** Articular cartilage and subchondral bone of the medial condyle of the femur of the patient with osteoarthritis stage IV OoCHAS after TKA. Stained with safranin O.



**Figure 3.** Articular cartilage and subchondral bone of the medial condyle of the femur of the patient with osteoarthritis stage V OoCHAS after TKA. Stained with H&E.

**Conclusion:** Among the patients who underwent TKA, only one in four (48 people – 25.7%) was at least once on a course of inpatient conservative or minimally invasive surgical treatment for OA of knee joint. According to the morphological study, 11 (36.7%) clinical cases who underwent arthroplasty had stage I – II OA of knee joint verified. To form a strategy for the treatment of patients

with OA of knee joint, it is necessary to develop an algorithm for interaction between specialists with the involvement of therapists, orthopedists, rheumatologists, rehabilitologists and specialists in restorative medicine and healthcare organizers.

P579

### IN VITRO EFFECTS OF FIBROBLAST GROWTH FACTOR 23 ON HUMAN SKELETAL MUSCLE-DERIVED CELLS

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**Objective:** FGF23 is a bone-derived hormone suppressing phosphate reabsorption and vitamin D hormone synthesis in the kidney. FGF23 serum levels are significantly elevated in hereditary hypophosphatemic rickets, attributable to inactivating mutations in the PHEX gene and resulting in skeletal muscle dysfunction. It remains unclear whether skeletal muscle development may be directly altered by FGF23 excess. Due to the lack of reports on human cell models, the present study will evaluate the *in vitro* effects of FGF23 exposures on proliferation and myogenic differentiation of human skeletal muscle-derived cells (hSMCs).

**Methods:** hSMCs were isolated by skeletal muscle tissue, as previously reported [1]. The presence of FGF receptors (type 1, 2, 3, 4) and  $\alpha$ -Klotho co-receptor were verified in skeletal muscle tissue and hSMCs by qualitative PCR. Cells were exposed to different concentrations of FGF23 (from 1 to 100 ng/ml), cell proliferation was assayed by BrDU and myogenic differentiation by quantitative PCR analysing specific genes (MyoD1, Myogenin, MHC). Statistical analysis was performed by ANOVA followed by Bonferroni's test.

**Results:** Gene expression analysis has highlighted the presence of all FGF receptors and  $\alpha$ -Klotho in skeletal muscle tissue and hSMCs. Proliferation, evaluated in hSMCs treated with different FGF23 concentrations for 48 h, has showed no significant differences with respect to non-treated control, assuming that, under our experimental conditions, FGF23 is not able to influence this process. The same treatments, carried out in hSMCs during myogenesis, although not able to cause any changes in MyoD1 and Myogenin genes, determine significant decreases in MHC gene expression after 48 h (\* $p < 0.01$ ).

**Conclusion:** This work has shown preliminary data on the *in vitro* effects of FGF23 on proliferation and myogenic differentiation of hSMCs. Despite such treatment has no effect on cell proliferation, it induces a decrease in MHC gene expression during hSMCs differentiation, indicating the possible involvement of FGF23 in muscular dysfunction characterizing hypophosphatemic rickets. However, studies are in progress in order to evaluate the effect of FGF23 in other primary lines and MHC protein during myogenesis.

**Reference:** 1. Romagnoli C et al. 2020 Calcif Tissue Int

**Acknowledgment:** FIRMO Foundation

P580

**IMPACT OF SARCOPENIA AND OSTEOPOROSIS ON RESPIRATORY FUNCTION IN LUNG TRANSPLANT RECIPIENTS**

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**Objective:** Evaluation of prevalence and impact on respiratory function of osteoporosis, fragility fractures and sarcopenia in lung transplant recipients, considering the presence of vertebral fractures and muscle deficiency can affect respiratory performance of the new lung after transplantation.

**Methods:** Medical data, phosphocalcic metabolism parameters, lumbar and femoral BMD, presence of vertebral fractures, muscle mass, strength and performance measures, and spirometry values were collected in a sample of 120 patients undergoing lung transplantation. The prevalence of osteopenia, osteoporosis and sarcopenia was investigated according to WHO recommendations and the revised criteria of the EWGSOP, respectively. The respiratory performance was compared between patients categorized by the presence and severity of osteoporosis and by the presence of sarcopenia.

**Results:** Of the 120 patients studied, 45.5% were women and these were predominantly affected by cystic fibrosis. Prevalence of osteoporosis and sarcopenia was 45% and 31%, respectively, with a predominance of men among the sarcopenic ones. About 49% of osteoporotic patients had vertebral fractures. Using a generalized linear model, adjusted for age, sex, and underlying respiratory disease, we found that sarcopenic patients had lower Vital Capacity%, Forced Vital Capacity%, Forced Expiratory Volume in the 1st second% and Total Lung Capacity% than the non-sarcopenic ones (p<0.05 for all).

**Conclusion:** Sarcopenia but not osteoporosis, although severe, is associated with poorer respiratory performance, therefore early diagnosis and prevention of this condition should be a priority to preserve the functioning of the new lung.

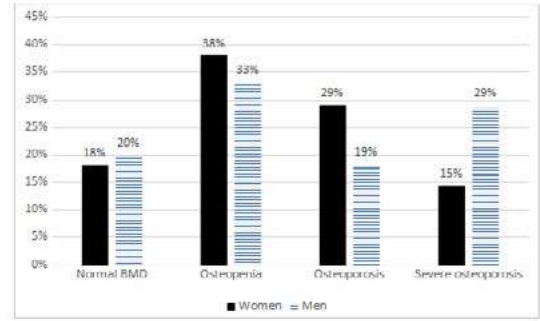
**Table 1. Spirometric parameters in the total sample and divided according to the presence of sarcopenia**

	Normal (n=101)	Sarcopenia (n=19)	p-value	Adjusted p-value
VC (% pred)	79.38±20.65	62.00±15.74	<0.001	0.004
FVC (% pred)	79.15±20.24	61.19±17.96	0.001	0.01
FEV1 (% pred)	79.32±21.81	66.72±22.65	0.03	0.04
TLC (% pred)	79.31±14.47	64.94±11.45	0.002	0.03

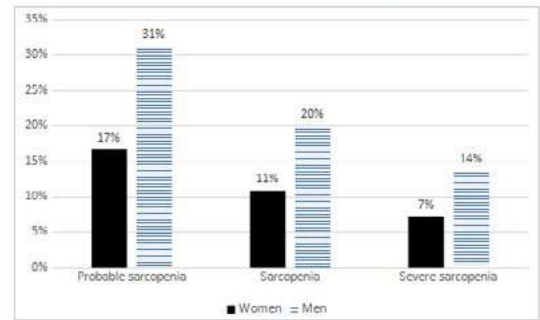
*Note:* Numbers are median (interquartile range). Adjusted p-value was adjusted for age, underlying disease, gender, degree of sarcopenia, and time to transplant in a generalized linear model.

*Abbreviations:* VC = vital capacity; FVC = forced vital capacity; FEV1% = predicted FEV1 (forced expiratory volume in one second); TLC = Total lung capacity.

**Figure 1. Prevalence of normal bone mineralization (BMD-Bone Mineral Density), osteopenia, osteoporosis and severe osteoporosis, by sex.**



**Figure 2. Prevalence of probable sarcopenia and sarcopenia, by sex.**



P581

**EFFICACY OF FOCUSED EXTRACORPOREAL SHOCKWAVE THERAPY IN PATIENTS WITH CARPAL TUNNEL SYNDROME: A SINGLE-BLINDED RANDOMIZED CONTROLLED TRIAL**

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**Objective:** Carpal tunnel syndrome (CTS) is the most common upper extremity entrapment neuropathy. Prior research has demonstrated an improvement in symptoms, functional score, and pain following focused extracorporeal shockwave therapy (fESWT). However, a recent systematic review and meta-analysis suggested that the effects of shockwave were not significantly different compared to the night wrist splint. Therefore, the effect of fESWT on CTS remains controversial. We aimed to evaluate the efficacy of fESWT for symptoms, function, and nerve conduction in patients with moderate-to-severe CTS.

**Methods:** 24 participants diagnosed with CTS were recruited from the Outpatient clinic, Rehabilitation Medicine Dept., Faculty of Medicine Ramathibodi Hospital were randomly allocated into two groups: fESWT and control. The intervention group received

fESWT with an energy flux density ranging from 0.01-0.15 mJ/mm<sup>2</sup>, a frequency of 4-5 Hz, 1,500 pulses per session once a week for a total of 3 sessions, in addition to conservative treatment. The control group received only conservative treatment, including tendon gliding exercise, a night wrist splint, and lifestyle modification. The Thai version of the Boston carpal tunnel questionnaire (T-BCTQ), the nerve conduction study (NCS), and the ultrasonography of the median nerve cross-sectional area (CSA) were assessed before treatment and at 3 and 6 weeks after baseline.

**Results:** At the end of the study, T-BCTQ symptoms and function scores reduced significantly in both groups, with a statistically significant difference between groups, favouring fESWT at all time points. Regarding NCS, only onset distal sensory latency and distal motor latency were significantly different across groups at 3 weeks from baseline. Despite this, the median nerve CSA did not change significantly at any time point.

**Conclusion:** fESWT plus conservative treatment effectively improved symptoms, hand function, and nerve conduction in patients with moderate-to-severe CTS compared with conservative treatment alone.

## P582

### TARGETED INHIBITION OF MITOCHONDRIAL DYSFUNCTION VIA TETRAHEDRAL FRAMEWORK NUCLEIC ACID ATTENUATES OSTEOARTHRITIS PROGRESSION

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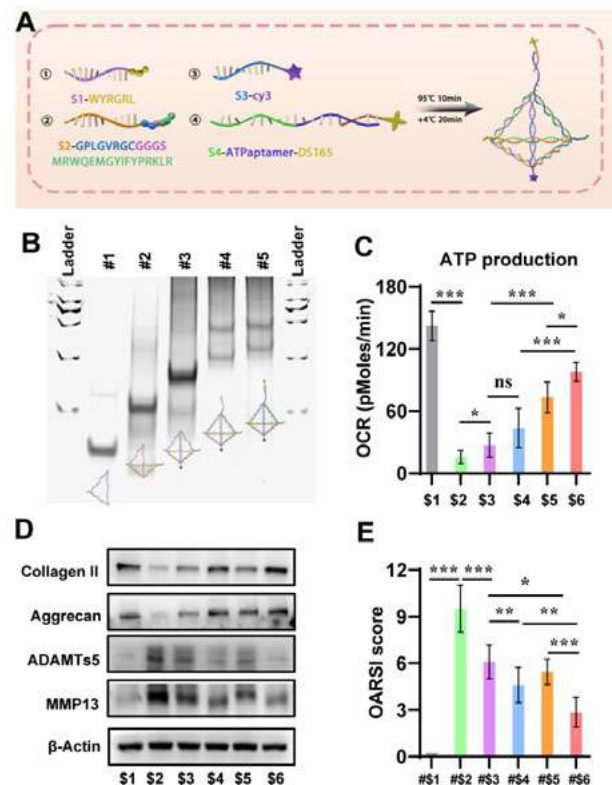
**Objective:** Growing evidence demonstrated cellular calcium (Ca<sup>2+</sup>) over-accumulation could induce senescence and apoptosis. Our previous work indicated mitochondrial Ca<sup>2+</sup> overload disrupted chondrocyte homeostasis and aggravated cartilage degradation upon chronic inflammation stimulation. Herein, we aimed to investigate the protective effect of inhibition of mitochondrial Ca<sup>2+</sup> overload combined with improving mitochondrial function via agent-loaded tetrahedral framework nucleic acid (TFNA) on osteoarthritis (OA).

**Methods:** 1) Verification of the successful synthesis of agent-loaded TFNA including mitochondrial Ca<sup>2+</sup> uniporter (MCU) inhibitor, DS16570511, and a kind of mitochondrial-derived peptide, MOTS-c via PAGE gel electrophoresis. 2) Seahorse XF analysis of the metabolic alterations in chondrocytes after treated with agent-loaded TFNAs and IL-1 $\beta$ . 3) Western blot analysis of the anabolism and catabolism-related proteins expression after treated with agent-loaded TFNAs and IL-1 $\beta$ . 4) Intra-articular injection of the agent-loaded TFNAs with dual-targeting effect in destabili-

zation of medial meniscus (DMM) mice model, and further detecting its rescue effect on OA via histological OARSI score.

#### Results:

- 1) The agents-loaded TFNAs have successfully prepared (Fig. 1A) and have a complete structure (Fig. 1B).
- 2) Agents-loaded TFNAs can reprogram energy metabolism of chondrocytes after IL-1 $\beta$  stimulation (Fig. 1C), improve anabolism and reduced catabolism (Fig. 1D);
- 3) Agents-loaded TFNAs can effectively exert protective effect on cartilage degradation in DMM mice model according to OARSI scores (Fig. 1E).



**Figure 1.** (A) Schematic diagram of the agent-loaded TFNA synthesis process. (B) PAGE gel electrophoresis analysis of the different synthetic component for agent-loaded TFNA. (#1: S1-P1; #2: S1-WYRIGRL (P1) + S2-GPLGVRGCGGGSMRWQEMGYIFPRKLR (P2); #3: S1-P1 + S2-P2 + S3-cy3; #4: S1-P1 + S2-P2 + S3-cy3 + S4-ATP aptamer (Apt); #5: S1-P1 + S2-P2 + S3-cy3 + S4-Apt-DS165.) (C) Seahorse XF analysis of the ATP production in chondrocytes after treated with IL-1 $\beta$  and different agent-loaded TFNAs. (#1: Ctrl; #2: IL-1 $\beta$ ; #3: IL-1 $\beta$  + WA@TFNA; #4: IL-1 $\beta$  + WAD@TFNA; #5: IL-1 $\beta$  + WAM@TFNA; #6: IL-1 $\beta$  + WAMD@TFNA.) (D) Western blot analysis of some proteins expression after corresponding treatments. (E) Histological OARSI scores for various treatment groups. (#\$1: Sham; #2: DMM; #3: DMM + WA@TFNA; #4: DMM + WAD@TFNA; #5: DMM + WAM@TFNA; #6: DMM + WAMD@TFNA).

**Conclusion:** Targeted inhibition of mitochondrial Ca<sup>2+</sup> overload and improving cellular energy metabolism via dual-agent loaded TFNAs dramatically attenuate chronic inflammation induced

chondrocyte catabolism in vitro and cartilage destruction in vivo. **Acknowledgment:** Funding from the 2020 Guangdong Provincial Science and Technology Innovation Strategy Special Fund (Guangdong-Hong Kong-Macau Joint Lab, No.2020B1212030006), National Natural Science Foundation of China (No.81974342).

## P583

### PARTICULARITY OF RECOVERY IN A PATIENT WITH COMPLEX TRAUMA THROUGH HAND SQUEEZING

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**Objective:** This case report aims to detect the importance of a rehabilitation program in a patient with complex trauma following 9 weeks of therapy.

**Methods:** The case report refers to a 24-year-old patient who suffered a crush injury on the left hand (dominant hand) with trans-metacarpal quasi-amputation, a dorsal integumentary bridge of approximately two centimeters, and acute ischemia of fingers II-V, for which he underwent surgery. He presents himself to the recovery service immediately after removing the wires and pins from the II-V metacarpals, with pain and swelling in the fist and fingers, pain in the left shoulder, and vegetative phenomena. He needs help to perform ADLs, DASH way of working: 100 points; DASH symptom score: 63 points. It is evaluated clinically and functionally and follows a specific recovery program that includes electrotherapy and physical therapy.

**Results:** After 9 weeks of the rehabilitation program, the scars are healed and adherent to the underlying planes; pain, edema, and vegetative disorders disappear; the range of motion in the fist and fingers increases. He can perform ADLs without help. DASH way of working: 75 points; DASH symptom score: 45 points.

**Conclusion:** Rehabilitation has improved mobility, pain, edema, and vegetative disorder but the dysfunctional condition of the patient remains a long-term care issue.

## P584

### PROGRESSION OF KEY PERFORMANCE INDICATORS FOR HOSPITALS JOINING THE SPANISH NATIONAL HIP FRACTURE REGISTRY

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**Objective:** To describe available registry data and examine changes

in key performance indicators (KPIs) by participating hospitals over varying lengths of membership in the registry.

**Methods:** We conducted an exploratory descriptive analysis of % of total and early surgeries, length of stay, pre-surgical stay, pressure ulcers, and mortality (as% of admitted patients) between 2017 and 2021. Hospitals were grouped according to the number of years they participated in the registry during the period. Univariate regression was applied to assess the relationship between registry membership years and KPIs.

**Results:** A total of 104 hospitals moved in and out of the registry over the period. Hospitals in the registry for  $\geq 2$  years conducted between 35.5% and 39.5% of surgeries within 48 hours, compared to 28.4% by those participating only 1 year. This was the only indicator significantly associated with the number of membership years in the registry ( $p=.003$ ). Median length of stay was lower in hospitals with membership  $> 2$  years compared to hospitals with just 1 (8.4 - 8.7 days vs. 9.91), as were median pre-surgical stay (48.0 - 51.4 hours vs. 63.9), pressure ulcers (4.2 - 5.9% vs. 7.2%), and deaths within 30 days after hospital admission (8.2% - 8.9% vs. 10.6%). The % of surgeries fluctuated between groups (Table 1).

**Table 1.** Key performance indicators by years as registry members

	1 year (n=18)	2 years (n=16)	3 years (n=24)	4 years (n=19)	5 years (n=27)
Surgeries (%)	94.0	96.1	95.8	94.4	91.6
Early surgeries <48hrs (%)	28.4	36.2	39.6	35.5	39.5
Median pre-surgical stay (h)	63.9	49.3	48.5	48.0	51.4
Median length of stay (d)	9.9	8.4	8.7	8.6	8.7
Ulcers (%)	7.2	4.2	5.9	5.3	4.9
Deaths within 30d after admission (%)	10.6	8.2	8.8	8.9	8.7

**Conclusion:** Membership in the RNFC appears to help hospitals improve their performance when treating hip fracture patients, although having hospitals join and leave the registry year-on-year adds further confounding to analyses. More research should be conducted to ascertain the drivers behind and mechanisms for improvement of hospital performance and patient outcomes.

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**PANDEMIC DRUG HOLIDAY: A NEW ENTITY IN REAL-LIFE-MEDICINE?**C. E. Nistor<sup>1</sup>, N. M. Bugălă<sup>2</sup>, E. D. Rentea<sup>3</sup>, A. I. Trandafir<sup>4</sup>, O. C. Sima<sup>3</sup>, A. M. Gheorghie<sup>3</sup>

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**Objective:** To introduce a female patient with a complicated, long history of menopausal osteoporosis management, also including taking twice a drug holiday.

**Case report:** This is a 68-year-old, non-smoking woman admitted for an endocrine check-up. She has the menopausal age of 45 (no hormone replacement therapy); she only associates one comorbidity – a nonfunctional pituitary (micro)incidentaloma: at the age of 54 she was confirmed with osteoporosis and started oral monthly ibandronate for 2 years then, due to developing digestive complaints, a switch to intravenous ibandronate was done for several years followed by an annual single injection with zoledronate 5 mg, then denosumab every 6 months for 2 more years until she reached a lumbar L1-4 T-score=-3SD, T-score=-2.6SD, Z-score=-1.7SD, total hip T-score=-2SD, Z-score=-1SD. She has 2 prevalent superior thoracic vertebral fractures. After 1 more year, BMD decreased to L1-4 BMD=0.7 g/cm<sup>2</sup>, T-score=-3.1SD, Z-score=-1.6SD; she considered herself as non-responsive and decided to stop any medication against osteoporosis despite recommendations. During this self-imposed drug holiday, she was diagnosed with asthma and started for a few months corticotherapy. 18 months later, BMD decreased to L1-4=0.758 g/cm<sup>2</sup>, T-score=-3.7SD, Z-score=-2.3SD, femoral neck BMD=0.684 g/cm<sup>2</sup>, T-score=-2.5SD, Z-score=-1.2SD, hip BMD=0.697 g/cm<sup>2</sup>, T-score=-2.5SD, Z-score=-1.4SD (no incidental fractures). She restarted zoledronate 5 mg/year with 2000 UI vitamin D/year for 3 years, when COVID-19 pandemic came and she decided to stop once again the medication for 2 years due to difficulties of reaching out to prescription and administration of medication. DXA showed stationary results at L1-L4 DXA-BMD=0.827 g/cm<sup>2</sup>, T-score=-3.1SD, Z-score=-1.4SD, femoral neck T-score=-2.5SD, total hip T-score=-2.5SD. 25-hydroxyvitamin D was adequate of 41 ng/mL under 2000 UI VD/d with normal blood bone turnover markers: osteocalcin (formation) 17.33 ng/mL(normal:14-46), P1NP (formation) 28.77 ng/mL(normal:15.13-58.59), and CrossLaps (resorption) 0.19 ng/mL(normal:0.104-0.504). Yearly IV zoledronate 5 mg was restarted with VD supplements.

**Conclusion:** This case points out 3 main aspects: the highest BMD loss within the 2 drug holiday was after denosumab; long term IV bisphosphonates might be less dramatic on BMD after stopping the drug than early during the course of osteoporosis treatment; a new entity is described amid COVID-19 pandemic namely "pandemic drug holiday" which has less to do with the medical protocols and more with the social environment.

P586

**BODY COMPOSITION ASSOCIATION BETWEEN MOTHER-OFFSPRING DYADS**D. López-González<sup>1</sup>, R. A. Pérez-Aguilar<sup>1</sup>, P. Reyes-Delpech<sup>1</sup>, P. E. Clark-Peralta<sup>1</sup>

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**Objective:** Evaluate the association between the body composition (BC) of the mother- offspring dyads.

**Methods:** A cross-sectional study from a sample of Mexican children/adolescents and their mothers. BC was assessed by DXA in the offspring and by bioelectrical bioimpedance (mBIA) in the mothers. The main outcomes were appendicular lean mass (ALM), and fat mass index (FMI)=fat mass/height<sup>2</sup>. Descriptive, correlation, linear-regression analyses were performed, adjusting for confounders.

**Results:** This study included 190 dyads; children aged 6-18 years, from which 53% were males, the mean BMI of the children was 0.48±1.29; the mean age of the mothers was 43.6±7.1 years, and their mean BMI was 29.0±5.0. Linear correlations adjusted for maternal age, and offspring sex, age and physical activity documented a significant positive correlation between the ALM in the dyads ( $\beta=1$ , CI95% 0.71 to 1.3, P<0.001), also for FMI ( $\beta=0.20$ , CI95% 0.09 to 0.32, P<0.001).

**Conclusion:** There was a positive association between the BC in mother-offspring dyads, mainly in appendicular lean mass followed by fat mass index. Interventions targeting maternal BC may improve the BC of their offspring.

P587

**ARTHRITIS AND JOINT PAIN IN MID-LIFE ZIMBABWEAN WOMEN: A CROSS-SECTIONAL STUDY**D. MCGAGH<sup>1</sup>, T. Madanhire<sup>2</sup>, T. Bandason<sup>2</sup>, K. Ward<sup>3</sup>, R. Ferrand<sup>2</sup>, C. L. Gregson<sup>4</sup>

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**Objective:** We aimed to report the prevalence and factors associated with a self-reported diagnosis of arthritis in mid-life women in Harare, Zimbabwe, and to estimate the potential undiagnosed burden of arthritis by exploring the prevalence of moderate to severe hip and knee pain and access to analgesia within this population.

**Methods:** A cross-sectional study recruiting women resident in Harare, Zimbabwe sampled by age group (40-44/ 45-49/ 50-54/ 55-60 years) and HIV status (50%). Researcher administered questionnaires determined a prior clinical diagnosis of arthritis

and characterised the presence, site and severity of any non-acute pain using the Brief Pain Inventory. Health-related quality of life (HRQoL) was quantified using the WHO-QOL questionnaire. Factors associated with arthritis diagnosis were identified using logistic regression. The relationship between arthritis, hip and knee pain and HRQoL was determined by linear regression.

**Results:** Women (n=399) had mean (SD) age 49.6(5.8) years, BMI 29.0(6.0) kg/m<sup>2</sup>, with 295(73.9%) being overweight or obese, and 196 (49.1%) were living with HIV. The prevalence of diagnosed arthritis was 9.5% (38/399). In univariate logistic regression, older age (OR 7.0 for eldest category, 95%CI 2.3, 30.6, p<0.001), obesity (OR 4.3, 95%CI 1.7, 13.0, p<0.001) and comorbidity (OR 2.2, 95%CI 1.3, 4.0, p=0.006) were associated with arthritis diagnosis, whilst women living with HIV reported less arthritis (OR 0.23, 95%CI 0.2, 0.6, p=0.002). Age and BMI adjustment attenuated the comorbidity association, but not that for HIV. Moderate to severe hip and knee pain was prevalent in 4% (16/399) of women, with 31.3% (5/16) using opioid analgesia; only 2/16 reported a diagnosis of arthritis. Hip and knee pain but not diagnosed arthritis was associated with reduced HRQoL (-1.7, 95%CI -0.1, -3.3, p=0.036).

**Conclusion:** In Zimbabwean mid-life women formally diagnosed arthritis is associated with multimorbidity, with its prevalence largely driven by high levels of obesity. There is an additional burden of likely undiagnosed arthritis, suggested by moderate-severe levels of hip and knee pain and relatively high opioid analgesia use, which is a concern. Multimorbidity research and management needs to consider joint health, weight control and non-pharmacological pain management approaches.

## P588

### ALBUMIN STATUS IN ELDERLY SUBJECTS WITH HIP FRACTURES

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**Objective:** Osteoporosis is a widespread disease of bone metabolism with a loss of bone mass [1]. A connection between hypoalbuminemia and osteoporosis-associated risk factors has already been found [2]. There are several prediction tools for estimate the osteoporotic fracture risk [3]. The albumin factor has not been specifically considered in patients with an osteoporotic fracture due to low-energy trauma. The aim was to investigate the albumin level in patients with acute osteoporotic low-energy hip fractures. **Methods:** We retrospectively analyzed albumin and total protein status of 76 patients with acute low-energy hip fractures. Low energy hip fractures were defined as a result of falling from standing height or less. Low albumin level was defined as level <35 g/l. Total protein <64 g/l was considered as low.

**Results:** The mean age of the subjects was 85±7 yrs (range 61-95). The mean albumin level was 28±3 g/l (range 19-35 g/l). Of to-

tal 76 subjects, 1 (1.3%) had normal albumin level and 75 (98.7%) had low albumin level. The mean total protein was 56±5 g/l (45-71 g/l).

**Conclusion:** The prevalence of low albumin level was 98.7% in patients with low-energy hip fractures. The albumin deficiency seems to have an indirect influence on osteoporosis and the tendency to fall. Albumin deficiency indicates malnutrition which is a risk factor for osteoporosis. Furthermore, a connection to increased osteoclast activity and altered metabolism of the vitamin D-binding protein is seen.

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## P589

### TRABECULAR BONE SCORE, BONE MINERAL DENSITY, AND QUANTITATIVE ULTRASOUND MEASUREMENTS IN THE ASSESSMENT OF BONE HEALTH IN ADULT PATIENTS WITH INFLAMMATORY BOWEL DISEASE: PRELIMINARY RESULTS FROM A SINGLE CENTER STUDY

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**Objective:** Inflammatory bowel disease (IBD) is possibly associated with osteopenia and osteoporosis. Most of the studies used areal BMD (aBMD) to evaluate the bone status in these patients. We have analysed the skeletal properties of adult patients with IBD using an extended panel of non-invasive bone assessment technologies.

**Methods:** We prospectively enrolled 50 IBD patients and 50 healthy volunteers -without any known metabolic bone disorders or drug therapy that may affect their bone quality-, matched for age, gender and BMI. Anterior-posterior (AP) and lateral spine, total hip, and femoral neck aBMD was measured by DXA (GE, Prodigy Advance v11.x). Vertebral fracture was assessed by VFA. Trabecular bone score (TBS) was calculated with lumbar spine data using TBSiSight v3.0. Hip vBMD was calculated using 3D-Shaper v2.20.2 software. Quantitative ultrasound (QUS) was performed in the left calcaneus using a Sonost 3000 device that measures the speed of ultrasound (SOS) and the broadband ultrasound attenuation (BUA). The device combines the values of BUA and SOS to yield the "bone quality index" (BQI). The study was powered to detect a clinically meaningful 50 units difference in TBS between the 2 groups.

**Results:** There were 20 males and 30 females in each group. Ulcerative colitis and Crohn's disease was diagnosed in 28 and 20 patients respectively, with 2 subjects showing a mix/indeterminate pattern. Six patients (12%) were receiving systemic glucocorticoids. Three subjects (6%) in the IBD group reported a previous low-trauma fracture. Table shows the results for both groups.

**Table.** Summary of bone variables (mean±SD).

Variable	IBD (n=50)	CONTROLS (n=50)	p-value
Age (years)	52,0 ± 13,3	52,0 ± 14,2	0,494
BMI (kg/m <sup>2</sup> )	25,4 ± 4,1	26,1 ± 4,3	0,194
TBS L1-L4	1296 ± 120	1318 ± 103	0,161
BMD (anterior-posterior) L1-L4 (mg/cm <sup>2</sup> )	1,120 ± 0,16	1,137 ± 0,17	0,301
BMD (lateral) L2-L4 (mg/cm <sup>2</sup> )	0,720 ± 0,24	0,776 ± 0,24	0,127
BMD Femoral neck (mg/cm <sup>2</sup> )	0,898 ± 0,15	0,921 ± 0,14	0,205
BMD Total hip (mg/cm <sup>2</sup> )	0,940 ± 0,15	0,971 ± 0,14	0,148
Trabecular vBMD (mg/cm <sup>3</sup> )	162,8 ± 39,0	173,5 ± 43,2	0,098
Integral vBMD (mg/cm <sup>3</sup> )	313,3 ± 48,6	324,0 ± 54,8	0,397
Cortical vBMD (mg/cm <sup>3</sup> )	818,1 ± 71,3	827,2 ± 80,3	0,275
Cortical Thickness (mm)	1,9 ± 0,2	1,9 ± 0,2	0,260
SOS (m/s)	1512,1 ± 14,8	1516,7 ± 19,5	0,501
BUA (db/MIHz)	105,2 ± 17,9	111,3 ± 19,5	0,083
BQI (%)	86,9 ± 14,9	92,2 ± 20,3	0,076

**Conclusion:** In this single center study, the group of patients with low-moderate severity IBD showed no statistically significant differences in TBS or BMD. There was a trend in lower QUS values and trabecular volumetric BMD at the hip in the IBD group (p<0.1).

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## P590

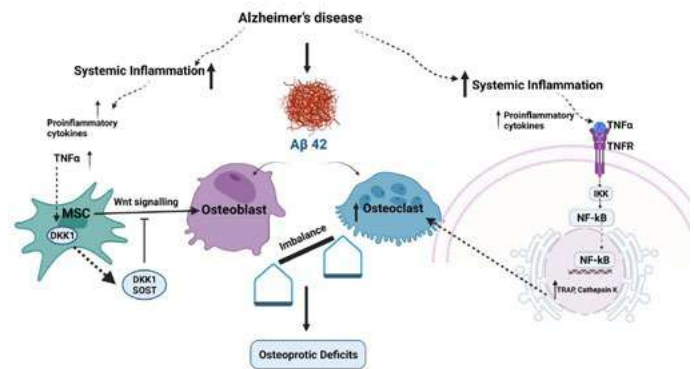
### MECHANISTIC UNDERSTANDING OF DYSREGULATED BONE REMODELING IN ALZHEIMER'S DISEASE

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Patients with Alzheimer's disease (AD) usually have low BMD and are more prone to bone fractures than healthy individual. However, the mechanism behind their connection is still unknown. We wanted to understand how the 3XFAD mouse model of familial Alzheimer's disease (FAD) affects age dependent changes in bone parameters. According to earlier research, females are more likely than males to experience osteoporosis and AD. In our research, we found that both male and female FAD mice have degeneration in bone microarchitecture than wildtype mice with females exhibiting a greater degree of deterioration than males. With age, these changes in bone micro architecture are observed to become more pronounced. The mechanical properties of bone, such as bone strength, stiffness, and energy stored in bone, are substantially impaired in FAD mice. In addition to this, we observed overall rise in bone turnover, as there was significant increase in serum levels of bone resorption markers and decrease in bone formation markers in FAD mice. Furthermore, both in the AD as well as in the presence of neurotoxic peptide Aβ42, bone marrow stem cell differentiation to osteoclast was considerably increased, but differentiation to osteoblast was severely impaired. Also, serological studies showed a rise in pro-inflammatory cytokines such as

TNFα, IL17, and IL18 in AD mice. As increased levels of proinflammatory cytokines have been proven to stimulate osteoclastogenesis, these findings lead us to the conclusion that bone tissue in AD mice start to deteriorate at a young age, even before AD pathology is evident, which could be because of increased bone resorption driven by proinflammatory cytokines.



## P591

### VITAMIN D LEVELS IN PATIENTS WITH ACUTE LOW-ENERGY HIP FRACTURES

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**Objective:** The connection between a vitamin D deficiency and osteoporosis is considered to be certain [1,2]. That is why the European osteoporosis societies recommend vitamin D prophylaxis for elderly people [3]. The aim of this work was to investigate the vitamin D level in patients with acute osteoporotic low-energy hip fractures.

**Methods:** We retrospectively analyzed vitamin D levels of 70 patients with acute low-energy hip fractures. Low energy hip fractures were defined as a result of falling from standing height or less. Low vitamin D level was defined as a level <30.05 µg/l.

**Results:** The mean age of the subjects was 85±7 yrs (range 61-95). The mean vitamin D level was 17.7±13.1 µg/l (range 3.5-68 µg/l). Of total 70 subjects, 9 (12.9%) had normal vitamin D level and 61 (87.1%) had low vitamin D level. Patients with low vitamin D level were older (85 yrs.) compared to the patients with normal vitamin D level (83 yrs.).

**Conclusion:** The prevalence of low vitamin D was 87.1% in patients with low-energy hip fractures. Our results show that in many patients who have suffered an osteoporosis-associated fracture, vitamin D prophylaxis was not carried out or was insufficient. Vitamin D deficiency is considered a proven risk factor for osteoporosis. It turns out that there is still a need for educational work on vitamin D prophylaxis.

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## P592

### BIOLOGICAL THERAPY (DENOSUMAB-PROLIA) IN OSTEOPOROSIS TREATMENT: OUR FIRST EXPERIENCES

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**Objective:** Osteoporosis is a metabolic disease of bones, where bones are porous and apt to fracture. Many kinds of medicines are used in the treatment of bisphosphonate, teriparatide - the analog of PTH and denosumab-biological therapy. Denosumab is a monocle antibody which acts by decreasing the resorption of the trabecular and cortical bone. It is applied once in six months, as a subcutaneous injection in the thigh or the upper arm. The indication of the application of this medicine (denosumab) is postmenopausal osteoporosis. The contradiction for the application of this medicine is hypocalcemia.

**Methods:** 14 patients were presented in our work and they were examined by DXA which helped to define the level of calcium, phosphorus, PTH, ALP and D vitamin.

**Results:** The average age of our patients is 61. The average time of the menstrual cycle end was 41. 10 of 14 patients got 2 ampullas of denosumab, while 4 patients got 3 ampullas until the first control examination. The average improvement of bone density of our patients was 8,4%, on the spine level and 7,6% on the hip level. The highest percent of the improvement regarding bone density of spine was obtained with one of the oldest patients who got 3 ampullas of the medicine, and it was 26,7%. Denosumab showed the best effect regarding hip bone density with patient who got 2 ampullas of the medicine, 24%. It was the patient who suffered from prolactinom for many years and was treated by kabergolin tablets. One fat patients was in our sample where Prolia caused the improvement of bone density on the spine level for 10,9%, which led the transfer of bone density from the level of osteoporosis to the level of osteopenia.

**Conclusion:** Besides the presence of other endocrine disease which influence the decrease of the bone density very much, the application of denosumab ampullas succeeded in improving the bone density on the spine level and on the hip level and it appearance of new bone fractures. There was not any undesirable effect of the medicine and none of the patients had a new bone fracture. Besides denosumab ampullas, all the patients were given calcium and D vitamin.

## P593

### HIGHER SERUM URATE LEVELS ARE ASSOCIATED WITH HIGHER SERUM PTH: IMPLICATIONS FOR BONE HEALTH?

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**Objective:** Some studies have found a positive association between urate levels and serum PTH. Serum urate is elevated in hyperparathyroidism and is found to decrease after parathyroidectomy. Teriparatide (recombinant PTH) has also been shown to increase urate in a dose-dependent manner. We aimed to explore the association between serum urate and PTH in patients attending our bone health clinic.

**Methods:** The study population included adults who attended our bone health clinic. Exclusion criteria included patients with an eGFR <30 ml/min and serum calcium >2.5 mmol/l to avoid primary hyperparathyroidism and advanced renal failure. Patients on teriparatide therapy were also excluded. We also performed an analysis in a subset of patients meeting the above criteria who had normal PTH levels (15-65 ng/ml).

**Results:** We identified 1418 adults, mean age 64.6±16.0 yrs, 78.3% female. The vast majority of patients (96.5%) had normal urate levels. Serum urate was positively associated with serum PTH after adjusting for age, sex, BMI, serum 25(OH)D and eGFR (p<0.0001). In a subsample (n=1250), who had normal serum PTH levels (15-65 pg/ml) the relationship remained highly significant (p<0.0001) in the same multivariate analysis.

**Conclusion:** Findings of the independent positive association of serum urate and PTH are consistent with other studies. It has been suggested that higher PTH levels may reduce uric acid secretion in the proximal renal tubule. However, the reason underlying this association is unclear as are the implications for bone health. Higher serum urate is linked to greater BMD so greater levels in patients with normal PTH might be beneficial. We were not able to allow for thiazides that increase urate but may be unlikely to affect the relationship as they have been associated with lower PTH.

P594

**SODIUM LEVELS IN PATIENTS WITH LOW-ENERGY HIP FRACTURES**E. Bischoff<sup>1</sup>, Z. Batalov<sup>2</sup>, P. Kinov<sup>3</sup>

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**Objective:** Clinical studies show that hyponatremia is increasing in elderly patients. There are already studies in the literature on hyponatremia and a general tendency to fall. Hyponatremia leads, among other things, to gait instability [1]. The cause can be, for example, taking medication (aldosterone antagonists, sartans), chronic alcohol abuse or previous illnesses (diabetes mellitus, chronic kidney failure). There is an overlap with regard to the possible cause of hyponatremia and risk factors for osteoporosis.

**Methods:** We retrospectively analyzed the sodium levels of 75 subjects with acute hip fractures. Sodium levels under 136 mmol/l was defined as low. The patients were divided into two groups-with low sodium levels and normal sodium levels. We compared age, C-reactive protein (CRP), calcium and vitamin D levels between the groups.

**Results:** The mean sodium level was 139±5 mmol/l (range 124-145 mmol/l). The prevalence of low sodium levels in patients with hip fractures was 20/75 subjects (26.7%). Subjects with low sodium levels were younger (82 yrs.) than those with normal sodium levels (86 yrs). Patients with low sodium levels had significantly higher CRP (12.4 mg/dl) than those with normal sodium levels (6.8 mg/dl), p=0.003. Calcium and vitamin D levels did not differ significantly between the both groups p=0.820, respectively p=0.107.

**Conclusion:** The prevalence of low sodium levels in patients with hip fractures was 26.7%. Hyponatremia is often caused by inflammation [2]. Since hyponatremia is associated with osteoporosis as well as with an increased tendency to falls, we recommend regular monitoring of serum sodium, for example with modern mobile health applications [3].

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P595

**THE EFFECT OF BODY MASS INDEX ON THE RISK OF HIP OSTEOPOROSIS: FINDINGS FROM THE TUDA COHORT**D. Fitzpatrick<sup>1</sup>, R. Lannon<sup>1</sup>, E. Laird<sup>2</sup>, L. Hoey<sup>3</sup>, C. Hughes<sup>3</sup>, H. Mc Nulty<sup>3</sup>, M. Ward<sup>3</sup>, A. Molloy<sup>2</sup>, C. Cunningham<sup>4</sup>, J. J. Strain<sup>3</sup>, F. Tracey<sup>5</sup>, K. Mc Carroll<sup>4</sup>

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**Objective:** Complex relationships exist between BMI, BMD, microarchitecture and fracture risk. Higher BMI is associated with greater BMD, particularly at weight bearing sites like the hip. We aimed to investigate the relative importance of BMI on the risk of hip osteoporosis in a large cohort of older Irish adults.

**Methods:** We identified participants of the Trinity, Ulster and Dept. of Agriculture (TUDA) study (aged >60) who had DXA and were treatment naive to osteoporosis medications. The relationship between BMI and hip osteoporosis was explored in multivariate logistic regression models. BMI was categorised as obese (>30), overweight (25-30), normal weight (18.5-25) and underweight (<18.5).

**Results:** There were 2236 participants who met the inclusion criteria: 70% were female, mean age 70.5±7.0 years, and 55% had hip osteoporosis. Obesity was associated with a reduced risk of hip osteoporosis vs. normal weight (OR 0.28, CI 0.18-0.45, P<0.0001) or underweight (OR 0.05, CI 0.01-0.16, P<0.0001) after adjusting for age, gender and physical frailty (timed up and go). Normal weight also predicted lower risk of osteoporosis vs. underweight (OR 0.16, CI 0.05-0.54 P<0.0001) though higher risk compared to non-obese overweight (OR 2.81, CI 1.94-4.00, P<0.0001).

**Conclusion:** Those with normal BMI were 84% less likely to have hip osteoporosis vs. underweight. However, increasing BMI above normal range also substantially reduced the risk. In particular, the risk with obesity was 72% less than compared to normal weight. Greater BMI leads to more mechanical loading on bone, with BMD increasing as a response. This study was limited in that we did not have an accurate measure of bone quality which can be negatively affected by obesity or accurate information relating to obesity and fracture risk.

P596

**THE ANTI-INFLAMMATORY ROLE OF VITAMIN D IN TMJ OSTEOARTHRITIS**T. Tang<sup>1</sup>, B. Li<sup>2</sup>, Y. Zhou<sup>2</sup>, L. Huang<sup>2</sup>, L. Zhang<sup>3</sup>, Y. Chen<sup>4</sup>, H. Li<sup>2</sup>

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**Objective:** Temporomandibular joint osteoarthritis (TMJ OA) is a severe chronic disease but lacks effective treatment. Vitamin D is an essential hormone for bone health. Recent research showed that vitamin D is also an important factor in regulating immune responses via its nuclear receptor, vitamin D receptor (VDR). This study aimed to investigate the potential anti-inflammatory role of vitamin D-VDR in TMJ OA.

**Material and Methods:** *Vdr*<sup>-/-</sup> mice in C57BL/6J background were

generated and fed with a rescue diet to avoid spontaneous rickets after weaning [1]. Experimental TMJ OA was induced by the unilateral anterior crossbite (UAC) in 6-week-old wildtype (WT) mice and *Vdr*<sup>-/-</sup> mice, while the sham controls were their littermates of the same genotype (n=5 in each group) [2]. After 3 weeks, their phenotype was characterized by histological staining, immunohistochemistry staining, and microCT analysis.

**Results:** The UAC-induced TMJ OA-like lesion was observed in the subchondral bone, with the decreased BV/TV (WT mice 85.7±5.1% vs. 72.9±3.4%, P<0.05; *Vdr*<sup>-/-</sup> mice 78.4±5.4% vs. 44.4±11.4%, P<0.001) and the increased Tb.Sp (WT mice 43.3±7.6µm vs. 55.2±8µm, P<0.05; *Vdr*<sup>-/-</sup> mice 35.6±4.9µm vs. 55.5±4.3µm, P<0.001). The number of osteoclasts was significantly increased in both genotype mice (P<0.05 and P<0.05, respectively). For cartilage, UAC decreased the thickness of TMJ cartilage in *Vdr*<sup>-/-</sup> mice (303.4±50.6 mm vs. 178.5±63.1 mm, P<0.05), while the lesion is mild in WT mice. Besides, the Safranin O staining found the UAC-induced degradation of the cartilage extracellular matrix in *Vdr*<sup>-/-</sup> mice, as the integrated optical density per area decreased significantly (P<0.05). Meanwhile, the immunohistochemistry staining showed that the proliferation of chondrocytes was significantly inhibited in *Vdr*<sup>-/-</sup> mice (19.6±3.9% vs. 6.7±1.1%, P<0.001). **Conclusion:** VD-VDR plays an anti-inflammatory in the progress of TMJ OA, and its deletion exacerbated TMJ OA.

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## P597

### ARTIFICIAL NEURAL NETWORK MODEL TRAINED WITH DEMOGRAPHIC, ANTHROPOMETRIC, AND DENSITOMETRIC (DXA) CHARACTERISTICS TO ESTABLISH THE PROBABILITY TO SUFFER AN OSTEOPOROTIC

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Assessing BMD by DXA is the reference methodology for defining an individual skeletal health status. In 1994, the WHO established the diagnostic criteria for osteopenia when BMD T-score values are in the range of -1.00 to ≥ -2.5, and for osteoporosis when these values are less than -2.5. According to the NIH Consensus Panel in 2001, osteoporosis was defined as a skeletal disease characterized by a decrease in bone strength that predisposes the patient to a greater risk of fracture. However, in practice, we frequently observe patients who fracture regardless of their T-score values, making it a challenging task to identify those at risk by means of a different methodology. To address this, we developed and validated an artificial neural network (ANN) model to evaluate these subjects by inputting demographic, anthropometric, and densitometric values and the corresponding fractured

or non-fractured status into the ANN. After training, this will allow us to establish the probability of belonging to the fractured or non-fractured group. The study population consisted of 478 postmenopausal women (mean age 62.5±8.6 years, between 32-93 years) randomly selected from a sample of 1960 women divided into two equal groups of fractured (n: 239) and non-fractured (n: 239). Among the fractured women, only those previously regarded as osteoporotic and with low-trauma fractures were included. The sample was subdivided into 334 participants in the training set, 72 participants in the validation set, and the remaining 72 participants in the testing set. The ANN input variables included demographic characteristics: age, anthropometric measures: weight, height, and BMI, and densitometric data: lean mass (LM) in grams of upper and lower extremities, trunk, and total body, and bone mineral content (BMC) in grams of upper and lower extremities, trunk, and total body. The ANN outcome variable was dichotomic, established at 0 for non-fractured and 1 for fractured. The ANN was built with the training and validation data and tested with the testing set, the outcome variable of which was unknown to the network. The ANN performance was evaluated by simultaneous discrimination and calibration. After the training processes, the best final ANN was a multilayer perceptron network that determined 12 input variables (age, weight, height, BMI, LMs, and BMCs) as significant features. The ANN discriminant power for the test set was excellent (area under ROC analysis curve=0.81±0.03). These results suggest that our final ANN had good discriminant power and accuracy. We conclude that this ANN can be used as a promising tool to stratify postmenopausal women with a high risk to suffer an osteoporotic fracture.

## P598

### SEVERE ACUTE KIDNEY INJURY AFTER FIRST DOSE OF ZOLEDRONIC ACID FOR OSTEOPOROSIS: A CASE REPORT

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**Objective:** Zoledronic acid is a potent intravenous bisphosphonate, used in the treatment of osteoporosis, hypercalcaemia, Paget's disease, and bone metastases. Nephrotoxicity is a recognised adverse effect of intravenous bisphosphonates, but clinically significant acute kidney injury (AKI) is rare. Nephrotoxicity from oral agents is even less common. Most case reports of AKI with bisphosphonates have been in patients with cancer. Here we describe a case of stage 3 AKI in a patient with osteoporosis.

**Case report:** The patient was a 70-year-old Caucasian woman with a history of hypertension and severe eczema treated with long term steroids. She had no premorbid renal disease. She had been on risedronate for four years but had difficulty tolerating it due to gastrointestinal side effects. She was given 4 mg of zoledronic acid after DXA demonstrated worsening T-scores. Serum

renal function one week post infusion demonstrated a creatinine of 265  $\mu\text{mol/L}$  (KDIGO AKI Stage 3) increased from a baseline of 80  $\mu\text{mol/L}$ . She was admitted to hospital and treated successfully with intravenous fluids and her antihypertensive (ramipril) was held. Urinalysis, ultrasound of bladder and kidneys, FBC including eosinophils, ANA, ANCA, AntiGBM, myeloma and viral screens were all unremarkable. No other cause for AKI was apparent. It was decided not to give her any further zoledronic acid. An oral bisphosphonate was recommended.

**Conclusion:** This case is unusual in that this was a patient who received a single dose of zoledronic acid for postmenopausal osteoporosis. Even in older frailer patients serious AKI is very uncommon in this setting. Bisphosphonate induced nephrotoxicity appears in most cases to be caused by acute tubular necrosis. Zoledronic acid is contraindicated in patients with a creatinine clearance  $<35$ . Although rare, it is important to be aware of this potential nephrotoxicity and to assess and monitor renal function before and after each infusion.

P599

### GENDER DIFFERENCES IN OSTEOPOROSIS: A SINGLE-CENTER OBSERVATIONAL STUDY

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**Objective:** Osteoporosis (OP) is as a systemic skeletal disease characterized by decreased bone mass and microarchitectural deterioration of bone tissue with increased risk of fractures and which is classically associated with postmenopausal women. The aim of this study was to identify sex differences in a Portuguese cohort of patients with OP.

**Methods:** Retrospective cohort study that involved patients with a diagnosis of OP observed in a Fracture Liaison Service between 1 January 2019 to 31 December 2022. Socio-demographic, clinical data and patients' outcomes were collected. A general descriptive analysis was performed, p-value  $<0.05$  was statistically significant.

**Results:** A total of 758 patients were included (627 women and 131 man). Both genders had a similar mean age (women  $80.4 \pm 9.4$  vs. men  $79.5 \pm 10.4$ ,  $p > 0.05$ ). Women observed were less dependent (Katz  $>4$ ,  $51.6$  vs.  $39.2$ ,  $p = 0.04$ ) and a higher percentage on anti-osteoporotics ( $12.3$  vs.  $1.5$ ,  $p = 0.001$ ). There were no gender differences in multimorbidity ( $75.4$  vs.  $74.8$ ,  $p = 0.908$ ). The most frequent chronic diseases were arterial hypertension (72.7%), followed by dyslipidemia (47.4%) and depressive syndrome (31.8%). Women also had higher levels of calcium ( $9.5 \pm 2.2$  vs.  $8.9 \pm 0.6$ ,  $p = 0.001$ ) and vitamin D ( $16.8 \pm 10.2$  vs.  $13.8 \pm 8.9$ ,  $p = 0.03$ ). All men and the majority of women (99.3%) had a history of fractures. The most frequent fractures were hip fractures (women 65%; men 71.8%). Women with fractures were more likely to receive pharmacotherapy than man ( $38.5$  vs.  $29.8\%$ ,  $p = 0.04$ ). In the multi-

variate analysis, a lower degree of dependence was significantly associated with a greater probability of receiving anti-osteoporotic therapy in both genders. During follow-up, higher post-fracture mortality was observed in man (women 18.4% vs. men 28.5%,  $p = 0.01$ ).

**Conclusion:** As global life expectancy continues to rise and more people live longer, the prevalence of OP will increase. It will be important to carry out an adequate screening in both genders, so that we can institute an early treatment and prevent fragility fractures to avoid consequences inherent to these, namely in the degree of dependence of the patients.

P600

### DIASTOLIC DYSFUNCTION OF THE LEFT AND RIGHT VENTRICLES IN PATIENTS WITH CALCIUM PYROPHOSPHATE CRYSTAL DEPOSITION DISEASE AND OSTEOARTHRITIS

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**Objective:** Risk factors for of diastolic dysfunction (DD) in patients with calcium pyrophosphate crystal deposition disease (CPPD) and osteoarthritis (OA) have not been studied. We aimed to determine the frequency and identify risk factors (RF) for the development of DD in patients with CPPD and OA.

**Methods:** 26 patients each were included with CPPD and with knee OA 18 - 65 years, matched in age and gender, without cardiovascular disease (CVD). Traditional risk factors (TFR) of CVD were assessed, echocardiography was performed.

**Results:** The frequency of DD in patients with CPPD and OA was quite high and almost did not differ in both groups: it was detected in 19 patients: 11 (42%) with CPPD and 8 (31%) with OA ( $p = 0.39$ ). Type 1 LV DD was detected in: 10 (39%) with CPPD and 8 (31%) with OA was detected ( $p = 0.11$ ); RV DD type 1 - in 8 (31%) patients with CPPD and 7 (27%) patients with OA ( $p = 0.17$ ), LV DD and RV DD type 1 - 7 (27%) patients with both CPPD and with OA. DD types 2 and 3 were not detected in both groups. There were no differences in both groups in CV risk factors, except for the level of CRP (it was higher in CPPD) ( $p = 0.03$ ). In the CPPD group, mean values of LV E/E' ( $p = 0.02$ ), LVDT ( $p = 0.03$ ), LVMI ( $p = 0.04$ ) were significantly higher than in patients with OA. In patients with OA, the following indicators: EDV ( $p = 0.004$ ), TVC ( $p = 0.02$ ) were higher. There were direct correlations between diastolic function indices and the following factors in CPPD: LVL, PWLV and PTH level ( $r = 0.7$ ,  $p < 0.005$ ), LV E' and PTH level ( $r = 0.7$ ,  $p < 0.005$ ); inverse correlations - the level of PTH and IS ( $r = -0.5$ ,  $p < 0.005$ ), LVMI ( $r = -0.5$ ,  $p < 0.005$ ), the level of vitamin D and VDDT ( $r = -0.6$ ,  $p < 0.005$ ). Direct correlations in OA: the level of CRP and PVAdiast ( $r = 0.6$ ,  $p < 0.005$ ), and the level of sUA ( $r = 0.7$ ,  $p < 0.005$ ), the level of vitamin D and E/E'LV ( $r = 0.6$ ,  $p < 0.005$ ).

**Conclusion:** A high prevalence of LV and RV DD was found in patients with CPPD and OA. The presence of DD in CPPD was asso-

ciated with lower vitamin D levels, and in OA - a higher level of sUA and a lower level of PTH.

## P601

### DIASTOLIC DYSFUNCTION IN PATIENTS WITH CALCIUM PYROPHOSPHATE CRYSTAL DEPOSITION DISEASE AND OSTEOARTHRITIS WHILE RECEIVING ANTI-INFLAMMATORY THERAPY

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**Objective:** Calcium pyrophosphate crystal deposition disease (CPPD) may be associated with a risk of developing diastolic dysfunction (DD), possibly due to the presence of chronic inflammation. We aimed to determine the variability of echocardiographic (EhoCG) parameters in patients with CPPD receiving long-term anti-inflammatory therapy (colchicine, methotrexate (MT), hydroxychloroquine).

**Methods:** 26 patients with CPPD and OA from 18 to 65 years old, comparable in age and sex, were included in the case-control study. All patients underwent EhoCG, assessment of anthropometric and laboratory parameters at baseline and after 6 months. Patients with CPPD received one of the listed drugs (MT 15 mg per week, hydroxychloroquine 200 mg once a day, or colchicine 0.5 mg twice a day) during the specified time.

**Results:** DD was detected in 19 patients: in 11 (42%) patients with CPPD and 8 (31%) patients with OA ( $p=0.39$ ). The initial level of serum C-reactive protein (CRP) was 2 times higher in the CPPD group ( $p=0.03$ ), no differences were found for other indicators. 22 patients with CPPD and 19 patients with OA completed the study. In patients treated with MT, the following was revealed: a decrease in E/E' LV, an increase in E'LV, IVRTL, E/APZh, in those treated with colchicine - a decrease in EDV; an increase in E/APZh, in those who received hydroxychloroquine - a decrease in ALZh, LP; increase in PPP system, IVRTL, E/ALV. In patients with OA, there were no significant changes in indicators reflecting the diastolic function.

**Conclusion:** Long-term (6 months) therapy with colchicine, hydroxychloroquine and MT has a positive effect on indicators of diastolic ventricular function in patients with CPPD.

## P602

### EARLY LIFE FACTORS IN RELATION TO BODY COMPOSITION: FROM CHILDHOOD INTO EARLY ADULTHOOD

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**Objective:** While studies suggest potential influences of early-life

exposures on child's body composition, less is known about the long-term effects. We investigated whether early-life exposures were associated with directly measured fat mass (FM) and lean body mass (LBM) in childhood, adolescence, and early adulthood.

**Methods:** This study used data from 526 participants (i.e., offspring) taken from within a Tasmanian Birth cohort from 1988-1989; associations between early life exposures (maternal pre-pregnancy BMI, breastfeeding, maternal diet, and smoking exposure and alcohol consumption during pregnancy) and offspring body composition measured by DXA at ~8 (n=330), 16 (n=415), and 25 (n=201) years of age were assessed. Linear mixed effect models were used for analysis of the repeated measures.

**Results:** After full adjustment for potential confounders, a higher maternal pre-pregnancy BMI was associated with higher FM and LBM (FM: 2.10%; CI 1.31%–2.94%; LBM 0.30%; CI 0.10%–0.50%). Participants being breastfed vs. bottle-fed only was associated with lower FM and LBM (FM: -9.90%; CI -16.1% to -3.2%; LBM: -2.20%; CI -4.02% to -0.30%). Maternal active smoking was not associated with offspring body composition, whereas, second-hand smoking was borderline associated with FM ( $P=0.06$ ), likely to suggest confounding. Maternal milk intake was associated with higher LBM, although borderline ( $P=0.052$ ). Maternal energy, macronutrient, micronutrient, and meat, fish, fruit, and vegetable intake were not associated with offspring body composition. **Conclusion:** This study showed that early life factors, including maternal pre-pregnancy BMI, breastfeeding, and potentially also second-hand during pregnancy, maternal milk and alcohol intake, are associated with body composition up to early adulthood.

## P603

### EVALUATION OF THE EFFECT OF LONG-TERM USE OF GLUCOCORTICOIDS ON THE RISK OF DEVELOPING DIABETES MELLITUS IN PATIENTS WITH GOUT

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**Objective:** Patients with gout are at high risk of developing diabetes mellitus (DM) and often take glucocorticoids (GCs), but no studies have been conducted to assess the effect of long-term use of GCs in patients with gout on the risk of DM. We aimed to evaluate the effect of long-term use of low doses of GCs on the risk of developing DM2 in patients with gout based on the results of a retrospective observation.

**Methods:** Included patients with gout  $\geq 18$  years. The exclusion criteria presence of DM2, the use of GCs for the relief of an acute attack of arthritis (by mouth, injectable forms). We analyzed the incidence of DM in the formed groups, HbA1c levels, and serum glucose levels at the beginning of the observation and at its end.

**Results:** Of 317 patients with gout (281 (89%) men and 36 women (11%)), 76 patients (24%) continuously took prednisolone at a dose of 5-10 mg/d for  $\geq 180$  d, 241 patients (76%) did not receive GCs during the entire observation period. The average

dose of prednisolone -  $7.9 \pm 1.2$  mg/d, the duration of treatment was  $206.3 \pm 20.4$  d. DM2 developed during the observation period in 20% of the main group and in 22% of the comparison group ( $p=0.73$ ). Patients who took GCs were older than those who did not take GCs ( $p=0.01$ ), they were more likely to have CHF ( $p=0.04$ ). There were no significant differences between the groups for the rest of the compared parameters. The dynamics of carbohydrate metabolism in patients treated with low doses of GCs showed a significant increase in the average level of HbA1c by the end of the study relative to the baseline (from 5.4% to  $6.1 \pm 0.9$  ( $p=0.002$ ); in addition, in this group, the number of patients with glucose level  $\geq 6.1$  mmol/l from 25.1% to 52.6% ( $p=0.004$ ). Antihyperglycemic drugs were prescribed 2 times more often in patients receiving GCs (20 (26%) patients) compared to those not taking GCs (29 (12%) patients), ( $p=0.003$ ). The baseline HbA1c level in patients who developed DM2 was expectedly higher, among them smokers were more often detected ( $p=0.01$ ), they had a higher sUA level ( $p=0.001$ ). The prevalence of other DM risk factors in those who developed and did not develop DM2 did not differ significantly.

**Conclusion:** The intake of low doses of GCs by patients with gout has a negative effect on carbohydrate metabolism. Further study of the safety of long-term GCs use in patients with gout is needed.

## P604

### EFFECT OF SERUM URIC ACID LEVELS ON THE RISK OF TYPE 2 DIABETES MELLITUS

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**Objective:** Baseline serum uric acid (sUA) levels may be positively associated with the risk of developing type 2 diabetes (DM2), but prospective studies to evaluate risk factors for diabetes in patients with gout have not been performed. We aimed to compare the effect of different sUA levels on the risk of DM2.

**Methods:** The prospective study included 444 patients with gout, without DM2 (49 (11.1%) women, 395 (88.9%) men) at the time of inclusion. The primary endpoint was the development of DM2.

**Results:** During the observation period (6 years), out of 444 patients with gout, 34 patients (7.7%) died: of these, 5 (14.7%) women, 29 (85.3%) men, refused to follow up during the study 5 (1.1%) patients. Of the 405 patients with gout who completed the study (361 (89.1%) men and 44 (10.9% women), DM2 developed during follow-up in 108 patients (26.7%): 96 (88.8%) men and 12 (11.2%) women. All patients were stratified into groups depending on the level of sUA:  $<300$   $\mu\text{mol/L}$ ,  $\geq 360$   $\mu\text{mol/L}$ ,  $\geq 420$   $\mu\text{mol/L}$ ,  $\geq 480$   $\mu\text{mol/L}$ ,  $\geq 540$   $\mu\text{mol/L}$ ,  $>600$   $\mu\text{mol/L}$ . For each group, the incidence of DM2 was determined. The results are presented in Table 1. The mean serum sUA level in those who developed DM2 ( $n=108$ ) was higher than in those who did not develop DM2 ( $n=297$ ):  $542.23 \pm 115.1$   $\mu\text{mol/L}$  and  $480.05 \pm 102.6$   $\mu\text{mol/L}$ ,  $p=0.0001$ . sUA level  $\geq 480$   $\mu\text{mol/L}$ : the chances of developing DM2 with such an initial level of sUA were 2.402 times higher,  $p<0.001$ , in the presence of sUA  $\geq 540$   $\mu\text{mol/L}$ : higher by 3.018 times,  $p=0.003$ , sUA

$\geq 600$   $\mu\text{mol/L}$  was 3 times higher than among those who did not develop and increased the risk of developing DM2 by almost 4 times,  $p<0.001$ .

**Table 1.** Comparison of serum levels of sUA in patients with gout who developed ( $n=108$ ) and did not develop ( $n=297$ ) DM2.

Parameter	OR; 95% DI	Development of DM2		p
		not develop DM2 (n=297)	developed DM2 (n=108)	
sUA<300 $\mu\text{mol/L}$	0,448; 95% DI: 0,491 – 10,137	79 (26,6)	13 (12)	0,286
sUA $\geq 360$ $\mu\text{mol/L}$	0,432; 95% DI: 0,874 – 6,128	267 (89,8)	103 (95,3)	0,08
sUA $\geq 420$ $\mu\text{mol/L}$	0,606; 95% DI: 0,921 – 2,957	227 (76,4)	91 (84,2)	0,09
sUA $\geq 480$ $\mu\text{mol/L}$	2,402; 95% DI: 1,494 – 3,862	151 (50,8)	77 (71,3)	<0,001*
sUA $\geq 540$ $\mu\text{mol/L}$	3,018; 95% DI: 1,908 – 4,773	76 (25,6)	55 (50,9)	0,003
sUA $\geq 600$ $\mu\text{mol/L}$	3,901; 95% DI: 2,293 – 6,637	35 (11,8)	37 (34,5)	<0,001*

\* – differences in indicators are statistically significant ( $p<0,05$ ).

**Conclusion:** The risk of developing DM2 in patients with gout increases significantly starting with a sUA level  $>480$   $\mu\text{mol/L}$ .

## P605

### EFFICACY OF FEBUXOSTAT IN PATIENTS WITH GOUT DEPENDING ON KIDNEY FUNCTION WITH OR WITHOUT TYPE 2 DIABETES MELLITUS

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**Objective:** Therapy that lowers uric acid levels can slow the progression of chronic kidney disease (CKD). We aimed to determine the probability of achieving the target level of uric acid (sUA) during febuxostat therapy in patients with gout, stratified depending on kidney function, including patients with type 2 diabetes mellitus (DM2).

**Methods:** Patients of both sexes over the age of 18 with a diagnosis of gout who had not previously taken febuxostat and other urate-lowering drugs for at least 2 weeks before inclusion and had a sUA level  $>360$   $\mu\text{mol/L}$  were included. All were prescribed febuxostat 80 mg/d; if the target sUA level ( $<360$   $\mu\text{mol/L}$ ) was not reached, the dose was increased to 120 mg/d. The patients were initially divided into groups depending on the stages of CKD according to the level of eGFR (CKD-EPI). Patients with eGFR  $<15$  ml/min/ $1.73\text{m}^2$  were not included. Patients with DM2 were analyzed separately. The observation period covered at least 26 weeks, the primary endpoint was the achievement of the target sUA level, and the dynamics of eGFR was also assessed.

**Results:** 136 patients (13 women, 126 men) with gout were examined. DM2 was in 38 (28%) patients. CKD C0-1 was detected

in 3 (22%) patients, C2 - in 28 (66%) patients, C3 - in 62 (46%) patients, C4 - in 16 (12%) patients. Received febuxostat at a dose of 80 mg/d 98 (72.1%) patients, 120 mg/d - 38 (27.9%) patients. Prophylactic anti-inflammatory therapy: colchicine - 59 (43%) patients, NSAIDs - 51 (38%) patients, GC - 12 (9%) patients, not taken - 14 (10%) patients. The sUA level significantly decreased in all groups, the mean  $\Delta$  sUA and the frequency of reaching the target sUA level were comparable. Achievement of the target level of sUA in general - in 84% of patients; at C0-1, C2, C3, C4: 83%, 89%, 82% and 81% of patients. Mean eGFR values increased relative to baseline by the end of the study in all groups, but significant differences were only in patients with C0-1: initially  $101.3 \pm 18.1$  vs.  $102.8 \pm 28.6$  after ( $p=0.002$ ). Of 38 patients with DM2, 33 (87%) achieved the target sUA level. In 2 patients with C3 CKD, there was an increase in ALT and AST up to two norms (when taking febuxostat 120 mg/d).

**Conclusion:** The ability to achieve the target level of sUA when taking febuxostat in patients with gout does not depend on kidney function, including in patients with DM2.

## P606

### AN OPEN-LABEL 6-MONTH TRIAL OF THE EFFICACY OF ALLOPURINOL DOSE TITRATION IN PATIENTS WITH GOUT AS PART OF A "TREAT TO TARGET" STRATEGY

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**Objective:** The most important component of gout therapy is taking urate-lowering drugs, the use of which is aimed at achieving and maintaining the level of uricemia below certain values, which is the basis for complete control of the disease. We aimed to determine the probability of reaching the target level of serum uric acid (sUA) in patients with gout with an escalation of the allopurinol dose as part of the "treat to target" strategy.

**Methods:** The study included patients with gout ( $n=78$ ) over 18 years of age with a sUA level  $>360 \mu\text{mol/l}$ , not using urate-lowering drugs and having no contraindications to allopurinol. All were prescribed allopurinol at a starting dose of 100 mg/d followed by an increase in dose every 2-3 weeks by 100 mg/d until the target sUA level ( $<300 \mu\text{mol/l}$  in patients with tophi gout ( $n=33$ ) and  $<360 \mu\text{mol/l}$  in the remaining patients ( $n=45$ )). The maximum dose of allopurinol was 900 mg/d, in patients with an estimated glomerular filtration rate (eGFR) $=30-59 \text{ ml/min/1.73m}^2$  ( $n=9$ ) - 300 mg/d. The primary endpoint was the achievement of the target sUA level. The secondary endpoint was the effectiveness of therapy after 6 months from the start of the study and the effect of allopurinol therapy on indicators reflecting the function of the kidneys and liver.

**Results:** In the process of dose titration of allopurinol, the target level of sUA was achieved in 67 (86%) patients. When titrating the dose to 300 mg/d - in 33 (42%), up to 600 mg/d - in 59 (76%) patients. The study was completed by 71 patients, of whom in 52

(73%) the level of sUA remained within the established normative values at the time of the final visit (after 6 months). In the remaining 15 of 67 (22%) patients who reached the target sUA level during dose titration, the sUA level exceeded the target values at the final visit. In 5 out of 9 (56%) patients with eGFR in the range of 30-60 ml/min/1.73m<sup>2</sup>, by the end of the study, the level of sUA corresponded to the target, in 6 (675) patients there was an increase in eGFR to values  $>60 \text{ ml/min/1.73m}^2$ . In no patient, regardless of the dose of allopurinol taken, serum levels of AST and ALT did not reach 2-fold excess of the upper limit of the norm. In 3 cases, allopurinol was canceled - in two patients due to an allergic reaction (at a dose of allopurinol 100 mg and 300 mg/d) in one patient due to a decrease in eGFR  $<30 \text{ ml/min/1.73m}^2$  (at a dose of allopurinol 200 mg/d).

**Conclusion:** Gradual escalation of the dose of allopurinol achieves the target level of sUA in 86% of patients with gout. In 22%, the effect "escapes" occurs, which predetermines the need for dynamic monitoring of sUA levels in patients with the target sUA level achieved. The likelihood of discontinuation of allopurinol due to the development of adverse events is low and does not depend on the dose of the drug taken.

## P607

### HEALTH-RELATED QUALITY OF LIFE AND FATIGUE IN RARE BONE DISEASE PATIENTS: CROSS-SECTIONAL STUDY FROM AUSTRIA

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**Objective:** Fatigue can be a serious problem among chronically ill patients, but may be overlooked by other more severe disease symptoms. There is not much evidence on fatigue and quality of life (QoL) in patients with rare bone diseases. We aimed to assess and compare prevalence of fatigue and QoL in rare bone disease patients (RARE), patients with osteoporosis (OPO) and healthy controls (CTRL).

**Methods:** Monocentric, cross-sectional study carried out during 2020-2022 in a hospital affiliated with the Vienna Centre of Expertise for Rare Bone Disease in Vienna, Austria. Study comprised four types of RARE: Osteogenesis imperfecta, Hypophosphatasia, X-linked Hypophosphatemia and Ehlers Danlos syndrome. Fatigue was assessed by Fatigue Severity Scale (FSS). The higher score indicates more fatigue severity. Health-related quality of life (HRQoL) was assessed by Short-Form Health Survey (SF-36). Physical component (PCS) and mental component summary scores (MCS) were calculated and normalised to a general population. A higher score indicates better HRQoL. Age-adjusted ANCOVA was used to assess differences in PCS and MCS between groups.

**Results:** Study comprised 54 RARE patients [Mean age (SD)

47.9 (16.0), 75.9% female], 53 OPO patients [66.7 (9.9), 88.7% female] and 52 controls [50.8 (16.3), 73.1% female]. The overall Cronbach's  $\alpha$  coefficient of the SF-36 was 0.889 and of the FSS 0.922. There were significant differences in fatigue between 3 groups ( $p=0.006$ ). Severe fatigue (FSS $\geq 4$ ) was reported by 38.0% of RARE patients, 20.8% OPO patients and by 11.5% controls. The least scores for both PCS and MCS were found in RARE group, followed by OPO and controls. Age-adjusted means (95%CI) of PCS and MCS in RARE was 36.1 (32.4-39.7) and 49.6 (46.2-53.1), in OPO 51.5 (46.4-56.6) and 50.2 (45.3-55.0), CTRL 45.2 (42.0-48.5) and 52.8 (49.8-55.9), respectively. FSS score was negatively correlated with physical and mental component in RARE ( $\rho=-0.45$ ,  $p=0.002$  and  $\rho=-0.57$ ,  $p<0.001$ , respectively) and OPO patients ( $\rho=-0.32$ ,  $p=0.03$  and  $\rho=-0.36$ ,  $p=0.01$ , respectively).

**Conclusion:** The QoL in adult patients with rare bone diseases is lower than compared to osteoporotic and control group. Fatigue has significant negative impact on QoL and it is important to address it when meeting with RARE patients in clinical practice.

## P608

### DEPENDENCE OF NEUTROPHIL EXTRACELLULAR TRAPS FORMATION ON REACTIVE SYNOVITIS IN OSTEOARTHRITIS PATIENTS

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**Objective:** Study reactive synovitis impact on the dynamics neutrophil extracellular traps (NETs) formation in osteoarthritis patients (OA).

**Methods:** Neutrophils were isolated with one-step centrifugation procedure using double-layer iohexol density gradient with density of upper and lower layers 1080 kg/m<sup>3</sup> and 1090 kg/m<sup>3</sup>, respectively [1,2]. The cell types in the resulting fractions were identified histochemically, and the extent of cell activation was assessed using common nitro-blue tetrazolium test. Generation of NETs was stimulated by phorbol-12-myristate-13-acetate (PMA). The shape and size of NETs were assessed using fluorescence microscopy with SYBR green [3].

**Results:** 31 patients with verified OA (7 males and 24 females, mean age 50,4 years, mean disease duration 12.5 years). 30 (9 males and 21 females) healthy volunteers were enrolled as a reference group. OA patients were in clinical remission at the inclusion timepoint. Synovitis was diagnosed in 23 OA patients during the study (3, 8 and 12 months after inclusion in the study). Neutrophil fractions showed high purity and a high content of viable non-activated cells. Mean percentage of spontaneous NETs in OA patients in remission was significantly increased comparing to healthy controls, the use of the PMA-inducer was accompanied by a significant increase in the ability of neutrophils to form NETs. The transition to exacerbation of OA was characterized by a fur-

ther significant increase in spontaneous and PMA-induced NETs. Spontaneous and induced NETs in OA patients with synovitis are significantly higher than in OA patients in remission. The growth rate of spontaneous NET formation was 149.1%, induced NET formation - 39.8%. The growth rate of spontaneous NET formation is 3.74 times higher than the induced NET formation in OA patients during exacerbation.

**Conclusion:** Reactive synovitis influenced NETs education in osteoarthritis. The data obtained suggest the possibility of participation of circulating neutrophils through NETosis in the pathogenesis of immune inflammation in OA.

#### Reference:

1. Bedina S et al. Medical Immunology 2022;24:1249.
2. Bedina S et al. Siberian Medical Review 2022;138:86.
3. Bedina S et al. Medical Immunology 2021;23:1165.

## P609

### EFFECTS OF PARATHYROIDECTOMY ON RISK OF FRACTURE BY SEVERITY OF PRIMARY HYPERPARATHYROIDISM: A DANISH REGISTER STUDY

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**Objective:** We have previously demonstrated that the risk of fracture is increased in primary hyperparathyroidism (PHPT) compared with matched controls. Here we investigated the effects of parathyroidectomy (PTX) on fracture risk according to severity of disease.

**Methods:** Using Danish hospital records, we identified patients diagnosed with PHPT between 1997 and June 2015. The severity of disease was based on serum calcium [ionised calcium concentration (mild: 1.33-1.44 mmol/L; moderate: 1.45-1.64 mmol/L; severe:  $\geq 1.65$  mmol/L) or total calcium concentration (mild: upper limit normal (ULN) range to 2.76 mmol/L; moderate: 2.77-3.02 mmol/L; severe:  $\geq 3.03$  mmol/L)] and PTH levels (mild:  $< 2 \times$ ULN; moderate:  $2-3 \times$ ULN; severe:  $> 3 \times$ ULN). All individuals were followed from index date to death, emigration, or 29/11/2017. Incident hip and major osteoporotic fractures were identified via ICD codes. An extended Poisson regression model was used to calculate the hazard ratio for fracture for PHPT patients prior to



and after PTX and by category of disease severity.

**Results:** Of the 6884 PHPT patients, 4186 (60.8%, mean age 60.6 years, 78% female) underwent PTX. After adjustment for sex, current age, and time since index/PTX date, the risk of hip fracture (HR: 0.35; 95%CI: 0.21-0.60) and major osteoporotic fracture (HR: 0.67; 95%CI: 0.50-0.90) was decreased after PTX compared to prior to PTX. When assessed according to disease severity (mild, moderate, or severe), PHPT patients with mild disease (mild hypercalcemia and mild PTH levels) had decreased risk of both hip (HR: 0.32; 95%CI: 0.14-0.70) and major osteoporotic fracture (HR: 0.63; 95%CI: 0.42-0.95) following PTX compared to prior to PTX. Similar results were seen for PHPT patients with severe disease (severe hypercalcemia or severe PTH levels) (HR: 0.27; 95%CI: 0.08-0.87 and HR: 0.39; 95%CI: 0.19-0.80, respectively).

**Conclusion:** Fracture risk is decreased following PTX even in patients with mild disease, suggesting a clinically meaningful benefit of PTX in this patient group.

## P610

### BURDEN OF OSTEOARTHRITIS IN THE NETHERLANDS: A SCOPING REVIEW

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**Objective:** We aim to provide an overview of the economic and human burden of osteoarthritis (OA) in the Netherlands.

**Methods:** The Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA2020) extension for scoping reviews was followed. Medline (via Ovid) and Embase databases were searched in September 2022 for all publications providing prevalence/incidence, cost or health-related quality of life (HRQoL) data of OA in the Netherlands. All sites of OA were included, and there were no restrictions on publication date.

**Results:** Of 438 potential references identified in bibliographic databases, 33 provided relevant data for this scoping review. Twelve studies reported prevalence/incidence data of OA, seven reported data on the economic burden of OA and twelve also reported HRQoL data of patients with OA. Most of the available data were provided by Dutch national cohorts. The prevalence of OA ranged from 6-18% across studies for knee OA, from 4-7% for hip OA and from 12-56% for hand OA, with high heterogeneity observed in terms of diagnostic approaches. Regarding economic burden, OA was shown to be associated with impairment in work participation and long-term requirement of health care utilization, translating into substantial medical costs and societal costs of lost productivity. Increasing age, female sex, and lower education level were related to lower work participation. Analgesics use and visits to health professionals were frequent sources of health care utilization in the early phase of OA but high quality information on the impact of OA on total/healthcare costs is scarce. All studies comparing HRQoL among persons with OA with control persons without OA showed a significantly lower HRQoL in patients with

OA, even after adjustment for age, sex, and various risk factors.

**Conclusion:** OA is a highly prevalent disease in the Dutch population and is responsible for a significant economic and humanistic burden. Several gaps were identified: i.e. lack of studies reporting the prevalence of hand OA in a population representative of the general Dutch adult population, no Dutch studies reporting medical costs for patients with hip and hand OA, and no studies providing utilities, as a specific measure of HRQoL for OA patients.

## P611

### SYSTEMIC LUPUS ERYTHEMATOSUS: CATALASE ANTIBODIES AS A MARKER OF ANEMIC SYNDROME

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**Objective:** To study the catalase activity antibody catalase level in serum and dependence of anemic syndrome in systemic lupus erythematosus (SLE) on catalase antibody.

**Methods:** The research was carried out in agreement with the WMA Declaration of Helsinki principles. Catalase activity in blood serum was determined spectrophotometrically and expressed in  $\mu$ CAT/ml. Catalase antibody was determined by enzyme immunoassay using immobilized granular preparations with magnetic properties. Statistical data processing is performed using the IBM SPSS Statistics 20 software. Evaluation results as mean (95%CI) (M (95%CI)).

**Results:** 35 SLE patients (33 women and 2 men, mean age 32.7 years) constituted the main group. 30 (3 men and 27 women, mean age 35.6 years) healthy people constituted the reference group. SLE activity was assessed based on the Systemic Lupus Erythematosus Disease Activity Index (SLEDAI). Anemia, characterized by a decrease in the number of circulating RBCs and hemoglobin (Hb) concentrations, was diagnosed in 26 (74%) SLE patients. Serum catalase activity was (M(95%CI): 22.28(21.38-23.18)  $\mu$ CAT/ml and 19.56 (18.32-20.8)  $\mu$ CAT/ml in the reference group and SLE patients, respectively. The catalase antibody level was 0.0587 (0.0437-0.0737) e.o.p. and 0.127 (0.109-0.145) e.o.p. in the reference group and in SLE patients, respectively. Correlation between the number of circulating RBCs, Hb concentrations and catalase antibodies level was found:  $r=-0.56$ ;  $p=0.02$  and  $r=-0.61$ ;  $p=0.01$ , respectively.

**Conclusion:** Our data on the possible involvement of catalase antibodies in the development of anemia in SLE may indicate. Catalase antibody level as an additional marker of anemic syndrome in SLE can probably be used.

P612

### PATIENTS' PREFERENCES FOR COMMUNICATING FRACTURE RISK: THE RISK COMMUNICATION IN OSTEOPOROSIS (RICO) STUDY

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**Objective:** Patients seek active involvement in decisions about their bone health, but little is known about how to best communicate fracture risk information to them. In order to facilitate greater patient involvement in clinical decision-making, this study aims to understand patient preferences, regarding fracture risk communication.

**Methods:** Semistructured interviews were conducted in 11 centres around the world (UK, Belgium, the Netherlands, Spain, Japan, Canada – Hamilton and Montreal, Argentina, Mexico, USA – Los Angeles and Spokane). The interview guide used to collect data was designed based on a systematic review and a qualitative pilot study involving 26 patients at risk for fractures. 332 postmenopausal women or women aged 60 years and older with or at risk of osteoporosis to whom anti-osteoporosis medicine were proposed were studied.

**Results:** Although participants (mean age 67.5±8.02 years, 48.2% with an history of fracture) considered it as important to receive information about their fracture risk (mean importance of 6.2±1.4 on a 7-point Likert scale), only 56% (i.e. 185/332) of them reported having received such information from their healthcare professionals. Globally, participants preferred a visual representation of their FRAX<sup>®</sup> score to a verbal or written presentation. Among visual presentations, colored graphs were preferred more often than icon arrays (colored graph ranked as the most understandable presentation and the most convincing to initiate a treatment by 61% of the sample). Many patients found a direct comparison of their fracture risk with and without medication use to be useful in deciding whether to initiate treatment. Almost all participants also considered it important to discuss the consequences of fractures (i.e. risk of death, inability to walk, loss of independence, loss of quality of life, and disability) and to receive a verbal explanation of their fracture risk from healthcare professionals. They also showed a potential interest in receiving a printed format or access to an online website that could present their own fracture risk.

**Conclusion:** The RICO study provides insights into preferred approaches, including visual representations of the FRAX score, to communicate fracture risk information with patients.

P613

### CIRCULATORY PATTERNS OF CYTOKINES, ADIPOKINES AND BONE MARKERS IN POSTMENOPAUSAL ASIAN WOMEN WITH LOW BMD

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**Objective:** To compare circulatory levels of selected cytokines, adipokines and Bone Turnover Markers (BTM) as well as levels of pro-resorptive and anti-resorptive cytokines secreted by peripheral blood mononuclear cells (PBMC) from postmenopausal women with normal and low BMD.

**Methods:** The study population included 71 postmenopausal Asian women, of whom 25 had normal BMD, 31 had osteopenia and 15 had osteoporosis. Serum levels of pro-resorptive cytokines (TNF $\alpha$ , IL-1 $\beta$ , IL-6, IL-8, IL-12, IL-17), anti-resorptive cytokines (IFN $\gamma$ , IL-4, IL-10, IL-13, TGF $\beta$ ) and five adipokine markers (adiponectin, adipisin, lipocalin-2/NGAL, PAI-1 and resistin) were measured using the Multiplex system and read on the Magpix ELISA platform. Further, levels of estradiol and two bone turnover markers procollagen type I N-terminal propeptide (PINP) and cross-linked C-telopeptide of type I collagen (CTX) were estimated.

**Results:** While serum levels of cytokines were not different between the three groups, PBMC from women with low BMD produced higher levels of the pro-resorptive cytokines TNF $\alpha$ , IL-6, IL-12, and IL-17 and lower levels of the anti-resorptive cytokines IL-4, IL-10, and IL-23 compared to women with normal BMD. Ratios of pro-resorptive to anti-resorptive cytokines indicate a stronger pro-resorptive cytokine bias in women with low BMD. Most of these ratios were lowest in the normal BMD group, modest in osteopenic women, and highest in the osteoporotic group. Serum levels of adiponectin, adipisin and resistin were significantly higher in the low BMD group. Further, while levels of CTX were not different between the two groups, levels of PINP, PINP/CTX ratio and estradiol were significantly lower in women with low BMD. Levels of adiponectin, PINP, PINP/CTX ratio and estradiol correlated significantly with BMD of the hip and spine.

**Conclusion:** Our data provide insights into the possible relevance of adipokines and bone turnover markers on the pathogenesis of postmenopausal osteoporosis because of the well-documented effects of these molecules on bone tissue and their contribution to the pathogenesis of osteoporosis. The data on cytokine production patterns of PBMC suggests a pro-resorptive cytokine bias in women with low BMD; this could contribute to the development of strategies for the treatment of systemic bone loss associated with osteoporosis.

**P614**  
**COST-EFFECTIVENESS OF WEEKLY GASTRO-RESISTANT RISEDRONATE 35 MG, COMPARED WITH WEEKLY ALENDRONATE TABLETS, IN THE TREATMENT OF POSTMENOPAUSAL OSTEOPOROSIS IN SPAIN**

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**Objective:** To estimate the cost-effectiveness of treating postmenopausal osteoporosis (PMO) with weekly gastro-resistant risedronate 35 mg gastro-resistant tablets (RIS-GR), compared with weekly alendronate 70 mg tablets (ALN) in Spain.

**Methods:** A probabilistic analysis (second-order Monte Carlo simulation) was performed with a time horizon of 5 years, from the perspective of the Spanish National Health System. The bone fracture probabilities were obtained from a cohort study of 3,614 women from USA with PMO treated with RIS-GR (1,807) or ALN (1,807)<sup>1</sup>. The pharmacological cost and the cost of fractures were obtained from Spanish sources (€ 2022). The utilities of patients with and without fracture (quality-adjusted life years [QALYs]) were obtained from the medical literature.

**Results:** Compared with ALN, treatment with RIS-GR can avoid 79 fractures (between 75 and 82) every 1,000 patients treated, and 0.0119 QALYs would be gained (between 0.0098 and 0.0140) per patient. Additionally, GR-RIS would generate a cost saving per patient of €1,994 (€1,437-2,904) with a probability of 99.7%. The deterministic sensitivity analyses confirmed the stability of the base case results.

**Conclusion:** The efficacy and economic analysis of this study suggests that weekly RIS-GR 35 mg is a cost-effective treatment for PMO compared with weekly ALN 70 mg in Spain.

**Reference:** 1. Thomasius et al. Osteoporosis Int 2021;33:217-28.

**Acknowledgment:** The study was funded by Theramex.

**P615**  
**AUGMENTED-REALITY TECHNOLOGY IMPROVES BALANCE, MOBILITY AND FALLS RISK IN ELDERLY PATIENTS: A META-ANALYSIS**

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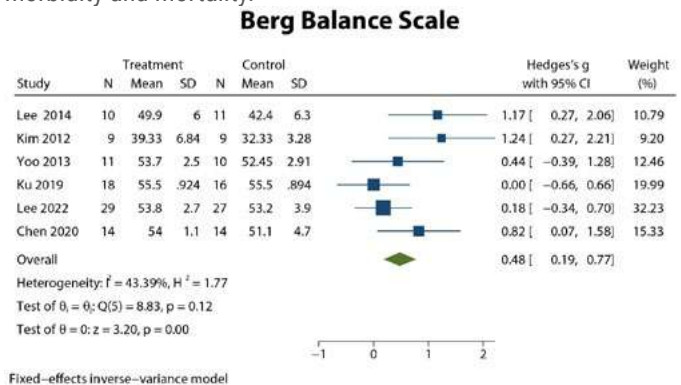
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**Objective:** Augmented reality (AR) technology has been widely used for rehabilitation purposes in healthcare owing to its ability for repetition, rapid feedback, and motivation for patients. The aim of the meta-analysis was to quantify the improvements in balance, mobility, and fall risk in elderly patients with the use of AR technology in comparison to conventional methods.

**Methods:** PubMed, Embase, and the Cochrane Central Register of Controlled Trials were systematically searched from inception to January 2023. Randomized trials and observational cohort studies comparing the effects of AR-based exercises with conventional training in elderly patients were included in the analysis. Studies using virtual reality, case reports and series, reviews, meta-analyses, letters, and editorials were excluded. Abstract screening and data extraction were performed independently by two researchers. Post-intervention data on the Berg Balance Scale (BBS) and Timed Up and Go Test (TUG) score were extracted and studied. The fixed-effects inverse variance model was utilized to pool the extracted data.

**Results:** Out of 438 articles, six articles (178 participants) comparing AR-based exercise with the controls were analysed. AR-based exercises resulted in a significantly higher BBS score than conventional exercise (Hedge's g=0.48, 95% C.I.=0.19-0.77, p<0.001). Likewise, the TUG score was found significantly lower in AR-group than the controls (Hedge's g=-0.41, 95%CI=-0.69- -0.12, p<0.01). No publication bias was observed in the review (p>0.05).

**Conclusion:** In comparison to conventional methods, AR-based exercises had higher improvements in balance, mobility, and fall risk parameters. The use of AR technology in elderly patients can promote independence while preventing falls and associated morbidity and mortality.



**P616**  
**GENOME-WIDE ASSOCIATION STUDY OF TRABECULAR BONE SCORE IN OLDER ADULTS: THE BUSHEHR ELDERLY HEALTH (BEH) PROGRAM**

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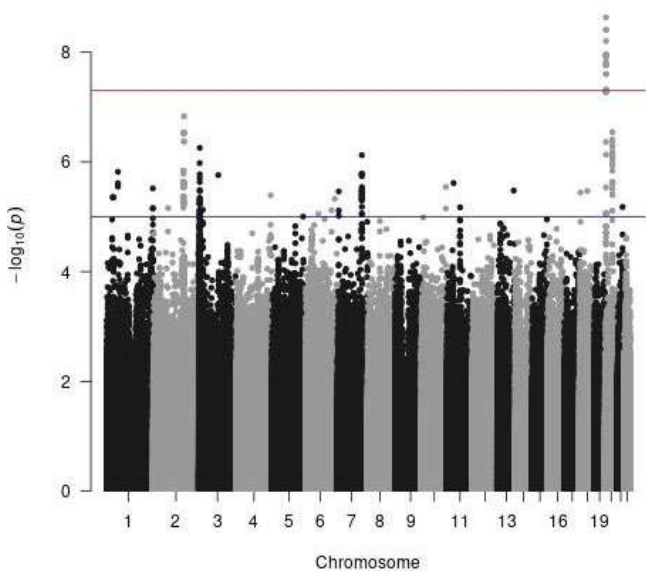
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**Objective:** This study was conducted to identify single nucleotide polymorphisms (SNPs) related to the trabecular bone score (TBS) in the elderly population of Bushehr, a southern province of Iran.

**Methods:** A genome-wide association study was performed on TBS in 2161 participants of the BEH cohort, a population-based cohort study. We investigated the association of more than 8.2 million SNPs with TBS of each lumbar spine from L1 to L4, as well as the mean of the four of them using a linear mix model. Adjustment was made for age, sex, and the first ten principal components. The genotype data were analyzed using the GCTA version 1.91.

**Results:** The number of genome-wide significant SNPs and loci were 30 and two for TBS L3. The most significant association was between rs77251236 (20p13, 18 kb upstream SLC23A2) and TBS L3 ( $p=2.31 \times 10^{-9}$ ). The findings explain 15 percentage of the genetic variance for TBS L3. We did not find any genome-wide significant SNPs for TBS L1, L2 and, L4.

**Conclusion:** The current study identified new loci associated with trabecular bone score, which were located near genes such as SLC23A2 and PCNA. PCNA has an important role on bone health and SLC23A2 may affect the trabecular bone formation through the encoded protein accounts for tissue-specific uptake of vitamin C.



## P617

**INTRINSIC CAPACITY USING THE MNA-SF AND THE GLOBAL LEADERSHIP INITIATIVE OF MALNUTRITION (GLIM) CRITERIA IN THE NUTRITIONAL DOMAIN AND MORTALITY-RISK: A 9-YEAR FOLLOW-UP IN THE SARCOPHAGE COHORT**

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**Objective:** Intrinsic capacity (IC) was developed in 2016 and is composed by five domains: sensorial, locomotor, nutritional, cognitive, and psychological domain. We aimed to estimate the ability of IC to predict death in community-dwelling older people using different criteria to define the IC nutritional domain.

**Methods:** The prospective, population-based *Sarcopenia and Physical Impairment with advancing Age* (SarcoPhAge) cohort included 534 community-dwelling participants  $\geq 65$ -year-old and followed them from 2013 to present (mean follow-up:  $9.3 \pm 0.3$  years). Outcome: death at 9-year follow-up, collected from medical records. Four IC domains were assessed at baseline (the sensory IC not collected in the SarcoPhAge study), and considered unsatisfactory when their score was below each assessment tool's threshold (for locomotor IC: Short Physical Performance Battery  $\leq 8$  points, for cognitive IC: Mini-Mental State Examination  $\leq 26$  points, and for psychological IC: Geriatric Depression Scale  $\geq 5$  points). The nutritional domain was considered unsatisfactory if both screening (MNA-SF  $\leq 11$  points) and diagnosis (GLIM criteria) were met. Appendicular lean mass/height<sup>2</sup> (reduced if  $< 7$  kg/m<sup>2</sup> in men and  $< 5.5$  kg/m<sup>2</sup> in women, measured by DXA) was considered for the reduced muscle mass phenotypic criterion. The association among baseline unsatisfactory IC domains and 9-year mortality-risk was calculated using odds ratio (OR) and 95%CI, adjusted for cofounders.

**Results:** From the 534 participants recruited at baseline ( $73.5 \pm 6.2$  years old; 60.3% women), 157 (29.4%) were death after a 9-year follow-up period. Patients with baseline unsatisfactory IC were at higher risk of death. The highest association with mortality was shown in participants with a baseline unsatisfactory IC nutritional domain (adjusted-OR=3.27 [95%CI 1.72-6.23]). Other IC domains were also predictive of death: adjusted-OR=2.31 [95%CI 1.38-3.86] for unsatisfactory locomotor domain, adjusted-OR=1.47 [95%CI 0.86-2.51] for unsatisfactory cognitive domain, and adjusted-OR=1.78 [1.12-2.83] for unsatisfactory psychological domain.

**Conclusion:** Presenting any of these four IC domains unsatisfactory at baseline was associated to a higher 9-year mortality-risk in community-dwelling older people. The sequential screening by MNA-SF and diagnosis by GLIM criteria, used to define an unsatisfactory IC domain, was associated to 3.5-fold higher mortality-risk. Incorporating the reference operational definition of malnutrition as IC nutritional domain could be helpful to guide Public Health Actions towards Healthy Aging.

P618

### SCREENING FOR MALNUTRITION BY THE MNA-SF, DIAGNOSIS BY THE GLOBAL LEADERSHIP INITIATIVE ON MALNUTRITION (GLIM) CRITERIA, OR BOTH? PREDICTIVE CAPACITY FOR MORTALITY IN A 9-YEAR FOLLOW-UP IN THE SARCOPHAGE COHORT

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**Objective:** Evidence have highlighted a higher risk of death in people with malnutrition. However, in the scientific community, different approaches have been proposed to screen or diagnose malnutrition. Moreover, the GLIS and ESPEN have recently recommended several ways to define a reduced muscle mass, one of the criteria used in the diagnosis of malnutrition. In this study, we aimed to explore the predictive risk of death of malnutrition, when muscle mass is measured with those different recommended approaches.

**Methods:** The prospective, population-based Sarcopenia and Physical Impairment with advancing Age (SarcoPhAge) cohort included 534 community-dwelling participants  $\geq 65$ -year-old and followed them from 2013 to present (mean follow-up:  $9.3 \pm 0.3$  years). Outcome: 9-year death, collected by medical records. DXA and anthropometry were used for muscle mass assessment. Baseline malnutrition was defined by: 1)MNA-SF $\leq 11$ ; 2)GLIM criteria incorporating in the muscle mass criterion, 2.1)appendicular lean mass(ALM)/height<sup>2</sup> (ALMI), 2.2)ALM/weight, 2.3) ALM/BMI, 2.4)ALM alone (GLIS), 2.5)ESPEN-endorsed calf-circumference, 2.6)calf-circumference, 2.7)mid-arm circumference, and 3)MNA-SF $\leq 11$ +GLIM criteria with ALMI. The association between baseline malnutrition and 9-year mortality-risk was calculated using odds ratio (OR) and 95%CI, adjusted for cofounders. Diagnostic accuracy and concordance for all techniques were calculated.

**Results:** From the 534 participants recruited at baseline (73.5 $\pm$ 6.2 years old; 60.3% women), 157 (29.4%) were death after a 9-year follow-up period. Prevalence of baseline malnutrition ranged from 10.9% (MNA-SF+GLIM with ALMI) to 23.9% (GLIM with ALM/BMI). Participants with baseline malnutrition showed higher mortality-risk, ranging from adjusted-OR=1.77 (95%CI 1.10-2.85) for GLIM criteria with ALM/BMI to adjusted-OR=3.27 [95%CI 1.72-6.23], for MNA-SF $\leq 11$ +GLIM criteria with ALMI. Diagnostic performance indicators and concordance for all techniques were good and strong, respectively, except for the MNA-SF (low-to-moderate agreement).

**Conclusion:** Malnutrition identified by MNA-SF and the GLIM criteria, predicted two-to 3-fold higher mortality. All the GLIS and ESPEN recommended techniques for muscle mass assessment ensured an accurate diagnosis. The sequential screening and di-

agnosis showed the highest predictive capacity for mortality and its combined use could be helpful to guide Public Health Actions on nutritional care in community-dwelling older people.

P619

### ASSOCIATION BETWEEN OSTEOPOROSIS SCREENING AND FRACTURE OUTCOMES IN OLDER SWEDISH WOMEN

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**Objective:** As a result of the ageing population, the burden of osteoporotic fractures is increasing and case finding strategies to identify those at high risk to reduce fracture risk are highly warranted. The objective of this study was to investigate treatment rates and fracture outcomes in older women 1) diagnosed with osteoporosis, with subsequent referral to their general practitioner, and 2) women with severe osteopenia, who were not referred to their general practitioner.

**Methods:** In total, 3028 women, 75-80 years old were included in the Sahlgrenska University hospital Prospective Evaluation of Risk of Bone fractures (SUPERB) study. At inclusion, 411 women were diagnosed with osteoporosis (T-score  $\leq -2.5$ ) at the spine or hip, did not have current or recent osteoporosis treatment, and were therefore referred to their primary care physician for evaluation (referral group). A control group of 217 women with severe osteopenia (T-scores between  $\leq -2.3$  and  $> -2.5$ ) at the spine or hip was selected. Cox regression (hazard ratios (HR) and 95%CI) analyses were performed to investigate the risk of fractures.

**Results:** During a median follow-up time of 6.6 years there were 76 MOFs (35%) in the control group and 106 MOFs (26%) in the referral group. The risk of MOF was significantly reduced (HR=0.64, 95%CI [0.47-0.87]) in the referral group compared to the control group. Similarly, the risks of hip fracture (HR=0.39, [0.22-0.70]) and any fracture (HR=0.69, [0.52-0.91]) were lower in the referral group. During follow-up, there was a 4-fold increase (HR=4.24, [3.27-5.51]) in prescription of osteoporosis medication in the referral group compared to the control group.

**Conclusion:** Screening older women for osteoporosis and referring those with osteoporosis diagnosis was associated with substantially increased treatment rates and reduced risk of any fracture, MOF and hip fracture.

P620

### EXPECTED PATIENT BENEFIT AND BUDGET IMPACT OF FRACTURE LIAISON SERVICE IMPLEMENTATION IN THE RUSSIAN FEDERATION

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**Objective:** We set out to estimate the patient benefit and budget impact over five years of Fracture Liaison Services (FLS) implementation in the Russian Federation at the country level as compared to local current practice.

**Methods:** A microsimulation model was used to simulate the pathway of individual men and women aged 50+ with a fragility fracture under current practice and under a scenario of wider FLS implementation. Data inputs were sourced from the literature, current FLS reports, benchmark values from other European countries, and consensus by local experts. The key outputs following one year of patients in the whole country presenting with a fragility fracture were fractures avoided, quality-adjusted life years (QALY) gain, savings in health and social care use and costs, and FLS-related resource use and cost investment required over the following 5 years.

**Results:** At least 46,028 hip, spine and other subsequent fractures would be avoided during the first five years of FLS implementation in Russia. This would result in a gain of at least 38,540 QALYs as well as 18,333 surgeries avoided, 311,680 bed days freed, 176,596 fewer clinic consultations, and 5,011 patient years of social care not needed. Avoided health care resources would lead to healthcare savings of at least 13.7 billion Russian rubles (RUB) or US\$183.8 million over the period, whilst social care savings would reach RUB 9.4 billion (US\$126.4 million). For this, an additional investment of RUB 31.9 billion (US\$428.2 million) in FLS services, 91% of which for anti-osteoporosis medication, would be needed. This represents 0.8% of total current costs and equates to an incremental cost-effectiveness ratio of US\$3,102 per QALY gained. Health benefits and budget impact would vary depending on FLS configuration such as expected identification rates, treatment initiation, medication prescription, and adherence. Results are highly sensitive to estimates of sex- and site-specific subsequent fracture rates.

**Conclusion:** FLS implementation in the Russian Federation would lead to substantial reduction in subsequent fractures and quality of life gain, whilst lowering the burden on the health and social care systems. Expected value for money places FLS as a highly cost-effective intervention in the country.

**Acknowledgment:** Funding received from the International Osteoporosis Foundation

P621

### TREATMENT WITH ROMOSUZUMAB IN A YOUNG MALE PATIENT WITH SPINAL CORD INJURY

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**Objective:** Patients with bone loss associated with spinal cord injury have limited treatment options, primarily bisphosphonates. Here, we report the case of a young male patient with spinal cord injury, a fragility fracture of the tibia, and low bone mass, who was previously treated with teriparatide and zoledronic acid with persistent low bone density in the hip. We present the patient's response to treatment with romosozumab.

**Methods:** We reviewed the patient's medical chart and received approval from the Ethics Committee to report this clinical case.

**Results:** A 40-year-old male patient with a history of spinal cord injury due to a firearm at age 26, with a sensory level of T7, presented with a fragility fracture of the tibia. Initial bone densitometry revealed normal spine BMD (1.185 g/cm<sup>2</sup>) and lower femoral neck BMD (0.637 g/cm<sup>2</sup>, Z-score -3.0). The patient received daily teriparatide at an outside facility for two years before being referred to our endocrine service. Secondary causes of bone loss were ruled out, and the patient received yearly zoledronic acid for six years, with stable hip and femoral neck BMD. However, after six years of zoledronic acid treatment, BMD remained low (FN BMD 0.698 g/cm<sup>2</sup>, T-score -2.6, Z-score -2.3; total hip BMD 0.608, T-score -3.0, Z-score -3.1), and we decided to start treatment with romosozumab. The patient received 210 mg of romosozumab for 10 months, which resulted in a significant increase in lumbar BMD (1.441 g/cm<sup>2</sup> to 1.495, T-score 2.2 to 2.6, Z-score 2.0 to 2.6) and a non-significant increase in left total hip (BMD 0.607 to 0.621, T-score -3.2 to -3.1, Z-score -3.1 to -2.9). Trabecular bone score was stable L1L4 (1137 to 1337). No side effects were reported.

**Conclusion:** Romosozumab may be a viable treatment option for patients with bone loss associated with spinal cord injury. The minimal gain seen in this case may be due to the extensive prior use of antiresorptive agents. There are ongoing clinical trials evaluating the use of romosozumab for this form of osteoporosis. Additionally, our case suggests that romosozumab may be a safe treatment option for young male patients.

P622

### DYNAPENIC ABDOMINAL OBESITY AND THE EFFECT ON LONG-TERM PHYSICAL PERFORMANCE TRAJECTORIES IN OLDER ADULTS

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**Objective:** To investigate whether the decline in physical performance is worse in individuals with dynapenic abdominal obesity and whether there are sex differences in this association.

**Methods:** We used longitudinal data from the English Longitudinal Study of Aging [ELSA], including 3875 participants aged 60 years and over. Physical performance was measured at baseline by the Short Physical Performance Battery [SPPB] and reassessed at four and eight years of follow-up. The study population were divided into non-dynapenic/non-abdominal obesity [ND/NAO], non-dynapenic/abdominal obesity [ND/AO], dynapenic/non-abdominal obesity [D/NAO], and dynapenic abdominal obesity [DAO] according to the sex-specific grip strength (<16 kg for women and <26 kg for men) and waist circumference (>88 cm for women and >102 cm for men). Generalized linear mixed models with physical performance as the outcome and the four groups according to dynapenia and abdominal obesity status as the main exposure were controlled by sociodemographic, behavioural, and clinical characteristics.

**Results:** The prevalence of D/AO and ND/AO was slightly higher in women than men (3.7%, [95%CI: 3.0 – 4.6] vs. 2.0% [95%CI: 1.4 – 2.7] and 50.3% [95%CI: 48.2 – 52.5] vs. 42.3% [95%CI: 40.0 – 44.6], respectively), although no difference in the prevalence of D/NAO was found between sexes (3.3% [95%CI: 2.6 – 4.3] vs. 3.9% [95%CI: 3.2 – 4.8]). At baseline, men (-1.11 points; 95%CI: -1.58 – -0.65) and women (-1.39 points; 95%CI: -1.76 – -1.02) DAO had worse SPPB performance compared to their ND/NAO counterparts. At the 8-year follow-up, only DAO men had a faster rate of decline in SPPB performance compared to ND/NAO men (-0.11 points per year; 95%CI: -0.21 – -0.01).

**Conclusion:** DAO men, but not women, exhibit accelerates decline in physical performance during the 8-year follow-up. Effort to avoid the first signs of functional impairment in men should focus on improving muscle strength and reducing abdominal fat.

P623

### SUPPRESSED PARATHORMON LEVELS AND HIGH BONE TURNOVER MARKERS IN NEWLY DETECTED HYPERTHYROIDISM: HOW FAR SHOULD WE GO TO INVESTIGATE IT?

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**Objective:** To introduce a female patient with multiple mineral metabolism changes at de novo detection of primary hyperthyroidism (PH).

**Case report:** This is a 70-year-old patient admitted for endocrine assessment due to suspected thyrotoxicosis. She entered menopause at age of 55, and has a history of venous thromboembolism currently on anticoagulants, arterial hypertension and ischemic cardiac disease. Overt PH is confirmed according to suppressed TSH=0.0000 µUI/mL(normal:0.5-4.5), very high FT4(free levothyroxine)=37.49 pmol/L(normal:9-19), while intensively positive TRAb(thyroid stimulating antibodies)=40 UI/L (normal: 0-1.75) sustain the diagnostic of Basedow-Graves' disease (BGD); thus requiring starting thiamazole 30 mg/d. She, also, associated (while not being under calcium and/or vitamin D supplements) high total serum calcium (TSC) of 10.9(8.4-10.2) mg/dL, high serum phosphorus (SP)=4.8(2.3-4.7) mg/dL, low PTH=11(15-65) pg/mL, and 25OHD=15 ng/mL(Normal>30). An increased bone turnover is reflected by high formation markers: osteocalcin=80.87(15-46) ng/mL, respective P1NP=162(14.28-58) ng/mL, and resorption marker serum CrossLaps=2.9(0.33-0.782) ng/mL. 2 months later while being under anti-thyroid medication (progressive reducing to 15 mg/d) and VD supplementation (1000 UI/d), FT4 normalized to 13.33 pmol/L(normal:9-19), so is TCS to 9.7 mg/dL, and SP to 3.98 mg/dL, 25OHD increased to 27.9 mg/dL, and PTH was within normal ranges of 48.68 pg/mL. Bone turnover markers (BTM) profile was stationary except for P1NP: osteocalcin=81.57 ng/mL(normal:15-46), alkaline phosphatase=248 U/L(normal:38-105), P1NP=276.8 ng/mL(normal:20.25-76.31), and CrossLaps=1.75 ng/mL(normal:0.33-0.782). DXA showed osteopenia: L1-4 BMD=1.272 g/cm<sup>2</sup>, T-score=0.6SD, Z-score=2.3SD, total hip BMD=0.790 g/cm<sup>2</sup>, T-score=-1.7SD, Z-score=-0.4SD, femoral neck BMD=0.786 g/cm<sup>2</sup>, T-score=-1.8SD, Z-score=0SD, 1/3 distal radius BMD=0.744 g/cm<sup>2</sup>, T-score=-1.5 SD, Z-score=0.3SD, while TBS=1.275 showed degraded microarchitecture and profile spine thoracic-lumbar plane X-ray showed no vertebral fracture. Close surveillance is recommended under specific anti-thyroid medication and vitamin D replacements. In case of completely normalizing thyroid function (including TSH which is currently of 0.0018 µUI/mL) and no response of BTM, a whole body bone scintigram is planned.

**Conclusion:** This case raises some questions in terms of thyroid-bone interferences in: which is timing of normalizing BTM in

people in their 70s who are newly detected with BGD; and when a secondary investigation like bone scintigram should be done if TSC and PTH normalized under specific medication for PH.

## P624

### EFFECTS OF NEUROPEPTIDE COCKTAIL ADMINISTRATION ON BONE METABOLISM AND PATHOGENESIS OF OSTEO-ARTICULAR DISEASES: AN IN VITRO STUDY

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**Objective:** To evaluate the effects of a neuropeptide cocktail (NC), consisting of Calcitonin Gene Related Peptide (CGRP), Substance P (SP) and Vasoactive Intestine Peptide (VIP) on the metabolism of primary cultures of human osteoblasts in terms of the expression of markers of mineralization, differentiation and cell proliferation, and to assess their involvement in the pathogenesis of musculoskeletal disorders.

**Methods:** Primary cultures of human osteoblasts were isolated from bone biopsies taken from patients undergoing hip arthroplasty for high-energy fractures (CTRL), osteoarthritis (OA) and osteoporosis (OP), as well as the human osteosarcoma cell line SaOs-2. Cell viability analysis was conducted by means of the MTS (3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium) assay to identify two different non-toxic concentrations, 10 nM (NC 1X) and 50 nM (NC 5X), used to treat the cells. After 5 days of NC treatment, toluidine blue staining was performed to quantify calcifying nodule-like structures. Mineralizing effects were investigated by alizarin red staining and immunocytochemistry for Pentraxin 3 (PTX3). Finally, immunocytochemistry for Runt-related transcription factor 2 (RUNX2) was performed to determine osteoblast differentiation.

**Results:** Our results show a potent mineralizing effect of the NC, evidenced by increased expression of PTX3 and staining with alizarin red and toluidine blue, concomitantly with increased expression of the differentiation marker RUNX2 in all experimental groups. However, the efficacy of the NC is significantly reduced in cells derived from OA and OP patients, suggesting a role of neuropeptides in the pathogenesis of musculoskeletal diseases.

**Conclusion:** The neuropeptides CGRP, SP, and VIP are involved in the pathogenesis of musculoskeletal disease, as their efficacy is reduced in OA and OP cells. There is a need to further investigate the role of these substances in bone metabolism and the pathogenesis of musculoskeletal disease in order to develop innovative strategies to optimize their mineralizing effect.

## P625

### THE EFFECT OF VITAMIN K2 ON THE TREATMENT OF CALCIFIC TENDINITIS OF THE SHOULDER

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**Objective:** We distinguish several forms of vitamin K – phylloquinone (VK1), menaquinones (VK2) and menadione (VK3). Vitamin K affects the coagulation cascade, bone mineralization and soft tissue calcification. In the process of calcification of soft tissues and bone mineralization, matrix Gla proteins (MGP) and osteocalcin are crucial. MGP have a high affinity for calcium ions and act as inhibitors of calcification and play a role in bone mineralization. Sufficient levels of vitamin K2 ensure the correct function of MGP and thus prevent the formation of extracellular calcifications of blood vessels and soft tissues. Calcific tendinitis of the shoulder is a disease characterized by a presence of calcium compounds in the rotator cuff, where they often cause severe, rapidly-onset pain and limited range of motion. Our goal was to verify whether the VK2 can affect the calcifications in calcareous tendinitis.

**Methods:** A group of 40 patients with calcific tendinitis was supplemented with vitamin K2 (MK-7) at a dose of 120 µg/d (30 patients) or with a placebo for 6 months (10 patients). To verify and evaluate the effect of vitamin K2, X-ray examination and blood collection (VK2, MGP, Ca, P, ALP, 25-OH vitamin D and creatinine) was performed before the start of treatment and periodically every three months.

**Results:** In 26 patients calcifications were significantly reduced (86.6%), and in 10 patients of them disappeared completely (46.7%). In 4 patients (13.4%), the finding was stationary, in none of our patients using VK2 the calcification progressed. No change of calcification was noted in 10 patients receiving placebo. The effect of VK2 was evaluated by X-ray examination and biochemical parameters. We detected significantly elevated levels in vitamin K2 only. All other biochemical parameters were unchanged.

**Conclusion:** Sufficient supplementation of VK2 significantly accelerates the resorption of calcium compounds in calcific tendinitis of the shoulder. This finding expands the range of options for conservative therapy of calcific tendinitis, allowing for invasive methods (needling, arthroscopy) to be avoided, which represents a significant discovery in the treatment.

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P626

### COMPRESSION FRACTURE OF THE VERTEBRAE IN A PATIENT WITH PRIMARY OSTEOPOROSIS: CASE OF CLINICAL PRACTICE

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**Objective:** Fractures of the vertebral bodies are referred to as "marker fractures" of osteoporosis. Due to the asymptomatic course, three-quarters of patients do not seek medical help, and subsequent pain symptoms are explained by the presence of degenerative changes in the spine. Up to 20% of patients who experience a pathological fracture of the vertebral body suffer a second fracture within the next year. In clinical practice, OP is often first recorded by radiologists, revealing vertebral compression when patients with radicular syndrome are treated. We aimed to analyze the development of pain syndrome in a patient with compression fractures of the vertebral bodies of the GOP and POP against the background of diffuse AP.

**Methods:** 890 patients, 302 men, 588 women, applied during the 2022 year with osteochondrosis. In 35 patients (28 women, mean age 72.3±5.4 years, 7 men, mean age 70.7±3.8 years), compression fractures were diagnosed for the first time. We give a typical example. Patient M, 69 years old, applied to the Second City Hospital in Cheboksary with complaints of acute pain in the lower back radiating to the right leg, severe weakness in the limb, which arose after a sharp awkward movement. Pain in the lumbar region for 3 years, almost constant, associated with heavy lifting, as well as girdle pain under the left shoulder blade and in the side for about 5 years. The patient was treated with a diagnosis of osteochondrosis GOP and POP, received courses of NSAIDs with a short-term effect up to 5-6 times a year.

**Results:** X-ray of the GOP and POP in 2 projections: wedge-shaped deformity of the body Th7 with a decrease in the height of the anterior section by more than 50% without signs of destruction, pronounced thoracic kyphosis and degenerative changes were detected in the thoracic region, pronounced scoliosis in the lumbar region, increased lumbar lordosis and wedge-shaped deformity of the body S1 with a decrease in the height of the left half of the vertebra and body S5 with a decrease in the right half of the vertebra by 50% without signs of destruction, pronounced degenerative changes – massive osteophytes, roughness of the end plates, depressions in places, syndesmophytes, a decrease in intervertebral spaces. Costal arches "sit" on the iliac crests. The vertebrae are porous, but most of them are little changed (with "keys"). Pg - signs are pathognomonic, the diagnosis is verified. The patient's treatment was revised in accordance with the Federal Clinical Guidelines and an individual rehabilitation program was selected to prevent recurrent fractures and improve the quality of life.

**Conclusion:** It is necessary to create training schools of self-control in order to prevent recurrent fractures.

P627

### IS STRENGTH TRAINING EFFECTIVE IN PREVENTING OSTEOPOROSIS?

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**Objective:** The article presents experimental data on the development and substantiation of a complex of physical exercises for the prevention of osteoporosis in men aged 41-50 years. Osteoporosis is increasingly affecting young people, including men. Low physical activity is one of the main factors of bone mass deficiency and violation of its structural and qualitative characteristics. But not all types of physical activity led to an increase in bone mass. Studies have shown that regular swimming lessons are not accompanied by a pronounced increase in bone mass [1, 2]. An active lifestyle in the elderly (walking, gymnastics) leads to an increase in bone mass and a decrease in the risk of fractures [3]. The purpose of the study is to substantiate the use of strength physical exercises for the prevention of osteoporosis in men in the age range of 41-50 years.

**Methods:** The experiment was carried out for two years from 2019-2021 at the Endocrinology Center in the city of Cheboksary, Chuvash Republic. The age of men was 41-50 years. The experiment involved 2 groups of men of 15 people. The groups were formed in full compliance with randomization procedures with mandatory standardization of the conditions and statistical parameters for measuring the studied indicators. The composition of the groups did not change during the entire experiment of 2 years. Group A performed a set of aerobic physical exercises (exercise bike or cycling on flat terrain 3 times a week for 20 km). Group B used a set of strength exercises (alternating exercises with a barbell, strength exercises on simulators), the exercises were borrowed from weightlifting. Bone density was determined by densitometry (g/cm<sup>2</sup>).

**Results:** Before the start of the experiment, the index of BMD of the neck of the right femur in group A was 0.991±0.074 g/cm<sup>2</sup>, in group B - 0.992±0.086 g/cm<sup>2</sup>. At the end of the experiment in group A this indicator was 0.998±0.082 g/cm<sup>2</sup>, and in group B there was an increase in the indicator and amounted to 1.165±0.081 g/cm<sup>2</sup>. In both groups, the indicators were statistically significant.

**Conclusion:** A complex of strength exercises can be recommended as a prevention of osteoporosis in men in the age range of 41-50 years. The use of systematic power loads helps to strengthen bone tissue. In order to prevent osteoporosis, they should be constantly dosed, taking into account the age and physiological characteristics of the body.

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## P628

### ROLE OF THE VITAMIN D RECEPTOR (VDR) IN THE PATHOGENESIS OF OSTEOPOROSIS: A GENETIC, EPIGENETIC AND MOLECULAR PILOT STUDY

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**Objective:** The vitamin D receptor (VDR) regulates bone development and calcium homeostasis, suggesting a central role in musculoskeletal diseases such as osteoporosis (OP). Several studies have examined the contribute of VDR polymorphisms and epigenetic signatures in bone metabolism and OP risk, with sometimes inconclusive results. Our study aimed to explore the association between genetic variability, expression and methylation pattern of VDR with the risk of OP in a cohort of Caucasian patients.

**Methods:** Genomic DNA from 139 OP, 54 osteopenic (Ope) and 73 healthy (CTR) subjects were used for genotyping the rs731236 (TaqI), rs2228570 (FokI) and rs11568820 (Cdx2) polymorphisms of the VDR gene by an allelic discrimination assay. Quantitative real-time polymerase chain reaction (qRT-PCR) analysis of VDR expression levels and pyrosequencing analysis of a VDR promoter CpG island were carried out in a sub-cohort (25 OP and 25 CTR) of subjects.

**Results:** Data obtained showed a significantly higher OP risk for rs11568820 GA and AA genotypes. qRT-PCR revealed lower VDR gene expression levels in OP group compared to CTR subjects, also associated with both rs11568820 AA genotype and femoral fragility fractures. No association was found between the methylation pattern of the region analyzed of VDR promoter and its expression levels.

**Conclusion:** Our results indicate that genetic variability and the expression pattern of VDR may play a role in the phenotypic severity and susceptibility of OP.

## P629

### RISK OF DIABETES MELLITUS IN PATIENTS WITH OSTEOPOROTIC FRACTURES TAKING BISPHOSPHONATES OR DENOSUMAB: A NATIONWIDE RETROSPECTIVE COHORT STUDY

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**Objective:** Previous preclinical studies suggest that bisphosphonates or denosumab may positively affect glucose metabolism, improving insulin sensitivity and glucose tolerance. However, clinical evidence regarding the association of bisphosphonate or denosumab use with the risk of diabetes mellitus (DM) is limited. This study aimed to evaluate the risk of DM in patients with osteoporotic fractures treated with bisphosphonates or denosumab.

**Methods:** This nationwide retrospective cohort study used Taiwan's National Health Insurance Research Database. Adult patients diagnosed with hip or vertebral fractures between 2012-2020 were included and classified into three groups: bisphosphonate, denosumab, or no treatment groups, based on each patient's prescription records. The primary outcome was incident DM requiring treatment with antidiabetic drugs. Stabilized inverse probability of treatment weighting was used to balance baseline characteristics between groups and control potential confounders (e.g., age, sex, income, comorbidities, Charlson comorbidity index, medications, and medical utilization). Cox proportional hazards models were used to estimate the hazard ratios (HRs) of DM development.

**Results:** We included 27641, 15565, and 153477 patients in bisphosphonate, denosumab, or non-treatment groups, respectively. Compared with those without treatment, patients taking bisphosphonates and denosumab had a lower risk of DM (bisphosphonates: HR=0.83, 95%CI: 0.78–0.88, p<0.001; denosumab: HR=0.78, 95%CI: 0.69-0.87, p<0.001). There was no significant difference in DM risk between bisphosphonate and denosumab users (HR=1.07, 95%CI: 0.95-1.20, p=0.290). Findings were consistent regardless of age and sex subgroups.

**Conclusion:** Bisphosphonate and denosumab use are associated with a lower risk of DM among patients with osteoporotic fractures. Future studies are needed to investigate the underlying mechanism and determine causality.

P630

## ASSOCIATION BETWEEN BISPHOSPHONATE USE AND THE RISK OF STROKE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** Some previous studies suggested that bisphosphonates may reduce the risk of stroke; however, the relevant evidence is inconsistent and inconclusive. We conducted a systematic review and meta-analysis to evaluate the association between bisphosphonate use and the risk of stroke based on up-to-date evidence.

**Methods:** We searched for studies evaluating the effects of bisphosphonate on the risk of stroke from inception until January 3, 2022 on PubMed, Embase, Scopus, and Cochrane libraries and updated our search till August 22, 2022 using PubMed to identify any new potential published studies. Two or more reviewers independently screened articles, extracted data, and assessed the study quality. We retrieved the data to synthesize the pooled relative risk (RR) of stroke associated with bisphosphonate use compared with controls; random-effects models were used for meta-analysis.

**Results:** A total of 21 studies (7 randomized controlled trials [RCTs] and 14 observational studies) involving 741,274 participants were included in our meta-analysis. Overall, bisphosphonate use was associated with a lower risk of stroke, but the result was only borderline significant (pooled RR=0.87, 95%CI: 0.76–0.99, p=0.048) (Figure 1). High between-study heterogeneity was found ( $I^2=83.7%$ ). Subgroup analyses showed that the evidence derived from RCTs suggested no significant association between bisphosphonate use and stroke risk (pooled RR=0.93, 95%CI: 0.76–1.13, p=0.462;  $I^2=13.4%$ ).

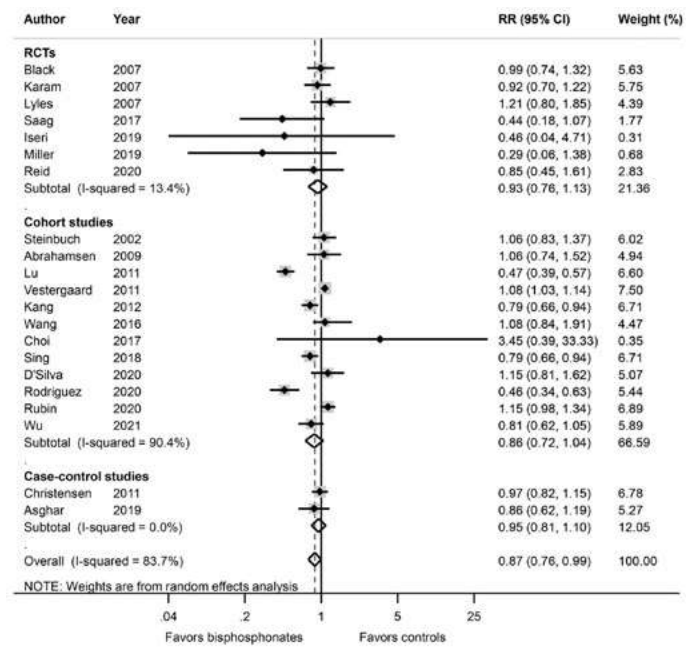


Figure 1.

**Conclusion:** Bisphosphonate use is associated with a lower risk of stroke based on currently available evidence. However, the borderline statistical significance and high between-study heterogeneity prevent us from making a definite conclusion. Future studies, especially RCTs, are necessary to assess causality.

P631

## SEQUENTIAL TREATMENT OF OSTEOPOROSIS: A CLAIMS DATA ANALYSIS COMPARING RISEDRONATE GASTRIC RESISTANT WITH ORAL BISPHOSPHONATES USED AFTER TERIPARATIDE

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**Objective:** International guidelines for osteoporosis (OP)<sup>1</sup> recommend teriparatide therapy for up to 2 yrs for patients at high risk of fracture, followed by antiresorptive OP therapy. Data on the optimal antiresorptive OP post-teriparatide is lacking. We aimed to compare fracture risk between patients initiated post-teriparatide on risedronate gastric resistant (RGR) vs. oral bisphosphonates with immediate release formulations (BPIR).

**Methods:** A large US claims database was used to identify patients with OP aged  $\geq 50$  yrs treated with teriparatide for  $\geq 6$  months from Jan 2010 to Dec 2021, followed by RGR or BPIR as their first therapy post-teriparatide, and who had  $\geq 6$  months of observation after the RGR and BPIR start date (index date). Incidence rate ratio (IRR) was used to retrospectively compare the risk of fracture between the RGR and BPIR cohorts (osteoporotic

fractures included those located at hip, pelvis, spine, and wrist/arm). Confounding factors were controlled for via inverse probability of treatment weighting (IPTW).

**Results:** Of 1,416 eligible patients, 89 and 1,327 were included in the RGR and BPIR cohorts, respectively (mean follow-up: 2.7 and 2.6 yrs). Patients in the RGR and BPIR cohorts were generally similar at baseline (mean age: 66 and 67 yrs; males: 11% and 12%; mean observed duration of teriparatide therapy pre-index: 1.4 and 1.5 yrs). The most used oral BP in the BPIR cohort was alendronate (844 pts, 64%). Fracture events were rare (RGR: 13 events/242 pt-yrs; IR: 255 events/3,453 pt-yrs). In the IPTW analyses, the fracture risk was lower though not statistically significant in the RGR than the BPIR cohort (IPTW IRR, 95%CI: 0.71, 0.31-1.62). Similar results were observed when comparing RGR and alendronate cohorts (IPTW IRR: 0.61, 0.24-1.56).

**Conclusion:** Notwithstanding limitations due to the reduced sample size, results from the current study suggest the risk of fracture post-teriparatide may be lower with RGR than BPIR. These results are consistent with findings from prior studies<sup>2</sup> that compared RGR and BPIR regardless of the prior OP therapies. Further studies with larger samples are needed to confirm our findings.

#### References:

- 1, Kanis et al. *Osteoporos Int* 2019;30:3.
2. Thomasius et al. *Osteoporosis Int* 2021;33:217.

**Acknowledgment:** The study was funded by Theramex.

## P632

### HIP FRACTURES IN MEXICO: DECREASING RATES BUT INCREASING HIP FRACTURES

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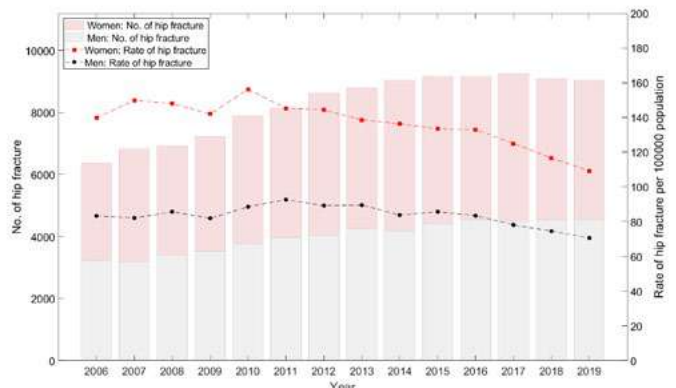
**Objective:** To examine the time trends of the number of hip fractures and rates in Mexico and a follow-up of the different five-year periods of age according to the birth cohort of the individuals.

**Methods:** Hip fractures registered from 2006 to 2019 were collected through the national discharge records of the Mexican Social Security Institute (IMSS). We performed a time trend analysis using linear regression and identification of break points in linear trends. In addition, a follow-up of the birth cohort of the different five-year periods of age was carried out.

**Results:** An increase of hip fractures from 2006 to 2019 in Mexico in both sexes  $\geq 50$  years (42% and 40% respectively) was noted, but the total number of fractures has increased. The fracture rates decreased in men and women by 1.9% and

0.9% per year respectively. Until 2005, this phenomenon had already been reported in other countries, but the difference is that these occurred at least a decade ago compared to the years analyzed here. When the information was analyzed by age groups, hip fracture rates were similar in both sexes but higher in women. The greatest contribution to the total number of fractures is due to the groups  $\geq 70$  years, people born before 1937 are causing the burden of fractures over the total data. In contrast, the younger generations appear to have lower rates.

**Conclusion:** Rates of hip fracture have steadily declined in Mexico since 2006, nonetheless as the population ageing in the coming decades current declines in rates could be expected to reverse.



**Figure 1.** Annual numbers, crude rates per 100 000 population of hip fractures.

## P633

### TREATMENT WITH VITAMIN D: MANAGEMENT AMONG DOCTORS IN SPAIN

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**Objective:** To evaluate vitamin D (VD) prescribing practices among Spanish doctors.

**Methods:** A national, 8-question Computer Aided Web Interviewing was completed by 698 doctors (General Practitioners-GPs, Rheumatology, Endocrinology, Internal Medicine, Gynecology, Traumatology and Geriatrics, N=95-110/specialty). Questions referred to testing, treatment, and monitoring of VD. Protocol was approved by the Research Ethics Committee.

**Results:** Out of the doctors surveyed (mean age 42 years, 56% women), 81% considered to identify VD deficiency as very relevant. 95% could ask for 25(OH)D testing with no restriction (87% for GPs), but actually only 74% tested at-risk patients before initiating VD treatment (absence of testing higher in Trauma and Gynecology). As to 25(OH)D levels, 47%, 45% and 7% of doctors considered to treat VD deficiency with values below 30, 20 or 10 ng/ml, respectively. Maximal level for risk of side effects was set over 50, 60, 90 ng/ml or unknown by 14%, 30%, 50% and 9% of clinicians. Doctors equally prescribed cholecalciferol or calcifediol (68% vs. 66%), being monthly and quarterly schedules the most frequent. Of those treating suspect of VD deficiency without testing, the percentage using cholecalciferol was higher compared to calcifediol ( $p < 0.05$ ). Once under treatment, 71% of doctors monitored patients at 4-6 months, 23% at 6-12 months and 5% did not follow up.

**Conclusion:** Spanish doctors are highly aware of the relevance of VD deficiency and testing before treating is usual. Cholecalciferol and calcifediol are commonly used, preferably at lower doses, although cholecalciferol prescribers trust more on its safety to treat in the absence of testing. Controversy is revealed regarding 25(OH)D optimal levels, mostly set at 30-50 ng/ml by guidelines. Risk of hypervitaminosis is a concern, usually monitoring treated patients. Results show no consensus on certain aspects of VD management, reflecting the need for medical education, harmonizing clinical guidelines and providing evidence-based recommendations across specialties.

## P634

### EPIDEMIOLOGICAL DATA FROM HUMERUS, WRIST AND VERTEBRAL FRACTURES FROM 2006-2019 IN MEXICO

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**Objective:** To examine the behavior of MOFs others than hip fracture and their incidence rates in Mexico during 2006-2019 in people  $\geq 50$  years of age.

**Methods:** Fractures in the population  $\geq 50$  years were gathered from the national discharge database SUI-70 from the Mexican Social Security Institute (IMSS) during the years 2006-2019.

**Results:** About 70,000 fractures were registered in this period; wrist and humerus fractures accounted for the highest numbers. The incidence rates analyzed showed that all fractures start increasing in people  $\geq 70$  years of age, being higher in women. The rates

of humeral fractures had an annual percentage increase of 1.40%, wrist fractures increased by 2.63%, while spinal fractures had a decrease of 0.82% from 2006 to 2019. The total number of wrist fractures in 2019 compared to 2006, an increase of 44% and 53% was observed, in women and men respectively. Similarly, humerus fractures increased by 43% and 34% in both sexes respectively. Contrarily, in spinal fractures a decrease in the total number of fractures of 14% and 15% was observed in both groups respectively.

**Conclusion:** Unlike what occurs in hip fractures, where rates have decreased in Mexico, the rates have increased for other fragility fractures. However, this increase did not show a specific pattern but seems to be fluctuating over time. This oscillation could be associated with an existing problem in the notification of this type of fractures worldwide, especially in vertebral fractures; hence, the pattern of increase is not as evident as it is with the hip fracture report.

**Table 1.** Annual rates per 100 000 population ( $\geq 50$  years)

	2006		2019	
	Women	Men	Women	Men
Humerus	20.4	12.3	27.1	16.5
Wrist	19.8	8.4	28.7	12.9
Spinal	5.1	8.2	4.4	6.8

## P635

### SHOULDER PAIN: DIFFICULTIES OF DIFFERENTIAL DIAGNOSIS

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**Objective:** Shoulder pain is a common complaint in practice of family doctor but differential diagnosis is sometimes very difficult.

**Methods:** This report describes a case of shoulder pain caused by combination of calcific tendonitis of the supraspinatus tendon and C5/C6 disc protrusion.

**Results:** A 45-year-old patient presented with progressive pain in the right shoulder. Visually, the area of the shoulder joint was unchanged, some hypotrophy of the muscles, soreness in the region of the large tubercle was marked and muscle strength was slightly reduced. On X-ray examination there was shading in the area of the subacromial space. Ultrasound revealed a pathological focus in the tendon of the supraspinatus muscle 45x12 mm. MRI confirmed the presence of calcification. Patient was diagnosed calcific tendonitis of the supraspinatus tendon received conservative treatment: nonsteroidal anti-inflammatory agents, subacromial blockade with betamethasone. Due to the insufficient effect, he was undergone surgery arthroscopy of right shoulder joint, subacromial decompression, removal of supraspinatus tendon calcification. After the operation the patient noted exacerbation of pain, which was interpreted as a reaction to surgery. Two months later motion in the shoulder joint was significantly limited in all directions, hypotrophy and decrease in the strength of mus-

cles in the arm was noted. Pain irradiated proximally to the innervation zone of 6th cervical nerve. MRI revealed a protrusion at the C5-C6 level with a right-sided distribution. The patient refused neurosurgical treatment and began therapy with physical rehabilitation specialists. 3 months later the pain decreased, there was an increase in the range of motion, but the limitation of abduction and external rotation remained.

**Conclusion:** This clinical case shows the need for careful differential diagnosis when examining patients with shoulder pain and the importance of differential diagnosis and combined treatment.

## P636

### BONE INVOLVEMENT IN CUSHING'S DISEASE

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**Objective:** Most of the studies on glucocorticoid-induced osteoporosis refer to exogenous exposure of cortisone and its derivatives. Only a small number of cases concern endogenous hypercortisolism.

**Methods:** We demonstrate the clinical case of secondary osteoporosis induced by ACTH-producing pituitary adenoma. Patient was a young 41-year-old Caucasian female who presented to the outpatient clinic with the symptoms of hypertension, hyperglycemia, acne, amenorrhea after the second delivery. Clinical features of Cushing's disease were typical: weight gain, excess red-ruddy round face, extra fat around the neck and abdomen, hip and shoulder muscle weakness, violaceous striae.

**Results:** The diagnosis was made by laboratory tests - consistent overproduction of cortisol: midnight salivary cortisol test - cortisol level 85,87 (normal range less than 7,56 nmol/l), 1 mg dexamethasone suppression test (cortisol level after dexamethasone administration persisted 848.8 mmol/l), ACTH 163,8 mmol/l (7,2-63,6). MRI revealed pituitary adenoma 12\*22 mm. DXA scan revealed T-score L1-L4 -2.6 Z-score -3.4 (T score L 1 -3.8 Z-score -4,6). Total neck left T-score-1.8 Z-score -1.9. Total neck right T-score -2.2 Z-score -2.3. The patient underwent transsphenoidal hypophysectomy and after surgery was carefully monitored. Calcium (1000 mg) and vitamin D (2000 ME) were administered. After a year DXA showed marked increase in BMD (+22%) T-score L1-L4 -1.0 Z-score -1.3 (T score L1 -1.6 Z-score -2,0). Total neck left T-score -1.3 Z-score -1.0, total neck right T-score-2.0 Z score -1.7.

**Conclusion:** This study proves that decrease of BMD in Cushing's disease is reversible. Successful treatment of Cushing's disease was associated with improvement in bone mass.

## P637

### EXAMINATION OF THE LEVEL OF STIMULATED CALCITONIN AS A COMPONENT OF VERIFICATION OF MEDULLARY CANCER

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**Objective:** Assessment of basal calcitonin as the main marker of medullary thyroid cancer (MTC) was introduced into routine practice in the Republic of Belarus more than 10 years ago. A number of laboratory and clinical factors can influence the result of this parameter determination. Equally important is the gender, age, weight, the deviation of the serum calcium level, certain medications. The aim of the study was to develop and implement of stimulated calcitonin test to solve the problem of low specificity of basal calcitonin test for MTC diagnosis.

**Methods:** The test protocol includes: 1) determination of basal calcitonin level in the serum - blood sampling before the administration of calcium gluconate; 2) determination of the stimulated calcitonin level in the serum - blood sampling in 2 and 5 minutes after intravenous administration of a 10% solution of calcium gluconate. Tubes with blood must be immediately placed on ice, as calcitonin decomposes at room temperature. It is recommended the estimated dose of a 10% solution of calcium gluconate is indicated in terms of elemental calcium and is 2.0-2.5 mg/kg. The maximum allowable dose (all patients weighing >70 kg) is 20 ml of a 10% calcium gluconate solution. The drug is administered intravenously slowly over at least 30 s. In this case, the patient must be in a horizontal position.

**Results:** In the Republic of Belarus stimulated calcitonin test was carried out in 2017 in the consultative and diagnostic department of thyroid pathology of the Republican Center for Thyroid Tumors. Within the framework of the project, the test was carried out in 50 patients, preventive thyroidectomy was performed in 20, the systematization and analysis of the results continues. Possible adverse reactions during the test are a feeling of heat, a decrease in blood pressure, heart rhythm disturbances, fainting, cardiac arrest. Contraindications to the test are hypercalcemia and the simultaneous intake of cardiac glycosides.

**Conclusion:** Thus, the introduction and conduct of a calcitonin stimulated test showed its effectiveness for the differential diagnosis of nodular thyroid pathology (primary diagnosis of MTC in patients with nodal pathology of uncertain malignancy potential, taking into account the hereditary factor and with elevated levels of calcitonin); to verify the progression of the tumor process in patients with MTC (detection of early biochemical recurrence). This method can confirm a stable remission of the disease and allow women with MTC to plan pregnancy.

P638

**NETTING ACTIVITY OF BLOOD PHAGOCYTES DERIVED FROM RHEUMATOID ARTHRITIS PATIENTS**M. Mamus<sup>1</sup>, E. Mozgovaya<sup>1</sup>, S. Bedina<sup>1</sup>, S. Spitsina<sup>1</sup>, A. Trofimenko<sup>1</sup><sup>1</sup>Research Institute of Clinical and Experimental Rheumatology named after A.B. Zborovsky, Volgograd, Russia**Objective:** Comparative analysis of extracellular traps generation by circulating monocytes and neutrophils from RA patients and healthy controls.**Methods:** 32 adult patients with verified RA were included in the study. 15 healthy volunteers were included in the control group. Circulating monocytes (Mo) were isolated using in-house adhesion technique. Neutrophils (Ne) were isolated with in-house one-step centrifugation procedure using double-layer density gradient. The generation of Mo and Ne extracellular traps (ETs) was stimulated by PMA. Morphological features of ETs were assessed using fluorescence microscopy with SYBR green. Results are expressed as percent of netting cells in smear. Central tendencies are expressed as means (95%CI).**Results:** The average proportion of Ne and Mo with spontaneous formation of extracellular traps in RA patients was significantly higher compared to healthy individuals. After the use of inducers of the formation of ETs, the proportion of ET-positive Mo and Ne became even higher, while the degree of increase even in inactive RA was significantly greater than in healthy individuals. The frequency of spontaneous and induced formation of ETs for Ne and Mo in patients with active ACPA-positive RA had some tendency to increase compared with samples from other patients. The average frequency of spontaneous and induced formation of Mo ETs for ACPA-positive RA patients was 18.5 (17.4-19.6) and 40.9 (38.5-43.3)%, respectively; for patients with ACPA-negative RA - 17.8 (16.6-19.0) and 37.3 (34.8-39.8)%, respectively. The growth rate of spontaneous formation of neutrophilic and monocytic ETs in patients with RA against the background of an increase in DAS28 >3.2 is higher than those for the induced one by 3.9 and 2.6 times, respectively.**Conclusion:** There is a significant increase in spontaneous and induced formation of ETs by both Mo and Ne during RA activation compared with the parameters of patients without a significant increase in RA activity.

P639

**ASSESSMENT OF THE STATE OF THE FAT COMPONENT OF THE BODY COMPOSITION IN PATIENTS WITH TYPE 1 DIABETES MELLITUS**Y. Dydyska<sup>1</sup>, A. Shepelkevich<sup>1</sup>, N. Vasilyeva<sup>2</sup>, O. Salco<sup>2</sup>, V. Lobashova<sup>2</sup>, E. Brutskaia-Stempkovskaya<sup>3</sup><sup>1</sup>Belarussian State Medical University, Endocrinology Dept., Minsk, Belarus, <sup>2</sup>Republic Center of Endocrinology and Medical Rehabilitation, Minsk, Belarus, <sup>3</sup>Belarusian State Medical University, Minsk, Belarus**Objective:** The connection of excess content of adipose tissue with the development of a large number of ontologies and pathological conditions has been proven, at the same time, the nature of the distribution of fat in the body can play a leading etiopathogenetic role. Thus, the purpose of our study was to identify the features of the content and distribution of adipose tissue in patients with type 1 diabetes mellitus (DM1).**Methods:** 95 patients with DM1 (60 women and 35 men) were examined. Mean age 30.6(24.9-37.5) years, duration of diabetes 13(7-20) years, age of disease manifestation 17(12-23) years, HbA1c 8.2(7.6-8,9)%. The control group consisted of 55 volunteers (31 women, 24 men). Comparison groups were identified: with normal body weight and with overweight (OWT). The assessment of the fat component was carried out in subgroups of men and women using the DRA method.**Results:** In the group with normal body weight, a comparable content of the fat component in women was revealed (total fat (TF): 18126 (14813-21483) vs. 16769 (14303-22884) g; U=523, p=0.593, percentage fat (fat%): 31.05(27.3-35.6) vs. 30.9(25.9-35.8)%, U=559.5; p=0.931; visceral fat (VF): 29.9(24.5-35.8) vs. 30.3(22.9-37.1)%, U=550, p=0.839) and in men with DM1 (TF: 13177(9629-17222) vs. 11552(8962-18903) g, U=154, p=0.839, fat%: 19.1 (14.5-24.2) vs. 16.25 (12.7-26.3)%, U=151.5; p=0.778; VF: 23.3 (17.7-29.3) vs. 22.6 (16-32.5), U=150, p=0.742) compared with controls. Similar data were obtained in the group with OWT - in women, TF: 28254 (25658-29499) vs. 29811 (26537-33443) g; U=24, p=0.395; % fat: 39 (37.9-41.4) vs. 41.8 (38.1-43.9)%, U=23, p=0.347; VF: 38.3 (35.1-42.2) vs. 43.65 (37.2-49.35)%, U=23, p=0.347) and in men TF: 23030 (19142-30231) vs. 22500 (19823-24454); U=95, p=0.473; % fat: 31.25 (22.9-34.2) vs. 24.8 (23.4-29.7)%, U=33, p=0.212; VF: 38 (29.2-46.6) vs. 33.45 (29-38.2), U=40, p=0.473. Differences in the distribution of fat in women with DM1 with normal and OWT were established - android-gynoid ratio (AGR) 0.72(0.65-0.85) vs. 0.8(0.75-0.93), U=220, 5; p=0.023; in healthy women, the corresponding differences were not revealed - AGR 0.74(0.66-0.87) vs. 0.86(0.79-0.95), U=30, p=0.166. In men with DM1 and those in the control group, AGR was comparable in groups with normal and OWT: DM1 0.91(0.72-1.1) vs. 1.1(0.83-1.28), U=44; p=0.135 and control 1.04(0.93-1.11) vs. 1.12(1.05-1.22), U=68; p=0.068.**Conclusion:** Patients with DM1 have a body fat content comparable to healthy individuals. Women with DM1 and OWT are charac-

terized by a redistribution of the fat component with an increase in the proportion of visceral adipose tissue.

P640

### GOUT AND COMORBIDITY

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**Objective:** The frequency of nephrolithiasis positively correlates with the degree of hyperuricemia. The appearance of calculi can precede gouty arthritis by at least 10 years in 14% cases. This study was on analysis of renal dysfunction in patients with gout in different age groups.

**Methods:** 237 patients with gout (average age for the men 60±8.0 years and for the women 63±9.0 years) were examined and analyzed retrospectively. The diagnosis of gout was carried out according to the classification criteria for gout according to American College of Rheumatology (ACR) and The European Alliance of Associations for Rheumatology (EULAR) 2015. The patients were separated into two groups, depending on the age of onset of gout: the age of onset up to and including 59 years (group I, 91 people) and the age of onset after 60 years inclusive (group II, 146 people). The raw data was processed in SPSS version 26.0.

**Results:** The renal function was more preserved in the representatives of group I: 51% had a level of glomerular filtration rate (GFR) corresponding to stage II of chronic kidney disease (CKD) (in the presence of kidney damage), stage IV of CKD was determined in only 2 representatives of group I. A pronounced decrease in kidney function was determined in group II representatives: significantly more often there was stage III of CKD (16 (22%) in group I and 59 (46%) in group II, p=0.001). In 12 participants in group II, GFR was below 29 ml/min/1.73 m<sup>2</sup>. Only in 6% of cases, a slight decrease in GFR was determined, which was IV times lower than in group I.

**Conclusion:** With increasing age, the frequency of risk factors acquired for gout increases, especially for kidney damage: taking small doses of acetylsalicylic acid increases from 6 to 40%, diuretics from 18 to 44%, alcohol consumption from 14 to 28%, hypertension from 44 to 78%, consumption of foods saturated with purine from 51 to 68%, overweight and obesity from 58 to 76% in groups of patients with gout onset at the age of 59 years including and 60 years and older.

P641

### THE FIRST ACCEPTED SYSTEM OF PRIMARY PREVENTION IN THE CZECH REPUBLIC BY THE CZECH INSURANCE HOUSE, BASED ON THE MEDICAL CARE AND MONITORING OF MUSCULOSKELETAL SYSTEM

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Primary prevention, according to CDC (the U.S. Centres for Diseases Control and Prevention), reduces probability of illness, physical incapability, or premature death due to unspecified causation. Primary prevention should precede all the secondary preventive programs which have been established, such as mammary, GIT, an others. The primary prevention, up to now, in the Czech Republic has not been listed as financially covered so far by the Czech insurance houses. However, it should aim at a large part of the population and should be economically rationalised.

This is the reason why we formulate the statement in which primary prevention is focused on chronic illness that according to the U.S. Centres for Diseases Control and Prevention cause about 75% of all deaths. Their basic cause is physical inactivity which, next to others, develop chronic low grade inflammation (LGI). Since 2002, as by definition from the World Health Organisation (WHO), these types of illness are referred to as an epidemic of non-communicable diseases (NCDs). They share a common cause, they last for a long time and have a slow progress. We have presented the verification of the key data on the last three IOF congress meetings (2022, 2021, 2020). See the reference 1., 2., 3. in the list of the literature. We have published the pathophysiological principle in the Czech Republic and also in Slovakia (Journal Remedia, 2021; m-edu-sk, 2022). We have also published an institutional scriptum which is available at our medical institution. After the evaluation of the real situation we designed a complex preventive program and it has been accepted by one of the large insurance houses in the Czech Republic. Medical examination in this system will be fully paid and will stimulate the clients financially to join the program. The preliminary verification group, before the participation of the state organs, counted 267 clients in the age range 45-70. The length of the prototype running was 4 years, since 2018.

The program is composed of three parts:

**Education-** is provided either on a mass scale (after agreements with state organs done with state press and media) or individually in a form of lectures, and individual consultations. We have prepared detailed materials where theory of the problematics is explained. Preliminary results were presented in the Czech Republic and at international conferences. Detailed materials are available on our website: [mediekosambulace.cz](http://mediekosambulace.cz)

**Diagnostics and monitoring-** 1. Grip Strength (M<30kg, F<20kg); 2. Evaluation of habitual speed of patient according to EWGSOP (M<0.8m/s); 3. Determination of BMI (Body mass index); 4. Quantitative evaluation of physical body composition (determination of relative muscle index M<7.26kg/m<sup>2</sup>; F < 5.45kg/m<sup>2</sup>); 5. Determination of activity for LGI-CRP protein high sensitivity (CRPhs < 0.4-0.6 mg/L) and interleukin - 6 (IL-6<7.0 ng/L). Control monitoring is offered after one year, in special cases after six months.

**Recommendation of the preventive regime:** This is composed of two parts:

**Recommendation of physical activity** which, according to WHO, should be 150 min per week at minimum. It is composed of two components: **1a/ physical isometric load**, i.e. exercising muscles



without contraction, against weight pressure (overstimulation).  
**1b/ physical longitudinal load**, where the optimal span is 3-5.9 MET (Metabolic Equivalent Task). This is an optimal aerobic load. We verified with our own sample whether this moderate intensity of walking speed at 5-8 km/hr is suitable for our clients and does not intervene into vigorous intensity and thus into the aerobic metabolism. The ratio between the isometric and longitudinal load is individual. The main stress is on the isometric load which strongly stimulates metabolic processes in the muscles. Physical regime is carried out at home by the educated client. If necessary, it can be adjusted by the physician.

**Dietary regime.** This is composed of the following parts:

**2a/ Setting the basic dietary regime.** In this context, as the basis for an individual's dietary regime, we recommend a regime very close to the Mediterranean diet. The reason is the ratio between the inflammatory and anti-inflammatory cytokines that relates to the individual dietary regimes. So called Western diets with prevalence of red meat are not suitable. The Mediterranean diet has optimal ratio of cytokines and stimulates many positive myoprotective impacts, such as so called hormetic effect by a stimulation of related factor 2, erythroid 2.

**2b/ Optimized amount or protein.** The amount <0.80 g/kg weight/a day is considered inadequate, while 0.83g/kg weight/a day is considered to be optimal (according to WHO). According to the European Society for Clinical Nutrition and Metabolism, the recommended amount for older people and a reduction dietary regime is 1.0-1.2g/kg/weight/a day. The most effective is whey protein enriched with Leucine. The optimal amount is 25-30g of protein with one meal, enriched with 2.5-2.8 g of Leucine.

**2c/ Vitamin D.** It is recommended to saturate the organism with vitamin D. See the reference list, No. 4.

This program was accepted by the second largest insurance house in the Czech Republic, Industrial Health Insurance House, in Zlín and North Moravian regions at the Mediekos Ambulance s.r.o. workplaces. The client receives 500 CZK/21 EURO at the first visit, mainly for the purchase of the whey protein. Subsequently, after one year of following the program and meeting the required criteria, the client receives 2000 CZK/84 EURO. During the first visit clients also receive a brochure with all the substantial information. The system will be gradually improved after practical experience and elimination of organisational flaws.

The most substantial about the above described principle is to follow it as complex measures. We have often witnessed varied individual recommendations which did not lead to a systematic change in dietary regime or physical regime. Those did not lead to a change in the understanding of health and illness. The client must be persuaded by the behaviour and offered services from the health care system that health is his/her property, not the state's property. The offer from the state should be constant and should contribute to the mind change. It will guide the client through a complicated period of aging towards longevity and independent existence. Such change is financially necessary with respect to the current situation in sanatoriums and long-term hospitalisation beds in hospitals. The health care system could

collapse financially, also due to lack of personnel, if this change is not soon implemented.

P642

## ULTRASONIC EVALUATION OF BONE MATRIX WITH DIFFERENT LEVELS OF OSTEOPOROSIS

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**Objective:** To create a process that accurately mimics osteoporosis, to image the samples with ultrasound, to observe heterogeneity levels by obtaining a percent echogenicity (%ECHO) of the structure of the bones, and to compare these with physical measurements of percent porosity and percent bone left in the samples.

**Methods:** Bovine femoral head samples were cut into 10 cubes (1x1x1cm) taken from the trabecular region of the bone. In order to observe repeatability in the results, all 10 samples were used as control first and then underwent osteoporosis induction. Each of these samples was exposed to 1.8% formic acid at increments of 10 minutes, from 10 to 80 minutes. At each time interval the samples were neutralized, degassed, imaged, and dried in preparation for further measurements of the physical parameters in the samples. B-scan images were collected with a 10 MHz ultrasonic transducer. A MATLAB program was employed to transform the pixels of the B-scans into a binary map to determine the %ECHO values of a selected but uniform region of interest (yellow box in Fig. 1). The ultrasound data was then correlated with physical measurements of percent bone (%Bone) present in the samples to evaluate the effectiveness of ultrasound imaging.

**Results:** Fig. 1 shows an example of the B-scan images collected for the control bone sample (A) and the same bone after it underwent osteoporosis-mimicking procedure for 10, 30, and 80 min (B, C, D). All 10 trials showed a decreasing trend in percent echogenicity as acid exposure incrementally increased. The results shown in Fig. 2 are average values for the percent echogenicity and bone present in all samples. As the acid exposure time increased, one can see that both %Bone and %ECHO decreased. There was a significant correlation between these values ( $R^2=0.92$ ,  $p=0.00004$ ).

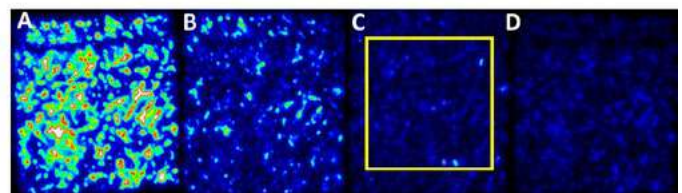
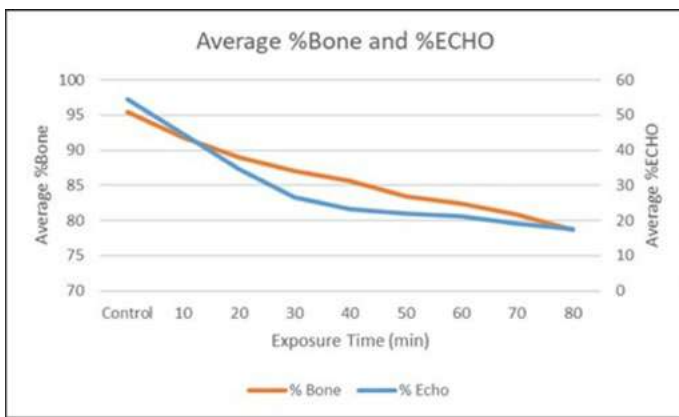


Figure 1.



**Figure 2.**

**Conclusion:** Results indicate that quantitative ultrasound analysis could be used as an alternative form of diagnosing and classifying osteoporosis. If such a technique is implemented into clinical practice, it may have a significant impact on detecting osteoporosis at an early stage while having the benefit of being non-ionizing.

### P643

#### STRENGTH FEATURES OF THE TIBIA RELATED TO BONE MINERAL IN DIABETIC RATS AFTER REPEATED FRACTURE

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**Objective:** To test strength of the tibia in diabetic rats after fracture (FR), which followed healed fracture of the femur.

**Methods:** Female rats (n=72) were distributed into 3 groups: group 1 comprised intact animals; group 2 comprised non-diabetic animals with fractures of both femurs and both tibiae. FR modeling was performed by means of perforation of the metaphyseal area to ensure that both cortical and cancellous layers were disturbed. Tibia FR was performed in 45 days after femur injuring giving time for femur FR to heal. Same interventions were performed in animals of the group 3, yet this group consisted of animals with type 2 diabetes caused by 60-day adipogenic diet. This diet lasted up to the end of the experiment. Observation terms were 7, 15, 30, and 60 days. At the end of each observation period tibiae were collected and prepared for strength testing. Three-point bending was chosen as testing method. The data collected were used for calculation of ultimate strength (US) and fracture energy (FRE).

**Results:** In animals of the group 2 values of both US and FRE decreased compared with those of the group 1. These changes were observed mainly in early observation periods while on the 60<sup>th</sup> day these values were close to the control values. This testifies for recovery of injured bone in later terms. In the group 3 compared with the group 2 US values decreased by 11.27%, 13.57%, and 38.02% on the 7<sup>th</sup>, the 15<sup>th</sup> and the 60<sup>th</sup> day. Values of FRE in the same group decreased by 11.09%, 11.21%, and 17.83% on the 15<sup>th</sup>, on the 30<sup>th</sup>, and on the 60<sup>th</sup> day.

**Conclusion:** In non-diabetic animals, strength of tibia after repeated FR decreases in the beginning of the experiment but recovery signs are still observed. In diabetic animals both strength features coming from calcium content remain lower than those of non-diabetic ones even in late terms, which testifies for persistent bone loss and thus low ability of healing in diabetic animals.

### P644

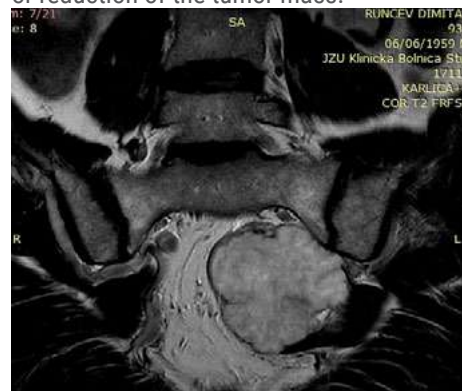
#### A CASE OF LOW GRADE CHONDROSARCOMA OF SACRUM

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**Objective:** Chondrosarcoma is a rare malignant tumor of bone. This family of tumors can be primary malignant tumors or a secondary malignant transformation of an underlying benign cartilage tumor. Pain is often the initial presenting complaint when chondrosarcoma involves the spine. Due to the resistance of chondrosarcoma to both radiation and chemotherapy, treatment is focused on surgery. With en bloc excision of chondrosarcoma of the mobile spine and sacrum patients can have local recurrence rates as low as 20%.

**Methods:** A 63-year-old male presented with left side sciatica pain, radiating to the posterior thigh and, at times, extending to the left inguinal region. The working diagnosis of ischialgia was established 18 months prior and the patient was treated with anti-inflammatory, analgesics and vitamin therapy. Despite these, the pain recurred and the patient experienced further symptoms, including spreading discomfort to the left testis, accompanied by burning and prickling sensations. Further diagnostic examinations, including lumbosacral X-ray, laboratory tests, MRI, and CT scan of the pelvis, revealed the presence of a large Tu formation (14cm posteriorly and 6cm anteriorly) originating from the Sacrum-S1,S2 and infiltrating the L5 vertebral body and compressing on nerve roots and rectosygmoidium. Before a year from now, an open biopsy was performed and the diagnosis of low-grade chondrosarcoma was established. Due to resistance to chemotherapy and radiation, surgical treatment was indicated. A combined anterior and posterior surgical approach was proposed due to the dimensions of the tumor, with the aim of en bloc resection or reduction of the tumor mass.





**Results:** The patient has denied operative treatment because of the possible complications and has applied for carbon ion radiotherapy but is still waiting for the treatment. By far the patients' mobility hasn't been affected and his overall condition is good, the only difficulties that the patient experiences are urgent need for urination and defecation.

**Conclusion:** Low grade chondrosarcoma of the sacrum is a rare slow growing malignant tumor. However, anatomical complexity, large tumor size, and high complication rate make it rarely possible to achieve RO resection of these tumors. Better results are achieved with combining surgical treatment and radiotherapy (proton - beam therapy).

## P645

### COMPENSATORY VITAMIN D METABOLISM WHEN TAKING HIGH DOSES OF CHOLECALCIFEROL

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**Objective:** To study the compensatory mechanisms of vitamin D metabolism in a situation of long-term use of high doses of cholecalciferol.

**Methods:** A male patient, 45 years old, with prolactin-secreting macro pituitary adenoma, effectively treated for hyperprolactinemia by cabergoline, was taking cholecalciferol 20000 IU per day for several months not controlling 25(OH)D blood levels. At the present evaluation his total of 25(OH)D was 94 ng/ml (30-60) with normal levels of PTH, blood and urinary calcium. Due to

high levels of vitamin D the serum was tested for vitamin D metabolites (HPLC-MS/MS): 25 (OH)D3 – 93.5 ng/ml (30-60), 3-epi-25(OH)2D3 – 10.6 ng/ml (1.0-10.0), 24,25(OH)2D3 – 8.5 (0.5-5.6), 25(OH)D3/24,25(OH)2D3 – 11.0 (7.0-25.0), 1,25(OH)2D3 - 63.20 pg/ml (18.0-64.0).

**Conclusion:** The presented clinical case reflects the body's good compensatory ability to metabolize high doses of vitamin D with activation of predominantly 24-hydroxylation and to a lesser extent 3-epi-hydroxylation, that despite high vitamin levels are not accompanied by an increase in its active metabolite of calcitriol or hypercalcemia.

**Acknowledgment:** The study was carried out with the financial support of the Russian Science Foundation, project № 19-15-00243-P

## P646

### PRE-OPERATIVE PHYSICAL STATUS & COGNITIVE FUNCTION & DELIRIUM AND NUTRITIONAL STATUS AND HIP FRACTURE INPATIENT MORTALITY

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**Objective:** 7-10% of hip fracture patients die within 30 days of admission and approximately 30% die within one year after their fracture. We aimed to study some of the physical status and cognitive function parameters in patients who died in hospital following hip fracture

**Methods:** Retrospective analysis of hip fracture inpatient mortality in a two-year period. Demographic data, ASA score on admission (as an assessment of the pre-operative physical status), Abbreviated Mental Test (AMT) on admission (for assessing the possibility of dementia) & 4 AT postoperatively, within 3 d (a tool to detect delirium) and (MUST) on admission (a screening tool to identify the nutritional status), hours between admission and surgery and length of stay from admission/diagnosis of fracture to death, and the 1 a cause of death. Data were downloaded on an excel sheet and descriptive statistics were used for analysis.

**Results:** 1036 hip fracture patients were admitted during the study period; 70% female and 30% males with average age of 83.2 and 81.4 years respectively. 8.5% (88/1036) had died while inpatient. 64% (56/88) females and 36% (32/88) males with an average age of 85.6 and 86.2 years respectively. All data were not available for all patients who died. ASA score: 55% (40/73) of patients who died had ASA score of III, and 40% (29/73) had score IV. AMT: 51% (40/79) scored <8/10 (suggestive of dementia). 30% (23/79) had AMT of 3/10 or less; i.e. severe dementia; with 20% had AMT of 0/10. However 49% (39/79) had a score of 8 or more, and 25% (20/79) scored 10/10. 4 AT: 58% (35/60) scored <4 and 41% (25/60) scored 4 or more. 8% (5/60) scored 12, i.e. markedly delirious. MUST: 23% (18/79) of patients were malnourished, 8% (6/79) were at risk of malnourishment and 70% (55/79) had normal nutritional status. The average time between admission and surgery was 39.4 hours. 15% (13/88) had no operation done. The average length of stay from admission or diagnosis of fracture to

death was 16.6 days. The most common 1 a cause of death was respiratory infections, it was reported in 58% (25/43) of cases. Limitation: We analyzed the profile of hip fracture patients who died as inpatients. We did not compare the patients who died to those who survived.

**Conclusion:** Hip fracture patients who died, as inpatients, are older people with poor physical status, nutritional status and mental function. On admission 95% of them had pre-operative severe systemic disease or severe systemic disease that is a constant threat to life. 51% had dementia and 30% had severe dementia. On admission, nearly one third were malnourished or at risk of malnourishment. 41% developed delirium postoperatively. Respiratory infections were documented as the 1 a cause of death in 58% of cases.

### P647

#### ATYPICAL FEMORAL FRACTURES: A CLINICAL CASE SERIES

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**Objective:** We report on the characteristics and management of a case series of atypical femoral fractures (AFF) in patients treated with bisphosphonates at a Bone Health Clinic at our hospital.

**Methods:** We searched our bone health database (between 2011 and 2023) for patients with a diagnosis of complete or incomplete AFF. All cases were reviewed to ensure the diagnosis was consistent with ASBMR criteria. We then collated relevant clinical data regarding presentation, duration of bisphosphonate use and patient treatment.

**Results:** We identified 23 patients, all female. Mean age for AFF was 71.5 years (range 54-91). Most patients (17) were treated with oral bisphosphonates, 3 zoledronic acid and 3 both oral and intravenous therapy. Six patients had AFF while on denosumab following bisphosphonate use. Mean duration of bisphosphonate use was 7.2 years (range 2-12) and denosumab 3.4 years (range 0.5-7). Most (18) presented with complete AFF and 5 incomplete. Contralateral incomplete AFF was identified in about a third (6) of patients presenting with complete AFF while one patient had bilateral incomplete AFF. Nearly half of all patients (10) had prodromal thigh pain. Most complete AFFs (13) were sustained from a simple fall while 5 were atraumatic. Complete AFFs were treated with surgical fixation and 7 received teriparatide. Patients with incomplete AFF were all considered for prophylactic femoral nailing with 3 having surgery, 4 healing with teriparatide, 3 dying of other issues before surgery and one being monitored closely. One patient had a non-union of surgically managed complete AFF despite teriparatide.

**Conclusion:** These cases are a reminder of the need for judicious use of bisphosphonates beyond five years and the importance of identifying incomplete AFF in patients with thigh pain when on treatment. While AFF is less common on denosumab, most patients have prior bisphosphonate treatment. Teriparatide may

reduce the time to healing in patients with complete AFF though non-union can still occur. Prophylactic femoral nailing should generally be done in incomplete AFF, especially if there is a visible fracture line, pain or ongoing use of steroids, though healing may occur spontaneously on withdrawal of bisphosphonates.

### P648

#### THE NEGLECTED ASSOCIATION BETWEEN SCHIZOPHRENIA AND BONE FRAGILITY: A SYSTEMATIC REVIEW AND META-ANALYSES

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**Objective:** Schizophrenia is associated with increased risk of medical comorbidity, possibly including osteoporosis. This is of public health concern due to associated economic, social and health consequences. In this systematic review and meta-analysis, we aimed to determine whether schizophrenia is associated with bone fragility.

**Methods:** The research question and inclusion/exclusion criteria were developed and presented according to the PECO (Population, Exposure, Comparison, Outcome) framework. Schizophrenia was identified from medical records, DSM-IV/5 or the ICD. The outcome for this review was bone fragility including BMD, fracture, bone turnover and bone quality. A search strategy was developed and implemented for electronic databases. A narrative synthesis was undertaken for all included studies; the results from eligible studies reporting on BMD and fracture were pooled using a random effects model to complete a meta-analysis. The conduct of the review and reporting of results adhered to PRISMA guidelines. The protocol for this review has been published (Azimi Manavi et al, 2023) and registered with PROSPERO (CRD42020171959).

**Results:** Our search yielded 3,103 studies, of which 29 met the predetermined eligibility criteria. Thirty-seven reports from 29 studies constituted 17 studies investigating BMD, eight investigating fracture, three investigating bone quality and nine investigating bone turnover. The meta-analyses revealed that people with schizophrenia had lower BMD at the lumbar spine [standardised mean difference (SMD) -0.74, 95%CI -1.27, -0.20; Z=-2.71, p=0.01] and at the femoral neck (SMD -0.78, 95%CI -1.03, -0.53; Z=-6.18, p≤0.001). Also observed was a higher risk of fracture (OR 1.43, 95%CI 1.27, 1.61; Z=5.88, p≤0.001). Following adjustment for publication bias, the association between schizophrenia and femoral neck BMD (SMD -0.63, 95%CI -0.97, -0.29) and fracture (OR 1.32, 95%CI 1.28, 1.35) remained.

**Conclusion:** Significantly increased risk of bone fragility was observed in people with schizophrenia. This association was independent of sex, participant number, methodological quality and year of publication.

**Reference:** Azimi Manavi B et al. *BMJ Open* 2020;10: e041859

**Acknowledgment:** The help and support of Blair Kelly, Librarian at Deakin University.

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### TWO-YEAR MORTALITY PREDICTORS IN OSTEOPOROTIC FRACTURES: A RETROSPECTIVE STUDY

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**Objective:** Fragility fractures represent the major determinant of morbidity and mortality associated with osteoporosis. Some predictors have been described for one-year mortality in osteoporotic fractures, such as male sex, hip fractures, and older age. Two-year mortality predictors are less well-recognized for these patients. The purpose of this study is to evaluate the presence of two-year mortality predictors in a cohort of Portuguese patients with osteoporotic fractures.

**Methods:** Single center, retrospective study of patients with osteoporotic fractures between 2017-2022. The number of fractures, demographic and clinical data were collected. Multimorbidity was defined as  $\geq 2$  chronic non-communicable diseases. Descriptive analysis was performed, using medians and interquartile range (IQR) for continuous data and frequencies and percentages for qualitative variables. Univariate and multivariate analysis was performed to evaluate two-year mortality predictors.  $p$ -values  $\leq 0.05$  was considered statistically significant.

**Results:** A total of 758 patients were enrolled in the study, 627 patients (82.70%) were female, and the median age was 80 years, IQR 13 years. We found a total of 151 deaths within the first two years post-fracture, 60 of which occurred during the first year. On univariate analysis, male sex ( $p=0.01$ ), older age ( $p<0.001$ ), chronic kidney disease ( $p=0.01$ ), the presence of multimorbidity ( $p=0.01$ ), baseline anemia ( $p<0.001$ ), and higher FRAX score for major and hip fractures ( $p=0.03$  and  $p<0.01$ , respectively) were associated with a two-year mortality in these patients. Moreover, pelvis or hip fractures were associated with higher two-year mortality rates when compared with other types of fractures. On the other hand, lower mortality incidences were encountered in patients initiating anti-osteoporotic treatment after osteoporotic fracture and patients under treatment at the time of fracture ( $p<0.001$ ). On logistic regression, older age [OR1,1 CI(1.05-1.11)], male sex [OR1,9 CI(1,2-3,2)], and anemia at baseline [OR2,9 CI(1,9-4,4)] were found as independent predictors for two-year post-fracture mortality.

**Conclusion:** Our study suggests that older age, male sex, and anemia are independent risk factors and predictors of two-year mortality in patients with osteoporotic fractures.

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### FEATURES OF DENSITOMETRIC CHARACTERISTICS OF BONE TISSUE IN ADOLESCENTS DEPENDING ON GENDER, BSML POLYMORPHISM OF VDR GENE, AND VITAMIN D STATUS

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**Objective:** To determine the relationship between Gender, Vitamin D level, and VDR Gene BSML polymorphism to bone density (BMD) in healthy adolescent children.

**Methods:** Study included 201 healthy children aged 10-17 including 108 males ( $13.0 \pm 1.8$ ) and 93 females ( $12.7 \pm 1.7$ ). History and Physical Exam confirmed normal development and healthy with no endocrine disorder or genetic syndromes. 25-(OH)-D level, ultrasound densitometry of calcaneus, and molecular diagnostics (BSML polymorphism of the VDR gene) were performed on all children. Decreased bone density was defined as BMD Z-score  $\leq -2.0$  (The International Society for Clinical Densitometry 2019).

**Results:** 47.2% of males had decreased BMD. Of the males with low bone density, average Z-score was  $-2.2 \pm 0.27$  SD and 25-(OH)-D level  $41.39 \pm 9.05$  SD nmol/l. Of males with normal bone density, average Z-score was  $-1.29 \pm 0.56$  SD and 25-(OH)-D level was  $42.16 \pm 8.83$  SD nmol/l. 41.9% of females had decreased BMD. Of the females with low bone density, average Z-score  $-2.3 \pm 0.31$  SD and 25-(OH)-D level was  $38.22 \pm 10.29$  SD nmol/l. Of females with normal bone density, average Z-score was  $-1.41 \pm 0.42$  SD and 25-(OH)-D level was  $44.04 \pm 6.71$  SD nmol/l. The following variants of the VDR gene were detected in males with low BMD: 1) mutations weren't detected in 56.9%, 2) heterozygous mutation, 35.3%, and 3) homozygous mutation, 7.8%. Males with normal BMD: 1) mutations weren't detected in 52.6%, 2) heterozygous mutation, 43.9%; and 3) homozygous mutation, 3.51%. The following variants of the VDR gene were detected in females with low BMD: 1) mutations weren't detected in 41.0%, 2) heterozygous mutation, 38.5%, and 3) homozygous mutation, 20.5%. Females with normal BMD: 1) mutations weren't detected in 44.4%, 2) heterozygous mutation, 46.3%; and 3) homozygous mutation, 9.26%.

**Conclusion:** Pathological gene mutations were significantly more common in females, especially in the group with low mineral density, which may indicate the influence of this variable on the mineralization of bone tissue. Also, the level of vitamin D in females with low BMD was the lowest. In males, the number of pathologi-

cal mutations of the VDR gene in the group with low BMD was the lowest. Our previous work has shown the mineralization of bone tissue of males in puberty is influenced not only by the metabolism of vitamin D and the gene that regulates it, but also by the growth spurt.

## P651

### INTERNATIONAL VALIDATION OF INTERAI FALL AND FRACTURE RISK ALGORITHMS FOR HOME AND LONG-TERM CARE: A RETROSPECTIVE COHORT STUDY

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**Objective:** To describe the distribution and predictive accuracy of two algorithms that predict first-time fallers (1<sup>st</sup>Fall) and fractures (Fracture Risk Scale (FRS)) across countries and care settings (home care (HC) and long-term care (LTC)).

**Methods:** This retrospective cohort study included LTC residents and HC recipients assessed between 2008-2019 in Canada (LTC n=123521, HC n=18950), New Zealand (LTC n=108573, HC n=8426), Germany (LTC n=934), Belgium (LTC n=1480, HC n=6578), and Europe including the Netherlands, Iceland, Finland, and Italy (HC n=2017). Data were obtained through the interRAI assessments for HC and LTC where available (Minimum Data Set 2.0, interRAI Long-term Care Facilities instrument, or the Resident Assessment Instrument for Home Care). The proportion of people in each risk level and who experienced a first-time fall or any fracture (hip or other) were described. The predictive accuracy of the algorithms was determined via logistic regression.

**Results:** In LTC across all countries, the mean age ranged between 74-85 and 65.8% were female. In HC, mean age ranged between 78-82 and 63.3% were female. Overall, 1.1-17.8% and 3.0-24.0% of people fell for the first time in LTC and HC, while 0.0-5.4% and 2.9-11.8% had any fracture in LTC and HC, respectively. The c-statistic ranged between 0.557-0.630 for 1<sup>st</sup> fall in LTC, 0.560-0.603 for 1<sup>st</sup>Fall in HC, 0.656-0.699 for FRS in LTC, and 0.531-0.625 for FRS in HC.

**Conclusion:** The predictive accuracy of the 1<sup>st</sup> fall and FRS were consistent across countries considered in this study. Both algorithms yielded c-statistics close to 0.6 suggesting that these algorithms can be used to predict risk of falls and fractures in HC and

LTC. This study will also aid in future research to further enhance predictions.

## P652

### THE ASSOCIATION OF POLYGENIC RISK OF OSTEOPOROSIS WITH BONE MINERAL DENSITY AND VASCULAR WALL STATUS INDICATORS

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**Objective:** To study the associations between BMD and vascular wall indicators and to assess the informativeness of genetic risk scales (GRS) based osteoporosis (OP), previously developed in European populations, in the prognosis of OP and vascular wall disorders.

**Methods:** 250 female outpatients in the peri- and postmenopausal periods (aged 45 to 69) were enrolled into a cross-sectional study. The intima-media thickness (IMT), the presence and number of atherosclerotic plaques (AP) were studied using duplex scanning. Coronary vessels calcium deposits were registered by multispiral computed tomography using the Agatston calcium index (CI). The BMD was measured using double energy x-ray absorptiometry. The genetic study included DNA extraction from whole blood samples. Targeted sequencing was performed on the Nextseq550 sequencer (Illumina, USA). GRS of OP included 62, 63, 1300 variants of nucleotide sequences.

**Results:** The chance of detecting low bone mass adjusted for age increased more than 2.5 times at values of IMT  $\geq 0.9$  mm (OR=2.51; 95%CI [1,12-10,14], p=0,045), 2.1 times in the presence of AP in the carotid arteries (OR=2.13; 95%CI [1,15-3,94], p=0,016), by 5.2 times with an Agatstone CI  $\geq 101$  units (OR=5.25; 95%CI [1,19-23,13], p=0,028). According to multivariate linear regression analysis (adjusted for age, duration of postmenopause, marker of bone resorption CTx), a significant association of all GRS with BMD in all parts of the skeleton was revealed. Both univariate and multivariate regression models adjusted for several covariates (age, total cholesterol, systolic blood pressure) showed a reliable association of GRS62 with the presence of AP and GRS63 - with coronary artery CI.

**Conclusion:** The results of the study demonstrated the association of polygenic risk of OP with BMD and vascular wall status indicators in women in the peri- and postmenopausal periods.

P653

**ANTIPSYCHOTIC MEDICATION USE AND FRACTURE: A CASE-CONTROL STUDY**

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**Objective:** It has been previously reported that antipsychotic use is associated with lower BMD and bone quality. We aimed to determine whether antipsychotic use is also associated with fracture risk in a population-based sample of men and women.

**Methods:** In this case-control study, we examined data collected from 1,458 participants (48.2% men) with radiologically confirmed incident fracture (cases) and compared with 1,796 participants (53.5% men) without fracture (controls). Medication use, anthropometry and lifestyle factors were self-reported. Multivariable binary logistic regression was used to explore the associations between antipsychotic use and fracture following adjustment for possible confounders.

**Results:** In women, antipsychotic use was identified for 20 of 755 (2.6%) cases and 10 of 834 (1.2%) controls ( $p=0.03$ ) and in men, antipsychotic use was identified for 13 of 703 (1.8%) cases and 5 of 961 (0.5%) controls ( $p=0.01$ ). Following adjustment for age, antipsychotic use was associated with a 2.4-fold increased risk of fracture in women and a 3.5-fold increased risk of fracture in men. Further adjustment for lifestyle factors, past fracture, falls and other medication use did not explain the findings and patterns persisted after the exclusion of minor fractures and self-reported schizophrenia.

**Conclusion:** Higher likelihood of fracture was observed for antipsychotic users compared to non-users, independent of recognised confounders. While future research exploring underlying mechanisms are needed, regular monitoring of bone health in antipsychotic users is suggested.

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**25 YEARS WITH OSTEOPOROSIS: THE TURKISH OSTEOPOROSIS SOCIETY**

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The Turkish Osteoporosis Society founded in 1998 celebrates its 25th anniversary this year. It is a national, non-profit organization founded by faculty members of various universities who are still working devotedly for years in the field of osteoporosis. Our society aims to make scientific contributions, and to cooperate with national and international institutions as a member of International Osteoporosis Foundation (IOF).

**Missions and Activities of the Turkish Osteoporosis Society On-going for 25 years:**

**Educational Activities and Scientific Meetings:** National Osteoporosis Conferences endorsed by IOF, the Osteoacademy, symposia and courses are organized regularly since 1998.

**Research and Publications:** The Turkish Osteoporosis Society's epidemiologic publication on the prevalence of hip fracture in Turkey has led to the national reference data in country based FRAX, and also a consensus report "Updated approach for the management of osteoporosis in Turkey" was published in 2020.

**The Turkish Journal of Osteoporosis:** This periodic journal is the society's continuous scientific publication since 1998 and it is indexed in the ESCI.

**Social Responsibility Projects:** The Turkish Osteoporosis Society planted 1000 pine saplings in 1998 as a social responsibility project, and they turned to a magnificent pine grove over the years.

In order to attract interest and raise awareness, "Break records, not bones" campaign was organized which took place in the Guinness Book of World Records for the highest number of BMD screening in 24 hours, in 2020.

**Coordination of FLS-Fracture Liaison Services:** Secondary fracture prevention and IOF's CTF campaign have been our priority as well. In collaboration with IOF, Turkish Mentors from our society performed various training programs; workshops, FLS Cafes, and roundtables. This programme has proven to be very effective for increasing the implementation of FLS. Indeed, the number of FLS has increased ten times in the last 2 years in Turkey.

**The 25th Year Project:** A brand new project is planned to obtain up-to-date national data on vertebral fracture incidence across Turkey. There will be other new projects besides ongoing activities while we are proudly celebrating the 25th anniversary of the The Turkish Osteoporosis Society.

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### DECOMPOSITION AND SIMPLIFICATION OF FRACTURE RISK ASSESSMENT TOOL IN TAIWAN

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**Objective:** The FRAX<sup>®</sup> tool is the most popular tool in screening the subjects with high risk fracture. The calculating details of FRAX tool, especially the country-specific calculator, is important but never been disclosed. This study aimed to decompose the FRAX tool, via the national community survey database, and identify the major clinical risk factors for osteoporotic fractures for clinical screening.

**Methods:** Participants were recruited from a cross-sectional community survey database was Taiwan Osteoporosis Survey (TOPS) between 2008 and 2011. The BMD value was measured by a DXA machine (Explorer, Hologic, USA). The 11 FRAX clinical risk factors were collected from the health questionnaire. The 10-year fracture risk was calculated by the FRAX tool, including major osteoporotic fracture (MOF) and hip fracture (HF). Multiple Linear Regression are applied to evaluate the interactive impact of those clinical risk factors. The logarithm of the 10-year fracture probability for the regression models were used due to the logarithmic relationship between the 10-year fracture probability and clinical risk factors.

**Results:** A total of 18,462 participants exhibited a female predominance with a mean age of 65.43 years. The mean femoral neck BMD was  $0.69 \pm 0.13$  g/cm<sup>2</sup> and the T-score was  $-1.9 \pm 1.15$ . Age, sex, parent fractured hip, and prior fracture were the main 4 clinical risk factors of the FRAX tool, regardless of MOF or HF, once femoral neck BMD assessed by decision tree algorithm was excluded. After decomposing the FRAX tool, the R<sup>2</sup> of the model with BMD was 0.92 in MOF and 0.93 in HF, and the model without BMD was 0.95 both in MOF and HF. The R<sup>2</sup> of the simplified model was 0.91-0.92 in MOF both with and without BMD, and 0.93 in HF with BMD. The FRAX tool was found to be more fitted for females than males in the Taiwan calculator after a sex stratification analysis.

**Conclusion:** Age, gender, and fracture history are important predictors of fracture in Taiwanese population. The simplified FRAX tool for community or clinical screening determined straightforwardly the 10-year fracture risk even without femoral neck BMD.

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### DEEP LEARNING BASED OSTEOPOROSIS DETECTION AND CLASSIFICATION SYSTEM BASED ON SIMULATED STANDARDISED BONE MINERAL DENSITY SCORE

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**Objective:** To prevent from osteoporosis and osteoporotic fractures, early prevention is essential and important because the treatments tend to be more effective in the early stages of the condition. In this study, it was proposed to build a T-score algorithm which could generate a simulated t-score that was comparable to the T-score rendered by DXA machine in order to detect the presence of osteoporosis in a more accurate and efficient manner. Considering the high accuracy and precision of the deep learning model (DenseNet121) in osteoporosis detection, it would be beneficial to osteoporosis patients as this tool would facilitate the process of screening without inflicting serious harm and financial burdens on them. It also enabled an earlier intervention to halt the process of osteoporosis and most importantly the occurrence of osteoporotic fracture in elderly patients.

**Methods:** DenseNet 121 was used for training and testing of 200 spine X-ray imaging data and subsequently rendered simulated T-scores for classification of osteoporosis. The algorithm was developed under the Python environment. To assess the performance of the DenseNet, the multiclass confusion matrix was employed and was used to produce five major assessment parameters – accuracy, precision, sensitivity, specificity and F-score values. To investigate the statistical relationship between the simulated T-scores and DXA T-scores, Pearson's correlation coefficient and mean square error were utilized.

**Results:** DenseNet121 model detected osteoporosis with high accuracy and precision by the multiclass confusion matrix. Mean square error was 0.214 which indicated only small variations were observed between the simulated t-scores and DXA t-scores. A strong and positive correlation between the DXA t-scores (ground truth values) and the simulated t-scores (predicted values) was observed as well which means it was capable of performing an automatic detection program for osteoporosis

**Conclusion:** The system based on DenseNet was proposed to detect and predict the simulated T-score because of the overwhelming advantages. It could classify healthy, osteopenia and osteoporosis based on the calculation of the simulated T-score which was comparable to the T-score generated by DXA. Thus, it has the potential to lessen the financial burden on medical examiners as well as the time and manual burden on radiologists for qualitatively detecting osteoporosis.



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### HIGH FRACTURE RATE OF FAMILIAL AMYLOIDOTIC POLYNEUROPATHY IN TAIWAN: A REAL-WORLD EVIDENCE

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**Objective:** Familial amyloidotic polyneuropathy (FAP), a rare autosomal-dominant neurodegenerative disease characterized by sensory and motor polyneuropathies, has gained attention in recent years owing to treatment improvements. In literature review, Amyloid material was demonstrated on bone biopsy and caused pathological fracture. However, the epidemiological real-world mega database of nationwide is limited. This study aims to explore the fracture rates of FAP patients compared with general population.

**Methods:** This study was based on nationwide claims data from Registry for NHI Catastrophic Illness Card database to identify FAP patients and linked to Taiwan's National Health Insurance Research Database for medical records. The fractures were identified based on ICD-9/10-CM from hospital claims.

**Results:** A total of 141 FAP patients were identified in the study from 2008-2019. The patients were mostly men (64.5%), with a mean age of 61.7 years and a mean follow-up year of 5.39 years. There are 12.2% of FAP patients had experienced with total fractures, 4.1% had major fractures, including 0.68% with hip fracture, 0.68% with vertebral fracture, 1.35% with forearm fracture, and 2.03% with shoulder fracture. FAP patients have a total fracture rate that is 10-fold and a major fracture rate that is 4-fold higher than the general population (1.15% and 0.90% respectively).

**Conclusion:** Patients with FAP appear to be at an increased risk of total fracture, implying that an early and well-planned fracture prevention and treatment program could be beneficial. FAP is a rare but possible cause in patients with unexplained fractures.

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### SYMPTOMATIC RIZARTROSIS AND THERAPEUTIC EFFECT OS PLATELET-RICH PLASMA FACTOR BETWEEN OCTOBER 2018 AND OCTOBER 2021 AT THE HOSPITAL RUBER JUAN BRAVO

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The therapeutic options in rhizarthrosis are limited. New technologies lead us to use treatments that have had an effect in other specialties to try to minimize the evolution of osteoarthritis. Due to the evidence of the use of PRP in gonarthrosis, in September 2018, we also began in symptomatic stage II and III rhizarthrosis under 65 years of age, evaluating it with the VAS and Q-DASH scale before treatment, at one month, 6 months and 12 months. The objective was to describe the changes in the degree of pain after PRP therapy as well as the quality of life.

Observational, analytical-descriptive, retrospective, longitudinal single-section study in a patient with symptomatic rhizarthrosis being followed up by Rheumatology at HRJB between October 2018 and October 2021.

Data from clinical histories were collected. Differences in functional quality of life and differences in pain were analyzed at each follow-up time.

Treatment with PRP benefits the clinical course of rhizarthrosis, obtaining a significant decrease in pain of at least 2 points on the VAS scale. Its use results in a significant improvement in functional quality in the medium-long term. Therefore, the use of PRP is an alternative in the management of rhizarthrosis that would reduce the use of analgesics in these patients, with what its excessive use implies.

The purpose of the project is to design a prospective, double-blind, randomized multicenter study with 4 treatment arms: PRP, Hyaluronic, Corticosteroids and placebo.

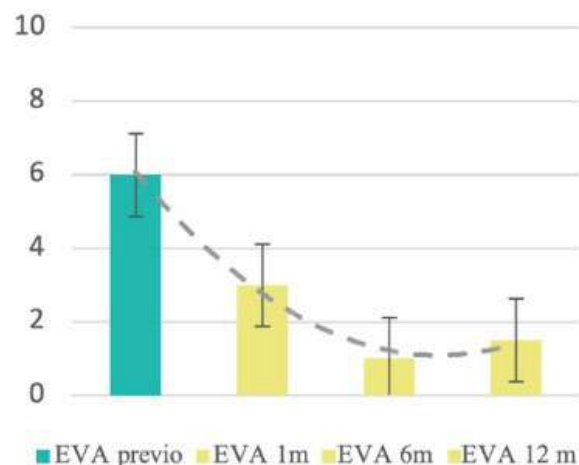


Figura 1 : Progresión en el tiempo del grado de dolor según la Escala EVA.

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### THE RELATIONSHIP BETWEEN DIABETIC FEMALE PATIENTS AND OSTEOPOROSIS: IDENTIFYING THE RISK WITH FRAX SCORE BASED ON BMI INDEX

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**Objective:** Osteoporosis is defined as a skeletal disorder characterised by compromised bone strength predisposing a person to an increased risk of fracture. BMI of an individual have been recognized as a major factor contributing to Osteoporosis. In relation to that, diabetic female patients who has a lower BMI score tend to have a higher risk of suffering from Osteoporosis. We aimed to identify the risk of diabetic female patients suffering from Osteoporosis based on FRAX score, with the relation of their BMI.

**Methods:** This is a prospective study from January 2022 to December 2022, elderly female patients aged 55 years and above, with underlying Diabetes Mellitus, along with all fragility fractures that were presented to our hospital were identified by the Fracture Liaison Service Coordinators. Patients with severe trauma, malignancy or steroid-induced fractures were excluded. Demographics data, medication prescription and surgical data were recorded.

**Results:** A total of 91 female patients were recorded (12 patients are underweight, 42 patients are in normal, 30 patients are overweight, and 7 patients are obese). Based on FRAX scoring, underweight patients have high risk of developing major osteoporotic fracture (91.7%) compared to normal and overweight patients. However, all patients who were in underweight, overweight, and obese categories have high risk of hip fracture compared with normal BMI.

**Conclusion:** Despite of any BMI, female patients with diabetes have a high risk of sustaining Osteoporotic fracture, mainly in hip fracture. In all patients with diabetes, besides optimal glycemic control, general recommendations regarding adequate dietary calcium intake, regular exercise, and avoidance of other potential risk factors such as smoking should be advised, as well as anti-osteoporotic medications should be prescribed to reduce risk of secondary fracture.

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### RELATIONSHIP BETWEEN MALE PATIENTS AND OSTEOPOROSIS: IDENTIFYING THE RISK WITH FRAX SCORE BASED PREVELANCE OF DIABETES

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**Objective:** Osteoporosis is defined as a skeletal disorder characterised by compromised bone strength predisposing a person to an increased risk of fracture. With the aging of the population, there is a growing recognition that osteoporosis and fractures

in men are significant public health problems, and both hip and vertebral fractures are associated with increased morbidity and mortality in men. Diabetes is a risk factor for bone fractures. We aimed to understand the relationship between male patients and osteoporosis based on FRAX score, with the relation of underlying diabetes.

**Methods:** This is a prospective study from January 2021 to December 2022, elderly male patients aged 55 years and above, along with all fragility fractures that were presented to our hospital were identified by the Fracture Liaison Service coordinators. A comparison between diabetic and non-diabetic patients was made. Patients with severe trauma, malignancy or steroid-induced fractures were excluded. Demographics data, medication prescription and surgical data were recorded.

**Results:** A total of 66 male patients were recorded. Based on FRAX scoring, diabetic male patients tend to have more risk of sustaining major osteoporotic fractures and hip fractures (88.9%) compared to non-diabetic male patients (69.2%).

**Conclusion:** There is a higher risk for male patients with underlying diabetes to have a hip fracture in the future, compared to those without underlying diabetes. Uncontrolled diabetes with hyperglycemia has been suggested as a possible mechanism for osteoporosis in both type 1 and type 2. In all patients with diabetes, besides optimal glycemic control, general recommendations regarding adequate dietary calcium intake, regular exercise, and avoidance of other potential risk factors such as smoking should be given, as well as anti-osteoporotic medications should be prescribed to reduce the risk of secondary fracture.

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### INCIDENCE AND DISTRIBUTION OF DIFFERENT TYPES OF ANTI-OSTEOPOROTIC MEDICATIONS AMONG HIP FRACTURE PATIENTS

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**Objective:** One of the treatment choices for Osteoporosis is medications, based on the National Osteoporosis Foundation's (NOF) recommendation if they fulfil any of the following, after exclusion of secondary causes of osteoporosis, identification of low trauma hip, vertebral, wrist, BMD score of T-score  $\leq -2.5$  at the femoral neck, total hip or lumbar spine, and patients with osteopenia (T-score between -1.0 and -2.5) with FRAX score of more than 3% for hip and more than 20% for major osteoporotic related fracture. We aimed to identify types of anti-osteoporotic medication prescribed in a tertiary university hospital setting and distribution of those medications based on patient's preference.

**Methods:** This is a prospective study from January 2022 to December 2022, elderly patients aged 55 years and above, with Hip fractures that were presented to our hospital were identified by the Fracture Liaison Service coordinators. Patients with severe trauma, malignancy or steroid-induced fractures were excluded.

Demographics data, medication prescription and surgical data were recorded.

**Results:** A total of 158 patients were recorded. 78% of patients were prescribed with denosumab, 20% of patients were prescribed with bisphosphonates, and 1% of patients were prescribed with teriparatide and romosozumab.

**Conclusion:** Denosumab prescription is the highest among hip fracture patients. This is because patients found it more convenient to be treated with denosumab as most of our hip fracture patients have multiple comorbidities and taking polypharmacy. Patients also find it more affordable to purchase denosumab compared to anabolic medication (teriparatide and romosozumab). Furthermore, alendronates are contraindicated in patients with gastritis and underlying kidney problems. Fracture Liaison Service is a secondary fracture prevention service that helps in consulting anti-osteoporotic medication to patients and their family members to improve bone health, hence preventing future fragility fractures.

### P662

#### A NOVEL EXTERNAL FIXATION IN THE TREATMENT OF OPEN TIBIAL FRACTURES

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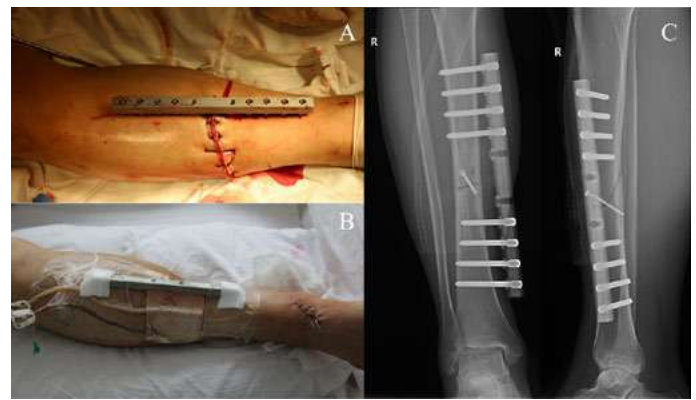
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**Objective:** Traditional external fixator (EF) was the first choice to treat high-grade open fracture, but there are problems such as inconvenience, poor stability and high-risks of nail infection. Some researchers directly placed internal fixation (IF) plate outside the body as EF. However, the structural stability and mechanical stiffness of IF have been questioned. To overcome the disadvantages of both EF and IF, we previously developed a novel EF device.

**Methods:** Through optimized biomechanical design, the strength and stability were greatly enhanced by the increased thickness of the fixator, the inclined nail holes and the raised bottom. We applied the newly designed device to one patient with Gustilo type IIIB open fractures of the tibial.

**Results:** The case achieved clinical bone healing three months later and the functional recovery was satisfying.

**Conclusion:** We designed a novel type of EF device with optimized biomechanics and stability. With the advantage of small size, high stability and convenience for operating, its application in a tibial fractures case achieves a comfortable clinical course.



### P663

#### MEDICATION ADHERENCE DURING PANDEMIC PERIOD FROM OSTEOPOROSIS LIAISON SERVICES

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**Objective:** The first COVID-19 outbreak in Taiwan started from May, 2021. Level III lockdown was implemented from 19 May to 27 July 2021. Another severe pandemic outbreak started from March 2022 with peak daily cases almost 100,000 on 27 May 2022. At the end of 2022, the daily cases were above 20,000. During the pandemic, many people did not show up for their routine clinic visits because of lockdown policy or fear of attracting COVID-19 in healthcare organizations. The aims of this study were to determine the impacts of such behaviours on osteoporosis medication adherence and the effects of strategies to mitigate the negative impacts from Osteoporosis Liaison Services (OLSs) of a healthcare system.

**Methods:** The OLSs from National Taiwan University Hospital and its Bei-Hu branch enrolled patients since 2014. The current study reported monthly clinic visit cancellation rate and medication adherence rate of 2021 and 2022 for 1100 patients who were still alive on 31 Dec 2020. Obvious appointment cancellations occurred during lockdown period. Strategies to mitigate the problems include 1) call out to patients for reschedule of appointments, 2) medication regimen changes (using oral medications or annually iv injection when appropriate), 3) health education.

**Results:** Before the pandemic period, the medication adherence was about 93%. During Level III lockdown period, about 40% patients cancel appointments and the medication adherence decreased about to 80%. With mitigation strategies, the appointment rates and the medication adherence returned to baseline level until Feb. 2022. During the second pandemic period, the medication adherence decreased to 85%, better than the 2021 number. In the second half year of 2022, the medication adherence rate gradually returned to baseline

**Conclusion:** The FLS coordinators responded rapidly to the clinic cancellation and decrease of medication adherence in 2021 pandemic. The impact of COVID-19 on osteoporosis medication adherence lessened in 2022. Further studies are needed to observe impacts of COVID-19 on other outcomes including re-fracture rate and mortality rate in past 2 years.

P664

### MANAGEMENT OF BONE HEALTH IN THE BREAST CANCER ITALIAN POPULATION

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**Objective:** To investigate the current state of clinical and therapeutic approach to bone disease in the Italian breast cancer (BC) population.

**Methods:** This is an observational multicenter longitudinal ambispective study (Hequobip study: HHealth and QQuality of life in Oncological patients: management of Bone pathology the Italian Population). Four clinical Italian centers (i.e. Rome, Naples, Pavia and Florence) recruited patients receiving AI (Aromatase Inhibitors) or Tamoxifen therapies. Data on BC, bone health, osteoporosis screening, types and timing of anti-resorptive therapy were collected. The therapeutic approach was studied by the evaluation of the adherence of centers to one among three indication identified by the scientific board: ESCEO 2017 recommendations (I) [1]; ASCO 2019 guidelines (II); Note 79 AIFA Determination (III).

**Results:** 555 women (mean age of 54.2 ±9.5 yrs) were enrolled. Most of women were in iatrogenic menopause (62.2%) and 37.8% in spontaneous menopause. The first DXA examination after surgery disclosed a median spine T-score of -1.5 and femur T-score of -1.4. Half of patients (50.3%) were in a status of osteopenia, whilst only the 18.4% were osteoporotic. DXA exam was performed in 52.6% of cases within the first 24 months af-

ter introduction of AI/tamoxifen therapy. At enrollment, only 7% of patients received anti-resorptive therapy, while after the study intervention, bone therapy was prescribed to 48.3% of women. Clinicians prescribed anti-resorptive therapy as following: the type I indication in 16.6% of patients, the type II indication in 4.1% of cases, the type III indication up to 46.7%.

**Conclusion:** Although clinicians indicate early bone screening, they more often prescribe anti-resorptive therapy without considering precise guidelines. This study adds information on the clinical benefit of bone therapy and suggests a potential standardized approach to long-term management.

**Reference:** 1. Peyman H et al. J Bone Oncol 2017;7;12.

P665

### ALENDRONATE FOLLOWING DENOSUMAB DISCONTINUATION IN POSTMENOPAUSAL WOMEN: CHANGES IN AREAL BMD AND IN CORTICAL AND TRABECULAR BONE USING 3D MODELING FROM DXA IMAGES

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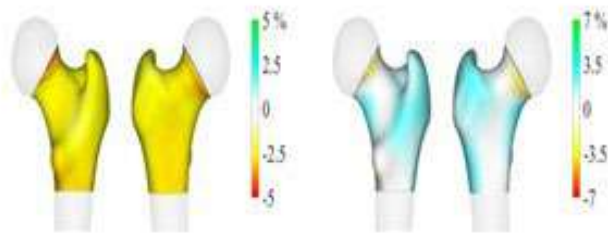
**Objective:** Preventing rapid bone loss after denosumab (Dmab) discontinuation is an issue of ongoing research. In this context, alendronate (ALN) or zoledronate are currently recommended to follow, although specifically designed prospective trials regarding ALN are scarce. In the ongoing BAD study (NCT04338529), ALN is administered for 6 or 12 months following Dmab. We aim to present preliminary results from the BAD study on the efficacy of ALN to preserve areal BMD (aBMD) and cortical and trabecular parameters through DXA-based modeling.

**Methods:** Nineteen postmenopausal women (aged 67.6±7 years) who achieved osteopenia with Dmab treatment (mean duration 3.9±2.7 years) and subsequently received either 6 months (n=10) or 12 months (n=9) of ALN were included. BMD data at baseline (BL) and 12 months (M12) was analyzed. We used hip DXA scans and 3D-SHAPER® software (v2.12) to calculate percent change from BL to M12 in cortical vBMD (CvBMD), cortical thickness (Cth), cortical volume (Cv), integral vBMD (IvBMD), and trabecular vBMD (TvBMD).

**Results:** Significant loss in lumbar spine (LS) and total hip (TH) aBMD as well as in IvBMD and significant increase in Cv were observed for the whole group (Table, Figure). No significant differences were observed between the subgroups of ALN 6m and ALN 12m either in their baseline parameters or in the aBMD changes after 12 months.

**Conclusion:** ALN did not prevent bone loss following Dmab discontinuation in this preliminary analysis. Bone loss was comparable between 6 and 12 months of ALN treatment. Increase in

cortical volume merits further attention.



Anatomical distribution of the average percentage changes in cortical thickness (right) and cortical volumetric density (left). Increases in bone parameters are presented in blue-green colour, decreases are presented in yellow-red colour.

**Table.** Mean% changes at M12 within groups

Group	aBMD <sub>LS</sub>	aBMD <sub>FNeck</sub>	aBMD <sub>TH</sub>	CvB-MD	lvB-MD	TvB-MD	Cth	Cv
ALN 6m	-8.0	-1.5	-2.2	-2.5	-3.5	-6.5	1.6	2.2
ALN 12m	-3.5	-5.0*	-0.7	-2.5	-3.1	-4.4	0.8	2.1
A L N merged	-5.8*	-3.1	-1.5*	-2.5	-3.3*	-5.5	1.2	2.2*

\*p<0.05

## P666

### A CASE OF ATYPICAL FEMORAL FRACTURE IN A PATIENT ON DENOSUMAB FOR OSTEOPOROSIS

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**Objective:** Denosumab is a human monoclonal antibody against RANKL and is a potent inhibitor of bone resorption that is frequently used in the treatment of osteoporosis. Atypical femoral fracture (AFF) is a rare adverse effect associated with bisphosphonate use. However, AFF has also been described in patients on denosumab, with the vast majority of cases reported in those with no prior bisphosphonate exposure. Here we present the case of AFF in a patient who was on denosumab for the treatment of osteoporosis but had no history of any previous therapies. To our knowledge, this is only the sixth case ever reported of AFF associated with denosumab in a bisphosphonate-naïve patient.

**Methods:** The patient was a 63-year-old woman who presented acutely with severe pain in her right thigh (in the absence of trauma) on a background of discomfort in the same area for 6 months. Past medical history included hysterectomy for an ectopic pregnancy (aged 40), a smoker of 30 pack years and COPD without significant steroid exposure.

**Results:** She had been on denosumab for five years for the treatment of osteoporosis and had no prior therapy with bisphosphonates. X-ray of right femur demonstrated an uncomminuted sub-

trochanteric fracture (meeting the criteria for complete AFF) for which she had surgery. MRI of the contralateral femur ruled out contralateral AFF. DXA showed a T-score -1.0 at spine, -1.2 neck of femur and -0.5 at total hip. A decision was made to withhold her next injection of denosumab and carefully monitor her bone turnover markers before deciding on further therapy.

**Conclusion:** This case highlights that while rare, AFF may occur in patients on denosumab therapy who are bisphosphonate naïve. The risk however, is lower than with bisphosphonates where it is approximately 1/1000 after 10 years of use. However, thigh or groin pain in a patient on denosumab should prompt consideration for further investigations including x-ray or MRI of femur where appropriate. The further optimal management of such patients is unclear with the risk of significant rebound bone loss should denosumab be stopped.

## P667

### HIP X-RAYS USED TO DETERMINE THE BONE MINERAL DENSITY OF THE PROXIMAL FEMUR

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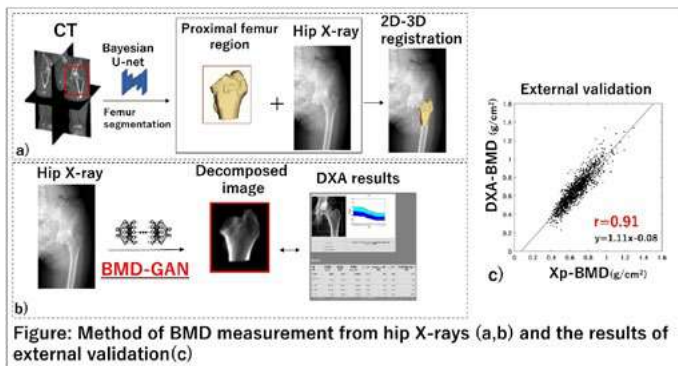
<sup>1</sup>Osaka University, Suita, <sup>2</sup>Nara Institute of Science and Technology, Ikoma, <sup>3</sup>Osaka National Hospital, Osaka, <sup>4</sup>Belland General Hospital, Sakai, <sup>5</sup>Japan Community Healthcare Organization Hoshigaoka Medical Center, Hirakata, <sup>6</sup>Kansai Rosai hospital, Amagasaki, <sup>7</sup>Yamaguchi University, Ube, <sup>8</sup>Ehime University, Toon, Japan

**Objective:** The BMD of the proximal femur is typically measured using DXA. However, because DXA is not available at all institutes, many osteoporosis patients go undiagnosed and untreated. Thus, our goals were to 1) develop a system that calculates proximal femur BMD using X-rays and 2) validate its accuracy in a multicenter study.

**Methods:** A deep-learning model was trained using 305 cases of hip anteroposterior X-rays (supine, standing, abduction, and adduction), hip CT, and proximal femur BMD measured using DXA (DXA-BMD). From the CT images, the proximal femur region was isolated and registered to the X-rays (i.e., 2D-3D registration) to account for the patient's positioning at the time the X-ray was acquired (Figure a). Using the datasets, a deep-learning model called "BMD-GAN" was developed, which could decompose the X-ray into an image that only included information of the proximal femur bone. Finally, pairs of the decomposed X-ray and the DXA-BMD were used for training; thus, a model to measure BMD from the X-rays (Xp-BMD) was developed (Figure b). Xp-BMD was correlated to the DXA-BMD for validation, and the accuracy in diagnosing osteoporosis was quantified using a receiver operating characteristic (ROC) analysis. Internal validation (IV) was carried out (5-fold cross-validation), and external validation (EV) was carried out using X-rays from 1426 cases acquired from 6 different institutions.

**Results:** The correlation of coefficient between Xp-BMD and DXA-

BMD was 0.87 (IV) and 0.91, respectively (EV, Figure c) (both  $p < 0.01$ ). The median absolute difference between Xp-BMD and DXA-BMD was 0.04 g/cm<sup>2</sup> (IV) and 0.05 g/cm<sup>2</sup>, respectively (EV). In the ROC analysis, the area under the curve for diagnosing osteoporosis was 0.95 for both IV and EV.



**Conclusion:** The system developed in this study accurately quantified proximal femoral BMD and diagnosed osteoporosis from hip X-rays. Thus, this system can be used for osteoporosis screening, and because its validity was confirmed in a multicenter study, it has the potential to be used as a replacement for DXA in the future.

**Acknowledgments:** This study was supported by the Japan Society for the Promotion of Science (JSPS) Grants-in-Aid for Scientific Research (KAKENHI) Numbers 19H01176, 20H04550, and 21K16655.

P668

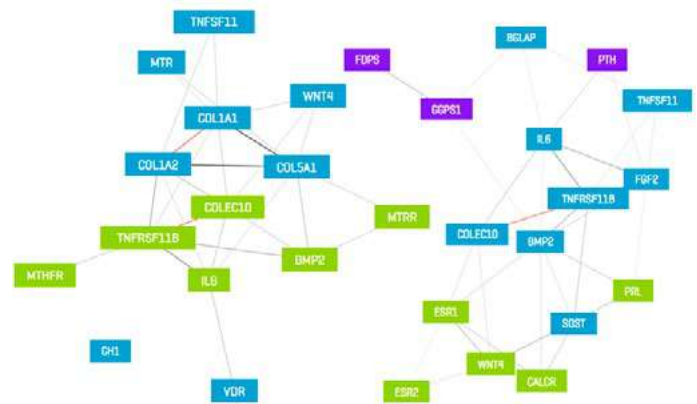
## GENETICS OF BONE DENSITY AND FRACTURE RISK IN BELARUSIAN PATIENTS WITH OSTEOPOROSIS

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**Objective:** The study of the genetic aspects of bone tissue metabolism in normal and pathological conditions will improve the effectiveness of the prevention and treatment of musculoskeletal pathology. The aim of this study was to identify the most informative polymorphic gene variants associated with the risk of osteoporosis, BMD level and bone fracture risk.

**Methods:** The study included 606 adult patients with primary osteoporosis, 270 controls. Genetic testing using NGS sequencing platform (Illumina Nextseq) included exons of 24 genes *COL1A1*, *COL1A2*, *COL5A1*, *BGP*, *VDR*, *ESR1*, *ESR2*, *CALCR*, *PRL*, *GH1*, *MTHFR*, *MTRR*, *SOST*, *FGF2*, *OPG*, *COLEC10*, *RANK*, *RANKL*, *WNT4*, *BMP2*, *IL6*, *BGLAP*, *AR*, *ALPL* (Figure 1).



**Figure 1.** The gene network associated with bone metabolism, included in analysis

**Results:** Based on the bioinformatics analysis, we identified a number of highly informative genetic markers: 11 markers of the osteoporosis risk, 7 markers of the BMD level, 8 markers of the bone fractures risk, 4 markers of vitamin D deficiency, 5 markers associated with biochemical OP markers. The following loci were found to be associated with OP risk: *COL1A1* rs1800012 (OR=1.9, P=0.009), *VDR* rs7975232 (OR=1.5, P=0.028), rs1544410 (2.0, 0.023), rs731236 (1.9, 0.039), *ESR1* rs2234693 (1.8, 0.039), *MTHFR* rs1801133 (1.8, 0.05), *RANKL* rs1021188 (1.7, 0.0021), *OPG* rs4355801 (2.0, 0.014), *WNT4* rs7521902 (2.9, 0.0035), *BMP* rs996544 (3.3, 0.04), *P2RX7* rs3751143 (1.6, 0.025). Loci associated with a decrease in BMD: *COL1A1* rs1800012 ( $\beta = -0.08$  g/cm<sup>2</sup>, P=0.024); *VDR* rs7975232 (-0.07, 0.016), rs1544410 (-0.07, 0.0057), rs731236 (-0.07, 0.0035); *RANKL* rs1021188 (-0.08, 0.0001); *P2RX7* rs3751143 (-0.06, 0.0001). Seven loci were associated with fracture risk: *COL1A1* rs1800012, *COL1A2* rs42517, *VDR* rs7975232, rs1544410, rs731236, *ESR1* rs9340799, rs2234693, and *MTHFR* rs1801133. It should be noted that a similar protective effect was observed for carriers of heterozygous rs9340799 A/G genotypes.

**Conclusion:** Based on analysis, we developed an algorithm for genetic testing of individual genetic predisposition to musculoskeletal diseases. Integrated in clinical practice, this algorithm will improve help to increase the effectiveness of pathology prevention.

P669

### EFFECTS OF SIMPLE HOME-EXERCISES FOR PREVENTION AND IMPROVEMENT OF LOCOMOTIVE SYNDROME ON THE MOTOR FUNCTIONS OF THE COMMUNITY-DWELLING ELDERLY

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**Objective:** For aging or aged societies, healthy life span is important and urgent issues. In Japan, the most aged country through the world, musculoskeletal diseases and declined motor functions were main barriers to independent living of old people. Locomotive syndrome, defined as mobility dysfunction originated from musculoskeletal pathologies, is among main causes of a care-needed status of the elderly. Locomotion training, a set of simple self-exercises established by Japanese Orthopaedic Association, is recommended for preventing and improving locomotive syndrome. The purpose of this study is to verify the effects of locomotion training on the motor functions of community-dwelling elderly people by a randomized controlled trial.

**Methods:** Subjects were 303 community-dwelling ambulatory old people, randomized into 184 subjects for the intervention group and 119 for the control group. At baseline, physical therapists evaluated grip power (GP), single-leg standing time (SLS), 5-time sit-to-stand test (5STS), gait speed (GS), 2-step test (2ST), stand-up test (SUT), knee extension strength (KES), three sets of questionnaires. To intervention group, locomotion training that consisted of squatting, single-leg standing, and heel raise was instructed and encouraged to continue locomotion training and walking for six months as home-exercises. The same tests and questionnaires were examined again at 3 months and 6 months later to compare with baseline data. For statistical analysis, paired t-test and two-way ANOVA were utilized.

**Results:** The intervention group gained significant improvement in GP, SLS, 5STS, 2ST, and KES at 3 months and in GP, SLS, 5STS, maximum GS, 2ST, and KES at 6 months. Also, significant interaction effects were shown in SLS, 5STS, maximum GS, and 2ST. Male subjects exhibited more effects of the intervention than female. Subjects in intervention group that underwent the recommended amount of exercises twice a week or more showed more interaction effects than the whole intervention group.

**Conclusion:** This study clarified the positive effects of locomotion training on motor functions of the elderly. With the growing population of the old people, we should prevent and improve locomotive syndrome with feasible and effective measures including locomotion training.

P670

### FINDING AN APPROPRIATE INSTRUMENT FOR DATA COLLECTION ABOUT BURDEN ON CARERS OF PEOPLE WITH X-LINKED HYPOPHOSPHATAEMIA: A CARER-CENTRED SELECTION PROCESS

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**Objective:** To identify the most appropriate instrument to better understand the burden experienced by carers of people with X-linked hypophosphataemia (XLH).

**Methods:** A literature search was conducted to identify instruments previously used to characterise burden on carers of people with XLH or, more widely, musculoskeletal diseases. Instruments used, carer domains and their contributors were extracted. Domain relevance was assessed by online or phone interviews with five carers of people with XLH who volunteered from the RUDY Study in the UK. The PROQOLID database was searched to identify relevant instruments, subsequently assessed according to whether they addressed the most important domains identified by interviewed carers. Preselected instruments were shared with four of the five volunteer carers to select the most appropriate.

**Results:** Lack of publications characterising the burden on carers of people with XLH led to widening the search to include musculoskeletal diseases; 27 publications were identified. These used 29 different instruments covering at least 17 distinct domains including feelings of burden, depression, and relationship satisfaction. We identified 52 contributors associated to these domains, such as health of carer, age of patient, and carer's educational level as contributors to feelings of burden. The five volunteer carers found 'Financial strain or difficulties' and 'Feeling of overall burden' to have the greatest impact, followed by 'Stress' and 'Emotional strain or difficulties'. The 50 relevant instruments identified in PROQOLID were reviewed to assess whether they addressed these four domains. Three instruments touched on them all: Caregiver strain index, Caregiver Well-Being Scale, and Caregiver oncology quality of life questionnaire (CarCOQoL). These were discussed with 4 of the original volunteer carers and they selected CarCOQoL as the most appropriate instrument to capture the burden experienced by carers of people with XLH.

**Conclusion:** We identified an instrument to study the burden experienced by carers of people with XLH by actively involving carers as a vital step to make sure that relevant domains of burden associated specifically with the disease are appropriately addressed.

**Acknowledgment:** Funding received from Kyowa Kirin.

P671

## IMPACT OF GLUCOCORTICOID AND ANTI-OSTEOPOROTIC TREATMENT ON BONE HEALTH IN PATIENTS WITH INFLAMMATORY RHEUMATIC MUSCULOSKELETAL DISEASES (IRMD)

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**Objective:** The negative effects of glucocorticoids (GCs) on the bone depend on dose and treatment duration. However, it is unclear whether a safe dose exists, especially for patients with inflammatory rheumatic musculoskeletal diseases (iRMDs). The primary objective of the present study was to determine, in a real-life setting, the risk of fragility fracture associated with the dose of glucocorticoids in iRMD.

**Methods:** We conducted a longitudinal cohort study on women with iRMD. Data were extracted from the DeFRA database (2012-2020). DeFRA is a fracture risk assessment tool similar to FRAX. BMD and fractures were assessed prospectively and compared to a matched cohort (propensity score matching, PSM with age, T-score and the% 10-year fracture risk estimated with DeFRA fracture risk assessment tool). Kaplan-Meier curves with log-rank test were made for iRMD (stratified for glucocorticoid use and dosage) and matched cohort respectively.

**Results:** 884 women with iRMD and 1,766 controls (age, T-score, and 10-year fracture risk matched) were included in the study and followed for up to 6 years. BMD levels decreased significantly in all GCs users not receiving anti-osteoporosis treatment (-4.26% p 0.0011, -4.23% p 0.0422, -2.66% p 0.0006 for  $\geq 5$  mg/d, 2.5 mg to 5 mg and 0 to 2.5 mg/d of prednisolone, respectively). As regards patients receiving anti-osteoporosis medications, BMD levels decreased significantly only in patients receiving  $\geq 5$  mg/d of pred eq (-3.01%, p 0.0012), whereas in patients receiving 2.5 mg to 5 mg and 0 to 2.5 mg/d, concomitantly treated with anti-osteoporotic drugs, BMD did not decrease significantly (+3.10% p NS, +1.12% p NS, respectively). Figure 1A. Fracture incidence was greater in patients with iRMD compared to controls but only GC doses above 5 mg/d were associated with significantly higher risk of fracture Figure 1B. 21, 12 and 29 fractures were reported for patients receiving  $\geq 5$  mg/d, 2.5-5 mg and 0-2.5 mg/d respectively, corresponding to a crude fracture rate of 4.8 fractures per 100 person-year, 2.8 fractures per 100 person-year and 2.5 fractures per 100 person-year respectively. 103 fractures were registered in the PSM cohort (crude fracture rate of 2.2 fractures per 100 person-year). We also explored the effects of GC on serum C-terminal telopeptide of type 1 collagen (CTX) in a subset of patients with available data (n=335). We found that the proportion of patients with low bone turnover (<400 ng/L) was numerically greater in patients receiving  $\geq 5$  mg/d compared to other doses and controls (p NS).

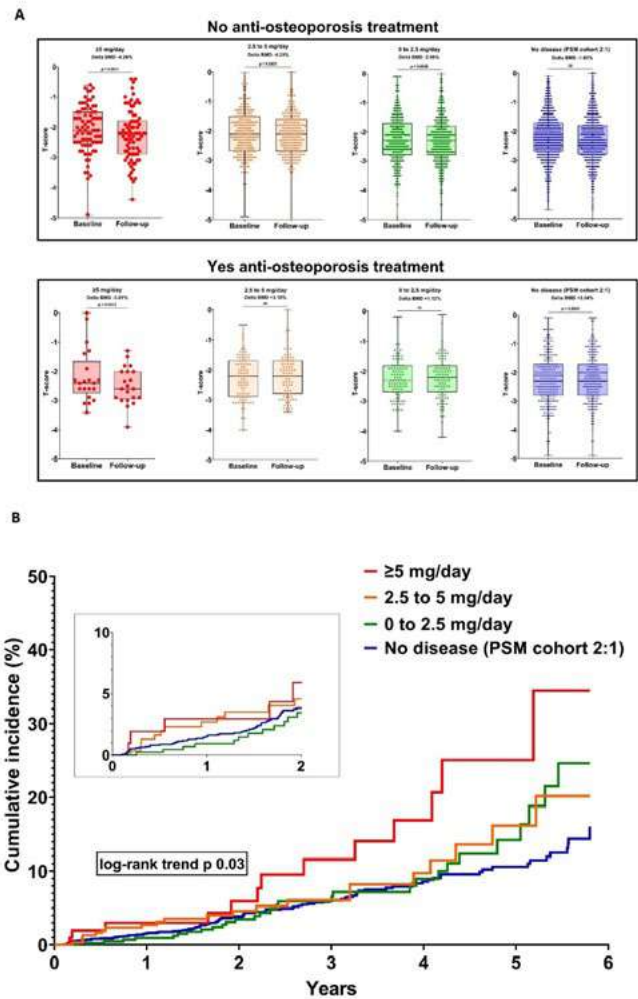


Figure 1.

**Conclusion:** GC doses as low as 2.5 mg/d were associated with BMD loss in iRMD but this effect was preventable. BMD loss in patients taking  $\geq 5$  mg/d was not totally prevented by anti-osteoporotic medications currently used in clinical practice, resulting in higher risk of fracture.

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## LONG-TERM EFFECTIVENESS AND PREDICTORS OF NERIDRONATE TREATMENT IN TYPE I COMPLEX REGIONAL PAIN SYNDROME (CRPS)

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**Objective:** Complex Regional Pain Syndrome (CRPS) is a painful disease that can lead to chronic pain and disability. Bisphosphonates are largely used in the real-life for the treatment of CRPS, but data on long-term effectiveness and its predictors are lacking. The aim of the present study is to describe the real-life effective-



ness of IV neridronate on both pain and long-term disability in patients with type I CRPS. Secondary objective is to determine the factors associated with long-term disability and response to treatment.

**Methods:** We conducted a longitudinal observational study on patients with type I CRPS treated with IV neridronate (400 mg over 4 days). Clinical and demographic characteristics were collected at baseline, after 3 months (M3) and after 12 months (M12) from treatment. Mixed-effect analysis was used to determine the effect of treatment on VAS pain. Multivariable logistic regression was employed to determine the factors associated with long-term response to treatment. We determined “responders” and “early responders” to be those who achieved a  $\geq 50\%$  VAS score reduction between (baseline/pretreatment) and M12 (responders) and M3 (early responders). We defined “excellent responders” based on full recovery from loss of motion at M12 AND VAS pain at M12 less than 20 mm (excellent responders were those patients with mild/moderate/severe loss of motion at baseline who had none loss of motion at M12 AND VAS pain less than 20 mm).

**Results:** 103 patients with type I CRPS treated with IV neridronate were included in the study. Mean VAS pain decreased significantly at M3 (79.1 mm to 33.1 mm, -45.9 mm, 95%CI 40.1 to 51.8) and M12 (79.1 mm to 17.5 mm, -61.6 mm, 95%CI 55.3 to 67.9) Figure 1A. Hyperalgesia and allodynia resolved in 84.3% and 88.1% of patients at M12. Loss of motion resolved in 53.5% of patients. The predictors of “excellent response” at M12 were gender (male better than female), predisposing event to CRPS (no event being better than any predisposing event), site of CRPS (lower limb being better than upper limb), and early response at M3 on VAS pain (2.5 times the chance of being excellent responder every 10 mm decrease). Predictors of excellent response are presented in Table 1 (binary logistic regression analysis). Figure 1B shows the long-term VAS pain reduction with IV neridronate in patients with or without complete recovery from functional disability (“excellent responders”).

Table 1.

Variable	aOR	95%CI	p value
Site of CRPS Lower limb vs. upper limb	12.76	1.65 to 199.1	0.0320
<b>Predisposing event</b> <b>None vs. fracture</b>	<b>71.31</b>	<b>6.511 to 176.1</b>	<b>0.0025</b>
<b>Orthopedic surgery vs. fracture</b>	1.77	0.01 to 0.8329	0.8329
<b>Trauma w/o fracture vs. fracture</b>	19.03	0.72 to 180.9	0.1664
Age	0.99	0.94 to 1.05	0.9509
Sex Male vs. Female	14.00	2.75 to 104.6	0.0037
BMI	0.92	0.75 to 1.11	0.4329

VAS pain at baseline	0.91	0.85 to 0.96	0.0040
VAS pain absolute reduction at M3	2.51	1.68 to 4.18	<0.0001

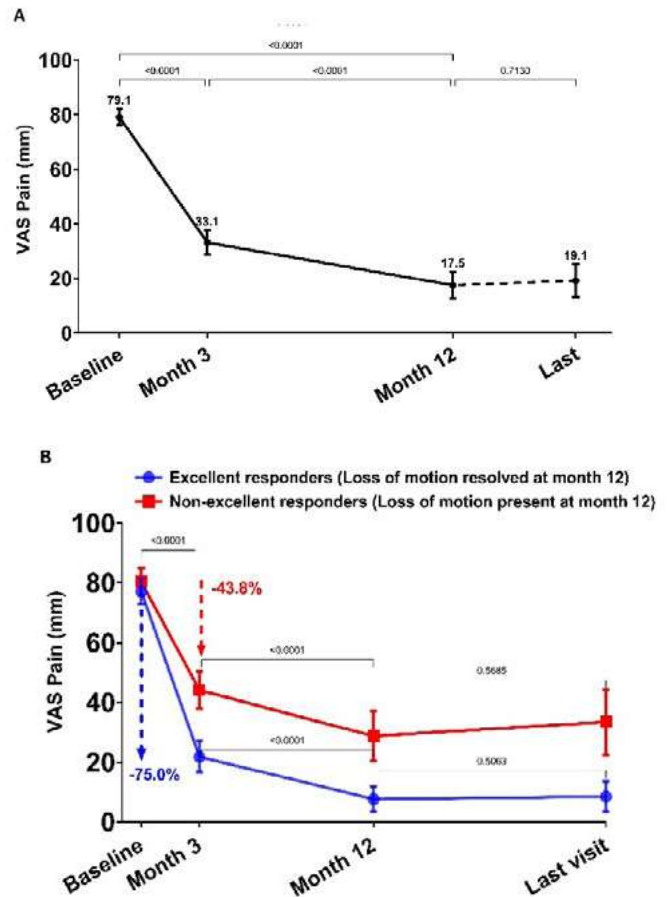


Figure 1.

**Conclusion:** In this real-life study, neridronate was associated with rapid and progressive improvement of symptoms of CRPS which was maintained up to 3 years of follow-up. The predictors of excellent response were early response, lower limb localization, absence of predisposing events and male gender.

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**PROPORTION OF PATIENTS REACHING THE BONE MINERAL DENSITY (BMD) SURROGATE THRESHOLD EFFECT (STE) WITH BISPHOSPHONATES, DENOSUMAB AND TERIPARATIDE IN REAL-LIFE**

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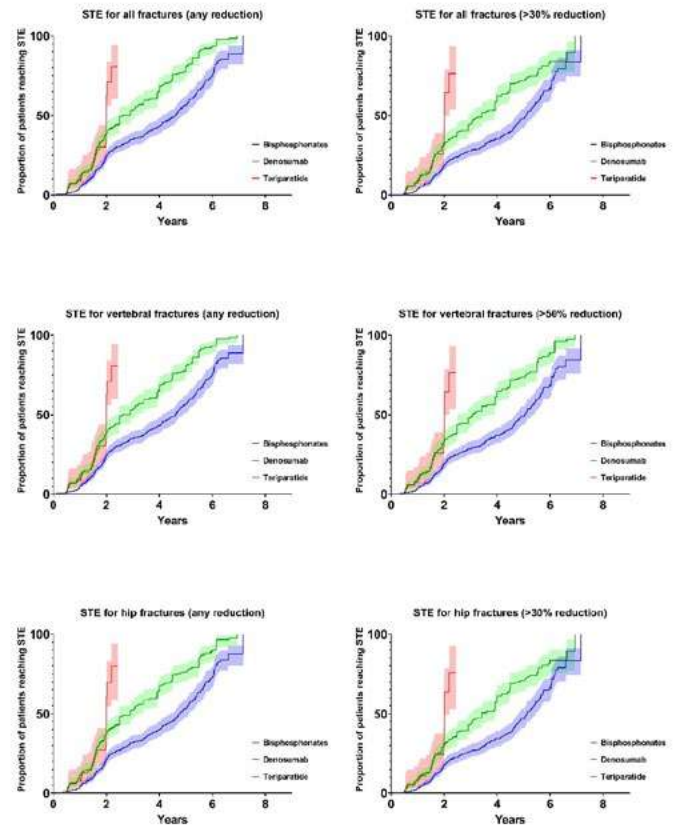
**Objective:** The BMD surrogate threshold effect (STE) is the change in BMD that can predict a fracture risk reduction with 95% certainty. The STE estimates for changes in total hip BMD have been recently validated by the FNIH-ASBMR SABRE Project. We evaluated the proportion of patients reaching the STEs with anti-osteoporotic medications in real-life.

**Methods:** We retrieved longitudinal data on women at high risk of fracture initiating an anti-osteoporotic treatment. Kaplan-Meier curves with log-rank tests were employed to analyze the proportion of patients reaching STEs over the time with various anti-osteoporotic treatments. Herein we present the proportion of patients achieving STEs for the lowest (1.8% increase in total hip BMD for all fractures, 1.4% for vertebral fractures and 3.2% for hip fractures) and highest risk reduction (5.1% increase in total hip BMD for >30% risk reduction for all fractures, 4.6% for >50% risk reduction for vertebral fractures and 5.8% for >30% risk reduction for hip fractures).

**Results:** Baseline and follow-up data from 1,272 women initiating an anti-osteoporotic treatment were available. 807 started bisphosphonates, 386 started denosumab and 79 started teriparatide. Median follow-up time was 2.18 years (IQR 1.47-3.87 years). In Table 1 are presented the proportion of patients reaching various STEs stratified for treatment. The Kaplan-Meier estimate curve for bisphosphonates vs. denosumab vs. teriparatide showing the proportion of patients reaching various STEs over the time are presented in Figure 1 (log-rank p<0.001 for teriparatide vs. bisphosphonates at 2 years and denosumab vs. bisphosphonates at 2, 4 and 6 years; log-rank p NS for teriparatide vs. denosumab at 2 years).

**Table 1.** Proportion of patients increasing BMD at 24 months above STEs

Fracture risk reduction	STE (%)	Bisphosphonates	Denosumab	Teriparatide
<b>All fractures</b>				
Any	1.8	24.2	48.5	62.9
>30%	5.1	18.6	39.9	64.5
<b>Vertebral Fractures</b>				
Any	1.4	24.4	49.1	62.9
>50%	4.6	19.1	41.3	60.5
<b>Hip Fractures</b>				
Any	3.2	21.4	46.9	61.4
>30%	5.8	17.7	38.0	59.8



**Figure 1.** Kaplan-Meier estimate curve for bisphosphonates vs. denosumab vs. teriparatide showing the proportion of patients reaching various STEs over the time.

**Conclusion:** In the present real-life study, a smaller proportion of patients treated with bisphosphonates reached the BMD STEs at 2 years of treatment as compared to denosumab and teriparatide. Nearly all subjects reached STEs at 6 years of follow-up.

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**ACPA TITER IS A MAJOR DETERMINANT OF SERUM CTX LEVELS OF PATIENTS WITH ACTIVE RHEUMATOID ARTHRITIS**

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**Objective:** Serum C-terminal telopeptide of type I collagen (CTX - a marker of bone resorption) and ACPA titer have been associated with higher erosive scores in rheumatoid arthritis (RA) and lower BMD, even in patients with pre-arthritis. Prominent inflammatory status cannot totally explain such association. The interplay between ACPA, disease activity, BMD and CTX is still unclear. The present study aims to investigate the determinants of CTX serum levels in RA patients.

**Methods:** We conducted a cross-sectional analysis on RA patients with active disease activity failure to first-line cDMARDs

candidate to bDMARDs. Clinical, laboratoristic and densitometric and BMD parameters were collected. ACPA, CTX, Procollagen I Intact N-Terminal Peptide (P1NP), Dkk1, Sclerostin (SOST), 25-OH-Vitamin D (VitD), PTH, RANKL, OPG, B-ALP were dosed. Potential predictors of serum were analyzed using hierarchical regressions. Potential predictors were selected based screened via simple regression analyses which included CTX and a single candidate baseline predictor in each model. Any baseline predictor with  $p < 0.10$  entered the multivariable model (model 1). We also conducted a multivariable linear regression forcing variables associated with CTX serum levels from the literature (model 2). Results were analyzed using GraphPad Prism version 9.5.0 for Windows, GraphPad Software, San Diego, California USA.

**Results:** We enrolled 62 RA patients in the study. DAS28-CRP at baseline was 4.17 (SD 1.28). 80.6% of patients were ACPA positive. The factors associated with CTX serum levels in the univariate analysis were: ACPA titer, DAS28-CRP, B-ALP, P1nP and BMD levels (Table 1). ACPA titer was the only independent factor significantly associated with CTX serum levels in both model 1 and model 2 (Table 1).

**Table 1.**

Variable	Univariate			Model 1			Model 2 (fully adjusted)		
	Estimate	SD	P value	Estimate	SD	P value	Estimate	SD	P value
ACPA	4,815e-005	1,299e-005	0,0005	3,602e-005	1,344e-005	0,01	4,730e-005	1,497e-005	0,003
Age	0,001	0,001	0,34				-0,0004	0,001	0,69
GC daily dose	0,002	0,003	0,46						
DAS28-CRP	0,01	0,009	0,09	0,01	0,009	0,18	0,02	0,01	0,11
RF	0,0001	0,0002	0,51						
B-ALP	0,006	0,002	0,005	0,001	0,002	0,37	0,004	0,002	0,11
P1nP	0,001	0,0005	0,002	0,0005	0,0006	0,40	-0,0001	0,0006	0,87
Dkk1	9,143e-005	0,0008	0,91				-0,0009	0,0007	0,20
SOST	-0,0003	0,001	0,73						
RANKL/OPG ratio	-0,30	0,47	0,53						
PTH	0,0001	0,001	0,86				0,0005	0,001	0,61
VitD	-0,0009	0,001	0,44				-0,0008	0,001	0,53
BMD Neck (g/cm <sup>2</sup> )	-0,24	0,11	0,03	-0,1531	0,1001	0,13	-0,23	0,11	0,06

**Conclusion:** We found that ACPA titer is an independent determinant of serum CTX levels in RA patients with active disease activity.

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### MEDICATION RELATED OSTEONECROSIS OF THE JAW (MRONJ) IN THE TREATMENT OF OSTEOPOROSIS: A CASE SERIES

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**Objective:** Medication Osteonecrosis of the jaw (MRONJ) is a rare condition associated with the use of antiresorptive agents such as denosumab and bisphosphonates in the treatment of osteoporosis. The majority of cases are precipitated by dental procedures including dental implants and tooth extractions. We present five cases of MRONJ in the treatment of osteoporosis in patients attending our bone health clinic.

**Methods:** We searched our Bone Health Database for patients with MRONJ between 2012 to 2022. Data on patients' demographics, antiresorptive drugs used and MRONJ risk factors were recorded. We also collated information on the medical / surgical management of patients.

**Results:** We identified 5 patients (mean age 77 years) and all were female. Four were diagnosed with MRONJ after tooth extractions while one occurred spontaneously in a patient with dental caries. At the time developing MRONJ, 4 patients were on denosumab while one was on a drug holiday from zoledronic acid. Three patients on denosumab had prior bisphosphonate exposure though one had no history of any previous osteoporosis treatments. Four patients were managed conservatively with one requiring surgical debridement. In 2 patients with severe osteoporosis and where MRONJ had healed, there was follow up therapy with teriparatide followed by oral bisphosphonates (with close monitoring of bone turnover markers).

**Conclusion:** While MRONJ is relatively rare in the treatment of osteoporosis, it is more common with potent antiresorptives. Consistent with this, our cases were in patients on either denosumab or zoledronic acid therapy. Importantly, the incidence of MRONJ on denosumab appears to be higher than with zoledronic acid, occurring in 0.68% of patients who had an invasive dental procedure in the FREEDOM trial. This highlights the importance of maintaining good oral hygiene and regular dental checks on these therapies. The decision to continue treatment for osteoporosis in patients with MRONJ also needs to be carefully balanced against any future fracture risk. There is some evidence to show that teriparatide may promote healing of MRONJ and may be suitable for some patients. While MRONJ may heal with conservative therapy, surgical debridement may be required for some patients. However, several risk factors are identified including diabetes, steroid use, dental caries and anti-angiogenic drugs used to treat cancer.

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**FACTORS ASSOCIATED WITH EROSIVE RHEUMATOID ARTHRITIS, A MULTIMARKER PRINCIPAL COMPONENT ANALYSIS (PCA) AND PRINCIPAL COMPONENT REGRESSION (PCR) ANALYSIS**

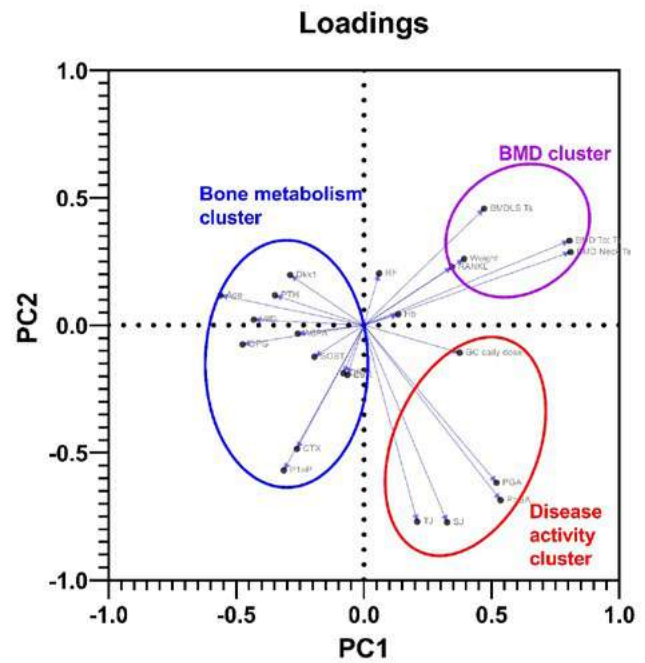
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**Objective:** Various clinical (disease activity, seropositive RA etc.) and metabolic risk factors (Dkk1 etc.) have been associated with erosive rheumatoid arthritis (RA). However, such risk factors might be intertwined, and multicollinearity might reduce our ability to discern the individual contribution to erosive score. Principal component analysis (PCA) is a statistical technique for reducing dataset's dimension and principal component regression (PCR) is a regression analysis based on PCA. PCR overcomes the multicollinearity problem. The objective of the present study is to investigate the clinical and bone metabolic risk factors associated with erosive RA using PCA and PCR.

**Methods:** We conducted a cross-sectional analysis on seropositive RA patients not responding to first-level disease-modifying antirheumatic drug, candidate to bDMARD treatment. Clinical, radiographic (both hands and feet x-ray), laboratoristic and densitometric (BMD parameters) were collected. Sharp van der Heijde Score (SvdHS) was calculated by two independent readers. Serum samples were collected and assayed for C-terminal telopeptide of type I collagen (CTX), procollagen I intact N-terminal peptide (P1NP), Dkk1, sclerostin (SOST), 25-OH-vitamin D (VitD), and PTH. PCA was applied to reduce dimensionality of the dataset and find clusters of variables recording largely redundant information. PCs were selected based on eigenvalues explaining >75% of total variance. PCR was used to predict the SvdHS. Results were analyzed using PCA package on GraphPad Prism version 9.5.0 for Windows, GraphPad Software, San Diego, California USA.

**Results:** 62 RA patients aged 57.2 years (SD 12.1) were consecutively enrolled. Mean DAS28-CRP was 4.17 (SD 1.27) and median SvdHS was 24 (IQR 12-53). The loadings plot (Figure 1) shows the clusters of correlated variables in the dataset (vectors). In Table 1 are presented the results of the PCR with SvdHS as outcome. We found that age, GC treatment, ACPA titer, RF titer, CRP levels, ESR, CTX serum levels and Dkk1 serum levels were significantly positively correlated with SvdHS, whereas P1nP serum levels and PGA were negatively correlated with SvdHS.



**Figure 1.** Loadings plot from PCA. When the vectors are close, forming a small angle, the two variables they represent are positively correlated. If they meet each other at 90°, they are not likely to be correlated. When they diverge and form a large angle (close to 180°), they are negative correlated.

**Table 1.** Results of the principal component regression (PCR) analysis

Variable	Estimate	Standard error	P value
Intercept	-13,85	26,92	0,61
Age	0,54	0,18	0,006
Weight	0,004	0,13	0,97
GC daily dose	2,05	0,68	0,007
TJ	-0,22	0,29	0,45
SJ	-0,06	0,34	0,85
PGA	-2,08	0,84	0,02
PhGA	-0,45	1,04	0,66
ACPA	0,007	0,003	0,03
RF	0,10	0,04	0,01
CRP	0,39	0,15	0,01
ESR	0,44	0,12	0,002
Hb	-0,14	0,16	0,40
CTX	30,05	13,62	0,03
P1NP	-0,20	0,08	0,01
Dkk1	0,32	0,14	0,03
SOST	0,18	0,28	0,52
OPG	-0,39	0,72	0,59
RANKL	-12,86	13,49	0,3514
PTH	-0,2879	0,1694	0,1041

VitD	0,1291	0,1990	0,5235
BMD LS Ts	1,163	1,694	0,4999
BMD Neck Ts	-0,8988	1,585	0,5766
BMD Tot Ts	-0,7266	1,492	0,6314

**Conclusion:** We found that age, seropositivity, and inflammation were the independent clinical risk factors associated with erosive RA. CTX and Dkk1 serum levels were the metabolic factors independently associated with erosive disease whereas P1NP serum levels were associated with less erosions.

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### TAPERING GLUCOCORTICOIDS AND RISK OF FLARE IN RHEUMATOID ARTHRITIS ON BIOLOGICAL DISEASE MODIFYING ANTIRHEUMATIC DRUGS (BDMARDS)

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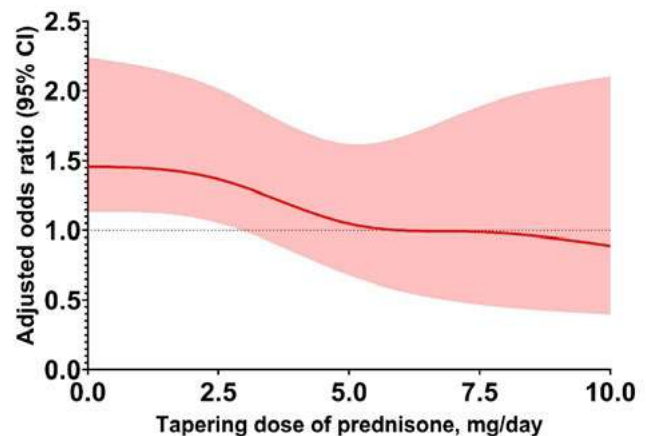
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**Objective:** Glucocorticoids are still a mainstream of rheumatoid arthritis (RA) treatment. Reducing glucocorticoids should be attempted in all patients. However, choosing the right tapering strategy is challenging. The primary aim of our study is to determine the dose-response association between glucocorticoid tapering and risk of flare in RA.

**Methods:** We conducted a case-crossover study to determine the factors associated to higher risk of flare in patients with RA. In case-crossover studies time-varying factors are assessed before events (hazard periods) and before control periods. We defined hazard periods as the 6 months immediately preceding flares of RA. Control periods were the 6 months prior to visits without flare. Exposure of interest was the tapering of glucocorticoids to various doses. The time-variant independent variable of interest (exposure) was the tapering of glucocorticoids during the hazard periods vs. control periods. Tapering of glucocorticoids was defined as the reduction of glucocorticoids dose from prior visit. Conditional logistic regression analysis was employed to determine the association between tapering of glucocorticoids with flare risk. We adjusted, as per case-crossover design, for relevant time-varying confounders (i.e., bDMARD use, csDMARD use, NSAID use and disease activity).

**Results:** 508 RA patients were included in the study and 267 (52.5%) had at least a flare and served as the case-crossover study population. 1,545 visits were available for analysis and 345 (22.3%) flares were recorded. Tapering of glucocorticoids was done in 176 (81.5% of 216) patients and discontinuation was attained, at least once, in 125 (57.8% of 216) patients. Definitive discontinuation was achieved in 101 patients (46.7%) at a median follow-up of 884 days (IQR 700-976 days). Discontinuation of glucocorticoids (i.e., tapering to doses of 0 mg/d) and tapering to 0-2.5 mg/d was associated with higher risk of flare (aOR of 1.45 [95%CI 1.13-2.24] and aOR of 1.37 [95%CI 1.06-2.01] respectively). Tapering to doses >2.5 mg/d was not associated with significantly higher risk of flare. In Figure 1 is depicted the smoothed line for dose-response association between glucocorticoid taper-

ing and risk of flare. Apparently, tapering the doses to >2.5 mg/d did not result in an increased risk of flare.



The curve was interpolated using the conditional logistic regression model. The curve was smoothed with restricted cubic splines with knots at 0-2.5 mg/d, 2.5-5 mg/d, 5-7.5 mg/d and  $\geq 7.5$  mg/d. The reference was not tapering.

**Conclusion:** We found that tapering to doses of >2.5 mg/d was generally effective in terms of risk of flare. Flare risk was higher when glucocorticoids were tapered to doses  $\leq 2.5$  mg/d. Our study might help design new tapering strategies in patients with RA on bDMARDS.

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### SHORT-TERM (2 YEARS) FRACTURE RISK PREDICTION: A MACHINE LEARNING APPROACH

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**Objective:** Osteoporotic fractures continue to be a major cause of global health concerns around the world. The most common risk scores (FRAX, DeFRA) are evaluating this risk within a 10-year time window, which might not be suitable for evaluating shorter term risk, or quickly progressing patients. The objective of the present analysis is to develop 2-year fracture risk scoring models using Machine Learning (ML) techniques and compare their performance with the DeFRA tool.

**Methods:** Data were obtained from web-based fracture risk assessment tool (DeFRA) used in Italy. This tool is a derived version of the FRAX and can be accessed through a website (<https://defra-osteoporosi.it/>). 33 clinical and densitometric variables were used to compute the DeFRA risk score, with variable degree of completeness for each patient. After eliminating the attributes with a large number of missing values, and eliminating the patient with large outlier values for any of the attributes, the dataset was reduced to 2516 patients (with follow-up visits) and 15 attributes (age, weight, height, bmi, smoking, alcohol, familial fractures/osteoporosis, previous femur or vertebra fractures, previous oth-

er fractures, comorbidities, prednisone mg equivalent per day, T-score femoral-neck, T-score spine, serum CTX levels, anti-osteoporotic therapy prescribed). For the development of the machine-learning prediction, the dataset has been randomly divided into a train-set and a test-set, and the train-set has been synthetically balanced using Synthetic Minority Oversampling Technique (SMOTE). A Logistic Regression (LR) model and a Random Forest (RF) model have been optimized on the train-set for predicting the patients who incurred either a hip fracture, or any major osteoporotic fracture, or both in the 2 years following the baseline visit. DeFRA risk score is used as a benchmark for the prediction of either hip fracture or of any major fracture within 2 years.

**Results:** The DeFRA score, when used to predict the patients incurring a hip fracture within 2 years, has an area under the receiver-operating curve (AUROC) of 0.52, compared to 0.76 for random Forest and 0.81 for logistic regression. When looking at other major osteoporotic fractures, the AUROC is 0.59 for DeFRA, 0.77 for LR and 0.80 for RF, and when looking at any fracture the values are 0.58, 0.78, 0.80 for DeFRA, LR and RF respectively. Performance metrics including accuracy, sensitivity, and specificity are summarized in Table 1.

Table 1: Performance of DeFRA and machine learning classifier in predicting patients incurring an osteoporotic fracture within 2 years

	Hip fracture			Major osteoporotic fracture			Any fracture		
	DeFRA	LR	RF	DeFRA	LR	RF	DeFRA	LR	RF
AUROC	0.52	0.81	0.76	0.59	0.77	0.80	0.58	0.78	0.80
Accuracy	0.62	0.63	0.92	0.68	0.69	0.89	0.61	0.71	0.90
Sensitivity	0.40	0.76	0.29	0.49	0.76	0.34	0.54	0.79	0.34
Specificity	0.63	0.62	0.95	0.69	0.69	0.93	0.61	0.70	0.95

**Conclusion:** Currently used risk scores for osteoporotic fractures are developed within a 10-year time window, which might be too long to stratify the most at risk-patients or those that are showing a fast-progressing disease. This is reflected by the poor predictive performance of DeFRA when looking at a 2-year time window. Machine-learning (either logistic regression or random forest) could greatly improve the predictive performance of a scoring system to identify the patients most likely to incur an osteoporotic fracture in the short term, thus requiring shorter follow-ups.

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### QUALITY OF LIFE OF CHILD ATHLETES DURING THE COVID-19 PANDEMIC: A PILOT STUDY

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**Objective:** During the COVID-19 pandemic children and adolescents have experienced many social changes including social distancing, online education, restrictions on sports and recreational activities. The aim of this study was to examine the quality of life of child athletes during the period of the COVID-19 pandemic.

**Methods:** The cross-sectional study was conducted during the period from 01.03.2022. to 01.05.2022. in the Health Center Bač, Serbia. The study involved 32 children karate players, who had sport medical examination during this period. The Kiddo-KINDL questionnaire was used for research purposes. The questionnaire consists of 24 Likert-scaled items and assesses the quality of life in the following six domains: physical well-being, emotional well-being, self-esteem, family, friends, school. The sub-scale scores for each domain were calculated and transformed into a scale from 0 to 100, where a higher score indicates a better quality of life. The descriptive statistical method was applied, as well as the Pearson's correlation to analyse the connection between individual domains. The JASP 0.17 statistical software was used to perform statistical analysis.

**Results:** In the examined sample, the majority were boys (20 (62.5%)), and the average age of the subjects was 14.2±0.7 years. The average scores for the domains physical well-being (35.5±11.8) and emotional well-being (33.6±10.5) are slightly lower than the average scores for the domains self-esteem (81.4±18.7), family (56.8±7.3), friends (71.9±11.2) and school (60.9±19.8). There is a statistically significant moderate positive correlation between the domain of self-esteem and school ( $r=0.390$ ,  $p=0.027$ ).

**Conclusion:** The quality of life of child athletes during the COVID-19 pandemic was worse in the domain of physical and emotional well-being, while in the domain of self-esteem, children show the best quality of life score. The quality of life and background of children and adolescents who have experienced changes as a result of the COVID-19 outbreak should be considered to understand their development in the post-COVID era.

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### PHYSIOLOGICAL, CLINICAL OR RHEOLOGICAL? TOWARDS A BETTER UNDERSTANDING OF THE FORMULATION CONSIDERATIONS IN VISCOSUPPLEMENTATION PRODUCTS FOR OSTEOARTHRITIS

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**Objective:** In osteoarthritis, the synovial fluid (SF) loses its viscoelasticity owing to a decrease in the hyaluronic acid (HA) content. The intraarticular injection of HA using viscosupplementation products (VSPs) is accepted as an option to substitute endogenous HA. Most of the studies focus on optimizing the formulation's rheological properties and surpassing commercial VSPs. This steers the attention away from considering the rheological properties of the SF to formulate an ideal substitute. In addition, the substantial investment in modifying HA to optimize the rheological properties increases the final products' cost. Therefore, the objective of this study is to investigate the rheological properties of common VSPs, compare them to human SF and calculate

their cost-effectiveness to gain an insight on the added value of HA modifications.

**Methods:** The rheological properties of different VSPs and SF were assessed through different oscillatory tests using a Modular Compact Rheometer (Anton-Paar, MCR 302e). Cost-effectiveness of VSPs was calculated considering the cost of a full course of treatment (6 months) and the visual analogue scale (VAS) pain relative reduction in published clinical data.

**Results:** Commercial VSPs exhibit different rheological behaviors ranging from being more elastic (shock-absorbing) to more viscous (able to flow) at conditions mimicking running. The reduction in VAS score at 6 months ranged from 42-64% relative to the baseline, corresponding to 1, 3 or 5 weekly injections administered. The cost-effectiveness was found in the range of 1.1-4.0 € per pain reduction% and in favor of linear HA-based products.

**Conclusion:** Available VSPs on the market exhibit vast differences in their rheological properties. However, rheological characterization shows that the molecular weight, concentration, or structure of HA alone do not determine the rheological properties of the final products nor their clinical outcomes. This study points to an existing gap between the rheological properties and the clinical outcomes and sheds light on the need of considering multiple parameters during the formulation development.

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## P681

### FRACT: FOLLOW-UP OF POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS AT THE FRACTURE LIAISON SERVICE OF PM&R DEPARTMENT

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**Objective:** The FRACT study was an observational registry study, on bone health and fracture screening, the diagnosis, treatment, and prevention of osteoporotic fractures. The objective was to collect follow-up data from the first Fracture Liaison Service (FLS) in Turkey, at the Dept. of PM&R, IUC, Cerrahpasa School of Medicine. Postmenopausal women with osteoporosis diagnosed based on BMD or a fragility fracture were screened. This study was planned to collect important data on the diagnosis, treatment and monitoring of osteoporotic patients and to identify newly formed fragility fractures.

**Methods:** This prospective study was performed on 210 women with postmenopausal osteoporosis, older than 50 years. Our patients were registered in the system between 2018-2020 and followed-up until March 2022. Following the first visit of 210 patients, 132 of them participated in the second visit, and 68 patients remained for the last visit. While 143 (68.1%) patients had fragility fractures, 67 (31.9%) patients did not.

**Results:** The mean age of the patients was 67.65 ( $\pm$  9.64), and the mean BMI was 27.63 ( $\pm$ 5.26). A total of 6 new vertebral fractures

were observed in 4 patients over a mean follow-up of 26.85 ( $\pm$  7.23) months. Three of the patients developed fractures while on treatment, and one of the patients had discontinued treatment before the fracture occurred. Lumbar spine T-score of the patients increased from -2.405 to -2.151 ( $p$ <0.001) at the FLS regardless of the treatment, while Femur neck T-score did not show any significant change. Height loss of the patients was statistically significant at the end of the study ( $p$ <0.001). 63% of the patients were prescribed anti-osteoporotic treatment. The rate of patients continuing medical treatment decreased to 60.7% at the second visit and declined to 41% at the end of the study.

**Conclusion:** In conclusion, FLS implementation has a positive impact on the management and monitoring of patients with postmenopausal osteoporosis.

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### TELE-DISTANCE THERAPEUTIC EXERCISE PROTOCOL FOR LUMBAR DISCOPATHY IN COVID ERA

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**Objective:** To examine the effects of distance therapeutic exercise in the COVID era in patients with lumbar disc herniation without neurological complications. The distance therapeutic exercise protocol was implemented as an intervention method that can be used for the clinical improvement of patients.

**Methods:** 141 patients with lumbar disc herniation underwent the intervention of therapeutic exercise, 45 minutes per day, three times per week for 6 months. The evaluation screening tools for the patients were: The Keele Star Back screening Tool aimed at identifying prognostic markers (both physical and psychosocial risk factors) for persistent, disabling pain in Lumbar spine, as well as categorizing patients into risk groups and guiding treatment, Roland-Morris Disability Index questionnaire regarding the disability index of each patient, Oswestry Disability Index (ODI) a questionnaire that assesses limitations of various activities of daily living, HADS (Hospital Anxiety and Depression scale) which is a scale for detecting symptoms of depression and anxiety. These parameters were re-measured and analyzed

**Results:** There was a significant pre-versus post –intervention difference in all the parameters after biofeedback spine stabilizer therapeutic exercise. The Keele STar Back screening tool improved 43%, Roland-Morris Disability Index improved 42.3%, ODI 41.2%, and HADS 32.7%. The 36 patients were very satisfied with the tele-rehabilitation program.

**Conclusion:** The lumbar stabilization exercise program, which controls balance, using pelvic movement, improves mobility and stability of the sacroiliac joint therefore, it increases pelvic and

back movements. These kinds of movements not only improved proprioception sense, they also had positive clinical effects on lumbar disc function recovery. Therefore, the consideration of interventions, such as spinal manipulation and therapeutic exercise, as used in these cases where there is no neurological compromise, the symptomatology is significantly improved

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### GENERAL SELF-EFFICACY, NOT MUSCULOSKELETAL HEALTH, WAS ASSOCIATED WITH SOCIAL ISOLATION AND LONELINESS IN OLDER ADULTS DURING COVID-19: FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY

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**Objective:** Social isolation and loneliness are prevalent among older adults and may be exacerbated by poor musculoskeletal health. The COVID-19 pandemic led to worldwide changes in lifestyle and social interaction; here we consider associates of worsening social isolation and loneliness of older adults during the COVID-19 pandemic, including relationships with osteoarthritis (OA), osteoporosis, falls and fractures.

**Methods:** We studied 153 men and women from the Hertfordshire Cohort Study, a cohort of UK community-dwelling older adults. Participants completed questionnaires at baseline (2019-20) and follow-up (2020-21). At baseline, osteoporosis, fractures after age 45 years, falls in previous year, and lifestyle factors were self-reported. Physical activity was assessed using the LAPAQ questionnaire. OA of hand, hip, or knee was defined by clinical examination. Self-efficacy was assessed using a shortened General Self-Efficacy Scale (GSE). Social isolation was assessed at both time points using the 6-item Lubben Social Network Scale, and loneliness at follow-up using the 6-item de Jong-Gierveld scale.

**Results:** Baseline median (IQR) age was 83.1 (81.5, 85.3) years; 22.8% of participants had OA; 17.6% reported osteoporosis; 22.2% and 29.4% reported fractures after 45 years and falls in the previous year respectively; 62.7% were married; and 39.4% were current/ex-smokers. Prevalence of follow-up social isolation was 15.9%. A history of current or past smoking was a predictor of worsening social isolation ( $p < 0.05$ ), with married participants ( $p = 0.026$ ) and those with higher GSE ( $p = 0.03$ ) having a lower risk of social isolation at follow-up. Greater alcohol consumption was associated with higher loneliness ( $p = 0.026$ ). We observed a 12% (95%CI: 4%, 20%) reduction in loneliness ( $p = 0.003$ ) per unit increase in GSE score. Neither PA nor any musculoskeletal health measure was associated with social isolation or loneliness.

**Conclusion:** Reassuringly, no measure of musculoskeletal aging was associated with worsening social isolation or loneliness in this community-dwelling sample during the COVID-19 pandemic, but longitudinal studies in larger samples are required. Greater self-efficacy was associated with a lower prevalence of social

isolation and reduced loneliness. Future interventions aimed at promoting self-efficacy in older adults may help reducing social isolation and loneliness in this age group.

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### SARCOPENIA EMERGES AS A RISK FACTOR FOR CARDIAC DIASTOLIC DYSFUNCTION: A NEW ERA TO FOCUS

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**Objective:** Cardiac diastolic dysfunction (left ventricular diastolic dysfunction, LVDD) is a well-known predictor of heart failure. Both conditions are common to older adults. We hypothesized that sarcopenia is independently associated with diastolic dysfunction. We aimed to investigate the association of the most recent consensus, definition of sarcopenia with LVDD.

**Methods:** We included 121 older participants that admitted to cardiology outpatient clinic. We followed the EWGSOP2 definition of confirmed sarcopenia (presence of low muscle mass+ low muscle strength). We estimated skeletal muscle mass with bio-impedance analysis, muscle strength by handgrip strength (HGS) via Jamar hydraulic hand dynamometer. Skeletal muscle mass was adjusted by BMI. Diastolic dysfunction (LVDD) was determined by echocardiographic parameters measured per American Society of Echocardiography recommendations. We ran multivariate logistic regression analyses adjusted for well known risk factors of diastolic dysfunction (i.e., age, sex, obesity, smoking, diabetes mellitus, hypertension and ischemic heart disease) to detect if sarcopenia was independently associated with diastolic dysfunction. We gave results in odds ratio (OR) and 95%CI.

**Results:** Mean age was 69.9 +5.8 years; 38.8% was male. Confirmed sarcopenia was detected in 34.7%, diastolic dysfunction in 19.8%. In univariate analyses, S was associated with diastolic dysfunction (OR=6.7 95%CI: 2.4-18.9). Regression analyses showed that two parameters, i.e. sarcopenia (OR=7.4 95%CI: 2.1-26.6,  $p = 0.002$ ) and obesity (OR: 5.0, 95%CI: 1.03-24.6,  $p = 0.046$ ) were associated with diastolic dysfunction.

**Conclusion:** This study revealed sarcopenia as a new risk factor for the presence of diastolic dysfunction, adding on to its known risk factors. (Sarcopenia may have an independent role in the pathogenesis of diastolic dysfunction and/or diastolic dysfunction may contribute to pathogenesis of sarcopenia. In addition, sarcopenia and diastolic dysfunction may be co-existing due to shared pathophysiological risk factors). Future longitudinal studies are needed to clarify the factors underlying their co-presence.



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### WHAT FACTORS DETERMINE WOMEN'S SELF-PERCEIVED RISK OF OSTEOPOROSIS? FINDINGS FROM THE HERTFORDSHIRE INTERGENERATIONAL STUDY

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**Objective:** Almost one in two women aged  $\geq 50$  years are at risk of any osteoporotic fracture. Self-perceived risk of osteoporotic fracture (SPR) has been associated with fracture risk, independently from objectively calculated risk provided by current prediction tools such as FRAX. Previous studies have suggested that SPR may indeed capture aspects of fracture risk not accounted for in FRAX. The aim of this qualitative study was to explore factors associated with SPR among women to understand what it captures separately from factors considered in the FRAX algorithm.

**Methods:** Ten women aged 50-70 years were recruited from the Hertfordshire Cohort intergenerational study, a cohort of community-dwelling adults and older adults from the UK. Women were interviewed between September and October 2022 via phone and Teams using semi-structured interviews; recordings were transcribed and thematically analysed using N-VIVO. Additional self-completed questionnaires (July-November 2022) including questions on SPR, past medical history, and lifestyle were used to guide discussion and allow calculation of 10 year risk of fracture using the FRAX tool without bone density measurement.

**Results:** Participants reported their SPRs as follows: compared to women their age, 2 thought themselves to be at a lot lower risk, 2 a little lower, 4 about the same, and 2 a little higher. The following themes were identified: physical activity, diet, family history, age, medication and medical conditions, menopause and hormonal status, stress, and social connections. Most participants possessed some knowledge in relation to bone health and were able to identify physical activity and diet as important contributing factors. However, participants also tended to underestimate their own risk of fracture, when SPR was compared to objectively calculated risk using FRAX. Participants also formed most of their opinion regarding osteoporosis from social conversations with others.

**Conclusion:** Most women interviewed demonstrated some understanding of osteoporosis and bone health, though some misconceptions were noticed. Participants identified some factors important for fracture risk but not currently captured in FRAX; these included physical activity and diet. Future strategies to improve bone health might include using social networks to improve awareness of osteoporosis.

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### MEASUREMENT PROPERTIES OF INSTRUMENTS TO MEASURE FATIGUE IN COMMUNITY-DWELLING OLDER PEOPLE: AN UMBRELLA REVIEW OF SYSTEMATIC REVIEWS AND META-ANALYSES

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**Objective:** Vitality capacity (VC) is a key component of intrinsic capacity (IC) and is its fundamental biophysiological aspect. Energy and metabolism is one of the core domains of VC, however, there is a need for potential biomarkers that can capture VC to enable its systematic measurement and monitoring. The aims of this umbrella review are a) to identify available instruments suitable for measuring fatigue in community-dwelling older adults and b) to critically review the measurement properties of the identified instruments.

**Methods:** PubMed, Web of Knowledge were systematically screened for systematic reviews and meta-analysis reporting on fatigue instruments resulting in 2263 articles (last search 5<sup>th</sup> December 2022). Data on fatigue construct, reference period, assessment method, validated population, reliability, validity, responsiveness and predictive validity on negative health outcomes was extracted. The measurement tool to assess the methodological quality of systematic reviews (AMSTAR) was used to assess methodological quality.

**Results:** In total 11 systematic reviews and meta-analyses were included in this study, providing information on different fatigue instruments. From the 70 fatigue instruments reported in the literature, there were 21 instruments that were originally designed for fatigue. Moderate to good validity and reliability was reported, data on responsiveness was lacking. The Fatigue Severity Scale (FSS), Pittsburgh fatigability scale (PFS) and Visual Analogue scale (VAS-F) represented good psychometric properties and could be used to measure fatigue in the context of VC

**Conclusion:** The FSS, PFS, and VAS-F presented good psychometric properties in various conditions and showed to increase the risk for adverse health outcomes. Therefore, these instruments could be used to quantify trajectories in the domain of VC in community-dwelling older adults. The review provides a guide for choosing the right fatigue instrument and helps healthcare professionals and policymakers to identify older people at risk and provide preventive and health-promoting support to promote healthy aging and well-being.

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### ASSOCIATIONS BETWEEN GUT MICROBIOTA AND SARCOPENIA OR ITS DEFINING PARAMETERS: A SYSTEMATIC REVIEW

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**Objective:** Ageing is associated with unbalanced gut microbiota (GM). While previous research has suggested that GM dysbiosis contributes to adverse health outcomes such as depression and Morbus Parkinson, more research is needed to determine the role of the gut-muscle axis in humans. Therefore, this systematic review aimed to clarify the associations between sarcopenia and its defining parameters (muscle mass, muscle strength, physical performance) and GM in older adults.

**Methods:** A systematic search was conducted according to the PRISMA guidelines in PubMed, Embase, Web of Science and Cochrane Library after registration on PROSPERO (CRD42021259597). Studies reporting on the construct sarcopenia or at least one defining parameter and GM were screened from inception until 19 July 2022. Observational (cross-sectional, cohort, case-control) studies with subjects  $\geq 50$  years were included.

**Results:** 25 studies with 5400 subjects (52% women) were included (18 cross-sectional, 4 case-controls, 3 cohort). The majority of studies comprised community-dwelling (n=21) and Caucasian (n=15) older persons. 12 studies adjusted for putative confounders. 8 studies had the construct sarcopenia (by varying definitions) as one of the outcomes, with prevalence ranging from 11% to 51%. In 9 studies at least 1  $\alpha$ -(within sample) GM diversity index and in 11 studies at least 1  $\beta$ -(between sample) GM dissimilarity index was different in older persons with preserved vs. low muscle function. Four studies reported differences in Firmicutes/Bacteroides ratio, which was increased in normal vs. low muscle mass groups in 3 of these. Multiple studies reported associations between bacterial taxa at multiple levels (phylum, family, genus and species) and muscle mass (n=10), muscle strength (n=7) and physical performance (n=3). The construct sarcopenia was associated with higher abundance of specific bacterial taxa (5 out of 8 studies). All mentioned results were significant ( $p \leq 0.05$ ).

**Conclusion:** This review suggests significant associations between GM and sarcopenia or at least one defining parameter. However, results were highly heterogeneous, and no conclusions about causality could be made. Therefore, additional longitudinal research with larger sample sizes is needed to unravel the gut-muscle axis in older persons with sarcopenia.

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### COST-EFFECTIVENESS ANALYSIS OF FRACTURE LIAISON SERVICES FOR PATIENTS WITH A RECENT FRACTURE IN THE NETHERLANDS

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**Objective:** To investigate the economic benefits of fracture liaison service (FLS) in the Netherlands from a societal perspective using real-world data.

**Methods:** Annual fracture incidence, treatment scenarios as well as treatment initiation in the years 2017-2019 were collected from VieCuri Medical Center in Venlo, the Netherlands. A decision tree followed by an individual-level state transition model was designed to simulate lifetime costs and quality-adjusted life years (QALYs) for different patient pathways that were differentiated according to gender, osteoporosis, clinical or prevalent vertebral fracture (C/PVF), and treatment status, and further to estimate the cost-effectiveness of FLS relative to no-FLS. For comparability reasons, identical gender distribution and prevalence of osteoporosis and/or C/PVF were modeled for both FLS and no-FLS branches. Results were presented as incremental cost-effectiveness ratios (ICER). Both one-way and probabilistic sensitivity analyses were conducted to examine the impact of parameter uncertainty.

**Results:** In all patients with a recent fracture aged 50 years and older, FLS was associated with a €396 higher cost and 0.08 additional QALY gained leading to an ICER of €4,950 per QALY gained, indicating FLS was cost-effective compared to no-FLS at the threshold of €20,000-80,000 per QALY gained. For every 1,000 patients in the FLS, 18 subsequent fractures were avoided in their lifetime. For patients at the ages of 50, 60, 70 and 80 years specifically, FLS remained cost-effective; patients aged 80 years resulted in higher extra costs and greater QALY gained compared to younger groups. Our results were robust in all one-way sensitivity analyses. At a threshold of €50,000 per QALY gained, FLS was cost-effective compared to no-FLS in 92% of the simulations (women 95.5% vs. men 90.5%). FLS was shown to be cost-effective in 72.5%, 83%, 94.5% and 99.5% of the simulations at the age of 50, 60, 70, and 80 years, respectively.

**Conclusion:** This study provides the first economic results of FLS in the Netherlands, suggesting that FLS is cost-effective compared to no-FLS in patients with a recent fracture aged 50 years and older. The implementation of FLS could lead to lifetime economic benefits.

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### RELATIONSHIP OF 25-HYDROXYVITAMIN D WITH FIBROMYALGIA AND ITS RELATED SYMPTOMS: THE NORWEGIAN HUNT STUDY

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**Objective:** Fibromyalgia can be viewed as a set of symptoms characterized by amplified pain in the central nervous system, along with fatigue and disruptions in sleep and mood, such as depression and anxiety. The cause of fibromyalgia is unclear. Besides genetic factors and female sex, potentially modifiable risk factors include sleep disturbances, physical inactivity, obesity and stress. Recent studies indicate that vitamin D deficiency is highly prevalent in patients with fibromyalgia. Our aim was to investigate the relationship between serum 25-hydroxyvitamin D [25(OH)D] and risk of fibromyalgia and its related symptoms in a Norwegian prospective cohort study.

**Methods:** We randomly selected a 10% sample from the population who participated in the Trøndelag Health Study Survey 2 (HUNT2, 1995-1997), and their serum [25(OH)D] levels were measured (n=6377). Of these, 3671 participants were followed up to HUNT3 (2006-2008). Logistic regression analysis was applied to investigate the relationship between seasonal-standardized 25(OH)D in HUNT2 and risk of fibromyalgia or its related symptoms in HUNT3 after excluding the outcome cases in HUNT2. These symptoms included chronic musculoskeletal pain, chronic widespread pain, as well as depression, anxiety and insomnia symptoms.

**Results:** We found that serum 25(OH)D level was inversely associated with the risk of depression symptoms (defined by Hospital Anxiety and Depression Score  $\geq 11$ ) (<30.0 nmol/L: OR 2.67, 95%CI 1.12 to 6.38; 30.0-49.9 nmol/L: 1.05, 0.58 to 1.91 and  $\geq 75.0$  nmol/L: 0.25, 0.03 to 1.91, as compared to the 50.0-74.9 nmol/L group, p for trend 0.02). Each 25 nmol/L decrease in serum 25(OH)D was associated with a 115% increased risk of depression symptoms (OR 2.15, 95%CI 1.28 to 3.62). There were no associations between serum 25(OH)D levels and the risk of fibromyalgia (<30.0 nmol/L: OR 1.08, 95%CI 0.39 to 2.99; 30.0-49.9 nmol/L: 1.22, 0.68 to 2.17 and  $\geq 75.0$  nmol/L: 0.54, 0.12 to 2.36, as compared to the 50.0-74.9 nmol/L group) or other fibromyalgia-related symptoms.

**Conclusion:** We did not find an association between serum 25(OH)D and the risk of fibromyalgia or its related symptoms, except for the presence of depression symptoms in this Norwegian general population.

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### THE INTERRELATIONSHIP BETWEEN SARCOPENIA AND MILD COGNITIVE IMPAIRMENT, ALZHEIMER'S DISEASE AND DEMENTIA: A SYSTEMATIC REVIEW

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**Objective:** Sarcopenia is associated with adverse health outcomes. Its specific interrelationship with the neurocognitive disorders mild cognitive impairment (MCI), Alzheimer's disease (AD) or other types of dementia remains unclear. The aim of this review is to clarify the existing evidence on this interrelationship.

**Methods:** This systematic review was conducted according to PRISMA guidelines and pre-registered to PROSPERO. Databases including PubMed, EMBASE, CINAHL, SCOPUS, Web of Sciences, ClinicalTrials.gov, PEDro, Sportdiscus and the Cochrane Central register of Controlled Trials were used to search for studies that reported on the association and prevalence of sarcopenia in MCI, AD or other types of dementia from inception to October 2022. Observational studies (cross-sectional and cohort) and interventional studies in adults  $\geq 50$  years were included.

**Results:** A total of 85 studies consisting of 69 924 subjects were finally included in the qualitative analysis (76 cross-sectional, 6 cohort and 3 interventional studies). Studies were heterogeneous, using different diagnostic criteria to define sarcopenia or cognitive status. The majority of studies (n=52) included Asian community-dwelling older adults, with the Asian Working Group for Sarcopenia being the most used diagnostic criteria (n=35). Most studies investigated the association of sarcopenia with MCI (50/85) and to a lesser extent with AD (26/85). Two studies included Lewy body dementia, whereas the remaining studies did not specify dementia aetiology. Half of the studies investigating MCI (25/50) reported a significant association with sarcopenia. Results from cohort studies (3/6) showed that sarcopenia increased the risk of having incident MCI, while results from interventional studies are less clear. Five studies (5/26) demonstrated a significant association between sarcopenia and AD. Prevalence of sarcopenia was increased in subjects with MCI and AD (range: 4.6-77.8%). The relationship between unspecified dementia and sarcopenia remains inconclusive.

**Conclusion:** This review showed that sarcopenia may be associated with an increased risk of MCI. No conclusions could be made about the association with AD or unspecified dementia. Further research is needed to confirm these findings and clarify the causal relationship between sarcopenia and cognitive dysfunction.

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### THE EFFECTIVENESS OF DENOSUMAB FOR OSTEOPOROSIS IN THE PATIENTS WITH ANKYLOSING SPONDYLITIS

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**Objective:** Ankylosing spondylitis (AS) is chronic inflammatory disease in especially spine. Recent study reported patient with AS have high risk of osteoporosis in the spine by QCT. But there has not been the study about the effectiveness of anti-osteoporotic agents for AS until now. We analyzed the change of BMD by DXA or QCT after 1 year treatment of denosumab.

**Methods:** We reviewed the patients who were diagnosed as AS by mNY criteria and treated by denosumab between 2017-2022 in Kyung Hee university hospital at Gang dong in South Korea. We analyzed the change of BMD, BASDAI, ASDAS-CRP, CRP and alkaline phosphatase (ALP).

**Results:** 26 patients were enrolled. The numbers of male were 11 (40.7%), average age was 53.2±6.8, BASDAI was 1.4±0.5, ASDAS-CRP was 0.7±0.4, CRP was 0.3±0.3 mg/dL and ALP was 84.4±21.8. Average disease duration of patients was 17.1±10.3 years. Combined medicines were non-steroidal anti-inflammatory drug (69.2%), steroid (11.5%) and biologics (34.6%). BMD was significantly increased after 1 year treatment of denosumab. The change of BMD was 0.4±0.2 (-2.9±0.5 to -2.5±0.1 (T score); p=0.000) by DXA (N=16). The change of BMD was 8.4±11.0 mg/cm<sup>2</sup> (49.8±36.4 to 58.3±43.2; p=0.038) by QCT (N=10). ALP which is bone formation marker was also significantly decreased (84.4±21.8 to 68.5±26.4 IU/L; p=0.000).

**Conclusion:** Denosumab was effective in osteoporosis in patient with AS.

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### A PRELIMINARY MOLECULAR STUDY IN TUMORAL CALCINOSIS CELL LINES DERIVED FROM A PATIENT WITH A NOVEL GALNT3 MUTATION

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**Objective:** Tumoral calcinosis (TC) is an extremely rare condition characterized by ectopic calcified mass which is usually raised in soft tissues. We have previously performed a preliminary characterization of a TC-stem cells (SCs) line (TC1-SC) from a finite

primary cell line (TC1) derived from a TC patient biopsy harboring a novel *GALNT3* mutation. In this study, we investigated the expression profile of specific miRNAs during osteogenic differentiation and the possible involvement of the endocannabinoid system (ES) in the TC progression.

**Methods:** After establishing and characterizing TC1-SCs line by several cellular and molecular assays, we studied which miRNAs are potentially able to bind to the 3'UTR region of the *GALNT3* through specific bioinformatic tools. We have identified and evaluated the expression of three miRNAs during osteogenic differentiation for up to 21 d in TC1 and TC1-SC by using TaqMan technology. We evaluated also the expression of the ES components, and of those genes associated with the FGF23 signaling pathway in both the established cell lines by using TaqMan technology.

**Results:** Among the microRNAs predicted to target the 3'UTR of *GALNT3*, we selected to investigate the expression levels of miR-27a-3p, miR-27b-3p, and miR-30b-5p. Hence, we found a miRNA signature that resulted to be specific of the isolated TC1-SCs line. In addition to this, our data reported, for the first time, the presence of ES components and *GALNT3*, while no expression has been reported for *FGF23* in all the tested cell lines.

**Conclusion:** For the first time we have not only established and characterized a SCs line from a TC patient, demonstrating the involvement of a SCs population in the TC progression, but we have also reported a preliminary miRNA signature specific only for the TC1-SCs line. Regarding this finding, we are evaluating the expression of other miRNAs compared to the primary TC line. Nowadays, we are studying the gene expression levels of ES components and *GALNT3* to investigate their involvement in TC mineralization and evaluating how their expression could change during the osteo-differentiation process of the TC1-SCs line. All these data could represent an important step forward regarding the molecular mechanisms underlying TC progression.

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### IS THE ENDOCANNABINOID SYSTEM INVOLVED IN GORHAM-STOUT SYNDROME PATHOGENESIS?

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**Objective:** Gorham-Stout Disease (GSD), an extremely rare bone disease, is characterized by an increase of lymphatic or blood vessels within bone tissue, causing a massive osteolysis. The GSD etiology and progression are still unknown. Nevertheless, recent studies observed that the PI3K/AKT/mTOR signaling pathway and the autophagy process may play a key role in the GSD pathogenesis. Related to this, recent studies have also shown how autophagy is regulated by the Endocannabinoid System (ES), which also appears to be involved in bone homeostasis. Consid-

ering this, the aim of this study is to evaluate the possible role of ES in GSD pathogenesis, paying particular attention to its ability to regulate the autophagy process.

**Methods:** First of all, we established and characterized a primary mesenchymal stem cell line, signed as BMSC-GS-1, from a pathological bone marrow biopsy sample obtained from a GSD patient, by different analyses. Then we performed a preliminary evaluation of the expression levels of ES components and autophagy genes in the BMSC-GS-1 line, by TaqMan technology, during osteogenic differentiation.

**Results:** Our obtained preliminary results showed not only the presence of the ES components (i.e., *CNR1*, *CNR2*, and *NAPE-PLD*) in the BMSC-GS1 line, but also a modulation of them during the osteogenic differentiation process. In fact, we have observed an increased expression of all three genes during this time. After that, we also observed that also the autophagy genes (i.e., *MA-PLC3B*, *BECN1*, and *ATG5*) were all found to be positively modulated in BMSC-GS-1 cells during osteogenic differentiation.

**Conclusion:** This preliminary study represents a first step toward understanding how the ES and the autophagy may be involved in the GSD onset and progression, with a focus on altering the mineralization process and inhibiting the regeneration of new bone tissue. Furthermore, the obtained results will allow the identification of new molecular targets for the development of targeted and effective therapies to counteract the massive osteolysis that characterizes GSD and improve the knowledge regarding this syndrome.

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## P694

### RADICAL SCAVENGING ACTIVITY AND BONE MINERAL DENSITY

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**Objective:** To establish radical scavenging activity (RSA%), copper and magnesium serum levels in osteoporosis patients.

**Methods:** 82 menopausal women aged 63.52±7.97 were investigated – newly diagnosed with reduced bone density (BD) and controls. Exclusion criteria were as follows: diabetes, endocrine and liver disease; intake of oestrogens and biogenic elements. BMD was measured in all patients using DXA. Serum RSA% is established using ABTS decolorization assay, and serum copper and magnesium levels using atom absorption analysis. [1, 2]

**Results:**

	Femoral reduced BD	re- Lumbar spine reduced BD	Normal BD	Total group with reduced BD
Number of patients	33	39	10	72
BMD g/cm <sup>2</sup>	0.661±0.07 p* <0.01, p** <0.05	0.737±0.05 p* <0.01	1.117±0.146	0.703±0.07 p* <0.01
RSA%	67.46±10.16 p* <0.01, p** <0.05	72.85±10.01 p* <0.01	55.64±1.30	70.38±10.37 p* <0.01
BMI kg/m <sup>2</sup>	23.42±4.12 p* <0.01, p** >0.05	24.21±3.96 p* <0.01	28.15±4.74	23.87±4.02 p* <0.01
Mg mmol/l	0.97±0.17 P* <0.05, p** >0.05	0.96±0.21 p* >0.05	0.83±0.065	0.96±0.19 p* <0.05
Cu µmol/l	22.18±5.19 p* <0.05, p** >0.05	22.19±6.54 p* >0.05	18.52±2.57	22.18±5.8 p*=0.05

p\* against controls; p\*\* against lumbar spine

**Conclusion:** In lumbar osteopenia cases, RSA% is higher compared to those of femoral reduced BD. When osteopenia is present, serum copper and magnesium levels are increased.

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## P695

### MODERATING EFFECT OF BODY HEIGHT ON THE ASSOCIATION OF BODY WEIGHT AND DISABILITY CAUSED BY NON-SPECIFIC CHRONIC LOW BACK PAIN IN WOMEN AND MEN

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**Objective:** To test the hypothesis that body height has a moderating effect on the association of weight and chronic low back pain (LBP) induced disability, and that this moderating effect is different in women and men.

**Methods:** We performed a nested cross-sectional analysis using data collected at baseline in a prospective cohort study conducted 2008-2009 in a special hospital for medical rehabilitation in Croatia. The outcome was the Roland Morris Disability Questionnaire (RMDQ) score. The independent variable was body weight. The focal moderators were body height and sex. The moderation analysis was adjusted for seven sociodemographic and clinical covariates.

**Results:** We analyzed the data from 72 patients with a median (IQR) age of 50 (43-55) years, 36 (50%) of whom were women, treated for nonspecific, chronic LBP. Body weight and height were

significantly correlated in the men (Pearson's  $r=0.47$ ;  $r^2=0.22$ ;  $p=0.004$ ) but not in the women (Pearson's  $r=0.28$ ;  $r^2=0.08$ ;  $p=0.102$ ). BMI was significantly correlated with body weight in both sexes (women: Pearson's  $r=0.87$ ;  $r^2=0.75$ ;  $p<0.001$ ; men: Pearson's  $r=0.82$ ;  $r^2=0.67$ ;  $p<0.001$ ). BMI was not significantly correlated with body height in either sex (women: Pearson's  $r=-0.23$ ;  $r^2=0.05$ ;  $p=0.172$ ; men: Pearson's  $r=-0.13$ ;  $r^2=0.02$ ;  $p=0.458$ ). After adjustments for age, educational level, type of work, family history of low back pain, locomotor comorbidities and other chronic diseases, the complex moderating effects of sex and body height on the relation between body weight and the RMDQ score was significant and of moderate magnitude  $F(1,57)=12.29$ ;  $p=0.001$ ;  $FDR<5\%$ ; change of  $R^2=0.13$ ). The moderating effect of body height on the correlation of body weight and the RMDQ score was significant in both sexes, but the directions of the effects were opposite (women:  $b=-0.02$ ;  $F(1,57)=10.25$ ;  $p=0.002$ ;  $FDR<5\%$ ; men:  $b=0.03$ ;  $F(1,57)=5.18$ ;  $p=0.027$ ;  $FDR<5\%$ ).

**Conclusion:** We found a complex relationship between sex, body weight, body height and physical disability i.e. everyday physical functioning associated with chronic LBP. The effects of body weight on physical disability are moderated by body height, but this moderation effect differs between women and men. In other words, the effect of body weight and disability caused by low-back pain is different in people of different body heights.

## P696

### FEATURES OF CLINICAL MANIFESTATIONS OF RHEUMATOID ARTHRITIS IN PATIENTS AFTER FAILURE OF DMARDS THERAPY DEPENDING ON THE SIGNS OF CENTRAL SENSITIZATION

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**Objective:** Central sensitization (CS) is a pathophysiological phenomenon characterized by neuroplastic changes in nociceptive neurons, decreased pain threshold, hyperalgesia and widespread pain. The presence of CS may be one of the causes of inadequate response to pathogenetic therapy of rheumatoid arthritis (RA). The purpose of this study is to evaluate the features of clinical manifestations of RA in patients with ineffective disease-modifying anti-rheumatic drugs (DMARDs), depending on the presence of signs of CS.

**Methods:** The study group included 509 patients diagnosed with RA (according to ACR/EULAR classification criteria, 2010) with moderate or high disease activity ( $DAS28\geq 3.2$ ) and ineffective or intolerance of conventional synthetic DMARDs, biological DMARDs and JAK inhibitors. RA activity was assessed using the DAS28-CRP. The Central Sensitization Inventory (CSI) was used to identify CS, the BPI questionnaire to assess pain intensity, the PainDETECT questionnaire to assess neuropathic pain symptoms (NPS), the HADS questionnaire for anxiety and depression, the FSS questionnaire for fatigue, the FIRST questionnaire for fibro-

myalgia signs and the HAQ questionnaire for functional impairment.

**Results:** Signs of CS (CSI  $\geq 40$ ) were detected in 57.2% of patients examined. Patients with signs of CS were found to have poorer assessment of their state of health (CSI  $64.6\pm 13.5$  and  $53.5\pm 16.8$ ,  $p=0.001$ ), higher pain intensity on all BPI scales, longer morning stiffness - 90 [30;180] and 60[20;120] minutes,  $p=0.001$ , more painful joints - 8[5;12] and 7[4;10],  $p=0.005$ , worse functional status on HAQ ( $1.65\pm 0.7$  and  $1.08\pm 0.5$ ,  $p=0.001$ ) and higher disease activity on DAS28-CRP ( $4.9\pm 1.0$  and  $4.6\pm 0.9$ ,  $p=0.001$ ) compared to patients without signs of CS. There was also a clear association between CS and a high likelihood of having an NPS (Pain DETECT  $>18$ ) - 34.5% and 10.3%,  $p=0.001$ , clinically significant anxiety and depression (HADS  $>11$ ) - 29, 0% and 5.1%,  $p=0.001$  and 26.3% and 4.2%,  $p=0.001$  respectively, fatigue (FSS) 96.5% and 70.4%,  $p=0.001$ , signs of fibromyalgia (FIRST  $\geq 5$ ) 38.4% and 6.1%,  $p=0.001$ .

**Conclusion:** The presence of signs of CS in RA significantly influences many disease symptoms, being associated with higher pain intensity, fatigue, impaired function, higher incidence of NPS, depression and anxiety, and fibromyalgia.

## P697

### THE NEED FOR OSTEOPOROSIS THERAPY AMONG PATIENTS WITH RHEUMATOID ARTHRITIS WITH NEWLY PRESCRIBED BIOLOGICS

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**Objective:** To determine the need for osteoporosis (OP) therapy among patients with rheumatoid arthritis (RA) with newly prescribed therapy with biologics.

**Methods:** The study includes 200 postmenopausal women with RA with first-time prescribed biologics therapy in the clinic at the V. A. Nasonova Research Institute of Rheumatology in 2021-2022. The mean age was  $60.9\pm 7.5$  years, RA duration was  $13.3\pm 11.1$  years (median was 10 years), RA activity by DAS-28 was  $5.9\pm 0.9$  points. When enrolled in the study, 119 (59.5%) patients took glucocorticoids (GC) at a dose of 5 mg/d or more. 40 (20%) patients in anamnesis took GC (5 mg/d or more) at least 3 months; 35 (17.5%) patients had never taken GC; 4 (2%) took GC for less than 3 months and 1 (0.5%) patient took GC at a dose of less than 5 mg/d. 69 (34.5%) patients in medical records had an indication of the established diagnosis of osteoporosis, and 42 (21%) patients had low-energy fractures characteristic of the OP localization at the age of 45 years and older. Osteoporosis complicated by fractures was in 26 (13%) people. Thus, in 83 (41.5%) people, according to medical records, OP was established and/or the presence of low-energy fractures in adulthood was noted. In 116 (58%) RA patients who had no history of OP and fractures, the FRAX algorithm determined a 10-year probability of fracture of the proximal hip and a 10-year probability of major osteoporotic fractures (clinically significant spinal fracture, distal forearm fracture, proximal

hip fracture, or shoulder fracture). One patient under the age of 40 was excluded from the study due to the inability to use the FRAX algorithm. In 40 of 116 patients, FRAX was determined using the mineral density T-test (BMD) of the femoral neck based on the results of X-ray absorptiometry over the past 6 months. For the rest, the FRAX calculation was carried out without densitometry.

**Results:** According to FRAX using the T-score of femoral neck 19 out of 40 patients needed to be treated with OP ("red zone"). Among 76 patients without femoral neck BMD data, 48 people needed X-ray densitometry to clarify the diagnosis and decide on the prescription of therapy ("orange zone" before the "intervention point"), 28 people were in the "red zone" or above the "intervention point," which means that they require the prescription of therapy for OP. And only 1 patient did not require treatment with OP (green zone).

**Conclusion:** Among 200 postmenopausal women suffering from RA with newly initiated biologics treatment, 130 (65%) people had a need to prescribe OP therapy. Among them, 47 (23.5%) people have a high 10-year probability of major osteoporotic fractures according to FRAX, and 83 (41.5%) people have a diagnosis of OP and/or there are indications in the materials of medical documents for low-energy fractures in adulthood.

## P698

### CLINICAL MANIFESTATIONS, DISEASE ACTIVITY AND TREATMENT RESPONSE IN PATIENTS WITH RHEUMATOID ARTHRITIS AND OBESITY

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**Objective:** To examine the impact of obesity on clinical manifestations, disease activity and treatment response in rheumatoid arthritis (RA).

**Methods:** The study group included 458 female patients aged 50 years and older with RA, and inadequate response to of conventional synthetic DMARDs, biological DMARDs and targeted synthetic DMARDs. The patients were divided into 2 groups: group 1 (n=116) - BMI  $\geq 30$  (main group), group 2 (n=342) - BMI  $\leq 30$  (control group). The groups were comparable by sex, age, and RA duration.

**Results:** Group 1 patients had fewer swollen joints (4[2;6,5] and 5[3;8],  $p=0.02$ ) and lower rates of radiographic progression over time (Steinbroker grade 4: 16.4% and 32.7%,  $p<0.001$ ), but disease activity did not differ between groups (DAS28:  $5.4\pm 1.2$  in both groups). At the same time, patients in group 1 were more likely to have serious comorbidities (hypertension in 88.8% and 54.7%,  $p<0.001$ ; coronary heart disease in 16.4% and 9.0%,  $p=0.03$ ; type II diabetes in 15.5% and 5.0%,  $p<0.001$ ) and signs of central sensitization (CSI  $\geq 40$ : 75.5% and 56.3%,  $p=0.02$ ), which significantly complicated treatment for these patients. Thus, secondary failure to TNF inhibitors was noted in 57.7% of patients from group 1 and 34.8% from group 2 ( $p=0.04$ ).

**Conclusion:** obesity in patients with RA has a substantial impact

on patient symptoms and outcomes, being associated with a higher frequency of signs of central sensitization, making assessment of disease activity and treatment response more challenging.

## P699

### EFFECT OF INJECTABLE CHONDROITIN SULFATE ON SYNOVITIS AND MAJOR SYMPTOMS IN KNEE OSTEOARTHRITIS

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**Objective:** To study the effect of chondroitin sulfate therapy on the severity of knee synovitis and the main clinical parameters in patients with knee osteoarthritis.

**Methods:** The study included 35 patients (32 women, 3 men) from 50-75 years (mean age  $63.0\pm 7.4$  years) with stage II and III osteoarthritis of the knee joints according to Kellgren - Lawrence: stage II - 25 (71%) and stage III - 10 (29%) patients, respectively. All patients received chondroitin sulfate intramuscularly at a dose of 100 mg/d (1 mL) every other day for 3 first injections, then at a dose of 200 mg/d (2 mL) every other day for about 2 months (approximately 30 injections in total). At baseline and after 2 months, patients were assessed for clinical symptoms on the VAS pain scale, the Lekens Index, the WOMAC and KOOS (Knee injury and Osteoarthritis Outcome Score) questionnaires, X-ray and ultrasound of knee joints. Ultrasound of the knee joints was carried out on an expert-class apparatus using a multi-frequency linear sensor (10-18 MHz) with an energy doppler (ED) technique. Signs of synovitis were: intra-articular effusion and proliferation of the synovial membrane according to the gray scale (B-mode) and hypervascularization of synovia in ED mode according to the OMERACT (the Outcome Measures in Rheumatology Clinical Trials) criteria. Thickening of the synovial membrane  $>3$  mm was considered a sign of synovitis. At the moment, ultrasound has been performed in 26 (74%) patients in dynamics.

**Results:** According to preliminary data obtained over time in 26 (74%) patients, it was noted that such indicators as VAS pain and the Lekens index decreased from  $61.9\pm 10.8$  mm to  $41.6\pm 13.1$  mm ( $M\pm d$ ) and from  $9.4\pm 2.3$  points to  $4.9\pm 2.3$  points ( $M\pm d$ ) respectively ( $p<0.05$ ). Overall WOMAC and its components (pain, stiffness, function) also demonstrated a significant decrease ( $p<0.05$ ), as well as significant increase ( $p<0.05$ ) in KOOS scale and its components (symptoms, pain, ADL, sport/rec, quality of life). An ultrasound of the knee joints showed that 25 (96%) patients had synovitis in at least one knee joint at baseline, after 2 months the number of patients with synovitis did not change significantly - 24 (92%), however, the thickness of the synovia over this period significantly decreased:  $2.5\pm 1.0$  to  $2.2\pm 0.9$  mm for the right and  $2.2\pm 1.0$  to  $2.0\pm 0.9$  mm for the left knee, respectively ( $p<0.05$ ). The number of patients with synovia thickness  $>3$  mm by ultrasound also decreased: 10 (38%) vs. 5 (19%) for the right and from 7 (27%) to 5 (19%) for the left knee joint.

**Conclusion:** After 2 months of therapy with chondroitin sulfate intramuscularly according to ultrasound, there was a decrease in the thickness of the synovial membrane in both knee joints and effusion in the knee joint cavity, which indicates a significant decrease in the activity of the inflammatory process. There was a significant decrease in pain according to VAS, Lekens index, improvement according to the WOMAC (pain, stiffness, function) and KOOS (symptoms, pain, ADL, sport/rec, quality of life) after 2 months.

## P700

### FGF23 AS AN EARLY MARKER OF MINERAL METABOLISM AND NUTRITIONAL STATUS DISORDERS IN CHRONIC KIDNEY DISEASE PATIENTS

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**Objective:** Patients with chronic kidney disease (CKD) frequently have disturbances in mineral and bone metabolism, nutritional status which result in high morbidity and mortality. The aim of the study was to establish the role of FGF23 in development of mineral and nutritional disturbances in pre-dialysis CKD.

**Methods:** We analyzed data on 106 adults aged 23-61 years with a mean of 49,6±13,8 years and CKD 2-4 stages. Nutritional status was assessed using BMI, lower scapular angle skinfold thickness (SFT), and serum albumin concentration. Mineral metabolism was assessed by measuring of serum concentration of c-terminal fragment of FGF23, calcium, phosphorus and iPTH.

**Results:** FGF23 concentration was significantly higher in CKD 2 stage patients (0,81± 0,05) pmol/l), compared with control (0,47±0,16) pmol/l) (p<0,01). It increased significantly up to (1,90±0,30) pmol/l) and (17,53±7,17 pmol/l) in CKD 3 and 4 stages (p<0,001). There was a negative significant correlation between FGF 23 and GFR (r=- 0,88; p<0,05) and positive correlation between FGF23 and PTH (r= 0,86; p<0,05). The mean SFT in CKD 3 (56,52±7,72 mm) and CKD 4 patients (53,95±7,44mm) was significantly higher than SFT (64,33±10,4 mm) observed in CKD 2 patients (P<0.01) There was a positive correlation between SFT and the GFR (r=0.23, P<0.05). The mean value of serum albumin of (3.22± 0.3 g/dL) observed in the CKD 3 stage patients was significantly lower than the mean albumin value of (4.31±0.32 g/dL) observed in the CKD 2 stage patients, P<0.001. The lowest albumin level was established in CKD4 patients (3.53 + 0.41 g/dL), P<0.01. There was a positive significant correlation between serum albumin concentration and GFR(r=0.33, P=0.001). There was a negative significant correlation between FGF 23 and thickness of fat fold (r=- 0,23; p<0,05) and albumin concentration (r=- 0,23; p<0,05).

**Conclusion:** FGF 23 is an early marker of bone and mineral disturbances in CKD patients which precedes development of PTH, calcium and phosphorus disturbances. It was established significant negative correlation between FGF 23 and thickness of skin and fat fold and serum albumin concentration. The data support

the idea about association between mineral and nutritional disorders. FGF 23 can be used as an early marker of both mineral and nutritional disturbances in CKD patients.

## P701

### EFFECTIVITY OF POLYDEOXYRIBONUCLEOTIDES IN THE PATIENTS WITH INFLAMMATORY PHENOTYPE OF THE OSTEOARTHRITIS OF KNEE JOINTS AND DIABETES MELLITUS

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**Objective:** For the patients with osteoarthritis of knee joints (OA) and diabetes mellitus under outpatient observation in Dushanbe (Republic of Tajikistan) with the inflammatory type of OA and effusion synovitis visualized on ultrasonography is the mostly common.

**Methods:** 277 OA patients with type II diabetes mellitus, the II-III stage by Kellgren and ultrasound verified synovitis were observed during 6 months. The patients were divided in two groups: the first one (n=136) got the course of treatment with 3 intra-jointal injections of highly molecular hyaluronic acid (HA)(density 6 megadaltons, 3 ml) weekly and the second one (n=141) 3 intra-jointal injections of polydeoxyribonucleotides(PN) (2 ml) weekly. The effectivity of therapy was estimated by the VAS and KOOS scales before and after 6 months from the course of intra-jointal injections.

**Results:** Before the course of treatment the VAS value in the first group was 8,6 and in the second-8,7, KOOS value in the first group was 72,3 and in the second -71,8. At the 6<sup>th</sup> month after the course of intra-jointal injections the value of VAS in the group getting HA was 6,2 and in the group getting PN it was 4,3, as for the KOOS value, in the group of the patients treated with HA it was 93,6 and in the group of patients treated with PN 98,1. In ultrasound control also was found the regression of synovitis in the 74% of patient treated with PN and in the 43% of patients treated with HA.

**Conclusion:** PN course of treatment demonstrated more significant efficacy concerning pain syndrome and synovitis regression in comparison with HA course of intra-jointal injections in the patient with inflammatory phenotype of OA of the knee joints and diabetes mellitus.

## P702

### LOW OPERATIVE RATES ASSOCIATED WITH HIGHER 30-DAY MORTALITY FOLLOWING HIP FRACTURE; FINDINGS FROM THE FRACTURES-E3 LONGITUDINAL STUDY IN ZIMBABWE

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**Objective:** To characterise the population experiencing hip fractures in Harare, Zimbabwe and assess 30-day outcomes.

**Methods:** All hip fractures in adults aged  $\geq 40$  years presenting to 1 of 7 hospitals in Harare were identified over 1 year (2021-22). Data were collected for all cases (age, sex, region of residence, presentation date, delayed presentation [i.e.  $>2$  weeks from injury], injury mechanism, fracture type). After consent, patients were followed-up to 30 d with data collected on anthropometry, surgical management and mortality. Associations were tested using T-tests and chi-squared tests.

**Results:** Overall, 237 hip fracture cases were identified (123[51.9%] female; mean age 72.4[SD14.2] years), 87.3% followed low impact trauma, e.g. falls, and 81[34.2%] presented  $>2$  weeks after injury. Household income was  $\leq \$100$ USD/month in 60.6%. By 30 d, 24[10.1%] had died. High impact trauma, e.g. traffic accidents, were more common in men than women (26[22.8%] vs. 4[3.3%],  $p < 0.001$ ), whilst presentation delays were similar by sex (45[36.6%] vs. 36[31.6%], respectively,  $p = 0.42$ ). In the 193 [82.8%] participants consenting to follow-up, 71[43.3%] had a mid-upper arm circumference  $< 25$  cm (indicating malnutrition), 26[13.5.2%] reported living with HIV (96% on treatment), 5.3% had known diabetes and 27.8% hypertension. Overall, 113[61.1%] had an operation, with age similar between those operated and non-operated (mean[SD] 70.7[14.6] vs. 73.2[13.4] years,  $p = 0.23$ ). Higher household income was associated with operative management (74.6% operated if income  $> \$100$ /month, 53.5% if  $< \$100$ /month,  $p = 0.005$ ). Those attending private vs. public hospitals were more likely to have an operation (17[85.0%] vs. 96[55.5%],  $p = 0.01$ ). Non-operative management was associated with higher 30-d mortality (16[20.0%] vs. 2[1.8%],  $p < 0.001$ ).

**Conclusion:** In Zimbabwe, where malnutrition and HIV infection are common, most adult hip fractures are fragility fractures (national adult HIV prevalence is 12.9%). Non-operative management was common and associated with higher mortality. Reasons for not operating may include lack of surgical capacity, perceived surgical risk and/or patient inability to pay. Understanding barriers to operative management is important to inform future healthcare delivery.

### P703

#### REMS FOR SHORT-TERM MONITORING OF BONE HEALTH STATUS DURING PREGNANCY

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**Objective:** Pregnancy-related osteoporosis is a major cause of maternal bone resorption due to an increased foetal demand for calcium, that exposes women to bone fragility. Currently, no diagnostic technique that can safely monitor the maternal bone status during pregnancy exists, without harming the foetus. This work aims to determine and monitor the bone health status during gestation by means of the non-ionizing radiofrequency echographic multispectrometry (REMS) technology.

**Methods:** A cohort of 48 pregnant women were enrolled in the study. Short-term monitoring of BMD measurement was carried out at the femur during the first (baseline) and third (follow-up) trimesters of pregnancy using the REMS technology. A paired t-test was performed to assess the difference in femoral neck BMD between baseline and follow-up.

**Results:** A significant reduction of femoral neck BMD was observed at the follow-up examination in the third trimester ( $0.711 \pm 0.071$  g/cm<sup>2</sup>) in comparison to the baseline measurement of the first trimester ( $0.726 \pm 0.072$  g/cm<sup>2</sup>) ( $p < 0.0001$ ). As a result, an overall BMD decrease of 2.07% has been recorded.

**Conclusion:** A previous study already reported a decline in REMS-measured BMD values among pregnant women compared with the non-pregnant control group, which is in line with the literature [1]. With this study, for the first time, a marked bone reduction was demonstrated at the follow-up during the last trimester of pregnancy. In conclusion, REMS provides a safe, accurate and non-invasive BMD assessment, thereby representing a clinically valid approach to monitor the skeletal bone status across and beyond gestation.

**Reference:** 1. Degennaro VA et al. Eur J Obstet Gynecol Reprod Biol 2021;263:44.

### P704

#### FRACTURES OF THE ANKLE IN PERSONS OVER 40 YEARS OF AGE IN THE IRKUTSK REGION (EAST SIBERIA, RUSSIAN FEDERATION)

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**Objective:** To study the frequency of fractures of the ankle in people over 40 years of age in the Irkutsk region (East Siberia, Russian Federation).

**Methods:** analyzed the medical documentation of trauma centers, trauma departments of Angarsk with a stable population, where the primary incidence was recorded. Only fractures received at a low level of injury were evaluated. A specially designed questionnaire was filled out with alphabetical verification of patients. The fracture rate was calculated based on 5-year strata and per 100,000 person-years of observation.

**Results:** The population over 40 years of age was 68,133 for women and 43,470 for men. In women, the frequency of fractures of the ankle ranged from 110,1/100 thousand person-years over the age of 70 to 207,8/100 thousand person-years in the age group of 50-54 years, averaging 146,0/100 thousand person-years of ob-

servation. In men, the highest frequency was detected at the age of 45-49 years 145,1/100 thousand person-years and in the age group over 70 years -141,5/100 thousand person-years. The lowest rates were in the age groups of 60-64 years 101,7/100 thousand and 65-69 years - 103,0/100 thousand. The average rate of fractures of ankle in men was 126,5/100 thousand person-years of follow-up and was lower than in women.

**Conclusion:** In women the incidence of ankle fractures was higher than in men and there are differences in fracture rates by age group depending on gender.

## P705

### THE RELATIONSHIP OF OSTEOPOROSIS WITH FRACTURES OF THE DISTAL FOREARM IN THE IRKUTSK REGION (EAST SIBERIA, RUSSIAN FEDERATION)

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**Objective:** Fractures of the distal forearm are fractures – markers of osteoporosis. At the same time, the frequency of forearm fractures in women over 50 years of age exceeds the frequency of osteoporosis in the region. At the same time, they are the first fractures that lead to the emergence of a cascade of new fractures. The aim of the study was to study the state of BMD in patients with fractures of the distal forearm (DFF) and the incidence of osteoporosis.

**Methods:** In the Center for the Prevention of Rheumatic Diseases and Osteoporosis of the Irkutsk Regional Clinical Diagnostic Center, 664 women over 45 years old (the average age was 66,4 years) and 192 women with forearm fractures were examined. Densitometry (DXA) was performed on the "DPX-IQ" device of the Lunar company in the proximal hip and lumbar spine.

**Results:** Forearm fractures were most common among the 664 women examined – 15,2% (101 women), their frequency in the group of individuals with osteoporosis in one of the localizations was 20.9%, in the group with osteopenia – 9,2%, with normal BMD – 7,7%. DFF were significant for the occurrence of repeated fractures of any localization. Fractures of the spine were not taken into account, because X-ray morphometry of the spine was not performed. In 192 women with forearm fractures, osteoporosis was detected in 62,1% (125 women), osteopenia in 29,2% (56 people). The highest incidence of osteoporosis was detected in the spine – 59,9%, in the hip neck only in 20,8% of cases, whose indicators BMD are taken into account when evaluating FRAX.

**Conclusion:** Thus, only 2/3 of people with forearm fractures have osteoporosis, for which treatment is prescribed, patients with osteopenia and normal BMD are not treated. The patients with osteopenia and normal BMD are not treated for which treatment is prescribed. Therefore, the presence of an already accomplished DFF at a low level of injury requires drug therapy for the secondary prevention of repeated fractures.

## P706

### PREVALENCE OF CARDIOVASCULAR DISEASE EVENTS AND DETERMINANTS IN PATIENTS WITH X-LINKED HYPOPHOSPHATEMIA

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**Objective:** Cardiovascular disease (CVD) is one of the leading causes of mortality in the UK (UK), with a high prevalence estimated among the aging population. In this analysis, we aimed to estimate the real-world prevalence of CVD-related events and determinants among patients with XLH as compared to controls.

**Methods:** Using data from the Clinical Research Data Link (CPRD), XLH cases were identified by experts using diagnosis codes and characteristic laboratory findings and treatments. Cases were matched with up to four controls by age, sex, and general practice. Read diagnosis codes were used to identify records at any point in the patients' medical history of angina, stroke, myocardial infarction (MI), and heart failure as CVD events. Read codes were also used to identify key determinants of CVD: hypertension, diabetes, dyslipidaemia, family history of CVD, atrial fibrillation, and other ischaemic heart disease. We report prevalence for both CVD events as well as determinants and corresponding odd ratios (OR) and 95% CIs.

**Results:** A total of 64 patients with XLH (cases) were included in the analysis (70% female, mean age 21 years), as were 254 controls. CVD-related events were only observed among controls, with heart failure and angina having a prevalence of 0.78%, and MI and stroke 0.39%. The observed prevalence of CVD determinants was higher in XLH cases than in controls for all determinants except family history of CVD and other ischaemic heart disease (Table 1). The difference between XLH cases and controls was greatest for dyslipidaemia (OR=2.07), diabetes (OR=2.03), and hypertension (OR=1.97).

**Table 1.** Prevalence of CVD determinants

Determinant	Controls (N=254) n (%)	XLH cases (N=64) n (%)	OR (95%CI)
Hypertension	15 (5.86)	7 (10.94)	1.97 (0.77 - 5.06)
Diabetes	4 (1.56)	2 (3.12)	2.03 (0.36 - 11.35)
Other IHD	3 (1.17)	0 (0.00)	-
Dyslipidaemia	8 (3.12)	4 (6.25)	2.07 (0.6 - 7.09)
Family History	13 (5.08)	2 (3.12)	0.6 (0.13 - 2.74)
Atrial fibrillation	5 (1.95)	1 (1.56)	0.8 (0.09 - 6.94)

**Conclusion:** No CVD events were seen in XLH cases likely due to sample size limitations. However, XLH cases reported higher prevalence of CVD determinants such as hypertension, diabetes and dyslipidemia. Assessment of CV risk should be incorporated in guidelines for the routine management of people with XLH.

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P707

### THE APPROPRIATE TIME INTERVAL OF WEEKLY BISPHOSPHONATE PRESCRIPTION IN POSTMENOPAUSAL OSTEOPOROSIS

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**Objective:** Oral bisphosphonate is considered as initial pharmacologic therapy for osteoporosis patients with high fracture risk and weekly alendronate is widely prescribed in most patients. However, drug adherence reduces over the time which might affect the treatment efficacy. This study was aimed to evaluate the appropriate time interval of weekly alendronate prescription in postmenopausal osteoporosis patients.

**Methods:** A retrospective review of 120 postmenopausal women aged more than 50 years and diagnosed with osteoporosis from BMD. Patients received 70 mg of alendronate weekly for a 1-year period. The outcome of this study was the drug adherence measuring by medication possession ratio (MPR) in patients with different follow-up time interval for drug prescription and refill. Treatment efficacy was evaluated by the percent change of the BMD at lumbar spine, femoral neck, and total hip after one year of treatment.

**Results:** The average age of patients was 69±9.3 years and 32.5% of patients had prior fragility fractures. The mean MPR was 93.4±9.5% with the average follow-up time interval of 14.2±4.5 weeks. The MPR was declined over the time with significant difference was found when the follow-up time interval was longer beyond 16 weeks (p=0.833, 0.364, 0.017, 0.03, and 0.05 for 8, 12, 16, 20, and 24 weeks, respectively) (Table 1). Patients with prior fragility fractures had better drug adherence than patients without any fractures (MPR: 95.5±4.6% vs. 92.4±10.9%; p=0.05). The percent change of BMD was increased at all sites after treatment significantly (p<0.01, 0.023 and 0.003 at lumbar spine, femoral neck, and total hip, respectively).

**Table 1.** The MPR related to the follow-up time interval

Follow-up time interval	MPR (%)	95% CI	p value
< 8 weeks	94.4±4.3	93.6–95.2	0.833
≥ 8 weeks	93.3±9.7	91.5–95.1	
< 12 weeks	95.0±4.2	94.2–95.8	0.364
≥ 12 weeks	92.9±10.6	91.0–94.8	
< 16 weeks	94.7±8.0	93.3–96.1	0.017
≥ 16 weeks	89.6±12.3	87.4–91.8	
< 20 weeks	94.0±9.2	92.3–95.7	0.03
≥ 20 weeks	87.2±11.1	85.2–89.2	
< 24 weeks	93.9±9.1	92.3–95.5	0.05
≥ 24 weeks	87.1±12.6	84.8–89.4	

**Conclusion:** Longer follow-up time interval leads to poor drug adherence. Patients who take weekly oral bisphosphonate should not be appointed later than 16 weeks in each interval for drug prescription and refill.

P708

### VARIATIONS IN DISPENSING OF ANTIRESORPTIVE DRUGS USED IN OSTEOPOROSIS IN THE YEARS SURROUNDING THE SARS-COV2 PANDEMIC

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**Objective:** To describe the administration and dispensing of osteoporosis treatments during the SARS-CoV2 pandemic, as well as the years preceding and following it.

**Methods:** We present data corresponding to community pharmacy dispensing of oral antiresorptive drugs (alendronate, risedronate, ibandronate) and denosumab (DB) between the years 2019–2021, given by the Pharmacology Unit of the Barcelona Litoral Region Primary Care Service, as well as hospital administration of zoledronic acid (ZOL) in Hospital del Mar between 2017 and 2022. The data analyzed includes all patients from the Barcelona Litoral Mar area, which comprised 316,435 in 2021.

**Results:** Regarding ZOL, the number of perfusions increased annually since 2017 (148) since 2019 (284). They decreased in 2020 (211), parallel to the beginning of the SARS-CoV2 pandemic (April and May). As of June 2020 the number of administrations stabilized, and in 2021 it began increasing again (306). The numbers regarding dispensing of DB show a decrease in March and April of 2020, in comparison with the other years, showing a recovery in June. In 2021, the dispensing between March and April shows a similar distribution as the year before the pandemic. Overall, the

dispensing of DB in 2020 is lower than the previous year. The dispensing of oral bisphosphonates is steady throughout the years (Fig. 1).

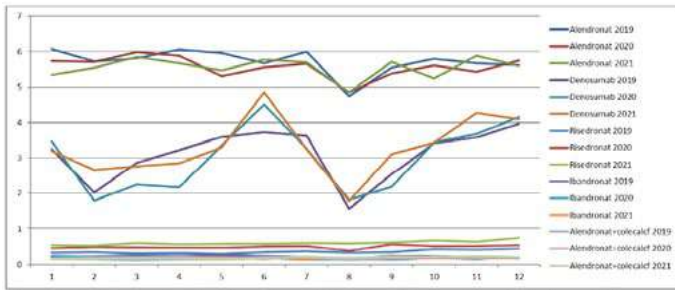


Figure 1: Graphic showing the dispensing of DB and oral bisphosphonates between 2019 and 2021.

**Conclusion:** Parallel to the confinement period due to the SARS-CoV2 pandemic there was a decrease in hospital administration of ZOL. In 2020, the decrease in dispensing was followed by a rise in the subsequent months, from which we could conclude that treatments were postponed but not suspended. The delay in administration of DB in 2020 should be noted. Finally, the data show that the decline in administration and dispensing of osteoporosis treatments during the first year of the SARS-CoV2 pandemic was corrected during the year 2021.

## P709

### PRELIMINARY RESULTS OF THE INVOLVEMENT OF THE ENDOCANNABINOID SYSTEM IN FIBROUS BONE DYSPLASIA

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**Objective:** Fibrous bone dysplasia (FBD) is a rare disease characterized by an alteration of the bone mineralization process leading to an increase of bone fragility and deformities. Since in the last years several studies reported an involvement of the endocannabinoid system (ES) in bone mineralization process, the aim of this study is to evaluate the role of the ES in FBD.

**Methods:** The study was conducted on the primary cell line of mandibular fibrous bone dysplasia, marked as FD-1. For first, the established FD-1 line has been characterized by different cellular and molecular biology analyses. Then we performed an osteogenic differentiation assay up to 14 d evaluating the gene expression levels of the osteogenic marker genes and of the components of the ES.

**Results:** We have phenotypically characterized the FD-1 line as a primary mesenchymal stem cell line through the evaluation of the positive expression of the mesenchymal stem cell markers. We have also reported the positive expression of ADAMTS2 gene, a specific FBD marker gene, and of the pre-osteoblastic marker genes. Preliminary data obtained showed the presence of the

components of the ES not only in FD-1 line, cultured in normal conditions, but also during the osteogenic differentiation process. We have observed a modulation of the expression levels of the components of the ES during osteogenic differentiation.

**Conclusion:** For the first time we have not only established a pre-osteoblastic cell line of FBD, but also demonstrated the presence of ES components in FBD, observing a modulation of the ES during the osteogenic differentiation, demonstrating that the ES is involved in bone mineralization. Preliminary data obtained could represent the starting point to evaluate how the ES could be related to FBD progression to identify new therapeutic targets and strategies to treat the bone alterations which characterized the FBD.

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## P710

### DEEP CARTILAGE DEFECTS IN OSTEOARTHRITIS OF THE KNEE (PRELIMINARY DATA)

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**Objective:** To determine the relationship between the presence of deep cartilage damage (DCD) according to MRI data and anthropometric, laboratory and instrumental parameters in patients with osteoarthritis (OA) of the knee joints.

**Methods:** In a prospective study for the period 2021-2022. included 78 women with a reliable diagnosis of OA (AKP) of the knee joints I-III stages (Kellgren-Lawrence), who signed an informed consent. The average age of the patients was 50.5±10.8 years (from 35-74), the BMI was 26.8±5.7 kg/m<sup>2</sup>, and the duration of OA was 1 [0.9; 4] years. An individual card was filled out for each patient, including anthropometric parameters, anamnesis and clinical examination data, assessment of pain in the knee joints according to VAS, WOMAC indicators, articular status, concomitant diseases and therapy during the observation period. All patients underwent radiography of the knee joints in the standing position, densitometry of the femoral neck and lumbar spine, MRI (according to WOMBS) of the knee joints. The signal intensity and cartilage morphology according to WOMBS were assessed according to the following gradation: 0 - normal, 1 - cartilage thinning without defects, 2 - 1 partial defect (not to the full depth), 3 - several partial defects, 4 - defect to the full depth <50% of cartilage length, 5 - full depth defect >50% of cartilage length. The presence of DCD was established in case of belonging to 4 or 5 types in accordance with the above gradation. Statistical processing of the material was carried out using Statistica 10.0 software.

**Results:** MRI of the knee joints according to WOMBS 5 revealed

the type of cartilage damage in 2.7% of cases (n=2), type 4 – in 7.7% (n=6), type 3 – in 44.9% (n=35), 2nd – in 41% (n=32), 1st – in 3.7% (n=3). Depending on the presence or absence of DCD, all patients were divided into 2 groups. Patients of both groups were comparable in age, disease duration, pain level according to VAS and WOMAC, as well as the duration of NSAID and SYSADOA use. However, individuals with DCD had significantly higher weight (p=0.037), BMI (p=0.031) and BMD in the lumbar spine (p=0.02) compared with patients without DCD (Table 1). In 50% of cases (n=4), patients with DCD were diagnosed with stage 3 OA according to Kellgren-Lawrence, in 12.5% of cases - stage 2, but in 37.5% of cases - stage 1. Correlation analysis according to Spearman confirmed positive relationships (p<0.05) between the presence of DCD and high values of weight (r=0.25), BMI (r=0.25), BMD in the lumbar spine (r=0.37).

**Table 1.**

Parameter	DCD Patients (n=8)	Patients without DCD (n=70)	P
Weight, kg	91,0 [71,0; 100,0]	70,0 [60,0; 81,0]	0,037
BMI, kg/m <sup>2</sup> , Me	32,0 [26,4; 38,0]	25,5 [22,3; 30,4]	0,031
MIC L1-L4 (g/cm <sup>2</sup> )	1,15 [1,08; 1,19]	1,03 [0,85; 1,13]	0,02

**Conclusion:** In our study, DCD (according to MRI-WORMS) was shown to be associated with higher BMI and BMD in the lumbar spine. Pronounced cartilage defects in OA of the knee joints can occur already at radiographic stage 1, which requires further study of this issue.

## P711

### BONE MINERAL DENSITY, TRABECULAR BONE SCORE AND FRACTURE FREQUENCY IN WOMEN WITH RHEUMATOID ARTHRITIS

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**Objective:** To assess the microarchitecture of bone tissue in postmenopausal women with rheumatoid arthritis (RA) using the trabecular bone score (TBS).

**Methods:** 95 postmenopausal women (median age 62,0 [57,0; 68,0] years) with confirmed RA according ACR/EULAR 2010 were included. Clinical examination, laboratory tests (ESR, CRP, rheumatoid factor (RF), antibodies to cyclic citrullated peptide (ACCP) and DXA were done and TBS was calculated.

**Results:** Median duration of RA was 9,0 [3,0; 16,0] years, DAS28 index was 5,1 [3,7; 6,0]. 85,3% and 81,8% of persons were seropositive by RF and ACCP, respectively. Oral glucocorticoids (GCs) were taken for ≥3 months by 57,9% of persons with a median duration of 3,0 [1,8; 8,0] years, and the cumulative dose 6,9 [3,7; 16,4] g. Low-energy fractures had 34,7% women: vertebral fractures and non-vertebral had 11,6% and 28,4% persons, respectively. 43,1% of women had osteoporosis (OP) and 35,8% of patients had os-

teopenia. 37 (38,9%) people had degraded bone microarchitecture (TBS ≤1,23), 24 (25,3%) - partially degraded (1,23<TBS<1,31), and 34 (35,8%) women - normal bone (TBS ≥1,31). Among patients with normal microarchitecture, T-score ≤-2,5SD was detected in 1 (2,9%) person in L1-L4, in 4 (11,8%) – in femoral neck (FN) and in 2 (5,9%) – in total hip (TH); among those with partially degraded - in 6 (6,3%), 5 (20,8%) and 3 (3,2%) patients, respectively, and in women with degraded microarchitecture- in 18 (48,6%), 12 (32,4%) and 6 (16,2%) persons, respectively. 17 (45,9%) patients with low TBS and 12(35,3%) women with normal TBS had a history of fractures, p>0.05. Negative associations were found between TBS and age (r=-0,30, p=0,003), duration of postmenopause (r=-0,26, p=0,014), cumulative dose of GCs (r=-0,34, p=0,045) and history of fractures (r=-0,20, p=0,056). TBS positive correlated with BMD L1-L4 (r=0,43, p<0,001), BMD FN (r=0,21, p=0,038) and BMD TH (r=0,23, p=0,02). There was no association between TBS and ESR, CRP, RF, ACCP.

**Conclusion:** OP was found in 43,1% of postmenopausal women with RA. Degraded bone microarchitecture by TBS was detected in 38,9% of persons. TBS value correlated with age, postmenopausal duration, cumulative GCs dose and BMD values in L1-L4 and proximal femur.

## P712

### THE IMPACT OF A COORDINATOR BASED FRACTURE LIAISON SERVICE IN ORTHOPEDIC DEPARTMENT IN ISRAEL: IS THE EFFORT WORTH IT?

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**Objective:** To evaluate the impact of coordinator based Fracture Liaison Service (FLS) on Osteoporosis medical treatment in Israel.

**Methods:** Retrospective cohort of hip fracture patients treated by FLS in Orthopedic Dept. in a single medical center in Israel. We compared coordinator based FLS during 2019 (data published)<sup>1</sup> to Non coordinator based FLS During 2021.

**Results:** 347 patients with hip fracture and FLS intervention were treated during 2019 (166 patients) and 2021 (181 patients, 70 had incomplete data). Average age was 78 y.o with majority of female patients (63%). Mean hospital stay was seven days. In both groups 75% of patients had vitamin D levels <30 ng/ml and more than 40% had severe deficiency (<20 ng/ml). Difference was found in both specific medical osteoporotic treatment recommendation at discharge and medical treatment adherence rate in 2019 (96% and 73%) and 2021 (78% and 28%) respectively. Average time for initiation of osteoporotic medical treatment in 2019 and 2021 was 74 d and 335 d, respectively. Mortality rates within one year of surgery were 5% in 2019 and 14% in 2021.

**Conclusion:** The impact of a coordinator based FLS is major. With a coordinator, most patients were discharged with a specific recommendation and had higher rates of medical osteoporotic treatment in shorter time period.

**Reference:** 1. Or O et al. Isr Med Assoc J 2021;23:490.

**Disclosure:** The FLS is financially supported by the Israel Foundation of Osteoporosis and Bone health (IFOB)

## P713

### 10-YEAR PROBABILITY OF OSTEOPOROTIC FRACTURES WITH INCLUSION OF THE TRABECULAR BONE SCORE IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To estimate the 10-year probability of low-energy fractures with including of the trabecular bone score (TBS) in postmenopausal women with rheumatoid arthritis (RA).

**Methods:** 95 postmenopausal women with confirmed diagnosis of RA (ACR/EULAR 2010) were included. DXA was done, TBS was calculated using the "TBS Insight" software. The risk of major osteoporotic fractures was assessed using the FRAX calculator (Russian version) without femoral neck (FN) BMD, with including the value of FN BMD and additionally adjusted for TBS.

**Results:** Low-energy fractures had 33 (34,7%) women over the age of 40. 34 (35,8%) women with RA had TBS  $\geq 1,31$ , 24 (25,3%) patients had TBS 1,23 to 1,31, and 37 (38,9%) persons had TBS  $\leq 1,23$ . 22 (66,6%) patients with fractures had low TBS. The median 10-year risk of major osteoporotic fractures without FN BMD was 18,0 [12,0; 26,0], with correction on FN BMD – 20,0 [13,0; 31,0], and adjusted for TBS – 18,0 [13,0; 30,0]. High risk of fractures according to FRAX with including only clinical risk factors was found in 47 (49,5%), when FN BMD was added - in 51 (53,7%) and adjusted for TBS in 52 (54,7%). It was revealed that out of 48 persons who had a low risk of fractures according to FRAX 12 (25%) women moved to a high-risk group when FN BMD was added, and after the inclusion of TBS values the risk decreased to low in 3(25%) of them. In 8 (17%) initially high-risk patients the risk changed to low with addition of FN BMD. After adjusting for TBS, 7 of them were confirmed to be at low risk of osteoporotic fractures, and one woman moved to a high-risk group.

**Conclusion:** Entering the BMD and TBS values into the FRAX calculator identified an additional 8 people at high risk for major osteoporotic fractures, and 7 patients were reduced to the low 10-year fracture probability. As a result, 54,7% women with RA had a high risk of fractures and required treatment.

## P714

### PARASITIC ARTHRITIS: CLINICAL CHARACTERISTICS

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**Objective:** Parasitic arthritis is associated with the patient's infestation of parasitic species of worms and protozoan microorganisms, manifesting an extremely heterogeneous clinical picture. Parasitic arthritis shares many similarities with peripheral psoriatic arthropathy and reactive arthritis, including asymmetry of arthritis, tendinitis with dactylitis and association with uveitis. However, has a gradual onset, mainly affects the lower extremities and is less associated with peri-arthritis. In the Republic of Moldova, the most common parasitosis in which damage of the musculoskeletal system were observed are infections caused by *Echinococcus granulosus* (The average morbidity index for the Republic in the last decade is 4.3%), *Giardia lamblia* (4.86%), *Toxocara canis* (24.6%). The purpose of the study was determination of the particularities of the clinical evolution of parasitic arthritis.

**Methods:** We selected a group of 161 patients with a definite diagnosis of parasitic arthritis. The average age of the patients was 47.0 $\pm$ 2.1 years, they had a history of the disease of 4.2 $\pm$ 1.3 years, so only patients with chronic parasitic arthritis were involved in the study (evolution approximately over 1 year). Parasitic arthritis by *Echinococcus* was diagnosed in 97 (60.24%) patients, *Toxocara canis* - 31 (19.25%) and *Giardia lamblia* - 33 (20.49%) cases.

**Results:** Echinococcosis was manifested by axial (65.67%) and peripheral (31.34%) clinical forms, the mixed form being rare (2.98%) ( $p < 0.001$ ). Parasitic arthritis *Toxocara canis* through peripheral (70.96%), insignificant axial (12.9%) and mixed (16.13%) forms ( $p < 0.01$ ). Arthritis from *Giardia lamblia* predominantly mixed (57.89%) and peripheral (36.84%), and axial (5%) ( $p < 0.05$ ).

**Conclusion:** Parasitic arthritis is characterized by the diversity of joint clinical manifestations, which fall into 3 clinical variants: induced by infestation with *Echinococcus*, *Toxocara canis* and *Giardia lamblia*, of which giardiasis correlates with a more severe clinical evolution, followed by echinococcosis and toxocariasis.

## P715

### THE EFFICACY OF DENOSUMAB THERAPY IN ELDERLY WOMEN WITH POSTMENOPAUSAL OSTEOPOROSIS

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**Objective:** To evaluate the efficacy of denosumab therapy in elderly women with postmenopausal osteoporosis (PO).

**Methods:** The study included 83 postmenopausal women (n=83, median age 66.0 [60.3; 70.7] years) with PO, who have taken denosumab for more than one year. The BMD was assessed with DXA by Lunar iDXA CORE 2015. Statistical processing was performed using Statistica 8.0.

**Results:** The primary BMD of all participants was 0.84 [0.79; 0.91] g/cm<sup>2</sup> in L1-L4; 0.76 [0.67; 0.83] g/cm<sup>2</sup> in FN. 43 (51.8%) women reported a history of one or more low-energy fractures. In 7 participants (8.4%), the fractures were multiple. Vertebral body deformities were diagnosed in 21 (25.3%) patients. The number of structural changes and artifacts in the densitometric scans

of the FN were diagnosed in 3 (3.6%) women. Degenerative dystrophic changes leading to additional pathological ossification in L1-L4, according to the analysis of densitometric scans, were determined in 43 (51.8%) women. After the BMD L1-L4 significantly increased from 0.84 [0.79; 0.91] to 0.88 [0.82; 0.96] g/cm<sup>2</sup> ( $p < 0.05$ ); BMD FN significantly increased from 0.76 [0.67; 0.83] to 0.79 [0.74; 0.85] g/cm<sup>2</sup> ( $p < 0.05$ ), which amounted to 18.9 [7.1; 35.6]% ( $p < 0.05$ ) in L1-L4, and 4.10 [1.30; 7.29]% ( $p < 0.05$ ) in FN. There were no new low-energy fractures during the 12 months of follow-up. During treatment with denosumab, 11 (13.3%) patients noted transient musculoskeletal pain within 10-12 d after the first injection, in 4 women, hypocalcemia was detected during control biochemical blood tests.

**Conclusion:** The effectiveness of denosumab treatment in postmenopausal women with PO aged 60 years and older after 12 months there was a statistically significant increase BMD in L1-L4 as well as a statistically significant increase in the BMD of FN ( $p < 0, 05$ ).

## P716

### THE INTERFERENCE OF VITAMIN D IN CANCER PREVENTION

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**Objective:** Basically, epidemiologic and trial data suggest that vitamin supplementation up to a certain level, may reduce metastatic cancer and cancer mortality, by reference to biological pathways. Several studies found a protective relationship between sufficient vitamin D (VD) status and lower risk of cancer.

**Methods:** Although VD deficiency is known mainly for its association with fractures and bone disease (1,2), its newly recognized association with risk of several types of cancer is receiving considerable attention (3,4). The high prevalence of VD deficiency, combined with discovery of increased risks of certain types of cancer in those who are deficient, suggest that VD deficiency may account for several thousand premature deaths from colon (5), breast (6,7), ovarian (8) and prostate (9) cancer annually. This discovery creates a new impetus for ensuring adequate VD intake in order to reduce the risk of cancer.

**Results:** A low serum level of 25(OH)D, the principal form of circulating, VD is the main marker of VD deficiency (10,11). Anti-cancer effect of VD may derive from an immune effect, particularly in some cases, from managing growth and differentiation. Because synthesis of circulating VD is regulated in the kidney by PTH (12), increased solar ultraviolet B (UVB) exposure does not elevate circulating VD. VD is the most active VD metabolite, although its concentration in serum is one thousandth that of VD (13). It is synthesized from VD by 1- $\alpha$ -hydroxylase enzymes in the colon (14) prostate (15) breast (16) and other tissues (17) through an autonomous mechanism not homeostatically regulated by PTH. VD and its metabolites reduce the incidence of many types of cancer by inhibiting tumor angiogenesis (18,19) stimulating mutual adherence of cells (20) and enhancing intercellular communication

through gap junctions (21).

**Conclusion:** More than 1000 laboratory and epidemiological studies have been published concerning the association between VD and its metabolites and cancer.

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## P717

### EFFECT OF GENDER ON THE EVOLUTION OF PAIN AND QUALITY OF LIFE AFTER TREATMENT OF SYMPTOMATIC VERTEBRAL FRAGILITY FRACTURES

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**Objective:** In a previous randomized clinical study comparing the effect of vertebroplasty (VP) vs. conventional/conservative therapy (CT) on the evolution of pain and quality of life of patients with symptomatic vertebral fractures (VF), we observed the development of chronic back pain in 23% of subjects, independently of the type of therapy received. The aim of this study was to analyze the effect of gender on the evolution of pain and quality of life in these subjects.

**Methods:** In the previous randomized study we included 125 patients (27 males, 91 females) with recent symptomatic VF (with edema in MRI and VAS  $\geq 4$ ). All subjects received standardized analgesic and antiosteoporotic treatment. Pain and quality of life were evaluated by VAS and Qualeffo-41, respectively, at baseline, at 2 weeks and 2 and 6 months. In the present study, we com-

pared the evolution of pain and quality of life after treatment (CT vs. VP) according to gender, also analyzing factors such as age, time of evolution, treatment received (CT or VP), baseline VAS, number of previous VF (total and recent), incidental VF, lumbar and femoral T-scores, analgesic treatment, and type of antiosteoporotic treatment.

**Results:** 118/125 randomized patients (27 males/91 females) completed 6 months of follow-up. At baseline, there were no differences in relation to age (males 74.8±11.2 vs. females:73.2±8.7 years), time of evolution, number of VF (males:3.8±2.4 vs. females: 3.1±2.4), treatment received (VP, males:59%, females:45%), lumbar or femoral T-scores, baseline VAS (males:6.8±2.1 vs. females:6.78±2.2) or Qualeffo score (males:52.2±24.4 vs. females:59.7±20.6). There was a clear difference in the evolution of pain and the quality of life based on patient gender, with better evolution in males (Figure 1); these differences were significant after two months of evolution and were independent of the treatment received (similar in both groups of patients) and the development of incidental VF during follow-up (males: 18.5 vs. females 12.1%).

**Conclusion:** The evolution of pain and quality of life after a symptomatic VF differs according to patient gender, with a worse evolution in women independently of the type of treatment received

## P718

### PROTEIN INTAKE, MALNUTRITION, AND ITS POTENTIAL IMPACT ON BONE HEALTH AFTER A HIP FRACTURE: A 3-MONTH PROSPECTIVE STUDY

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**Objective:** To investigate the association between protein intake with bone markers, calcaneal quantitative ultrasound (QUS) and BMD in older patients recovering from a hip fracture and to investigate the association between nutritional status with QUS and BMD. Additionally, the change of bone turnover markers from post-surgery till 3 months was investigated.

**Methods:** A 3-month prospective study in 96 adults aged ≥70 years with an acute hip fracture was conducted. Assessments, measured within 1 week after the fracture and after 3 months, included protein intake (questionnaire), nutritional status (Mini Nutritional Assessment Short Form), bone turnover markers procollagen type I N-terminal propeptide (PINP) and C-terminal telopeptide of type I collagen (CTX), insulin-like growth factor 1 (IGF-1) and PTH levels, QUS, and BMD (DXA). Data were analyzed with linear mixed models.

**Results:** At baseline, half of the patients (mean age 84 years, 63% females) had a low protein intake (<0.8 g/kg/d) and this did not change over time. Percentage of patients at risk of malnutrition or malnourishment increased from 20% to 64%, and patients had significant weight loss (median 3.6 kg). Protein intake was only associated with QUS parameter broadband ultrasound attenua-

tion (BUA) in females ( $\beta$  0.127, 95%CI 0.024-0.231). Higher MNA-SF was associated with higher BMD in the total body ( $\beta$  0.020, 95%CI 0.006-0.033), spine ( $\beta$  0.032, 95%CI 0.010-0.054) and femoral neck ( $\beta$  0.018, 95%CI 0.002-0.033). PINP and IGF-1 increased over time, while CTX remained stable and PTH decreased. IGF-1 was associated with PINP ( $\beta$  1.228, 95%CI 0.373-2.084).

**Conclusion:** A good nutritional status comes with higher BMD in older hip fracture patients. The role of protein for bone health in these patients remains unclear and further studies are needed. After a hip fracture there is an increase in PINP, which is probably caused by IGF-1. Strategies are warranted to prevent inadequate protein intakes, malnutrition, and weight loss during rehabilitation.

## P719

### NO EFFECT OF PROTEIN SUPPLEMENTATION ON BONE MINERAL DENSITY IN PROSTATE CANCER PATIENTS ON ANDROGEN DEPRIVATION THERAPY

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**Objective:** To assess the effects of 20 weeks of protein supplementation, alongside resistance exercise training, on BMD after 5 and 12 months in prostate cancer (PCa) patients on androgen deprivation therapy (ADT).

**Methods:** Sixty PCa patients receiving ADT were randomly assigned to receive protein supplements containing 31g whey protein (EX+PRO, n=30) or placebo (EX+PLA, n=30), immediately after exercise and every evening before sleep. Both groups followed a 5-month resistance exercise training program. At baseline, 5 and 12 months, total body BMD was assessed with DXA and dietary intake with 3-day food diaries. Data were analyzed with linear mixed models (LMM).

**Results:** In EX+PRO, BMD decreased by -0.96±1.98% from baseline till 5 months and -3.60±3.31% from baseline till 12 months. In EX+PLA, BMD decreased by -0.99±1.54% from baseline till 5 months and -2.25±2.51% till 12 months. LMM showed only a significant time effect. At baseline, protein intake was below 0.8, 1.2 and 1.5 g/kg/d in 15, 73 and 95% of the patients, respectively. Protein supplementation increased protein intake in EX+PRO to 1.43±0.35 g/kg/d at 5 months.

**Conclusion:** BMD decreased over time in PCa patients on ADT with reasonably good habitual protein intake (mean 1.04 g/kg/d). Protein supplementation for 20 weeks did not attenuate the decrease in BMD after 5 and 12 months. Further trials should investigate the effect of combined resistance and impact exercise training with and without protein supplementation on BMD at different sites.



P720

## ADDED VALUE OF WAIST CIRCUMFERENCE TO BODY MASS INDEX FOR IDENTIFICATION OF INDIVIDUALS AT RISK OF FRACTURE: A PROSPECTIVE STUDY FROM THE CARTAGENE COHORT

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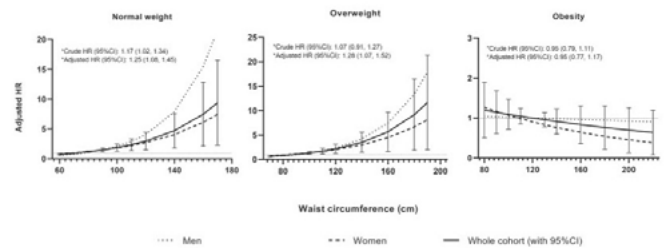
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**Objective:** We aimed to evaluate the dose-response relationship between WC and fracture incidence within World Health Organization BMI categories and examine whether BMI modifies the relationship between WC and fracture.

**Methods:** Using CARTaGENE, a large population-based cohort of individuals aged 40-70 years from Quebec, Canada (recruited in 2009-2010) we categorized individuals into 3 groups based on their BMI at recruitment: normal, overweight, and obesity. Incident fractures were identified over 7 years via linkage with healthcare administrative databases. Adjusted Cox proportional hazard models were used to estimate the dose-response relationships between WC and incident fractures (any site, major osteoporotic fractures (MOFs), distal lower limbs, distal upper limbs) within each BMI category. Results are reported as adjusted hazard ratio (aHR with 95%CI) per 10 cm increase in WC. Effect modification was evaluated qualitatively by comparing dose-response relationships between BMI categories.

**Results:** Of the 18 236 individuals included (52% women), 776 sustained a fracture. Significant dose-response relationships were found between WC and distal lower limb fractures in the normal (aHR 1.26 [1.09, 1.46],  $p=0.002$ ) and overweight (aHR 1.27 [1.07, 1.51],  $p=0.006$ ) categories, but not in the obesity category (Figure 1). In the overweight group, higher WC was also associated with an increased risk of distal upper limb fractures (aHR 1.49 [1.03, 2.14],  $p=0.032$ ). No significant relationship was observed regarding any fracture or MOFs. There was an effect modification of BMI on the dose-response relationship between WC and incident distal lower limb fractures.

**Conclusion:** WC provides both independent and additive information to BMI for the identification of individuals at higher risk of obesity-related fractures, especially for individuals within the normal and overweight BMI categories.



**Figure 1.** Dose-response relationships between waist circumference and distal lower limb fractures in the normal weight, overweight and obesity BMI categories.

P721

## ASSOCIATIONS BETWEEN VISCERAL ADIPOSITY, BONE MINERAL DENSITY AND BONE BIOPSY PARAMETERS IN INDIVIDUALS WITH SEVERE OBESITY

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**Objective:** We aimed to compare volumetric BMD (vBMD), bone microarchitecture parameters and bone remodeling activity between individuals with higher vs. lower visceral adipose tissue (VAT), using iliac crest bone biopsies, in a sample of pre-bariatric participants with severe obesity.

**Methods:** In a cross-sectional analysis from a prospective cohort study assessing bone and muscle health before and after bariatric surgery, iliac crest bone biopsies were performed during bariatric surgery, after double-labeling with tetracycline. Histomorphometric analysis was performed using a semi-automatic image analysis system (Bioquant, Nashville, TN), and both static and dynamic parameters were measured. QCT was used to assess vBMD at the total hip, femoral neck and lumbar spine (L2-L3), analysed using Mindways QCTPro software. Fasting serum C-terminal telopeptide (CTX), N-terminal propeptide of type 1 procollagen (P1NP) and osteocalcin (OC) were measured. VAT cross-sectional area (CSA) was measured by QCT, and individuals were divided into 2 groups based on the median of VAT CSA to allow comparisons using Student's t-test. Results are expressed as mean difference  $\pm$  standard deviation.

**Results:** 29 participants were analyzed and categorized into 2 groups: low VAT CSA (n=14) and high VAT CSA (N=15). None had a history of fracture, and all had normal serum levels of PTH and 25-hydroxyvitamin D. Compared with individuals in the low VAT CSA group, individuals with greater VAT had lower vBMD at L2-L3 ( $-35 \pm 30$  mg/cm<sup>3</sup>,  $p=0.004$ ), the total hip ( $-47 \pm 52$  mg/cm<sup>3</sup>,

p=0.028) and femoral neck ( $-44\pm 47$  mg/cm<sup>3</sup>, p=0.026). They also had lower trabecular number ( $-0.28\pm 0.26$  /mm, p=0.012) and tended to have higher trabecular separation ( $114\pm 153$  μm, p=0.077) in bone biopsies. However, statistical significance was lost after controlling for age and sex. There was no difference in bone turnover markers between groups.

**Conclusion:** These results suggest that the negative impact of VAT on bone parameters may plateau once a certain level of adiposity is reached. However, studies with greater sample size are needed since loss of significance may also be explained by a lack of statistical power.

## P722

### THE CONCEPT OF 'TIME TO FIRST FRACTURE' IN THE FRISBEE COHORT: ANALYSIS OF RISK FACTORS AND ASSOCIATION WITH 'IMMINENT FRACTURES'

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**Objective:** Risk factors for fragility fractures were assessed in several prediction models. However, predictors of a shorter 'time to first fracture' and its impact on imminent re-fracture occurrence are unknown.

**Methods:** Here, we looked at the 'time to first fracture' after inclusion in the FRISBEE ("Fracture Risk Brussels Epidemiological Enquiry") cohort (3560 postmenopausal women; median follow-up time of 10.1±2 years). Validated fractures were divided into 3 groups: first fracture <2 years, 2-5 years, and >5 years after inclusion. Uni- and multivariate analyses using Cox modeling were performed to evaluate factors associated with first fracture risk in these three groups. We also examined if a short 'time to first fracture' was a risk factor for imminent fractures. Differences between groups were evaluated by chi-square tests.

**Results:** Classical risk factors (age, prior fracture, fall history and low BMD) were associated with a first fracture in all groups. Previous glucocorticoid use and rheumatoid arthritis (RA) were predictors for early fracture (<2 years), consistent with the concept of very high risk. On the other hand, 'time to first fracture' was not an independent risk factor for subsequent imminent fractures.

**Conclusion:** Among the risk factors considered, only previous glucocorticoid use and RA were specific predictors for early fracture. Moreover, the 'time to first validated fracture' was not an inde-

pendent risk factor for imminent fractures. Patients with a first osteoporotic fracture should thus be considered at very high risk for re-fracture, independent of the 'time to first fracture'.

## P723

### VERTEBRAL FRACTURE PREVALENCE AND RISK FACTORS FOR FRACTURE IN SUB-SAHARAN AFRICA: THE GAMBIAN BONE AND MUSCLE AGEING STUDY

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**Objective:** To determine the prevalence of vertebral fractures in The Gambia, and to identify potential risk factors associated with these fractures.

**Methods:** The Gambian Bone and Muscle Ageing Study (GambAS) is a prospective observational study in men and women aged ≥40 years. Rural participants had baseline measurements and were followed-up (FU) 6-8 years later; urban participants had a single measurement in 2019. DXA scans of the lateral spine were obtained for vertebral fracture assessment using the Genant semi-quantitative method, and proximal femur BMD measured. Prevalence was calculated; differences in risk factors (bone turnover markers, BMD, PTH, 25(OH)D, grip strength and lower limb muscle power) between fracture and non-fracture groups compared using t-tests and chi-squared tests. For BMD outcomes, adjustment for age was tested using logistic regression.

**Results:** 581 individuals (307 women[W]) at baseline and 212 (96 W) individuals at FU had useable scans. Prevalence was 14.8% (n=86; 49W) at baseline and 25.4% (n=49; 31W) at FU. Those with a VF were older (65.3(11.1) vs. 61.8(12.2) years, p=0.01) at baseline. Baseline femoral neck and total hip BMD were lower in individuals with a VF (p<0.01), and the T-scores and z-scores were also significantly lower in this group (p<0.01). After age-adjustment differences in bone outcomes remained. CTX was higher in those with a VF compared to no fracture (0.79 vs. 0.69 pg/ml, p<0.01). There were no significant differences in area of residence (rural vs. urban), grip strength, 2-leg jump power, height, weight, BMI, 25(OH)D, P1NP or PTH between the two groups.

**Conclusion:** This study is one of the first to present VF prevalence and explore risk factors for fracture in sub-Saharan Africa. Prevalence was similar to higher income countries despite osteoporosis not being a perceived issue. Risk factors were like those identified elsewhere including BMD and bone resorption. Understanding the individual burden of these fractures will be an important step in a country where health of the ageing population needs to be prioritized.

P724

## VERTEBRAL TRABECULAR MICROARCHITECTURE IN OLDER HEALTHY ASIANS

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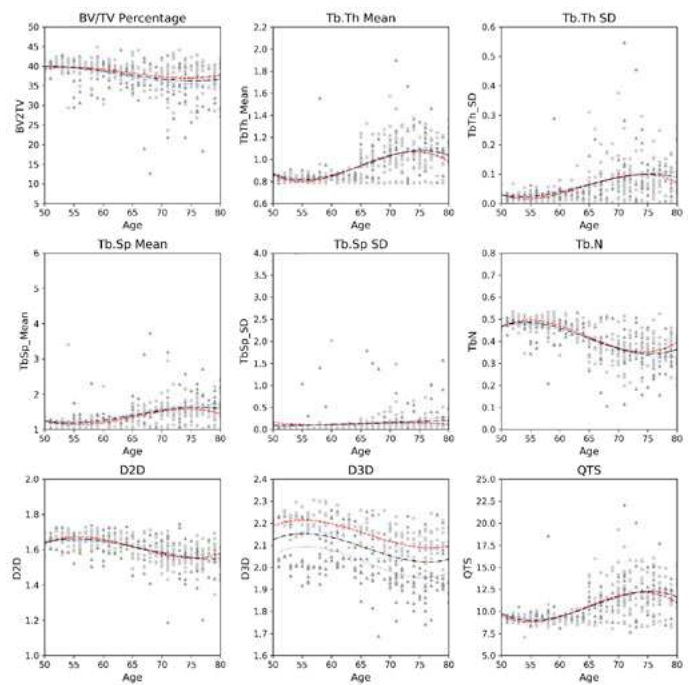
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**Objective:** To determine the trabecular microarchitecture of the older healthy population by sex using quantitative analysis of multidetector CT images.

**Methods:** Non-contrast abdominal CT scans from 2014-2021 of 417 participants (212 women) with no systemic disease, spine injuries, or surgeries were recruited. The L1 vertebrae were reconstructed into slices 1.0-mm thick for trabecular microarchitecture analysis using QIBIM software. The subjects were divided into 6 groups by age; each group was 5 years old. We assessed their differences in trabecular microarchitecture parameters by sex with ANOVA and independent t-test.

**Results:** The results showed that the mean of TbTh, the mean of Tb.Sp, the SD of Tb.Sp and QTS in two age groups (55-60 and 75-80) in men were significantly higher than in women (P values <0.05). Post hoc analysis of ANOVA demonstrated that the age of 65 years in the percentage of BV / TV, the mean of Tb.Sp and Tb.N and the age of 70 in QTS was statistically significant difference of the two aging stages of vertebral trabecular microarchitecture in men. Although the two aging stages in female subjects were statistically significant differences at the age of 65, presenting in mean Tb.Th, SD Tb.Th, Tb.N, D2D, and QTS. The rest of the parameters had a fuzzy threshold that was reached at the age of 65-70. The correlation analysis between aging and the quantitative parameters of the trabecular microarchitecture presented that the percentage of BV/TV (-0.352, -0.286), TbN (-0.639, -0.637), D2D (-0.498, -0.609) and D3D (-0.422, -0.606) in men and women had a significantly negative correlation with the aging process, respectively. The mean of TbTh (0.588, 0.572), the mean of TbSp (0.484, 0.477) and QTS (0.559, 0.534) in men and women had a significantly moderate and positive correlation with the aging process, respectively.

**Conclusion:** In older healthy Asians, we found that the remodeling process of changes in the trabecular microarchitecture in men was earlier than in women, with a reduction of the number of trabeculae, thickened trabeculae and a sparser separation of trabeculae, in turn, strengthening the trabecular microarchitecture to support body weight. In addition, the age range of 65 to 70 was the threshold for two stages of changes in the trabecular microarchitecture, which could be used for the screening age for osteoporosis.



**Figure 1.** The aging trend with the third polynomial linear fit, where the triangle and square makers are the quantitative parameters of the trabecular microarchitecture of male and female vertebrae. Blue dashed, red dotted, and black dashed-dot lines are the third-order polynomial linear fitting curves for men, women, and the general population, respectively. (a) BV/TV percentage; (b) Tb.Th mean; (c) Tb.Th SD; (d) Tb.Sp mean; (e) Tb.Sp SD; (f) Tb.N; (g) D2D; (h) D3D; (i) QTS.

P725

## BONE DENSITY AND BODY COMPOSITION IN ELITE FEMALE WATER POLO ATHLETES

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**Objective:** The monitoring of changes in bone mass and body composition might be helpful for the coach to achieve optimal regional lean/fat ratio, bone strength, and optimized performance. DXA is an accepted method to measure bone mineral mass and assess body composition. The aim of our study was to evaluate bone mass and fragility, and changes in body composition during the physical training of elite polo players.

**Methods:** 76 female water polo athletes (age: 15.9±1.9 y) participated in the study. BMD (lumbar spine, hip and radius) and the lean and fat mass in body regions was measured by DXA (GE Lunar, WI, US). Data for fracture history, lifestyle, and physical activity has been collected. Results were analysed with SPSS 27 software.

**Results:** 27 athletes had 38 previous fractures, 31 of these in the arms. Athletes with fractures had lower lumbar and femoral bone density than that of athletes without fractures (Z-scores, spine:  $0.4 \pm 0.8$  vs.  $0.9 \pm 0.9$ ,  $p=0.012$ ; hip:  $0.5 \pm 1.0$  vs.  $1.1 \pm 0.9$ ,  $p=0.017$ ) and their menarche started later. Differences were found between the dominant and non-dominant arm but not in the lower limbs in bone mineral content (BMC), fat and lean mass (BMC:  $202.6 \pm 26.9$  vs.  $196.2 \pm 25.4$  g,  $p<0.001$ ; lean:  $3344.6 \pm 546.9$  vs.  $3210.7 \pm 507.6$  g,  $p<0.001$ ; fat:  $1374.2 \pm 401.3$  vs.  $1350.4 \pm 389.2$  g,  $p<0.05$ ).

**Conclusion:** High occurrence of previous fractures in young elite athletes could be attributed to alterations of bone development in puberty or hormonal characteristics due to the professional physical training. The asymmetric distribution of body composition reflected in our DXA results suggest this method to be a suitable tool to assist the athletes' training program, creating even individual training plans.

## P726

### PHYSICAL-KINETIC TREATMENT IN A PATIENT WITH POSTTRAUMATIC SECONDARY HIP OSTEOARTHRITIS: CASE REPORT

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**Objective:** To assess the role of a program of physical and kinetic rehabilitation for a patient with posttraumatic pathology in the hip, tibial ankle and shoulder, after a domestic trauma, with a fall from a height of one meter, followed by secondary hip osteoarthritis.

**Methods:** We present the case of a 66 years patient, which was hospitalized in our clinic for mixed, predominant mechanical pain of right hip, ankle and shoulder, marked functional impotence- difficult gait, with support in the frame. From the past medical history we found domestic trauma with a fall from a one meter (2021), followed by right hip basicervical fracture, treated orthopedic-surgery (reduction hip fracture and osteosynthesis with DHS), right tibial ankle fracture (treated orthopedic), right scapulohumeral dislocation immobilized in Dessault bandage. On local examination are found: increased thoracic kyphosis, reduction of lumbar lordosis, paravertebral contracture of the dorso-lumbar spine, Schober 10/13 cm. The right hip joint exam shows: spontaneous pain, flexion 60°, abduction 15°; the right knee joint exam shows flexum irreducible 10°, dorsal addition plantar flexion at the right ankle-25°; modification of the walking pattern, with the alteration of the initial phase and balance of gait, with support in the frame. The right shoulder exam shows spontaneous pain, marked reduction in active mobility in flexion (59°) and abduction (30°). For evaluation were used: VAS, FIM, joint and muscle testing. The complex program of rehabilitation utilized: pharmacological treatment, infrared thermotherapy, electrotherapy with antalgic and myorelaxant effect, Diapulse of right hip, sedative massage for the cervico-dorso-lumbar spine, kinetotherapy with postural therapy, analytical,

closed and open kinematic chain, walking exercises, TECAR. **Results:** After the treatment was applied, it was noted: VAS Score reduced from 9 points (at admission) to 6 points (at discharge); improving dysfunctional syndrome from right hip, ankle and shoulder, increasing flexion of the hip to 75°, abduction to 25°; dorsal addition plantar flexion of the ankle to 35°. FIM Score Modified Dependence was 3 (at admission), 4 (at discharge). **Conclusion:** The rehabilitation program improved algo-dysfunctional syndrome at the level the right hip, ankle and shoulder. However, the patient is afraid to step on the operated leg without support; because of this, the patient needs psychological counseling at home.

## P727

### CLINICAL SIGNIFICANCE OF PRE-TRANSPLANTATION TREATMENT OF REDUCED BONE MINERAL DENSITY IN PATIENTS WITH LIVER CIRRHOSIS: CASE REPORT

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**Objective:** The pathogenesis of reduced BMD in liver cirrhosis is multifactorial. In hepatocellular diseases, the levels of proinflammatory proresorptive cytokines (IL-1, 6, 17 and TNF $\alpha$ ) are increased. Proresorptive cytokines activate osteoclast precursors, stimulating osteoclastogenesis and directly blocking osteoblast function. In addition, in liver insufficiency with malnutrition, reduced muscle mass, hypogonadism, the synthesis of osteoprotegerin (inhibitor of osteoclast differentiation) and IGF1 (stimulator of osteoblast proliferation) are reduced.

**Case report:** A 45-year-old female patient has been treated for autoimmune hepatitis type I for the past 25 years, primarily with corticosteroids (prednisolone 10 mg/d) and azathioprine (100 mg/d). In the pre-transplantation period, due to advanced liver insufficiency (MELD score 17) and severe portal hypertension, immunosuppressants and corticosteroids were discontinued. Dex / BMD L1-L4 0.920 Z-score -1.6, Neck BMD 0.865 Z-score -0.3, Total Hip BMD 0.887 Z-score -0.4. Considering that the patient was in the reproductive period, that she was not on corticosteroid therapy and that the Z-score was  $<-2.0$ , no therapy for osteoporosis was recommended. Vitamin D was included in a dose of 2000 ij/d along with CaCO<sub>3</sub> 1000 mg. During the transplantation in the anhepatic phase, 500 mg of methylprednisolone was administered with a successive reduction to a dose of 30 mg of prednisolone/d, with which the patient was discharged. In addition, the concentration of tacrolimus, a calcineurin inhibitor, that induces high-turnover osteoporosis, was 8.7 ng/ml. After 25 days of transplantation, the patient complains of severe pain in the lower back and difficulty in mobility. MRI of the L/S spine confirmed a decrease in the height diameter of the vertebral bodies L1, L4. By osteoden-

sitometry performed 2 months after transplantation, BMD L1-L4 0.703 Z-score -2.6, L2-L4 BMD 0.703 Z-score -2.6. Neck BMD 0.683 Z-score -0.7 Total Hip BMD 0.799 Z-score -0.7. Frax score Major Op Fx 3.2% Hip fx 0.4%. TBS L1-L4 1,370. TBS L2-L4 1,406 (completely preserved bone microarchitecture). The patient was diagnosed with severe osteoporosis with crush fractures L1, L4 and denosumab was administered. A follow-up DXA performed after one year indicated significant improvement. BMD L1-L4 0.812 Z-score -1.2 – increase in BMD by 13%, BMD L2-L4 0.799 Z-score -1.6 – increase in BMD by 10.7% compared to the findings of a year ago. Neck BMD 0.716 Z-score -0.3 – BMD increase by 4.8%, and Total Hip BMD 0.835 Z-score -0.3 – BMD improvement by 4.4%. Frax score Major Op Fx 5.85% Hip Fx 0.6%. TBS L1-L4 1.327, TBS L2-L4 1.303. Current therapy tacrolimus 2 mg/d, prednisolone 10 mg/d, CaCO<sub>3</sub> 1000 mg 1x1. The patient continues to have regular menstrual cycles. On denosumab therapy, there is an increase in BMD in both measured segments, with an expected decrease in TBS, given that the patient is on corticosteroid therapy. Ten-year fracture risk remained unchanged.

**Conclusion:** for patients on the waiting list for transplantation, it is necessary to perform diagnostics and implement adequate therapy, because pathological fractures in the early post-transplantation period significantly affect morbidity and mortality. Denosumab therapy in a female patient in the reproductive period, on corticosteroid therapy, led to an increase in BMD in both measured segments and there was no increase in fracture risk.

## P728

### REHABILITATION TREATMENT IN A PATIENT WITH SECONDARY POSTTRAUMATIC ANKLE OSTEOARTHRITIS: CASE REPORT

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**Objective:** To assess the role of a rehabilitation treatment for a patient with polytrauma at the level of lumbar vertebral L3 and bilateral calcaneus, with secondary ankle osteoarthritis. **Case report:** We present the case of a 60 years patient, which was hospitalized in our clinic for mechanical pain of dorsolumbar spine and the level of the bilateral ankle-foot complex (left more than right), functional impotence-difficult gait, with support in the Canadian crutch. From the past medical history, we found: polytrauma after falling from a tree, with amylic L3 lumbar vertebral fracture with Frenkel E score and bilateral calcaneus fracture, treated orthopedic. Lumbar spinal MRI exam: vertebral body fracture L3, discrete protrusion in the medullary canal, in the upper half of the posterior wall related to the fracture. On local examination: static and dynamic dorsolumbar vertebral syndrome, contracture of the dorsolumbar spine, Schober 10/11,5 cm; dorsal and plantar flexion of the ankles limited analgesic, total active mobility- 30°;

modified gait pattern, by altering the gait initiation phase, with support in the Canadian crutch. For evaluation were used: VAS, FIM, joint and muscle testing. During the 2 weeks of hospitalization, physical-kinetic treatment was applied with: analgesic electrotherapy- TENS currents, Laser therapy, interferential currents, sedative massage, kinetotherapy passive and active, with closed and open kinematic chain exercises, gait exercises. The patient is discharged with improved scores; VAS score reduced from 9 points (at admission) to 5 points (at discharge). FIM Score Modified Dependence was 4 (at admission), 5 (at discharge); improving dorsal addition plantar flexion of the ankles- 40°, increasing mobility of the dorsolumbar spine- Schober 10/13 cm. **Conclusion:** The rehabilitation treatment improved algo-dysfunctional syndrome at the level the dorsolumbar spine and the bilateral ankle-foot complex.

## P729

### WHICH IS THE BEST TREATMENT FOR PATIENTS WITH REBOUND-ASSOCIATED VERTEBRAL FRACTURES AFTER STOPPING DENOSUMAB? OUR EXPERIENCE AFTER 24 MONTHS OF FOLLOW UP

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**Objective:** Investigate BMD and bone turnover markers (BTM) changes after re-starting osteoporosis treatment with denosumab (Dmab), zoledronate (Zol) or teriparatide (TPT), in postmenopausal women who had sustained rebound-associated vertebral fractures (RAVFs) following Dmab discontinuation.

**Methods:** In this retrospective observational study, we examined lumbar spine, femoral neck, and total hip. DXA scans (Lunar Prodigy Advance, software 13.6) and assessed C-telopeptide (CTX) (74-550 pg/mL), osteocalcin (BGP) (11-43 ng/mL) and alkaline phosphatase (ALP) (21.3 ug/L), at the time of the re-initiation treatment and after 24 months of follow-up.

**Results:** Seven women were included (mean age: 66,7±3,8 years). They had sustained RAVFs and received treatment for 24 months. Dmab treatment duration before the RAVFs was 24 months (range 11-42). Five patients (71.4%) had received bisphosphonates before Dmab, and 2 patients (28.5%) had prevalent vertebral fractures. None had received bisphosphonates after stopping Dmab. Three were re-treated with Dmab, three with TPT and one with Zol. Regarding lumbar spine BMD, after 24 months, gains were 1.9%, 7% and 5% in the Dmab, TPD and Zol groups respectively. In femoral neck gains were 5.6; 1.5% and 0.6% and in total hip 1.1; 2.9% and 3.9% for Dmab, Zol and TPT groups respectively. However, no statistically significant differences were found between the baseline densitometry and 24 months after treatment (Table 1). With reference to BTM behavior after 24 months, a significant decrease in CTX was observed: 87% with Dmab (p 0.03), 35% with TPT and 72% with Zol. ALP and the BGP, presented a significant reduction of 64% (p 0.04) and 77% (p 0.004) with Dmab, while the

reduction in the Zol group was 61 and 70% and in the TPT group 27 and 9%, respectively. No patient suffered additional vertebral fractures.

Table 1. Comparison of baseline BMD vs. 24 months with the different treatments					
TPD Group					
	N	Baseline	24 months	% change (mean)	P
LS	3	0,801±0,024	0,863±0,107	+7,7%	0,285
FN	3	0,657±0,060	0,667±0,061	+1,5%	0,109
TH	3	0,714±0,015	0,735±0,007	+2,9%	0,177
Dmab group					
	N	Baseline	24 months	% change (mean)	P
LS	3	0,849±0,020	0,868±0,036	+1,9%	0,285
FN	3	0,736±0,065	0,777±0,054	+5,6	0,593
Th	3	0,791±0,035	0,800±0,026	+1,1%	0,715

**Conclusion:** In this group of patients with RAVFs, we did not observe new fractures and BMD remained stable with the different treatments. However, the densitometric increase in lumbar spine and hip stability in the TPT group seems clinically relevant. To our knowledge, there are no published studies on the treatment of RAVFs at 24 months.

### P730

#### COMPARATIVE STUDY OF PATELLAR TRACKING BETWEEN SUBVASTUS AND MEDIAL PARAPATELLAR APPROACH IN TKA: A PROSPECTIVE RANDOMISED TRIAL

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**Objective:** To comparison of patellar tracking using 4 of 6 degree of freedom of patellar movement in subvastus and medial parapatellar approaches using a simple ingeniously developed method of radiological study, keeping outlier constant as far as single surgeon and single implant design in randomly selected patients  
**Methods:** 80 TKA in 55 patients performed by a single surgeon in a single centre using similar design implant (Gensis II, Smith and Nephew) without patellar resurfacing, equally distributed into two groups of medial parapatellar and subvastus approach with mean age of 64.23 and 66.83 yrs. respectively. Skyline and lateral view X-rays were used to measure PF kinematics in each follow at fixed weeks starting from first post op week to minimum of 6 months. Using a custom made hinged flat platform radiographs were taken at 90°, 60,45° and 30° of knee flexion sequentially in partial weight bearing and static situation.

**Results:** The findings were tabulated and compared in both groups at regular follow up taking into consideration 4 of the 5

degrees of patellar tracking. Upon application student t-test there was significant difference in patellar tilt at all angles except 90° of flexion, significant Medio-lateral translation at all degrees of flexion, significant difference in flexion of patella at 45°, significant difference in AP translation at 30° of knee flexion.

**Conclusion:** Our results were compared with studies having a similar comparative assessment of both approaches, both radiological and clinical, in living and cadavers. It was concluded that the subvastus approach has a better patellar tracking in the femoral sulcos in all degrees of flexion, thus giving a better clinical outcome in early post operative period.

### P731

#### DOES THE ACCERELOMETER-BASED NAVIGATION SYSTEM REDUCE BLOOD LOSS AND TRANSFUSION IN ONE-STAGE SEQUENTIAL BILATERAL TOTAL KNEE ARTHROPLASTY? A RANDOMIZED DOUBLE-BLIND CONTROLLED TRIAL

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**Objective:** Blood loss is considered to be one of the concerning complications following sequential bilateral total knee arthroplasty (SBTKA) especially in the early postoperative period. Accelerometer-based navigation (ABN) system provides bone cut without breaching into the intramedullary canal which therefore, could reduce bleeding. The aim of this study was to evaluate blood loss and transfusion rate in patients who underwent one-stage SBTKA.

**Methods:** This prospective randomized study included 63 patients who scheduled for SBTKA. The patients were allocated before surgical intervention by a sealed envelope into two groups: an ABN group, which the distal femoral bone cut was performed using an ABN device, and a conventional group, which the distal femoral bone cut was prepared using an intramedullary reference guide, followed by a bone plug occlusion at the opening of the intramedullary canal before prosthesis implantation. Postoperative hematocrit (Hct) level, drainage blood loss, transfusion rate and amount of packed red cells transfusion were collected. Total red blood cells (RBC) loss was then calculated for the primary outcome.

**Results:** There were 31 patients in the ABN group and 32 patients in the conventional group. The mean age of the patients was 70.5 years, with predominant female gender (89.1%). There was no significant difference regarding postoperative Hct level and drainage blood loss in all timeframes between the 2 groups. The mean calculated total RBC loss in the ABN group was 669.7 mL, whereas 630.0 mL was demonstrated in the conventional group. However, the statistical significance was not achieved (p=0.572). All patients in the conventional group required blood transfusion while

96.8% of patients in ABN group were transfused. The packed red cells transfusion volume was found no significant difference between groups.

**Conclusion:** The total RBC loss and volume of packed red cells transfusion were not significant difference between interventions, which suggest no benefit of the ABN system in reducing blood loss and transfusion in patients undergoing SBTKA. This may refer to the occlusion of femoral canal opening with a bone plug in the conventional procedure was as effective as the non-breaching femoral canal technique in the ABN system.

### P732

#### HEALTHY LONGEVITY AND AGING IN PLACE (HOPE) PROJECT: A PRAGMATIC RANDOMIZED CONTROLLED TRIAL TO EVALUATE THE EFFECTIVENESS OF OSTEOPOROSIS-BASED INTEGRATED MULTICOMPONENT CARE ON QUALITY OF LIFE AND DISABILITY PREVENTION IN COMMUNITY-DWELLING OLDER ADULTS

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**Objective:** Osteoporotic fractures in elderly individuals can lead to disabilities, and considerable financial and societal burdens. Although earlier multicomponent interventions have focused on exercise, nutrition, and cognitive training to promote healthy aging, they have overlooked the importance of preventing osteoporosis. To address this, the Healthy Longevity and Aging in Place (HOPE) project introduces a comprehensive care that integrates osteoporotic fracture prevention into existing multicomponent programs, with the aim of demonstrating its efficacy.

**Methods:** HOPE was a stepped-wedge cluster-randomized controlled trial with four-year follows. Eligible participants were community-dwelling residents aged 50 years or older. Participants were randomized to one of three interventions: osteoporosis treatment combined with exercise training, nutritional support, and medication simplification, without these interventions, or delayed interventions. The six months outcomes of interest included physical performance, quality of life, and the initiation of osteoporosis treatment when needed.

**Results:** 567 older adults from 30 communities between September 2021 and April 2022 were recruited. The participants had a mean age of 74.8±8.7, with 81.1% female. At baseline, the average BMI was 24.7±3.7, the Charlson comorbidity index score was 3.9±1.3, and the average ADL score was 98.6±4.8. Osteoporosis was identified in 63% of women and 22.4% of men, more than 30% of participants had sarcopenia, and 37.7% had potentially inappropriate medications. Following six months of intervention, the multicomponent care group exhibited significant improvements in hand strength ( $p=0.041$ ) and happiness score ( $p<0.001$ ). The rate of osteoporosis treatment was notably higher in the multicomponent care group (58.6%) and osteoporosis care group (69.2%)

compared to the delayed care group (4.1%).

**Conclusion:** The HOPE project has demonstrated its novel approach, which integrates community resources and hospital-based healthcare teams, has the potential to improve the health and overall wellness of older adults in communities. Prioritizing osteoporotic fracture prevention, the multicomponent approach is a promising model that can be useful for regions with an aging population.

### P733

#### COMPARING KETOROLAC AND LIDOCAINE VS. LIDOCAINE FOR CORE NEEDLE SOFT TISSUE BIOPSY PAIN REDUCTION: A RANDOMIZED CONTROLLED STUDY

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**Objective:** To compare the pain-control efficacy of the nonsteroidal anti-inflammatory drug (NSAID), ketorolac when administered locally in combination with lidocaine compared with conventional local administration of lidocaine injection in core needle biopsy for musculoskeletal tumours.

**Methods:** One hundred twenty-eight patients suspected to have musculoskeletal tumours were included in this randomized, controlled clinical trial. Patients were randomly assigned to either the ketorolac and lidocaine combination group (64 patients) or the lidocaine group (64 patients). The ketorolac and lidocaine combination syringe contained 30 mg of ketorolac and 2% lidocaine + adrenaline. The lidocaine syringe contained 2% lidocaine + adrenaline. The level of pain after core needle biopsy at 1, 6, 12, 24, 48, and more than 48 hours was evaluated for each patient using a Visual Analog Scale (VAS). A linear mixed model was used to assess the mean VAS changes over time comparing the ketorolac and lidocaine combination and the lidocaine group.

**Results:** The patients in the combined ketorolac and lidocaine group had statistically significantly lower VAS scores than the lidocaine alone group at the 1 h up to 24 h post-operation.

**Conclusion:** In this study, the injection of ketorolac in combination with lidocaine resulted in greater improvement in pain control 1 h up to 24 h after core needle biopsy of soft tissue in extremities based on VAS pain score.

P734

### DIFFERENT TYPE OF FRAGILITY FRACTURES LEAD TO DIFFERENT PERFORMANCE IN ACTIVITIES OF DAILY LIVING, QUALITY OF LIFE AND DEPRESSIVE STATUS

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**Objective:** Osteoporosis and fragility fractures are associated with increased disability, morbidity, and mortality. The aim of this study was to evaluate physical performance and depressive status in osteoporotic patients with and without fragility fractures at a minimum of 1 year after being received treatment with antiosteoporotic drugs.

**Methods:** This cross-sectional study included postmenopausal women or men who aged more than 50 years and were diagnosed with osteoporosis by using BMD or had history of fragility fracture either hip or vertebral compression fracture (VCF). All patients had been treated with antiosteoporotic drugs for at least 1 year. 100 patients had history of either osteoporotic hip fracture (50 patients) or VCF (50 patients). Another 50 patients were diagnosed with osteoporosis without fracture (designated as control group). Functional performance and quality of life were evaluated by using the Barthel index and EuroQoL (EQ-5D-5L and EQ-visual analogue scale (EQ-VAS), respectively). The depressive status was assessed by using the Thai Hamilton rating scale (THRS).

**Results:** The mean Barthel index of the control, VCF and hip fracture groups were 94.4, 89.9 and 87.3, respectively ( $p=0.057$ ). There was statistically significant difference between hip fracture and control group ( $p=0.018$ ). The mean EQ-5D-5L and EQ-VAS were lower in patients with VCF when compared to control and hip fracture patients; however, statistical significance was found only between VCF and control groups for EQ-VAS (64.5 and 74.1 for VCF and control groups, respectively;  $p=0.005$ ). Although the mean THRS was significantly higher in the VCF (mean THRS were 6.0, 7.7 and 5.5 for control, VCF and hip fracture groups, respectively;  $p=0.004$ ), there were no differences in proportion of patients who classified as no depression, mild depression, and less than major depression among the 3 groups.

**Conclusion:** Different type of fractures led to different performance in activities of daily living, quality of life and depressive status. At a minimum of 1 year after sustaining fragility fracture, patients with hip fracture had lower physical performance; while those with VCF had lower quality of life when compared to osteoporosis patient without fragility fracture.

P735

### EARLY DETECTION OF BONE DEMINERALIZATION ASSOCIATED WITH OSTEOPOROSIS THROUGH THE NON-INVASIVE MEASUREMENT OF NATURALLY OCCURRING CALCIUM (CA) ISOTOPE RATIOS (CA-44/CA-42) IN SERUM AND URINE

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**Methods:** Serum and urine of 100 women older than 50 with at least one risk factor for osteoporosis were included in an exploratory study (NCT02967978). Changes in Ca-44/Ca-42 ratios were compared to bone turnover markers (CTX, P1NP) and DXA as gold standard. Two years after the study the number of osteoporotic fractures were assessed and compared to the predictions based on the Ca-44/Ca-22 ratios, bone turnover markers and DXA.

**Results:** We observed a shift toward lower Ca-44/Ca-42 ratios for DXA diagnosed osteoporotic women (N=18) and higher Ca-44/Ca-42 ratios for non-osteoporotic women (N=82). The Ca-44/Ca-42 ratios correlated (serum:  $p=0.004$ ,  $r=0.32$ ; urine:  $p=0.031$ ,  $r=0.25$ ) with the corresponding DXA data and to each other ( $p<0.001$ ,  $r=0.77$ ). Ca-44/Ca-42 ratios correlated with CTX/P1NP ratios, implying that demineralization was associated with bone turnover. Regression analysis showed that the Ca-44/Ca-42 values were the best marker for osteoporosis and that no other parameters need to be taken into account to improve diagnostic accuracy. Cut-off values for osteoporotic related Ca loss were  $-0.85\pm 0.06\%$  and  $0.16\pm 0.06\%$  for Ca-44/Ca-42 ratios in serum and urine, with sensitivities of  $\sim 94\%$  and  $\sim 79\%$  respectively. Apparent specificities were  $\sim 55\%$  and  $\sim 71\%$  for serum and urine, respectively. Twelve fractures (3 high trauma, 9 low-trauma) were observed in a two years post-study survey. The Ca-44/Ca-42 ratios predicted all low trauma fractures but only three were predicted by DXA.

**Conclusion:** The Ca-44/Ca-42 ratios sensitively reflect bone demineralization associated with osteoporosis. It represents a more sensitive marker for bone resorption than CTX and CTX/P1NP respectively. We suggest that this novel marker may be applied for early prediction of osteoporosis. Its use may be extended to other diseases associated with bone demineralization such as renal failure and bone metastasis cancer patients.

**Disclosures:** Eisenhauer and Mueller are partners in osteolabs GmbH, Kiel, Germany. Heuser and Kolevica are part-time employees of osteolabs GmbH.



P736

## ELDECALCITOL PREVENTS MUSCLE ATROPHY AND OSTEOPOROSIS INDUCED IN TAIL-SUSPENDED MICE

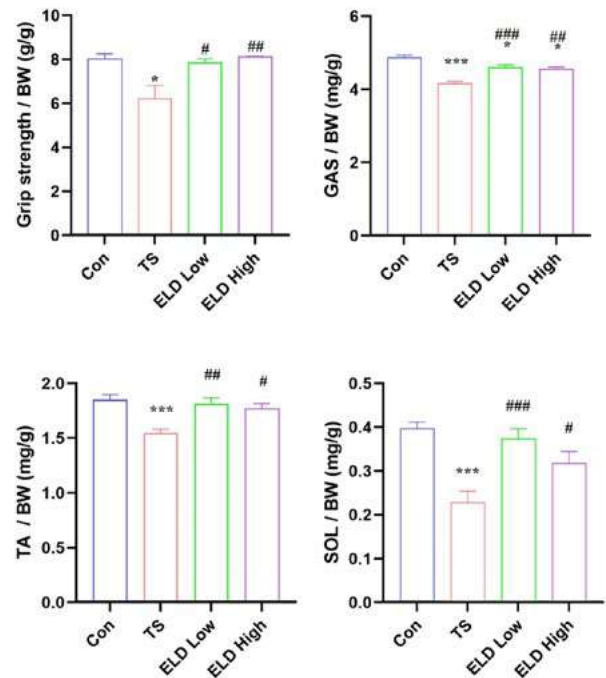
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**Objective:** To assess the role of eldecalcitol (ELD) in preventing disused muscle atrophy.

**Methods:** Six-week-old C57BL/6J male mice were randomized into 4 groups- control, tail suspension (TS), ELD low dose (3.5 ng/time) and ELD high dose (5 ng/time). The mice were injected intraperitoneally twice a week with vehicle (control and TS) or ELD, for 3 weeks. Skeletal muscle function was assessed by evaluating gastrocnemius (GAS), tibialis anterior (TA) and soleus (SOL) muscle weight, and hindlimb muscle grip strength. Distal femur bone was evaluated for BMD, bone surface (BS), bone volume (BV), tissue volume (TV), tissue volume (BV/TV), bone surface/total tissue volume (BS/TV), bone surface/total bone volume (BS/BV), trabecular number (Tb.N), trabecular thickness (Tb.Th), trabecular separation (Tb.Sp), trabecular pattern factor (Tb.Pf) and structure model index (SMI) by microcomputed tomography. Malondialdehyde, superoxidase dismutase, glutathione peroxidase and catalase were evaluated for oxidative stress in GAS and serum.

**Results:** TS-induced reduction of 22.5% in hindlimb muscle grip strength; 14.4%, 16.7% and 42.3% reduction in GAS, TA and SOL muscle weight, respectively and 18.6% reduction in GAS cross-sectional area was almost completely reversed by ELD administration (Figure 1). ELD also restored the levels of myofibrillar protein and attenuated the TS-caused increase of 42.1% and 134.6% in levels of muscle atrophy markers Atrogin-1 and MuRF-1 by 41.5% and 38.8%, respectively in vitro. TS-induced decrease in cortical BMD (-12.4%) and trabecular BMD (-28.5%) of distal femur was also reversed by ELD administration. Bone loss as indicated by decrease of 75.7% in BV, 62.6% in BS/TV, 65.9% in Tb.N, 26.1% in Tb.Th and increase of 45.8% in BS/BV, 31.8% in Tb.Sp, 26.6% in Tb.Pf and 21.1% in SMI was partially rescued by ELD while TV showed no change within groups indicating no influence of drug. Thus, BV/TV improved significantly by 122.7% in ELD vs. TS group ( $p < 0.05$ ). Oxidative stress was also significantly reduced in ELD treated TS mice ( $p < 0.05$ ).



Abbreviations: ELD, eldecalcitol; BW, body weight; GAS, gastrocnemius; SOL, soleus; TA, tibialis anterior; Con, control group; TS, tail suspension; ELD Low, low dosage of eldecalcitol (3.5 ng/time); ELD High, high dosage of eldecalcitol (5 ng/time)

Figure 1

**Conclusion:** ELD exerted beneficial effects against disused muscle atrophy.

**Disclosures:** Funding: Chugai Pharma China Co Ltd, National Natural Science Foundation of China and National Key R&D Program of China.

P737

## NATIONAL GUIDELINES AND FRACTURE LIAISON SERVICES (FLS) IN ISRAEL: AN UPDATE

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**Objective:** To review the national guidelines and FLS status in Israel.

**Methods:** Data was collected from national and international publications and interview with leading clinicians.

**Results:** Several quality indicators were published. 1. Preforming surgery within 48 hours which showed an improvement from 71% in 2013 to 88.1% in 2019. 2. Functional assessment upon admission and at discharge from rehabilitation after a hip fracture with a rate of 86% in 2019. 3. Administration of Vitamin D after a hip fracture showed increase from 74% in 2014 to 97% 2020; 4. Osteoporosis medical treatment within the first year following hip fracture showed mild increase from 25% in 2015 to 30.9% in 2021. There are nine active FLS programs: medical centers (5), rehabil-

itation centers (3) and community-based care (1). All programs were set by local initiatives with leading physicians. One program used virtual consultation and one program was completely embedded in the orthopedic department. The osteoporosis medical treatment rates in medical centers, rehabilitation centers and community based care showed 54% (22-73%, varied between centers), 82% and 67% respectively.

**Conclusion:** Most of Israel quality indicators are improving yearly with high compliance rates. The compliance for osteoporosis medical treatment is low. The local initiative of FLS have shown major improvement and should be implemented in all medical, rehabilitation and community-based care centers.

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4. National Program for Quality Indicators in Community Healthcare in Israel 2019-2021 (Hebrew)

### P738

#### COMPLIANCE TO ANTIOSTEOPOROTIC MEDICATION UNDER FRACTURE LIAISON SERVICE AFTER 6 MONTHS & 1 YEAR IN A TERTIARY HOSPITAL, MALAYSIA

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**Objective:** Osteoporosis is a condition characterized by excessive bone loss and significant public health issues for elderly men and women. Adherence to medication for osteoporosis patients has become a challenge since those medications are required for the long term. Similar to other chronic diseases such as hypertension and diabetes, osteoporosis has struggled with suboptimal medication adherence, resulting in more fractures and all-cause mortality in elderly people. We aimed to investigate the compliance of antiosteoporotic medication after 6 months and 1 year among fragility fracture patients.

**Methods:** Patients from January 2021 to June 2021 started treatment related to osteoporosis and were systematically followed up by the Fracture Liaison Service (FLS) during a one-year period. Compliance with medication was evaluated after 6 months and 1 year on medication.

**Results:** A total of 76 patients were identified and consulted by FLS. 76% of patients were compliant with anti-osteoporotic medication after 6 months and the compliance dropped to 68% after 1 year. Patients taking denosumab (85%) have shown better

compliance than those on bisphosphonate (74%) after one year. Several causes were identified for the reduction in compliance. These include financial issues, difficulty in transportation to the hospital, and unknown reasons for which the patient defaulted and decided to stop treatment.

**Conclusion:** Compliance with antiosteoporosis treatment can be improved by effective pharmacological management strategies. Collaboration among healthcare team members and multidisciplinary can benefit patients with osteoporosis. Implementation FLS is an important program to aid in early intervention and ensure compliance for the patients.

### P739

#### NUTRITIONAL BEHAVIOR IN PATIENTS WITH BONE DISEASE: A CROSS-SECTIONAL STUDY FROM AUSTRIA

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**Objective:** Nutrition plays an important role in patients with bone diseases. Specifically, patients with rare bone diseases (RBD) have decreased mobility thus being of higher risk for obesity and related disorders.

**Methods:** This monocentric, cross-sectional study was carried out during 2020-2022 in a hospital affiliated with the Vienna Centre of Expertise for Rare Bone Disease in Vienna, Austria. It compared the prevalence of nutritional behavior in patients with RBD (osteogenesis imperfecta, hypophosphatasia, X-linked hypophosphatemia and hypermobile Ehlers Danlos syndrome), osteoporosis (OPO) and healthy controls (CTRL). The nutritional questionnaire consisted of 28 items. BMI was calculated and categorized according to the WHO guidelines.

**Results:** The study comprised 54 RBD patients [Mean age (SD) 47.9(16.0), 75.9% female], 53 OPO patients [66.7(9.9), 88.7% female] and 52 controls [50.8(16.3), 73.1% female]. Overweight was found in 52% of RBD patients. The prevalence of obesity (BMI  $\geq 30$ ) in RBD patients was 24%, in OPO 8.2% and in CTRL 22.2%. Daily consumption of at least 5 portions of fruits and/or vegetables was observed in 10% of RARE, 17.3% of OPO and 9.6% of CTRL (p=0.407). At least 3 dairy products daily as complied with Austrian recommendations was reported by 16% of RBD, 17% of OPO and 11.5% of CTRL (p=0.707). A vegetarian lifestyle was stated in 8% RBD, 9% OPO and 14% CTRLs. The meat intake was generally in the recommended range. Recommended fish intake was only fulfilled by 2% of RBD, 4% of OPO and 14% of CTRLs.

**Conclusion:** A significant proportion of RBD patients do not follow healthy lifestyle recommendations. Considering physical limitations related to the severity of disease, RBD patients should be advised to watch their daily nutritional intake.

P740

### UNDERSTANDING THE FUNCTION OF METATARSALS IN DIFFERENT FOOT SHAPES

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**Objective:** Metatarsals are the key part in the forefoot, forming the longitudinal arches as distal base, and transverse arch dome with the five individual metatarsal bones. This structure has played an important role during walking and running, specifically for propulsion. This study is aimed to investigate the form and function of the metatarsals in an atypical foot shape with foot binding practice.

**Methods:** Examples of atypical foot shape, including elderly females with full foot binding and half foot binding practice, were recruited for subject-specific gait test and foot CT scanning. An age-matched female with healthy typical developed foot was also recruited for the same test. The metatarsal bone shape was firstly reconstructed from segmentation of CT images, followed by statistical shape analysis with mesh fitting and centroid alignment, to compare the shape. Three FE (finite element) foot models were also developed with loaded boundaries from gait plantar pressure measurement.

**Results:** In terms of the shape, we found smaller metatarsals in both full foot binding and half foot binding females compared with healthy female. While half foot binding was still larger than the full binding foot in the size of metatarsals. As for the stress distribution, healthy foot showed a uniform stress pattern in the metatarsals, while half binding and full binding feet showed concentrated stress in the first metatarsal (medial side), with half binding had higher magnitude than the full binding.

**Conclusion:** This study compared the shape and function in the metatarsals of atypical foot shapes as contrast to healthy foot. The size variations and load distribution showed certain relationship that higher loading stress during gait may contribute to larger bone size development, particularly in the first metatarsal.

P741

### TEICOPLANIN INDUCED AGRANULOCYTOSIS IN THE TREATMENT OF OSTEOARTICULAR INFECTIONS

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**Objective:** Teicoplanin is generally well-tolerated when treating osteo-articular infections such as spondylodiscitis. Leuko-neutropenia has been rarely observed (0.3%). The mechanism of the hematological toxicity of this antibiotic remains unknown. We report the case of a patient treated with teicoplanin for infectious spondylodiscitis who presented with severe febrile leuko-neutropenia after 10 d of treatment.

**Case report:** A 57-year-old patient with type 2 diabetes mellitus with degenerative complications was admitted to the hospital for amputation of the 1st and 3rd left toes. One week after surgery, the patient developed an inflammatory left L5 lumbosciatica. Blood analysis showed anemia and both elevated C-reactive protein (CRP): 173 mg/L and ESR=75 mm H1. Standard radiography showed an irregularity of the 2 vertebral plates L3-L4 with a pinched disc. Spinal MRI showed multifocal spondylodiscitis L3-L4, D6-D7 and D8 -D9. The diagnosis of an infectious pyogenic spondylodiscitis was established. The patient was put on a probabilistic anti-staphylococcal antibiotic therapy based on teicoplanin (400 mg/d with a loading dose of 800 mg/d for 3 d) and cefotaxime. Our patient, already anemic, developed severe febrile leuko-neutropenia and thrombocytopenia after 10 d of treatment. Echocardiography did not objectify infective endocarditis. Teicoplanin induced agranulocytosis was considered and the treatment was stopped. Hematological values reverted to normal six days after.

**Conclusion:** The prevalence of teicoplanin-induced agranulocytosis remains relatively rare (0.33%) and often reversible upon discontinuation of the drug, as was the case in our patient. The mechanism may be immunological or toxic. Teicoplanin induced agranulocytosis remains an exceptional complication compared to excellent tolerance and efficacy. Thus, close hematological monitoring would be essential when treating patients with teicoplanin.

P742

### PREDICTORS OF EMOTIONAL WELL-BEING IN FEMALE PATIENTS WITH KNEE OSTEOARTHRITIS: PILOT STUDY

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**Objective:** Joint structures damage in patients with osteoarthritis (OA) is associated with pain, deformity, functional disability and significantly lower health-related quality of life compared to people without OA. It is known that the degree of disability is related to mental health and that impaired mental health is associated with a worse treatment outcome in patients with knee OA. Therefore, it is crucial to identify predictors that could be related to emotional well-being, as a component of mental health, in patients with knee OA. This study aims to investigate the influence of different risk factors on emotional well-being in patients with knee OA.

**Methods:** This retrospective cross-sectional study included 38 postmenopausal women with OA (structural damage II and IV according to Kellgren-Lawrence scale) aged 60-75 years treated at the Special Hospital for Rheumatic Diseases Novi Sad, Serbia

from February 2022 to September 2022. Body mass and body height were measured for all respondents. Descriptive analyses were conducted on health status, and SF-36 RAND subscales. To examine the association between emotional well-being with comorbidity and the SF-36 RAND subscale score, we performed a series of univariate linear regression models. Statistical analysis was carried out using IBM SPSS Statistics for Windows, Version 24.0. (IBM Corp., Armonk, NY, USA).

**Results:** A larger number of comorbidities in patients with knee OA was significantly associated with worse emotional well-being ( $\beta$  -0.44; 95%CI: -4.50 – -1.61;  $p < 0.001$ ). Better physical ( $\beta$  0.25; 95%CI: 0.01 – 0.28;  $p = 0.030$ ) and social functioning ( $\beta$  0.38; 95%CI: 0.11 – 0.40;  $p = 0.001$ ) were associated with better emotional well-being. The grade of structural damage, pain intensity, BMI, and age were not associated with emotional well-being in patients with knee OA ( $p > 0.05$ ).

**Conclusion:** Risk factors associated with poorer emotional well-being in patients with knee OA include a larger number of comorbidities, while better physical and social functioning are associated with better emotional well-being.

### P743

#### ASSOCIATION BETWEEN DYSGLYCEMIA AND KNEE OSTEOARTHRITIS

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**Objective:** In the last two decades, the incidence and prevalence of diabetes mellitus type II (T2DM) have almost doubled, and a high incidence of type T2DM among patients with knee osteoarthritis (OA) has been reported. The present study aimed to examine the relationship between dysglycemia and knee OA.

**Methods:** The sample for the study comprised 77 postmenopausal women aged 60-75 years treated at the Special Hospital for Rheumatic Diseases Novi Sad, Serbia from February 2022 to September 2022. They all reported pain in their knees  $\geq 3$  according to The Numerical Pain Rating Scale (NPRS). The experimental group (45) consisted of subjects with structural damage on their knees (according to Kellgren-Lawrence (KL) scale II-IV), while the control (32) group consisted of subjects without structural damage (KL 0-I). Additionally, patients in both groups were divided into 3 subgroups based on fasting glucose levels: I ( $\leq 6$  mmol/l), II (6.1 to 6.9 mmol/l) and III ( $\geq 7.0$  mmol/l). Clinical parameters related to knees were assessed through The Lequesne index. Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 24.0. (IBM Corp., Armonk, NY, USA)

**Results:** Respondents with different fasting glucose levels were uniform concerning BMI in both the experimental ( $p = 0.535$ ) and

control groups ( $p = 0.247$ ). Although there is a difference in the number of patients with a previous diagnosis of T2DM between the experimental and control groups, this difference was not statistically significant ( $p = 0.309$ ). Within the experimental group, the Lequesne score was statistically significantly higher (more severe disorder) in subjects with III category of fasting glucose levels ( $p = 0.022$ ). The grade of structural damage (KL scale) in the experimental group and fasting glucose levels categorized according to the aforementioned criteria were not statistically significant ( $p = 0.672$ ).

**Conclusion:** There is no statistically significant association between the grade of structural damage of the knee in patients with knee OA and fasting glucose levels, while the Lequesne index shows that higher fasting glucose levels in patients with knee OA are associated with more severe clinical disorders of the knee.

### P744

#### ASSOCIATION BETWEEN DYSLIPIDEMIA AND KNEE OSTEOARTHRITIS IN POSTMENOPAUSAL WOMEN

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**Objective:** The pathophysiological mechanisms leading to osteoarthritis (OA) are still not entirely clear. The results of epidemiological studies show heterogeneous results when it comes to the association between dyslipidemia and OA. The objective of the present study was to evaluate the relationship between dyslipidemia and OA.

**Methods:** This prospective cross-sectional study was conducted at the Special Hospital for Rheumatic disease Novi Sad, Serbia from February to September 2022. It included 90 postmenopausal women. The experimental group (56) consisted of subjects with knee pain  $\geq 3$  according to The Numerical Pain Rating Scale (NPRS) and with OA (according to Kellgren-Lawrence (KL) scale II-IV), while the control group (34) consisted of subjects with knee pain  $\geq 3$  according to NRPS but without OA (KL 0-I). Laboratory analysis involved the assessment of Lipid Panel (triglycerides, low-density lipoprotein (LDL), high-density lipoprotein (HDL) and total cholesterol). All respondents filled out SF-36 RAND questionnaire, subscale for physical function. Statistical processing and analyses were performed in the statistical package the IBM SPSS Statistics for Windows, Version 24.0. (IBM Corp., Armonk, NY, USA).

**Results:** The groups were uniform by age ( $p = 0.553$ ) and BMI ( $p = 0.296$ ). The average age of the respondents in the study was 66 years, while the BMI of the respondents was 29.65. The distribution of normal and elevated values of lipid panel (triglycerides, LDL, HDL and total cholesterol) was similar in the experimen-

tal and control groups, i.e. there was no statistically significant difference between the two groups ( $p>0.05$ ). Within the experimental group, there was no statistically significant difference in functional status in patients with a normal and elevated level of triglycerides, HDL or LDL. Unexpectedly, respondents with normal values of total cholesterol had worse physical functioning compared to respondents with elevated values of total cholesterol ( $p=0.015$ ).

**Conclusion:** Among patients with OA, there is no higher frequency of lipid status disorders compared to patients without OA. In patients with knee OA elevated values of total cholesterol are associated with better physical functioning which can be explained by the fact that the use of statins was not considered in this study.

## P745

### MULTIPLE ENDOCRINE NEOPLASIA TYPE 2 SYNDROME AND OSTEOPOROSIS

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**Objective:** To introduce a case of *RET* positive patient coming from a family with type 2 Multiple Endocrine Neoplasia (2AMEN) syndrome who was identified with osteoporosis. This is a case report. DXA based on a GE Lunar Prodigy device is performed.

**Case report:** This is a 60-year-old MEN2A positive female admitted for periodic endocrine evaluation. Her medical history includes post-surgical, chronic adrenal insufficiency for bilateral pheochromocytoma, respectively 18 years prior she had left adrenalectomy followed by right adrenalectomy and total thyroidectomy for medullary thyroid carcinoma (MTC) that were both performed 10 years ago. Her family medical history includes her daughter, sister, and niece who are *RET* positive, and only one of them with primary hyperparathyroidism (PHP). Before the COVID-19 pandemic, she received a diagnostic of osteopenia at central DXA based on BMD at lumbar L1-4 level of 0.832g/cm<sup>2</sup>, T-score=-2SD, Z-score=-0.7SD, femoral neck BMD=0.57 g/cm<sup>2</sup>, T-score=-2.4SD, Z-score=-1.2SD, total hip BMD=0.691 g/cm<sup>2</sup>, T-score=-2.1SD, Z=-1.2SD. She intermittently continued with vitamin D (VD) supplements in association with levothyroxine, glucocorticoid, and mineralocorticoid replacements (different doses). Due to variation of her blood pressure, she increased her daily hydrocortisone dose to 25-30 mg/d. After no being evaluated due to pandemic circumstances for 3 years, currently, her endocrine profile shows normal thyroid function: TSH=2.11  $\mu$ UI/mL(normal:0.5-4.5), FT4(free levothyroxine)=12.05 pmol/L(normal:9-19) under LT4 100  $\mu$ g/d,

and plasma calcitonin=1 pg/mL(normal:1-4.8). Mild vitamin D deficiency 25OHD(25-hydroxyvitamin D)=24.9 ng/mL(normal:30-100) with normal PTH=48.66 pg/mL(normal:15-65) and serum total calcium=9.9 mg/dL(normal:8.4-10.3), are identified. Of note, clinical phenotype is not suggestive for Cushing syndrome, but she has arterial hypertension. DXA reveals osteoporosis based on L1-4 BMD=0.873 g/cm<sup>2</sup>, T-score=-2.6SD, Z-score=-2.1SD, total hip BMD=0.694 g/cm<sup>2</sup>, T-score=-2.6SD, Z-score=-2.2SD, femoral neck BMD=0.657 g/cm<sup>2</sup>, T-score=-2.7SD, Z-score=-2.1SD, 1/3 distal radius BMD=0.828 g/cm<sup>2</sup>, T-score=-0.5SD, Z-score=0.4SD. TBS is normal (1.350). No vertebral fractures are identified at screening spine profile X-Ray. The patient received treatment with IV zoledronate 5 mg/year, 2000 UI VD/d, progressively adjustment of the doses of hydrocortisone and fludrocortisone, and continued with the same LT4 regime. Surveillance of bone status is required in addition to MEN2A protocol.

**Conclusion:** In menopausal patients with MEN2A, bone loss may be due, a part from menopausal state, to over-treatment with LT4 (despite not being recommended a suppressive dose for MTC), over-treatment with glucocorticoid substitution (as seen here), and co-presence of MEN2A-PHP. The pandemic impact of delaying periodic check-up of these patients who require close surveillance is yet to be determined.

## P746

### MOLECULAR INTERACTIONS OF GUGGULSTERONE WITH MAJOR COMPLEMENT PROTEINS HIGHLIGHTS ITS POTENTIAL TO CONTROL INFLAMMATION CASCADE IN KNEE OSTEOARTHRITIS

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**Objective:** Active role of complement system in osteoarthritis (OA) pathology is well discussed (1). We found abundance of complement proteins in knee synovial fluid (SF) analysis, reiterating their pathological role in the OA. Guggulsterone (GS), a Phyto steroid found in *Commiphora mukul* has been recognised as an anti-arthritis drug of high translational potential. This is after recognition of its anti-inflammatory and immunomodulatory properties, however, GS has never been studied for its action on complement system. In the present work, we studied interaction of GS with C3 and C5 proteins through molecular docking.

**Methods:** C3 and C5 expressions were significantly higher in knee SF proteome analysis. Taking this lead further, docking studies were performed using GS with C3 proteins including its four versions available on Protein Data Bank (2) as - 2QKI (C3c-Compstatin), 7BAG (C3b-Cp40), 7TV9 (C3b-APL-1030) and C3a (4HW5) using AutoDockTools-1.5.7. For the docking on C5, 5I5K (C5-eculizumab) was selected. Curcumin (CMN) was included in study for the purpose of comparison.

**Results:** GS binds to several non-active sites on C3a and C3b proteins, revealing a peculiar preference to arginine, phenylalanine

and lysine residues. In case of C3, higher binding score (-6.8 for 2QKI, -6.7 for 7BAG, -6.6 for 7TV9 and -7.0 for 4HW5) than CMN (-6.9, -6.0, -5.9 and -6.8 respectively) was observed. In C5 with 5I5K, GS binds to arginine, aspartic acid and tyrosine residues with binding score of -8.3 compared to CMN (-7.6). Apart from conventional H-bond interactions, hydrophobic interactions (alkyl and pi-alkyl) and van der Waals interactions were also observed for GS and CMN.

**Conclusion:** GS showed several non-active site bindings with C3 and C5, that can cause conformational changes in the protein structures, which in turn, may inhibit its interaction with other proteins potentially preventing formation of an active convertase complex and therefore disrupting the further chain of complement formation. GS bound C3a does not interact with mast cells thus avoids degranulation mediated escalation of inflammation.

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2. Berman et al. The Protein Data Bank, 235-42.

### P747

#### MULTIFOCAL AVASCULAR OSTEONECROSIS AFTER COVID-19: A CLINICAL CASE

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**Objective:** SARS-CoV-2 (COVID-19) infection can cause endothelial dysfunction, vasculitis, and thromboembolic complications. One of the manifestations of vascular pathology in this disease is avascular osteonecrosis (AON) of bones.

**Case report:** We present a clinical case. A 30-year-old patient, who didn't suffer from musculoskeletal diseases and didn't have thrombosis, suffered moderate COVID-19 in February 2021, which required hospitalization. Therapy was carried out with antibiotics, glucocorticoids (up to 30 mg/d for 3 weeks), antiviral drugs, anticoagulants. She was discharged from the hospital after cessation of fever, saturation normalization, and a negative SARS-CoV-2 (PCR) test. The patient noted the appearance of pain in both hip, left ankle and right shoulder joints by mid-December 2021. On examination: pain and limitation of movement in both hip joints, the severity of pain according to the visual analog scale (VAS, 100 mm) - 75 mm on the left, 60 mm on the right, pain in the left ankle joint (VAS 50 mm), on the right shoulder (VAS 40 mm). On MRI of December 2021: osteonecrosis femoral head (ONFH), osteonecrosis humeral head (ONHH) and talar osteonecrosis (TON) stage 2 by Ficat-Arlet. The patient received therapy with alendronic acid (70 mg/week), calcium 1000 mg/d, alfacalcidol and dipyrindamole (75 mg/d for 3 months), unloading both legs by walking with additional support on crutches, 9 sessions nuclear magnetic resonance therapy and taking NSAIDs as needed from December 2021 to September 2022. Pain appeared in the left elbow joint (VAS=40) and both knee joints (VAS=50) by September 2022. An

MRI scan from September 2022 revealed progression of ONFH from stage 2 to stage 4 in both hips, stage 3 ONHH, stage 2 TON, osteonecrosis condyles of the humerus 2 stage, extensive bone marrow infarcts of the femur and tibia, ending in the subchondral region, were also identified. By February 2023 the patient underwent arthroplasty of both hip joints, in terms of arthroplasty of the shoulder joint. The dynamic monitoring of the patient continues.

**Conclusion:** This case demonstrates an aggressive and rapid course of post-COVID AON refractory to standard conservative therapy.

### P748

#### BEHAVIOUR OF BONE REMODELLING MARKERS ONE YEAR AFTER ANTIRESORPTIVE TREATMENTS AT THE HOSPITAL RUBER JUAN BRAVO

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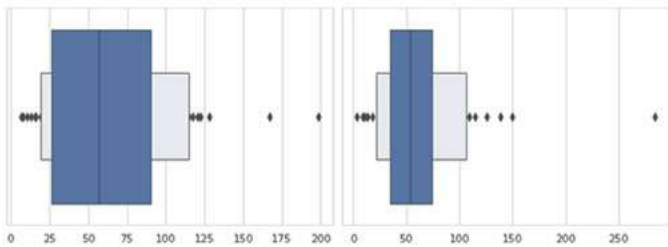
**Objective:** To compare the value of bone turnover markers (BTM) after 1 year of antiresorptive treatment.

**Methods:** Observational, descriptive-analytical, longitudinal and retrospective study of 70 women diagnosed with osteoporosis and undergoing treatment (Tto) with antiresorptive drugs between 2018-2019 at the Hospital Ruber Juan Bravo in Madrid.

**Results:** In the study the median age was 70 years (58-89), 81,4% did not smoke and 78,6% had no maternal history of fragility fracture. Of the 70 patients: 65,7% received a Bisphosphonate, 40% Denosumab and 28,6% SERMs.

**Table1.** Description of fractures

Fractura centinela pre-tto	Fractura post-tto	Total	Porcentajes
Ninguna	Húmero	1	1,43%
	Muñeca	2	2,86%
	Ninguna	38	54,29%
	Otra	1	1,43%
	Vertebral	4	5,71%
Vertebral	Cadera	2	2,86%
	Ninguna	9	12,86%
	Vertebral	4	5,71%
Otro	Ninguna	3	4,29%
Muñeca	Ninguna	2	2,86%
	Más de una	Muñeca	1
	Ninguna	1	1,43%
Húmero	Ninguna	1	1,43%
Cadera	Ninguna	1	1,43%
Total general		70	



**Figure 1.** Distribution and central tendency of NTX pre and post treatment respectively.

**Conclusion:** The main factor influencing the study is the variability of BTM in different population groups. Also we do not ignore the mutability of drug adherence and the burdensome follow-up of patients during the COVID-19 pandemic. BTM offer a better diagnosis of osteoporosis made by densitometry. Vertebral fracture is the most frequent sentinel fracture as a complication of this disease, as well as being the type of fracture that most predisposes to suffering future fractures. Antiresorptive treatments in monotherapy or sequentially are effective in reducing the appearance of new fractures, and their efficacy can be measured in the increase of densitometric values and the decrease of BTM values after those treatments.

#### P749

### THE USE OF CORE DECOMPRESSION WITH BONE MARROW ASPIRATE CONCENTRATE IN THE TREATMENT OF OSTEONECROSIS FEMORAL HEAD

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**Objective:** Evaluate the effectiveness of core decompression with bone marrow aspirate concentrate (BMAC) as the joint preserve surgery of osteonecrosis femoral head (ONFH).

**Methods:** During the period from 2020-2022 at the V.A. Nasonova Research Institute of Rheumatology performed 23 procedures for the introduction of core decompression with BMAC into the area of ONFH in 19 patients. 16 of them were men (84%), 3 were women (16%). The mean age of the patients was 43.7±9.4 years. The ONFH stage was assessed according to the ARCO classification. Stage 1 was detected in 2 patients, 2- in 16, and 3A in another 5 cases. Core decompression with the introduction of BMAC was carried out under the control of an electronic optical transducer. A visual analog pain scale (VAS) and Harris hip score (HHS) were used to evaluate the results. The pain intensity according to VAS was 50±12,3 mm, and the function according to HHS was 63±8,4 points, initially. The results were evaluated after 3,6,12 months and 1.5 years.

**Results:** A decrease in pain intensity according to VAS was noted after 3,6,12 months and 1.5 years to 25±9,3, 25±15,1, 35±12,4 and 30±14,8 mm. The HHS was 75±7,7, 75±10,1, 80±12,3 and 82±15,1 points for the same time intervals. We obtained 18 good results

and in 5 cases a progression of ONFH to stage 4 was revealed (3 cases from stage 3A and 2 from stage 2) 1.5 years after operation. These 5 patients underwent total hip arthroplasty. Thus, 1.5 years after core decompression with BMAC, good treatment outcomes persisted in 16 (88.9%) of 18 patients who underwent surgery at stages 1 and 2 of the disease, and only in 2 (40%) patients at stage 3A.

**Conclusion:** Core decompression with BMAC is most effective in the initial stages of ONFH. Clinical improvement is maintained in 88.9% of patients who underwent surgery at stages 1 and 2 of the disease 1.5 years after procedure.

#### P750

### LOW LEAN MASS IN YOUNG IBD ADULTS

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**Objective:** Low lean mass and sarcopenia are frequent complications in IBD patients. However, few data are about this condition in young patients. We aimed to study the frequency and risk factors for low lean mass in young patients with IBD

**Methods:** Anthropometric data were collected, and all patients underwent blood tests. ASMI (appendicular muscle skeletal index) was determined using DXA whole body. Skeletal mass was appreciated according to EWGSOP and International Working Group in Sarcopenia as appendicular skeletal muscle index (ASMI). It was calculated as the sum of muscle mass on the legs and arms divided by square height (ASM/height<sup>2</sup>) (13-14). Low lean mass represented an ASMI Z-score<-1DS for age and gender, using NHANES scales.

**Results:** A multicentric cross-sectional study was conducted on 39 young adults diagnosed with IBD, 23 with Crohn's disease (CD), and 16 with ulcerative colitis (UC). Out of the patients, 20 were men. The median age of the patients was 31 (9) years, BMI 21.7 (4.7) kg/m<sup>2</sup>, and disease duration 6.5 (7) years. Low lean mass was present in 18 patients. When the comparative analysis was performed between the group with normal vs. low lean mass, fecal calprotectin was the only parameter significantly higher in the latter (p=0.02). The two groups had no statistical significance regarding hormonal parameters (PTH, IGF1 Z-score, 25-hydroxyvitamin D) or inflammatory profile. When analyzed in subgroups, in patients with low lean mass, the best AUROC was fecal calprotectin (0.720, p=0.02). High-dose exposure to glucocorticoids is associated with low lean mass in these patients (χ<sup>2</sup>=5.5, p=0.2)

**Conclusion:** Low lean mass is a frequent complication, even in young adults with IBD. High-dose usage of glucocorticoids and fecal calprotectin are risk factors for this condition. Better control of the disease may lower the risk for its development of it, but longitudinal studies should be conducted to validate this assumption.

P751

### EFFECT OF YOGA ASANAS AND CONVENTIONAL PHYSIOTHERAPY TREATMENT IN ELDERLY KNEE OSTEOARTHRITIS: A CASE STUDY

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**Objective:** Osteoarthritis is the most common form of arthritis and one of the leading causes of disability. The term 'Yoga' is derived from the Sanskrit root 'YUJ', meaning 'to join' or 'to yoke' or 'to unite'. The global prevalence rate of OA is 29% for men and 47% for women. Objective- To see the effect of yoga asanas and conventional physiotherapy treatment in knee osteoarthritis.

**Methods:** Patient diagnosed with grade 2 osteoarthritis of knee according to Kellgren-Lawrence classification BY orthopaedician. Pretreatment assessment - XYZ, aged 62 years, female came to OPD with a complaint of pain in her right knee. Mesomorph, diabetic, non-hypertensive, cleaner by occupation in Hospital, non-vegetarian, non-alcoholic. Resting heart rate - 76 bpm. Resting blood pressure - 126 /86 mmHg. Score of 7/10 on Numeric Pain Rating Scale (NPRS), WOMAC osteoarthritis index score 48/96, knee ROM with 116° of knee flexion. The pain increases on weight bearing, walking more than 50 m, staircase activities. ACR Classification- knee pain - yes, plus age >50 - yes, morning stiffness <30 minutes- yes, crepitus - yes on right knee movements, bony enlargement seen- yes, bony tenderness-yes, palpable warmth- no., treatment- conventional physiotherapy- isometrics quadriceps, single leg raise, hamstring, calf stretching, IFT (four pole method), toga postures like tadasana, virbhadrāsana, janusirsana, uttitha trikonāsana and utkatasana were given 5 times/week - 3 weeks. Outcome measures- NPRS, WOMAC.

**Results:** Post treatment- After 3 weeks treatment- Score of 3/10 on Numeric Pain Rating Scale, WOMAC osteoarthritis index score 30/96, knee ROM with 124° of knee flexion. Less pain on weight bearing, staircase activities. ACR Classification- knee pain -yes but reduced plus age >50 - yes, morning stiffness <30 minutes- yes, crepitus -no, bony enlargement seen- no, bony tenderness-no, palpable warmth- no.

**Conclusion:** Yoga asanas and conventional physiotherapy treatment was effective in improving pain, disability in elderly knee osteoarthritis.

P752

### IS ADIPONECTIN THE MISSING LINK BETWEEN FAT AND BONE TISSUE IN IBD PATIENTS?

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**Objective:** Although obesity has traditionally been thought to be a protective factor for bone mass, recent studies show otherwise. Adiponectin bone effects and potential role in linking fat and bone are still under debate. Studies show increased adiponectin levels in inflammatory bowel disease (IBD) patients. The aim of the study was to assess the link between adipose tissue and lumbar spine BMD in IBD patients.

**Methods:** Anthropometric and general data were collected. ASMI (appendicular muscle skeletal index), fat mass, visceral adipose tissue, and BMD LS (lumbar spine) was determined using DXA. All the patients underwent adiponectin measurement.

**Results:** 81 adult IBD patients (48 with Crohn's disease and 33 with ulcerative colitis), median age of 42 (IQR 23) years, were included in the study. Depending on the fat mass composition, more than half of the patients included in the study (55.7%) had a normal Z-score compared to the population of the same age and sex. About 28% had low fat mass, assessed as a Z-score value <-1 DS. Regarding the study of BMD-LS, it correlated positively with ASMI ( $r=0.401$ ,  $p<0.001$ ) but negatively with adiponectin ( $r=-0.338$ ,  $p<0.01$ ). No association was found with fat mass or visceral adipose tissue. Linear regression showed adiponectin ( $\beta=-0.313$ ,  $p=0.01$ ) and ASMI ( $\beta=0.04$ ,  $p=0.02$ ) as independent factors for lumbar BMD in IBD patients in an analysis that included gender and age.

**Conclusion:** Our study showed that adiponectin is an independent factor in BMD in IBD patients and this could be important in understanding the link between adipose and bone tissue.

P753

### COMORBIDITIES IN PATIENTS WITH SPONDYLOARTHRITIS

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**Objective:** To investigate the prevalence of comorbidities in spondyloarthritis (SpA) and to evaluate their impact on the disease activity and the functional status.

**Methods:** This retrospective, monocentric study included 136 patients with diagnosed SpA according to ASAS 2009 criteria. Data collected were demographics, disease characteristics, treatment and comorbidities. We divided the patients into two groups: group 1 with at least one comorbidity and group 2 without comorbidities.



**Results:** 58.1% were men, the mean age was 39.72±13.1 years, and the mean disease duration was 11.6±9.98 years. HLAB27 status was available for 14% of patients and was positive in half of these cases. Current smoking was reported by 17.6% of patients and past smoking by 1.5%. The mean ASDAS-CRP was 3.39±1.2, the mean BASDAI was 4.0±2.0 and the mean BASFI was 4.53±2.68. 87.2% of patients had received NSAIDs, 13.2% corticosteroids, 73.7% csDMARDs, and 26.5% Tumor Necrosis Factor inhibitors (TNFi). At least one comorbidity was reported in 42.6% of patients, and 17.6% had two and more comorbidities. The mean number of comorbidities was 1.6 (range 1-4); the most common were hypertension (10.3%), obesity (9.6%), osteoporosis (8.8%), gastrointestinal disorders (8.1%), pulmonary diseases (5.1%), diabetes (4.4%), cardiovascular diseases (3.7%), and renal diseases (3.7%). Comorbidities were associated with older age ( $p=0.001$ ) and longer disease duration ( $p=0.01$ ). A higher prevalence of diabetes was observed in patients with peripheral involvement ( $p=0.02$ ). Current smoking was significantly associated with high ASDAS-CRP ( $p=0.03$ ), BASDAI ( $p=0.01$ ), and BASFI ( $p=0.03$ ). Cardiovascular and renal diseases were significantly associated with a high level of CRP ( $p=0.02$ ,  $0.04$  respectively). The prescription of NSAIDs, csDMARDs, and TNFi was similar between the groups.

**Conclusion:** We found an increased frequency of comorbidities in patients with SpA, with an increased prevalence of hypertension, obesity and osteoporosis.

## P754

### SERIAL ADMINISTRATION OF RECOMBINANT HUMAN BONE MORPHOGENETIC PROTEIN-2 AND OSTEOPTERIN-FC ENHANCES THE DIFFERENTIATION OF OSTEOBLASTS

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**Objective:** We compared the level of differentiation from preosteoblasts to osteoblasts by serially administering recombinant human bone morphogenetic protein-2 (rhBMP-2), involved in bone formation and regeneration, and osteoprotegerin-immunoglobulin Fc segment complex (OPG-Fc), an osteoclast inhibitor.

**Methods:** The MC3T3-E1 preosteoblast cell line was differentiated for one, three, and seven days with a treatment of OPG-Fc in 10–200 ng/mL concentration and the cell viability was evaluated by Cell Counting Kit-8 analysis. The level of differentiation from MC3T3-E1 cells to osteoblasts was determined by alkaline phosphatase activity. The level of runt domain-containing transcription factor 2 (Runx2) and osteopontin (OPN) manifestation, involved in osteoblast differentiation, was examined by real-time polymerase chain reaction and western blotting.

**Results:** During MC3T3-E1 cell differentiation, the differentiation level was high with one-day treatment using 100 ng/mL OPG-Fc. The treatment with 50 ng/mL rhBMP-2 for 7 d, followed by one-day treatment with 100 ng/mL OPG-Fc produced the highest differentiation level, which was approximately 5.3 times that of the control group ( $P<0.05$ ). The expression of Runx2 mRNA significantly increased, reaching 2.5 times the level of the control group under the condition of seven-day treatment with rhBMP-2 and one-day treatment with OPG-Fc ( $P<0.001$ ). The expression of Runx2 protein significantly increased to approximately 5.7 times that of the control group under the condition of 7-d treatment with rhBMP-2, followed by 1-d treatment with OPG-Fc ( $P<0.01$ ). The expression of OPN protein showed no change from that of the control group under various conditions of rhBMP-2 and OPG-Fc combinations.

**Conclusion:** Differentiation ability of preosteoblasts to osteoblasts was strong with serial treatment and rhBMP-2, followed by OPG-Fc. Runx2 and OPN mRNA levels and Runx2 protein levels increased. These results imply that the combination of OPG-Fc and rhBMP-2 increased osteoblast differentiation efficacy.

## P755

### PREDICTORS OF ATYPICAL FRACTURES: A RETROSPECTIVE ANALYSIS OF A FRACTURE LIAISON SERVICE

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**Objective:** To evaluate predictors of atypical femoral fractures (AFF) among hip fracture patients.

**Methods:** This is a retrospective case-control study, including patients over 50 years, after operation for osteoporotic hip fracture and followed at our Fracture Liaison Service between September 2019 and January 2023. We classified fracture radiographs and compared demographic, clinical, biochemical features and BP purchase data between patients with AFF and those with typical osteoporotic hip fracture (controls). Logistic regression was performed to assess predictors of atypical fracture.

**Results:** Of 109 patients, 9 (8.3%) had AFF. Patients with AFF were younger than those with trochanteric fractures (71.0±8.8 vs. 78.3±8.6 years,  $p=0.008$ ), had a higher BMI (28.5±5.2 vs. 24.8±4.5 kg/m<sup>2</sup>,  $p=0.023$ ) and estimated glomerular filtration rate (eGFR) (88.7±19.3 vs. 70.9±21.7 mg/dL,  $p=0.027$ ), and had a higher proportion of any treatment with BP (77.8 vs. 14.0%,  $p<0.001$ ). These were tested in multivariate logistic regression:  $X^2$  (4) 29.2,  $p<0.001$ ;  $R^2=0.604$ . Previous treatment with BP and BMI were predictors of atypical fracture ( $p=0.006$  and  $p=0.017$ , respectively). Odds ratio (OR) for previous treatment with BP was 58.2 (95%CI 3.1-1086.1) and 1.4 (95%CI 1.1-1.8) for BMI.

**Conclusion:** In addition to what has already been reported, that

previous use of bisphosphonates is related to the appearance of atypical fractures, this work concludes that an increased BMI appears to also be a predictor of atypical fractures.

Table 1 - Baseline characteristics of included patients according to site and type of fracture.

	Typical osteoporotic fracture (n=100)	Atypical femoral fractures (n=9)	p value
Age (years), mean±SD	78.3±8.6	71.0±8.8	0.017
Sex, female n (%)	84 (84.0%)	7 (77.8%)	0.457
BMI (kg/m <sup>2</sup> ), mean±SD	24.8±4.5	28.5±5.2	0.023
eGFR (mg/dL), mean±SD	70.9±21.7	88.7±19.3	0.027
Hb (g/dL), mean±SD	12.7±1.9	12.8±0.9	0.800
Charlson's Comorbidity Index, mean±SD	4.4±1.7	3.6±1.2	0.070
Any treatment with BP, n (%)	14 (14.0%)	7 (77.8%)	<0.001
Duration of BP treatment (years), mean±SD	4.3±2.9	6.4±3.3	0.157
PPIs, n (%)	54 (54.0%)	7 (77.8%)	0.292
Corticosteroids, n (%)	6 (6.0%)	2 (22.2%)	0.154
Anti-depressants, n (%)	24 (24.0%)	0 (0.0%)	0.201
Statins, n (%)	47 (47.0%)	3 (33.3%)	0.505

BMI Body mass index, BP bisphosphonate, eGFR estimated glomerular filtration rate, Hb Hemoglobin, PPI proton pump inhibitors

## P756 DYNAMICS OF EMOTIONAL STATUS IN SYSTEMIC SCLEROSIS PATIENTS UNDER INFLUENCE OF BIOFEEDBACK TRAINING COURSE

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**Objective:** Diagnosis and treatment of systemic sclerosis (SS) is a challenge for the doctor, not only because of the involvement of many organs and systems in the pathological process, but also the presence of significant psychosocial problems in patients who complain of emotional problems, among which the most common symptoms are anxiety and depression. Their timely detection and appropriate psychological interventions can improve the psychological well-being and quality of life of patients. It seems promising to use biofeedback (BFB) techniques. The aim of the study is to correct the psycho-emotional state of patients with systemic sclerosis using biofeedback training.

**Methods:** 90 SS patients were under observation. Patients of the main group additionally received 12-14 sessions of multimodal biofeedback training.

**Results:** A high level of personal (52.74 points) and reactive (53.11 points) anxiety was established in SS patients. After biofeedback training, there was a significant decrease in anxiety-depressive reactions in patients of the main group, which was accompanied by a significant decrease of Spieberger-Khanin and Beck scores. It is assumed that the use of biofeedback contributes to the correction of the psycho-emotional state, the reduction of reflex muscular-tonic syndromes, the improvement of microcirculation, cerebral and peripheral blood flow, the mobilization of volitional potential, and the increase in patients' self-esteem. A session of biofeedback training is characterized by active and conscious participation of the subject in the treatment process, his desire for self-regulation and self-control.

**Conclusion:** Thus, the positive effect of biofeedback therapy on

anxiety and depressive disorders in patients with SS, which can improve the effectiveness of the complex therapy of this disease, its long-term prognosis and the quality of life of the patients.

## P757 EFFECT OF RADIOFREQUENCY IN TREATMENT OF KNEE OSTEOARTHRITIS

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**Objective:** Efficacy of genicular branch radiofrequency ablation in different grades of osteoarthritis in 2022.

**Methods:** Retrospective randomized clinical trial on 237 cases of osteoarthritis in different grades from grade 2 to grade 4; grade 2 (56 cases); grade 3 (87 cases); grade 4 (94 cases); success rate is based on pain relief.

**Results:** 51 patients with grade 2 showed pain relief with success rate 90%. 72 patients with grade 3 showed pain relief with success rate 83%. 67 patients with grade 4 showed pain relief with success rate 71%.

**Conclusion:** The knees' radiofrequency ablation has a very good efficacy in the management of different grades of osteoarthritis with success rate higher in grade 2 than in grade 3 and 4.

## P758 WOMAC INDEX IN OLDER WOMEN WITH OSTEOARTHRITIS OF THE KNEE JOINT DEPENDING ON MUSCLE STRENGTH

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**Objective:** Evaluate WOMAC index for older women with osteoarthritis (OA) of the knee joint, depending on muscle strength.

**Methods:** The study includes 32 women with OA of the knee, established according to criteria of the American College of Rheumatology (median age 70 [60;73] years). To assess the clinical manifestations of OA, patients used a WOMAC index consisting of 24 questions divided into three sections: pain (5 questions), stiffness (2 questions) and physical function (17 questions). Muscle strength was measured by handheld dynamometry.

**Results:** The average muscle strength in the study cohort was 19±9 kg (95%CI: 14-24). According to EWGSOP2 recommendations in 2019, all patients were divided into two groups: 12 (37.50%) patients with reduced muscle strength to sarcopenia and 20 (62.50%) patients without reduced muscle strength. The average muscle strength of the sarcopenic group was 12±4 (95% CI: 8-16) kg, in the group of patients without sarcopenia - 23±9 kg (95% CI:17-29). Comparing the WOMAC index of pain, stiffness

and physical function showed no statistically significant differences between the study groups. Analysis of individual components of the WOMAC index showed that women with reduced muscle strength to sarcopenia had reliably more pronounced difficulties in getting in/out of bath - 70 [55;92] mm compared to a group of patients without reduced muscle strength - 5 [0; 28] mm,  $p=0.018$ . A correlation analysis found a significant negative correlation between muscle strength and physical function at the getting in/out of bath ( $r=-0.68$ ,  $p=0.003$ ).

**Conclusion:** The study found that 37.50% of patients with OA of the knee joint had reduced muscle strength to sarcopenia. Significant impairment of physical function in getting in/out of bath observed in OA patients with reduced muscle strength.

### P759

#### LOCUS OF CONTROL DYNAMICS AFTER NEUROFEEDBACK TRAINING IN SYSTEMIC SCLEROSIS PATIENTS

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**Objective:** Patients suffering from systemic sclerosis (SS) are characterized by a decrease of locus of control level - such patients are convinced that they will not be able to effectively influence the symptoms of their disease. The external locus of control, along with the insufficient effectiveness of treatment, contributes to the formation of non-adaptive behavior of the patient, in particular, low compliance. Such behavior can be attributed to the consequences of the state of "learned helplessness". To correct the identified psychological disorders in SS patients, it is advisable to use the biofeedback method. Our purpose was to study the dynamics of the locus of control in SS patients during combined therapy using the biofeedback method.

**Methods:** We observed 90 SS patients, who were randomly divided into two groups: main ( $n=60$ ) and control ( $n=30$ ). Patients of both groups received similar medication and physiotherapy, but patients of the main group additionally received 12-14 multimedia neurofeedback training procedures based on the parameters of the electrical activity of the brain, aimed at increasing the alpha activity.

**Results:** The use of neurofeedback contributed to an increase in the internality of SS patients on scales in the general sphere, the sphere of achievements and attitudes towards the disease.

**Conclusion:** The results of the studies testify to the effectiveness of biofeedback method in the complex treatment of SS patients and its positive effect on the correction of the psycho-emotional state, mobilization of volitional potential, increasing self-esteem and the quality of life of patients. With the help of biofeedback training, patients acquire a sense of control over their disease, strictly adhere to the treatment regimen, and take responsibility for caring for their health.

### P760

#### ASSOCIATION BETWEEN CHRONIC LUMBAR SYNDROME AND OSTEOPOROSIS IN CORRELATION WITH GENDER AND VITAMIN D LEVEL IN HEALTHCARE WORKERS

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**Objective:** Chronic lumbar pain affects over 80% of individuals, regardless of gender. After the age of 40, chronic lumbar syndrome becomes more prevalent. Healthcare workers, drivers, educators, office workers, and construction workers are among the most typically afflicted occupations. The most common type of metabolic bone disease is osteoporosis, which is characterized by decreased bone mass and disruption of bone microarchitecture. The aim of this study is to demonstrate the association between chronic lumbar syndrome and osteoporosis in correlation to gender and vitamin D level among health workers.

**Methods:** The research group consists of 40 women and 40 men aged 45-60 years with symptoms of chronic lumbar syndrome with pain longer than 12 weeks employed as health professionals, and the control group also consists of 40 women and 40 men without symptoms of chronic lumbar syndrome also health workers of the same age. Data from anamnesis, work anamnesis, X-ray findings of L-S spine, ultrasound densitometry and level of vitamin D in blood were analyzed.

**Results:** The analysis of the results revealed a significant difference ( $p<0.05$ ) in the correlation of chronic lumbar syndrome and osteoporosis in the examined group, 32.5% of patients, opposed to 13.75% in the control group. In regards of the gender correlation, a significant difference ( $p<0.05$ ) was determined, with women having a 47.5% greater incidence than men (17.5%). A significant difference ( $p<0.05$ ) was also detected in the levels of vitamin D, with a low level in 66% of research group patients and 34% of control group patients.

**Conclusion:** The analysis revealed that the incidence of osteoporosis was higher among healthcare professionals with chronic lumbar syndrome than in the control group. Also, working indoors, reduced exposure to the sun and long sitting are the reasons why about half of the healthcare workers in this research are deficient in vitamin D. The association between chronic lumbar syndrome and osteoporosis is frequently discussed without a definite consensus, therefore it is critical to identify it on time so that patients may obtain appropriate treatment.

P761

**EFFECT OF HYALURONIC ACID INJECTION IN PAIN RELIEF OF KNEE OSTEOARTHRITIS**M. Koura<sup>1</sup>, A. Mekawy<sup>1</sup>, M. Salem<sup>1</sup>, A. Shahin<sup>1</sup><sup>1</sup>Koura Clinics, Giza, Egypt**Objective:** Efficacy of hyaluronic acid in different grades of osteoarthritis in 2022**Methods:** Retrospective randomized clinical trial on 213 cases of osteoarthritis in different grades from grade 2 to grade 4; grade 2 (87 cases); grade 3 (72 cases); grade 4 (54 cases); success rate is based on pain relief.**Results:** 73 patients with grade 2 showed pain relief with success rate 84%. 49 patients with grade 3 showed pain relief with success rate 69%. 27 patients with grade 4 showed pain relief with success rate 50%.**Conclusion:** The knee injection has a very good efficacy in the management of different grades of osteoarthritis with success rate higher in grade 2 than in grade 3 and 4.

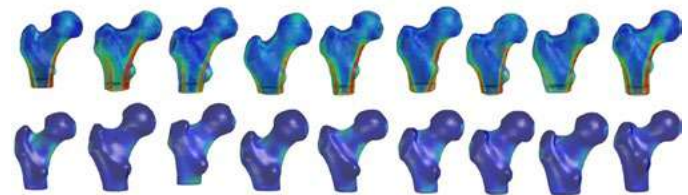
P762

**ONE-YEAR RESULTS OF GENICULAR ARTERIES EMBOLIZATION AS TREATMENT OF KNEE OA**M. U. Rezende<sup>1</sup>, L. G. M. Valle<sup>2</sup>, A. M. Assis<sup>3</sup>, G. P. Ocampos<sup>1</sup>, F. C. Carnevale<sup>4</sup>, B. B. Affonso<sup>2</sup>, F. L. Galastri<sup>2</sup>, F. Nasser<sup>2</sup><sup>1</sup>Departamento de Ortopedia e Traumatologia - Hospital das Clinicas - FMUSP, <sup>2</sup>Hospital Albert Einstein, Sao Paulo, Brazil, <sup>3</sup>Instituto de Radiologia - Hospital das Clínicas - FMUSP, <sup>4</sup>Instituto de Radiologia - Hospital das Clinicas - FMUSP, Sao Paulo, Brazil**Objective:** To quantify improvements of patients with knee OA by embolization of branches of genicular arteries.**Methods:** Prospective case series included 27 patients (28 knees) with OA Kellgren-Lawrence (KL) grades 2-4 and synovitis with persistent moderate to severe pain resistant to conservative management submitted to transcatheter arterial embolization between August 2021 and December 2022. Clinical outcomes were evaluated at 1, 3, 6 and 12 months by EQ5D, WOMAC and KOOS.**Results:** Abnormal neovessels were identified in all cases. Three patients remained with cutaneous color changes even after a year (all women). Three tissue necrosis with dermal ulcers occurred resolving in 2 months (all 3 in women). EQ5D improved from an average of 0.7699 to 0.8940 at 3, and 0.8938 at 6 months. WOMAC total (0-96) and subsets best results were at 6 months (decreasing from 28.8 to 15.4). WOMAC total results at 12 months were 19.9. KOOS pain improved from 59.2 to 69.8 at one month and 74.7, and 77.6 at three and six months, respectively, declining to 75 at one year. KOOS activities of daily living improved from 68.4 to 77.4, 78.5, 81.1 and 76.1 at 3, 6, and 12 months. KOOS sports improved from 28.4 to 44.3, 46.4, 46.3 and 44.4 (1, 3, 6 and 12 months respectively). KOOS general improved from 57.9 to 68.9, 71.7, 73.6 and 70.9 at one year. Patients with grade IV

K&amp;L OA and painful periarticular cysts did not improve with the technique. Results remain steady in patients with K&amp;L grades 2 and 3 up to a year.

**Conclusion:** In patients with knee OA and pain due to synovitis, long lasting improvements in pain, function and quality of life can be achieved by embolization of genicular arteries.

P763

**ASSESSING FEMORAL BONE STRENGTH IN FEMALE PATIENTS WITH CUSHING SYNDROME'S REMISSION AT FALL RISK USING MEDICAL IMAGES AND FINITE ELEMENT MODELS**A. Giuliadori<sup>1</sup>, E. Soudah<sup>1</sup>, J. A. Hernández<sup>2</sup>, E. Valassi<sup>3</sup><sup>1</sup>Centre Internacional de Mètodes Numèrics a l'Enginyeria (CIMNE), <sup>2</sup>Universitat Politècnica de Catalunya (UPC), <sup>3</sup>Endocrinology and Nutrition Dept., Germans Trias i Pujol Hospital and Research Institute, Barcelona, Spain**Objective:** Cushing's Syndrome (CS) is a rare endocrine disease that is characterized by hyper-secretion of cortisol. Evidence shows that, after effective treatment, the normalization of cortisol secretion is not constantly followed by the complete remission of the associated complications. Persistent bone disease is one of the many clinical manifestations seen in treated patients. This study aims to examine the mechanical properties of femoral bone in female patients with long-term CS remission to identify factors that may be linked to eventual chronic deterioration using medical images and Finite Element (FE) models.**Methods:** The study included 66 female subjects, stratified into two groups: 34 long-term remission of CS cases, and 32 healthy control patients. DXA and QCT images of the total hip were obtained. QCT-images were used to derive the mechanical properties, and the patient-specific 3D FE models of the proximal femora. A sideways-fall impact was simulated for each subject based on her height and weight, and the resulting stress values were compared between the two groups. Areal and volumetric BMD (aBMD, vBMD) were also studied. Statistical analyses were conducted to determine whether CS treated patients had similar femoral density and mechanical properties to control subjects.**Results:** aBMD measurements on the femoral neck of treated patients do not differ from those of control patients, however vBMD and Von Mises stress (Figure 1) measurements show differences between the two groups. Maximum stresses are higher in treated patients, indicating that these subjects may more easily reach the ultimate strength threshold under the same loading conditions and, as a result, they present a higher risk of fracture.**Figure 1.** Normalized stiffness (above) and Von Mises stresses

(bottom) in a subset of patients' femora.

**Conclusion:** This study provides evidence that long-term remission of Cushing's syndrome may lead to alterations in the mechanical properties of femoral bone after resolution of cortisol excess, resulting in higher stress values and an increased risk of fracture. These findings can help identify factors that may be linked to eventual chronic deterioration and may inform the development of prevention and treatment strategies for persistent bone disease in treated CS patients.

## P764

### RESIDUAL KNEE PAIN AND SYNOVITIS AFTER TOTAL KNEE ARTHROPLASTY TREATED WITH SELECTED EMBOLIZATION OF GENICULAR ARTERIES

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**Objective:** To measure improvements of patients with pain and synovitis after total knee arthroplasty due to OA by embolization of branches of genicular arteries.

**Methods:** Prospective case series included 9 patients (10 knees) with persistent pain and synovitis after knee arthroplasty due to OA submitted to transcatheter arterial embolization between August 2021 and September 2022. Clinical outcomes were evaluated at 1, 3, 6 and 12 months by EQ5D, WOMAC (0-96) and KOOS. All patients had their knees aspirated at the operating room to ascertain lack of infection.

**Results:** Abnormal neovessels were identified in all cases. One patient remained with cutaneous color changes even after a year of procedure in both knees. No tissue necrosis, dermal ulcers or peripheral ulcers. EQ5D improved from an average of 0.8938 to 0.9591, 0.9694, 0.9549 and 0.99573 at 1,3,6, and 12 months. WOMAC total and subsets improved progressively up to a year. WOMAC total reduced from an average of 18.6 to 5.7, 7.7, 6.3 and 2.75 at 1,3, 6, and 12 months. KOOS pain improved from 80.86 to 94.4, 92, 89.7 and 92.5 at 1, 3, 6 and 12 months, respectively. KOOS activities of daily living improved from 67.9 to 79.4, 91.3, 92.1 and 94.2 at 1, 3, 6, and 12 months. KOOS sports improved from 37 to 59.3, 45, 47.9 and 58.8 (1, 3, 6 and 12 months, respectively). KOOS quality of life improved from 61.6 to 83.2 at one year. KOOS general improved from 71.9 to 87.7, 83.1, 82.4 and 87 at one year. All patients improved in all parameters.

**Conclusion:** In patients with persistent pain and synovitis after total knee arthroplasty due to OA, long lasting improvements in pain, function and quality of life can be achieved by embolization of branches of genicular arteries.

## P765

### CORRELATION OF OSTEOPOROSIS WITH MARKERS OF SYSTEMIC INFLAMMATION, HEMATOLOGICAL PARAMETERS AND CYTOKINES IN PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS

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**Objective:** Osteoporosis significantly increases morbidity and mortality in patients with systemic lupus erythematosus (SLE). Chronic corticosteroid use and persistent inflammation are significant predictors of increased bone fragility. The effect of inflammatory mediators and the disruption of the immune system contribute to increased bone breakdown. The aim of the work is to examine BMD in patients with SLE and its association with standard markers of systemic inflammation - erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) level, then hematological parameters - neutrophil to lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR), as well as with cytokines - serum and urinary monocyte-hemoattractant protein-1 (MCP-1).

**Methods:** The study included 105 patients with SLE, consisting of 94 women (58 premenopausal and 36 postmenopausal) and 11 men, treated at the Rheumatology Clinic of the Institute "Niška Banja", average age 45.04±10.49 and average duration of the disease 10.26±8.34, in which the diagnosis was made on the basis of the revised ACR criteria from 1997. In addition to the clinical examination, all patients had their BMD measured in the lumbar vertebrae L1-L4 and hips using DXA with the Hologic brand apparatus, and the values are expressed as absolute in g/cm<sup>2</sup>. ESR was done manually, by measuring the sedimentation rate at the bottom of the test tube; CRP was measured quantitatively in a biochemical analyzer (BA400, Spain); blood count and leukocyte count were performed in a 5-part differential hematology analyzer (Sysmex XS1000i, Japan); MCP1 in serum and urine was determined according to the manufacturer's instructions (R&D Systems, Inc. Minneapolis, USA).

**Results:** BMD measured at the spine and hip did not show a correlation with the values of ESR, CRP, PLR, nor with serum and urinary MCP-1. The only discovered correlation was between NLR and BMD on the spine, and it was negative ( $r=-0.231$ ;  $p<0.05$ ).

**Conclusion:** Although systemic inflammation affects increased bone resorption, our results showed no correlation of BMD measured at the spine and hip with ESR, CRP, hematological parameter PLR, nor with serum and urinary MCP-1. It was only shown that higher values of the hematological parameter NLR are associated with lower values of BMD on the spine.

P766

### POSSIBILITIES OF LOW-FREQUENCY MAGNETIC THERAPY FOR PROLONGING THE REMISSION PERIOD AND REDUCING THE RECURRENCE OF INFLAMMATORY PROCESS IN JOINTS

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**Objective:** The effectiveness and safety of various non-pharmacological technologies in the rehabilitation process of patients with inflammatory joint damage needs to be confirmed. We aimed to evaluate the long-term results of low-frequency magnetic therapy (LFMT) in the treatment of patients with inflammatory joint lesions.

**Methods:** 113 patients with inflammatory process in hip and/or knee joints (70 patients with osteoarthritis, OA; 43 patients with rheumatoid arthritis, RA) were examined. The patients were divided into two groups: I (main) - 40 patients with OA and 25 patients with RA; II (control) - 30 patients with OA and 18 patients with RA. Patients of the main group underwent low-frequency magnetic therapy (from 0.3-100 Hz; up to 5 mT): each patient underwent 4 courses of treatment (10 daily procedures of 30 minutes each) with a frequency of once every 3 months.

**Results:** All patients were invited for regular annual examination. After one year of monitoring the recurrence of the inflammatory process in group I was noted in 58.5% of cases, in group II - in 77% of patients ( $\chi^2=4.29$ ,  $p=0.039$ ). Two years after the start of treatment, recurrences of the inflammatory process (during the last year) were observed in 48% of patients in group I and in 67% of patients in group II ( $\chi^2=4.98$ ,  $p=0.026$ ). During the first year of follow-up, the number of detected recurrences of inflammatory joint damage among RA patients was significantly higher than in OA patients ( $p=0.026$ ). During the second year of monitoring no such differences were observed ( $p>0.05$ ). Supposedly, the positive impact of LFMT on metabolic processes in cartilage tissue is due to the effect on microcirculation in the synovial membrane and periarticular tissues, which are less affected in OA than in RA.

**Conclusion:** The use of LFMT helps to improve the long-term results of therapy in patients with inflammatory joint damage. Longer remission is observed in patients with OA compared to RA when using LFMT.

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### PECULIARITIES OF EARLY PHYSIOTHERAPY AFTER HIP FRACTURE SURGERY IN OLDER ADULTS: AN EXTENDED LITERATURE REVIEW

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**Objective:** Hip fractures are one of the leading causes of hospitalization and a significant health impairment problem in older adults. About 1.6 million new cases of hip fractures are diagnosed worldwide every year, and in 2025 the number may reach 2.6 million [1]. Hip fracture impairs mobility, balance and independence in activities of daily living, leading to a deterioration in health-related quality of life. Early physiotherapy results in significant improvements in daily functioning in the first 3 postoperative months, with only minimal improvement thereafter. The aim of this study was to analyze the peculiarities of early physiotherapy and its impact on functional state and quality of life after hip fracture surgery in older adults.

**Methods:** Analysis of the scientific literature was performed using MEDLINE (PubMed), Science Direct, Springer Link databases from September 2021 to April 2022. Inclusion criteria: men and women 60 years and older; published randomized controlled trials in English language in 2016-2022; research intervention – early physiotherapy after hip fracture surgery.

**Results:** Of the 21162 records retrieved, 7 randomized controlled trials were included in the scientific literature analysis. The resistance, functional and aerobic exercises with and without projected visual context were the main object of study in the analyzed studies. The start of intervention varied from the 2nd to the 10th postoperative day and the duration of the intervention lasted from 1 to 12 weeks. In the studies reviewed, methods of mobility assessment included TUG, 10MWT, FAC, KWAS and mILOA. Balance was measured by BBS and SPPB. Quality of life was assessed by EQ-5D-5L and SF-36. Analysis of six out of seven randomized controlled studies showed a significant improvement in mobility between a control and an experimental group. It was found a significant improvement in balance among groups in three out of seven randomized controlled studies. Data of four out of seven randomized controlled studies demonstrated a significant improvement in quality of life between the two groups. The results of the analyzed scientific studies revealed that early physiotherapy had a positive effect on mobility, balance and quality of life after hip fracture surgery in older adults.

**Conclusion:** Early physiotherapy significantly improved mobility, balance and quality of life after hip fracture surgery in older adults.

**Reference:** 1. Johnell O. Am J Med 1997;103:20.

P768

### EVALUATION OF THE EFFECTIVENESS OF A MULTICOMPONENT TREATMENT PROGRAM FOR POSTHOSPITAL REHABILITATION OF PATIENTS WITH JOINT PATHOLOGY

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**Objective:** Non-pharmacological treatment strategies can be used in the post-hospital rehabilitation phase of patients with joint pathology. We aimed to evaluate in the short term the effectiveness and rehabilitation potential of a multicomponent rehabilitation program (MRP) in patients with osteoarthritis (OA) and rheumatoid arthritis (RA).

**Methods:** For posthospital rehabilitation (treatment in a sanatorium for 21 days) of patients with OA (n=16) and RA (n=24) the MRP with kinesitherapy (dosed walking up to 60 min daily) in combination with hydrokinesitherapy (therapeutic swimming for 30 min daily), low-frequency magnetic therapy (from 0.3-100 Hz; upto 5 mT; every 30 min; every other day; 10 sessions in total) and the method of functional biocontrol with biofeedback - temperature-myographic biofeedback therapy (20-25 min, every day, 10-12 sessions) was used. Pain intensity (while walking) was assessed by visual analogue scale (VAS Huskisson). The VAS0-100 screening scale and the BRAF-NRSv2 scale were used to assess fatigue.

**Results:** In patients with OA the use of MRP was characterized by a decrease in pain intensity according to VAS (p=0.022), fatigue according to VAS0-100 (p=0.021), the number of painful (p=0.034) and swollen (p=0.044) joints. RA patients showed a decrease in VAS pain (p=0.018), number of painful joints (p=0.023), and fatigue level (VAS0-100, p=0.002; BRAF-NRSv2, p<0.05). During the rehabilitation cycle, the most significant changes in the spectrum of joint structure and function abnormalities (rehabilitation potential) were observed when using MRP in patients with OA (p=0.039), and less pronounced - in patients with RA (p=0.067).

**Conclusion:** The use of a multicomponent rehabilitation program based on a combination of aerobic exercises and methods of modern physiotherapy is characterized in the short term by an improvement in the indicators of joint syndrome, pain and chronic fatigue.

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### CYTOKINES AS POTENTIAL BIOMARKERS OF ATHEROSCLEROTIC VASCULAR LESIONS IN RHEUMATOID ARTHRITIS

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**Objective:** To evaluate the role of tissue cytokines in the development of atherosclerotic lesions of the brachiocephalic arteries (BCA) in rheumatoid arthritis (RA).

**Methods:** We examined 57 patients with a reliable diagnosis of RA (mean age 50.45±10.12 years old; mean duration of disease 9.2±6.8 years). Ultrasound measurements of BCA were performed in B-mode (Accuvix V10, Samsung Medison) with determining the thickness of arterial intima-media complex (IMC). The following criteria were used to assess the severity of atherosclerotic changes in the vessels: A0 - no atherosclerosis (n=32), A1 - isolated thickening of intima-media complex (n=19), AII - presence of atherosclerotic plaques and stenosis of BCA arteries (n=6). Laboratory examination included determination of a number of tissue cytokines in serum (by solid-phase enzyme immunoassay): nesphatin-1, visfatin, angiopoietin-like proteins of types 2, 3, 4 and 6.

**Results:** Signs of atherosclerosis (groups A1 and AII) were detected in 43.8% of RA patients. Data from analysis of variance showed intergroup differences in angiopoietin-like protein (ANGPTL) type 2 (p=0.002), ANGPTL type 4 (p=0.0037) and nesphatin-1 (p=0.0011). There were no differences in the severity of atherosclerotic changes in the BCA for visfatin, ANGPTL types 3 and 6 (p>0.05). There was a negative association of IMC with nesphatin-1 level (p=0.012) and a positive association with ANGPTL2 (p=0.031) and ANGPTL4 level (p=0.048). In the group of RA patients with pronounced clinical and laboratory activity of the disease (n=19) the processes of atherosclerotic lesions of the BCA prevailed (IMC ≥1.2 mm; n=11) (p=0.044). This may indicate the role of arterial inflammation in the pathogenesis of vascular complications in this category of patients. Moreover, ANGPTL 4 may have a greater effect on IMC than on the development of plaques, which represent a later stage of atherogenesis.

**Conclusion:** Vascular ultrasound should be performed as a routine examination for adequate stratification of cardiovascular risk in patients with RA, especially in the presence of potential biomarkers of atherosclerotic lesions of the BCA in the serum.

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**NEUROPATHIC PAIN: WHICH PREDICTIVE FACTORS?**S. Bousselham<sup>1</sup>, S. Zaher<sup>1</sup>, K. Erraoui<sup>1</sup>, S. Sboul<sup>1</sup>, R. Assadi<sup>1</sup>, A. Ibovi<sup>1</sup>, J. Daoudim<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Ibn Rochd Hospital, Casablanca, Morocco**Objective:** Neuropathic pain (NP) is a real public health problem. It remains frequent and sometimes very inconvenient for patients.**Methods:** This is a monocentric, cross-sectional, descriptive, retrospective and comparative study, conducted within the rheumatology department over a recruitment period of 19 months, from October 2020 to April 2022. The collection of data was made from the medical records of patients followed at rheumatology department. The missing parameters were collected during phone calls from the patients concerned. The diagnostic tool adopted was the DN4 questionnaire in dialectal Arabic version. We used the x2 to calculate the odds ratio (OR) with a 95%CI.**Results:** In our study, 1528 participants were included, 1385 women were involved, sex ratio (M/F) was 1/10. The average age was 57 years (17-94 years). 20% of patients were under 45 years old. The mean DN4 score calculated for all causes of pain combined was 5.27 ( $\pm 1.24$ ) with a median of 5 (4-9). The average duration of NP evolution was 41 months with extremes of up to 360 months in 2 patients and 1 month in 23 patients. NP was dominated by lumboradiculalgia in 51% (n=779), cervico-brachial neuralgia (CBN) in 26% of cases (n=398), and distal related to carpal tunnel syndrome in 20% of cases (n=305), of chronic evolution. In patients with CBNs, stress was significantly associated with their appearance ( $p < 0.002$ ; OR: 1.50 [1.16; 1.93]). Also, carrying a heavy load ( $p < 0.001$ ; OR: 1.49 [1.19; 1.87]) and stress ( $p < 0.001$ ; OR: 1.43 [1.15; 1.77]) were significantly associated with the onset of lumboradiculalgia. Carpal tunnel syndrome was significantly associated with the use of a vibration machine ( $p < 0.001$ ; OR: 5.61 [3.82; 8.24]), dysthyroidism ( $p < 0.001$ ; OR: 2.12 [1.56; 2.89]), diabetes ( $p < 0.001$ ; OR: 1.67 [1.27; 2.20]) and overweight (BMI  $> 25 \text{ kg/m}^2$ ) ( $p < 0.001$ ; OR: 3, 64 [1.99; 6.64]).**Conclusion:** Our study made it possible to highlight some predictive factors of DN in a significant way, such as stress and diabetes implying the need for a global management of these factors to prevent the appearance of NP and to take them into consideration in the therapeutic management of this type of pain.

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**EVALUATION OF THERAPEUTIC RESPONSE TO CORTICOSTEROID INJECTIONS IN LUMBORADICULALGIA AND CARPAL TUNNEL SYNDROME**S. Bousselham<sup>1</sup>, S. Zaher<sup>1</sup>, K. Erraoui<sup>1</sup>, S. Sboul<sup>1</sup>, R. Assadi<sup>1</sup>, A. Ibovi<sup>1</sup>, J. Daoudim<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Ibn Rochd Hospital, Casablanca, Morocco**Objective:** Joint and periarticular corticosteroid infiltrations are currently widely used in the treatment of disorders of the musculoskeletal conditions, including lumboradiculalgia and carpal tunnel syndrome. The aim of our study was to evaluate the therapeutic response to infiltrations in these two conditions.**Methods:** This was a single-center, cross-sectional, descriptive, retrospective, comparative study conducted in the rheumatology department. The recruitment period was 19 months, from October 2020 to April 2022. Data collection was done from the medical records of patients followed the rheumatology department who presented Neuropathic Pain (NP). Missing parameters were collected during telephone calls of the concerned patients. The diagnostic tool adopted was the DN4 questionnaire in Arabic dialect. The impact of NP on the quality of life before and after corticosteroid infiltration was evaluated by the visual analog scale (VAS) for pain, sleep and function, and the Hospital Anxiety and Depression Scale (HAD) in a validated Arabic version to evaluate the psychological impact. Statistical analysis was performed with the Jamovi software.**Results:** In our study, out of 1528 patients with NP, 13.5% received corticosteroid infiltration, namely, 31 patients had chronic lumboradiculalgia and 165 patients complained of carpal tunnel syndrome. This population consisted of 189 women and 14 men (sex ratio=0.074). The age ranged from 26-84 years with an average of 52.9 years. 90.3% of this population was followed for pathologies related to degenerative rheumatism. Concerning the characteristics of the pain, the DN4 varied between 4-9 with an average of 5.62. The average duration of evolution was 57.8 months for lumboradiculalgia and 18.29 months for carpal tunnel syndrome. Corticosteroid infiltration was associated with other pharmacological and non-pharmacological treatments in 10.3% of patients (n=21), including amitriptyline, pregabalin, transcutaneous neurostimulation (TENS) and physical rehabilitation. Before the infiltration, the VAS pain was between 3-5 out of 10 in 67% of the patients with a significant improvement after the treatment ( $p < 0.0001$ ). The quality of sleep was average before infiltration in 62% of patients vs. 14.5% after treatment, which showed a significant improvement ( $p < 0.0001$ ). Function was limited in 55% of patients vs. 14% after treatment ( $p < 0.0001$ ). A positive impact on mood had also been noted in all patients with a significant improvement of HAD anxiety and depression ( $p < 0.0001$ ).**Conclusion:** Our study allowed us to conclude that corticosteroid infiltrations can reinforce the therapeutic management of NP in lumboradiculalgia and carpal tunnel syndrome with a significant positive impact on the quality of life of patients.



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### IMPACT OF NUTRITIONAL INTERVENTION AND VITAMIN D SUPPLEMENTATION ON FIBROMYALGIA

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**Objective:** Fibromyalgia is a chronic disease of unknown etiology, with a negative impact on the patient's quality of life. We intend to present the clinical evolution of a patient with fibromyalgia after dietary interventions and vitamin D3 supplementation.

**Case report:** Patient aged 39 years, known in history with irritable bowel syndrome, muscle cramps, anxiety, diffuse musculoskeletal pain, memory and mood disorders, symptomatology started about 2 years ago for which she presented herself at neurology, rheumatology, psychiatry, gastroenterology consultations, subsequently establishing the diagnosis of fibromyalgia. The prescribed pain relievers and myorelaxants had minimal and short-term effects. Blood tests reveal a low level of 25-OH-vitamin D (11 ng/mL). Because the effects of the drugs were limited and the severity of the symptomatology was more intense, a new approach was tried for the symptomatic remission of fibromyalgia. The therapeutic approach consisted in increasing the level of vitamin D3 – 10,000 IU/d (physiological dose) until the serum vitamin D level increased to normal values. The proposed food plan involves the elimination from the diet of proinflammatory foods such as refined carbohydrates, dairy, gluten, ultraprocessed foods for a period of at least 3 months and the consumption of foods rich in tryptophan, fiber, antioxidants, omega-3, magnesium. After one month from the observance of the proposed dietary plan, the patient notices an improvement in the state of health, the muscle pain has improved significantly (initial VAS scale=8, later VAS=2 scale). Memory and mood disorders, muscle cramps are present unsteady. The level of 25-OH-vitamin D after a month of supplementation becomes 53 ng/mL.

**Conclusion:** The abnormal function of dopamine is associated with a disorder of pain processing in fibromyalgia. Vitamin D has anti-inflammatory properties and is involved in the modulation of brain neurotransmitters (acetylcholine, serotonin, dopamine). Dietary changes as well as vitamin D supplementation provided clinically remarkable improvements by reducing chronic pain, which led to an increase in the patient's quality of life.

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### VITAMIN D STATUS IN FERTILE WOMEN WITH MILD PRIMARY HYPERPARATHYROIDISM

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**Objective:** To study vitamin D status in fertile women with mild primary hyperparathyroidism (PHPT).

**Methods:** We studied 39 fertile women with mild PHPT, average age 41,4±6,47 years. The control group: 27 fertile women without PHPT and osteoporosis, average age 40,9±6,78 years. Vitamin D status ≥30 ng/ml was detected as normal, 20-29 ng/ml was detected as insufficiency, <20 ng/ml – the deficiency, <10 ng/ml – the severe deficiency. We analyzed vitamin D level from May, 1, to September, 30. Women treated vitamin D 6 month before were excluded from the study. Examination: total calcium, phosphorus, albumin, creatinine, PTG, OPG, 25(OH)D, BMD measurements by DXA.

**Results:** Were no differences in the age, height, weight, BMI in both groups. The vitamin D level in fertile women with mild PHPT was 19,4 (12,3-28,4) ng/ml, in the control group – 28,2 (21,1-32,1) ng/ml, U=277,0, p=0,001. Vitamin D was normal in fertile women with mild PHPT in 15,3% (n=6) cases vs. control group -44,5% (n=12) cases,  $\chi^2=6,79$ , p=0,009. Vitamin D insufficiency was detected in fertile women with mild PHPT in 28,2% (n=11) cases vs. control group -33,3% (n=9) cases,  $\chi^2=0,20$ , p=0,656. Vitamin D deficiency was in fertile women with mild PHPT in 56,4% (n=22) cases vs. control group -22,2% (n=6) cases,  $\chi^2=6,73$ , p=0,006. Vitamin D severe deficiency was revealed in fertile women with mild PHPT in 15,3% (n=6) cases and was no found in the control group, F=0,07, p=0,036. Significant differences were detected in vitamin D status in fertile women with PHPT compared fertile women without PHPT. Vitamin D status in fertile women with PHPT was abnormal in 84,6%. The vitamin D deficiency (<20 nmol/l) detected in 2,5 times higher in fertile women with mild PHPT vs. control group (p=0,006).

**Conclusion:** The results of the study detected the high prevalence of low vitamin D level in fertile women with mild PHPT (84,6%). These findings may suggest a potential role for low vitamin D levels in PHPT pathogenesis.

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### EXPLORING THE LINK BETWEEN GENERAL AND SPECIFIC RISK FACTORS AND THE DEGREE OF FUNCTIONAL IMPAIRMENT IN FEMAL PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** Rheumatoid arthritis is a subject of study of epidemiology, not only due to their incidence and distribution, but also due to the chance of arriving at answers to questions about possible etiological and risk factors for the other diseases. We aimed to explore the link between general and specific risk factors with the degree of functional impairment in female patients.

**Methods:** A cross-sectional study was conducted to explore this link. The study enrolled 100 subjects, who were treated from November 2016 to November 2017 of the Institute of Rheumatology, CCS. The first part of the questionnaire related to the socio-demographic characteristics. The second part comprised questions on the prevalence of specific habits. The third part referred to the prevalence and occurrence of fractures and surgery, presence of other concomitant diseases, as well as family history of studied diseases. The degree of joint damage was followed up and assessed in the anatomical and functional stage of the disease. Then the variables present and degree of damage were correlated.

**Results:** The analysis of the link has shown that there was a statistically significant positive correlation between these variables, that is, older age correlated with a higher degree of functional impairment ( $p=0.313$ ,  $p=0.014$ ). The association between living in an urban environment and a higher degree of functional impairment was detected at the level of statistical significance of 0.1 ( $p=0.239$ ,  $p=0.063$ ). It observed a statistically significant correlation between the years of service and the degree of functional impairment, i.e. a higher number of years of service is associated with a higher degree of a functional deficit ( $p=0.321$ ,  $p=0.012$ ). Moreover, in the studied sample of RA patients, a statistically significant link was observed between joint surgery ( $p=0.226$ ,  $p=0.080$ ) or other previous surgeries ( $p=0.231$ ,  $p=0.073$ ) and the degree of functional impairment at the level of statistical significance of 0.1.

**Conclusion:** There is a link between the age of the subject, living in an urban environment, number of years of service, and the presence of previous joint surgeries and degree of functional impairment in female patients with rheumatoid arthritis.

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### BONE DENSITOMETRY PROFILE OF DIABETIC PATIENTS

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**Objective:** Diabetes is one of the most frequent and chronic endorphinopathies with an increasing prevalence, especially in the elderly. It leads to changes in bone characteristics, both in quantity and quality. The aim of our study is to determine the vitamin-calcium and bone-densitometric profile of diabetic patients.

**Methods:** We conducted a descriptive, unicentric study over a period of 3 months from September to December 2022, on diabetic patients followed in the rheumatology department. An operating form was developed and filled in from the medical records. The inclusion criteria were: any diabetic patient followed at the rheumatology department and having given their consent to participate in the study. Patients who had a complete phospho-calcium and vitamin D status as well as those who had undergone bone densitometry were also included.

**Results:** 158 patients were identified, 95% were female ( $n=150$ ), 6 of them were not yet menopausal. The mean age was 65.13 years (27 - 97 years). 62 patients were obese ( $BMI >30$ ), 47 patients were overweight ( $BMI >25$ ) and 49 had a normal BMI. Concerning the type of diabetes, 95% had type 2 diabetes, the mean duration of the disease was 8.2 years (1 and 36 years). 55% were on oral antidiabetic drugs, 25% on insulin only, and 12% on dietary management measures only. 8% were on insulin and oral antidiabetic drugs. The mean duration of treatment was 8.08 years (1-36 years). Concerning vitamin and calcium status, 2 patients had mild hypercalcaemia, 86% had hypovitaminosis D, the rest of the phospho-calcium profile was normal. However, the densitometric profile was in favour of: Osteoporosis of the lumbar spine in 58 cases, 56 cases had osteopenia at the same site. BMD was normal in 44 patients. Regarding the femoral neck, osteopenia of the femoral neck was found in 82 cases, BMD was normal in 59 cases, and osteoporosis was found in 17 patients. At the total hip, BMD was in favour of osteoporosis, osteopenia and normal in 17, 61, 78 cases respectively. Vitamin D supplementation was given in 128 cases, and antiosteoporotic treatment was indicated in 74 cases, of which 27 were injected and 47 oral.

**Conclusion:** The frequency of osteoporosis in diabetic patients is 20% according to a recent study, the mechanism can be explained by insulinopenia, micro angiopathy, poor regulation of phospho-calcic metabolism, nutritional status, weight and duration of diabetes. In our series, osteoporosis was high in the lumbar spine and was of the order of 37%. The search for bone fragility in diabetic patients and its treatment are necessary to prevent osteoporosis and its fractural complications.

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**OSTEOPOROTIC FRACTURES IN DIABETICS**S. Bousselham<sup>1</sup>, K. Nassar<sup>1</sup>, S. Zaher<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Ibn Rochd Hospital, Casablanca, Morocco

**Objective:** Diabetes is the most common endocrinopathy in the world. It causes changes in bone status, both in quantity and quality. The mechanisms responsible for these effects are different in type 1 diabetes and type 2 diabetes. What they have in common is an increased risk of fracture, which requires appropriate assessment and management. The aim of our study was to evaluate the osteodensitometric and vitamin-calcium profile as well as the management of diabetic patients with an osteoporotic fracture.

**Methods:** We conducted a descriptive, unicentric study over a period of 3 months from September to December 2022, on diabetic patients followed in the rheumatology department of the CHU Ibn Rochd of Casablanca. An evaluation form was developed and filled in from the medical records. The inclusion criteria were: any diabetic patient followed at the rheumatology department, having presented an osteoporotic fracture and having given his consent to participate in the study. Patients who had a phosphocalcic and vitamin D status, as well as those who had done a bone densitometry were included.

**Results:** 55 patients were included, 91% were female (n=50), 1 of them was not yet menopausal, the mean age was 51 years (51-84 years). 23 patients were obese (BMI >30) 14 patients were in overweight (BMI >25) and 18 had a normal BMI. Concerning the type of diabetes, 94.5% had type 2 diabetes, the mean duration of the disease was 8.65 years (2-32 years), 58% (n=32) of the patients were on oral antidiabetic drugs (OADs), 24% (n=13) on insulin, 9% of the cases (n=5) were on dietary hygiene measures and 9% (n=5) on insulin and OADs. The average duration of treatment was 8.39 years (1-32 years). Of the 55 patients, 30 had vertebral fractures and 25 had peripheral fractures; the causes of the fractures were: low-energy trauma in 24 cases, fall from height in 13 patients. Fractures were classified as major in 39 patients, dominated by vertebral fractures in 30 cases. The risk factors for falls in our series were repeated falls in 43 cases followed by decreased visual acuity in 35 patients. The vitamin D calcium and bone densitometry profile was in favour of: hypovitaminosis D in 45 patients; osteopenia of the lumbar spine in 22 patients, 21 had osteoporosis at the same site. Regarding the femoral neck, osteopenia was found in 27 cases, BMD was normal in 18 patients, osteoporosis was found in 10 patients. At the level of the total hip, BMD was in favour of osteoporosis, osteopenia and normal in respectively 19, 10, 26. 48 cases benefited from vitamin D supplementation, anti-osteoporotic treatment was indicated in 38 cases, of which 30 were injected and 8 oral.

**Conclusion:** The relationship between diabetes and osteoporosis is complex. Since diabetes causes qualitative and quantitative bone changes, the studies were in favour of a risk of hip fracture multiplied by more than 10 compared to subjects without such a condition. As a result, the management does not differ from the usual management of subjects with bone fragility, and is based essentially on the prevention of falling.

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**HOW DOES RHEUMATOID ARTHRITIS IMPACT FRAX BASED ESTIMATES OF MOF: A NARRATIVE REVIEW?**M. Ebrahimi-arjestan<sup>1</sup>, L. Yang<sup>2</sup>, E. E.<sup>3</sup>, T. Wang<sup>4</sup>, J. J. Carrey<sup>5,6</sup>, B. Whelan<sup>5,7</sup>, C. Silke<sup>5,7</sup>, M. O'sullivan<sup>5,7</sup>, A. Gsel<sup>5,8</sup>, A. Brennan<sup>9</sup>, M. Dempsey<sup>10</sup>, M. Yu<sup>1</sup>

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**Objective:** Osteoporosis and rheumatoid arthritis (RA) knowledge is often poor among patients and non-specialist clinicians. Patients with RA are at greater risk for osteoporotic fracture, related to disease severity, activity, duration and treatment, though modern treatment may induce sustained remission. The FRAX<sup>®</sup> calculation tool is a widely used and cited algorithm to estimate the 10-year risk of major osteoporotic and hip fracture. These calculations require inputting up to 13 variables, among which RA is the only included disease. Meta-analyses of these factors are published except gender, secondary osteoporosis and RA, some of which may confound RA presence such as smoking, gender and glucocorticoids. A joint IOF-ISCD position in 2011 notes FRAX<sup>®</sup> may underestimate risk, but studies validating which RA features consistently increase the greater risk were few.

**Methods:** We reviewed multiple publications including the cohorts used in the development and validation of FRAX estimates, and later validation studies to identify the prevalence of RA in those cohorts, and which additional RA characteristics were included.

**Results:** We found considerable heterogeneity around the prevalence of RA among different development and validation cohorts with respect to RA. The prevalence of RA among the 9 development cohorts ranged from 0-6% of 46,340 individuals (present in 3/9 cohorts) and 0-15% of 230,846 (present in 6/11) among the 11 validation cohorts. A further 1,304,065 individuals representing cohorts from 13 countries validating FRAX show the prevalence of RA ranged from 0-10.5% since 2010. Most studies rely on a coded or self-reported diagnosis of RA or 'arthritis', while only 1 provided additional data (some RA treatments).

**Conclusion:** RA is an important risk factor for fracture risk among men and women though its significance is heterogeneous and evolving. Further studies are needed to clarify and characterise the gradient of risk associated with RA in FRAX and other risk assessment tools.

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### ODONTOGENIC MAXILLARY SINUSITIS IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS

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**Objective:** The incidence of acute maxillary sinusitis is 5-15% in adults; it is constantly increasing, especially in certain groups of patients. The decrease in bone density in postmenopausal osteoporosis is not only in the lumbar spine and proximal femur but diffuse lesion of the skeleton. A decrease in the maxilla bone density can probably contribute to the acceleration of infectious processes spreading due to the presence of a natural anastomosis between the maxillary sinus and the nasal cavity. The source of infection can be dental-alveolar system and teeth inflammation presenting to the baseline of the maxillary sinus. We aimed to study the incidence of acute odontogenic maxillary sinusitis in postmenopausal women with osteoporosis compared to postmenopausal women without osteoporosis.

**Methods:** odontogenic sinusitis, pathology of the teeth, purulent foci and infected maxillary sinuses granulations were diagnosed by MSCT, osteoporosis was detected with T-score<-2,5 (L<sub>1</sub>-L<sub>4</sub>, total hip) diagnosed by DXA.

**Results:** We observed 14 postmenopausal women with acute maxillary sinusitis, mean age 59.2±4.26 years, all patients underwent surgical treatment. 10 postmenopausal women were with apical granuloma (24,25,15,16), 4 postmenopausal women with filling material in the maxillary sinus after endodontic treatment. Of these, postmenopausal women without osteoporosis were 2 with apical granuloma (F=0.36, p=0,012), and one woman was with the filling material in the maxillary sinus (F=0.25, p=0,243). The increased incidence of odontogenic maxillary sinusitis was revealed in postmenopausal women with osteoporosis compared to postmenopausal women without osteoporosis (F=0.21, p=0,043).

**Conclusion:** Decreased maxillary bone density may accelerate the spread of infection in the maxilla and increase acute odontogenic maxillary sinusitis development in postmenopausal women with osteoporosis.

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### ASSESSMENT OF CALCIUM INTAKE AND PERCEPTION OF CALCIUM-RICH FOOD AMONG SAUDI POPULATION

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**Objective:** Calcium is an essential mineral compound and one of the most abundant minerals in the human body. A long-term low calcium intake predisposes the bones to fractures, osteopenia, and osteoporosis. This study aims to assess the intake of calcium and the knowledge of calcium sources among Saudi population. In addition to identifying factors associated with inadequate calcium intake. The purpose of this study is to assess the Saudi population's calcium intake and awareness of calcium sources. In addition to identifying factors associated with insufficient calcium intake.

**Methods:** A cross-sectional study was carried out throughout all regions of Saudi Arabia using an online questionnaire distributed randomly through social media platforms. It included Participants of both genders aged 14 or older, citizens and residents of Saudi Arabia were included in the study. The questionnaire, which was created by the original author and translated into Arabic, was completed by 950 participants. The questionnaire contains three sections demographic data, calcium knowledge, and calcium intake. Calcium knowledge was classified as good if the participant answered >11 questions correctly. The intake was classified as sufficient or insufficient based on the recommended dietary allowance (RDA) of 1000 mg/d.

**Results:** Out of 950 study participants, 62.9% were in 26-50 years age group, 64.2% were females, 71.7% were married, 61.9% had a diploma or bachelor's degree, 97.6% were Saudis and 63.8% were from central region. The mean calcium intake was 577 mg/d for subjects aged 9-18, 479 mg/d for subjects aged 19-50, 479 mg/d for males aged 51-70, and 438 mg/d for females aged 51-70, which was statistically significantly (p<0.001) lower than both the estimated average requirements and RDA of calcium intake. Towards the 19 statements of knowledge items of calcium intake, the proportion of correct responses were between 23.4-94.7%, where 48.9% of them had adequate knowledge of calcium intake, with a score of >11 correct responses for the 19 statements. There was a statistically significant association between adequate and age groups, gender, marital status, educational status, and place of residence. Also, statistically significant association was observed between adequate level of consumption of food items related to calcium and age groups, marital status, and place of residence.

**Conclusion:** 51.1% of the participants had insufficient calcium knowledge, and the mean calcium intake was lower than the RDA which indicates a need for intervention to improve calcium knowledge and intake.

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### CHARACTERISTICS OF REHABILITATION IN A PATIENT WITH LONG-TERM SEQUELAE OF OSTEOMYELITIS WITH MULTIPLE LOCALIZATION SITES

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**Objective:** This case report aims to present the characteristics of the rehabilitation program in a patient with complex long-term osteomyelitis sequelae with multiple localization sites (right shoulder, knee, ankle) and dorsal, the lumbar spine that required vertebral osteosynthesis of the spine (T12-L3) and disk hernia repair surgery.

**Methods:** The case report refers to a 55-year-old patient who suffered from acute hematogenous osteomyelitis as a child. It is a relatively uncommon, but potentially serious disease, mostly due to *Staphylococcus aureus* or *Haemophilus influenzae* infections. Usually, positive cultures are obtained in most cases and improvements in antibiotic treatment have lessened the role of surgery in managing these infections. Long-term sequelae and morbidity are primarily due to delays in diagnosis or inadequate treatment. During the acute event, the patient received specific medical treatment, but there were complications due to hematogenous dissemination which affected multiple sites: right shoulder, knee, ankle, and dorsal and lumbar spine. Subsequently, in 2001 and 2003, the patient needed surgery after recurrent episodes of dorsal and lumbar pain that didn't respond to conservatory treatment. The patient was admitted into our rehabilitation clinic, accusing pain in the lumbar spine area, right knee, right ankle, and both shoulders (more on the right side) (VAS=7). He was evaluated clinically and functionally and followed a specific rehabilitation program that included electrotherapy and kinesiotherapy.

**Results:** After 2 weeks of the rehabilitation program, we observed a general decrease in pain (VAS=3), an increase in the range of motion of the affected joints, a slight increase in the way he performs ADLs without help, and a moderate increase in quality of life.

**Conclusion:** The rehabilitation program has improved pain, mobility, functional independence, and quality of life, but the dysfunctional condition of the patient remains a long-term issue, given the cause of the disease and the long-term effects that it had, causing irreversible structural pathological changes.

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### RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY (REMS) AS A NONINVASIVE AND COMPLEMENTARY TOOL FOR THE ASSESSMENT OF BONE MINERAL DENSITY IN SUBJECTS WITH OSTEOPOROSIS

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**Objective:** Osteogenesis imperfecta (OI) is the term used to describe a group of rare inherited skeletal disorders characterized by reduced BMD and increase risk of fragility fracture. This study aimed to evaluate the usefulness of the new radiofrequency echographic multispectrometry (REMS) technique in the assessment of bone status in subjects with OI.

**Methods:** In a cohort of 30 subjects (39.5±18.3) with OI and in 30 healthy controls we measured BMD at the lumbar spine (LS-BMD), at femoral neck (FN-BMD) and total hip (TH-BMD) using a DXA device; moreover, REMS scans were also carried out at the same axial sites. Serum calcium, phosphate, creatinine, PTH, 25-hydroxyvitamin D, total alkaline phosphatase, bone alkaline phosphatase and C-terminal telopeptide of type 1 collagen were measured. Moreover, in OI subjects the presence of prior fractures was reported.

**Results:** A total of 86.4% of patients presented with a fracture history. The most common fracture sites were extremity long bones (femur, tibia-fibula and radius-ulna accounted for 18.2%, 54.5% and 27.3%, respectively) and at vertebral site (54.5%). BMD evaluated by DXA and REMS technique at all measurement sites were all significantly (p<0.05) lower in subjects suffering from OI than in controls. Good correlations were detected between BMD by DXA and BMD by REMS at TH (p<0.01) in subjects suffering from OI.

**Conclusion:** This preliminary study has shown that REMS appears to be an accurate non-ionizing technology able to assess the bone status in subjects with OI. The attractiveness of the use of REMS for bone measurements in OI patients lies in its lack of ionizing radiation, its ease of use and the portability. In fact, the REMS device can be used directly on the patient's bed, and this could represent an excellent method for assessing the bone status even in OI subjects with a recent fracture.

P782

### SEVERE SARCOPIENIA AS A CONSEQUENCE OF SARS-COV-2 INFECTION: MANAGEMENT BY MILD EXERCISE

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**Objective:** Sarcopenia is a consequence of hospitalization and long or even short term stay within the acute care unit. Sarcopenia appears to be also a consequence of hospitalization for COVID-19 disease. The aim of the study was to describe sarcopenia as a consequence of hospitalization for severe SARS-Cov-2 infection.

**Methods:** A group of 5 patients is described. Patients were male aged 52-64 years and they were hospitalized for severe SARS-CoV-2 infection. All developed pneumonia. However, they did not require intubation. They had comorbidities such as diabetes mellitus type 2, hypothyroidism, hyperlipidemia and obesity.

**Results:** After exiting from the acute care unit all patients developed severe sarcopenia which led to mobility limitation. The patients were treated with vitamin D, physical therapy and after exiting from the hospital they were offered a program of mild exercise. Subsequently, all patients improved. However, the recovery process was slow and required a dedicated effort from both the managing team and the patients.

**Conclusion:** Severe sarcopenia appears to be a consequence of severe infection from SARS-CoV-2 virus. Sarcopenia in such patients manifests itself with mobility limitation. The presence of comorbidities, in particular diabetes mellitus appears to be a predisposing factor for the development of sarcopenia. Patients should be managed with physical therapy and after exit from the hospital they should be offered a program of mild exercise. Recovery process is slow. The addition of vitamin D as well as a specified nutrition program is necessary for the successful recovery of the patients.

## P783

### T-SHAPED ACETABULAR FRACTURE: IS A LOCKED PLATE FIXATION BIOMECHANICALLY SUPERIOR?

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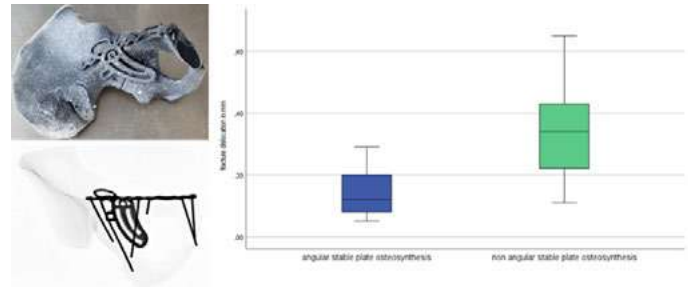
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**Objective:** The incidence of acetabular fractures in patients >60 years has increased during the last decades [1]. To minimize the risk of posttraumatic arthrosis or ossifications, retention of the intraoperatively restored anatomic reposition is essential [2]. Aim of the present biomechanical study was to investigate if a locked plate fixation (LPF) leads to less fracture displacement than a non-locked plate fixation (non-LPF).

**Methods:** A T-shaped acetabular fracture was created in 16 synthetic hemipelvis models (Synbone) (Fig. 1). A plate osteosynthesis which provides angular stability or non-angular stability (Biplanare 2-Pfeiler Platte, Fa. ITS, Graz, Austria) depending on the design of the screw head and which addresses the quadrilateral plate was used. The hemipelvis models were assigned to two groups of 8 models each for fixation with a LPF or non-LPF. Biomechanical testing was performed on an electrodynamic test system (Zwick Z005). The load was applied according to an established set-up [3]. Starting from 100 N the peak load of each

cycle was increased at a rate of 0.63 N/cycle. Interfragmentary displacements were measured by motion tracking (ARAMIS SRX, GOM GmbH, Braunschweig, Germany). The Mann-Whitney U test was applied to compare the outcome measures. Level of significance was set at  $p < 0.05$ .

**Results:** Fracture displacement along the axis of load application (0.12 vs. 0.34mm) and between os ilium and os ischium (0.09 vs. 0.18 mm) was significantly less ( $p < 0.05$ ) in the group of LPF (Fig. 1).



**Conclusion:** Regarding the retention of anatomic reposition under cyclic testing, the LPF is superior compared to the non-LPF. The use of an angular stable implant might be favorable in cases of reduced bone quality in elderly patients who are not able to maintain weight-bearing restrictions.

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## P784

### CLINICAL, FUNCTIONAL AND DEMOGRAPHIC CHARACTERISTICS ON PATIENTS WITH OSTEOPOROSIS ADMITTED FOR REHABILITATION TREATMENT IN THE BALNEARY UNIT

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**Objective:** We purposed a functional evaluation of patients with Osteoporosis (OP), admitted in Balneal and Rehabilitation Sanatorium Techirghiol, observing clinical and demographic characteristics and the presence of the risk factors.

**Methods:** We designed a descriptive retrospective study, including 389 patients with OP, admitted in our unit in 2022, for function-

al rehabilitation treatment, using natural factors. Medical, demographic data, functional independence measure (FIM) and the risk of falling (RF) were collected from the records. OP was diagnosed according to WHO criteria, based on BMD, evaluated by DXA, T- or Z- score being interpreted.

**Results:** Our group included 389 subjects, aged between 21 and 91, 382 women and 7 men. (346) (87,95%) came from urban areas, (45) (12,04%) originating from the rural ones. For 12 patients, OP was the main reason for their admission, while the other 377 having it as a secondary diagnosis. Most of the subjects (139) (35,73%) had no treatment at all, only 137 (35%) had antiresorptive such as bisphosphonates (90) or anti-RANKL agents (28) and 113 (29,05%) only vitamin D. 40 patients associated OP fractures (24 concerning the forearm, 9 one or more vertebrae and 7 the hip), their average age being 67,4 years. Even though 21 of them were prior diagnosed with OP, only 9 followed antiresorptive treatment. For 19 subjects (female gender, aged between 61 and 72), the fracture was the first symptom of OP, none of them being investigated with DXA before. 88 patients associated risk factors. The average functional independence (FIM=89,5) was lower and the risk of falling (RF=3,2) higher in the group with associated fractures compared to the lot without this complication (FIM=96,5 and RF=2,1). 35 patients had gait disorders, 17 of them using assistive devices.

**Conclusion:** Early diagnosis of lower BMD is important for OP prevention and its complications. Being an asymptomatic disease, there still are people unexamined by DXA at the right time, and even if the patients are diagnosed, many of them don't follow antiresorptive therapy and not even vitamin D. Thus, it's necessary to perform a systematic screening, to inform the patients correctly and to prevent the decrease of BMD and falls by medication and rehabilitation treatment.

## P785

### COMPARISON OF THE EFFECTS OF TWO DIFFERENT FRAILTY SCREENING SCALES FOR PREDICTING MORTALITY DUE TO ALL CAUSES IN OLDER INPATIENTS

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**Objective:** Osteoporotic fractures are an important cause of morbidity, mortality and loss of functionality in older patients. Recent studies have shown that frailty is an indicator for osteoporotic fractures. It is important to give priority to screening and treatment of osteoporosis in frail patients. In this context, we planned to examine the relationship between two different frailty screening tools and 90-d all-cause mortality in geriatric inpatients.

**Methods:** Patients aged  $\geq 60$  years who admitted to a university hospital geriatrics service between June 2021 and August 2022

were included in the study. Demographic characteristics, number and types of diseases, number of drugs, data of geriatric syndromes obtained through the comprehensive geriatric evaluation of the patients were recorded retrospectively from the patient files. The patient's mortality and length of stay data were obtained through the health ministry system. During their hospitalization, patients were screened with two different frailty scales, the Simpler Modified Fried scale (MFS) and the clinical frailty scale (CFS). Patients with  $\geq 5$  on the CFS scale and  $\geq 3$  on the MFS scale were evaluated as frail. Malnutrition screening was performed by Mini Nutritional Test -Short Form (MNA-SF). Patients with an MNA-SF score of 11 were accepted as undernutrition. Polypharmacy was evaluated as the number of drugs<sup>4</sup>. Functional status of the participants was evaluated with the daily living activities (ADL) the 6-item Katz scale and the instrumental daily living activities (IADL) with the 8-item Lawton Brody scale.

**Results:** The study included 84 participants a mean age of  $78.3 \pm 7.6$ . Participants of 36.9% were male. The prevalence of frailty by CFS and MFS was 60.7%- 89.3% respectively. All-cause mortality within 90 d prevalence was 19%. In univariate analyses using the Kaplan-Meier survival method, the CFS scale was statistically significantly related with 90-d all-cause mortality ( $p < 0.001$ ). However, in univariate analyses, MFS scale was not found to be statistically significant ( $p: 0.849$ ). A statistically significant relation was found between CFS scale and all-cause mortality after adjusting for age, gender, undernutrition, number of diseases, and falls in the evaluation of screening tools in multivariate analysis with Cox regression analysis [ $p < 0.001$ , Hazzard Ratio (HR): 3.078; (95%CI: 1.746-5.425)]. A statistically significant correlation was found between CFS and MFS frailty screening tools ( $r: 0.602$ ,  $p < 0.001$ ).

**Conclusion:** In the results of this study, in which frailty was evaluated using two different scales in hospitalized older adults, the CFS scale came to the fore in predicting all-cause mortality within 90 d.

## P786

### KNOCKDOWN OF SKELETAL MUSCLE-RELATED MICRORNAS POSITIVELY AFFECTS BONE MASS AND MICROSTRUCTURE IN MICE

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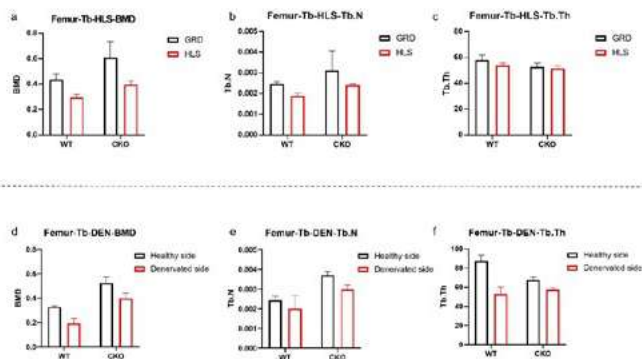
**Objective:** Skeletal muscle (SM) related microRNAs, i.e., myomiRs, are required by physiological myogenesis and muscle regeneration under pathological conditions. They can be released

into circulation as possible crosstalk mediators between SM and distant tissues. Intriguingly, some myomiRs like miR-206 and miR-133a were previously shown to either repress osteogenesis or promote osteoclastogenesis. Given this evidence, it is our interest to investigate the role of myomiRs in regulating bone function. Specifically, this study aimed to determine the effects of knocking down myomiRs in SM on bone mass and microstructure in physiological state or mechanical unloading conditions.

**Methods:** We knocked down myomiRs in SM via established SM-specific inducible Dicer conditional knock-out (cKO) mice. Both cKO and WT mice were divided into hind limb suspension (HLS) groups, denervation (DEN) groups, and control groups, respectively. The trabecular bone morphology of femur metaphysis and related parameters were analyzed by micro-CT.

**Results:** In the control group with physiological state, the cKO mice exhibited higher BMD (Fig.1a) and trabecular number (Tb.N) (Fig.1b) than the WT mice, with no significant difference in trabecular thickness (Tb.Th) (Fig.1c), indicating that the bone mass increase was mainly due to the rise in the number of trabeculae, rather than their thickness. In the HLS model, both WT and cKO mice suffered notable bone loss compared to their control group (Fig.1a, b). However, the cKO mice with HLS still maintained higher bone mass than WT mice with HLS. In the DEN model, both mouse strains showed a reduced bone mass on the denervated side compared to their healthy side (Fig.1d, e, f). Interestingly, the denervated side of cKO mice displayed a higher bone mass than the healthy side of WT mice (Fig.1d, e).

**Conclusion:** Knockdown of myomiRs in SM positively affected bone mass and microstructure both in physiological state and mechanical unloading conditions. As the underlying mechanisms remain unclear, further exploration of how myomiRs from SM regulate bone is warranted.



**Figure 1.** MicroCT analysis of the trabecular bone from WT and cKO mice. (a)-(c) BMD, Tb.N, and Tb.Th of the femur from the HLS model. (d)-(f) BMD, Tb.N, and Tb.Th of the femur from the DEN model.

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P787

## DEVELOPMENT OF SEVERE RHEUMATOID ARTHRITIS AFTER STEROID HORMONE WITHDRAWAL

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**Objective:** Pregnancy is characterized by increased secretion of estrogens and cortisol. Estrogen is used to prepare the maternal environment for the fetus. Cortisol induces a state of immunosuppression to avoid loss of the fetus, which, by definition, is at least partly a foreign organism. Parturition is characterized by estrogen and cortisol withdrawal. It leads to a rebound in immunity and may be accompanied by the development of autoimmune disease. Autoimmune thyroid disease is observed postpartum and may be related to this rebound in immunity. Rheumatoid arthritis (RA) is a systemic inflammatory autoimmune disease with multiple severe musculoskeletal manifestations. The aim was to present the cases of two female patients who developed RA postpartum after the birth of their second child.

**Methods:** The cases of two female patients aged 40 and 42 years, respectively, who developed RA postpartum after the birth of their second child are described.

**Results:** The patients went into menopause immediately following the birth of their second child. RA was RF(+) anti-CCP antibody (+) and led into hospitalization of the patients for a month following parturition. Corticosteroids were administered followed by methotrexate. In long-term follow-up both patients required the addition of a biologic agent and are now in remission on treatment with methotrexate and a biologic agent at the age of 79 and 81 years, respectively. Both patients had a severe disease course with multiple musculoskeletal manifestations.

**Conclusion:** Oestrogen and cortisol withdrawal may have led to the development of RA immediately postpartum. The development of RA postpartum has been previously reported. Amongst a large cohort of RA patients 2 were reported to develop RA postpartum. RA flare has also been reported postpartum. Additionally, autoimmune thyroid disease is known to occur postpartum, an incidence, which may also be related to steroid hormone withdrawal. In conclusion, estrogen and cortisol withdrawal may reverse the immunologically beneficial maternal profile and may lead to the development of postpartum clinical autoimmune disease. In the cases described herein steroid hormone withdrawal led to the development of severe RA with multiple musculoskeletal manifestations.



P788

### FIRST INTERIM ANALYSIS OF FGF23-RELATED HYPOPHOSPHATEMIC RICKETS AND OSTEOMALACIA REGISTRY IN THE GULF REGION: BASELINE CHARACTERISTICS FOR ADULT AND PEDIATRIC POPULATION

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**Objective:** Hypophosphatemia presents as rickets in children and osteomalacia in adults. This observational registry aims to collect data on treatment, disease burden, progression, and long-term outcomes among FGF23-related hypophosphatemic rickets (HR)/osteomalacia patients in Gulf Cooperation Council (GCC) countries. This first interim analysis presents patient baseline characteristics.

**Methods:** This is a multi-center, non-interventional registry, open to FGF23-related HR/osteomalacia patients of any age/sex, treated, currently untreated or treatment-naïve. The registry comprises a planned 10-year prospective component, and a retrospective component that captures data up to 6 years from diagnosis date. The registry was initiated in December 2020, and approximately 250 patients will be enrolled. Following patient consent/assent, baseline data collected included demographics, medical/treatment history, and clinical presentation.

**Results:** At the time of this interim analysis, 9 adults ( $\geq 18$  years) and 42 pediatrics ( $< 18$  years) were enrolled across Kingdom of Saudi Arabia (N=39), Oman (N=7), United Arab Emirates (N=3), and Kuwait (N=2). Patients were diagnosed with: X-linked dominant (n=20, 39.2%), autosomal dominant (n=28, 54.9%), autosomal recessive type 1 (n=2, 3.9%), and linear nevus sebaceous syndrome/epidermal nevus syndrome (n=1, 2.0%) subtypes. Mean (SD) age was 13.5 (12.7) years, and 66.7% (n=34) of patients were female. Mean (SD) time since diagnosis, and time between first symptoms and diagnosis were 24.0 (20.6) months and 25.7 (25.4) months, respectively. Treatments included phosphate (n=8, 32.0%), active vitamin D (n=5, 20.0%), burosumab (n=8, 32.0%), and growth hormone (n=2, 8.0%). There were 17 (33.3%) and 7 (13.7%) patients diagnosed or treated for bone and dental/oral conditions, respectively.

**Conclusion:** In this interim analysis, demographic and clinical characteristics of FGF23-related HR/osteomalacia patients are consistent with the literature. Insights generated from this GCC registry will enhance understanding of disease burden, natural history, and treatment, and thereby optimize clinical decision-making and long-term patient outcomes.

**Acknowledgments:** Contribution of all GCC registry Steering Committee members, and all investigators participating in the registry.

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registry and abstract. This abstract was previously presented at the American Association of Clinical Endocrinology (AACE) Communities Middle East 2022 Conference.

P789

### CHANGE OF EXTRACELLULAR TRAPS FEATURES GENERATED BY BLOOD NEUTROPHILS AND MONOCYTES IN OSTEOARTHRITIS PATIENTS

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**Objective:** To compare the parameters of extracellular traps (ET) formation by monocytes and neutrophils in patients with and without exacerbation of osteoarthritis (OA).

**Methods:** 23 adult patients with inactive hip or knee joint OA verified by X-ray and 18 OA patients with the features of synovitis in respective joints were included in the study. Neutrophils and monocytes were purified with centrifugation procedure using originally designed iohexol density gradients. The cell types in resulting fractions were identified histochemically, and the extent of cell activation was assessed using common NBT test. ET generation was stimulated by PMA. The shape and size of ET were assessed using fluorescence microscopy with SYBR green. Central tendencies are expressed as means (95%CI).

**Results:** Mean fraction of spontaneous ET exhibition by neutrophils was 5.3 (5.1-5.5)% and 13.2 (12.8-13.6)% for non-synovitic and synovitic OA patients, respectively. Mean fraction of induced ET exhibition by neutrophils was 20.6 (18.4-22.8)% and 28.8 (26.6-31.0)% for non-synovitic and synovitic OA patients, respectively. Mean fraction of spontaneous ET exhibition by monocytes was 7.9 (7.1-8.7)% and 15.0 (14.5-15.5)% for non-synovitic and synovitic OA patients, respectively. Mean fraction of induced ET exhibition by monocytes was 21.7 (19.2-24.2)% and 30.2 (28.1-32.3)% for non-synovitic and synovitic OA patients, respectively. There were significant differences between non-synovitic and synovitic OA patients in every measured parameter of ET formation ( $p < 0.001$ ).

**Conclusion:** Distinct increase of intensity of spontaneous ET generation by both blood monocytes and neutrophils is observed during OA synovitis exacerbation. This phenomenon can be presumably explained by high levels of proinflammatory cytokines and other mediators of inflammation which influence ET generation stimulatingly.

P790

### THE RELATIONSHIP BETWEEN PERCEIVED SLEEP QUALITY OVER DEPRESSION AND ANXIETY IN COMMUNITY-DWELLING OLDER ADULTS

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**Objective:** With aging, major changes occur in sleep structure. Although it has been shown that there is a bidirectional relationship between sleep disorders and psychiatric diseases, sleep problems are often overlooked among the elderly population and their caregivers. In addition, there is an important relationship between sleep quality and mental health and psychiatric health as well as medical problems of the elderly population. Sleep problems should be noticeable easily without causing adverse negative medical, psychiatric, mental problems.

**Methods:** Participants over the age of 62 who admitted to the geriatric outpatient clinics of university hospital between December 2012 and June 2022 were included in the study. The number of medications, diseases and numbers, marital status and living condition of the participants were recorded retrospectively in the patient files. Dementia patients were excluded from the study. Participants were asked about their thoughts about their sleep by giving two options as adequate and insufficient. Participants who said "insufficient" were considered to have poor sleep quality. Geriatric depression was screened with the long form of the geriatric depression scale -long form (GDS-LF) consisting of 30 questions. GDS-LF >10 was considered geriatric depression. Anxiety was screened with generalized anxiety disorder-7 (GAD-7). A score of 8 or higher was considered anxiety.

**Results:** Of the 1970 patients who applied to geriatric outpatient clinics, 236 were included in the study. The median age of the participants was 74 (62-92), female 28% (69). 62.4% (131) of the participants were married, 72% (172) primary school graduates and above, 23.2% (57) lived alone. The median number of diseases of the participants was 4 (0-10), and the median number of medications was 5 (0-21). The prevalence of perceived poor sleep quality, geriatric depression and geriatric anxiety disorder 43.1% (106), 41.5% (102), 43.1% (106) respectively. When the relationship between sleep quality and variables in the univariate analysis was examined: age, marital status, education status, living condition were not significant; sex ( $p=0.027$ ), number of diseases ( $p=0.044$ ), number of drugs ( $p=0.02$ ), GDS-LF and GAD-7 ( $p<0.001$ ) were significant. In the results of multivariate regression analysis: factors independently associated with perceived sleep quality after adjusting for confounding factors were found to be geriatric depression ( $p<0.001$ ) and geriatric anxiety disorder ( $p=0.001$ ).

**Conclusion:** Perceived poor sleep quality is common and independently associated with geriatric depression and geriatric anxiety disorder in geriatric outpatients. Although the results of our study are important, the factors associated with perceived poor sleep quality need to be investigated with further longitudinal studies.

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### ASSOCIATION OF PREVIOUSLY REPORTED SNPs WITH BONE MINERAL DENSITY AND OSTEOPOROSIS IN THE ELDERLY POPULATION OF IRAN: BUSHEHR ELDERLY HEALTH PROGRAM

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**Objective:** Genetic factors have a significant role in osteoporosis and fragility fracture. This study aims to investigate the relationship between the SNPs already identified by the existing studies with BMD and osteoporosis in a population-based study in Iran.

**Methods:** We searched the GWAS catalog database to find the articles reporting the SNPs associated with osteoporosis or BMD without time limitation. The articles were evaluated for quality. The related SNPs were listed. Then, we examined if the listed SNPs were associated with osteoporosis related variables (quantitative: total hip BMD, Lumbar spine BMD, femoral neck BMD, and qualitative: osteoporosis, femoral neck osteoporosis, total hip osteoporosis, spinal osteoporosis) in a data of 2,369 men and women aged  $\geq 60$  years participated in the Bushehr Elderly Health (BEH) program, a population-based study in Southwestern, Iran. We used linear and logistic regression models to investigate the association between SNPs (in additive mode) and outcomes, adjusted for age and sex. False discovery rate (FDR) method was

used to adjust for the multiple testing effects on the type I error. **Results:** The result of the GWAS catalog search included 35 high-quality papers. These papers reported 349 SNPs associated with osteoporosis or BMD. A total of 331 out of 349 SNPs identified in the previous stage were investigated in the BEH program data. Among them, 11 SNPs were significantly associated with at least one outcome related to osteoporosis or BMD (P value <0.05) (Table 1).

**Table 1.** Associated SNPs with osteoporosis (P value<0/05) in the BEH program.

SNP	Position	Mapped gene	Phenotype	B	S.E.	FDR P value
rs10037512_T	5:88354675	MEF2C-AS1	Femoral neck BMD	0.014	0.003	0.00658
rs1038304_A	6:151933175	CCDC170	Lumbar spine BMD	0.016	0.005	0.041125
rs1366594_A	5:88376061	MEF2C-AS1	Femoral neck BMD	0.014	0.003	0.00658
rs1414660_T	1:240586695	FMN2	Lumbar spine BMD	0.017	0.005	0.041125
rs1425800_C	11:35109917	CD44, PDHX	Lumbar spine BMD	0.027	0.008	0.041125
rs182943_C	1:68126096	HNRNCP9	Lumbar spine BMD	0.018	0.005	0.041125
rs2062375_G	8:90883803	RNU6-12P, TNFRSF11B	Lumbar spine BMD	0.016	0.005	0.041125
rs2120461_C	1:8447722	RERE	Lumbar spine BMD	-0.017	0.005	0.041125
rs2566752_C	1:68656697	GNG12-AS1, WLS	Lumbar spine BMD	0.018	0.005	0.01974
rs7727117_A	5:89062462	MEF2C-AS1	Femoral neck BMD	-0.012	0.003	0.0329
rs7830959_A	8:119976542	TNFRSF11B, RNU6-12P	Lumbar spine BMD	-0.016	0.005	0.041125

**Conclusion:** Despite the small sample size and potential differences in genetic background, 11 SNPs identified from previous studies were significantly associated with osteoporosis or BMD in a population from Iran. These results could lead the researchers to the important related genetic pathways of osteoporosis in this Middle Eastern population.

## P792

### THE IMMUNOLOGICAL PROFILE OF RHEUMATOID ARTHRITIS: A NEW MARKER OF LIPID IMBALANCE?

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**Objective:** Rheumatoid arthritis (RA) is a chronic autoimmune disease associated with an increase in cardiovascular morbidity and mortality. Chronic inflammation and high disease activity accelerate the process of atherosclerosis. The presence of rheumatoid factor or anti-citrullinated peptide antibodies predicted more severe inflammatory activity. The aim of our work is to seek the influence of the immunological profile on the lipid profile.

**Methods:** This is a cross-sectional study carried out over a period of one year on patients with RA meeting the ACR/EULAR 2010 criteria. Sociodemographic, clinical, biological and immunological data was collected. The immunological assessment included: rheumatoid factor (RF) and anti-citrullinated peptide antibodies (ACPA). The lipid profile included: a measurement of total cholesterol (TC), HDL, LDL and triglycerides (TG). Lipoproteins APOA1

and APOB were measured. All data was collected after patient consent.

**Results:** Fifty patients were included, with a sex ratio (M/F) of 0.3. The average age was 54 years old [31-76]. The RA evolved over 86 months [5-288]. Nine patients were smokers. Seven patients had comorbidities such as: hypertension (n=5), diabetes (n=5) and dyslipidemia (n=6). The mean systolic blood pressure was 122mmHg [100-160]. The average cholesterol level was 4.4mmol/l [1.2-7.58] with an HDL cholesterol level of 1.38mmol/l [0.18-4.1]. LDL level mean was 2.55±1.16 [0.24-5.54]. The mean TG value was 1.28±0.6 [0.24-5.54]. CT elevation was found in 9.1% of cases, HDL in 21.3% of cases, LDL in 5.5% of cases and TG in 16.4% of cases. The mean APOB/APOA1 was 0.67±0.18 [0.46-1.11]. Patients had positive RF and ACPA in 57.8% and 62.2% of cases; respectively. There was no association in our series between the presence of RF and lipid profile: TG(p=0.4), CT(p=0.3), HDL(p=0.8), LDL(p=0.7), APOA1 and APOB (p=0.3), on the other hand, positive ACPA were correlated with CT(p=0.02), LDL(p=0.04), APOA1(p=0.039) and APOB(p=0.033) but there was no association between ACPA and HDL.

**Conclusion:** We identified intriguing associations between immunopositivity and imbalance of lipid parameters, in particular with ACPA, suggesting the atherogenic role of these antibodies.

## P793

### TREATMENT OF DIAPHYSEAL PSEUDOARTHROSIS WITH OSTEOPOROSIS DUE TO DISUSE. BLOCKED NAIL PLUS EXTERNAL FIXATOR. INDICATIONS AND SYSTEM FAILURE

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**Objective:** A small sample of the indication of the combination of 2 implants is presented to give stability to some types of diaphyseal pseudoarthrosis, infected or not, accompanied by osteoporosis due to disuse. It teaches why it does not consolidate a fracture and what is the solution to this error, justifying the use of the 2 implants, their benefits and causes of failure of this method. Aim was to show the advantages of the blocked nail plus external fixative method with clinical cases. Indications and causes of failure.

**Results:** according to the type of pseudoarthrosis.

**Conclusion:** Why I have to use 2 implants when there is osteoporosis due to disuse?

P794

### THE THREE-YEAR EFFECT OF BIPHOSPHONATES ON BONE MINERAL DENSITY AFTER DENOSUMAB WITHDRAWAL: OBSERVATIONS FROM A REAL-WORLD STUDY

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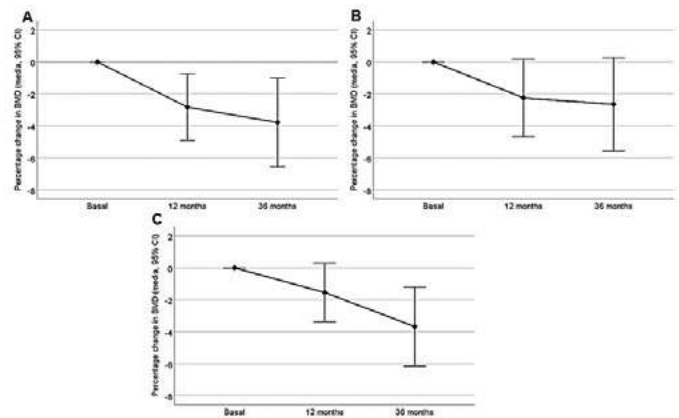
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**Objective:** To evaluate changes in BMD in a group of postmenopausal women who were treated with denosumab (Dmab) and who received subsequent treatment with bisphosphonates (BP). Secondary objectives: to evaluate prognostic factors of BMD loss, to compare BMD changes in patients who received oral vs. intravenous BP, and to assess the frequency of vertebral fractures (VFX) after Dmab discontinuation.

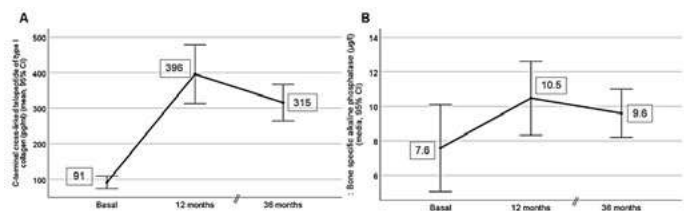
**Methods:** This is a retrospective study (January 2012-June 2021). Inclusion criteria: postmenopausal women treated with Dmab ( $\geq 2$  injections), who received subsequent treatment with BF within 12 months after Dmab withdrawal and had at least one follow-up visit with DXA 12-36 months after the initiation of BPs.

**Results:** The total cohort included 54 patients. Out of 26 patients with longer follow-up BMD decreased 2.8%, 1.9%, and 1.9% after 12 months and 3.7%, 2.5%, and 3.6% after 36 months, at lumbar spine (LS), femoral neck (FN), and total hip (TH), respectively. Regarding the total cohort, the BMD loss after 12 months was higher in patients with  $\geq 30$  months of Dmab treatment. This difference was only statistically significant at FN (-0.3 vs. -3.3%,  $p=0.252$  for LS, 0.3 vs. -3.3%,  $p=0.033$  for FN and 0.9 vs. -2.1%,  $p=0.091$  for TH). There were no statistically significant differences regarding changes in BMD at 12 and at 36 months in patients receiving oral vs. intravenous BF. Incidental VFX were seen in 7 patients, including 3 patients with multiple VFX, but none of these patients received adequate treatment due to non-adherence of the patient to their physicians' recommendations.

**Conclusion:** BFN seems to prevent total bone loss after Dmab withdrawal. BMD loss occurred mostly during the first 12 months. Shorter Dmab treatment duration was associated with less BMD loss at FN after withdrawal. Both oral and intravenous BF or a combination of both, seems to be effective. Future studies with a greater number of patients are needed for corroborate these data.



**Figure 1.** Changes in BMD pos-Dmab, 12 months and 36 months after Dmab withdrawal, at (A) lumbar spine, (B) femoral neck, and (C) total hip.



**Figure 2.** (A) C-terminal cross-linked telopeptide of type I collagen changes between basal, 12 and 36 months assessments. (B) Bone-specific alkaline phosphatase changes between basal, 12, and 36 months assessments.

P795

### CHILDREN WITH OSTEOGENESIS IMPERFECTA IN ARMENIA RECEIVE LIFE-CHANGING CARE FOR THE FIRST TIME: ZOLEDRONIC ACID SHOWS REMARKABLE RESULTS

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**Objective:** Osteogenesis Imperfecta (OI), commonly referred to as brittle bone disease, is a hereditary bone disorder that is present at birth. Children born with OI may experience a range of signs and symptoms, from fragile bones that fracture easily to abnormal bone formation and other related issues. Children with OI in Armenia have faced challenges not only with the clinical manifestations of the disease but also with their low quality of life and social integration. Our study aimed to evaluate the effectiveness and safety of zoledronic acid (ZA), a bisphosphonate primarily used for treating osteoporosis in adults, for treating mild osteogenesis imperfecta in children for the first time in Armenia.

**Methods:** We enrolled children diagnosed with OI for treatment and administered ZA via intravenous infusion over 30 min at a dose of 0.025-0.05 mg/kg every 3-4 months for a period of 1-2 years. To mitigate risks, patients were kept under observation for 24 h following dose administration to monitor any immediate side effects. We closely monitored the patients for changes in clinical and biochemical parameters, adverse effects, and fracture frequency during the whole follow-up period.

**Results:** The study involved 7 patients with osteogenesis imperfecta, aged 0.1-17 years, who had 74 fractures in total. During treatment, they had 9 new long-bone fractures. Over 2 years of treatment, their bone density improved and they experienced less pain and better mobility. The primary outcome was fracture rate, while secondary outcomes included BMD, pain, mobility, improved height SDS and adverse events, which were generally mild, with fever and flu-like symptoms being the most common.

**Conclusion:** ZA administered intravenously has proven to be an effective treatment option for children with osteogenesis imperfecta. Reduction in fracture rate and improvement in BMD, pain, and mobility is demonstrated. However, further studies are needed to determine the optimal dosing regimen, long-term safety, and efficacy of ZA in different subtypes of OI. According to this, the data of all, even the smallest studies, can be useful. We look forward to expand the ZA treatment options in other bone related disorders in pediatric patients.

## P796

### DOES THE CONSUMPTION OF OLIVE OIL PROTECT AGAINST ATHEROSCLEROSIS IN RHEUMATOID ARTHRITIS?

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**Objective:** Rheumatoid arthritis (RA) is the most common chronic inflammatory rheumatism. In recent years, an increasing number of studies suggested that diet has a pivotal role in the progression of RA and the protection against atherosclerosis, in particular, the Mediterranean diet rich in polyunsaturated fatty acids. The aim of this study is to assess the impact of consumption of olive oil on cardiovascular risk.

**Methods:** This is a cross-sectional study carried out over a period of one year on patients with RA meeting the ACR/EULAR 2010 criteria. Sociodemographic, clinical, biological and immunological data was collected. The cardiovascular risk was assessed by the FRAMINGHAM score (risk at 10 years). The risk is considered low if it is <10%, moderate between 10% and 19% and high if it is ≥20%.

**Results:** 50 patients were included, with a sex ratio (M/F) of 0.3. The average age was 54 years old [31-76]. The RA evolved over 86 months [5-288]. The mean number of painful joints was 7[0-28]. The average number of swollen joints was 3[0-21]. The median number of nocturnal awakenings was 1[0-10]. There mean morning stiffness was 29 min [0-240]. The overall condition of

the patient was 6 [0-10]. The average sedimentation rate was 37 mm/h [0-110]. The median DAS28vs was 4.64 [1.75-8.21]. The patients had rheumatoid factor (RF) and anti-citrullinated peptide antibodies (ACPA) positive in 57.8% and 62.2% of cases; respectively. The physical activity was performed in 29 patients. 94% of patients were receiving conventional disease-modifying drugs: csDMARDS (methotrexate: 94%, salazopyrine: 32%, leflunomide: 20%) and only 20% among them used biotherapies: bDMARDS (5 patients on etanercept, 2 patients on infliximab, 2 on certolizumab, 1 on adalimumab). Nine patients were smokers. Seven patients had comorbidities such as: high blood pressure (n=5), diabetes (n=5) and dyslipidemia (n=6). Mean systolic blood pressure was 122 mmHg[100-160]. The average cholesterol level was 4.4 mmol/l[1.2-7.58] with an HDL cholesterol level of 1.38 mmol/l[0.18-4.1]. Among these patients, 25 consumed olive oil at the rate of 100ml [0-500] per week. The FRAMINGHAM Cardiovascular Risk Score was 7.08% [0.6-29.3]. There was no association in our series between consumption of olive oil and the cardiovascular risk score (p=0.2).

**Conclusion:** In our series, we did not identify any association between consumption of olive oil and the cardiovascular risk suggesting that the diet does not protect against cardiovascular events in RA.

## P797

### HIGH PREVALENCE OF OSTEOPOROSIS ESTIMATED BY REMS IN HEALTH SERVICES USERS

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**Objective:** The Jalisco Health Services, through the Elderly Program, have implemented a model in gerontological care centered on the person, which includes gerontological assessment and gerontological interventions applicable to the older adult. Osteoporosis and the prevention of fragility fractures are one of the main pathologies to be addressed. It is crucial to estimate the magnitude of the problem to implement prevention programs and timely treatment adequately. For this purpose, and as part of the CTF program, the Bone Densitometry Program with REMS technology was established in First Level Care Units. We aimed to evaluate the prevalence of osteoporosis among users of the Elderly Program of the Jalisco Health Services OPD.

**Methods:** In November 2022, a REMS bone densitometry and fracture risk questionnaire were performed on all users of the osteoporosis detection pilot program of the Jalisco Health Services OPD's gerontological care services in the metropolitan area of Guadalajara.

**Results:** 169 women aged 50-84 years, average age 65.1 years,

SD 3.67, 93.5% postmenopausal, the fracture risk calculated by FRAX was 10.65 (3-27, SD 4.93) for major osteoporotic fracture, and 3.05 for hip fracture (0-15, SD 3.36), 11.8% and 36.6% of women exceeded the cutoff points of 20% and 3% for MOF and Hip Fracture, respectively. The prevalence of osteoporosis was 41.4% and 26% according to the assessment of the spine and hip, respectively, and 45.56% using both regions. 45 men aged 50-81 years, average age 66.5 years, SD 8.41, the fracture risk calculated by FRAX was 5.59 (2.6-20, SD 2.68) for major osteoporotic fracture, and 1.5 for hip fracture (0.1-9.3, SD 1.5), 2.22% and 8.89% of men exceeded the cutoff points of 20% and 3% for MOF and Hip Fracture, respectively. The prevalence of osteoporosis was 15.6% and 4.4% according to the assessment of the spine and hip, respectively, and 17.8% using both regions.

**Conclusion:** Our data reveal a high prevalence of osteoporosis estimated by REMS among health service users. These data will be helpful for the implementation of public health policies that will allow preventive actions, timely treatment, and follow-up to avoid fractures that affect the quality of life of the older adult.

## P798

### A RARE PRESENTATION OF CLINICALLY AND GENETICALLY DIAGNOSED MEDICAL CONDITION, HYPERPHOSPHATEMIC TUMORAL CALCINOSIS

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**Objective:** Tumoral calcinosis (TC) is a rare, debilitating condition that affects primarily children and youth, with a progressive behavior. It characterized by peri-articular deposition of calcium and phosphate particles, prominently around large joints. Etiology is not fully understood. Diagnosis clenched by unique clinical and radiological features. Treatment cardinally targets surgical removal of the masses and phosphate lowering therapy.

**Case report:** Our patient presented at age of 13, with 3 months history of progressive, non-tender left elbow and right hip swellings increasing as time progresses, restricting his movement, ending up with limping. His work up revealed an elevated serum phosphate and normal calcium level. A plane radiograph of the elbow and hip joints showed a cloud-like multilobulated calcified densities surrounding these joints. TC was suspected, genetic mutation was detected in GLANT3 gene. After the confirmation of the diagnosis, the patient was treated surgically and oral phosphate binder, sevelamer, was added. On subsequent follow-up visits, patient was doing well with improved phosphate level.

**Conclusion:** Our case is being reported due to the rarity of the illness and to share the last discussed treatment pathways.

## P799

### PRESENCE OF SCHMORL'S NODES AS A PREDICTOR OF BONE DENSITY CHANGES

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**Objective:** Schmorl's nodes (intervertebral disc herniation) are appeared as result of soft issues protrusion of intervertebral disc into adjacent vertebrae (up or down). Even they can appear in all levels of vertebral column, mostly are finding in the lumbar region. The incidence is from 38-76% of population. There are a lot of reasons for appearance of Schmorl's nodes and one of these is bones metabolic changes. We aimed to understand if the presence of Schmorl's nodes can be early predictor of bone metabolism changes and their relationship.

**Methods:** The criteria of including in the study were: patient presented at rheumatology clinic over a period of two years with low back pain. The patients did not refer any trauma or accidents. They had completed MRI and X-rays of vertebral column. Presence of Schmorl's nodes were identified in 420 patients (280 male and 140 female) confirmed by radiology specialist. Later, patients underwent DXA -scan examination to assess bone density in lumbar and coxofemoral region.

**Results:** The mean age of the patients was 52.3 and standard deviation 3.4 years old. Incidence of Schmorl's nodes during the study was in 48% of patients of the study. Mostly, the location was central. In 210 of patients (changes in bone density were identified as osteopenia (T-score >-1) and in 90 of them changes in bone density were identified as osteoporosis (T-score >-2.5). Analysis of data has shown a strong positive correlation between (osteopenia or osteoporosis in one hand and presence of Schmorl's nodes with 71% of cases).

**Conclusion:** Finding of Schmorl's nodes during imagery examination in rheumatology practice must follow with request for DXA examination to identify in time any metabolic changes in bone density and proper early treatment.

## P800

### MULTIMORBIDITY IS ASSOCIATED WITH A HIGHER RISK OF REHOSPITALIZATION 2 YEARS AFTER A FRAGILITY FRACTURE

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**Objective:** Readmission rates after a fragility fracture can be as high as 12-43% and they're a growing concern for the already overburdened health systems. Our aim was to evaluate risk factors of rehospitalization 2 years after a fragility fracture.

**Methods:** We conducted a retrospective study of patients admitted to our hospital with a fragility fracture between 2017-2020. Demographic, comorbidities, and clinical data were collected. Multimorbidity was defined as  $\geq 2$  chronic non-communicable diseases. Readmission was evaluated at 2 years. Logistic regression analysis was performed, and a p-value  $\leq 0.05$  was considered statistically significant.

**Results:** A total of 551 patients were included: 460 (83.5%) women, with  $80.8 \pm 8.9$  years. 185 (33.6%) patients were readmitted to our hospital within 2 years. Of these, 45.8% were due to infections, 18.4% to chronic disease decompensations and 15.5% to new fragility fractures. Patients who were rehospitalized were more likely to be older, male, have some grade of physical dependence and be institutionalized after the first fracture. They had a higher prevalence of comorbidities, such as neurologic conditions, chronic kidney disease, atrial fibrillation, cardiovascular risk factors and heart failure. Hemoglobin and vitamin D levels were lower in the rehospitalized group. On the other hand, patients who were evaluated in the fracture liaison service and begun anti-osteoporotic treatment were rehospitalized less often. Multimorbidity (OR 3.422 (1.508-7.768),  $p=0.003$ ) and impairment of mobility (OR 1.882 (1.018-3.479),  $p=0.044$ ) were found to independently influence the chance for readmission.

**Conclusion:** In our cohort, two-thirds of patients were rehospitalized 2 years after the fragility fracture. Male gender, multimorbidity, and impairment of mobility were higher in those patients. We observed a lower rehospitalization rate in patients managed in our FLS.

## P801

### THE IMPACT OF SGLT2-INHIBITORS ON FRACTURE INCIDENCE

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**Objective:** Patients with Diabetes Mellitus are at increased risk of fracture incidence. This fact has led to the investigation of the impact of antidiabetic agents on bone metabolism, especially regarding SGLT2-inhibitors. The latter agents are promising drugs in lowering blood glucose effects with pleiotropic actions such as beneficial effect on kidney and heart, although the impact on bone metabolism and the underlying mechanism is not yet clearly understood.

**Methods:** A systematic review of the literature conducted on data bases of PubMed, CENTRAL (Cochrane Central Register of Controlled Trials) and Google Scholar from October 2022 to January 2023, for articles related to Diabetes Mellitus, bone metabolism and SGLT2-inhibitors. Only papers in English were included and

experimental studies were excluded. Finally six randomized controlled trials (RCTs), three retrospective studies, one prospective and one meta-analyses were included in the present study.

**Results:** Studies which were included, showed a controversy on the impact on bone metabolism. Increased fracture incidence was showed only with ganagliflozin, although not in all studies. SGLT2-inhibitors are very effective class of anti-diabetic agents, achieving not only glycaemic control but with pleiotropic effects on metabolism, heart and kidneys.

**Conclusion:** Because of the controversy on the impact on bone metabolism they should be carefully prescribed in patients vulnerable to fractures. RCTs are further needed in order to highlight their influence on bone metabolism and to discriminate whether this is a class or drug effect.

## P802

### FLS IMPACT ON SECONDARY FRACTURE PREVENTION: EXPERIENCE OF A PORTUGUESE CENTER

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**Objective:** FLS have gained an increasingly important role in health systems. Some studies demonstrate a decrease in secondary fractures and in the economic burden associated with osteoporosis. Our aim was to evaluate the effect of FLS on secondary fracture risk and mortality in the 2 years after fragility fracture.

**Methods:** We conducted a retrospective study with patients aged  $\geq 50$  years, admitted to the orthopedics service after a fragility fracture, between 2017-2020, before and after the implementation of the FLS. Patients who were totally dependent prior to the fracture and who died during hospitalization were excluded. Secondary fractures and mortality were compared between groups using Cox regression model, adjusted for age and gender, and a p-value  $\leq 0.05$  was considered statistically significant.

**Results:** 551 patients were included: 349 and 202 evaluated pre and post FLS, respectively. Patients evaluated pre-FLS were older ( $80.90 \pm 6.42$  vs.  $78.01 \pm 9.65$ ,  $p < 0.001$ ) and more institutionalized (15.1 vs. 5.6%,  $p < 0.001$ ), but without differences regarding gender, autonomy and multimorbidity. In the group evaluated by FLS, there was a higher prescription of anti-osteoporotic treatment (8.3 vs. 84.5%,  $p < 0.001$ ), fewer institutionalizations (28.5 vs. 16.8%,  $p = 0.002$ ), fewer secondary fractures (20.9 vs. 8.4%,  $p < 0.001$ ), and lower mortality (28.9 vs. 13.6%,  $p < 0.001$ ) at 2 years. When adjusted for age and gender, FLS was associated with a lower risk of secondary fracture (HR 0.422 (0.179-0.996),  $p = 0.049$ ). However, it was not associated with a lower risk of mortality.

**Conclusion:** The implementation of FLS in our center allowed to increase the initiation of anti-osteoporotic treatment and prevent secondary fractures.

## P803

## THE CONTRIBUTION OF MEDICAL RECOVERY IN SECONDARY COMPLICATIONS OF COVID-19 INFECTION

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**Objective:** Although at the most people, COVID-19 manifests primarily as an acute respiratory infection, this pathology can have a varied clinical picture (from asymptomatic people to severe/complicated cases) affecting various organs and systems (respiratory, neurological, cardiac, locomotor, ocular, gastrointestinal, skin and others), with a strong impact on the functionality of the affected persons, that potentially generate various long-term disabilities.

**Case report:** This is a case of a 61-year-old patient who presents with sudden left hemiplegia on the 4<sup>th</sup> day of infectious disease-COVID-19. Following the imagistic investigations, the diagnosis of acute ischemic stroke is established in the territory of the right middle cerebral artery, as well as paroxysmal atrial fibrillation. The patient is treated by thrombolysis and the anticoagulant therapy is initiated. A week later, he presents with acute ischemia of the upper limb, with restoration of arterial flow by thromboembolectomy. In February 2022, he was admitted to the Techirghiol Balneary and Recovery Sanatorium for severe functional deficit (left hemiplegia) and mechanical pain in the shoulders bilaterally. The patient benefited from a multidisciplinary approach and physical-kinetic treatment accompanied by robotic systems to recover lost functions. The patient was evaluated both at admission and at discharge by functional scales such as the MIF scale, the ADL score, the Barthel scale, the VAS and the patient-specific functional scale, in order to be able to evaluate his performance acquired during hospitalization. The evolution during hospitalization was favorable, a fact supported by the improvement of the performance scale scores, but the long-term prognosis remains reserved.

**Conclusion:** Rehabilitation therapy in patients with stroke after infection with COVID-19 should represent an essential step in their basic treatment, from the earliest possible stage, to avoid the state of infirmity with immobilization in bed and inability of self-care.

## P804

## MANAGEMENT OF OSTEOARTHRITIS AND JOINT PROBLEMS IN SEMI-RURAL INDIA

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This is a retrospective presentation of patients who were treated

under the author's care in Eastern India over a period of 13 years. The aim of this study was to identify and address the difficulties faced by the patients in accessing appropriate care and the obstacles in educating and treating patients with osteoarthritis and other joint related problems, then obtaining their consent for surgery. During a period of approximately 13 years from July 2009 to January 2023, over 2100 patients were assessed and counselled for various joint related problems. 191 patients underwent total knee replacement, 6 patients required total hip replacement. 39 patients underwent arthroscopy of the knee joint. 4 patients required removal of metal work from previous surgery due to post-operative complications and further treatment. The others were managed non-operatively. Follow-up was difficult due to communications and commuting from rural areas. There was one case of post-operative superficial wound dehiscence. One patient underwent revision of Total knee replacement due to post-traumatic quadriceps tendon rupture. Torniquet related thigh pain and blisters developed in two patients after knee replacement. There were no arthroplasty cases of deep infections or loosening of prostheses, so far.

## P805

## PATIENT FRACTURE RISK DECISION POINT: CLINICAL &amp; DEMOGRAPHIC FACTORS

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**Objective:** Treatment thresholds based on fracture risk algorithms are country-specific and used by health care providers to inform decisions about initiating treatment. However, a patient's fracture risk decision point (FRDP)—the lowest level of fracture risk at which one would choose to initiate an osteoporosis medication—may differ from country-specific treatment thresholds. This study aims to understand patients' willingness to initiate treatment based on their perception of fracture risk—in terms of FRAX<sup>®</sup> score—and demographic and clinical factors, such as fracture history and medication use.

**Methods:** In 2022-2023, 332 postmenopausal women with osteoporosis were interviewed from eleven sites in nine different countries to determine each individual's FRDP. 50.3% of participants were taking an osteoporosis medication at the time of the interview. Participants were presented with eight hypothetical scenarios with increasing risk of major osteoporotic fracture over a 10-year period and were shown how each risk scenario could be mitigated by administering medication. They were then asked whether they would be willing to start an osteoporosis medication. Participants were stratified based on age, place of origin, level of education, use of prescription osteoporosis medication, and fracture history.

**Results:** Median FRDP at each site ranged from 5-20% and was



below the country-specific treatment threshold in ten of eleven sites. Patients taking an osteoporosis medication demonstrated a significantly lower median FRDP (5%) than those who were not (15%). However, age and history of fracture did not influence FRDP significantly.

**Conclusion:** Willingness to pursue osteoporosis medication as measured by FRDP often falls below country-specific treatment threshold and was not influenced significantly by age or history of fracture but was impacted by education and current use of osteoporosis medication.

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## P806

### VALUE OF METABOLIC RADIOTHERAPY IN RHEUMATOLOGY

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**Objective:** Metabolic radiotherapy is the injection of radionuclides into the bloodstream, which can target bone metastases. It is one of the therapeutic alternatives for analgesic treatment. We report the case of a patient with bone metastases refractory to grade 3 analgesics who has benefited from this treatment.

**Case report:** A 65-year-old female, with a history of arterial hypertension, was hospitalized for a severe inflammatory right L5 lumbosacralgia (pain scale of a 9/10) with altered general state. The standard radiographs had shown vertebral compression fractures with multiple geodic lesions in the pelvis. Scintigraphy revealed diffuse hyperfixation. The vertebral biopsy had concluded to bone metastases of a breast cancer. High doses of morphine did not relieve the patient's pain, hence the decision to initiate treatment with Quadramet. The evolution was marked by a decrease in pain (Pain scale of a 2/10).

**Conclusion:** Metabolic radiotherapy is used to reduce pain secondary to bone metastases, with or without the use of analgesic drugs. The radioactive substances currently used are Metastron, Quadramet and Alpharadin. The results of studies on the cost/effectiveness ratio of this type of treatment are promising and the impact on patients' quality of life has been demonstrated. Metabolic radiotherapy is nowadays a therapeutic progress in the management of pain. Nevertheless, despite a high success rate in certain cancers, these treatments have side effects that need to be monitored.

## P807

### VALUE OF ASSESSING PLATELET PARAMETERS IN RHEUMATOID ARTHRITIS ACTIVITY: MEAN PLATELET VOLUME AND PLATELET/LYMPHOCYTE RATIO

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**Objective:** Several markers of inflammation are used to assess disease activity in Rheumatoid arthritis (RA) including erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP). Our study aimed to determine the role of platelet activity assessment in distinguishing patients with active disease.

**Methods:** We conducted a cross-sectional study of patients followed for RA meeting the ACR 1987 and/or ACR-EULAR 2010 criteria. We collected clinical data and assessed disease activity using the DAS 28. CRP and ESR measurements were performed as well as a complete blood count (CBC). For each patient, the mean platelet volume (MPV) was specified and the platelet to lymphocyte ratio (PLR) was calculated.

**Results:** Our study included 70 patients with a mean age of 54.7±13.6 years [19-82]. The majority were women (82.9%) with a sex ratio M/F=0.2. The mean duration of disease progression was 10.1 years± 9.9. The mean DAS 28 vs. was 5.38±1.48. Thirty-nine patients or 55.7% of cases had high disease activity. The mean ESR was 59 mmH1± 35 [12-150] and the mean CRP was 30.3 mg/l±28.6 [0-159]. An anemia of inflammation was observed in 43.3% of cases. Lymphopenia was observed in 28.6% of cases. The mean platelet count was 332071 elements/mm<sup>3</sup>±106728. Thrombocytopenia was found in 2.8% of patients. The mean platelet volume was 10.61±1.56 [7.1-12.9]. The PLR was 193.34 ±151.11 [61.25-301]. Statistical analysis showed a correlation between high disease activity (DAS28 vs. >5.1) and platelet count (p=0.03) and mean platelet volume (MPV) (p=0.009). On the other hand, there was not a significant association between PLR, DAS 28 vs. (p=0.06) and DAS28 CRP (p=0.08).

**Conclusion:** Our study showed that MPV was positively correlated with high RA activity. Currently, more and more studies are interested in determining the value of PLR and MPV. However, their results remain controversial. Hence, more work is needed to show the role of platelet activity assessment as a marker of inflammation indicating active disease.

## P808

### FEATURES OF SCIATICA PAIN IN OLDER ADULTS

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**Objective:** The common sciatica is a pathology of the young adult, not very frequent after the 6th decade where the arthrosis lesions and the spinal stenosis are preponderant. The aim of our work is to study the epidemiological, clinical, radiological features and evolution of sciatica in the older patients.

**Methods:** This is a retrospective study of 39 patients aged over 65 years hospitalized in the rheumatology Dept. of Mahdia for the management of a common sciatica.

**Results:** There were 6 men and 33 women. The average age was 73.2 years. Among our patients 66.6% had arterial hypertension and 30.7% had diabetes mellitus. A triggering factor was found in only 5.1% of cases. The pain was mechanical in 66.6% of cases, mixed in 30.7% of cases and inflammatory in 2.5% of cases. The sciatica was L5 in 66% and S1 in 20.5% of cases. The involvement

was bilateral in 58.9% of cases. Intermittent radicular claudication was found in 46.1% of cases. Standard radiography showed a disc pinch in 71.7%, posterior interapophyseal osteoarthritis (23%), spondylolisthesis in 41% of cases. Bone demineralization was present in 28.2% of cases. Nineteen patients underwent second-line radiological exploration (CT and/or MRI), which revealed a degenerative narrow lumbar canal in 38.4% of cases and a herniated disc in 15.3%. In addition to symptomatic treatment, 76.9% of patients received epidural infiltrations. None of our patients had surgical treatment. The short-term evolution was considered good in 66.6% of cases.

**Conclusion:** Sciatica in the elderly is particular because of the bilaterality of the path, the rarity of a triggering factor and the frequency of radicular claudication. Second-line radiological exploration allows to eliminate a secondary cause and to specify the mechanism of the sciatica. Therapeutic management is the same as for adult common sciatica with satisfactory results.

## P809

### BONE DENSITY MONITORING REMAINS SUBOPTIMAL IN PRIMARY HYPERPARATHYROIDISM PATIENTS FOLLOWING PARATHYROIDECTOMY SURGERY

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**Objective:** National Institute of Clinical Excellence (NICE) UK guideline recommends 2-3 yearly DXA assessments in primary hyperparathyroidism (PHPT). To assess the level of adherence of BMD monitoring, who underwent elective parathyroidectomy against NICE guideline.

**Methods:** Retrospective electronic records' review of histopathology database between April 2010 and December 2020 identified PHPT patients who underwent parathyroidectomy and had a confirmed parathyroid adenoma on histology. Evaluation was done of their (i)pre-operative DXA (ii)post-operative DXA, (iii)albumin-adjusted calcium.

**Results:** n=256 patients (mean-age 54 years at diagnosis; 181F:75M), mean pre-op adjusted calcium of 2.92 mmol/L reduced to 2.30 post-operatively; 8(3%) uncured. 94/256 (36%) had DXA scans; 48 (18%) (40F:8M) had post-op DXA; 22 (8%) having both pre- and post-op DXA and 7 patients had 2 follow up DXA scans after surgery but none before. 40% of females had any kind of DXA scan compared to 27% of males. Of those in pre- and post-op DXA group, following an average of 4.3 years between initial and latest scan, mean T-scores improved at neck of femur from -2.32 to -1.77 (BMD +2.3%/year). T-scores also improved at spine and at left total hip from -1.49 to -1.15 (BMD +1.06%/year) and from -2.1 to -1.55 (BMD +2.06%/year) respectively. Of the 48 with latest post-op DXA scans, 50% remained osteoporotic, 15% were borderline osteoporosis, and 27% were osteopaenic whilst the

rest were normal. Only 42% of scans included distal radius which is a preferred site in PHPT.

**Conclusion:** 81% patients did not undergo post-operative DXA despite 82% being either osteopaenic or osteoporotic at DXA diagnosis. Less men were offered DXA assessment compared to women. Assessment of BMD and osteoporosis treatment remained suboptimal in PHPT. We intend to address all this with a quality improvement project to be taken prospectively following this audit.

A public health message that post-operative bone health assessment remains suboptimal in PHPT patients post parathyroidectomy.

Patients remain at risk of fragility fracture post-operatively, pending full recovery in BMD.

Patient education, prevention/treatment of osteoporosis, mandatory DXA evaluation is recommended as part of post-surgical follow up.

## P810

### OSTEOPOROSIS AND BONE METABOLISM IN SYSTEMIC SCLEROSIS

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**Objective:** The relationship between systemic sclerosis (SSc) and low BMD is poorly understood but it has been associated with bone loss and increased risk for bone fractures. Disease-related factors, age, corticosteroid therapy may be associated with increased bone turnover and bone loss. We performed a transversal, descriptive, observational study on osteoporosis (OP) in SSc.

**Methods:** We performed an observational study involving patients fulfilling ACR/EULAR 2013 SSc classification criteria followed prospectively in a Rheumatology Unit, in Portugal, between 2011 and 2022. We used the database retrospectively collecting SSc related variables including clinical phenotype, organ involvement, autoantibodies (ANA, ACA and anti-Scl70) and biological parameters. Bone health parameters were added including DXA, history of fragility fractures and anti-osteoporotic treatment. OP was defined by a femoral or lumbar spine T-score below -2.5 and/or history of main osteoporotic fracture and/or prescription of anti-osteoporotic drugs.

**Results:** Altogether 25 SSc patients (22 women, 3 men; age: 61.1 years; disease duration: 5.7 years) were included. Regarding disease-modifying antirheumatic drugs, only 10 patients (40%) were undertreatment: methotrexate (12%, n=3); hydroxychloroquine (24%, n=6); azathioprine (4%, n=1). Four patients (16%) were smokers. Vitamin D levels were lower (15.45ng/ml) than the normal range (>30 ng/ml) (n=21 patients): 7 had very low levels <10 ng/ml), 8 moderate low levels (<20 ng/ml), 4 low levels (<30 ng/ml). Fifteen patients (60%) have been exposed to oral glucocorticoids for more than 3 months at a dose of prednisolone of <10 mg daily (2.5-10 mg). Bone density was assessed by DXA at

the lumbar spine and femoral neck only in 14 patients (56%). In these, 4 (28.75%) had OP; other 4 (28.57%) had osteopenia and 6 (42.57%) were normal. Only 3 (21.4%) patients were under anti-osteoporosis treatment. 14 patients (56%) were under supplementation with vitamin D, and 7 (28%) simultaneously with calcium plus vitamin D. One patient had previous low impact fracture. **Conclusion:** A low proportion of SSc patients in this observational study seems to have osteoporosis, but instead the majority presented low vitamin D levels. In other studies, low BMD and fracture are frequently seen in SSc patients and a number of clinically relevant factors are associated with low BMD. Further research is needed to evaluate these factors and the role of bone-specific treatments in SSc.

**P811**  
**THE EFFECT OF ANTIRESORPTIVE ON BONE LOSS AFTER HIP ARTHROPLASTY: A LITERATURE REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS**

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**Objective:** There is increasing interest in evaluating and addressing bone quality in patients undergoing arthroplasty. A new term, "bone optimization," has been created to identify and correct metabolic deficits and treat structural deficiencies of the skeleton. As part of the Joint Position Statement on the diagnosis of osteoporosis and perioperative bone optimization in candidates for arthroplasty, a review of available literature was conducted in three relevant areas for the Joint Statement. These areas include the evolution of BMD after arthroplasty, the effect of anabolic and antiresorptive bone medications on the evolution of periprosthetic bone after arthroplasty, and the effect of anabolic and antiresorptive bone medications on the rate of non-septic complications related to arthroplasty.

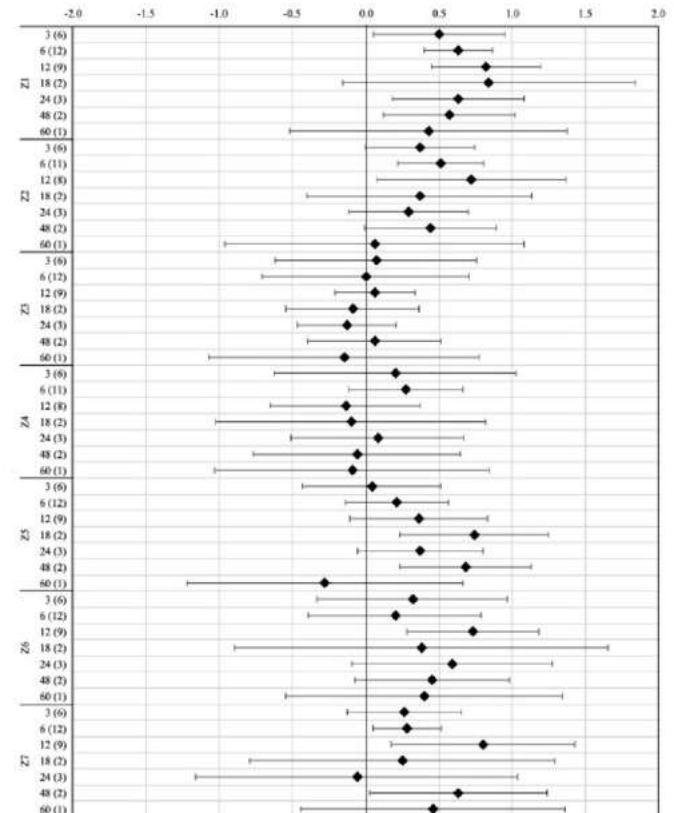
**Methods:** Initial searches in August 2022 involved a classic search in the databases PubMed, Scopus, Web of Science, and ScienceDirect. After selecting the studies, review and meta-analysis articles were retrieved and contrasted against selected clinical trials to cross-validate the selection. An additional search was conducted to detect possible related studies that did not appear in the classic search using the review and meta-analysis articles rescued from the initial examination. Included studies should

have at least two measurements of periprosthetic BMD. A random-effects meta-analysis was performed using the DerSimonian and Laird approach.

**Results:** After full-text examination, the meta-analysis included 24 studies enrolling 554 adult patients undergoing elective total hip arthroplasty surgery and following up for at least 24 months with at least two BMD of periprosthetic bone DXA examinations and antiresorptive and bone formers application after the surgical procedure. BMD in Gruen zones 1 and 7 decreased during the 24 months following hip arthroplasty. The size of the effect is represented in Figure 1. Spine and hip BMD are not reported in most of the studies, Gruen BMD is not consistently reported in all cases, and in some cases, only the percentage of change is noted, even without data on baseline BMD.

**Conclusion:** Patients undergoing hip arthroplasty show a decrease in BMD in Gruen zones 1 and 7 during the 24 months following hip arthroplasty. The use of antiresorptive drugs appears to attenuate this loss. Not all studies provide detailed information about baseline BMD, follow-up BMD measurements, and other important factors for assessing bone health after hip arthroplasty. Therefore, further research is needed to understand the effects of hip arthroplasty on bone health and to develop effective strategies for preventing bone loss and reducing the risk of complications after surgery.

Figure 1. Average random effect sizes (DerSimonian and Laird, 1986) by Gruen zone, months, and number of studies included.



P812

### CHRONIC RHEUMATOID INFLAMMATION POTENTIATES THE DEVELOPMENT OF RENAL DYSFUNCTION: THE ROLE OF ANGIOPOIETIN-LIKE PROTEINS

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**Objective:** To evaluate the association of serum concentrations of angiotensin-like proteins (ANGPTL) with the development of renal dysfunction in rheumatoid arthritis (RA) patients.

**Methods:** We examined 158 patients with RA (women 91.8%; mean duration of disease: 9 [4;15] years; moderate disease activity: 58.2%). ELISA was used to study serum concentrations of ANGPTL types 3, 4, 6 and 8. All patients were calculated glomerular filtration rate (GFR) according to CKD-EPI formula (2009). The presence of metabolic syndrome (MS) in RA patients was established using National Cholesterol Education Program (NCEP/ATPIII 2004) and International Diabetes Federation (IDF) criteria. **Results:** The study of the joint effect of MS and renal dysfunction on the ANGPTL content of different types demonstrated that the presence of MS had a significant impact on ANGPTL4 and ANGPTL8 parameters in the groups of RA patients with different GFR. There was a significant increase in ANGPTL4 and ANGPTL8 in the serum of RA patients with decreased GFR ( $p < 0.001$  and  $p = 0.021$ , respectively) and marked metabolic changes ( $p < 0.001$  and  $p = 0.013$ , respectively). The square of the multiple correlation coefficient ( $R^2$ ) in the model involving ANGPTL4 was 0.33, in the model involving ANGPTL8 – 0.31.

**Conclusion:** ANGPTL types 4 and 8 can be considered as potential markers of the correlation between renal dysfunction and metabolic changes caused by rheumatoid inflammation.

P813

### PECULIARITIES OF THE DEVELOPMENT OF LOW-ENERGY FRACTURES IN THE LUMBAR SPINE IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To evaluate patterns of new low-energy fractures in the lumbar spine in patients with rheumatoid arthritis (RA).

**Methods:** 86 RA patients took part in the study. All patients underwent DXA at the admission for treatment and after 24 months of observation. The state of BMD was assessed using the T-criterion (Lunar DPX, GE, USA). An ELISA was used to determine serum angiotensin-like protein type 4 (ANGPTL4).

**Results:** ANGPTL4 values in RA patients correlated with the Sharp's radiological change score ( $\rho = 0.39$ ), the number of low-energy fractures in the lumbar spine at baseline ( $\rho = 0.32$ ) and after 24 months of follow-up ( $\rho = 0.51$ ). There was a close association of ANGPTL4 with the BMD index at the L1-4 level ( $r = -0.37$ ). 15% of RA patients had lumbar spinal fractures prior to the start of the study (according to anamnestic data). During the two years of follow-up, new vertebral fractures were reported in 16 (21.9%) patients without previous fractures and in 7 (53.8%) patients with a history of fractures ( $p = 0.036$ ). When RA patients initially had high levels of ANGPTL4 ( $> 6.8$  ng/mL;  $> 3SD$  from healthy individuals), osteoporotic fractures in the spine according to DXA were observed in a higher percentage of subsequent cases (66.7 vs. 12.7%;  $p < 0.001$ ).

**Conclusion:** RA patients with baseline lumbar spine fractures and high serum ANGPTL4 values are at high risk of low-energy fractures at follow-up.

P814

### CLINICAL CASE OF COMBINATION OF PAGET'S DISEASE AND NON-SPECIFIC SPONDYLODISCITIS

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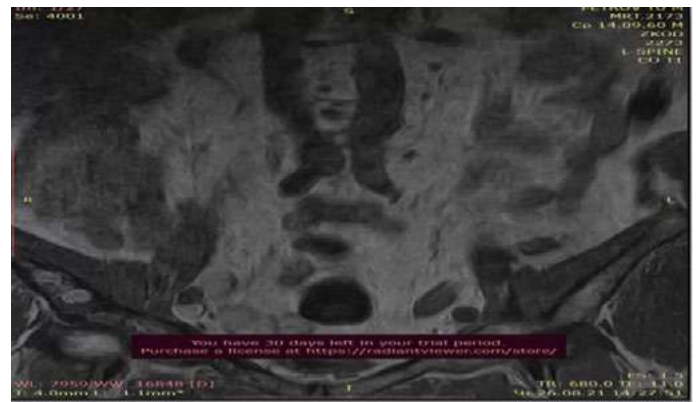
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**Objective:** Paget's disease is a chronic local bone disease that belongs to the group of metabolic osteopathies. It is characterized by restructuring of bone tissue, during which the initially developing resorption is replaced by excessive chaotic and defective bone formation. Foci of restructuring are noted in one or more bones, may increase and lead to deformation of the skeleton. We aimed to demonstrate a clinical case of the combination of Paget's disease and non-specific spondylodiscitis.

**Case report:** Patient P, 61 years old, fell ill in March 2021, when, after hypothermia, he was complaining of pain in the lumbosacral spine radiating to the gluteal regions, pain in the hip joints, an increase in body temperature to 39 C, and weakness. Initially, he went to a general practitioner, the patient was prescribed NSAIDs, which were not effective. The patient was referred to the hospital to clarify the diagnosis. Computed tomography of the abdominal

cavity revealed multiple areas of bone tissue destruction in the L2 body with a transition to the caudal endplate, in the bodies of all sacral vertebrae and their lateral masses, mainly on the right. Heterogeneous structure of the right iliac bone due to the presence of multiple sites of destruction. Single site of destruction in the left ilium up to 9 mm with uneven fuzzy contours. These bone changes were regarded as metastatic foci. Bone scanning revealed pathological lesions in L2, sacrum, and right iliac bone. On April 24, 2021, the patient underwent MRI of the lumbar spine. MRI also revealed rounded and irregularly shaped areas ranging in size from 8 mm to 12 mm in L2, L5, S1, lateral masses of the sacral vertebrae. MRI also revealed rounded and irregularly shaped areas ranging in size from 8 mm to 12 mm in L2, L5, S1, lateral masses of the sacral vertebrae. It was also found that in the soft tissues at the level of the transverse processes L4-5 on the right, an irregularly shaped area with a homogeneous structure with an approximate size of 10-13-92 mm (cyst?) is determined, there is soft tissue edema at this level with a length of 10cm \* 25cm. The patient was consulted by an oncologist. The changes found in the bones were interpreted as metastases without a primary focus. Oncologists recommended a histological examination of the found bone changes. On July 10, 2021, the patient underwent MSCT of the lumbar and sacral spine. For the first time, the nature of bone changes was established, namely, the polyostotic form of Paget's disease. And also revealed spondylodiscitis segment L2-3. In August 2021, patient P. was consulted at the NMITSO. N.N. Blokhin, where the diagnosis was confirmed: Spondylodiscitis (nonspecific) in the L2-L3 segment with the presence of an abscess in the central parts of the vertebral bodies and a paravertebral abscess in the thickness of the proximal part of the right lumbar muscle. Paget's disease affecting the entire right pelvic bone and sacrum. However, despite the established diagnosis, the patient did not receive treatment until he was admitted to the railway hospital. He was admitted with complaints of persistent fever up to 39°C, weight loss by 20 kg during the illness and severe pain in the lumbosacral spine, hip joints with irradiation to the gluteal muscles. A laboratory study revealed a decrease in hemoglobin to 96 g/l, an acceleration of ESR to 58 mm/h, an increase in the level of C-reactive protein to 43 g/l. The patient was prescribed treatment with three antibacterial drugs (sulbactam, cefoperazon, levofloxacin), analgesic, detoxification therapy and zoledronic acid. On the 6th day of treatment, the patient began to feel better, the pain syndrome decreased, the temperature returned to normal. He was discharged in a satisfactory condition, with improvement, with recommendations for constant monitoring by a rheumatologist and a neurosurgeon.

**Conclusion:** This clinical case demonstrates the complexity of diagnosing the combination of Paget's disease and nonspecific spondylodiscitis using modern imaging methods of research due to the rarity of both diseases. Difficulties in diagnosis, in our opinion, are associated with the rarity of the pathology and the lack of alertness of doctors regarding Paget's disease.



P815

### CLINICAL FEATURES OF PATIENT WITH RHUPUS SYNDROME

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**Objective:** Autoimmune diseases are dynamic and can evolve. A concomitant presence of two autoimmune diseases – systemic lupus erythematosus (SLE) and rheumatoid arthritis (RA) – in the same patient is known as Rhupus. The frequent debut of rheumatic diseases is development of polyarthritis, it is necessary to remember the possibility of developing systemic autoimmune diseases by regularly monitoring relevant immunological markers. We aimed to present a clinical case with a description of a patient with Rhupus, to study the features of clinical symptoms, to analyze the correspondence of instrumental data to objective signs of the course of this disease.

**Methods:** Patient P, 34 years old, was admitted to the clinic in January 2021 with complaints of general weakness, hair loss, rashes on the face, fever in the evening up to 37°C, symmetrical arthritis, morning stiffness for an hour, discoloration of finger skins. From the anamnesis it is known that: a missed pregnancy (for a period of 10 weeks) in 2013, thrombocytopenia (up to  $5 \cdot 10^9 / l$ ) was detected in 2016, and a fracture of the femoral neck on the right followed by osteosynthesis in 2017. There are erythematous rashes on the face, two-phase Raynaud's phenomenon, palmar capillaries, and lymphadenopathies on internal organs within normal. Also pronounced vascular pattern on the skin of the lower extremities by the type of livedo-vasculitis was observed. There is swelling and pain in the joints (DAS28-5,75) Photo1. Also we would like to note a swan neck deformity of the hand joints and valgus deformity of the first metatarsophalangeal joints of both feet. Complete blood count (CBC) tests revealed: three-pronged cytopenia and high immunological activity (i.e., hypocomplementemia, antinuclear antibody (ANA), anti-dsDNA, anti-Sm, anti-Ro/La and anti-RNP, anti-CCP, rheumatoid factor (RF), antiphospholipid antibodies (aPL; anticardiolipin antibodies (aCL), lupus anticoagu-

lant (LA) and anti-beta2 glycoprotein I (anti-b2GPI)). Radiography examinations of the hands and wrist joints, (Photo 2) metatarsus and phalanges of the feet revealed signs of chronic erosive arthritis stage III, osteopenia according to densitometry. Ophthalmologist's examination showed OU-complicated posterior capsular cataract. We estimated Disease Activity Index (SLEDAI-2K) and Disease Activity Score 28 Joint (DAS-28) for RA before the assigned therapy. The patient was prescribed: methylprednisolone 16 mg/d, mycophenolate mofetil 1500 mg/d, hydroxychloroquine 200 mg/d, Rituximab 1000 mg IV.

**Results:** Against the background of the therapy, there is a positive trend in the form of: improvement in the general condition and a decrease in the severity of the articular syndrome. At the control examinations after 3 and 6 months of this therapy, a minimal disease activity was achieved. Arthritis was stopped, morning stiffness did not bother, the level of ESR, platelets, leukocytes returned to normal, the immunological activity of the disease decreased, DAS-28 - 2,34, SLEDAI-2K - 6. After 6 months of the therapy by a rheumatologist at the place of residence, the dose of oral corticosteroids was reduced from 8 mg to 4 mg/d; no exacerbation of the disease was observed. Thus, the ongoing therapy during the year allowed to reduce the intake of corticosteroids and achieve remission of the disease.

**Conclusion:** the clinical observation supports the idea that co-existence of SLE and RA has a distinct clinical course in which the signs and symptoms of RA predominate, with the activity and presence of organic lesions associated with SLE.

**Figure 1.** Arms of Patient P, 34 years old



P816

### TREATING SYSTEMIC LUPUS ERYTHEMATOSUS IN THE 21ST CENTURY: COMBINING RITUXIMAB WITH BELIMUMAB

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**Objective:** Efficacy of combination therapy with rituximab and belimumab in patients with systemic lupus erythematosus.

**Methods:** The study included 15 SLE pts (1M/14F) criteria with high (SLEDAI2K $\geq$ 10 - 12pts.) and moderate (SLEDAI2K<10 - 3pts.) disease activity; out of them 4 patients had lupus nephritis, 2- vasculitis. 1 pts had kidney damage, cerebrovasculitis and vasculitis. All patients fulfilled the Systemic Lupus Erythematosus International Collaborating Clinics (SLICC) disease classification criteria [1] for SLE Others have predominantly mucocutaneous and articular manifestations of SLE. The dose of oral glucocorticoids (GC) was: 60 mg in one patient with vasculitis, LN, cerebrovasculitis, and one patient with vasculitis received 20 mg of prednisone; in 11 patients from 10 to 5 mg; in 2 patients without oral glucocorticoids. All patients with SLE with kidney damage and vasculitis received mycophenolate mofetil or cyclophosphamide. Rituximab (RTM) was administered at a dose of 500-2000 mg, followed by the addition of belimumab (BLM) after 1-6 months at a standard dose of 10 mg/kg once a month - a total of 7 infusions. The following parameters were evaluated: the effectiveness of therapy, the concentration of autoantibodies, the dose of oral corticosteroids initially at the time of RTM administration and then every 3 months after the initiation of BLM therapy.

**Results:** 13 pts demonstrated the decrease in clinical and labora-

tory SLE activity, starting from 3 mo of follow-up. After the start of BLM infusions, a decrease in SLE activity was observed in all patients. Among them, 10 had SLEDAI-2K activity of <4 points. SLEDAI-2k Me 10 [10;16], after treatment of RTM and BLM 4 [2;6]. Only one patient (№4) had an relapse of SLE, due to the delay in receiving the infusion of BLM. He was receiving standard GC doses. In dynamics, a decrease anti-double DNA titres (Me 101 [36;200] vs. 28 [8;67] U/ml), C3 (0,49 [0,42;0,78] vs. 0,71 [0,59;0,87] g/l), C4 (0,06 [0,045;0,1] vs. 0,12 [0,07;0,14] g/l) was registered. The GC dose was reduced in most patients (Table 1), but the previously prescribed immunosuppressive therapy continued. There were no cases of severe infection. We have not detected any new organ damage

**Table 1.** Dose of oral glucocorticoids, mg

№ patient	Before RTM, mg	1st injection of BLM, mg	7th injection of BLM, mg	
1	20 mg	20 mg	15 mg	↓
2	7,5 mg	5 mg	5 mg	↓
3	5 mg	5 mg	5 mg	=
4	10 mg	10 mg	10 mg	=
5	5 mg	5 mg	5 mg	=
6	60 mg	7,5 mg	2,5 mg	↓↓↓
7	10 mg	2,5 mg	0 mg	↓↓↓
8	10 mg	10 mg	5 mg	↓
9	2,5 mg	2,5 mg	2,5 mg	=
10	10 mg	10 mg	5 mg	↓
11	0 mg	0 mg	0 mg	=
12	0 mg	0 mg	0 mg	=
13	15	15	10	↓
14	15	5	3,75	↓↓
15	20	10	10	↓

**Conclusion:** Combination therapy allows to gain control over disease activity in short time, due to the effect of RTM, while added BLM provides further prolongation of the effect achieved, minimizing the risk of flare. The use of such therapy contributes to a rapid and effective reduction in the activity of the disease, improvement of laboratory markers of SLE (at to ds-DNA, C3, C4), the use of lower doses of oral GCs. This combination may be used as a method of choice in pts with severe SLE involving vital organs, and in persistent cutaneous-articular disease and high immunological activity.

**Reference:** 1. Petri M et al. Arthritis Rheum 2012;64:2677

## P817

### SLE WITH SECONDARY SJÖGREN SYNDROME AS ONE OF ENDOTYPE

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**Objective:** Among the various endotypes, childhood-onset SLE (cSLE), organ-dominant SLE (dermatologic, musculoskeletal - so called 'rhusus', renal, neurological, haematologic), lupus with antiphospholipid syndrome (APS) and Sjögren's syndrome (SS) have received more attention due to differences in prognosis and treatment [1]. We aimed to compare clinical, laboratory and immunological parameters, variants of the onset and course of the disease, ongoing therapy in SLE patients and SLE patients with secondary Sjögren syndrome (SLE-sSS).

**Methods:** 400 SLE patients who fulfilled the Systemic Lupus Erythematosus International Collaborating Clinics (SLICC) disease classification criteria [1] were included into the study. The SLE-DAI 2K index activity, SLICC damage index were assessed. 44 patients of them had a symptoms of dry syndrome and underwent a mandatory ophthalmological and dental additional examination to identify it. According to the results of the studies, chronic parenchymal parotitis was diagnosed in 40 (90%) patients with SLE with suspected concomitant Sjögren's syndrome, keratoconjunctivitis sicca in 24 (55%) patients. The combination of lesions of the salivary glands and eyes was observed in 20 (45%) patients, isolated lesions of the salivary glands - in 20 (45%), isolated lesions of the eyes occurred in 4 (10%) patients. 44 pts of 400 had a secondary SS according ACR-EULAR criteria [2].

**Results:** When conducting a comparative study of patients with SLE with the presence (n =44) and absence (n =356) of SS, it was found that SLE patients with SS had polyarthritis more often (44% vs. 23%, p=0.01) and Raynaud's syndrome (in 22 vs. 6%, p<0.003). Among the clinical manifestations in patients with SLE in combination with Sjögren's syndrome, subacute cutaneous lupus erythematosus was more often detected (in 8 [18%] vs. 4 [1%], OR=19.5; 95%CI 5.61–68.1; p=0.0001), Raynaud's syndrome (18 [40%] vs. 48 [14%], OR=8.25; 95%CI 3.85–17.6; p=0.0001), damage to the peripheral nervous system in the form of sensory or sensory-motor polyneuropathy (in 9 [20%] vs. 10 [3%], OR=8.79; 95%CI 3.35–23.1; p=0.0001), development of interstitial pneumonitis (in 6 [13%] vs. 17 [5%], OR=3.15; 95%CI 1.17–8.47; p=0.03) in contrast to patients without SS. Among laboratory abnormalities in patients with SLE in combination with SS, leukopenia was more often observed (in 31 [70%] vs. 144 [40%], OR=3.51; 95%CI 1.78–6.94; p=0.0001), SS-A/Ro (41 [93%] vs. 13 [4%], OR=312.5; 95%CI 86.7–1125.3; p=0.0001), SS-B/La (in 15 (35%) vs. 11 (3%), OR=16.1; 95%CI 6.79–38.3; p=0.0001) and rheumatoid factor (in 12 [27%] vs. 7 [2%], OR=18.4, 95%CI 6.80–50.2, p<0.0001). 32 (72%) vs. 174 (49%) treated with lower doses of glucocorticoids (24.52±21.35 mg/d vs. 33.34±22.02 mg/d, p=0.01), rituximab was used more frequently (22 [50%] vs. 114 [32%], p=0.01).

**Conclusion:** Thus, the results of the study confirmed the presence of two different clinical and immunological variants (endotypes) of SLE with and without SS, which differ from each other in trigger factors, the nature of the onset, clinical manifestations both at the onset of the disease and during the course of the disease laboratory and immunological signs, the degree of disease activity and the intensity of therapeutic measures.

**References:**

1. Petri M et al. Arthritis Rheum 2012;64:2677.
2. van Nimwegen JF et al. Rheumatology (Oxford) 2018;57:818.

## P818

## LUPUS NEPHRITIS AS ONE OF ENDOTYPE OF SLE

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**Objective:** Among the various endotypes, childhood-onset SLE (cSLE), organ-dominant SLE (dermatologic, musculoskeletal - so called 'rhusus', renal, neurological, haematologic), lupus with antiphospholipid syndrome (APS) and Sjögren's syndrome (SS) have received more attention due to differences in prognosis and treatment [1]. We aimed to compare clinical, laboratory and immunological parameters, variants of the onset and course of the disease, ongoing therapy in SLE patients with lupus nephritis and without kidney damage.

**Methods:** 400 SLE patients who fulfilled the Systemic Lupus Erythematosus International Collaborating Clinics (SLICC) disease classification criteria [1] were included into the study. Patients were divided into two groups according to the clinical sign of the presence of kidney damage. The first group included patients with LN. LN was diagnosed in 192 (48%) of 400 people (based on the 2004 ACR criteria [2], if the patient had a daily proteinuria of more than 0.5 g/l per day and/or erythrocyturia, leukocyturia and cylindruria more than 5 in the field of view in the general analysis of urine. In 82 (43%) patients, the clinical diagnosis was confirmed by the results of a pathomorphological study of kidney biopsy specimens. The second group with predominantly extrarenal manifestations included 208 (52%) patients who did not have kidney damage for the entire duration of the illness. The SLEDAI 2K index activity, SLICC damage index were assessed.

**Results:** When conducting a comparative study using the  $\chi^2$  method, the following differences were obtained between patients with SLE with LN and patients with predominantly extrarenal manifestations of SLE. The most frequently identified trigger for the development of SLE in the LN group was insolation (in 49 [26%] vs. 26 [13%]; OR=2.4; 95%CI 1.4-4.0; p=0.001). The first signs of the disease in almost 77 (40%) patients with LN were proteinuria and/or changes in urinary sediment, edema, increased blood pressure, less often (in 31 [16%] and 33 [17%], respectively), the development of LN was preceded by polyarthritis or a combination damage to the skin and joints, but within no more than 6 months, signs of kidney damage were added. In the group of patients with SLE without nephritis at the onset, the following were more often observed: polyarthritis - in 69 (33%), combined skin and joint damage - in 54 (26%), Raynaud's syndrome - in 33 (16%) (p≤0.0001). LN was often associated with an erythematous facial skin lesion, a "butterfly" (80 [42%] vs. 56 [27%], OR=1.93; 95%CI 1.27-2.95; p=0.02), with serositis (exudative pleurisy in 84 [44%] vs. 42 [20%],

OR=3.07; 95%CI 1.97-4.78; p=0.0001), s pericarditis (87 [46%] vs. 46 [22%], OR=2.91; 95%CI 1.89-4.50; p=0.0001), with hematological disorders in the form of anemia (120 [63%] vs. 75 [36%], OR=2.95, 95%CI 1.96-4.43, p=0.009), leukopenia (94 [49%] vs. 81 [39%]), OR=1.5; 95%CI 1.01-2.24; p=0.04) and thrombocytopenia (81 [42%] vs. 33 [16%], OR=3.86; 95% CI 2.42-6.18, p=0.0001). With the development of LN, an acute onset course of the disease was significantly more common (96 [50%] vs. 19 [9%]) and high activity according to the SLEDAI2K index (11.54±9.25 points vs. p=0.01). Patients with LN were more likely to have hypocplementemia (155 [81%] vs. 97 [47%], OR=4.79; 95%CI 3.05-7.52; p=0.0001). Significant differences were observed in the therapy: thus, patients with LN received higher doses of glucocorticoids (38.15±19.17 vs. 26.6±8.29 mg/d, p ≤ 0.0001), mycophenolate mofetil (in 57 [31%] vs. 27 [4%], p≤0.0001) and cyclophosphamide (119 [62%] vs. 35 [17%], p≤0.0001).

**Conclusion:** Thus, the results of the study confirmed the presence of two different clinical and immunological variants (endotypes) of SLE with kidney damage and with predominantly extrarenal manifestations, which differ from each other in trigger factors, the nature of the onset, clinical manifestations both at the onset of the disease and during the course of the disease laboratory and immunological signs, the degree of disease activity and the intensity of therapeutic measures.

**References:**

1. Petri M et al. Arthritis Rheum 2012;64:2677.
2. Dooley M. Lupus 2004;13:857.

## P819

## RISK FACTORS OF OSTEOPOROSIS

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**Objective:** Compare test data "Do you have a risk of osteoporosis?" with the results of densitometry of patients with a therapeutic profile.

**Methods:** A survey was conducted of 71 patients (67 women, 4 men), the average age - 59 years (18; 79), sent for densitometry. The risk osteoporosis (OP) of developing was assessed using the International Osteoporosis Foundation "Do you have a risk of osteoporosis?". To assess BMD, the T/Z test which was determined by two-energy x-ray absorptiometry (Lunar Prodigy Primo densitometer; GE, USA).

According to the T/Z criterion, the patients were divided into 3 groups:

I - 20 (28%) patients with osteoporosis (T / Z-criterion ≤ -2.5), average age 59.8 years (33; 77);

II - 16 (22.5%) patients with osteopenia (OPE) (T / Z-criterion from -1 to -2.5), average age 62 years (45; 79);

III - 35 (49.5%) patients with normal BMD (T / Z-criterion ≥ -1), av-



erage age 55.5 years (24; 74).

**Results:** Based on the results of the test, the risk of developing OP was found in 17 (26.7%) of the respondents, and 5 (7%) people had a high risk of developing fractures. It was found that only 5 (25%) people had a high risk of developing OP and fractures in the group of patients with OP according to the results of densitometry, and 15 (75%) in the majority of patients. The results of the questionnaire do not allow us to talk about the risk of developing OP. In the group of patients with OPE, a high risk of OP was detected in 8 people, which was 50%. The second half of patients have no risk of developing OP. In the group of patients with normal IPC indicators, a high risk of developing OP was detected in 4 (11.4%) people. In the majority of patients - 31 (88.6%) the risk of developing OP is missing.

**Conclusion:** Our work shows that test "Do you have a risk of osteoporosis?" does not allow us to fully assess the risk of developing OP. This determines the need to take into account more parameters to assess the risk of developing this disease.

## P820

### ASSOCIATION BETWEEN OSTEOPOROSIS TREATMENT PERSISTENCE WITH MEDICATION SWITCHING AND SUBSEQUENT FRACTURES AMONG PATIENTS WITH OSTEOPOROTIC FRACTURES

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**Objective:** This real-world study aimed to examine the association between persistence in anti-osteoporotic medication (AOM) usage and subsequent fractures, allowing for medication switching among patients with osteoporotic fractures.

**Methods:** This observational retrospective cohort study used claims data from the National Health Insurance system in Taiwan. We selected patients who initiated AOM for osteoporotic fractures between January 1, 2013, and June 30, 2016. Treatment persistence was defined as whether the patients were on any AOM on a given day of interest, allowing a 45-day grace period. Medication switch was allowed for persistence if a patient remained on treatment. AOM potency group was defined as high-potency (i.e., denosumab and zoledronate) and low-potency (i.e., alendronate, intravenous (IV) ibandronate, and raloxifene). A multivariate Cox proportional hazards model with time-varying covariates was used to evaluate the risk of subsequent fractures 3 months after initiating AOM.

**Results:** A total of 119,473 patients were included in the analysis, with a mean follow-up of 46.4 months (standard deviation, 15.6), and 26.8% switched from the index AOM. Within 1 year of follow-up, 52% of the patients remained persistent with AOM usage. Compared to patients with persistent AOM usage, those

not persistent had a higher risk of subsequent hip (adjusted hazard ratio [aHR]=1.31, 95% confidence interval [CI]:1.21–1.42), vertebral (aHR=1.17, 95%CI:1.13–1.22), and radius fractures (aHR=1.16, 95%CI:1.08–1.25). Patients with persistent AOM usage who switched from high potency to low potency AOM had a higher risk of subsequent vertebral fractures than those with persistent AOM usage who did not switch potencies (aHR=1.28; 95%CI:1.02–1.60).

**Conclusion:** Patients with non-persistent AOM usage had a higher risk of subsequent fractures to persistent users when allowing AOM switch. Furthermore, the switch pattern of AOM potency may interfere with the risk of subsequent vertebral fractures and warrants further investigation.

## P821

### FREQUENCY OF OSTEOPOROTIC VERTEBRAL FRACTURES DEPENDING ON GENDER AND AGE IN PERSONS OF THE OLDER AGE GROUP

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**Objective:** To study the frequency of occurrence of osteoporotic fractures of the vertebrae depending on gender and age in persons of the older age group.

**Methods:** Vertebral fractures with a minimal level of injury were registered in 78 cases in patients older than 50 years: 57 (73.08%) men and 21 (26.92%) women ( $p < 0.001$ ). The frequency of fractures was calculated per 100,000 population in each age group and averages over the study period per 100,000 person/years.

**Results:** It was found that vertebral fractures in all age groups were more common in men than in women. In the age group of 50-54 years, vertebral fractures in women are not registered, while in men, the prevalence of fractures was 17.2/100,000 person/years. In the age groups 55-59 years and 60-64 years, vertebral fractures were also more common in men (17.2/100,000 and 52.4/100,000 person/years, respectively) than in women (9.6/100,000 and 10.2/100,000 person/years), however, there were no statistically significant differences between the groups ( $p > 0.05$ ). Starting from the age of 65-69 years, there was an increase in the frequency of fractures in both men and women (151.1/100,000 and 20.9/100,000 person/years, respectively). The rate of increase in the number of fractures in men in this age group is 7.5 times higher than in women ( $p < 0.001$ ). When comparing the group of men depending on age, it was found that vertebral fractures were statistically significantly more common at the age of 80 years and older (836.0/100,000 person/years) than in other age groups ( $p < 0.05$ ). In women, the highest incidence of fractures was also found at the age of 80 years and older (68.1/100,000 person/years) without statistically significant differences with the age group of 75-79 years ( $p > 0.05$ ).

**Conclusion:** Thus, in men, fractures of the vertebrae in all age groups were more common than in women. The greatest number of fractures occurred at the age of 80 years and older in both women and men.

## P822

### ANTIRETROVIRAL DRUG USE AND RISK OF FALLS IN PEOPLE LIVING WITH HIV: A META-ANALYSIS

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**Objective:** The risk of falls in people living with HIV (PLHIVs) on antiretroviral therapy (ART) has received little attention in the literature. The aim of the meta-analysis is to quantify the association between the fall risk and various categories of drugs used in ART.

**Methods:** PubMed, Google Scholar, Embase, and the Cochrane Central Register of Controlled Trials were systematically searched from inception to January 2023. Any observational study or controlled trial that reported on the relationship of at least one antiretroviral drug with falls in PLHIVs was included. Studies without distinction between separate drugs, case reports and series, reviews, meta-analyses, letters, and editorials were excluded. Abstract screening and data extraction were performed independently by two researchers. The Newcastle Ottawa scale was used to assess the quality of each study. Data on the frequency of single fallers, multiple fallers ( $\geq 2$  falls), and non-fallers were extracted and studied for each drug and drug category. The fixed-effects and random-effects models were utilized to pool the extracted data according to heterogeneity. The pooled results were reported as odd's ratio (OR) with a 95%CI.

**Results:** A total of five observational studies (51,675 participants) were included out of 414 articles obtained through a literature review. Stavudine use was found to be associated with an increased risk of single falls in PLHIVs (OR: 1.69, 95%CI=1.08-2.66,  $p=0.02$ ). However, Efavirenz (OR: 0.82, 95%CI=0.76-0.89,  $p<0.001$ ) and Zidovudine (OR: 0.82, 95%CI=0.77-0.92,  $p<0.001$ ) were found protective against the single falls. Didanosine had no significant association with fall risk (OR: 1.23, 95%CI: 0.78-1.93,  $p=0.37$ ). Likewise, protease inhibitors, integrase inhibitors, nucleoside reverse transcriptase inhibitors, and non-nucleoside reverse transcriptase inhibitors were discovered to have no significant association with fall risk.

**Conclusion:** Using the available data from studies, most drug categories of ART have no significant association with the risk of falls in PLHIVs. However, certain drugs, such as didanosine and stavudine, which have the inherent adverse effect of causing balance deficits and neuropathy, should be used cautiously.

## P823

### BONE STATUS EVALUATION BY BONE MINERAL DENSITY AND TBS IN MEN WITH AXIAL SPONDYLOARTHRITIS: PATIENTS WITH VS. WITHOUT SYNDESMOPHYTES

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**Objective:** Spondyloarthritis (SpA) like every inflammatory rheumatism is a risk factor for osteoporosis. The evaluation of bone status using BMD in such patients can be distorted by the presence of ossification, especially syndesmophytes on the lumbar spine. TBS allowing the assessment of bone microstructure, would be more reliable. The aim of our study is to assess a population of men with SpA using BMD and TBS, and to define the impact of lumbar syndesmophytes.

**Methods:** A prospective study of men with axial SpA, meeting ASAS and/or AMOR criteria. Age, lifestyle (smoking, alcohol intake), comorbidities, have been collected. Spine Xray has been performed to look out for vertebral compression. Bone assessment using BMD and TBS, and the results has been compared according to the presence or not of syndesmophytes.

**Results:** Our study included 53 men, 25 with syndesmophytes (L1 to L4  $\geq 1$ ), and 28 without syndesmophytes. Mean age 45 (without a difference between the 2 groups). Average BMI is 24.55 kg/m<sup>2</sup> (24.9 $\pm$ 4.34 in the group with syndesmophytes, 24.17 $\pm$ 4.41 kg/m<sup>2</sup> in the group without,  $p=0.5$ ). The mean T-scores were respectively 0.5 $\pm$ 2.2 and 1.2 $\pm$ 1.44 ( $p=0.1$ ) on the spine, the mean T-score on the femoral neck is -1.07 $\pm$ 0 and 1.05 $\pm$ 1.44 ( $p=0.8$ ), and the mean TBS is 1.227 $\pm$ 0.09 et 1.301 $\pm$ 0.07 ( $p=0.005$ ), in patients with and without syndesmophytes.

**Conclusion:** The group with syndesmophytes has a higher T-score on the spine compared to the group without syndesmophytes with a low TBS, confirming the fact that the latter is more reliable to assess the bone status in this population.

## P824

### INVESTIGATING CLINICAL APPLICATIONS OF AN AUTOMATIC TECHNIQUE FOR ANALYZING MASTICATORY AND TONGUE MUSCLES IN DEMENTIA PATIENTS

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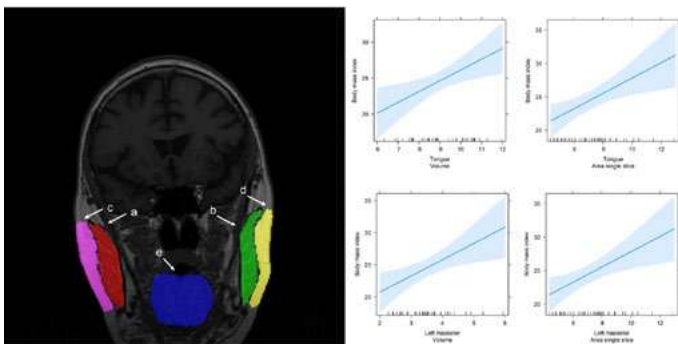
**Objective:** The high prevalence of sarcopenia in dementia patients, ranging from 60% to 70%, is concerning due to the in-

creased risk of adverse outcomes caused by malnutrition, sedentary behavior, and falls, which are already common in people with neurodegenerative diseases. Sarcopenia is also a contributing factor to cognitive decline in healthy older adults. MRI is a common diagnostic evaluation for dementia, with estimates suggesting that 60-80% of patients undergo the procedure. In this study, we evaluate the diagnostic potential of an artificial intelligence technique previously developed to quantify masseter and tongue muscle volumes in MRI scans of the head.

**Methods:** In this study, we conducted a cross-sectional analysis of 65 participants with mild dementia from the DemVest study, consisting of 5 MRI sections per participant, resulting in a total of 325 slices. We utilized the DenseUnet model to segment five different tissues, including the left and right masseter muscle, left and right subcutaneous fat, and tongue muscle. To measure the similarity of results between manual and automatic techniques, we employed the Dice similarity coefficient (DSC). Furthermore, we investigated the relationship between BMI and muscle volumes in the MRI images using individual linear regression models adjusted for sex and age. No adjustments were made for multiple testing.

**Results:** Our fully automatic technique accurately segmented and quantified masseter muscles and subcutaneous fat on the left and right side of the head, as well as the tongue muscle (avg DSC 92.4%) (Figure 1-left). There is a significant correlation between the tongue muscle area (single slice) and BMI (T-value=2.29, estimated standard error=[11.8,10.24]), tongue muscle volume (from 5 slices) and BMI (2.78, [1.5,0.54]), left masseter muscle area and BMI (2.89, [1.15,0.39]), and left masseter muscle volume and BMI (2.75, [2.53,0.91]). The associations ( $p<0.05$ ) are presented in Figure 1-right.

**Conclusion:** While opportunistically using MRI images in patients with neurocognitive disorders, our novel automatic method successfully quantified muscle volumes in masseter and tongue while demonstrating that those volumes could be accurate indicators of changes in general body composition in patients with neurocognitive conditions, which are known to predispose them to adverse outcomes. Our results are the first step to bringing a more efficient method to estimate masseter and tongue muscle in radiological images with a better capacity to be implemented in clinical practice.



**Figure 1.** (left) Example of segmentation of R (a) and L (b) masseter muscle, R (c) and L (d) subcutaneous fat and tongue (e) using developed AI techniques. right) Relationship between segmented muscles and BMI.

## P825

### PREVENTING FALLS PUTS A STOP TO FRAGILITY FRACTURES AMONG THE ELDERLY IN CATALONIA (SPAIN) USING THE OTAGO EXERCISE PROGRAM

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**Objective:** To analyse the efficacy of a mixed intervention program in reducing the rate of falls among older adults aged 75-90 years and the consequences (fear of falling and fractures).

**Methods:** 478 participants were followed up for 12 months and split into: control group (CG) and intervention group (IG). The IG received instruction on the OTAGO physical activity program in a group format and quarterly underwent a follow-up nursing visit.

**Results:** The rate of falls in the IG was 23.3% and 39.8% in the CG ( $p=0.0001$ ) with a lower rate of falls in the IG (15.9 vs. 32.1% in men, and 30.0 vs. 45.5% in women,  $p=0.0056$  and  $p=0.0098$ , respectively). The difference in the rate of falls was also significant in the age groups of 75-79 years (24.1 vs. 35.8%,  $p=0.002$ ) and 80-84 years (19.6 vs. 41.0%,  $p=0.002$ ), but not in the group of 85-90 years (31.6 vs. 46.7%,  $p=0.1617$ ). The fear of falling was also lower in the IG (11.5%) compared to the CG (22.3%,  $p=0.0017$ ), and the rate of fractures during the follow-up period was lower in the IG (2.2%) compared to the CG (6.8%,  $p=0.0173$ ). There were no significant differences in admissions to nursing homes or mortality.

**Conclusion:** The results of this study demonstrated the efficacy of the mixed intervention program in reducing the rate of falls and fractures among older adults, as well as reducing the fear of falling. These findings highlight the importance of implementing fall prevention programs among this age group to reduce related risks.

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## P826

### OSTEOPOROSIS CASE MANAGER INTERVENTION TO IMPROVE MEDICATION POSSESSION RATIO AMONG OSTEOPOROTIC PATIENTS WITH ANTI-OSTEOPOROTIC MEDICATION FOR FRAGILITY FRACTURE

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**Objective:** Previous studies showed hospital-based case manager could increase rate of osteoporosis treatment and patient compliance. We have carried out a case manager program in our hospital since 2018. The aim of this study was to compare the medication possession rate osteoporotic patients with anti-osteoporotic medication for fragility fracture between case manager intervention group and non-intervention group.

**Methods:** We retrospectively reviewed the records of 1890 osteoporotic patients who received case manager intervention from January 2010 to December 2021 at Taichung veteran general hospital in Taiwan. All of them received anti-osteoporotic medication for osteoporosis with history of fragility fracture. 1:1 propensity matched-pairs analysis was used to match patients who received case manager intervention (n=1,890) with patients who treated with anti-osteoporotic medication but did not receive case manager intervention (n=1,890) by age, sex, BMI, and comorbidities.

**Results:** The average age and BMI were no significant difference between case manager intervention group and non-intervention group. The sex and comorbidities were not significantly different between the two groups. Patients in the case manager intervention group had significant better medication possession ratio (69.24 vs. 63.66%, p<0.001) as compared with patients in the non-intervention group. Patients in the intervention group had significantly more previous fragility fractures, lower initial bone mineral densities, and lower T-scores as compared to patients in the non-intervention group. However, no significant difference on the secondary fracture rate (0.69 vs. 0.74%, p=0.847) and mortality rate (6.30 vs. 7.41%, p=0.176) were noted between the intervention group and non-intervention group.

**Conclusion:** A hospital-based case manager could raise the medication possession ratio among osteoporotic patients with anti-osteoporotic medication for fragility fracture. Our study revealed case manager intervention may also mitigate the secondary fracture rate and mortality despite more previous fragility fractures and lower initial bone mineral densities. Further study is required to confirm the efficacy of this approach for reducing secondary fracture rate and mortality in our hospital.

## P827

### REHABILITATION OF A PATIENT WITH OSTEOPETROSIS: CASE REPORT

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**Objective:** Osteopetrosis is a rare hereditary metabolic bone disease, caused by osteoclast insufficiency. Due to reduced activity of osteoclasts, there is a disruption of the bone remodeling process that leads to osteosclerosis and hyperostosis of the cortical bones. Our aim was impact end effect of application of physical procedures and education of the patient in the treatment process.

**Case report:** A 45-year-old man comes to the outpatient clinic because of pain in the back, pain in the left hip and groin and in the left gluteal region. At the Orthopedic Clinic in Skopje and X-ray of the lumbar spine and pelvis with hips was performed, followed by biopsy of the left femur and a diagnosis was made: benign osteosclerotic dysplasia. Other diagnostic procedures such as basic laboratory analysis (with proper parameters) and a DXA scan were performed. Osteopetrosis was diagnosed. Physical therapy included magnetotherapy, electrotherapy, kinesitherapy and hydrokinesitherapy for 15 d. The effects of the physical treatment are monitored with the Numerical Pain Scale, measurement of range of motion in the lumbar spine, in the coxofemoral joints and MMT. The measurements were taken before and after the end of the physical therapy. With the application of physical therapy, the pain was significantly reduced, the movements in the lumbar spine and left hip were freer and with a better range, and the trophism of the paravertebral, abdominal and gluteal muscles also improved.

**Conclusion:** Physical medicine and rehabilitation make it possible to improve the functional status and quality of life in patients suffering from osteopetrosis.

## P828

### THE IMPACT OF FUNCTIONAL ELECTRIC STIMULATION AND A STRUCTURED EXERCISE PROGRAM ON GRIP STRENGTH AND PHYSICAL FUNCTION IN POSTMENOPAUSAL WOMEN WITH LOW BONE MASS

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**Objective:** At menopause, women's age-related decline in BMD is typically accelerated which can affect their physical functions. This is becoming an important public health issue in India. Both functional electric stimulation (FES) and exercise is potentially beneficial for improving function. We hypothesized that in combi-

nation of FES and exercise will be more effective than performing exercise or FES alone. Currently there aren't any studies that compare how well FES and structured exercise training work together. So, the purpose of our study was to find out how using FES and exercise affects the grip strength and physical function of postmenopausal women with low bone mass.

**Methods:** 45 postmenopausal between age 55-70 able to walk independently and diagnosed with low bone mass were randomly allocated into three groups: (i) FES plus structured exercise (EFES), (ii) structured exercise, and (iii) control group. The intervention was 45 min long given for three times/week for 6 weeks. The EFES group performed exercise while receiving FES on major muscle groups. The structured exercise group performed the same exercise without FES and control group did not perform any physical exercise, they just maintained their daily activities. After 6 weeks grip strength and physical function was measured in all the groups. Physical function was measured using, five times sit-to-stand tests (FTSS), gait speed and timed up-and-go test (TUG).

**Results:** After 6 weeks of intervention, EFES improved muscle strength ( $p<0.05$ ) and mobility in lower limbs as observed in TUG and FTSS tests ( $p<0.05$ ) compared to the exercise and control group. Significant improvements were observed in gait speed ( $p<0.05$ ) in the EFES group compared to the control group. No significant difference is seen in grip strength.

**Conclusion:** This study concluded that structured exercise combined with functional electrical stimulation can improve Physical function in postmenopausal women during intervention program better than only exercise group. Thus, it may be one of the realistic alternatives for the prevention of muscle loss and improving Physical function for postmenopausal osteoporotic women with low bone mass.

## P829

### INTRA-ARTICULAR PTH (1-34) AMELIORATES KNEE OSTEOARTHRITIS IN A PRECLINICAL OSTEOARTHRITIS BIG ANIMAL MODEL

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**Objective:** Osteoarthritis (OA) is prevalent among older adults and remains incurable. Intra-articular PTH improved OA in models of papain-induced and anterior cruciate ligament transection (ACLT). However, there is lack of study in large animal. Therefore, we examined the effects of PTH in a preclinical preclinical osteoarthritis model in goats after receiving partial medial meniscectomy (PMM).

**Methods:** Fourteen Nubain goats were randomized into three groups: control group (N=3), PMM group (N=6), and PMM with intra-articular PTH (1-34) treatment (PTH) group (n=5). At the age of 2 years old, the goats in PTH and PMM groups received PMM at the right knee. The goat then received 10 nM PTH or vehicle (2 mL) once weekly for 3 months. Knee function was evaluated by weight-bearing tests at the end of study. Gross lesions of knees

were determined by lesion area quantification and the OARSI score. OA Cartilage matrix was determined by a histological glycosaminoglycan (GAG).

**Results:** PTH significantly improved the goats to bear weight from  $24.3\pm 3.2\%$  to  $38.2\pm 4.9\%$  of body weight ( $P<0.05$ ), the macroscopic scoring of cartilage from 8.6 to 5.7 ( $P<0.05$ ) and the macroscopic scoring of osteophytes from 7.1 to 4.6. PTH treatment did not change macroscopic scoring of synovium. PTH treatment decrease surface lesion area from 5.2% to 3.2% in tibia plateau and 7.5% to 4% in the femoral condyle. GAG stain from the PTH group significantly increased compared with PMM group ( $p<0.05$ ). There were no significant differences between the control and PTH in GAG stain.

**Conclusion:** We previously demonstrated PTH can improve knee OA in several animal models including matrix degradation model by papain, post-traumatic model by ACLT model and aging related model by spontaneous OA in guinea pig. PTH can prevent chondrocytes from hypertrophy and apoptosis both in vivo and in vitro. In this study, we further demonstrated the effects of PTH in large animals, goat. Furthermore, our repeated dose sub-chronic toxicology also revealed that no animal death, adverse clinical signs and significant toxicity, no clinical pathology and no histopathology in dosing sites. Our PK/PD and toxicology also showed drug clearance within 0-30 mins with therapeutic dose and no toxic effect in 80~2050 folds over the maximal therapeutic dose. Combining all the preclinical data we have, intra-articular PTH may be a good candidate for OA treatment for clinical trial.

## P830

### 3D-DXA ASSESMENT OF BONE LOSS AFTER BARIATRIC SURGERY

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**Objective:** To analyze changes in bone structure using 3D-DXA in severely obese patients after different types of bariatric surgery (BS).

**Methods:** Prospective, single center and non-blinded study in patients with obesity undergoing BS. BMD at lumbar spine (LS, L1-L4), femoral neck (FN) and total hip (TH) was measured by DXA (Horizon Wi; Hologic Inc., Waltham, MA, USA) prior and 12 months after surgery. Proximal femur 3D-DXA parameters including cortical and trabecular volumetric(v) BMD, cortical thickness (CTh) and surface(s) BMD at TH, FN, trochanter and shaft were analyzed using 3D-Shaper software v.2.12.1 (3D-Shaper Medical, Barcelona, Spain).

**Results:** 153 patients, 81% female, aged  $50\pm 9$  years and BMI  $38\pm 9$  kg/m<sup>2</sup> underwent Sleeve gastrectomy (SG) (54.3%), Duo-

denal Switch/SADIS (29.4%) or Roux-en-Y Gastric bypass (RYGB) (16.3%). Baseline characteristics were comparable between groups, except BMI that was lower in RYGB. Weight loss was  $29\pm 11\%$ , greater in DS/SADIS ( $p<0.021$ ). After surgery, BMD decreased at LS ( $-3.5\pm 5.4\%$ ), FN ( $-5.2\pm 5.9\%$ ), and TH ( $-8.1\pm 5.1\%$ ). Losses were significantly greater in DS/SADIS and RYGB ( $p<0.001$ ). Final Z-scores were 0.66 (IC 95%: 0.46 to 0.86) at LS and 0.96 (IC 95%: 0.77 to 1.16) at FN. Significant changes from baseline were found in 3D-DXA measurements at the TH. Cortical sBMD decreased by  $-4.4\pm 4.8\%$ ; Cortical vBMD by  $-1.4\pm 2.8\%$ ; CTh by  $-3.1\pm 3.9\%$ ; and Trabecular vBMD by  $-8.0\pm 6.6$  ( $p<0.05$ ). Similar results were found at all hip regions except the neck where a  $2.1\pm 7.3\%$  increase in CTh was found (increase from baseline statistically significant ( $p<0,05$ ) in SG). Cortical and trabecular BMD losses were greater in DS/SADIS and RYGB ( $p<0.01$ ). Final Z-scores for Cortical sBMD and Trabecular vBMD were 0.96 (IC 95%: 0.73 to 1.19) and  $-0.17$  (IC 95%:  $-0.32$  to  $-0.02$ ).

**Conclusion:** Patients undergoing BS showed a significant decrease in LS and hip BMD assessed by DXA. 3D-DXA analysis showed greater decreases in trabecular vBMD, compared to cortical sBMD. More hypoabsorptive techniques induced a greater bone loss. After one year, bone density remains within or above mean reference values from the general population.

### P831

#### PREVALENCE OF SARCOPENIA AND ITS ASSOCIATION WITH LOW BACK PAIN AND QUALITY OF LIFE IN COMMUNITY DWELLING OLDER MEN AND WOMEN WITH LOW BONE MASS

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**Objective:** Low bone mass combined with sarcopenia contribute to high risk of low back pain, falls, fracture, and even mortality which can affect the quality of life(QOL). Few research have particularly examined if there is a difference between the prevalence of sarcopenia in men and women with low bone mass.so the aim of this study was determine the prevalence of sarcopenia in community dwelling older men and women with low bone mass and its association with low back pain and QOL.

**Methods:** Total 243 participants recruited from a specialized geriatric community camps who already diagnosed with low bone mass. Participants aged 55 to 81 with ability to walk independently without history of any fatal disease was included in study. Muscular mass was measured by bio-electrical impedance analysis and weak grip strength was measured by Jamar hydraulic hand dynamometer to check the presence of sarcopenia. Low back pain was evaluated using the Visual Analogue Scale (VAS). Quality of Life was measured by Questionnaire of the European Foundation for Osteoporosis (QUALEFFO-41).Additional measure of functional reach test and five times sit to stand was also taken to see the functional status of participants. The Wilcoxon rank-sum test was used to investigate Differences in low back pain

intensity assessed by VAS between groups. To evaluate quality of life, multivariable regression analysis was used.

**Results:** Patients were classified into the sarcopenia group and the non-sarcopenia group. Low back pain intensity was significantly higher in the sarcopenia group than in the non-sarcopenia group ( $p<0.05$ ).The prevalence of sarcopenia was 1.5-fold higher in women compared to men. Lower level of quality of life is seen in sarcopenia group. Functional reach and sit to stand was also affected in sarcopenia group.

**Conclusion:** In this cross-sectional investigation of ambulatory patients with low bone mass, low back pain and QOL were impacted by sarcopenia, and the prevalence is higher in women compared to men thus early screening and prevention need to be provided for good quality of life in this group.

### P832

#### APPLICATION OF PROXIMAL PROCEDURES IN PATIENTS WITH PATELLAR INSTABILITY WITH TROCHLEA DYSPLASIA TYPE A AND B

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**Objective:** The purpose of this study was to determine the correct proximal surgical procedure for PI, prospectively evaluate the results of surgical treatment of the PI depending on the type of trochlea dysplasia (A or B) and surgical procedure.

**Methods:** A prospective study was conducted on 98 patients with PI. For the diagnosis of PI used: MRI, dynamic MRI, radiography, ultrasonography of the knee joint. Design: prospective case series. Dynamic computer models of the knee joint with TD types A and B were created for PI modeling, which allowed to determine the tendency to change the lateral displacement and stress distribution in the cartilage of patella of the knee joint in the range of bending of the knee joint from  $0-30^\circ$ , as well as to simulate the damage of the medial patellofemoral ligament (MPFL) and the lateral release (LR). In the comparative group ( $n=53$ ), the MPFL reefing and LR were performed. In the comparative group: 34 (64.2%) patients with TD type A and 19 (35.8%) patients with TD type B. In the main group ( $n=45$ ), MPFL reconstruction were performed. In the main group 31 (68.9%) patients with TD type A and 14 (31.1%) patients with TD type B. Comparison of groups by age ( $p=0.53$ ), sex ( $p=0.85$ ), type of TD ( $p=0.62$ ). The Kujala Score was completed preoperatively and at the follow-up (12 month).

**Results:** In the patients of the main group, the Kujala scale before the operation with TD type A was  $56.8\pm 10.2$ , with TD type B  $58.6\pm 10.4$  ( $p>0.05$ ), 12 months after surgery with TD type A  $91,8\pm 5,5$ , with TD of type B  $87,8\pm 5,7$  points ( $p<0,05$ ). In the comparative group, the Kujala scale before operation with TD type A was  $58.5\pm 10.2$  before surgery, with TD type B  $55.6\pm 14.0$  ( $p>0.05$ ), 12 months after surgery with TD type A  $87.8\pm 5.6$ , with TD type B  $83.0\pm 5.1$  points ( $p<0.05$ ). The difference in treatment outcomes

in 12 months after surgery was noted when comparing patients with the corresponding subgroups of TD of the main and comparative groups ( $p < 0.05$ ). The change patella tilt angle was observed between the patients in the comparison group with the TD types A and B after the operation; and the main group: with TD types A and B after surgery ( $p < 0.05$ ). The Kujala score was significantly increased in patients of the main group. The type of trochlea dysplasia affects patellar displacement and distribution of von Mises equivalent stress in the patellar cartilage in norma and at patella instability.

**Conclusion:** The use of modern diagnostic methods to determine the factors of PI allows you to choose correct method of surgical treatment. The type of TD and type of surgical intervention effect on the results of treatment. The MPFL reefing is possible only in patients with PI with TD type A, who has rupture MPFL at patella level. The MPFL reconstruction is indicated in patients with PI with TD type A and B.

### P833

#### PREOPERATIVE BACTERIURIA TREATMENT AS A POSTOPERATIVE INFECTIOUS COMPLICATION PREVENTIVE MEASURE AMONG INSETTING-CARE PATIENTS WITH OSTEOARTHRITIS: A RETROSPECTIVE STUDY

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**Objective:** To introduce the main infectious agents associated with postoperative complications among patients with coxarthrosis required inpatient care setting.

**Methods:** Medical charts of the Dept. of Orthopedy and Traumatology, Izmirlian Medical Center for the 2018-2019 period were enrolled. We included 203 patients who required hip joint replacement therapy with the following pathologies: coxarthrosis ( $n=117; 57.6\%$ ), trauma ( $n=51; 25.1\%$ ), and gonarthrosis ( $n=8; 4\%$ ). The remaining 27 ( $13.3\%$ ) patients underwent revision surgery (common causes were periprosthetic joint infections (15) and prosthesis displacement). Then we imported the data to a Microsoft Excel file and analyzed them.

**Results:** Totally 203 patients met the inclusion criteria. Male-to-female ratio was 1:3 (53 to 150), mean age was 61.3. All patients were checked for complete blood count, biochemistry profile, coagulation testing, blood-borne infections, urinalysis, and urine culture. In 2018, urinalysis on admission revealed high leukocyte levels in 44 ( $32.6\%$ ) out of 135 patients. Urine culture was positive in 22 ( $50\%$ ) patients. The most common pathogens were *E.coli* ( $n=9; 41\%$ ), followed by *Candida spp.+E.coli* ( $n=3; 13.6\%$ ), *Candida spp.+P.aeruginosa+S.epidermidis* ( $n=3; 13.6\%$ ), *E.coli+S.*

*epidermidis* ( $n=3; 13.6\%$ ), *S.epidermidis* ( $n=2; 9.1\%$ ), *P.aeruginosa+S.epidermidis* ( $n=1; 4.5\%$ ) and *Candida spp.+E.coli+S.epidermidis* ( $n=1; 4.5\%$ ). In contrast to 2018, in 2019 urinalysis on admission revealed high leukocyte levels in 21 ( $30.9\%$ ) out of 68 patients. Urine culture was positive in 12 ( $57.1\%$ ) patients. The most common pathogens were *E.coli* ( $n=4; 33.3\%$ ) and *S.epidermidis* ( $n=4; 33.3\%$ ), followed by *E.coli+S.epidermidis* ( $n=3; 25\%$ ) and *P.aeruginosa* ( $n=1; 8.4\%$ ). All patients with positive urine cultures received appropriate preoperative treatment. After the surgery, wound culture revealed no organisms except for 2 ( $1\%$ ) revision surgery cases which were performed to diagnose and treat periprosthetic joint infection (1. *E.coli+S.epidermidis*; 2. *S.epidermidis*).

**Conclusion:** The results of our department correspond to international data that the most common organism responsible for causing urinary tract infections and asymptomatic bacteriuria in both community and healthcare settings is *Escherichia coli* [1]. There was no difference in prevalence of bacteriuria between 2018-2019 ( $p < 0.3089$ ). Urine culture and antibacterial therapy prior to osteoarthritis surgical treatment may be an option to reduce infectious complications.

**Reference:** 1. Das R et al. Infect Control Hosp Epidemiol 2009;30:1116.

### P834

#### CLINICAL OUTCOMES OF SURGICAL TREATMENT OF DEGENERATIVE MEDIAL MENISCUS "ROOT TEARS" AND CONCOMITANT KNEE OA

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**Objective:** Assessment of clinical results of surgical treatment in patients with degenerative medial meniscus root tear and concomitant 1 stand 2nd K-L knee osteoarthritis. Damage of the medial meniscus root is critical, because it leads to rapid progression knee osteoarthritis and requires surgical treatment. According to meniscal tissue quality and type of meniscal root tear repairing is impossible.

**Methods:** The results of treatment of 55 patients with degenerative medial meniscus root tears were evaluated. MRI and arthroscopy were used for diagnosis and measuring meniscal extrusion, evaluated meniscal root lesion according to La Prade classification. The mean follow up period was  $24 \pm 3$  month. Patients were divided into the main group ( $n_o=18$ ) and comparison group ( $n_c=37$ ) patients. In the comparison group, a partial meniscectomy was performed ( $n_c=37$ ), which consisted of the removal of the damaged posterior horn and part of the body of the medial meniscus under arthroscopic control. In the main group ( $n_o=18$ ) the suture of the medial meniscus root was performed under arthroscopic control. Also notchplasty was done in all patients to prevent flexion contracture and restore normal knee extension.

**Results:** The mean age in patients of the main group was  $53,61 \pm 4,92$  years, comparison group  $54,16 \pm 4,4$  years ( $p=0,67$ ). BMI in main group was  $32,1 \pm 1,85$ , comparison group  $31,8 \pm 1,92$  ( $p=0,68$ ). In the main group were female 14 (77,8%) females and 4 (22,2%) males and in the comparison group were female 26 (70,3%) and male 11 (29,7%) ( $p=0,56$ ). Before surgery, the score on the Lyschalm scale in patients of the main group ( $n_o=18$ ) was  $62,5 \pm 4,6$  points, in the comparison group ( $n_c=37$ )  $63,8 \pm 4,2$  points ( $p>0,05$ ). One year after surgery, the score on the Lyschalm scale in patients of the main group ( $n_o=18$ )  $88,5 \pm 6,1$  points, in the comparison group ( $n_c=37$ )  $82,8 \pm 5,2$  points ( $p<0,05$ ). Two year after surgery, the score on the Lyschalm scale in patients of the main group ( $n_o=18$ )  $87,3 \pm 4,1$  points, in the comparison group ( $n_c=37$ )  $81,5 \pm 6,2$  points ( $p<0,05$ ). In one patient, who underwent partial meniscectomy after two years we performed uni knee arthroplasty.

**Conclusion:** Partial meniscectomy is associated with worse knee function, and patients with meniscal extrusion and elevated BMI have worse preoperative knee pain and function. The suture of the medial meniscus root is the method of choice that allows to get better clinical results compared to partial meniscectomy, as well as slowdown the development of knee osteoarthritis.

## P835

### NAIL FOLD CAPILLAROSCOPY: A VERY USEFUL TOOL IN CONNECTIVE TISSUE DISEASES

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Nail fold video capillaroscopy is a non-invasive imaging tool for the evaluation of microvascular abnormalities, with an important benefit in the early study of connective tissue disorders, especially systemic sclerosis. Its main indication is the presence of Raynaud phenomenon. Nail fold capillaroscopy allows the identification of characteristic patterns of microvascular changes.

In the assessment of patients, two parameters must be considered: morphological (static) and functional (dynamic) abnormalities.

The morphological parameter includes visibility, morphology, size and length of capillary loops, their distribution, density and microbleeding. The functional parameter evaluates the type of blood flow, continuous or granular, microaggregates, intermittent, with or without interruptions.

An important number of studies have demonstrated that the microchanges identified by the nail fold capillaroscopy are correlated with the severity of both skin and visceral involvement.

The importance of performing video capillaroscopy, especially in scleroderma spectrum disorders is also demonstrated by the inclusion of microvascular changes in the new 2013 ACR and EULAR classification criteria for Systemic sclerosis, which increased diagnostic sensibility and sensitivity.

## P836

### REFERENCE INTERVALS FOR SERUM CONCENTRATIONS OF TWO BONE TURNOVER MARKERS FOR GREEK ADULT MEN AND WOMEN

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**Objective:** Bone turnover markers (BTMs) reflect the metabolic activity of bone tissue and can be used to monitor osteoporosis therapy. To adequately interpret BTMs, method-specific and population specific reference intervals are needed. We aimed to determine reference intervals for serum concentrations of intact N-terminal propeptide of type I procollagen (PINP), and C-terminal telopeptide of type I collagen (CTX).

**Methods:** We collected samples from 439 apparently healthy Greeks (140 men as well as 150 pre- and 139 postmenopausal women), who volunteered to participate in our study. Data on socio-demographic characteristics, medical histories and medications were collected and subjects with conditions or receiving medications that affecting bone metabolism were excluded. All blood collections were performed in the morning after overnight fast. Serum PINP, and CTX concentrations were measured by an electrochemiluminescent assay (ECLIA) on the Cobas e411 (Roche Diagnostics). The reference interval was defined as the central 95% range. We determined reference intervals for PINP, and CTX for each group according to CLSI guide C28-A3 and using the MedCalc Software.

**Results:** The mean age of men, pre- and postmenopausal women were 50.7, 40.7 and 58.4 years respectively. Since our data were not normally distributed (Shapiro-Wilk test) in any of the three groups and after the exclusion of outliers (Tukey test), we used the non-parametric method suggested by the CLSI guide in order to determine the reference intervals. For PINP the reference intervals were 26.8-80.2 ng/mL, 25.9-86.9 ng/mL and 26.1-099.7 ng/mL for men, pre- and postmenopausal women respectively. For CTX the reference intervals were 140-704 pg/mL, 114-649 pg/mL and 134-827 pg/mL for men, pre- and postmenopausal women respectively.

**Conclusion:** We provide gender and menopausal status specific reference intervals for the determination of PINP, and CTX concentrations in serum of men, pre- and postmenopausal women. Our data may aid to interpret bone turnover in the Greek adult



population

P837

### EFFECTS OF ACTIVITY AND SEDENTARY TIME ON BONE CHARACTERISTICS AMONG IRANIAN ELDERLY POPULATION: FINDINGS FROM BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

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**Objective:** Older adults tend to suffer osteoporotic fractures, which cause significant morbidity. The objective of this study was to investigate the role of activity level and sedentary time as risk factors for osteoporosis among elderly population.

**Methods:** Using data generated by 2384 women and men participating in the BEH study, stage 2, this cross-sectional study was carried out. The correlation of determinants of bone health including BMD, trabecular bone score (TBS) values, with activity level, and sedentary time were investigated among women and men participants separately. Univariate and multivariate linear and logistic regression models were used to measure the effects of confounding factors such as age, BMI, years of schooling, smoking, diabetes mellitus (DM), cancer, and years after menopause.

**Results:** According to our results, although physically inactive participants had significantly lower BMD femoral neck and total hip than physically active participants ( $P=0.015$ ,  $P=0.006$  among male participants,  $P=0.033$ ,  $P=0.031$  among female participants), the mean TBS did not differ significantly between those who were physically active and those who were inactive. In addition, sedentary time negatively correlated with BMD femoral neck and total hip in male participants. ( $P=0.04$ ,  $P=0.03$ ). When confounding factors are taken into account, these significant relationships disappear. Regression analysis showed, in male participants the chance of osteoporosis increases by 48%, and 55% with each 10-year increase in participants age, and each 5-unit decrease in BMI. Also smoker men had a 1.77 time more chance to osteoporosis. Among female participants, the chance of osteoporosis increased by 79% and 34% with each 10-year increase in age, and years after menopause, respectively. Also each 5-unit increase in

BMI owing to decrease the chance of osteoporosis by 40%. Furthermore, sedentary time was not associated with osteoporosis in male or female participants, according to a logistic regression model.

**Conclusion:** BMD and TBS values were significantly correlated with age, BMI, years after menopause, and smoking, although we could not identify any association between physical activity level, sedentary time, and bone health determinants.

P838

### TREATMENT OF SEVERE SECONDARY OSTEOPOROSIS IN YOUNG ADULT PATIENT: A CASE REPORT

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**Objective:** Secondary osteoporosis in young people often remains undiagnosed, which leads to the development of complications and a decrease the quality of life of patients.

**Case report:** 39-year-old patient had been suffering from ankylosing spondylitis from the age of 20. Received non-steroidal anti-inflammatory drugs, sulfasalazine for several years. Underwent total left and right hip replacements in 2010 and 2011 respectively. Then was treated with methylprednisolone, methotrexate (was discontinued due to adverse event). High activity of the disease persisted; the patient was constantly taking glucocorticoids. Since 2013, proteinuria was noted, renal amyloidosis was confirmed by nephrobiopsy. Was treated with biological drugs (tocilizumab, then infliximab). Since 2016, progression of renal failure was noted, the patient was on hemodialysis. In 2018, a successful kidney transplant was performed. The patient received the following therapy: adalimumab, mycophenolate mofetil, cyclosporin, methylprednisolone 4 mg. 4 weeks after the kidney transplant, pain appeared in the lower back, and CT revealed wedge-shaped deformities of Th10, Th11, L2, L3. Densitometry was performed, which confirmed osteoporosis of lumbar spine (Z score - 3.7). Due to the pathology of the kidneys, denosumab in combination with calcium and vitamin D was prescribed as an antiresorptive agent for the treatment of osteoporosis. Dynamics of indicators of BMD during treatment with denosumab is shown in the table. Repeated spine morphometry didn't reveal new vertebral fractures.

**Table 1.** Showings of BMD in lumbar spine (Z-score) and periprosthetic zones ( $\text{g}/\text{cm}^2$ ) during the course of treatment

	L1	L2	L3	L4	Left femur Reg.1/ 7	Right femur Reg1/7
25.07.16	-3,7	Z -3,5	Z -3,2	Z-3,6	0,377/0,876	0,398/0,961
18.08.18	-4,7	4,5	-4,9	-5,2		
03.01.20	-4.2	-3.8	-4,3	-4,2	0,264/0,615	0,237/0,690
23.02.21	-3,0	Z-3,1	-3,7	-3,4	0,333/0,708	0,277/0,724
Trend 2020/2021	L1-L4 + 17%				Reg1 +26%/ Reg7 +15%	Reg1 +16%/ Reg7 +5%
2022	-2,7	-2,8	-2,7	-3,0	0,335/0,695	0,284/0,695

**Conclusion:** Our case demonstrates successful use of denosumab for the treatment of severe complicated osteoporosis in young adult male patient with risk factors of osteoporosis and low energy fractures (persisted high activity of autoimmune disease, prolonged use of glucocorticoids and immunosuppressive drugs, kidney failure). Careful medical examination should be always carried out in each patient with multiple risk factors of osteoporosis to exclude potentially reversible causes of bone loss and timely start anti-osteoporotic treatment.

### P839 HYPOVITAMINOSIS D IN ADULTS IS AN ACTUAL PROBLEM IN THE REPUBLIC OF BELARUS

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**Objective:** Vitamin D deficiency leads to dysregulation of calcium homeostasis, bone metabolism, and activity of other systems of the human body. Recently, its role in the pathogenesis of COVID-19 infection has been actively studied. The purpose of the study was to determine the frequency of hypovitaminosis D in the adult population of the Republic of Belarus.

**Methods:** We evaluated the results of laboratory determination of 25(OH)D performed in people over 18 years for the period 2019 and 2020. A total of 131,292 results were analyzed (49,248 in 2019 and 82,044 in 2020). Information about the age of patients and the date of the tests were also obtained and analyzed. Determination of the level of total vitamin D (25(OH)D) in blood serum was carried out by electrochemiluminescence. Vitamin D status was assessed according to international recommendations: normal if 25(OH)D ≥30 ng/ml, insufficiency - 20-29.9 ng/ml, deficiency - <20 ng/ml, and severe deficiency - <10 ng/ml.

**Results:** The average level of vitamin D in the surveyed population during the study period did not reach normal values in all age groups, both in men and women. The frequency of hypovitaminosis D was more than 70% in winter and more than 50% in summer in all examined patients, regardless of age. Attention is drawn to the high prevalence of hypovitaminosis D in young people (18-44 years old), which amounted to 73.9% for men in 2019 and 68.8% in 2020, for women 71.8% and 68.8%, respectively. Analysis of vitamin D status by months (Figure 1) showed that hypovitaminosis D in the surveyed sample expectedly prevailed in the autumn-winter months: the highest frequency of hypovitaminosis was observed

in the autumn-winter months and reached maximum values in January in people older than 75 years (28% of those surveyed had vitamin D deficiency, 41.5% - deficiency, 11.9% - severe deficiency). However, in people of other age groups in the winter months, the frequency of hypovitaminosis was high with maximum values of 79.8% for people in the age group 18-44 years old, 78.3% for people in the age group 45-59 years old, 78.9% in the age group 60-74 years old. It should be noted that even in the summer period, most of the surveyed had hypovitaminosis D of varying severity, the highest% of normal 25(OH)D values was 44.9% for persons in the age group 18-44 years, 41.4% for persons in the age group 45-44 years. 59 years old, 39.6% for people aged 60-74 years and 30.4% for people over the age of 75 years.



**Conclusion:** Hypovitaminosis D is widespread in the adult population of the Republic of Belarus, regardless of age and gender, as well as the season. Measures for the prevention and treatment of this condition should be one of the priorities of health practitioners, taking into account the potential effects of vitamin D on the course and outcomes of COVID-19 infection, especially in patients at risk.

### P840 BODY COMPOSITION ANALYSES AND FUNCTIONAL ACTIVITY IN MEN WITH CHRONIC HEART FAILURE

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**Objective:** To evaluate fat mass, lean mass, BMD and functional activity (FA) in men with chronic heart failure (CHF).

**Methods:** The case-control study included 100 men aged 20-70 years (average age 54.34±11.16). The group of patients with CHF consists of 50 men with NYHA functional class (FC) I-III and left ventricular ejection fraction <50%. The control group was represented by 40 patients without CHF. Body composition and BMD of the lumbar spine and the proximal femur was measured using DXA. Low bone mass was defined as Z-score to -2 and below in

men under 50 years and to the T-score to -2.5 and below in men over 50 years. To assess FA, a brief battery of physical activity tests (SPPB), hand-held dynamometry, the timed up and go (TUG) test, and the 6-minute walk test (6MWT) were used.

**Results:** The low BMD was registered in 60% in both groups. The analysis in the group with CHF showed the independent relationship of the BMD in all measured areas with FC CHF, adjusted for age and several covariates. There was a significant decrease in FA indicators in patients with CHF compared to the control group: SPPB - 11.2 vs. 11.8 points ( $p < 0.001$ ), 6MWT - 433.6 vs. 51.8 meters ( $p < 0.001$ ), dynamometry - 36.12 vs. 39.68 kg ( $p < 0.05$ ), the TUG test - 6.76 vs. 5.49 s ( $p < 0.001$ ), respectively. An inverse correlation was revealed between FC CHF and such FA indicators as SPPB ( $r = -0.58$ ,  $p < 0.001$ ) and hand-held dynamometry ( $r = -0.46$ ,  $p < 0.001$ ), as well as a direct relationship of CHF FC with the TUG test ( $r = 0.33$ ,  $p < 0.05$ ). Was found the significant inverse correlation between CHF FC and total lean mass ( $r = -0.35$ ,  $p < 0.01$ ), as well as between the N-terminal pro-B-type natriuretic peptide and lean mass ( $r = -0.41$ ,  $p < 0.01$ ) and total fat mass ( $r = -0.31$ ,  $p < 0.05$ ).

**Conclusion:** The average values of BMD in all measured areas of the skeleton didn't significantly differ in the study groups. The decreased FA in patients with CHF is associated with a reduced muscle function with preserved muscle and bone mass.

## P841

### FREQUENCY OF HYPOVITAMINOSIS D AND ASSOCIATION OF PLASMA 25(OH)D WITH INDICATORS OF DISEASE ACTIVITY IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** Vitamin D deficiency is an important environmental risk factor that influences the prevalence and severity of several autoimmune diseases, including rheumatoid arthritis (RA). The aim of this study was to determine the incidence of hypovitaminosis D in patients with RA and to establish the correlation between serum vitamin D levels and indicators of disease activity.

**Methods:** 156 patients with RA were included in the study, mean age  $60.2 \pm 13.9$  years. Assessment of clinical status was performed, including swollen (SJC) and tender (TJC) joint counts, physician's (PhGA) and patient's global assessments of disease activity (PGA), pane assessment by Visual Analogue Scale (VAS). Serum concentrations of rheumatoid factor (RF), C-reactive protein (CRP), total vitamin D (25(OH)D), antibodies to cyclic citrullinated peptide (ACCP) were determined. RA disease activity was evaluated using DAS28 (disease activity score), SDAI (Simplified Disease Activity Index) и CDAI (Clinical Disease Activity Index) scores.

**Results:** The study included 156 patients with RA, mean age  $60.2 \pm 13.9$  years, including 139 women (mean age  $60.1 \pm 13.7$

years) and 17 men (mean age  $58.8 \pm 13.4$  years).). The mean age of disease onset in the surveyed sample was  $49.7 \pm 16.4$  years ( $51.3 \pm 14$  years for men and  $49.0 \pm 16.2$  years for women). According to the results of X-ray densitometry performed in 128 patients, a decrease in BMD, corresponding to osteoporosis, was detected in 51 patients (39.9%), osteopenia - in 39 patients (30.5%), 38 patients (29.6%) had normal BMD. 25 patients (16%) of the examined sample had a history of low-energy fractures. Comparative analysis of demographic data and indicators of RA activity in patients with different levels of vitamin D using ANOVA analysis is presented in the table.

**Table.** Correlation between vitamin D levels, demographics, and disease characteristics in patients with RA

	25(OH)D serum level			p
	Normal (group I, n 47)	Insufficiency (group II, n 45)	Deficiency (group III, n 64)	
Age, years	65,8±14,4	58,4±12,9	58,9±14,1	0,74
BMI	26,0±4,3	26,5±6,2	26,9±5,1	0,96
Duration of RA, yeas	11,2±12,8	8,6±10,3	10,8±10,6	0,72
PGA, VAS	50,4±25,2	39,0±27,7	51,8±26,9	0,1
PhGA, VAS	38,7±20,8	31,5±18,04	39,2±15,7	0,69
Pane, VAS	49,1±26,4	37,3±27,8	52,5±25,4	0,16
RF, u/L	102,8±18,0	73,6±13,2	100,8±12,6	0,977
CRP, mg/L	21,4±5,5	18,3±4,6	29,5±6,7	0,31
ACCP, u/L	374,2±81,2	99,1±60,4	291,4±42,0	0,459
TJC	9,5±1,6	8,1±1,3	13,6±1,5	<b>0,037</b>
SJC	3,8±0,9	2,7±0,7	4,4±0,9	0,16
DAS28	3,3±0,4	3,5±0,4	4,5±0,2	<b>0,006</b>
SDAI	31,0±5,6	27,3±4,6	48,7±6,6	<b>0,029</b>
CDAI	15,1±2,1	14,3±1,9	22,4±2,1	<b>0,009</b>
GC dose, mg	6,7±5,2	6,6±2,6	7,4±2,3	0,99

**Conclusion:** Hypovitaminosis D is common in patients with RA: in the surveyed sample, vitamin D deficiency and insufficiency were observed in 40.7% and 28.7% of patients, respectively. Low 25(OH)D levels in RA patients are associated with higher DAS 28, SDAI, and SDAI scores of disease activity and more TJC.

## P842

### STUDY OF BONE MICROARCHITECTURE AND BONE MINERAL DENSITY IN ACROMEGALY PATIENTS

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**Objective:** To study BMD and microarchitecture of bone using DXA scan and TBS in post op acromegalic patients in Eastern India region.

**Methods:** This was a Cross sectional observational study conducted at Endocrinology outpatient department of a tertiary care centre over a period of 18 months. We had included 30 post operative acromegaly cases (10 males and 20 females) and 30 controls (13 males, 17 females). Cases were age and BMI comparable with controls. Relevant data from investigations done in preoperative and post operative period were collected and tabulated. Imaging of hip and LS (lumbosacral) spine were acquired using the Lunar prodigy Advance machine. TBS data were acquired using Medimaps TBS iN Sight TM version 3 software. We computed and compared all variables for male and female group separately. BMD and Z-score at hip and spine of cases were compared with controls, active cases with inactive cases, hypogonadal with eugonadal cases, correlation of BMD and Z-score at hip with S.IGF1 and s.prolactin levels were done. TBS was calculated for LS (L1-L4) spine and compared with controls.

**Results:** From our study, we found significant ( $p < 0.02$ ) low values of TBS in female cases ( $1.39 \pm 0.13$ ) when compared to female controls ( $1.46 \pm 0.09$ ) even with comparable aBMD levels. TBS scores in male cases ( $-1.48 \pm 0.09$ ) when compared to male controls ( $1.43 \pm 0.09$ ) were lower but with no significant difference. No significant difference was observed in the TBS between eugonadal and hypogonadal cases be they male or female. This suggests acromegalic patients have alteration in bone microarchitecture independently of hypogonadal status. Effect of disease activity and gonadal status on aBMD in acromegaly patients was not demonstrated. We found negative correlation of aBMD with s.prolactin levels only in male cases.

**Conclusion:** Skeletal microarchitecture in acromegalic patients as assessed by TBS appears to be altered when compared with controls even at comparable aBMD levels especially in female patients. We can conclude from the present study that growth hormone and IGF-1 excess can cause changes in microarchitecture of bone independent of sex steroid hormone deficiency, although we feel there is need for studies with larger sample size to understand effects of acromegaly on bone microarchitecture.

## P843

### EFFECT OF 8 WEEKS OF ELECTRICAL STIMULATION WITH RESISTANCE TO INCREASE BONE DENSITY AND REDUCE MUSCLE ATROPHY: A CASE SERIES

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**Objective:** To investigate the extent to which disuse osteoporosis and muscle atrophy be reverses with faradic stimulation under tension in patients with infantile hemiparesis.

**Methods:** Study Design was a within subject, contralateral limb, prospective longitudinal case series. 7 subjects with infantile hemiparesis with minimum 13 years duration were included. Wrist extensors were stimulated with faradic current stimulation against the theratube applied to fingers for 3 sessions of 20 contractions each, 5 days a week for 8 weeks. Primary outcome measure was BMD of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> metacarpal and lower end radius

and ulna measured using DXA. Muscle atrophy at upper part of forearm and mid forearm region was measured using cross sectional area (CSA).

**Results:** There was a significant increase in bmd from baseline of distal radius ( $0.82 \text{ g/cm}^2$ ), ulna ( $0.78 \text{ g/cm}^2$ ), 1<sup>st</sup> metacarpal ( $0.69 \text{ g/cm}^2$ ), 2<sup>nd</sup> metacarpal ( $0.62 \text{ g/cm}^2$ ) and 3<sup>rd</sup> metacarpal ( $0.68 \text{ g/cm}^2$ ). CSA increased at mid forearm region from  $1000 \text{ mm}^2$  at baseline to  $1700 \text{ mm}^2$  after 8 weeks and at upper part of forearm from  $1900 \text{ mm}^2$  to  $2800 \text{ mm}^2$ .

**Conclusion:** There was a partial reversal of osteoporosis and muscle atrophy after 8 weeks of resisted electrical stimulation.

## P844

### SERUM LEVELS OF DEHYDROEPIANDROSTERONE SULFATE AND CORTISOL IN PATIENTS WITH THE METABOLIC PHENOTYPE OF OSTEOARTHRITIS

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**Objective:** To assess the levels of dehydroepiandrosterone sulfate (DHEA) and cortisol in the blood in patients with the metabolic phenotype of osteoarthritis (OA) and to identify their possible influence on the course of OA.

**Methods:** We examined 91 patients (22 men) with a reliable diagnosis of knee OA according to ACR criteria. Mean age was 54 [50; 58] years, duration of OA – 7 [4; 12] years. We performed anthropometric examination, evaluation of joint pain according to VAS, WOMAC, lipid and carbohydrate exchange, blood levels of DHEA and cortisol, roentgenographic and arthrosonographic examination of knee joints.

**Results:** Metabolic syndrome (MS) was diagnosed in 47.3% of patients with OA. Patients with the metabolic phenotype of OA showed lower levels of DHEA ( $2.45 \pm 1.41$  vs.  $2.79 \pm 1.84 \mu\text{g/mL}$ ,  $p > 0.05$ ) and cortisol ( $428.9 \pm 211.7$  vs.  $542.1 \pm 244.3 \text{ nmol/L}$ ,  $p = 0.049$ ) in blood, compared with OA patients without MS. The metabolic phenotype of OA was characterized by a more severe course. There were higher intensity of knee joint pain on movement ( $p = 0.017$ ) and nocturnal pain according to VAS ( $p = 0.025$ ), total WOMAC score ( $p = 0.049$ ), C-reactive protein level ( $p = 0.027$ ), synovitis was detected more frequently ( $p < 0.001$ ), were more significant arthrosonographic changes of hyaline cartilage ( $p = 0.025$ ), more pronounced radiological changes ( $p = 0.046$ ). Patients with and without MS were comparable in age ( $p = 0.25$ ) and duration of OA ( $p = 0.89$ ). According to arthrosonography, increase in BMI was directly related to increase in osteophyte size ( $r = 0.43$ ,  $p = 0.003$ ) and inversely correlated with width of joint gap of knee joints ( $r = -0.37$ ,  $p = 0.014$ ). Negative correlations between blood levels of DHEA and osteophyte size on radiographs ( $r = -0.33$ ,  $p = 0.048$ ), between cortisol and effusion volume in knee joints ( $r = -0.38$ ,  $p = 0.013$ ), and positive correlation between blood levels of cortisol and hyaline cartilage thickness according to ultrasound

( $r=0.58$ ,  $p=0.005$ ) were revealed in patients with metabolic OA phenotype.

**Conclusion:** MS was diagnosed in 47.3% of patients with OA. Patients with the metabolic phenotype of OA showed lower blood levels of DHEA and cortisol compared to OA patients without MS. A negative effect of abdominal obesity on the course of knee OA was demonstrated. Correlations between blood levels of adrenal hormones and arthrosonographic and radiological changes in knee joints were revealed.

## P845

### FRACTURE LIAISON SERVICE: REAL-LIFE IN A UNIVERSITY HOSPITAL OF BUENOS AIRES

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**Objective:** Fragility hip fractures are associated with increased morbidity, mortality, and secondary fractures. Fracture Liaison Service (FLS) is a post-fracture care coordination and multidisciplinary model that revealed an important reduction in subsequent fractures with impact in quality of life and health costs. We aimed to evaluate the results after of the implementation of the FLS unit on patients with recent hip fracture, in a University Hospital of Buenos Aires.

**Methods:** We conducted a prospective cohort study on patients  $\geq 50$  yo, who were consecutive admitted in the emergency department for osteoporotic hip fracture from March 2021 to December 2022. After orthopedic treatment, all patients received endocrine evaluation about osteoporosis risk factors, history of fragility fractures, daily calcium intake, drugs, laboratory testing and DXA scan. We assessed the adherence to treatment after FLS implementation.

**Results:** A total of 181 individuals ( $82.3 \pm 9.2$  yo), 141 women and 40 males were included. Forty seven (26%) patients had history of prior fragility fracture: 53.2% referred contralateral hip fracture and 23.4% reported  $\geq 2$  fractures in the last 10 years. However, only the 27.6% of them, had received some osteoporosis therapy. We detected 3 atypical femoral fracture associated to long-term bisphosphonates treatment. Twenty two (12.2%) patients died during the follow-up, 86.3% of them died in the first 6 months after surgery. Finally, 156 patients were incorporated at our FLS unit. We found different problems that interfered with the attendance of the patients. The 52.6% of cases were missed or had an incomplete evaluation. The main reasons of non-attendance were: refusal of treatment, living alone or in a nursing home, inability to attend the hospital for different reasons, failure to attend their scheduled appointment, wrong contact phone number or patients that decided to continue treatment in other center. A total of 74 patients (47.4%) received anti-osteoporosis therapy and no re-fracture were detected during the follow-up.

**Conclusion:** the FLS model allowed us to improve the assessment and /or treatment of patients with a recent fragility hip fracture. However, the challenge is to detect and solve the difficulties of implementing this model in real life, in order to reduce the treatment gap.

## P846

### THE ENDOCANNABINOID SYSTEM AND OSTEOBLASTOGENESIS: PRELIMINARY AND CLEAR RESULTS OF THAT THIS SYSTEM ENHANCES OSTEOBLASTOGENESIS

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**Objective:** The endocannabinoid system (ES) has recently been recognized to be present in bone, playing a role in the regulation of bone homeostasis. Nevertheless, the role of the ES in the osteoblastogenesis is not completely clear. Hence, the principal aim of this study has been to investigate and demonstrate how the ES is involved in the osteoblastogenesis process, starting to evaluate the effects of anandamide (AEA), one of the principal endocannabinoids on osteogenic differentiation of osteoblast progenitors.

**Methods:** Adipose tissue derived mesenchymal stem cells (preadipocytes (PA)) and bone marrow derived mesenchymal stem cells (MO) are both able to differentiate in several cellular lineages, and to differentiate into osteoblasts. To study the effects/role of the ES on the mineralization process we have evaluated the in vitro effects of a range of AEA concentrations (i.e. 1nM-10nM-100nM-1 $\mu$ M-10 $\mu$ M) on osteogenic differentiation, of three primary PA lines and of three primary MO lines. The effects of AEA on the osteogenic differentiation process have been evaluated through several cellular and molecular biology analyses.

**Results:** The data obtained showed that all the tested AEA concentrations induced a significant increase of ALP activity as well as an equal increase in the production of HA deposits during in vitro osteogenic differentiation of both tested PA and MO lines. Gene expression analyses have also revealed that all the tested concentrations of AEA induced an early increase in the expression levels of osteogenic differentiation genes. Studies regarding the modulation of the components of the ES during the osteogenic differentiation process are now ongoing.

**Conclusion:** For the first time, thanks to the established bioassay of PA and MO lines, we reported that our findings indicate that the endocannabinoid system is really involved in the osteoblastogenesis and that can enhance this process. Our preliminary results performed on these in vitro human osteoblast precursors seem really demonstrate that the ES could be an ally in the treatment of the bone loss and in the treatment of all those pathologies which

are characterized by an altered bone mineralization process.

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P847

### VALIDATION OF TEN OSTEOPOROSIS SCREENING TOOLS IN RURAL COMMUNITIES OF TAIWAN

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**Objective:** Patients with osteoporosis are at risk of osteoporotic fractures, which leads to immobility and worsened quality of life. However, many patients were not diagnosed as osteoporosis until they encountered a fracture. Therefore, an early diagnosis and treatment for osteoporosis are crucial. This study aimed to know the performance of osteoporosis screening tools (OSTs) in rural communities of Taiwan.

**Methods:** In this prospective cohort, a total of 567 senior citizens from rural communities in Taiwan were recruited. All clinical factors needed for osteoporosis assessment were collected through a comprehensive questionnaire, and BMD of lumbar spine, bilateral femoral neck, and bilateral hip were measured by DXA. Ten existing osteoporosis screening tools (OSTs) were conducted for all senior citizens. Discrimination analysis measured by the area under the receiver operating characteristic curve (AUROC) was performed to evaluate the performance of the 10 OSTs.

**Results:** Among the 567 senior citizens, the DXA examination revealed 63.0% of females and 22.4% of males having osteoporosis. In females, OSIRIS and OSTA presented the best AUROC value with 0.71 (0.66-0.76) and 0.70 (0.66-0.75). In males, BWC had the best AUROC value of 0.77 (0.67-0.86), followed by OSTA, SCORE, and OSIRIS. OSTA and OSIRIS showed acceptable performance in both females and males. The specificity of FRAX-Hip, SCORE, NOF, OSIRIS, ORAI, ABONE, and BWC increased in both females and males after the optimum cut-off was applied.

**Conclusion:** Considering performance and simplicity, OSTA appeared to be the best tool for seniors of both genders among the ten OSTs. This study provides a viable reference for future development of OSTs in Taiwan. Further adjustment according to epidemiological data and risk factors was recommended while applying OSTs to different cohorts.

P848

### PROPORTION OF DIFFERENT ROUTES OF INTERVENTION THRESHOLDS IN A GRATUITY TREATMENT PROGRAM FOR OSTEOPOROSIS IN A ROMANIAN REFERRAL CENTRE

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**Objective:** To calculate the proportion of patients under a BMD threshold (<-2.7 SD) or with prior fragility fracture to access an ongoing osteoporosis treatment program in Romania and to analyze FRAX probabilities thresholds to be used in a near future.

**Methods:** The current criteria to access the program are: 1. T-score BMD by DXA <-2.7 SD at the lumbar spine or hip; 2. A prior fragility fracture (those of MOF) plus a T-score BMD less than -2 SD. Charts with complete data were available for 293 female patients, enrolled between 2018-2022, mean age 68.8 yrs. BMD by DXA was measured at lumbar spine and hip, fragility fractures were confirmed by X-rays and FRAX probabilities were calculated with the Romanian FRAX model (<https://www.sheffield.ac.uk/FRAX/?lang=r>)<sup>1</sup>. We used a fixed probability threshold beyond 70 yrs.<sup>2</sup> (high risk: MOF >10%, hip >3%) and compared with it the risk incurred by the first two criteria.

**Results:** Almost 70% had T-score BMD <-2.7 SD (mean T-score LS -3.2 SD and -2.5 at the hip, mean age 68.7 yrs.) and no fractures. The corresponding mean risk was MOF 8%, Hip 3%. More than 30% had prior fractures (mean age 71.4 yrs.), with similar mean T-scores but higher mean risk: MOF 12%, Hip 5%. Only 20% who qualified with BMD and without fracture had MOF>10% and 32% hip>3%. 63% of pts. with fracture had MOF >10% and 67% had hip>3%.

**Conclusion:** The use of the T-score as an intervention threshold and the sole gateway to therapy still dominates osteoporosis management in our country. Efforts needed to move the field towards risk assessment and treatment, adjustments of FRAX and updated education for those practicing osteoporosis.

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**Acknowledgments:** To all colleagues who referred and managed patients.

P849

### ANTIHYPERTENSION EFFECTS OF CALCIUM INTAKE ITSELF: EVIDENCE FROM UK BIOBANK

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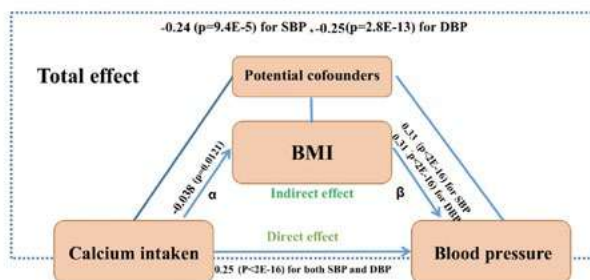
**Objective:** Calcium is well known to be integral to bone and muscle health. Recent studies have highlighted the significant effects of calcium in extra-musculoskeletal functioning, including the cardiovascular system. There is growing evidence that the calcium intake may lower the risk of hypertension. Whether this as-

sociation is due to the calcium by itself or is mediated by weight loss is uncertain. Our aim was to disentangle these relationships of adults in UK biobank.

**Methods:** UK Biobank is a large prospective cohort comprising 502,637 men and women aged 40 to 69 years at recruitment. Calcium intake was self-reported, (blood pressure) BP was measured twice with a digital sphygmomanometer. Multiple linear regression was used to investigate relationships between calcium intake and BP men/women, controlling for covariates. A mediation analysis was implemented to disentangle the role of BMI in the calcium intake-BP relationship.

**Results:** Mean calcium intake was 978.5 mg/d. For each 500 mg increase in calcium intake, SBP can be decreased by 0.43 mmHg and DBP can be decreased by 0.3 mmHg in men; In women, there was no significant change in SBP, and DBP be decreased by 0.24 mmHg. This association split into an indirect effect of 8.1%, mediated by BMI ( $\beta$ : 0.081, 95%CI: 0.02-0.23), and a direct effect of the calcium intake is -0.24 (95%CI: -0.00007 – -0.00), regardless of the effect mediated by BMI.

**Conclusion:** Dietary calcium intake was negatively associated with diastolic blood pressure (DBP) in both men and women, and negatively with Systolic blood pressure (SBP) in men but not in women. Weight loss as a mediator contributes to the association between calcium intake and lower blood pressure on these UK adults. However, the direct effect of the calcium intake on the BP should be taken seriously.



- Total effect : Whole association between calcium intaken and blood pressure
- Indirect effect : Association between calcium intaken and blood pressure, mediated by BMI
- Direct effect : Association between calcium intaken and blood pressure, adjusted for BMI

## P850

### AUTOANTIBODIES TO STRUCTURAL PROTEINS OF THE INTERCELLULAR MATRIX IN SKIN AND ARTICULAR MANIFESTATIONS OF SYSTEMIC LUPUS ERYTHEMATOSUS

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**Objective:** To study the concentration of autoantibodies to elastin and elastase in the blood serum of systemic lupus erythematosus (SLE) patients with a primary lesion of the skin and musculoskeletal system.

**Methods:** The study included 65 patients with SLE, established according to the criteria of the ACR 1997: 60 (92,3%) women and 5 (7,7%) men. The age of the patients was 42,5±12,1 years; duration of the disease – 8,4±6,7 years. To assess the activity of SLE, the SLEDAI index was used: I degree of activity was detected in 18 (27,7%) patients, II – in 40 (61,5%), III – in 7 (10,8%). The level of autoantibodies to elastin and elastase was determined by enzyme immunoassay using immobilized granular preparations with magnetic properties. Statistical processing was carried out using the programs "IBM SPSS Statistics 20".

**Results:** Skin manifestations were the most common manifestations among SLE patients: 53 (81,5%) patients had erythematous lesions, 31 (47,7%) had discoid lesions, 9 (13,8%) had photosensitivity, 27 (41,5%) – lesions of the oral mucosa. Symptoms of damage to the musculoskeletal system were common: articular syndrome was in 17 (26%) patients, myalgia – in 53 (81,5%), myositis – in 38 (58,5%), tendinitis – in 3 (4,6%). The level of antibodies to elastin in the general group of patients with SLE was 0,050±0,027 units of optical density (u.o.d.), in patients with skin lesions – 0,152±0,082 u.o.d. ( $p<0,05$ ), with arthritis – 0,133±0,071 u.o.d., with muscle damage – 0,130±0,061 u.o.d. The concentration of antibodies to elastase in the general group of patients with SLE was 0,095±0,009 u.o.d., among patients with skin manifestations – 0,179±0,102 u.o.d. ( $p<0,05$ ), with articular syndrome – 0,175±0,077 u.o.d. ( $p<0,05$ ), with myalgias and myositis 0,162±0,091 u.o.d.

**Conclusion:** The presence of SLE manifestations in the skin, joints and tendons is associated with increased synthesis of autoantibodies to elastin and elastase, which may be biomarkers of connective tissue damage.

## P851

### PRIMARY HYPERPARATHYROIDISM ASSOCIATED WITH PAPILLARY THYROID CANCER

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**Objective:** Primary Hyperparathyroidism and papillary thyroid cancer are often described simultaneously, due to ultrasound evaluation of the cervical region. We aimed to present a case of a 68-year-old female patient diagnosed with primary hyperparathyroidism and papillary thyroid cancer that were addressed in one single surgery.

**Case report:** The female patient was investigated for cervical discomfort and difficulty swallowing. She was known with osteoporosis treated for three years with alendronate and cholecalciferol. During the cervical ultrasound, a suspicious nodule was detected in the left thyroid lobe. It had microcalcifications and was intensely hypoechoic. Biological and hormonal assessments showed normal thyroid function (TSH=2.5  $\mu$ UI/ml, FT4=1.12 ng/dl), calcitonin under 2 pg/ml, hypercalcemia with total serum calcium (11.8 mg/dl, normal 8.6-10.3 mg/dl), elevated ionic calcium

(5.36 mg/dl, normal 3.8-4.8 mg/dl), elevated PTH levels (169 pg/ml, normal 11-67 pg/ml), normal phosphate values (4.3 mg/dl, normal 2.7-4.9 mg/dl) and a decreased level of 25OH-vitamin D (20 ng/ml, normal over 30 ng/ml). After the biochemical findings the patient underwent parathyroid scintigraphy that described parathyroid hyperplasia. Abdominal ultrasound examination was performed, but no renal pathology was described. Surgery in the anterior cervical region with removal of parathyroid hyperplasia and total thyroidectomy was performed. The histopathological exam revealed papillary thyroid cancer pT2N1aMx and radioactive iodine therapy was initiated. Three months later, at the follow up two lymphatic metastasis were described and the second surgery is needed.

**Conclusion:** Most cases of hyperparathyroidism go unnoticed because they are clinically silent. In this case, the only medical condition was the osteoporosis already treated for 3 years and due to cervical region investigations, the coexistence of thyroid and parathyroid affection was found. Both of these endocrine conditions were managed with one single surgery.

## P852

### DEVELOPMENT OF AN INTERVENTION THRESHOLD FOR MEN IN THE RUSSIAN FEDERATION ACCORDING TO FRAX: EXPERT CONSENSUS OF THE RUSSIAN ASSOCIATION FOR OSTEOPOROSIS

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**Objective:** According to the European guidelines for osteoporosis, the same FRAX intervention threshold is suggested for men as for women. At the same time, in the Russian Federation, according to research data, an extremely low proportion of identified men who are subject to the initiation of osteoporosis therapy. The female intervention threshold identifies only 1,1% to 4% of men for treatment. We aimed to develop and evaluate various options for the intervention threshold using the FRAX calculator for men in the Russian Federation and adopt the most acceptable intervention threshold by consensus.

**Methods:** Delphi voting was conducted among 18 Russian experts who have publications and personal reports about their experience with the FRAX calculator. For discussion, 5 intervention threshold options with the corresponding rationale based on the literature reference were presented, as well as the proportion of men of different ages to be initiated in each of the options (based on several Russian population-based studies). Anonymous voting was carried out using the Delphi method with questionnaire placed in the Google form. It was proposed to evaluate all options for intervention thresholds on a 9-point Likert scale. Consensus was considered reached if the intervention threshold reached a Likert score of 7 or more points in 80% or more of the experts. The rating of each intervention threshold option was expressed as mean and standard deviations.

**Results:** In the first round of voting, the maximum rating and percentage of agreement is reached for the 9% fixed interference threshold option based on the FRAX calculation. The rating was 7,72±1,6 points, the percentage of experts' agreement was 88,9%. A fixed threshold of 9% determined 13-19,5% of men aged 50 years and older to be treated for osteoporosis, while their proportion increased to 26-38% at the age of 85 years and older.

**Conclusion:** The consensus of experts of the Russian Osteoporosis Association suggests initiating treatment of osteoporosis in Russian men with a 10-year probability of major osteoporotic fractures according to FRAX of 9% or higher.

## P853

### AUTOANTIBODIES TO INTERCELLULAR MATRIX PROTEINS IN ARTICULAR MANIFESTATIONS OF SYSTEMIC SCLERODERMA

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**Objective:** To study the concentration of autoantibodies to elastin and elastase in the blood serum of patients with systemic sclerosis (SS) with lesion of the musculoskeletal system.

**Methods:** The study included 50 patients with SS according to the EULAR/ACR 2013 classification criteria: 38 (76%) women and 12 (24%) men. The age of the patients was 43,2±14,6 years; the duration of the disease – 10,6±8,2 years. Two clinical forms of SS were identified: diffuse in 21 (42%) patients, and limited in 29 (58%) patients. To determine autoantibodies to elastin and elastase, we used the enzyme immunoassay method using immobilized granular preparations with magnetic properties.

**Results:** Lesions of the musculoskeletal system were represented by arthritis, tendonitis, synovitis in 48% of cases, myalgia and myositis – in 36%. The level of antibodies to elastin in the general group of SS patients was 0,128 (0,057-0,199) units of optical density (u.o.d.), in patients with clinical manifestations of musculoskeletal joint syndrome – 0,159 (0,124-0,194), in patients without



musculoskeletal lesions – 0,114 (0,108-0,120) u.o.d. The differences in autoantibody levels between the groups of patients with and without the presence of these manifestations were significant. The level of antibodies to elastase in the total group of SS patients was 0,146 (0,093-0,197) u.o.d., in patients with clinical manifestations of joint-muscle syndrome – 0,146 (0,084-0,208) u.o.d., in SS patients without musculoskeletal lesions – 0,145 (0,072-0,218) u.o.d. The relationship between the joint and muscle syndrome and the concentration of antibodies to elastase was not detected.

**Conclusion:** The association of antibodies to elastin with lesions of the musculoskeletal system in SS can be used to predict the clinical manifestations of the disease.

## P854

### AUTOANTIBODIES TO ELASTIN AS MARKER OF LUNG DAMAGE IN DIFFUSED CONNECTIVE TISSUE DISEASES

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**Objective:** To evaluate the concentration of autoantibodies to elastin in patients with systemic lupus erythematosus (SLE) and systemic scleroderma (SSD).

**Methods:** The study enrolled 58 SLE patients (49 (84%) women and 9 (16%) men), 50 SLE patients (38 (76%) women and 12 (24%) men), and 30 conditionally healthy control subjects. Among pulmonary pathology in SLE (in 34 patients) pleurisy (62%), alveolitis (23%), pneumosclerosis (15%) were diagnosed. Pulmonary tissue pathology was noted in 45 patients with SCD: pneumofibrosis (58%), pulmonary hypertension (27%), pleurisy (15%). Autoantibodies to elastin were determined by enzyme immunoassay using immobilized pellet preparations with magnetic properties. Statistical processing was performed using IBM SPSS Statistics 20. Results were expressed as mean (95%CI).

**Results:** Increased concentrations of antibodies to elastin were observed in SLE and SSD compared to controls ( $p < 0.05$ ). Concentration of autoantibodies to elastin in SLE patients with pulmonary pathology was 0,139 (0,096-0,182) units of optical density (u.o.d.), in the group without lung lesions – 0,136 (0,089-0,178) u.o.d. There were no significant differences between the groups. The concentration of antibodies to elastin in SSD patients with lung pathology was 0,149 (0,131-0,167) u.o.d. and 0,104 (0,079-0,129) u.o.d. without pathology. Concentration of antibodies to elastin had statistically significant differences due to the interstitial lung damage in SSD patients, manifested as pneumofibrosis and pulmonary hypertension with vascular component.

**Conclusion:** Increased concentration of autoantibodies to elastin was found in patients with SLE and SSD. A correlation between the concentration of autoantibodies to elastin and lung damage

in SSD has been revealed, which indicates the possible use of this index as an additional marker of lung damage in SSD patients.

## P855

### MANAGEMENT OF OSTEOPOROSIS DURING THE WAR IN UKRAINE: THE CHALLENGES AND NEW EXPERIENCE

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**Objective:** The Russian aggression had a significant effect on healthcare in Ukraine, in general, and on the diagnostics and treatment of subjects with osteoporosis and its complications, in particular. The purpose was to analyze the features of osteoporosis care in various Ukrainian Centers of Osteoporosis during the war to determine the main challenges associated with Russian aggression for their possible elimination.

**Methods:** We analyzed the activity of the Centers of Osteoporosis from different regions of Ukraine (Kyiv, Kharkiv, Lviv, Zaporizhzhia, and Lyman) during the 11 months of the war and compared the indices during 2019-2021.

**Results:** The analysis confirmed the decreased quantity of DXA procedures and consultations from the beginning of the war in the majority of centers (the maximal fall was observed during the first 3 months). Despite the difficulties related to logistics and other reasons, the resumption of work in the Centers took place after some weeks or months depending on the regions. Activity in some Centers (Lviv, Zaporizhzhia) accelerated due to the increased number of refugees. Despite the decreased number of DXA procedures and offline consultations during the war, we established significantly increased online consultation numbers in most Ukrainian Centers. We revealed common for various Centers challenges for Ukrainian doctors and patients with osteoporosis during the war: reduced attention to the problem, limited access to DXA, delay in anti-osteoporotic therapy initiation, and limitations in its options, “forced drugs holiday”, decreased adherence to osteoporosis treatment, changes in patient’s nutrition and physical activity, reduction in medical personnel numbers, difficulties in communication between the patient and the doctor, an increased frequency of disused osteoporosis, etc.

**Conclusion:** Destruction of hospitals, limited access to emergency and planned medical care, the collapse of the power supply system and transport capabilities, and increased workload on

some hospitals due to a significant number of refugees and internally displaced persons are only some of the problems faced by the Ukrainian medical community. Well-established Centers' cooperation using telemedicine allows for maintaining the provision of medical care to patients with osteoporosis and its complications at an appropriate level despite the challenges associated with war.

## P856

### ELECTROCARDIOGRAPHIC ABNORMALITIES IN PATIENTS WITH PSORIATIC ARTHRITIS

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**Objective:** To identify functional heart abnormalities in psoriatic arthritis (PsA) patients according to electrocardiography (ECG) data, to analyze the frequency of occurrence of major changes, to determine their relationship with the clinical manifestations of PsA.

**Methods:** 50 patients with PsA took part in clinical study: 12 (24%) women and 38 (76%) men. Mean age of patients was 51,4±8,6 years, duration of disease was from 0,4 to 42 years. Spondyloarthritic variant with presence of inflammatory back pain according to ASAS 2009 criteria was revealed in 32 (64%) patients, polyarthritic variant - in 16 (32%), mutilating variant - in 2 (4%). 14 (28%) patients had limited vulgar psoriasis, the rest had widespread psoriasis. Most patients had moderate to high PsA activity (DAS28-CRP(4)≥3.2), only 6 (12%) patients had low activity. All patients were on baseline anti-inflammatory therapy.

**Results:** In 17 patients (34%) with PsA no abnormalities were revealed by ECG data. The rhythm and conduction disorders were registered in 12 (24%) patients: Giss bundle branch block - in 6 (12%) patients, atrioventricular block - in 1 (2%), extrasystole - in 2 (4%), sinus rhythm disorders (sinus tachycardia) - in 3 (6%). Diffuse myocardial changes were described in 6 (12%) cases. Left ventricular hypertrophy (LVH) occurred in 15 (30%) patients. The findings correlated with the degree of activity, duration of PsA and traditional factors of cardiovascular complications: hypercholesterolemia, abdominal obesity, arterial hypertension.

**Conclusion:** According to ECG data, the patients with PsA revealed the disorders of rhythm and conduction, which had no evident clinical picture, as well as the signs of diffuse changes in myocardium and HLV. The obtained data confirm the belonging of the patients with this pathology to the group of high cardiovascular risk. Early detection of abnormalities according to routine ECG data helps to identify the category of patients requiring further monitoring.

## P857

### REAL-LIFE EXPERIENCE OF BUROSUMAB TREATMENT IN PATIENTS WITH TUMOR-INDUCED OSTEOMALACIA

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**Objective:** To evaluate patients who required burosumab treatment among the referral population with tumor induced osteomalacia (TIO).

**Methods:** consecutive patients with TIO diagnosed between 2018-2022 were enrolled into the observational study at the National Medical Research Centre for Endocrinology in Russia. The levels of iFGF23 were measured using ELISA Kit Biomedica BI-20700, the median values in serum of healthy individuals were 14.8 [3.8;25.0]. Phosphate levels (reference range 0.74-1.52 mmol/l), alkaline phosphatase (reference range 40-150 UE/l) were measured by Abbott Architect c8000; tubular reabsorption of phosphate (TRP) was calculated at <http://www.scymed.com/en/smnxps/psphpd274.htm>

**Results:** 40 patients (age 48 [41;63] min 19, max 73, male 42.5%) with biochemically-confirmed TIO (phosphate levels 0,47 [0,4; 0,53] mmol/l; TRP 62 [52; 67]%; alkaline phosphatase 183 [112; 294] IU/l, iFGF23 106 [35;736] pg/ml) were enrolled into the study. At the moment of evaluation 15 patients did not achieve remission, in 5 cases the tumor was not localized, and in 10 cases surgery was not performed because of death (n=1), disseminated process (n=3), relapse after previous surgery (n=4), incurable surgery localization (sacrum) (n=1), surgery declined (n=1). Five patients (age 53 [49;54] years (minimum 45 and maximum 61 years), 4 males; phosphate - 0.45 [0.38;0.47] mmol/l; TRP 57 [42;58]%, alkaline phosphatase of 196 [195;220] IU/l) received burosumab. In two cases the tumors were not localized, in one case there was prolonged tumor growth of the temporal bone after surgery, in one case there was a disseminated process after the tumor biopsy of calcaneus tumor and in one patient the sacrum tumor (size 40 mm) was impossible to eliminate by surgery. At the time of diagnosis, 100% had multiple pathological fractures with a decrease in height of 14 [13;15] cm. None of the patients could move independently: 3 patients used crutches and 2 used wheelchairs. The pain was unbearable (8-10 points according to the 10-point pain syndrome scale) in all subjects. The median FGF23 levels were 28 pg/ml [27;126] min 19, max 4588 pg/ml; the median dose of burosumab was 0.6 mg/kg per month [0.5;1.5], min 0.5, max 1.8. The treatment duration was 6 [2;12] min 2, max 18 months. Phosphate levels were normalized (0.98 [0.9;1.02] mmol/l) in 4 out of 5 subjects with clinical recovery (fracture healing, pain relief and muscle performance improvements) after the first month of treatment with gradual further improvements. In the one non-responding case of a female patient with a sacrum tumor of 40 mm due

to most likely the highest FGF23 levels of 4588 pg/ml, we plan to increase the dose to 2 mg/kg per two weeks.

**Conclusion:** Burosumab is an effective treatment in case of an unresectable or occult FGF23 producing tumor. The initial FGF23 levels may affect the required burosumab dose to achieve biochemical and clinical recovery.

## P858

### LIPID DISORDERS IN RHEUMATOID ARTHRITIS

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**Objective:** To evaluate lipid spectrum in rheumatoid arthritis (RA) patients without concomitant cardiovascular pathology in history; to reveal disorders and their interrelation with basic clinical characteristics of RA.

**Methods:** The study enrolled 30 RA patients, who received methotrexate for more than 6 months. Disease activity was determined using the DAS28-CRP(4) index. Exclusion criteria were the presence of cardiovascular pathology in the anamnesis, as well as diseases that can affect lipid metabolism. Total cholesterol (TC), LDL, HDL, triglycerides (TG), ApoA1, ApoB were determined in blood plasma of all RA patients; ApoB/ApoA1 ratio was calculated.

**Results:** In the group of RA patients, 22 women and 8 men were examined, age was 56,2±8,7 years, with a duration of arthritis of 5,6±3 years. Most patients (22 (73%)) were seropositive. All patients had DAS28-CRP(4) ≥5,1. BMI was 27,9±3,4 kg/m<sup>2</sup>. In 23 (77%) patients lipid metabolism disorders were diagnosed predominantly of type IIa and IIb according to Fredrickson classification. In this group of patients increased TC was registered in 100% of cases, the value of which was 6,85±1,3 mmol/l. Increased TG was noted in 13 (43%) patients, LDL – in 23 (78%), decreased HDL – in 18 (61%). The value of TG was 1,87 mmol/l, LDL – 3,92 mmol/l, HDL – 1,01 mmol/l. Direct correlations of TC and LDL with age, BMI, as well as activity and duration of RA were revealed. RA activity had a negative effect on HDL. The mean apoA1 level was 1,06±0,36 mg/dL; the mean apoB level was 1,28±0,41 mg/dL. In 14 (47%) patients, the ApoB/ApoA1 ratio was >0,9, which corresponds to a high risk of cardiovascular pathology.

**Conclusion:** Lipid spectrum disorders are frequently found in RA patients. The most expressed were increase of TC, LDL, ApoB, ApoA1 ratio. Each RA patient should be evaluated to determine the overall cardiovascular risk in order to decide on the intensity of treatment, which will help to reduce this risk.

## P859

### STATUS OF LIPID METABOLISM AND BONE MINERAL DENSITY IN WOMEN WITH ARTERIAL HYPERTENSION AND OBESITY

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**Objective:** To study the state of lipid metabolism and mineral density of bone tissue in postmenopausal women with arterial hypertension and obesity, who work under the influence of harmful production conditions.

**Methods:** 170 people (average age – 55.3±0.6 years) in postmenopause were examined, 140 of them had hypertension and obesity. All women were divided into 3 groups: I - 80 women with arterial hypertension and obesity working in harmful production conditions, II - 60 women with arterial hypertension and obesity, III (control) - 30 practically healthy women. Clinical examination included determination of total cholesterol (CHD), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and atherogenic factor (AF). The study of BMD was performed using ultrasound densitometry (AOS-100NW, Aloka (Japan)).

**Results:** The analysis of the biochemical parameters of the blood lipid spectrum showed a significant increase in the level of cholesterol in women of the I and II groups ((6.19±0.17) mmol/l and (5.57±0.20) mmol/l (p<0.05) respectively), in the control group of total cholesterol – (4.42±0.09) mmol/l; increase of LDL-C ((4.43±0.26) mmol/l and (3.98±0.14) mmol/l (p<0.05) respectively), in the control group LDL-C – (2.14±0.10) mmol/l; an increase in AF ((3.5±0.21) mmol/l and (2.91±0.24) mmol/l (p<0.05) respectively), in the control group AF was (1.61±0,10) mmol/l. The level of HDL-C was reduced in women of groups I and II ((1.38±0.05) mmol/l and (1.46±0.05) mmol/l), in the control group – (1.67±0, 10) mmol/l. Thus, lipid metabolism disorders accompanied by the development of hypercholesterolemia and dyslipoproteinemia were found in women with hypertension and hypertension. The indicator of the T-score in the I group was (-2.03) SD, (p<0.05), in the II group – (-1.73) SD, (p<0.05), in the III group – (-0.89) SD. A more pronounced decrease was noted in women of the I group compared to the II group (p<0.05), which indicates the negative impact of harmful production factors on the state of bone tissue. Correlation analysis showed the presence of a negative relationship between the level of total cholesterol and the T-score (r=0.792, p<0.01), the level of LDL-C and the T-score (r=0.68, p<0.01), KA and T-score (r=0.56, p<0.01).

**Conclusion:** In postmenopausal women with arterial hypertension and obesity, working in harmful production conditions, a violation of lipid metabolism and a decrease in the mineral density of bone tissue were found (p<0.05). Harmful production factors are independent factors in the development of dyslipidemia and a decrease in the mineral density of bone tissue. Established correlations confirm the presence of common pathogenetic links in the development of arterial hypertension, obesity, dyslipidemia, and a decrease in BMD in postmenopausal women.

P860

### A CASE REPORT OF A VERY RARE SYNDROME OF CONGENITAL INSENSITIVITY TO PAIN WITH ANHIDROSIS (CIPA)

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**Objective:** Hereditary sensory and autonomic neuropathy type 4 (HSAN4), also called congenital insensitivity to pain with anhidrosis (CIPA), is an autosomal recessive disorder. There is no data about the prevalence. Symptoms begin early in infancy. Neuropathologic findings include a marked reduction in sural nerve size and a severe reduction in unmyelinated and small myelinated fibers in peripheral nerves. HSAN4 has been linked to variants within the tyrosinase-kinase domain of the *NTRK1* gene, which encodes one of the receptors for the nerve growth factor. Nerve growth factor normally induces neurite outgrowth and promotes survival of embryonic sensory and sympathetic neurons. In these patients, pain perception is significantly impaired and autonomic functions are lost while pressure and touch sensations remain intact. Due to anhidrosis, inability to sweat, fever might occur secondary to hyperpyrexia. These patients are more prone to have multiple and recurrent injuries. In the current report we present a case of a pediatric patient with a very rare CIPA syndrome.

**Case report:** In 2020, a 6-year-old girl was admitted to the hospital with fractures, insensitivity to pain, and anhidrosis. At the age of 1, she had a fracture of the humerus and a surgery was done. In total, she had 12 fractures. She also had hyperpyrexia. Osteogenesis Imperfecta was suspected, then genetic analysis was performed and a mutation of the *NTRK1* gene was revealed. The diagnosis of CIPA syndrome was confirmed. The treatment with vitamin D, calcium and zoledronate was started and a good response to treatment was observed. Because of several fractures now she has deformities of both legs, walks with difficulties, and wears orthosis. Since the start of the treatment (appr. 1.5 years), the child has not had any new fractures.

**Conclusion:** This is a rare case of CIPA syndrome, which demonstrates the importance of genetic analyses and highlights the benefits of bisphosphonate treatment. There is no definitive therapeutic intervention for this condition, although early recognition of CIPA patients and early treatment with bisphosphonates can be useful in reducing the frequency and severity of fractures and improving the quality of life.

P861

### NOVEL NUTRACEUTICALS FOR OSTEOPENIA/ OSTEOPOROSIS BASED ON GUT MICROBIOTA MECHANISMS: PRELIMINARY RESULTS FROM THE OSTEOME CLINICAL TRIAL

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**Objective:** The importance of the gut microbiota for both health and disease has been recently intensively studied. It is well proven that the intestinal microbes regulate bone metabolism and can affect bone density. Also, it has been observed that flavonoids and catechins are transformed via the microbes into bioactive compounds, and polyphenols themselves can modify the microflora composition. OSTEOME is a randomised, double-blind trial to evaluate the efficacy and tolerability of a novel dietary supplement for osteopenia advancing the role of gut microbiota in bone remodeling.

**Methods:** 120 postmenopausal women with osteopenia are enrolled in the study. Participants are randomly divided into 3 groups. In those who receive orally: supplement A - calcium and vitamin D, supplement B - calcium, vitamin D and prebiotic oligosaccharides and supplement C - calcium, vitamin D and flavonoids. At baseline and at 3, 6, and 12 months, blood tests are performed to exclude common secondary causes of osteoporosis and measurement of the bone remodeling markers, CTX and PINP. In addition, serum levels of TNF $\alpha$ , IL-1, OPG, RANKL and IGF-1 are measured as well as further investigation of miRNAs is performed. At 0 and 12 months, BMD by DXA at spine, hip and whole body are calculated. Patients also undergo assessment of muscle strength with digital dynamometer and function with certified specific clinical tests at the same time points. Fecal material is collected at baseline and 12 months for metagenomic and metabolomic studies.

**Results:** In the present study, 114 subjects, 40 in group A, 39 in B and 35 in C were recruited. Their mean age was 61 years with a mean BMI 26 kg/cm<sup>2</sup>. Baseline vitamin D was 34 ng/mL and mean PTH levels were 43 pg/mL. Mean baseline PINP and CTX were 51 ng/mL and 440 ng/mL. The mean BMD/T-scores were 1.03/-1,2 at LS, 0.849/-1.27 at total hip and 0.657/-1.31 at the femoral neck.

**Conclusion:** The study is ongoing and at present we report preliminary data on baseline demographic characteristics and parameters of the bone metabolism of participants involved in this study.

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P862

### A CASE OF HYPOPHOSPHATEMIA WITH SEVERE BONE COMPLICATIONS IN A PATIENT WITH DIABETES MELLITUS TYPE 1 RECEIVING KIDNEY REPLACEMENT THERAPY

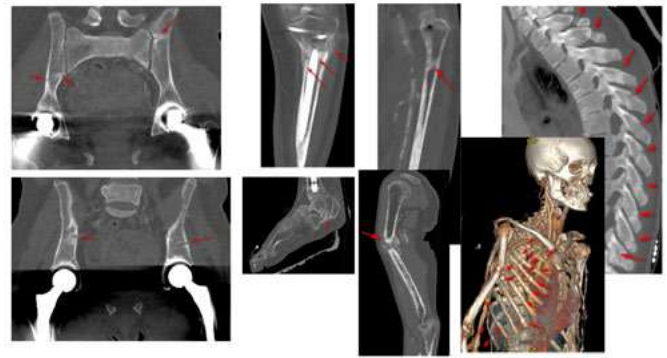
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**Objective:** Type 1 diabetes mellitus (T1DM) is a well-established cause of a secondary osteoporosis. However, the mechanisms of bone deteriorations are still being studied. We describe a clinical case of a patient with T1DM and multiple complications of the disease, who developed low phosphate levels while on kidney replacement therapy associated with multiple low traumatic fracture.

**Case report:** A female patient was admitted to our clinic at the age of 47, complaining of bone pain, muscle weakness, restricted to a wheelchair due to multiple fractures (Fig.1). T1DM was diagnosed at the age of 8, the available HbA1c varied 10-14.2%. The patient developed all complications of T1DM. From the age of 37 renal replacement therapy (RRT) with programmed hemodialysis was started. Glycemic control was extremely poor 5-25 mmol/L with frequent cases of ketoacidosis. From the age of 41 she suffered multiple bone fractures, including fractures of the ribs, both femur necks, and radius bones, she received denosumab 60 mg per 6 months treatment for two years and one infusion of zoledronic acid 5mg at 44 without major improvements. Laboratory evaluation at the age of 44 first revealed hypophosphatemia (phosphorus 0.48 mmol/L), hypocalcemia (total calcium 1.81 mmol/L), alkaline phosphatase (ALP) 1205 U/L, PTH 478 pg/ml. A three-year follow-up revealed HbA1c-10.3%, sodium - 131.2 mmol/L, phosphate - 0.69 mmol/l, normocalcemia, PTH - 97 pg/ml. Renal causes of hypophosphatemia were excluded, because of total absence of urine. Hypophosphatemia on dialysis is extremely rare and was not present in any cases of other patients receiving kidney replacement therapy in the same dialysis center. She was not prescribed phosphate binders, but she received alfacalcidol 0.25 µg, though irregularly. The patient also received several iron infusions due to anemia. We considered the primary cause of her hypophosphatemia to be the effects of intracellular phosphate depletion due to poorly compensated T1DM. Along with stable glycemia 4-7 mmol/l in a hospital care, her phosphate levels gradually increased to 0.76 mmol/L and ALP decreased from 326 to 272 U/L.

**Conclusion:** Severe cases of bone complications in patients with poorly compensated T1DM may be associated with hypophosphatemic osteomalacia due to intracellular phosphate depletion. Consequently, phosphate levels should be checked and repleted.



P863

### 25OHD IN NOT SUPPLEMENTED WOMEN IS LOWER IN WINTER AND OBESITY

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**Objective:** To measure total 25OHD levels in not supplemented women and analyze the relationship between 25OHD with age, BMI and season.

**Methods:** Total 25OHD and calcium was measured in 598 women in La Plata, Argentina. Data are shown as media±standard deviation, and by percentage. ANOVA with post hoc Tukey test, Test Chi, Spearman Rank Correlation coefficient and its significance were calculated. InfoStat (UNC) software was used.

**Results:** Age 52.5±15.2 years; BMI 26.6±6.1; 25OHD 21.8±8.7 ng/mL. 25OHD by age: <50 years (41.0%) 21.1±8.6 ng/mL; 50-65 years (39.6%) 22.7±8.6 ng/mL; >65 years (19.4%) 21.6±8.8 ng/mL (n.s). BMI: <20 (8.7%) 21.8±8.4 ng/mL; 20-25 (39.3%) 22.3±8.7 ng/mL; 25-30 (29.6%) 22.5±8.8 ng/mL; >30 (22.4%) 18.4±7.7 ng/mL (p<0.0001). Season: winter (36.1%) 18.7±7.1; spring (27.4%) 21.2±8.0; summer (14.4%) 26.8±9.5; fall (22.1%) 24.4±8.9 (p<0.0001). Winter and spring (lowest values) and fall and summer (lower values) do not differ from each other (p<0.05). 94.0% of obese woman (OW) and 82.5% of no obese woman (NoW) had 25OHD <30 ng/mL (p<0.0001). OW (18.4±7.7) had lower 25OHD than NoW ((22.9±8.7) (p<0.0001). Correlation coefficient between 25OHD and BMI were -0.21 p<0.0001. By season were winter -0.19 p=0.0060, spring -0.35 p<0.0001 and -0.30 p=0.0056 in summer. 25OHD was not associated with age (p=0,1442). Women with 25OHD <30 ng/mL: 76.5% in fall is not detected significantly different from 68.6% in summer (p=0.2123); 94.9% in winter is significantly different from 87.8% in spring (p=0.0141).

**Conclusion:** Age is not a factor for 25OHD levels. BMI has negative correlation with 25OHD and obese women have lower levels. In summer values are higher although with an average lower than 30 ng/mL It seems necessary when indicating the prevalence of deficiency in a region, or in a disease, detailing the season of the year and whether it is obese or non-obese people.

P864

### THE EFFECT OF THERMAL MINERAL BATHING AND JOINT MOBILIZATION TECHNIQUES ON PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** To demonstrate the effectiveness of thermal mineral bathing associated to joint mobilization techniques in patients with knee osteoarthritis (OA).

**Methods:** The research was conducted at the Ceres Treatment Centre from Baile 1 Mai, Romania, and all the study subjects signed an informed consent form. Ninety-one patients with medium knee OA according to ACR criteria, from two cohorts were included in analysis (Group A and Group B). The Group A (47 subjects) benefited from 30 minutes of knee joint mobilization techniques in addition to 20 minutes of thermal (32° C) mineral (sulfurous, oligomineral) bathing 5 d/week for 4 consecutive weeks. The Group B (44 subjects) received, only, 30 min of knee joint mobilization techniques. A blind researcher assessed patients immediately before and after the treatment. The studied parameters were: pain (VAS-Visual Analog Scale), disability (WOMAC), the 30-s chair-stand test (30s-CST), and health status (SHSQ-25 - Suboptimal Health Status Questionnaire-25).

**Results:** At baseline, age, gender and investigated parameters were not significantly different between groups. Additional improvements in pain, disability, knee mobility and health status were found in Group A vs. Group B. The mean difference between values at 4 weeks and baseline ( $\Delta$ ) were as follows:  $\Delta$ VAS was -1.48 vs. -1.07 ( $p < 0.003$ ),  $\Delta$ WOMAC score was -3.39 vs. -2.34 ( $p < 0.001$ ),  $\Delta$ 30s-CST score was 1.66 vs. 1.09 ( $p < 0.009$ ) and  $\Delta$ SHSQ-25 score was -3.25 vs. -0.07 ( $p < 0.001$ ) in Group A vs. B, respectively.

**Conclusion:** Knee OA patients who performed four weeks of thermal mineral bathing in addition to joint mobilization techniques, had significant improvements in pain, disability, leg strength and health status than those who performed conventional joint mobilization techniques only.

P865

### PLANNING OF PREGNANCY IN PATIENTS WITH OSTEOPOROSIS AND LOW ANTI-MULLERIAN HORMONE

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**Objective:** Osteoporosis is a skeletal condition characterized by low bone mass, which is associated with reduced bone strength and an increased risk of fractures. Osteoporosis occurs mostly in postmenopausal women. Few data exist to guide clinical care for premenopausal women who have low BMD. The guidelines for the treatment of osteoporosis in postmenopausal women do not generally apply to premenopausal women. The purpose of this research is to find out how bisphosphonates affect the quality of oocytes and how to plan a pregnancy in patients with osteoporosis and low anti-mullerian hormone (AMH).

**Methods:** The research was conducted during the years 2021-2023 at Vitromed Reproductive Center and Armenian-American Wellness Center. 11 patients aged between 30-35 years, who had osteoporosis or osteopenia and low AMH levels, participated in this study. The question arose whether to plan the pregnancy early or to freeze the oocytes and start the treatment of osteoporosis in the meantime.

**Results:** The pregnancy itself is burdensome for the skeletal system. Since the AMH levels were low, and there are no reliable data on the safety of treatment with bisphosphonates during pregnancy, a decision was made to freeze the oocytes. Bisphosphonates have systematic effects and may affect the quality of oocytes. After oocyte freezing, patients received treatment with bisphosphonates. One patient who had severe osteoporosis with a T-score of -4.3, received zoledronate twice a year, the others once a year. The DXA results of all patients improved after treatment. When the second DXA examination confirmed the improvement of BMD in all patients, oocyte implantation was performed. 3 patients are already pregnant, the others are still waiting to have oocyte implantation within 2-3 months.

**Conclusion:** For patients who are of reproductive age but have low AMH levels and low BMD, we recommend oocyte freezing, and after receiving anti-osteoporotic treatment for 1-2 years, perform oocyte implantation. Since there are no reliable data on the safety of treatment with bisphosphonates during pregnancy, and its effects on the quality of oocytes, we are planning to continue our research.

P866

### INTRAOPERATIVE PHYSICIAN ASSESSMENT DURING TOTAL HIP ARTHROPLASTY CORRELATES WITH DXA PARAMETERS

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**Objective:** To evaluate intraoperative physician assessment (IPA) during total hip arthroplasty (THA) as a quantitative measure of bone status based on tactile assessment. IPA was compared to

DXA-measured BMD and 3D-Shaper parameters.

**Methods:** Chart review identified 60 patients (64 hips) undergoing primary THA by two fellowship-trained arthroplasty surgeons who had IPA recorded in the operative report and a DXA within 2 years before surgery. Patients were excluded if they had prior surgery on the involved hip. Intraoperatively, surgeons subjectively assessed bone status on a 5-point scale based on tactile feedback. This scale defined bone numerically as 1=excellent, 2=above average, 3=normal, 4=below average and 5=poor. IPA score was compared to DXA BMD and T-score, WHO classification, FRAX scores and 3D Shaper parameters using the Pearson method for continuous variables and Spearman method for ordinal variables.

**Results:** Mean (SD) patient age and BMI were 69.1 (8.5) years and 27.7 (5.9) kg/m<sup>2</sup> respectively; 54 (84%) were female. Patient demographic data and bone parameters were similar between surgeons. Mean (SD) IPA was 2.95±0.98 with no difference between surgeons ( $p=0.121$ ). There was a moderate correlation between IPA score and total hip BMD ( $r=0.386$ ,  $p=0.002$ ) and 3D shaper measurements, including trabecular volumetric BMD ( $r=-0.326$ ,  $p=0.010$ ), cortical surface BMD ( $r=-0.347$ ,  $p=0.006$ ), and cortical thickness ( $r=-0.381$ ,  $p=0.002$ ). There was a strong correlation (all  $p<0.001$ ) between IPA score and lowest T-score ( $r=-0.485$ ), WHO classification ( $r=0.528$ ), and FRAX major and hip fracture scores ( $r=0.501$ ,  $0.622$ ). All patients with below average or poor IPA score (4 or 5) had osteopenia or osteoporosis by DXA.

**Conclusion:** IPA during THA is a simple, valuable tool for quantifying bone status based on tactile feedback. This information can be used to identify patients with poor bone quality that may benefit from bone health evaluation and treatment.

## P867

### DIFFERENCES IN THE CLINICAL FEATURES OF EUROPEAN (HPGD GENE) AND ASIAN (SLCO2A1 GENE) TYPES OF MUTATIONS CAUSING PACHYDERMOPERIOSTOSIS

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**Objective:** Pachydermoperiostosis (primary hypertrophic osteoarthropathy) is an orphan disease, the main clinical manifestations of which include: club-shaped deformity of the fingers like "drumsticks", periostosis (non-inflammatory changes in the periosteum) of tubular bones, pachydermia of the face (hypertrophy and hyperplasia of all skin layers). To date, 2 genes are known, mutations in which are associated with the development of pachydermoperiostosis, HPGD and SLC02A1. It is known that mutations in the HPGD gene are more characteristic of the European population, while mutations in the SLC02A1 gene are more characteristic of the Asian population.

**Case reports:** We describe the difference in clinical presentations

of two Russian patients with HPGD and SLC02A1 mutations.

Patient A, a 21-year-old female, complained of recurrent pain in the joints, deformities of the fingers and toes in the form of "drumsticks". From her medical history she had open ductus arteriosus. She suffered from pain in joints since her childhood. On examination, a Marfan-like phenotype (tall stature, long limbs, enlarged palms, feet, elongated collarbones), coarse facial features, and slight hyperkeratosis on the skin were noted. However, signs of pachydermia (hypertrophy and hyperplasia of the skin of the face) were not observed. No clinically significant laboratory changes were identified. There was an increase in the marker of bone resorption of the C-terminal telopeptide type 1 collagen up to 1.89 ng/ml (0.01–0.7). According to the radiography of the joints, there was an isolated thickening of the cortical layer and endosteum, mainly in the area of the second metacarpal bones and in the radius bones. According to the genetic study, two pathogenic variants in the HPGD gene were identified: in 1 (chr4-174522451-T-A, NM\_000860.6:c.1A>T) and in 2 (chr4-174521985-AG -NM\_000860.6:c.175\_176del) exons in a compound heterozygous state.

Patient B, a 19-year-old male, complained of enlargement of the hands and feet, severe sweating, swelling and pain in the knee joints. The above complaints first appeared at the age of 14 years. Over time, changes in appearance became more pronounced: sharply defined folds of the skin of the forehead, thickening of the skin of the eyelids, swelling of the knee joints, enlargement of the hands and feet, symptoms of "drumsticks". Given the presence of phenotypic and clinical features characteristic of acromegaly (large hands and feet, hyperhidrosis, arthralgia), the hormonal activity of the pituitary gland was assessed. The level of IGF-1 was within the reference range. When examining the state of the skeletal system, an increase in the level of bone remodeling markers was also revealed. X-ray examination of the hands revealed thickening of the cortical bone tissue. Based on the results of a molecular genetic study, two pathogenic variants were found in the compound heterozygous state in the SLC02A1 gene. One of them has already been described for pachydermoperiostosis - p.Gly183Arg. Another: p.Cys444Gly, was identified for the first time and is presumably pathogenic.

**Conclusion:** These clinical cases demonstrate the different clinical presentations of both classic European type of pachydermoperiostosis, manifesting in early childhood and having a relatively mild course, prone to remission, and the Asian variant with a late onset and increasing symptoms of clinical manifestations revealing a typical acromegalic appearance.

## P868

### APPENDICULAR LEAN MASS AND FAT PERCENTAGES CUTOFF VALUES TO DEFINE SARCOPENIC OBESITY IN UKRAINE COMMUNITY-DWELLING OLDER ADULTS

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**Objective:** Sarcopenic obesity – the combination of muscle loss and obesity reduces physical activity and mobility and increases the risk of inability and mortality. Data on its prevalence in the population are ambiguous, which is due to the lack of unified diagnostic criteria. Sarcopenic obesity is the combination of an increased fat percentage and decreased skeletal muscles mass (appendicular lean mass) percentage or appendicular lean mass index according to EWGSOP2 criteria (appendicular lean mass (ALM) <15 kg or appendicular lean mass index (ALMI) <5.5 kg/m<sup>2</sup> for women and ALM <20 kg or ALMI <7 kg/m<sup>2</sup> for men). The aim of the study was to investigate the appendicular lean mass and fat-percentages cut-off values for sarcopenic obesity in the Ukrainian population.

**Methods:** Fat percentage cutoff values to define sarcopenic obesity were measured above the 60th percentile (Zoico-method) in 3095 persons (2666 women and 429 men) aged 20-90 years. Cutoff values for appendicular lean mass percentages (ALM/BW) were assessed as -2 SD in 770 healthy persons (385 women and 385 men) aged 20-39 years. The body composition (body weight (BW), height, fat mass (FM), lean mass, appendicular lean mass (ALM), appendicular lean mass index (ALMI) and fat mass/BW (%), ALM/BW (%)), were assessed by DXA (Hologic, Discovery).

**Results:** Body fat percentage thresholds for sarcopenic obesity were >28% for men and >41% for women. Prevalence of sarcopenic obesity was 3.6% (using ALM <15 kg) and 1.6% (ALMI <5.5 kg/m<sup>2</sup>) for women and 1.6% (ALM <20 kg) and 4.2% (ALMI <7 kg/m<sup>2</sup>) for men. Cutoff values for ALM/BW were <22% for women and <28% for men. The frequency of sarcopenic obesity in a cohort of 3,095 subjects using the cut-off values for fat and lean mass that we selected was 9.6% in men and 9.8% in women.

**Conclusion:** Determining the population-specific cut-off points of fat mass and lean mass is necessary for the further selection of individuals with sarcopenic obesity. Our results are similar to data for other European populations. Differences in the frequency of sarcopenic obesity obtained according to different criteria require further research and unification of criteria.

P869

## XLH, WHEN CHILDREN GROW UP

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**Objective:** To evaluate the clinical characteristics of a cohort of adult patients with XLH.

Hereditary hypophosphatemic rickets are a group of diseases characterized by renal loss of phosphates, which cause growth retardation and rickets or osteomalacia. The most common form is X-linked hypophosphatemic rickets (XLH)<sup>1</sup>. X-linked hypophosphatemia is a genetic disease, one of those considered rare, with an incidence of 1 in 20,000 inhabitants, which causes metabolic disorders that mainly affect the bone. It is characterized by renal loss of phosphorus and alterations in mineral metabolism<sup>2</sup>. It is caused by the mutation of a phosphate regulator gene that is

homologous to an endopeptidase of the X chromosome (PHEX), which leads to an increase in the concentration of FGF23 by a mechanism that is not yet well elucidated.<sup>2</sup>In the proximal tubule, 70-85% of the filtered phosphorus is reabsorbed. At this level, phosphorus transport is mediated by sodium-phosphate cotransporters (NaPi). There are two types of NaPi II a and c in TCP. NaPi IIb is found in the intestine (duodenum and jejunum) and is activated when the phosphate concentration is low in the blood<sup>1</sup>. Phosphorus balance is maintained and regulated by the coordinated action of 3 factors: PTH, FGF23 and the active form of vitamin D (1,25 dihydroxyvitamin D).<sup>3</sup>The increase in FGF23 affects mineralization and skeletal development by several mechanisms, among which are: hypophosphatemia, low or inappropriately normal levels of 1,25 dihydroxyvitamin D, as well as local, autocrine, and paracrine mechanisms.<sup>2</sup>FGF23 is a hormone produced by osteoblasts and since its discovery in the year 2000 it has been implicated as one of the main regulators of phosphorus and vitamin D metabolism. These actions were called classic or canonical actions of FGF23 and they require a co-receptor  $\alpha$ -Klotho that is expressed in various tissues such as the parathyroid gland, placenta, pituitary gland, and choroid plexus.<sup>4</sup>It is currently known that FGF23 is expressed in other tissues and has non-classical or non-canonical functions where it acts independently of Klotho causing myocardial hypertrophy, cardiac fibrosis, induces the secretion of inflammatory cytokines from Kupffer cells, altered immune response, muscle fatigue, cognitive disorders and even pulmonary emphysema.<sup>5</sup>

Currently there are two types of treatment:<sup>6</sup>

1- The conventional treatment that consists of administering phosphorus salts 0.75-1 g/d orally in 4-5 daily doses and active vitamin D in doses of 0.5-1 ug/d.

This treatment has some disadvantages, which is poor oral tolerance to phosphorus salts, causing abdominal pain, nausea and diarrhea, added to the fact that optimal values of phosphorus in the blood are never reached.

2- Specific treatment with anti-FGF23 monoclonal Ab (burosumab) that attacks and blocks FGF23. This drug is called burosumab and has been approved since 2018 in various countries in LATAM, Europe and North America for the treatment of x-linked rickets. It is administered as subcutaneous injections every two weeks in children and every 4 weeks in adults and has been shown to increase levels of phosphorus, vitamin D.

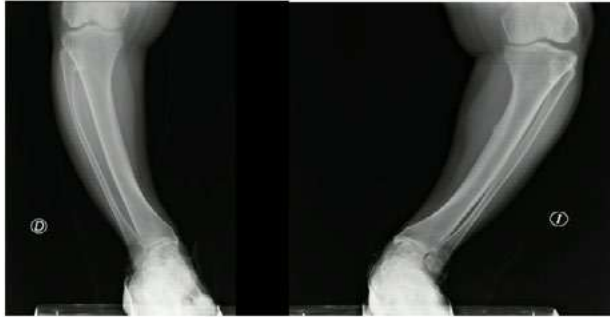
**Methods:** Six adult patients with XLH were evaluated, the clinical history was made detailing the age at diagnosis, sequelae of the disease, medical and orthopedic treatments to which they were subjected, long-term complications of the disease and treatment, and therapeutic alternatives for each patient.

**Results:** With the detailed results, great clinical variability is observed in which adult patients suffering from XLH are found. Bearing in mind that they have been suffering from the condition for many years, we found patients who underwent treatment regularly, patients who underwent it with interruptions, and patients who never started treatment after diagnosis and who currently have complications typical of the natural course of the disease. In our cohort, it can be seen that only one of the six patients carried out the conventional treatment correctly throughout child-



hood and into adulthood. Two patients underwent it partially and three did not undergo any treatment. The bone deformities (Figures) with height alteration are striking. This brings with it difficulty in mobility and consequently a tendency to be overweight and obese with the consequent deleterious effect that the latter can have on cardiovascular and metabolic health, adding another risk factor for morbimortality. Also the negative consequences on the oral health of all the patients studied with orthopantomography; as well as hearing disorders in patients who underwent audiometry (Table).

figures



Lower limb deformity in a 35 years old female. Radiograph image of each leg was taken individually due to severe varus deformity.



35 years old female with varus deformity with distance between both knees of 21 cm



Upper limb deformity in a 29 years old male.



Lower limb deformity in a 29 years old male

Table.

Patient N°	1	2	3	4	5	6
Age (years)	34	20	35	29	N/D	23
Gender	Female	Female	Female	Male	Male	Male
Age at diagnosis (years)	2	5	8	6	N/D	2
Weight (kg)	62	38	58	55	66.6	89.3
Height (cm)	140	134	139	138	N/D	138
BMI	31.6	21.2	30	28.7	N/D	46.7
FGF23 (pg/ml)	<LOQ	268.76	<LOQ	N/D	N/D	<LOQ
Molecular studies	Pathogenic variant found. PHEX gene Diagnosis: X-linked hypophosphatemic rickets	Pathogenic variant found. PHEX gene Diagnosis: X-linked hypophosphatemic rickets	Pathogenic variant found. PHEX gene Diagnosis: X-linked hypophosphatemic rickets	N/D	N/D	N/D
Kidney ultrasound	Normal	Hiperecogenicidad bilateral	Normal	N/D	N/D	normal
Bone densitometry	Normal	Normal	Normal	N/D	N/D	Normal
Echocardiogram	S/D	Normal	Normal	N/D	N/D	Normal
Audiometry	S/D	Yes, pathological	Yes, pathological	N/D	N/D	yes, pathological
Orthopantomography	S/D	Yes, pathological	Yes, pathological	N/D	N/D	Yes, pathological
X-ray of lower/upper limbs	YES	YES	YES	N/D	N/D	Si

Genu valgus/varus (cm)	S/D	S/D	21	7	N/D	NO
Urea (mg/dl)	26	39	27	37	N/D	30
Creatinine (mg/dl)	0.36	0.8	0.4	0.5	N/D	0.6
Calcium (mg/dl)	9.2	8.4	8.7	9.2	N/D	9.9
Phosphorus (mg/dl)	1.6	2.6	1.5	1.3	N/D	1.8
PTH (pg/ml)	65.2	328.8	46.8	27.03	N/D	32.2
25 OH VD (ng/dl)	16.09	20.6	24.1	21.3	N/D	21.5
ALP (mg/dl)	158	157	152	154	N/D	257
Phosphaturia (mg/24hs)	616.9	1458	776.7	639.9	N/D	934.2
Calciuria (mg/24hs)	308.8	2.8	94.5	124.5	N/D	36.2
Creatinuria	888.29	691.08	1147.6	1225.6	N/D	1354.07
Urinary sodium (mEq/24h)	192	170	116	230	N/D	75
TRP	84%	35%	81%	N/D	N/D	81%
TmP/GFR	S/D	1.48	N/D	N/D	N/D	
Orthopedic surgeries	YES	YES	NO	NO	NO	YES
Dental treatments	NO	YES	YES	NO	NO	N/D
Other treatments/complications	NO	N/D	NO	NO	NO	N/D
Conventional treatment	Yes, partial	YES	YES	NO	NO	YES
Specific treatment	NO	NO	NO	NO	NO	N/D

ND: No data; BMI: Body Mass Index; FGF 23: Fibroblast growth factor 23; PTH: Parathormone; 25 OH VD: 25 hydroxy-vitamin D; ALP: alkaline phosphatase; TPR: tubular reabsorption of phosphorus; TmP/GFR: Tubular maximum reabsorption of phosphate/glomerular filtration rate. LOQ: quantification limit

**Conclusion:** We note that patients with XLH reach adulthood with an evident reluctance to see a doctor and this is possibly due to the fact that throughout their childhood they had to undergo multiple studies, treatments that were very difficult to adhere to, and in many cases also undergo surgical interventions, without good results in relation to the therapeutic objectives. In this way, when osteomalacia persists, the sequelae they present are aggravated and the morbidity provided by the conventional treatment used chronically is added. This pathology is usually diagnosed in childhood and it is at this stage that effective treatment and exhaustive follow-up should be initiated. Until recently, the only

treatment available was the conventional one, which does not address the pathophysiology of the disease and presents serious adverse reactions, such as secondary hyperparathyroidism, hypercalciuria, renal lithiasis, nephrocalcinosis, and renal failure. Thus, some patients present complications not only due to the disease but also as a consequence of the treatment instituted for many years. We found renal hyperechogenicity and secondary hyperparathyroidism in the case of the patient who never stopped taking phosphorus salts and calcitriol for 18 years. As a final reflection, we believe that a screening of the disease should be carried out in the pediatric population, emphasizing trying to use specific treatment and thus improve the quality of life of these patients, ensuring development and growth as close to the parameters considered normal; and in adult patients, continue treatment and try to detect complications as early as possible.

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## P870

### STROKE IS A SUBPHENOTYPE OF HIP FRACTURE: A MULTI-COUNTRY LATENT CLASS ANALYSIS

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**Objective:** Hip fracture is a public health issue, and understanding the subphenotypes of hip fracture is clinically important. We aimed to identify the subphenotypes of hip fracture and evaluate their association with healthcare use, complications, and mortality in Hong Kong and the UK populations.

**Methods:** This was a retrospective study using two independent hip fracture cohorts of patients aged  $\geq 65$  years with newly diagnosed hip fractures. The identification of subphenotypes was first conducted using the Hong Kong cohort (HK CDARS), while the external validation was conducted using the UK cohort (UK THIN). Latent class analysis (LCA) was applied to identify hip fracture patient subphenotypes using 24 predefined variables that were associated with hip fracture. The associations of subphenotypes with various clinical outcomes of interest were evaluated.

**Results:** HK CDARS-based training and testing cohorts included 48,720 and 20,879 patients, while the UK THIN-based external validation cohort included 6,562 patients. LCA identified three clusters from the HK CDARS training cohort. Cluster 1 (n=5,296; 10.87%) was dominated by patients with stroke (100%). Cluster 2 (n=13,350; 27.40%) was characterized by patients with CVD other than stroke, and cluster 3 (n=30,074; 61.73%) consisted of relatively healthy patients. Similar three clusters were identified in the test cohort. Using cluster 3 as the reference, clusters 1 and 2 were associated with a higher risk of adverse cardiac outcomes

and mortality, a higher number of unplanned A&E visits, and a longer length of hospitalization. In the UK THIN cohort, the cluster that was dominated by patients with stroke (100%) was consistently identified, and the same association results were observed. **Conclusion:** Using the LCA, we consistently identified stroke as a subphenotype of hip fracture in both Hong Kong and UK populations, and they were associated with poor prognosis.

### P871 THE EFFECT OF METFORMIN ON BONE BIOMARKERS: A META-ANALYSIS OF CLINICAL TRIALS

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**Objective:** Recent clinical studies have highlighted that metformin, the most commonly used anti-diabetic agent, has possible effects on bone formation and/or resorption. Due to the inconsistency of the existing results, we conducted a systematic review/meta-analysis to critically assess the influence of metformin on bone metabolism by assessing its impact on bone biomarkers.

**Methods:** A comprehensive search of PubMed and Web of Sciences databases was performed to find trials published in English until 26 October 2022 and compare the effect of metformin intake alone or in combination with other anti-diabetic agents vs. placebo on CTX and PINP, as the main bone turnover markers linked with bone loss. Non-trials, animal studies, letters, and meeting abstracts were excluded. The study was conducted according to the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-analyses) guidelines 2020.

**Results:** Out of 190 records, 6 trials were included after removing the duplicates and unrelated studies. The majority of the studies were of high quality based on the Jadad Modified scale. The total sample size was 2866 patients who used 1000-1500 mg/d metformin alone or in combination with insulin or placebo and compared with pioglitazone (30 mg/d), rosiglitazone (4 mg/twice/d), glyburide (7.5 mg/twice/d) placebo, or metformin + dapagliflozin (10 mg/d) for 3-18 months. Due to the high heterogeneity (I<sup>2</sup> >98%) of the samples, a random-effect model was used for the meta-analysis. A significant decrease in CTX and PINP levels with a standardized mean difference (SMD) of -1.199, 95%CI [-1.280, -1.118], and -0.234[-0.329, -0.139] was found with metformin use,

respectively.

**Conclusion:** It could be concluded that taking metformin alone or in combination with other anti-diabetics could negatively affect both bone formation and resorption, with a greater impact on the bone formation biomarkers. However, further well-designed trials are required to confirm these results.

### P872 VITAMIN D DEFICIENCY IN THE UKRAINE: CURRENT STATUS

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**Objective:** Previous studies demonstrated the high level of vitamin D deficiency (VDD) worldwide and in Ukraine, in particular. The last Ukrainian epidemiological study dedicated to vitamin D status was published in 2017, so the current knowledge about this topic is insufficient. This research aimed to study the frequency of VDD in Ukraine during the 2016-2022 years depending on age, sex, month, and year of observation.

**Methods:** In a single-center cohort study, we measured the serum 25-hydroxyvitamin D (25(OH)D) level in 7,418 subjects aged 20-99 years. The total 25(OH)D (25-hydroxyvitamin D<sub>2</sub> and 25-hydroxyvitamin D<sub>3</sub>) level in blood serum was measured using the electrochemiluminescence method on Cobas<sup>®</sup> e411 analyzer, (Roche Diagnostics<sup>®</sup>, Germany).

**Results:** The mean serum 25(OH)D level in the total group was 31.0 [22.3-41.1] ng/mL with the lowest 25(OH)D concentration in the subjects aged 90-99 years old. 41.6% of the participants had an optimal (>30-50 ng/mL) 25(OH)D level, 19.5% had a VDD. The share of VDD in our research was significantly lower compared to data from previous Ukrainian studies (2011 year (82%); 2017 years (37%)). The suboptimal and high serum 25(OH)D level (50-100 ng/mL) had 11.4% of the subjects. Additionally, we revealed the increase of serum 25(OH)D level from 2016 to 2022 with the highest values in 2020-2022. Seasonal variations of 25(OH)D concentration found the highest index in autumn and the lowest one in the spring with the highest 25(OH)D level in September and the lowest in March. Also, we established the considerable decline of quantity of 25(OH)D measurement in 2022 during the war in Ukraine, possible due to restriction in diagnostic procedures performing, diminishment of patients interest to vitamin D, and other reasons.

**Conclusion:** Our results confirmed a decreased share of VDD in Ukraine in comparison to previous investigations with similar age and seasonal particularities. The share of VDD in 2020-2022 significantly decreased which can be related to the improvement of public awareness of global VDD, positive skeletal and extra-skeletal effects of vitamin D, and more intensive vitamin D supplementation due to the COVID-19 pandemic in recent years.

P873

**INTERACTION BETWEEN VITAMIN D STATUS AND CANCER**R. Amir<sup>1</sup><sup>1</sup>Research group, Jeumont, France

**Objective:** A good vitamin D (VD) status is proved to be beneficial both in cancer prevention and in the prognosis of several cancers, according to a new research review. Many studies have shown that the VD receptor (VDR) is expressed in almost all tissues of the body. Many tissues without any obvious relationship with the calcium/phosphorus and/or bone metabolism are able to express the VDR, 1- $\alpha$ -hydroxylase, and 24-hydroxylase molecules. 25(OH)D enters these tissues and is locally hydroxylated into calcitriol which binds to the VDRs present in these cells. This "peripheral" production of calcitriol is not regulated by calciotropic hormones (PTH, FGF23, etc.), but seems dependent on the 25(OH)D concentration in the extra-cellular fluid of these tissues.

**Methods:** After review and analysis of multiple publications and several studies, VD is recognized as a regulation factor of the immune system. Its anticancer effects are mediated mainly by immune cells, such as monocytes and T-cells. It exerts its effects via the VDR which is a transcription factor involved in the expression and epigenetic regulation of numerous genes. VD is important both for the differentiation of blood cells during hematopoiesis as well as adult stem cells in rapidly regenerating tissues, such as colon or skin.

**Results:** Preliminary results suggest that VD reduce the risk of developing advanced cancer among adults without a diagnosis of cancer at baseline. This protective effect is apparent for those who have normal but not elevated BMI. More extensively, randomized trial data suggest a stronger benefit of VD on cancer mortality and survival than cancer incidence. Laboratory and animal studies show that VD may inhibit carcinogenesis and slow tumor progression, including promotion of cell differentiation, inhibition of cancer cell proliferation, and anti-inflammatory, immunomodulatory, proapoptotic, and antiangiogenic effects. VD may decrease tumor invasiveness and propensity to metastasize, leading to reduced cancer mortality. Higher serum 25(OH)D levels at diagnosis have been linked to longer survival in cancer patients.

**Conclusion:** Important differences in VD status can be found in any population. A range of lifestyle, personal and genetic factors affect it. These together drive the heterogeneity of treatment affects by determine baseline levels after a calibrated supplementation of VD deficiency, depending of the serum concentration expected. The total serum 25(OH)D levels is currently considered the best indicator of VD supply.

P874

**FACTORS INFLUENCING PEAK BONE MASS IN TRANSGENDER YOUTH**R. Abdala<sup>1</sup>, K. Maury<sup>1</sup>, V. Figueroa<sup>2</sup>, C. Riu<sup>3</sup>, M. V. Fernández Manteberry<sup>4</sup>, M. Sesta<sup>1</sup>, M. B. Zanchetta<sup>1</sup>

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**Objective:** Peak bone mass (PBM), is defined as the amount of bony tissue present at the end of the skeletal maturation, is an important determinant of osteoporotic fracture risk. Race, gender, and family history are responsible for the majority of PBM, but other factors, such as physical activity, calcium and vitamin D intake play important roles. Gender identity is the internal and individual experience of gender. Transgender people are people whose gender identity is different from the gender they were thought to be at birth. Gender Identity Law in Argentina (N 26743) was approved in 2012. Our aim was to provide data regarding determinant factors that may affect PBM in transgender youth.

**Methods:** A cross-sectional study was carried out. Transgender youth who consulted for its evaluation in three centers of Argentine were included. Eating habits, exercise, recreation and sport survey was conducted. Laboratory data were obtained; body composition and BMD by DXA were assessed. The protocol was approved by the ethics committee.

**Results:** 20 male to female (MtF) and 65 female to male (FtM) transgender were included. The mean age was 15.68 y (9-18). 29.5% (n=26) reported vegetarian and/or ovo-lacto-vegetarian diet. 75 answered the physical activity questionnaire, 53% (n=40) of them reported not doing physical activity or exercise. The mean vitamin D (ng/ml) was 18.04 $\pm$ 7.8 in MtF and 19.60 $\pm$ 10.6 FtM (p=NS). 89% had vitamin D values <30 (22%  $\leq$ 10; 37% 10-20; 30%  $\geq$ 20-30). MtF had more BMC (1857 $\pm$ 433 vs. 1564 $\pm$ 326 g; p $\leq$ 0.01) and less trabecular bone score (TBS 1416 $\pm$ 117 vs. 1512 $\pm$ 131; p<0.01) compared to FtM; these differences in TBS could be attributed to the inference of fat tissue (R<sup>2</sup> 0.42; p<0.05).

**Conclusion:** Currently, the medical consultations of transgender youth are increasing. This stage is essential for the acquisition of maximum bone mass. Based on our preliminary study, we believe that a comprehensive assessment of bone health is essential in this population

P875

**OPPORTUNISTIC CT SCREENING FOR LOW BONE DENSITY IN KIDNEY TRANSPLANT PATIENTS: A RETROSPECTIVE MONOCENTRIC STUDY**C. Bardon<sup>1</sup>, D. Chu Miow Lin<sup>1</sup>, H. Longuet<sup>1</sup>, L. Bouilleau<sup>1</sup><sup>1</sup>University of Tours, Tours, France

**Objective:** Each year 3500 kidney transplantations take place in France. These patients have a 4 times higher risk of fractures than the general population(1). This risk prevails during the first two years after transplantation. It is mostly caused by low bone density in trabecular bones. The use of DXA to evaluate this risk

is not recommended in routine practice in this population. Computed tomography (CT) has proven to have the same sensibility as DXA for detecting osteoporosis in the general population(2). We aimed to determine the prevalence and characteristics of patients with low bone density on CT before transplantation and to assess the reproducibility of the density measurement.

**Methods:** Retrospective monocentric study of kidney transplant patients at the CHRU Tours, France, in 2021. Out of the 130 eligible patients, 88 were enrolled. All of them had to be older than 18, have a thoracic or abdominal CT before transplantation that was without any contrast injection and performed at 120 kV. On each CT an oval ROI (region of interest) was placed in the anterior area of the L1 vertebra to measure its density. A 100 HU (Hounsfield Unity) threshold was set to define a low bone density.

**Results:** 29 (33%) patients had a L1 density lower than 100 HU. Of those, 69% were men, 17% had a prior kidney transplant, 86% had a history of dialysis and 10% had a vertebral fracture. All of them had high blood pressure, and more than 50% had dyslipidemia or diabetes. The mean age in the low bone density group was 66 compared to 55 (p=0.001). Bone density decreased progressively with age. We found an excellent intra- and inter-rater reliability: kappa coefficient was 0.98 and 0.96 respectively.

**Conclusion:** CTs can be used opportunistically to detect kidney transplant patients with low bone density that are therefore most at risk for fractures. The L1 density is a reproducible measure that can be done without any supplemental cost or irradiation.

**References:**

- Bouquegneau A et al. Clin J Am Soc Nephrol 2016;11:1282.
- Jang S et al. Radiology 2019;291:360.

**P876**

**OPPORTUNISTIC CT SCREENING FOR VERTEBRAL FRACTURES IN KIDNEY TRANSPLANT PATIENTS**

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**Objective:** Kidney transplant patients have a 4 times higher risk of fractures than the general population(1). This risk prevails during the first two years after transplantation. It is increased by a third between before and after transplantation. The prevalence of vertebral fractures (VF) after kidney transplantation is estimated to be around 40%(2). We aimed to assess the prevalence of VF before transplantation, their incidence during the first year after transplantation and compare patients' characteristics with and without VF.

**Methods:** Retrospective monocentric study of kidney transplant patients at the CHRU Tours, France, in 2021. 88 patients with a thoracic or abdominal computed tomography (CT) before transplantation were included. Presence of VF was identified with the Genant semiquantitative method. Only grade 2 and 3 fractures were retained. After transplantation, we collected prospectively the occurrence of new VF during the first year of post-transplantation follow-up, for patients who had a spine radiography.

**Results:** 5 (6%) patients had a VF before transplantation. Of

those, 2 were women, 4 had a history of dialysis, 1 had a previous kidney transplant, 4 had an inducing osteoporosis medication, 3 had dyslipidemia and all had high blood pressure. Their mean age was 58 (p=0.86). Their mean bone density was 85 and significantly lower than in the non-fractured group (p=0.05). After transplantation, only 2 patients had a new VF, out of the 75 who had a spine radiography. One of them already had a VF before transplantation, and one had a history of dialysis. They both had diabetes and high blood pressure. Their mean bone density before transplantation was 69 compared to 134 in the other group.

**Conclusion:** Presence of vertebral fractures is associated with low bone density in kidney transplant patients. CTs allow a rapid opportunistic screening of VF with any additional cost or irradiation.

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- 2. Durieux S and al. Transplantation 2002;74:496.

**P877**

**ASSESSMENT OF RISK FACTORS IN WOMEN WITH OSTEOPOROSIS ASSOCIATED WITH PREGNANCY AND LACTATION**

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**Objective:** Assessing risk factors for osteoporosis can help with early intervention. The aim of this study was to analyze numerous potential risk factors to see which ones affect pregnancy and lactation-associated osteoporosis.

**Methods:** In this study, we included 2 groups of women examined. The first, main group consisted of 27 women who developed back pain during pregnancy and/or lactation and MRI revealed compression fractures of the vertebrae of various localization. The second, control group consisted of 14 women without fractures and complaints of back pain in history.

**Results:** The control and main groups were comparable in clinical parameters. The average age of women in the main and control groups was 29.4 and 30.9 years. The calculated BMI in both groups was 23.6 and 24.59 kg/m<sup>2</sup>, respectively. The age of onset of menstruation in patients of the main group was 12.9 years, and in the control group 13.2 years. Our analysis showed that between the studied groups, physical activity was significantly more in the control group than in the main group (P=0.001). The analysis showed that open clothing was worn more in the control group than in the OPL group (P=0.01).

		Main group	Control group	P
Relatives had fractures?	yes	11% (3)	0	0,20
	no	89% (24)	100% (14)	

Does he get enough calcium? no	yes	44% (12)	64% (9)	0,16
	no	26% (7)	0	
regularly	not	30% (8)	36% (5)	
Physical activity at least 30 min? no	yes	30% (8)	86% (12)	0,001
	no	11% (3)	14% (2)	
	not regularly	59% (16)	0	
Does he wear open Clothes? no	yes	12% (3)	93% (13)	0,01
	no	88% (23)	7% (1)	
Does he drink 2 cups coffee or soda daily? no	yes	7% (2)	57% (8)	0,65
	no	26% (7)	7% (1)	
regularly	not	66% (18)	36% (5)	
Alcohol abuse? no	yes	0	0	0,001
	no	100% (27)	100% (14)	
Smoking? no	yes	0	0	0,001
	no	100% (27)	100% (14)	

**Conclusion:** Although lack of physical activity and lack of calcium intake, vitamin D deficiency are recognized as risk factors for osteoporosis, the etiology and pathophysiology of this condition remain unknown.

## P878

### GM-CSF AND MPO IN SERUM AND SYNOVIAL FLUID OF PATIENTS WITH RHEUMATIC DISEASES

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**Objective:** The study of GM-CSF and MPO in synovial fluid in patients with rheumatic diseases is a challenge. The aim of the study was to investigate the levels of GM-CSF and MPO in serum and synovial fluid of patients with rheumatic diseases.

**Methods:** In the study for the period 2018-2021, 156 patients with CASPAR criteria for Psoriatic arthritis (PsA) age of 59.00±13.18 (range 29-82 y), 50 patients with activated gonarthrosis (GoA) age of 61.48±11.01 (range 49-81 y) and 15 patients with rheumatoid arthritis age of 55.22±7.21 (range 29-73 y) were analyzed. Serum and synovial fluid samples were examined by GM-CSF ELISA Kit, Elabscience Biotechnology Inc., USA, and human myeloperoxidase (MPO) ELISA Kit, Wuhan Fine Biotech Co., Ltd., China. Descriptive statistics, parametric and nonparametric tests, linear regression, and binary logistic analysis using computer statistical program SPSS, Vers 26 were used for statistical data processing, with p<0.05.

**Results:** Serum levels of GM-CSF and MPO correlate with the age of the patients and the duration of the disease in all patients. A

strong significant relationship were found between the concentration of GM-CSF and MPO in the synovial fluid and the concentrations of circulating GM-CSF and MPO in the patients with PsA (Rs=0.871; p=0.001) and with RA (Rs=0.822; p=0.01). The mean values of GM-CSF and MPO in synovial fluid were significantly lower than in the serum of patients with PsA. The higher level of GM-CSF and MPO strongly correlate with the indices for disease activity in patients with PsA, RA and GoA.

**Conclusion:** GM-CSF and MPO can be used as biomarkers for a severe and aggressive course of the disease in patients with GoA, PsA, RA. Their higher level strongly correlates with the indices for disease activity in patients with PsA, RA and GoA.

## P879

### OSTEOGENESIS IMPERFECTA IN A POSTMENOPAUSE OSTEOPOROTIC PATIENT: CASE REPORT

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**Objective:** To showcase diagnostic challenges of osteogenesis imperfecta (OI) through a case-report. The complete evaluation of osteoporosis in postmenopausal women and also in men must exclude usual endocrine and metabolic causes, but not to exclude genetic evaluations in selected cases such as the case we are presenting.(3)

**Methods:** We present the case of a 56-year-old female diagnosed with osteoporosis, admitted for complaints of diffuse bone pain. The complete endocrinological evaluation for the assessment of thyroid function and morphology (TSH, FT4, TPO, thyroid ultrasound), of parathyroid function and morphology (PTH, calcium, calciuria/24-h, 25-hydroxycholecalciferol, ultrasound and scintigraphy of parathyroid), as well as the complete evaluation of adrenal function excluded a secondary osteoporosis of endocrine nature (1,2). Molecular testing was performed using the TruSight Inherited Diseases on Illumina NextSeq550Dx.

**Results:** The pathognomonic sign of blue sclera was otherwise accompanied by clinical signs frequently seen in aged postmenopausal women: multiple spine deformities, mild osteoporosis, deafness, lack of personal history of fracture, positive maternal history for arthritis and osteoporosis. The diagnosis was based on genetic findings in the clinical context. The heterozygous pathogenic *COL1A1* variant c.3910C>T, a non-sense variant that causes early truncation, was identified. This established the diagnosis of OI type I (autosomal dominant). Genetic counseling,

rehabilitation, surgical, and pharmacological management are essential for case management.

**Conclusion:** It may be challenging to distinguish rare conditions among common findings seen in what may pass as unremarkable cases of moderate 'postmenopausal osteoporosis'. Careful clinical investigation, thorough personal and family history may reveal the suspicion for the rare disease; molecular testing is a helpful tool to establish ethio-pathogenical diagnosis.

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2. Pavel OR et al. *Rom J Morphol Embryol* 2016;57:121.
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## P880

### METHODS OF HELPING PATIENTS WITH COGNITIVE IMPAIRMENTS

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**Objective:** Cognitive impairments (CI) have significant physical, psychological, economic and social losses for the patient's family members and society as a whole. The aim of the study is to develop measures to prevent cognitive impairment in the elderly.

**Methods:** We analyzed 300 outpatient patient records in a clinic in the city of Tyumen. There were 3 groups of patients depending on their age: group I from 65-74 years (33.3%); group II 74-84 years (33.3%); group III 85 years and older (33.3%). There were 100 people in each group. CI was evaluated using the Mini-Cog test (Borson S, 2000). If the patient scores <3 points, then this is a reason to assume dementia.

**Results:** The distribution of participants depending on the amount of points on the Mini-Cog test had the following values: 0 points - 8% (n=24); 1 point - 11% (n=33); 2 points - 19% (n=57); 3 points - 23% (n=69); 4 points - 20% (n=60); 5 points - 19% (n=57). CI was detected in 61% (n=183) of 300 patients examined (score on the Mini-Cog test  $\leq 3$ ). The prevalence of CI, depending on the age group, had the following distribution: group I - 42% (n=42); group II-63% (n=63); group III - 80% (n=80). The frequency of geriatric syndromes (GS), depending on the presence of CI, had the following form: frailty syndrome in the presence of CI occurred in 71.5% (n=131) of cases, in the absence of CI in 39.3% (n=46); urinary incontinence in the presence of CI - 49.7% (n=91), in the absence of CI in 37.6% (n=44) of cases; chronic pain syndrome (CPS) in the presence of CI in 89.6% (n=164) of cases, in the absence of CI in 80.3% (n=94).

**Conclusion:** With increasing age of the patient, the probability of CI increases. Patients with CI were more likely to have GS. The results of the study require an integrated approach in the prevention and rehabilitation of patients. Geriatricians, cardiologists, therapists, physical therapy instructors and clinical psychologists are called upon to help them. Of great importance in the prevention of CI were: the development of algorithms for the provision of med-

ical care to patients with CI; the training of primary care doctors and nurses with the ability to carry out screening measures to detect CI; development of educational programs for patients with cognitive impairments and their relatives; creation of federal and regional registries of persons with disabilities; implementation of IT programs for cognitive training of patients (especially with the use of artificial intelligence); conducting health schools with a gerontocognitive orientation.

## P881

### ALCOHOL INTAKE AND FRAGILITY FRACTURES: A RETROSPECTIVE STUDY

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**Objective:** Osteoporosis is a worldwide public health problem and incidence of fragility fractures are increasing. Although the real association between alcohol intake and fracture risk remains controversial, alcohol consumption seems to have a positive relationship with osteoporosis and is included on tools used to calculate the risk of fracture, as FRAX<sup>®</sup>. This study aimed to determine demographic and clinical differences between patients with and without significant alcohol intake who had had a fragility fracture.

**Methods:** We conducted a retrospective study including patients with a fragility fracture observed in our Fracture Liaison Services (FLS) between September 2018 and September 2022. Patients with fragility fractures without record of alcohol intake were excluded. Patients were divided into two groups based on alcohol intake: group A -  $\geq 3$  units/d and group B - <3 units/d. Demographic and clinical data were collected. Descriptive analysis, parametric and non-parametric tests were performed and a p value  $\leq 0.05$  was considered statistically significant.

**Results:** We included 355 patients divided in two groups: group A - 34 (9.6%) patients and group B - 321 (90.4%) patients. We found a difference regarding the gender, with a higher prevalence of alcohol intake in male patients (28.1%) comparing with female patients (5.5%),  $p < 0.05$ ; and mean age (group A:  $74.71 \pm 12.94$ ; group B:  $79.82 \pm 9.97$ ;  $p < 0.05$ ). Group A patients had a higher prevalence of concomitant smoking ( $p < 0.05$ ) and more non-hip fractures ( $p < 0.05$ ). The body mass index (BMI), presence of previous fractures, multimorbidity and length of hospitalization after occurrence of fracture were similar between the two groups.

**Conclusion:** Patients with alcohol intake  $\geq 3$  units/d had more non-hip fragility fractures and were younger, with a male predominance. This study should raise awareness for this profile of patients with fragility fractures.

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### CLINICAL AND RADIOLOGICAL OUTCOMES OF FEMORAL FRACTURES SUSTAINED AROUND TROCHANTERIC NAILS

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**Objective:** Many of the around the nail fractures may be avoidable if we identify the main risk factors. The aim of our study is to analyze the risk factors associated to around the nail fractures, as well as their clinical outcomes and treatments.

**Methods:** We conducted a retrospective analysis of all femur fractures sustained by patients treated with a proximal femoral nail for a trochanteric fracture from 2010-2021. Data collected included patients' demographics, time until fracture (considered as early onset those appearing in the first 2 months after surgery, and late onset after 2 months), fracture patterns (around the nail, at the tip of the nail or distal to the nail), existing osteoporosis medication, chosen treatment as well as clinical (Parker Mobility Score) and radiological outcomes.

**Results:** A total of 33 fractures were included (27 female, 6 male) with a mean age of 86.14 years [SD: 7.6, range: 70-98]. 14 fractures were classified as distal to the implant, 10 fractures affected the tip of the nail, and 6 fractures involved the nail site. Finally, 3 fractures were considered as inter-implant. Mean time between the index surgery and the around the nail fracture was 37.5 months [SD: 41.2, range: 0.6-134], of which 6 appeared in the early onset (4 at the nail site and 2 at the tip of the nail). One case had criteria for being considered as an atypical fracture. Chosen treatment was a long nail in 26 cases, using cement augmentation in the proximal screw/blade in 9 patients. A percutaneous locking plate was chosen in 7 cases. 92.3% required at least one blood concentrate. Of the 69.2% patients who were able to walk before the fracture, only 65% could do it after the second fracture, with a final Parker Mobility Score of 4.7 [SD: 3.3, range: 0-9]. During follow up, 19 patients (57.6%) died, of which 4 (12.2%) died during the first month and 8 (24.2%) during the first year. There was only one mechanical complication (distal migration of the nail) whilst all other fractures healed.

**Conclusion:** All early onset fractures involve the distal screw or the tip of the nail and can be considered to be affected by the surgical technique (therefore, potentially avoidable). Those in the late onset are usually distal to the tip of the nail and are more related to bone fragility. Osteoporosis treatment or long nails could lower the incidence of these fractures.

P883

### THE INFLUENCE OF ARTERIAL HYPERTENSION ON CLINICAL MANIFESTATIONS OF OSTEOARTHRITIS

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**Objective:** To evaluate influence of arterial hypertension (AH) on the clinical manifestations of knee osteoarthritis (OA) in a multi-center study.

**Methods:** Were enrolled 535 patients aged 40-75 y.o. with knee OA, baseline KL grade I-III, who signed an informed consent form. The average age was 58.6±9.0 y.o, mean BMI - 30.7±6.1 kg/m<sup>2</sup>, duration of the OA- 6 (3-12) years. An individual card was filled in for each patient, including anthropometric parameters, medical history and clinical examination data, pain assessment by visual analog scale (VAS), WOMAC, KOOS, DN4, patient health assessment (PGA) and concomitant disease. Statistical analysis was done in SPSS version 10.

**Results:** AH was diagnosed in 356 patients with OA - 66.5%. All participants were divided into 2 groups depending on the presence of AH - Table 1. Patients with AH were older, had a higher weight, BMI, waist and hip circumference, longer menopause duration (p<0.05). AH was associated with OA course severity: higher VAS pain, PGA, total WOMAC as well as all its subscales, DN4, worse KOOS (p<0.05), more often was registered OA of hand (OR=1.56, 95%CI 1.26-1.93, p<0.0001) and hip (OR=1.6, 95%CI 1.29-1.99, p<0.0001). Obesity (OR=2.0, 95%CI 1.6-2.5, p<0.0001), type 2 diabetes (OR=3.3, 95%CI 1.6-6.8, p<0.0004) and hyperuricemia (OR=1.74, 95%CI 1.04-2.9, p<0.03) were diagnosed more frequently. All associations were saved after adjustments for age. Spearman correlation analysis confirmed positive associations (p<0.05) between AH and VAS pain (r=0.45), total WOMAC (r=0.31) and all its components (pain (r=0.32), stiffness (r=0.26) and FI (r=0.3), DN4 (r=0.2), PGA (r=0.45), disease duration (r=0.42), generalized OA (r=0.21), other localizations of OA (r=0.22); negative associations with KOOS (r=-0.54). Other parameters like traditional risk factors of cardiovascular disease are also assessed and appeared positively associated (p<0,05) with AH and age (r=0.4), duration of menopause (r=0.22), waist and hip circumference (r=0.42 and r=0.4), obesity (r=0.33), hyperuricemia (r=0.2), type 2 diabetes (r=0.16), ischemic heart disease (r=0.23).

**Table 1.** Comparative characteristics of patients with OA who had and did not have arterial hypertension



Parameter	Patients with AH (n=356)	Patients without AH (n=179)	p
Age, y, Me	61 (56-67)	53 (46-61)	<0.0001
Duration OA, years, Me	8 (4-14)	3 (1-6)	<0.0001
WC, cm, Me	93 (88-104)	85 (78-90)	<0.0001
HC, cm, Me	112.5 (104-118)	102 (98-110)	<0.0001
BMI, kg/cm <sup>2</sup> , Me	31.6 (28.2-35.7)	27 (23.6-30.1)	<0.0001
VAS pain score, mm, Me	50 (40-65)	22.5 (7-48)	<0.0001
WOMAC pain, mm, Me	160 (110-250)	85 (30-160)	<0.0001
WOMAC stiffness, mm, Me	70 (35-100)	40 (10-70)	<0.0001
WOMAC functional impairment (FI), mm, Me	580 (310-810)	260 (60-663)	<0.0001
Total WOMAC, mm, Me	817 (465-1140)	380 (105-876)	<0.0001
KOOS, points, Me	0.47 (0.36-0.58)	0.72 (0.56-0.86)	<0.0001
DN4, points, Me	2 (1-3)	1 (0-2)	0.01
PGA, mm, Me	46 (37-59)	25.5 (10-45)	<0.0001

**Conclusion:** AH is associated with harder clinical course of knee OA, also after age adjustment. Our data are requiring a further study. Probably, the preventive measures, lead to decreased of traditional risk factors of AH development, and correct pharmacological therapy will promote favorable course of the OA.

## P884

### FRACTURES AND BONE HEALTH IN BOYS WITH DUCHENNE MUSCULAR DYSTROPHY

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**Objective:** DMD is a rare genetic disease characterized by progressive muscular dystrophy. A high risk of fractures was reported in a patient with DMD which could be due to immobilization, the pathophysiology of the disease, treatment with glucocorticoids (GCs) and increased BMI. Knowledge of the risk factors for the

disease contributes to creating preventive strategies that reduce co-morbidities and improve the quality of life in these patients. We aimed to assess the incidence of first fractures and factors contributing to risk of first fracture in children with DMD

**Methods:** A retrospective analysis of a cohort of patients with Duchenne Muscular was carried out. A total of 27 children under 18 years of age with clinical and molecular diagnosis of DMD were enrolled. The study was approved by the ethics committee and all procedures were performed following the Declaration of Helsinki. The study began in 2010, a total of 27 children were referred to our endocrinology service for their evaluation. Anthropometric variables were evaluated at the start of the study and during follow-up. In addition, annual spine radiographs were performed. Data on long bone (LBF) and vertebral fractures (VF) were recorded. Questionnaires about calcium intake and mobility were also administered. The variables are summarized in mean (SD), median (IQR) and percentage according to their nature.

**Results:** The age of DMD diagnosis was 6.52±2.83y and the follow-up time was 7.77 (±4.57y). Age of starting GCs was 8.12±2.45y and average daily was 0.6±0.12 mg/k/d. 7 children with new fractures (VF or LBF) were observed during this period, median time 5.07 (RIQ 3-6.66y). Cumulative incidences was 0.26 or 26%. Children with fractures presented a delay in the age of diagnosis (8 vs. 5.5 y) and increased BMI (p=0.01). No differences were observed in biochemical markers, vitamin D, time and dose of corticosteroids between fractured and non-fractured.

**Conclusion:** We observed a high incidence of fractures in this population, which highlights the importance of a multidisciplinary approach and the creation of strategies to reduce modifiable risk factors to improve the quality of life of these children.

## P885

### EVALUATING FALL RISK IN ELDERLY PERSONS DURING INSTRUMENTED GAIT ANALYSIS USING WEARABLE SENSORS TECHNOLOGY

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**Objective:** To examine the ability of wearable sensor-based (WSB) assessments of gait to evaluate fall risk in older adults.

**Methods:** A cross-sectional study was conducted in Vilnius, Lithuania. The participants were aged 60 and older community-dwelling adults who were able to ambulate 12 m without an assistive device. Exclusion criteria were a Mini-Mental State Examination score <21, Parkinson's disease, recent stroke, terminal illness or unwillingness to participate. The study was performed on 135 participants (94 female (69.6%) and 41 male). Face-to-face interviews were conducted and self-reported history of falls in the previous 12 months was recorded. Timed Up and Go (TUG), Berg Balance scale (BBS) and Tinetti test were performed to evaluate physical performance. We used a total of six wireless inertial sen-

sors (Shimmer Research, Dublin, Ireland) attached by straps on the thighs, shins, and feet. Eight temporal gait parameters were calculated using validated technology: gait time, gait velocity, stance phase time, swing phase time, stride time, on right and left leg, double support time, cadence (steps/min). Statistical analysis was performed using IBM SPSS Statistics 20 software. Binary logistic regression was used to examine the ability of WSB gait parameters to evaluate fall risk.

**Results:** The data of 135 participants (mean age was 74±8.05 years) were analyzed. The study population was divided into three groups based on the number of falls experienced during the previous 12 months: non-fallers (n=71), experienced 1 fall (n=36), and ≥2 falls (n=28). TUG negatively correlated with gait velocity ( $r=-0.717$ ), and positively with gait time ( $r=0.761$ ), stance time ( $r=0.582$ ), double support time ( $r=0.516$ ), and step time ( $r=0.506$ ). BBS positively correlated with gait velocity ( $r=0.566$ ) and negatively with gait time ( $r=-0.565$ ). Tinetti positively correlated with gait velocity ( $r=0.582$ ) and negatively with gait time ( $r=-0.613$ ). There were no significant differences in WSB gait parameters revealed between the three study groups. Gait velocity showed the ability to evaluate fall risk (OR=0.086,  $p=.012$ ).

**Conclusion:** The most of WSB gait parameters had significant correlations with TUG, BBS and Tinetti scores. Gait velocity showed the ability to evaluate fall risk.

## P886

### OSTEOARTHRITIS AND ARTERIAL HYPERTENSION: LABORATORY AND INSTRUMENTAL CHARACTERISTICS

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**Objective:** To evaluate the relationship between arterial hypertension (AH) and the course of knee osteoarthritis (OA) by clinical and instrumental examination in a multicenter study.

**Methods:** Were enrolled 535 patients aged 40-75 y.o. with knee OA, baseline KL grade I-III, who signed an informed consent form. The average age was 58.6±9.0 y.o. (from 40-75), mean BMI - 30.3±6.5 kg/m<sup>2</sup>, duration of the OA- 6 (3-12) years. An individual card was filled in for each patient, including anthropometric pa-

rameters, medical history and clinical examination data. For all patients were obtained data of laboratory examination, standard radiography of the knee joints, ultrasound and MRI of the knee joints (WORMS). Statistical analysis was done in SPSS version 10.

**Results:** AH was diagnosed in 356 patients with OA - 66.5%. Table 1 shows the main differences in knee OA patients with and without AH. Patients with AH were older, had a higher BMI, harder manifestations of knee OA not only by clinical but also by instrumental examination. At MRI was more frequent confirmed of bone marrow lesions (BML) of the lateral (OR=7.3, 95%CI 1.7-30.6,  $p=0.004$ ) and medial condyles of tibia (OR=12.2, 95%CI 1.46-115,  $p=0.009$ ), higher risk to identify KL grade III by knee X-ray (OR=2.37, 95%CI 1.4-4.0,  $p=0.0007$ ); smaller narrow of medial joint space, greater size of osteophytes on the tibia and femoral surface; smaller ultrasound thickness of the cartilage ( $p<0.05$  for each). Laboratory examination showed higher values of markers of acute phase (CRP, ESR) and cartilage degradation (COMP and CTX-II), leptin, glucose, HbA1c, HDL, TG, ALT, AST, uric acid, creatinine, calcium. Spearman correlation analysis confirmed associations between AH and harder course of knee OA. Thus in instrumental examination more frequently was identified progressed stages of OA ( $r=0.37$ ), BML of lateral ( $r=0.33$ ) and medial ( $r=0.35$ ) condyles of tibia, smaller medial joint space narrow ( $r=-0.28$ ) and cartilage thickness in anterior-medialis ( $r=-0.36$ ) and anterior-lateralis ( $r=-0.38$ ) areas of knee joint, greater osteophytes ( $r=0.35$ ) and thickness of the synovial membrane ( $r=0.44$ ), ( $p<0.05$  for each). Positive relationships were confirmed between AH and CRP ( $r=0.4$ ), ESR ( $r=0.32$ ), COMP ( $r=0.43$ ), CTX-II ( $r=0.27$ ), leptin ( $r=0.38$ ), glucose ( $r=0.21$ ), HbA1c ( $r=0.42$ ), TG ( $r=0.28$ ), ALT ( $r=0.31$ ), AST ( $r=0.26$ ), uric acid ( $r=0.2$ ), creatinine ( $r=0.2$ ), HDL ( $r=-0.28$ ) and ALP ( $r=0.4$ ), ( $p<0.05$  for each).

**Table 1.** Comparative characteristics of patients with OA who had and did not have arterial hypertension

Parameter	Patients with AH (n=356)	Patients without AH (n=179)	p
Age, y Me	61 (56-67)	53 (46-61)	<0.0001
X-ray grade K-L			
I,%	9.9	46	
II,%	66.7	44.2	
III,%	23.4	9.8	0.0007
Medial knee joint space, mm, M±SD	2.8 (1.75-4.05)	3.8 (3.2- 4.2)	0.0009
Osteophytes on the femoral lateral surface, mm, Me	3 (2- 6)	1 (0-2.5)	0.006
Osteophytes on the tibia lateral surface, mm, Me	3 (1.4-4)	1 (0.5-2)	0.03
Cartilage thickness in anterior-medialis area of knee joint, mm, Me	1.3 (0.9-1.6)	1.6 (1.5-1.7)	<0.0001

Cartilage thickness in anterior-lateralis area of knee joint, mm, Me	1.4 (1.2-1.7)	1.7 (1.6-1.8)	<0.0001
BML in medial condyle of tibia,%	36	7.1	0.004
BML in lateral condyle of tibia,%	24	2.4	0.009
CRP, mg/l, Me	2.3 (1,3-4,2)	1 (0.4-1.9)	<0.0001
COMP, ng/ml, Me	23.5 (17.8-32.2)	12.1 (9.5-22.4)	<0.0001
CTX-II, ng/ml, Me	3.03 (2.36-3.9)	2.35 (0.88-3.26)	0.007
Leptin, ng/ml, Me	33.9 (25.4-48.2)	20.1 (13.5-32.9)	0.0003

**Conclusion:** In complex examination with laboratory and instrumental methods was demonstrated that AH is associated with more severe manifestations of knee OA, also after age adjustment.

## P887

### OBESITY AND FRAGILITY FRACTURES RISK

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**Objective:** Low BMI has been reported as one of the main fragility fractures risk factors. On the other hand, by 2030, obesity is expected to affect more than 50% of the population as well as the risk of fractures is also forecasted to increase. The relationship between obesity and fracture risk is complex and probably varies depending on the fracture skeleton location and may differ in men and women. We aimed to assess the association between BMI and the risk of fragility fractures in patients of the Fracture Liaison Service (FLS).

**Methods:** A cross-sectional survey enrolled 129 patients (123 females, 6 males) over 60 years old who had applied for the FLS in Yekaterinburg, City Hospital №7. The average age was 68.5±6.2 years. Obesity as BMI greater than 30 kg/m<sup>2</sup> was detected in 30 persons.

**Results:** Among 129 enrolled patients of FLS, 123 women had 65(52.8%) cases of wrist fractures, 24 (19.5%) proximal humerus fractures, 5 (4.1%) hip fractures and 14 (11.4%) vertebral fractures, 14 (11.4%) other bones fractures. The 6 men had survived 2 hip fractures, 1 humerus fracture, 2 wrist fractures, 1 vertebral fracture. Moreover, 50 (38.8%) persons had repeated fragility fractures. Group 1 (29 women and 1 man, average age 68.3±6.4) were obese, and Group 2 (94 women and 5 men, average age 68.6±6.2) BMI below 30 kg/m<sup>2</sup>. In Group 1 there were 10 wrist fractures, 10 humerus fractures, 2 hip fractures and 2 vertebral fractures, 4 other fractures. In Group 2 there were 57 wrist fractures, 15 humerus fractures, 5 hip fractures and 13 vertebral fractures, 10 other fractures. In Group 1, humerus fractures were significantly more frequent ( $\chi^2=4.871$ ,  $p=0.028$ ) and wrist fractures were sig-

nificantly less frequent than in Group 2 ( $22=4.973$ ,  $p=0.026$ ). No difference was found for other localizations. There were no significant differences of FRAX® risk assessment between the groups. Type 2 diabetes mellitus (T2DM), arterial hypertension (AH) and osteoarthritis (OA) were the most frequent comorbidities. There were significantly more cases of T2DM ( $\chi^2=6,414$ ,  $p=0.012$ ) and AH ( $\chi^2=7,036$ ,  $p=0.008$ ) in the Group 1.

**Conclusion:** Previously published meta-analyses of the relationship between obesity and fracture risk were aimed only at women, hip fractures, vertebral fractures. The assessment of the risk of fractures by anatomical localization in men and women showed that in obese individuals the risk of humerus fractures is higher, and the risk of wrist fractures is lower compared to patients without obesity. Our result showed no significant differences in the risk of fragility fractures in obese and non-obese patients. The impact of obesity, AH and DM2T on the risk of fractures is very difficult to be assessed since no study has specifically addressed this issue at present. Studies considering the presence of T2DM, obesity and the risk of fractures are limited: in most studies, T2DM was used as a correction factor and it was not evaluated whether the presence of T2DM changes the relationship between obesity and of fragility fractures. In this limited pilot study of patients with fragility fractures, T2DM and AH were significantly more common in Group 1. There was no falls risk assessment performed. We concluded: 1. In the FLS patients setting, obesity was associated with a lower risk of wrist fracture but with a higher risk of humerus fractures. The sampling being highly heterogeneous, the results should be interpreted with caution. 2. T2DM and AH were significantly more common in obese patients.

## P888

### COMPARATIVE COST-EFFECTIVENESS OF DIFFERENT INTERVENTION THRESHOLDS USING THE FRAX CALCULATOR IN RUSSIAN MEN

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**Objective:** The FRAX intervention threshold recommended in the Russian Federation for men reveals an extremely low proportion of men subject to therapeutic intervention, from 1.1% to 4%, with a population incidence of osteoporosis of 25%. Based on the results of the Delphi voting with the participation of leading Russian experts, a new intervention threshold for Russian men was proposed, based on which the number of identified individuals with a fracture risk classified as high increased. The new threshold is a fixed figure of 9% for all ages. We conducted a comparative economic analysis of the effectiveness of using the existing "age-based" intervention threshold in the Russian male population using the FRAX calculator designed for women and the newly proposed fixed threshold of 9%.

**Methods:** The design of the study was developed based on the recommendations of the European Society for the Clinical and

Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases ESCEO and the American branch of the International Osteoporosis Foundation (IOF). A cost-utility analysis and a cost-effectiveness analysis were carried out. Economic evaluation method - Markov modeling with an annual cycle, evaluation duration - 10 years. Types of fractures - hip fracture, clinical vertebral fractures and other fractures.

**Results:** In the Markov model, the low effectiveness of the female intervention threshold in men was demonstrated. The use of a 9% intervention threshold made it possible to increase the number of quality life years (QALY) saved by 245.6 compared with no intervention, while the use of the female threshold was only 15 QALY. At the same time, the NNT for the female threshold for preventing 1 fracture of the proximal femur was 884, for 9% - 168.

## P889

### PRIMARY HYPERPARATHYROIDISM AND SEVERE HYPOPHOSPHATEMIA: DIFFICULTIES IN DIFFERENTIAL DIAGNOSIS AND TREATMENT

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**Objective:** Hypophosphatemia may occur in various endocrine disorders. In primary hyperparathyroidism (PHPT) serum phosphorus level tends to decrease, but extreme hypophosphatemia is rare. Life-threatening persistent hypophosphatemia may occur in tumor-induced osteomalacia (TIO) usually due to FGF23 oversecretion by mesenchymal tumors. We report an unusual case of hyperparathyroidism and life-threatening persistent hypophosphatemia, which was initially regarded as a manifestation of TIO.

**Case report:** A 50-year-old woman with a 3-year history of chronic pelvic and rib pain and previously identified giant cell tumor of the pelvis received denosumab 120 mg monthly without preliminary estimation of PTH, calcium and phosphorus levels. Five months after the first denosumab injection initial tests demonstrated normocalcemia (Caadj 2.36 mmol/l), PTH 2205 pg/ml and extreme hypophosphatemia (0.36 mmol/l). Tubular phosphate reabsorption was decreased up to 54% that raised the suspicion of TIO. The patient received therapy with phosphorus up to 4 g/d, alfacalcidol 3 µg/d with no improvement. Radiographic imaging revealed multiple lytic lesions of pelvis, ribs, shoulder blades, ulnas and multiple spine and rib fractures. The pentetreotide scan, MSCT and MRI showed a soft-tissue lesion located in the area of the left knee thus removal was performed, but the histological analysis showed no signs of phosphaturic mesenchymal tumor. The follow-up examination revealed persistent hypophosphatemia and high PTH level thus the diagnosis was revised to PHPT. Neck ultrasonography and parathyroid MIBI-scintigraphy revealed a focal lesion 23x22x12 mm behind the left thyroid lobe suggestive for an enlarged parathyroid gland. The patient underwent parathyroidectomy, histology confirmed parathyroid adenoma. Post-surgery PTH decreased to normal and normophosphatemia was achieved.

**Conclusion:** In this case, extreme hypophosphatemia was en-

hanced by PTH action causing high bone turnover and progressive bone loss, although such decrease in phosphorus levels is not typical for PHPT. By presenting this case, we wanted to highlight the importance of monitoring PTH, calcium and phosphorus concentrations in patients with chronic bone pain before administering therapy that affects phosphorus and calcium metabolism.

## P890

### INFLUENCE OF DISEASE ACTIVITY AND BODY COMPOSITION PARAMETERS ON BONES IN ACROMEGALIC PATIENTS

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**Objective:** Acromegalic patients (AP) have variable degrees of bone structure impairment independently of BMD. Body composition parameters, which are modified in acromegalic patients, are important determinants of bone strength. The aim of this study was to examine BMD and lumbar trabecular bone score (TBS) by DXA and to assess its relationship with disease activity, age of the patients, metabolic parameters and body composition parameters.

**Methods:** This cross-sectional prospective study involved 105 acromegalic patients (70 females, 35 males) and 75 healthy controls (CON) (53 females, 25 males) matched for age, gender, and BMI. BMD, TBS and body composition parameters were measured using DXA.

**Results:** AP presented with lower TBS compared to CON (1.2±0.1 vs. 1.31±0.1, P<0.001). No correlation was observed between IGF-1/GH levels and TBS. Age, glycated haemoglobin, BMI, waist circumference, fat mass and lean mass negatively correlated with TBS in both sexes. After multiple linear regression (including all these parameters) only age and waist circumference being independent significant predictors of TBS in AP. We did not find difference in BMD (lumbar spine, femoral neck, total hip) between AP and CON as well as between active and controlled AP. We observed negative correlation between patient's age and BMD of the femoral neck and total hip (P<0.001). We confirmed positive correlation between testosterone levels in males, BMI, waist circumference, fat mass, lean mass and BMD in AP. Lean mass more strongly positively correlated with BMD in AP compare to fat mass.

**Conclusion:** Acromegalic patients have lower TBS than controls confirming impaired bone microarchitecture in acromegaly regardless of the BMD. Age of the patients, glycated haemoglobin and body composition parameters contribute to TBS deterioration in AP.

P891

### PREVALENCE AND PREDICTIVE FACTORS OF OSTEOPOROSIS IN RHEUMATOID ARTHRITIS PATIENTS

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**Objective:** Osteoporosis (OP) is one of the most known common extra-articular complications of rheumatoid arthritis (RA) and has previously been reported to be twice as common as in the general population. We aimed to evaluate the prevalence and clinical predictors of osteoporosis in RA.

**Methods:** Cross-sectional observational study that included consecutive patients with diagnosis of RA (ACR/EULAR 2010 criteria). Demographic and RA characteristics were collected. All patients underwent DXA at a single centre. The correlation between OP and patient and disease characteristics was evaluated using the Spearman's rho coefficient (r). Multivariate analysis was performed, adjusting for clinical and demographic variables.

**Results:** Eighty patients with a sex ratio of 0.13 and a mean age of 58.04±9.5 years were included. RA was immunopositive in 87.1% of cases and erosive in 76.8%. Mean DAS28 was 5.08±1.13. OP was found in 34% of the patients. The mean T-scores at the lumbar and femoral sites were -2.8±1.5 DS and -2.3±1.8 DS respectively. The OP was trabecular in 72% of cases, cortical in 10% and mixed in 42% of cases. Multivariate analysis showed that pain. OP was associated with age (r=0.36, p=0.02), menopause (r=0.251, p=0.05), BMI (r=0.42, p=0.02), disease duration (r=0.361, p=0.03) and atlanto-axial subluxation (r=0.26, p=0.027). Multivariate analysis showed that only age (p=0.026) and BMI (p=0.023) were independent predictors.

**Conclusion:** The prevalence of OP among RA patients in these patients is high and is caused by several factors. More attention should be paid to this comorbidity.

P892

### PREVALENCE OF UPPER LIMB MUSCULOSKELETAL DISORDERS AMONG FEMALE OFFICE WORKERS

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**Objective:** To examine the prevalence of upper limb musculoskeletal disorders (ULMSD) among female office workers (medical secretaries) in three public hospitals in Tunisia.

**Methods:** This is a multicentric cross-sectional study consist-

ing of two parts: a questionnaire study (Nordic Musculoskeletal Questionnaire) and clinical examination (six clinical maneuvers carried out in accordance with the SALTSA guide). The study population comprised 72 medical secretaries. The prevalence of ULMSD (shoulders, elbows, wrists/hands, as well as the neck) was evaluated.

**Results:** The prevalence rates of shoulder, elbow, wrist/hand and neck pain were 24 (33.3%), 15 (20.8%), 17 (23.6%) and 60 (83.3%), respectively. The perceived mean discomfort of these disorders was rated 7±2 out of 10 with extremes ranging from 0-10. The intensity of these disorders was classified as moderate to severe in 88.8% of cases. The results of the examination revealed cervical stiffness in 33 secretaries. The painful arc test of the shoulder was positive among eight secretaries. Wrist flexor tendonitis was detected among nine secretaries. The Phalen tests, as well as the Elbow flexion test, were positive among seven secretaries and the Tennis elbow test was positive among six secretaries.

**Conclusion:** This study showed a relatively high prevalence of ULMSD in medical secretaries. These disorders are associated with considerable morbidity and have a social impact in terms of consumption of health care resources and lost time from work, highlighting the importance of ergonomic design of office workstations.

P893

### PHYSIOTHERAPIST KNOWLEDGE, BELIEFS AND BARRIER REGARDING USING ARTIFICIAL INTELLIGENCE IN PREVENTION AND REHABILITATION OF FALLS: A CROSS-SECTIONAL STUDY

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**Objective:** There has been a proliferation of tech-based apps in recent years whose primary purpose is to facilitate the provision of fall prevention interventions. By offering consumers with a digitalized system for physiotherapy, artificial intelligence (AI) could be a crucial tool in expanding access to high-quality healthcare for underserved populations. The purpose of this research was to characterize PTs' perspectives on using AI in prevention and rehabilitation of falls and to examine several aspects as markers of PTs' AI knowledge, attitude, and acceptance. In addition, the study intended to determine what kinds of barrier there are when it comes to employing AI in the field of rehabilitation.

**Methods:** 180 Volunteer physical therapists took part in the research through google form survey. The perspectives of PTs on the use of AI in rehabilitation were recorded using a contemporaneous mixed-method methodology. A self-administered questionnaire was used to collect data on factors like respondents' demographics and level of education about the field of artificial intelligence (AI) in fall prevention and rehabilitation, as well as their familiarity with its applications, their perceptions of their benefits, and the obstacles that prevent their use of AI.

**Results:** PTs had general understanding of AI, but they lacked expertise in using AI for fall prevention and rehabilitation. It was found that 82% of PTs had not encountered any artificial intelligence apps for fall prevention and rehabilitation. Significant predictors of PTs' knowledge of AI applications were both experience (95%CI, P=.02) and educational qualification (95%CI, P=.03). Positive attitude towards AI were seen among nonacademic PTs with more than five years of experience. Adoption of AI-based solutions was slowed mostly due to concerns over the high price and limited availability of relevant AI technology

**Conclusion:** The study found that PTs lack AI understanding for fall prevention and rehabilitation, indicating that physiotherapy education must adapt to produce 21<sup>st</sup> century health professionals. Hence, PTs should capitalize on the growing adoption of AI technology to learn about and improve their fall prevention and rehabilitation practice with AI.

## P894

### EPIDEMIOLOGY OF RHEUMATOID ARTHRITIS AND ANKYLOSING SPONDYLITIS IN ALMATY

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**Objective:** Rheumatoid arthritis and ankylosing spondylitis occupy a central position among inflammatory diseases of the joints and spine. We aimed an analysis of the prevalence and incidence of rheumatoid arthritis (RA) and ankylosing spondylitis (AS) among the population of Almaty.

**Methods:** The prevalence and incidence rates of rheumatic diseases were studied according to the official statistical materials of the Ministry of Health of the Republic of Kazakhstan "Health of the population of the Republic of Kazakhstan and the activities of healthcare organizations" and reports on appeals to medical organisations from 2014 to 2019 (form No. 12) [1,2].

**Results:** 101 807 patients with diseases of the musculoskeletal system (MSDs) were registered in Almaty in 2014 (including 30 553 newly diagnosed). In 2019 were registered 120 922 patients (48 337 newly diagnosed). The growth dynamics for overall and newly diagnosed cases was 18.8% and 58.2%, respectively. There was a trend towards an increase in the proportion of RA and AS among patients with MSDs: in 2014 - 3.7% and 0.2%, and in 2019 - 8.8% and 0.3%, respectively. An increase in the total number of patients among the adult population ( $\geq 18$  years) with RA - by 2.9 times (from 3 508 to 10 075 patients) and with AS - by 2.4 times (from 150 to 367 patients) were revealed. The vast majority of patients suffering from RA were women - 79.6%, while with AS - only 25.6% (2019). The prevalence and incidence of RA among the adult population ( $\geq 18$  years) increased over the analyzed period - from 281.8 to 719.2 and 63.3 to 180.8 per 100 thousand population, respectively. The morbidity rates of AS were much lower: prevalence - from 12 to 26.2, incidence: from 1.8 to 5.7 per 100 thousand, respectively.

**Conclusion:** An analysis of the prevalence and incidence rates of

RA and AS revealed a significant increase in the total number of patients over the analyzed period, which indicates the preservation of the social significance of the problem. The high dynamics of the growth of the main rheumatic diseases may be associated with an improvement in diagnosis, but requires further use of innovative technologies in the early diagnosis and treatment of patients.

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## P895

### BONE STATUS OF RHEUMATOID ARTHRITIS PATIENTS TREATED WITH BIOLOGIC DISEASE-MODIFYING ANTI-RHEUMATIC DRUGS

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**Objective:** Biologic disease modifying anti rheumatic drugs (bDMARDs) has been shown to be superior to synthetic DMARDs (cDMARDs) to reduce rheumatoid arthritis (RA) symptoms and the rate of disease progression. Our aim was to examine whether biologics limit BMD decrease in RA patients.

**Methods:** Cross-sectional observational study that included consecutive patients with diagnosis of RA (ACR/EULAR 2010 criteria). Demographic and RA characteristics were collected. All patients underwent DXA at a single centre.

**Results:** Eighty patients with a sex ratio of 0.13 and a mean age of 58.04 $\pm$ 9.5 years were included. RA was immunopositive in 87.1% of cases and erosive in 76.8%. Twenty-seven patients were on bDMARDs treatment, 85% of whom were on TNF $\alpha$  inhibitors (anti-TNF). A decrease in the BMD was noted in 64% of cases: osteopenia in 31% and OP in 33%. cases. No significant difference in the prevalence of bone loss was not between patients on cDMARDs and those on bDMARDs (p=0.055). However, BMD decrease was significantly and positively associated with age on biologics treatment initiation (r=0.43, p=0.043).

**Conclusion:** Our study showed that biologics might limit bone loss in RA patients when they are early initiated. Other studies are needed to confirm these results.

P896

### THE EFFECT OF BODY WEIGHT ASSISTED TREADMILL TRAINING ON BONE IN CHRONIC SPINAL CORD INJURY

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**Objective:** To determine the body-weight supported treadmill training (BWSTT) impacted bone in people who had had a spinal cord injury (SCI).

**Methods:** We identified eight persons who have been suffering with chronic traumatic spinal cord injury for more than two years. BMD of the proximal femur, distal femur, proximal tibia, and lumbar spine were assessed before and after 6 months (twice-weekly) body-weight supported treadmill training (BWSTT).

**Results:** As a result, all participants had BMD reductions ranged from 1.2-26.7% in all subjects at practically all lower limb sites following training. BMD changes in the lumbar spine varied from 0.2-7.4%.

**Conclusion:** There was found Following chronic SCI, regular BWSTT can help to prevent bone loss.

P897

### IMPACT OF MUSCULOSKELETAL DISORDERS ON HEALTH-RELATED QUALITY OF LIFE IN FEMALE OFFICE WORKERS

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**Objective:** To evaluate the impact of musculoskeletal disorders (MSDs) on the health-related quality of life of medical secretaries.

**Methods:** A self-designed questionnaire based on Nordic musculoskeletal disorder was delivered to 88 secretaries working in three public hospitals in Tunisia. Out of which 72 questionnaires were found completely filled. Health related quality of life (HRQoL) was evaluated using the Short Form 12 Health Survey (SF12) consisting of 36 questions that can be reported as a Physical (PCS) and Mental Component Summary (MCS). Association of risk factor was accessed using SPSS 21.

**Results:** During the last 12 months, participants suffering from MSDs reported problem in the low-back (64.4%), knees (25%), Neck (79.2%), hand/wrist (22.2%) and shoulder (25%). The mean physical component score of HRQoL was 42.95±7.33. On the other hand, the mean mental component score of HRQoL was 40.99±8.04. Evaluation of the HRQoL scores showed that 52 secretaries (72.2%) had an altered physical HRQoL (PCS <50.11). Regarding the mental HRQoL, 55 secretaries were considered to have an altered one (MCS <47.96) making a percentage of 76.4%.

During the last seven days, physical HRQoL was found to be significantly associated with MSDs of the neck (p=0.024) and MSDs of the shoulder (p=0.043). As for mental HRQoL, MCS score was found to be significantly associated with MSDs of the knees (p=0.01).

**Conclusion:** This study found that MSDs of the neck and shoulder are risk factors for the physical HRQoL. Similarly, MSDs of the knees were found to be a risk factor for mental HRQoL.

P898

### CANNULATED COMPRESSION SCREWS FOR THE TREATMENT OF NON-DISPLACED INTRACAPSULAR HIP FRACTURES IN THE ELDERLY PATIENT

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**Objective:** The incidence of hip fractures is increasing worldwide together with the trend of population aging. The elderly have not only a decreased functional reserve but also fragile bone, so the use of a minimally invasive technique should reduce complications and shorten the recovery period. Cannulated compression screws are one of the most commonly used implants for the treatment of a non-displaced femoral neck fracture, but are weak in terms of anchorage and holding, especially in patients with osteoporosis. Loosening of the cannulated compression screws and compression of the fracture site can lead to femoral neck shortening and compromised hip function. Our aim is to assess the functional and radiological results of osteosynthesis with cannulated screws and to detect possible complications.

**Methods:** During the period between January 2015 and June 2022, a total of 25 patients over 80 years old with non-displaced femoral neck fracture who underwent internal fixation with cannulated compression screws were included in our retrospective study. Demographic data, pre- and post-fracture functionality (Barthel, Parker), radiological characteristics (Garden, Pauwels), surgical data, outcomes and complications were collected.

**Results:** The mean age was 86,4 years old [range: 80-96; SD: 4.09]. All patients walked before the fracture (14 without mechanical aids, 8 with a cane and 3 with a frame). Regarding previous functionality, the mean Barthel index was 88'6 [60-100;12'21] and the mean Parker index was 6'84 [3-9;1'82]. In relation to the type of fracture, according to the Garden classification, 20 were type I and 5 were type II; according to the Pauwels classification, 12 were type I and 13 were type II. The mean time from trauma to surgical intervention was 1.92 d [0-5;1.68]. Mean surgical time was 51.04 min [20-210;38.54]. The mean length of stay was 4.02 d [2-15;3.07]. Of the 25 patients, 21 were walking on discharge. The mean follow-up time was 9.84 months [1-48;10.72]. After recovery, the mean Barthel index was 80.59 [35-100;18.53] and the mean Parker was 3.88 [0-9;3.38]. Complications were observed in 32% of cases (1 intraoperative, 5 implant failures and 2 avascular necrosis of the femoral head), which required reintervention.

**Conclusion:** With 32% of complications in our series of cases, we cannot recommend osteosynthesis with cannulated compression screws as the first therapeutic option in the population over 80 years old. However, the functional results in 82.36% of the uncomplicated cases are satisfactory, obtaining a Barthel score equivalent to fully independence - minimally dependence.

P899

### EXTRA-ARTICULAR MANIFESTATIONS AND OSTEOPOROSIS IN RHEUMATOID ARTHRITIS: IS THERE A LINK?

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**Objective:** Extra-articular manifestations (EAMs) and comorbidities in rheumatoid arthritis (RA) share common immunopathogenic pathways linked to the systemic inflammation of this disease. We aimed to study the association of bone comorbidity with the different EAMs.

**Methods:** Cross-sectional observational study that included consecutive patients with diagnosis of RA (ACR/EULAR 2010 criteria). Demographic and RA characteristics were collected. All patients underwent DXA at a single centre.

**Results:** Eighty patients with a sex ratio of 0.13 and a mean age of 58.04±9.5 years were included. RA was immunopositive in 87.1% of cases and erosive in 76.8%. Ophthalmic manifestations were the most frequent EAM (56.3%). Rheumatoid nodules were found in 17.5% of patients and lung involvement in 10%. OP was found in 34% of the patients. The mean T-scores at the lumbar and femoral sites were -2.8±1.5 DS and -2.3±1.8 DS respectively. OP was significantly more frequent in patients with ophthalmic manifestation (p=0.024), however, no significant association was noted between OP and rheumatoid nodules (p=0.1), lung involvement (p=0.065), nor kidney involvement (p=0.34).

**Conclusion:** Our results showed that ophthalmic manifestations and OP tend to be associated in RA patients, which might majorize the risk of falls and thus of osteoporotic fractures.

P900

### 25OHD IN WOMEN WITH SUPPLEMENTATION OF 100.000 IU/MONTH IS RELATED WITH BODY WEIGHT

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**Objective:** Vitamin D supplementation can be done in different ways (daily, weekly, monthly) and with different doses. The value reached in response to treatment depends on several factors:

basal level, body weight and genetic polymorphisms (1). Two other factors, latitude and season of the year, are determinants of the basal 25OHD value, but not of the response to supplementation. It was published that in pregnant women the coexistence of obesity and sampling in winter are factors of severe deficit (2). The objective of the work is determine 25OHD in women supplemented with a monthly dose of 100,000 IU and relate it to age, weight, BMI and seasons.

**Methods:** Retrospective study of 195 women receiving 100,000 IU/month for at least 3 months.

**Results:** Age: 63.4±11.3 years. BMI: 25.55±5.25. Weight: 63.4±13 kg. 25OHD:44.19±10.1 ng/mL.

1. Age: 25OHD correlates with age (p=0.0089). Younger women have less 25OHD. Divided in: <50: 41.04±9; 50-65: 42.97±9; >65: 46.11±11 (p=0.03).

2. Season: winter: 43.52±10; spring: 45.45±9; summer: 46.12±9; fall: 42.43±13 (no s.)

3. BMI: <20: 45.53±11; 20-25: 44.8±10; 25-30: 44.51±11; >30: 41.28±10 (no s.)

4. Weight: is associated with 25OHD:p=0.0004. A) <65 Kg (45.61 ng/mL) vs. >65 kg (41.23 ng/mL):p=0.0056. B) < and >median (62 kg):p=0.03

Range of 25OHD was from 24.3-81.6. 12 patients (6.1%) had <30 ng/ml, and 3 patients (1.5%) >70 ng/ml, but none >100 ng/ml.

**Conclusion:** In this retrospective study in which the baseline level and genetics are not analyzed, body weight is confirmed as a determinant of the response to supplementation, although not BMI. Supplementation with 100,000 IU/d 1) did not show differences according to different seasons of the year, but did show differences according body weight. This has been pointed out in 2023 in an analysis of the Vital study. (3). 2) did not present a risk of hypervitaminosis D or hypercalcemia.

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P901

### IMPACT OF LOW BACK PAIN POST-ACUTE COVID-19 ON PRODUCTIVITY LOSS AND ACTIVITY IMPAIRMENT AMONG HEALTHCARE WORKERS

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**Objective:** To assess the impact of low back pain post-acute COVID-19 on work productivity and activity Impairment among healthcare workers

**Methods:** A cross-sectional study was conducted one month after the first wave of COVID-19 among healthcare personnel of a public hospital in the central region of Tunisia. Data collection was based on a synoptic sheet containing the socio-demographic characteristics of the participants. The Roland-Morris Disability



Questionnaire (RMDQ) was used to assess disability caused by low back pain. Work productivity was evaluated using the Work Productivity and Activity Impairment Questionnaire: Low Back Pain (WPAI: LBP).

**Results:** This study included 109 healthcare workers suffering from low back pain post-acute COVID-19 and whose COVID-19 infection was confirmed by The polymerase chain reaction (PCR). The mean age of participants was 31.2±8 years with a male predominance (63.3%). The vast majority of study population (97.2%) wasn't bedridden due to low back pain in the period following their COVID-19 infection meanwhile 2.8% of them were. The RMDQ used in this study revealed that 19.3% of the participants didn't have any disability due to low back pain, 78% had a low disability level and only 2.8% had a high disability level. The percentage of absenteeism associated with low back pain was 44.3%, while that of presenteeism was 10.7%. The resulting decrease in productivity was estimated to be 49.3% on average. On the other hand, the percentage of activity impairment due to low back pain in this population was 13.7%.

**Conclusion:** Data from the literature have confirmed significant increase in LBP prevalence and intensity during the COVID-19 pandemic compared to the prepandemic period. This study highlight the impact of low back pain post-acute COVID-19 on daily life activities as well as work productivity among health care workers who have been heavily affected by the pandemic.

## P902

### IS THE BERG BALANCE SCALE (BBS) APPROPRIATE FOR DETECTING FALL RISK IN STROKE SURVIVORS?

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**Objective:** Balance impairment is the most prevalent impairment seen in stroke patients. The Berg Balance scale is the most commonly used scale to test balance in them. In BBS, the individual's decision of which extremity to use to accomplish specific components may result in scoring differences when applied to stroke populations. The study's goal is to determine the applicability of the BBS in stroke patients using affected and unaffected limbs and their scoring. To determine the relationship between the Berg Balance Score (affected side) and the TUG and the Berg Balance Scale (unaffected side).

**Methods:** It was an observational study were 100 ambulatory stroke individuals were taken after Institutional ethical Individuals with Mini Mental State Examination Scoring of 24-30, falling under stage 3 to 5 of Brunnstrom's stages of recovery for lower limb were included in the study. TUG test was performed by the individuals and later were asked to perform BBS with affected and unaffected side.

**Results:** The data was evaluated with Medcalc Software. Because the data defied normality, the correlation of BBS and TUG scoring was performed using Spearman's rho correlation test,

which revealed a very strong negative link between BBS scoring on the affected side and TUG ( $r=-0.73$ ) and BBS scoring on the unaffected side and TUG ( $r=-0.71$ ). When the mean values for the affected and unaffected sides were compared, the affected side (41.76) was found to be less than the unaffected side (46.17), with  $p<0.001$  being highly significant.

**Conclusion:** The study found a difference in score when done on the afflicted or unaffected side. As a result, modifications to the BBS instructions are required when it is expressly utilised for stroke individuals in order to achieve uniformity and standardised use.

## P903

### OSTEOPOROSIS KNOWLEDGE ASSESSMENT AMONG MEDICAL INTERNS

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**Objective:** Osteoporosis (OP) is a diffuse skeletal disease characterized by low bone mass and altered microarchitecture of bone tissue. Although it is recognized as a public health problem, there is little data on how non-rheumatologists deal with osteoporosis. We aimed to assess the knowledge of medical interns (excluding interns in rheumatology), regarding OP and its management.

**Methods:** We conducted a cross-sectional survey among medical interns via a published online questionnaire on risk factors, diagnosis, and treatment of OP.

**Results:** Thirty-five medical interns, 27 of whom were female, completed the questionnaire. The mean age was 26.8±3.2 years. The majority (25.7%) were interns in family medicine, 40% of whom completed a fellowship in a rheumatology department. The risk factors for OP reported were: prolonged corticosteroid therapy (97.1%), menopause regardless of age of onset (94.3%), hyperparathyroidism (63%) and high BMI (34.3%). Regarding the circumstances of discovery of OP, these were: a low-energy fracture (100%), cervical vertebral compression (60%), bone pain (43%) and loss of height (31%). The majority of residents (82%) recognized the bone densitometry definition of OP according to the T-score. However, 15% of them wrongly considered that the T-score is the universal standard regardless of age and sex. Only one third of the residents systematically asked for an etiological assessment in the face of a densitometric OP, whereas for the rest of the respondents the main indications for this assessment were the following: non-menopausal women (63%), age less than 40 years (62%) and male sex (51%). Consequently, when faced with a postmenopausal woman with a densitometric OP, 17% of the residents prescribed bisphosphonate (BP) treatment directly and 15.4% prescribed hormone therapy. Concerning the pre-BP check-up: the renal and phosphocalcic check-up and the stomatological examination were requested respectively in 77%, 71% and 54% of cases respectively. The reported adverse effects of BP were esophagitis (56%), osteonecrosis of the jaw (53%), hyper-

calcemia (35%), and hypocalcemia (32%). However, only one resident answered yes to the proposition "atypical femoral fracture". **Conclusion:** Although the Groupe de Recherche et d'Information sur les Osteoporoses (GRIO) and the French Society of Rheumatology have established clear recommendations for the diagnosis and management of OP, knowledge of these recommendations by non-rheumatologists remains insufficient.

## P904

### CLINICAL APPLICATIONS OF IN-HOSPITAL 3D PRINTING FOR OSTEOPOROTIC TRAUMA PATIENTS: A SYSTEMATIC REVIEW

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**Objective:** Interest for 3D printing in orthopaedic surgery has been increasing since its progressive adoption in most of the hospitals around the world. The aim of the study is to describe all the current applications of 3D printing in patients undergoing osteoporotic fractures at the present time.

**Methods:** We conducted a systematic review of publications indexed in MedLine through the search engine PubMed, with the following parameters: 3D printing AND (orthopedics OR traumatology) NOT tissue engineering NOT scaffold NOT in vitro and deadline 31st December 2021. After reading the abstracts of the articles, papers were selected according to the following criteria: full text in English or Spanish and content related to osteoporotic fractures. Those publications involving experimental studies (in vitro or with anatomical specimens) or 3D printing outside hospital facilities were excluded. Results are presented as a reference guide classified by disease, including the used software and the steps required for the development of the idea.

**Results:** A total of 20 applications were described: 1. Percutaneous vertebroplasty with patient specific instruments (PSI), 2. Surgical planning of proximal humerus fractures, 3. Percutaneous pre-contoured plate fixation of diaphyseal humerus fractures, 4. Surgical planning of supra-condylar fractures of the elbow, 5. Osteochondral allograft transplantation for complex distal humeral fractures (PSI), 6. Surgical planning of distal radius fractures, 7. Open reduction and internal fixation of distal radius fractures with PSI, 8. Treatment of malunion of distal radius fractures with PSI, 9. Surgical planning of periprosthetic acetabular fractures, 10. Closed reduction and fixation (CRIF) of intracapsular neck of femur fractures with PSI, 11. A PSI guide for femoral head harvest of bone graft for mechanical complications of proximal femoral nails, 12. Surgical planning of proximal femur fractures, 13. A device to prevent excessive drilling in orthopedic surgery, 14. Pre-contouring of plates in femoral fractures, 15. Pre-contouring of nails in femoral fractures, 16. Minimally invasive femoral fixation with percutaneous plates and PSI, 17. Surgical planning of tibial plateau fractures, 18. ORIF of tibial plateau fractures with PSI, 19. CRIF of tibial plateau fractures with PSI, 20. Treatment of

tibial plateau malunion with PSI.

**Conclusion:** There are many surgical applications of 3D printing for osteoporotic patients. All of them are based on CT images. The development of new applications specially depends on the initiative and imagination of surgeons.

## P905

### FACTORS INFLUENCING THE QUALITY OF LIFE OF PATIENTS SUFFERING FROM UPPER LIMB MUSCULOSKELETAL DISORDERS

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**Objective:** To investigate the different factors affecting the quality of life related to patients suffering from Upper Limb Musculoskeletal Disorders.

**Methods:** This is a multi-centric cross-sectional study. A total of 72 secretaries suffering from Upper Limb Musculoskeletal Disorders (ULMSD) were included in this study. Every participant completed a self-reported questionnaire that included his socio-demographic data, and occupational information. The Quality of Life was measured by the Nottingham Health Profile questionnaire (NHP). It consists of 38 items that are regrouped into six dimensions (Pain, Physical mobility, Sleep, Energy, Emotional reactions and social isolation). Each score, ranging from 0 to 100, reflects the degree of difficulty the subject perceives in the corresponding domain. The higher the score, the greater the number and perceived severity of the ULMSD.

**Results:** The mean score of the domain of sleep, the domain of mobility, the domain of social isolation, the domain of pain, the domain of emotional reactions and the domain of energy level were respectively 38.8; 30.54; 20.41; 42.31; 35.56 and 80.53. Regarding socio-demographic characteristics, age was significantly associated with the domain of mobility ( $p=0.029$ ) and the domain of pain ( $p=0.036$ ). The BMI was significantly associated with the domain of social isolation ( $p=0.04$ ). The number of children was significantly associated with the domain of pain ( $p=0.025$ ). The familial status was significantly associated with the domain of pain ( $p=0.012$ ) and the domain of energy level ( $p=0.001$ ). The duration of home to work route was significantly associated with the domain of pain ( $p=0.03$ ) and the domain of sleep ( $p=0.05$ ). The sleep quality was significantly associated with the domain of emotional reactions ( $p=0.015$ ) and the domain of sleep ( $p=0.05$ ). Concerning professional characteristics, job tenure was significantly associated with the domain of mobility ( $p=0.006$ ) and the domain of pain ( $p=0.025$ ). Musculoskeletal disorders of shoulders were significantly associated with the domain of pain ( $p=0.034$ ).

**Conclusion:** The awareness of socio-professional factors influencing patients suffering from ULMSD can improve the quality of life of these patients.

P906

### OCCUPATIONAL FACTORS AND MUSCULOSKELETAL COMPLAINTS ASSOCIATED WITH COMPUTER USE IN THREE PUBLIC HOSPITALS IN TUNISIA

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**Objective:** To determine the prevalence of musculoskeletal complaints and occupational factors associated with computer use in three public hospitals in Tunisia.

**Methods:** Secretaries at three public hospitals in Tunisia were included in a cross-sectional study in 2022. Every participant completed a questionnaire that included his socio-demographic data, and information about job-related musculoskeletal disorders. Working conditions were assessed according to Karasek's Job Content Questionnaire.

**Results:** The study population was entirely female (n=72) with a mean age of 43.75±8.9 years. The prevalence of musculoskeletal complaints was arranged in the following order: neck complaints (79.2%), upper limb musculoskeletal complaints (68%) and lower back pain (64.4%). The Karasek Questionnaire revealed that the group's median decision latitude was 58 and the median psychological demand was 25. Thus, according to Karasek's model, 54 subjects (75%) were in a situation of "job strain" (work-related stressful situation). The duration of working with a computer was found as a significant factor for neck pain (p=0.005) as well as job strain (p=0.029). Factors significantly associated with upper musculoskeletal complaints were age (P=0.01) and job tenure (P=0.007).

**Conclusion:** This study highlighted occupational factors associated with upper limb musculoskeletal pain, namely, job tenure, job strain and time spent in front of the screen.

P907

### THE IMPACT OF EARLY PHYSIOTHERAPEUTIC THERAPY ON THE DEVELOPMENT OF POST-STROKE OSTEOPOROSIS

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**Objective:** Osteoporosis is a significant complication of stroke. The clinical course of hemiplegic stroke predisposes patients to disturbed bone physiology. Sudden immobility and unilateral loss of function unload the skeleton at key areas such as the affected hip. This is manifest by an early reduction in bone density at this site. Stroke patients may also have motor, sensory, and visual/perceptual deficits that predispose them to falls. The purpose of this study is to prevent the development of osteoporosis post-

stroke by providing early effective physiotherapeutic rehabilitation strategies to the patient and to improve activities of daily living and motor and functional improvement in stroke patients with hemiparesis.

**Methods:** A total of Sixty subjects who are diagnosed with osteoporosis (T-score >2.5) and are in the subacute phase of stroke (40 women, 20 men, age range 51-79 years) are included in the study. Patients will be divided into two groups Group A and B. Group A will receive Body weight-supported treadmill training and conventional physiotherapy exercise and Group B will receive Parallel bar walking along with conventional exercise for a period of 4 weeks. Main outcome measures included the Brunnstrom motor recovery stages, Barthel index, and radiographic severity of osteoporosis (loss of bone density, presence of ballooning of intervertebral disc).

**Results:** Both groups showed clinically and statistically significant improvements in Brunnstrom motor recovery stages at 4 weeks. But Group A receiving body weight-supported treadmill training showed more improvement than Group B receiving parallel bar walking training. The p-value at the 4th week post-intervention is P=0.001 (P<0.005) which will be found to be significant and is represented graphically. Subjects in the A group were less likely to be taking medications for their osteoporosis and were more satisfied with the overall outcome of their rehabilitative treatment compared with subjects in Group B.

**Conclusion:** The present study shows that both types of physiotherapeutic approaches are useful to treat and prevent osteoporosis post-stroke if early measures are taken and early weight bearing is initiated in patients. Small increases in bone mass are achieved by structured weight training and weight-bearing exercise. Body weight-supported treadmill training can be used to treat and prevent post-stroke developed osteoporosis along with conventional weight-bearing exercises and will help to improve activities of daily living and motor and functional improvement in stroke patients with hemiparesis.

P908

### PERIPROSTHETIC FRACTURES: THE UNAPPRECIATED OSTEOPOROSIS CRISIS

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**Objective:** Periprosthetic fracture (PPFx), i.e., those associated with a joint replacement or other fixation device, occur in up to 18% of those with total hip replacement. PPFx morbidity and mortality is similar to osteoporosis-related hip fractures. The purpose of this study is to describe osteoporosis-related demographics in PPFx patients seen by a university-based orthopedic practice.

**Methods:** The electronic medical record of PPFx patients seen from Dec 2016-Dec 2021 was reviewed. Demographic data and parameters relevant to osteoporosis were collected. Any prior DXA studies were reviewed. L1 Hounsfield Unit (HU) measurements were obtained on CT scans performed within 2 years be-

fore the PPFx. Clinical osteoporosis was defined as T-score  $\leq -2.5$ , HU  $<100$ , prior low trauma fracture or any use of osteoporosis medications.

**Results:** Femur or tibial PPFx were observed in 156 patients (115 F/41 M). Mean (SD) age, BMI and time from orthopedic procedure to PPFx were 75.4 (11.9) yrs, 29.9 (6.9) kg/m<sup>2</sup> and 7.9 (6.3) yrs respectively. Almost all, 153/156 (98%), of these PPFx were of the femur. Falls caused 89% and 8% were spontaneous. Prior DXA was available in 58; mean (SD) lowest T-score was -1.9 (0.9), 20 were  $\leq -2.5$ . CT scans were available in 45; mean (SD) L1 HU was 79.0 (29.4) with 35 having a HU value  $<100$ . Prior low-trauma fracture(s) had occurred in 46% and 9% had prior PPFx. Osteoporosis had been diagnosed and treatment prescribed previously in 45 (28%) and 41 (26%) respectively. Of these 41, 13 had received  $\geq 5$  years of bisphosphonates, only 6 were receiving treatment at time of PPFx. Clinical osteoporosis was identified based upon pre-existing data in 104 (66%) at the time of PPFx.

**Conclusion:** Periprosthetic fractures are osteoporosis-related. Specifically, PPFx patients are generally older and female; fractures are spontaneous or due to falls and BMD, when assessed, is low. Increased identification and treatment of osteoporosis in arthroplasty patients should reduce PPFx.

P909

**TREATMENT NON-ADHERENCE IN IRANIAN WOMEN WITH OSTEOPOROSIS: A CROSS-SECTIONAL STUDY**

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**Objective:** According to the studies, many patients do not adhere to the treatment of osteoporosis. Non-adherence to treatment leads to increased fragility fractures, cost, and mortality in patients. The study aims to investigate the level of adherence to prescribed medications in women  $\geq 50$  with osteoporosis.

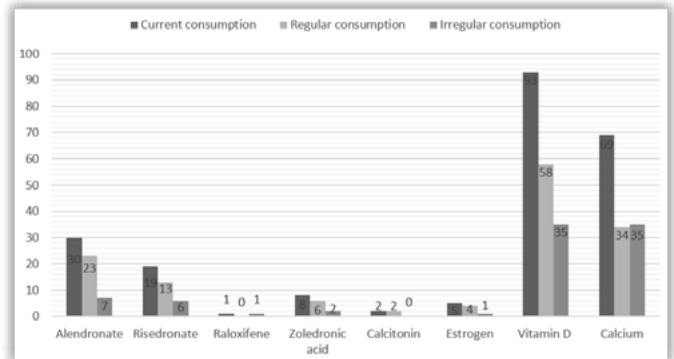
**Methods:** This cross-sectional observational study in one the province of Iran, collected data from women  $\geq 50$  years with osteoporosis who had initiated treatment. Variables including FRAX, demographic, socio-economic factors were collected over the phone due to the COVID-19 pandemic. Medication adherence was assessed using the validated OS-MMAS-8 questionnaire. The chi-square test and independent sample t-test were applied to explore the association of groups with different variables. P-values  $<0.2$  were considered significant.

**Results:** Of a total of 998 women, 109 (31.5%) were diagnosed with osteoporosis according to BMD. The mean age of women participate in this study was 73.41 $\pm$ 7.72 years. Of 109 patients with a diagnosis, 98 women initiated the treatment 44 (44.9%)

patients adhere to the treatment and 54 (55.1%) patients did not (Table 1). Overall, from 44 patients who adhere to the treatment 9(20.5%), 35(79.5%), and zero, had low, medium, and high OS-MMAS-8 scores ( $<6$ , 6 to  $<8$ , and 8, respectively). The mean age (74.57 $\pm$ 7.92) and the median 10-year risk of hip fracture (6.4 $\pm$ 5.7) in non-adherent patients were significantly higher than those who adhered to treatment ( $p<0.2$ ). Also, 13 (24.1%) and 11 (20.4%) patients had non-adherence to treatment, respectively, of rural residence and a history of glucocorticoid acid use, which difference was statistically significant ( $p<0.2$ ). Adherence to alendronate (76.66%), risedronate (68.42%), zoledronic acid (75%), vitamin d (62.36%) and calcium (49.27%) was observed in patients undergoing treatment (Fig. 1).

**Table1.** Selected patient characteristics by persistence status. (n=98)

Characteristics	Persistence status			P-value
	All patients (n=98)	Persistent (n=44)	Not persistent (n=54)	
Age, years*	73.41 $\pm$ 7.72	71.98 $\pm$ 7.28	74.57 $\pm$ 7.92	0.098
BMI, kg/m <sup>2</sup> *	26.67 $\pm$ 4.20	27.04 $\pm$ 4.25	26.36 $\pm$ 4.17	0.432
Hip fracture**	5.85 $\pm$ 5.47	4.7 $\pm$ 5.3	6.4 $\pm$ 5.7	0.145
Major osteoporotic fracture**	13 $\pm$ 8.9	11.5 $\pm$ 8	3.4 $\pm$ 8.8	0.254
Residence				
Urban	80(81.6)	39(88.6)	41(75.9)	0.106
Rural	18(18.4)	5(11.4)	13(24.1)	
Marital status				
Married	49(50)	26(59.1)	23(42.6)	0.251
Not married	49(50)	18(40.9)	31(57.5)	
Education				
Illiterate	60(61.2)	24(54.5)	36(66.7)	0.307
Elementary	6(32.7)	16(36.4)	16(29.6)	
Middle school and higher	6(6.1)	4(9.1)	2(3.2)	
Insurance				
Basic	88(89.8)	40(90.9)	48(88.9)	0.832
Supplementary	59(60.2)	27(61.4)	32(59.3)	
BMI				
Underweight, n (%)	2(2.0)	1(2.3)	1(1.9)	0.901
Normal, n (%)	31(31.6)	14(31.8)	17(31.5)	
Overweight, n (%)	45(45.9)	19(43.2)	26(48.1)	
Obese, n (%)	20(20.4)	10(22.7)	10(18.5)	
Parental hip fracture, n (%)	11(11.2)	5(11.4)	6(11.1)	0.989
Glucocorticoids intake, n (%)	25(25.5)	14(31.8)	11(20.4)	0.196
Previous Fracture, n (%)	35(35.7)	13(29.5)	22(40.7)	0.250
Rheumatoid arthritis, n (%)	24(24.5)	12(27.3)	12(22.2)	0.563
Secondary osteoporosis, n (%)	19(19.4)	9(20.5)	10(18.5)	0.809



**Figure 1.** Status of osteoporosis medication use in in patients who have initiated to the treatment

**Conclusion:** Adherence to anti-osteoporosis treatments is poor. Improving adherence to osteoporosis treatment will lead to a reduction in fragility fractures, the economic burden and mortality.

P910

### POSITIVE ANTI-CITRULLINATED PROTEIN ANTIBODIES AND OSTEOPOROSIS IN RHEUMATOID ARTHRITIS PATIENTS: IS THERE A LINK?

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**Objective:** Rheumatoid arthritis (RA) can be associated with several comorbidities including osteoporosis (OP). The origin of this bone loss is multifactorial. The link between anti-peptide citrullinated protein antibodies (ACPAs) and OP in RA has been suggested. The objective of our work was to study the association between positive ACPAs and the occurrence of OP in patients with RA.

**Methods:** A retrospective study including patients with RA according to the ACR/EULAR 2010 criteria was conducted over a period from 2000 to 2022 at the rheumatology department in Charles Nicolle hospital in Tunisia. Clinical data and parameters related to RA were collected. We compared the osteo-densitometric profile between RA patients with positive ACPAs and those with negative ACPAs.

**Results:** 244 patients (198 women and 46 men) were included. The mean age was 56.9 ±13.5 years. The mean age at diagnosis was 41.8±14 years. 57% of the patients had erosive RA. ACPAs were positive in 62% of patients (n=151). A decrease in the BMD was noted in 49% of cases: osteopenia in 31% and OP in 18% of cases. The mean T-scores at the lumbar and femoral sites were -2.1±1.10 DS and -2±1.2 DS respectively. The OP was trabecular in 59% of cases, cortical in 9% and mixed in 32% of cases. A vertebral fracture was noted in 11% of the osteoporotic patients. OP was found in 70% of patients with positive ACPAs vs. 29% in ACPAs-negative patients (p=0.03). All patients with OP had positive ACPAs. However, no significant relationship was found between the presence of trabecular OP and ACPA positivity (p=0.085).

**Conclusion:** Our study showed that the presence of OP, especially cortical, was significantly associated with ACPA positivity.

P911

### 3D-DXA PARAMETERS IN PATIENTS SUFFERING OSTEOPOROTIC FRACTURES

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**Objective:** Evaluate the association of 3D parameters in patients with osteoporotic fractures.

**Methods:** Retrospective analysis of clinical, DXA bone measurements and body composition in a group of patients selected from the Spanish CETIR cohort. 372 patients (267 women and 105 men) with clinical indications for DXA were categorized consid-

ering their history of fractures into fractured (FX) and non-fractured (NFX) subjects. Patients with fractures were classified as hip fractures (HFX) and major osteoporotic fractures (OTPFX). All patients underwent DXA of the lumbar spine, total hip, and total body. The studies are complemented with lateral spine VFA to confirm vertebral fractures. Aerial and volumetric BMD measurements were obtained using specific 3D-DXA software (3D Shaper Medical, Barcelona, Spain). T-test was used to compare the means between non-fractured (NFX) and fractured (FX) patients in a first analysis, and between the different types of osteoporotic fracture. **Results:** The age of the FX subjects was significantly higher than in the NFX subjects and the airborne BMD was lower in the FX subjects. No significant difference in height or weight was found. All 3D parameters were significantly lower in the FX. In the FX subjects, all parameters were lower in patients HFX compared to OTPFX, except for weight and cortical thickness. Prevalence of osteoporosis was: NFX: 13%; OTPFX: 23%; HFX: 47%.

**Table.** Significant results are in bold (p<0.05).

	NFX (157)	FX (215)	OTPFX (87)	HFX (131)
Age (years)	<b>68.5 ±11</b>	<b>75.0±9.9</b>	<b>70.4±10.3</b>	<b>78.3±8.2</b>
Weight (kg)	69.3±14.9	68.0±11.5	68.6±10.2	67.5±12.1
Height (cm)	157.2±8.10	157.3±8.4	<b>159.2±8.4</b>	<b>155.8±8.1</b>
Total Femur BMD (g/cm <sup>2</sup> )	<b>0.879±0.159</b>	<b>0.756±0.122</b>	<b>0.803±0.115</b>	<b>0.72±0.117</b>
surf. Cort. Dens (mg/cm <sup>2</sup> )	<b>147.6 ±27.2</b>	<b>131.3±20.4</b>	<b>137.03±19.9</b>	<b>127.6±21.1</b>
vBMD-Trab.	<b>144.7±48.5</b>	<b>107.3±29.8</b>	<b>113.3±32.9</b>	<b>103.5±26.9</b>
Cortical Thickness (mm)	<b>1.8602±0.163</b>	<b>1.780±0.134</b>	1.798±0.114	1.771±0.147

**Conclusion:** The results show that a history of previous fractures and especially hip fractures correlate with lower 3D-DXA parameters than in subjects without fractures.

P912

### FUNCTIONAL MOTOR ABILITY OF UPPER EXTREMITY FOLLOWING AN IMMERSIVE VIRTUAL REALITY REHABILITATION PROGRAM IN STROKE PATIENTS

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**Objective:** Immersive virtual reality (IVR.) although safe, is still in an embryonic stage for improving the post stroke disfunctions of the upper extremity (1, 2). The aim for this study was to explore the effectiveness of an IVR rehabilitation program in the functional motor ability of the hemiplegic upper limb.

**Methods:** A convenient sample of patients with stroke were randomly assigned to either an experimental group, receiving an IVR

rehabilitation program on top of a conventional physiotherapeutic exercises program, or to a control group, receiving only a conventional physiotherapeutic intervention for the hemiplegic upper limb. The intervention consisted of 16 -45 minutes-sessions (4 sessions per week, for 4 weeks). An evaluation of the sensorimotor function of the upper extremity (Fugl Meyer Assessment), the negligence of the paretic side (line bisection, line cancellation, letter cancellation), and the use of the upper limb in daily activities (Barthel Index) were reported before-, with the completion- and one month after the end of the intervention. Differences within and between groups were assessed via mixed ANOVA, SPSS vs. 28.

**Results:** After signing a consent form, 5 patients were randomly assigned to the experimental group (3 men and 2 women 62±3 years old) and 5 patients were allocated to the control group (4 men and 1 woman 64±4 years old). The sensorimotor function ( $F_{(1,16)}=12.27, p<0.05$ ), the negligence of the paretic side in terms of line bisection ( $F_{(2,16)}=32.41, p<0.01$ ), line cancellation ( $F_{(1,12,9,03)}=24.51, p<0.01$ ) and letter cancellation ( $F_{(1,8)}=7.74, p<0.05$ ) as well as the functional capacity in daily activities ( $F_{(1,8)}=14.40, p<0.05$ ) were all improved following the intervention. No statistically significant differences were observed between the two groups ( $p>0.05$ ).

**Conclusion:** The use of IVR rehabilitation program give promises to the rehabilitation post stroke, however, further studies are required to establish its superiority to the conventional physiotherapy.

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## P913

### SHOULD A SURGERY BE PERFORMED FOR CERVICO OSTEOARTHRITIC MYELOPATHIES DECOMPENSATED BY TRAUMA TO THE CERVICAL SPINE: ABOUT 37 CASES

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The incidence of the spinal cord trauma (SCT) in Algeria is 20 people/1000 inhabitants. SCT can lead to spinal cord injury without bone involvement, particularly when a narrow cervical canal (NCC) preexists. 75% of people over 65 have a narrow cervical canal, which is the most common risk factor for spinal cord injury. Furthermore, the cervical cord is more vulnerable because it is less well vascularized, particularly in the elderly population.

We report the experience of the neurosurgery department in the care of 37 patients with cervico osteoarthritic myelopathies whose ages are between 56-78 years old and who are victims of various accidents manifested by incomplete tetraplegia evaluat-

ed by the score by JOA. Our course of action was: hospitalization of patients; implementation of a therapeutic regimen based on corticoids 2 mg/kg/d associated with adjuvant treatment; the wearing of a cervical collar and not a minerva given the absence of spinal instability; and nursing, Reassessment of the JOA score on D3 post-trauma then patient discharge. Patients systematically reviewed in spine consultation at 1 month with a reassessment of the JOA.

The neurological and functional benefit of decompressive and stabilization surgery remains controversial. In our study, early surgery did not improve neurological and functional recovery and was not associated with fewer medical complications or shorter hospital stay. Moreover, there is no evidence in the literature to encourage routine early surgery in patients with SCT on NCC without vertebral fracture. In addition, potential preoperative complications must be taken into account, particularly in the elderly population. In the acute phase, the most frequent indications for surgery are the presence of signs of clinical and/or radiological instability. The criteria traditionally used in favor of remote surgery are worsening or stagnation of a neurological state after a phase of improvement.

## P914

### DOES A LOW SERUM CREATININE LEVEL CORRELATE WITH MORE SEVERE RHEUMATOID ARTHRITIS?

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**Objective:** Many studies have recently reported on rheumatoid cachexia which is defined by a decrease in muscle mass without loss of fat mass in patients with rheumatoid (RA). This phenomenon is the consequence of chronic inflammation and sarcopenia that are common in RA. A low serum creatinine (SC) level is one of the biological translations of this cachexia. The objective of this study was to investigate the correlation between low serum creatinine and the characteristics of RA and its activity. **Methods:** Descriptive and analytical cross-sectional study including patients followed for RA (ACR EULAR 2010 criteria) without chronic or acute renal pathology. Serum creatinine was measured in a standardized way by enzymatic method. Creatinine levels <5 mg/L were considered low. The activity of the disease was assessed by the 28 Disease Activity Score (DAS28). The correlation between low CR and the different parameters was studied by Spearman's coefficient r.

**Results:** We included 80 patients with a mean age of 58±10 years and a sex ratio of 0.14. The mean BMI was 25±5.6 kg/m<sup>2</sup>. The mean duration of RA was 13.8±7.9 years. RA was immunopositive in 87% of cases and erosive in 67.5%. Coxitis was present in 19 patients, while dislocation was present in 4 patients. 72% of the patients were on long-term corticosteroid therapy. Biotherapy was necessary in 34% of patients. The mean DAS28 was

4.5±1.01. A low CR level was found in 21% of the patients had a low CR level. A statistically significant correlation was noted between low CR and low BMI (<25 kg/mm) ( $r=0.637$ ,  $p=0.000$ ), long duration of duration of RA ( $r=0.250$ ,  $p=0.026$ ), the presence of coxitis ( $r=0.257$ ,  $p=0.03$ ), long-term corticosteroid therapy ( $r=0.233$ ,  $p=0.05$ ) and the use of biotherapy ( $r=0.291$ ,  $p=0.05$ ). There was no significant correlation between low CR levels and clinical or biological parameters of RA activity. **Conclusion:** Our results suggest that a low CR level is rather a reflection of old, severe and refractory RA to conventional treatments. Further studies are needed to confirm these results.

## P915

### THERAPEUTIC MAINTENANCE AND CAUSES OF DISCONTINUATION OF ANTI-TNFA IN SPONDYLOARTHRITIS: ABOUT 78 CASES

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**Objective:** Biological antirheumatic drugs (bDMARDs) have considerably revolutionized the treatment of spondyloarthritis (SpA). Tumor necrosis factor (antiTNF $\alpha$ ) inhibitors were the first bDMARDs used and evidence has been accumulating regarding safety, efficacy and tolerability. We aimed to investigate the reasons for discontinuation and therapeutic maintenance of biotherapies during SpA.

**Methods:** A retrospective study was conducted in the rheumatology department, involving patients with SpA meeting the ASAS 2009 criteria. Clinical and therapeutic data were collected. Therapeutic maintenance is defined by the time before stopping treatment as a measure of the efficacy of bDMARDs. All of the adverse effects (AEs) attested by pharmacovigilance have been noted. The data was analyzed using SPSS statistical software. All data was collected after patient consent.

**Results:** 78 patients followed for SpA were included, with a sex ratio (M/F) of 1.51. The average age of the patients was 43 years [19-69]. The average duration of the disease was 10 years [1-34]. The SPA types were: 59% SPA, 28% psoriatic arthritis and 12% IBD. Concerning the biotherapies received: 82% of the patients had one or more antiTNF $\alpha$ . The antiTNF $\alpha$  prescribed were: infliximab (38%), etanercept (24%), adalimumab (30%), golimumab (6%) and certolizumab (5%). The duration of therapeutic maintenance of infliximab (INF) was 3 years [0-12], etanercept (ETA) 5 years [1-10], adalimumab (ADA) 3 years [1-7], golimumab (GOLI) for 2 years [1-3], certolizumab (CERTO) and secukinumab for 1 year. The frequency of treatment discontinuation was 19% for INF, 14% for ETA, 17% for ADA, 3% for GOLI and 1% for CERTO. Among the causes of discontinuation of these biotherapies, we note: primary failure with INF, ADA (2 cases each) and ETA (5 cases), secondary failure under ADA (4 cases), case under INF and 2 cases under ETA. Adverse effects (AEs) were noted after taking ETA (9 cases), vs. 6 cases of INF, 7 cases of ADA and one case of GOLI. Seven patients receiving INF, GOLI and CERTO were lost to follow-up and

three others had a problem of access to treatment with INF and ADA. The distribution of the main AEs according to the type of anti-TNF $\alpha$  was as follows in Table 1.

**Table 1.** Table summarizing the duration of therapeutic maintenance and the side effects of each biotherapy

	INF	ETA	ADA	GOLI	CER-TO	SECUKI-NUMAB
Therapeutic maintenance (year)	3	5	3	2	1	1
Adverse effects (%):			12%			
*Infection	9%		3 cases			
*Paradoxical reactions	1 case	12%				
		1 case		1%		
*Allergic reaction			8 cases: uveitis			
*Hallucination	3 cases		1 case: psoriasis	1 case		1 case: psoriasis
*Hepatic cytolysis	1 case		1 case			
*Neutropenia	1 case					
*Erectile dysfunction	1 case		1 case			
*Dermatological impairment			2 cases			

**Conclusion:** Our study showed that the main reason for stopping biotherapies in SpA was adverse effects. Therapeutic maintenance was noted up to 5 years for etanercept. However, etanercept and adalimumab were more prone to adverse effects, especially paradoxical reactions, than infliximab.

## P916

### EVALUATION OF A DEEP LEARNING SPINE SEGMENTATION (SPS) ALGORITHM FOR ACCURATE AND REPRODUCIBLE MONITORING OF LUMBAR SPINE DXA SCANS

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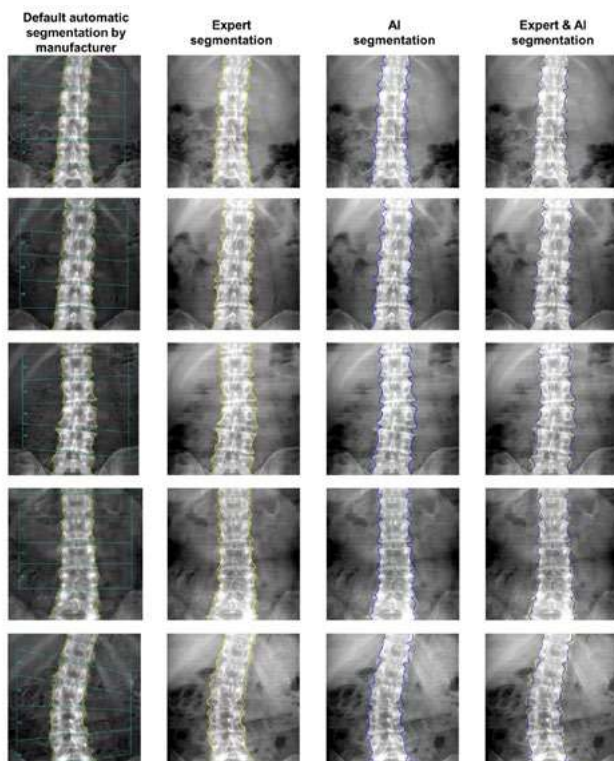
**Objective:** The antero-posterior (AP) lumbar spine DXA scan is an important diagnostic measure, used for the assessment of osteoporosis. The quality of the scan is highly dependent on the accuracy of the vertebral bone mask, derived from bone edge detection and spine segmentation (SpS). Reducing technical error requires manual validation of the default bone mask for each scan. However, this can be time-consuming and influenced by inter- and intra-observer variability. The aim of this study was to evaluate a

new deep-learning artificial intelligence (AI) -based model for the automated SpS, designed to minimize time and improve accuracy of lumbar spine scan analysis. First, we compared BMD, trabecular bone score (TBS) and bone surface area outcomes across three methods for SpS: 1) the manufacturer default, 2) the clinical DXA expert (criterion) and 3) the new AI-application. Second, we examined longitudinal reproducibility of each method for the measurement of spine surface area.

**Methods:** A sub-sample of 130 women (mean age: 67.1; BMI: 25.2; with no vertebral anomalies) were selected from the Osteo-Laus population cohort, who had previously received two LS DXA scans (GE Lunar iDXA, encore v 18) at two time points, 2.5 years apart. Scans were analyzed according to each of the three methods (default, clinical expert and AI), and the primary outcomes (BMD, TBS and surface area) were compared using one-way repeated measures-ANOVA. The coefficient of variation (CV%) for bone surface area was also computed.

**Results:** There were significant differences in BMD and TBS outcomes derived from the default bone mask method compared to the DXA clinical expert ( $p=0.01$ , Table 1). There were no differences in BMD and TBS derived using the AI SpS bone mask method compared to the DXA clinical expert ( $p=0.67$ , Table 1). Reproducibility for bone surface area was superior for the clinical expert and the AI model compared to the default method (Table 2).

**Conclusion:** The new deep learning AI based model demonstrated improved accuracy and reproducibility for lumbar spine bone segmentation compared to the default analysis method, and in close agreement with the clinical criterion. Overall, these results suggest that the new AI-based model for automated SpS may be a valuable tool for reducing time and improving accuracy for the analysis of lumbar spine DXA scans.



**Image 1.** Comparison of the default, expert and AI lumbar spine segmentation.

**Table 1.** Comparison of BMD and trabecular bone score between three spine segmentation methods: default, clinical expert and deep learning AI model.

		Mean (SD)		Mean (SD)	p-value
L1L4 BMD	Expert	1.003 (0.156)	AI	1.006 (0.158)	0.67
L1L4 BMD	Expert	1.003 (0.156)	Default	1.034 (0.145)	0.01*
L1L4 TBS	Expert	1.326 (0.084)	AI	1.325 (0.084)	0.84
L1L4 TBS	Expert	1.326 (0.084)	Default	1.296 (0.091)	< 0.001*

**Table 2.** Bone surface area reproducibility (CV%) for the default, clinical expert and deep learning AI model.

Variable	A	B	(A) Mean (sd)	(B) Mean 2 (sd)	p-value
L1L4 surface CV%	Default	AI	1.61 (1.56)	0.932 (0.685)	< 0.001*
L1L4 surface CV%	Expert	Default	0.985 (0.898)	1.61 (1.56)	< 0.001*
L1L4 surface CV%	Expert	AI	0.985 (0.898)	0.932 (0.685)	0.496

## P917

### BODY COMPOSITION IN A COHORT OF PATIENTS WITH OSTEOPOROTIC FRACTURES

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**Objective:** Evaluate the relevance of results of body composition analysis performed by DXA method in patients with osteoporotic fractures (hip, wrist and vertebral).

**Methods:** Retrospective analysis of selected patients from the CETIR Cohort, with a clinical indication for bone densitometry and who had a full body DXA scan with analysis of body composition. 372 patients were included, categorized according to their history of fractures: 131 hip (HFX), 39 vertebral (VFX) and 49 wrist fracture (WFX). All patients underwent DXA exploration of the lumbar spine, proximal femur, and whole body. A 3D volumetric reconstruction of the proximal femur was performed, obtaining measurements of cortical and trabecular bone using specific 3D-DXA software. (3D Shaper. Galgo Medical, Barcelona, Spain). In the cases of patients with hip fracture, the value of the lean mass calculated in the non-fractured limb was inferred. A t-test was applied for the comparison between the mean values of the subgroups of subjects. The relationship of the 3D-DXA parameters in the upper third of the femur with lean mass was assessed by linear regression.

**Results:** VFX vs. NFX: VFX were older and BMDs at total femur, sDENS, vBMD trab. were significant lower. No differences were found at weight, height and lean mass. WFX vs. NFX: vBMD trab. was significant lower. No differences were found at weight, lean mass and other bone parameters. HFX vs. NFX: HFX were older, BMD at total femur, sDENS and vBMD trab. were significant low-



er. No differences were found at weight, height. In these cases, lean mass measurements were significant lower. Lean mass was a good predictor for cortical parameter in all groups, but not for trabecular parameter.

sDENS	NFX	FX	VFX	WFX	HFX
ALMI	R: 0.560 R2: 0.313	R: 0.442; R2: 0.196	R: 0.426; FR2: 0.182	R: 0.507; R2: 0.257	R: 0.342; R2: 0.117
vBMD Trab	NFX	FX	VFX	VFX	HFX
ALMI	R: 0.530; R2: 0.281	R: 0.310; R2: 0.096	R: 0.201; R2: 0.040	R: 0.258; R2: 0.067	R: 0.295; R2: 0.087

**Conclusion:** Preliminary results show a direct relationship of lean mass to cortical parameters in patients with osteoporotic fractures, more relevant in WFX group. Trabecular parameter is not related to lean mass. This could be explained as mechanical cortical bone behavior is intimately related to muscle.

## P918

### THE USE OF AN IMMERSIVE VIRTUAL REALITY REHABILITATION PROGRAM TO INFLUENCE THE INTEREST AND ENJOYMENT OF PATIENTS WITH STROKE

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**Objective:** The use of virtual reality is increasingly being used for the rehabilitation of neurological diseases (1, 2). The objective of this study was to record the intrinsic motivation of the patients during an IVR rehabilitation program and its effectiveness on the functional ability of the paretic upper limb following stroke.

**Methods:** The two groups of stroke patients (experimental and control) received conventional physiotherapeutic intervention for the upper limb, while the experimental group additionally undertook an IVR rehabilitation program. The IVR program consisted of electronic games "flower meadow", "gaze maze", "miner" and "shooting star" which engaged the movement of the cervical spine and activated the upper limb. The intervention lasted 4 weeks. The patient's experience during the intervention (Intrinsic Motivation Index), the improvement in the functional ability (Motor Assessment Scale) of the upper extremity, and the quality of life (Stroke Specific Quality of Life Scale) were measured via Mixed ANOVA, and t-test with SPSS vs. 28.

**Results:** Both the experimental (5 patients 62±4 years old) and the control group (5 patients 64±4 years old) showed a significant improvement in the motor function of the upper limb ( $F_{(1,8)}=32,4$   $p<0.01$ ), and the quality of life ( $F_{(2,16)}=314.6$   $p<0.01$ ) but no differences were observed between the two groups. However, the patients in the experimental group felt they had more freedom of choice during the intervention than patients in the control group ( $t_{(8)}=3.91$   $p<0.05$ ). Additionally, patients in the experimental group seemed to find the intervention more pleasant and interesting than the control group ( $t_{(8)}=8.48$   $p<0.05$ ).

**Conclusion:** The results indicate the IVR as a more pleasant inter-

vention than conventional means, which could be considered as a potential parameter to increase the involvement of the patient with the rehabilitation program leading to a better clinical picture in motor daily functions, and quality of life.

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## P919

### PLACE OF CURRENT IMPLANTS IN THE MANAGEMENT OF CERVICO OSTEOARTHRITIC MYELOPATHY (COM) ABOUT 150 CASES

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**Objective:** Cervic osteoarthritic myelopathy is a cervical spinal cord suffering associating a narrowing of the dimensions of the cervical canal of osteoarthritis origin, the natural evolution of the pathology is towards progressive aggravation until tetraplegia. At present there is no medical treatment, so it is an almost exclusively surgical treatment that both decompresses the cervical spinal cord.

**Case report:** We report a series of 150 cases collected in the neurosurgery department, carrying CAM at the operative stage and having benefited from decompression with the addition of prosthetic material, namely cervical prostheses. The whole difficulty of the management of CAM is to pose an indication for surgery at the right time, the addition of implants in this surgery has allowed on the one hand to restore spinal biomechanics but also to restore a function of lost neck mobility.

**Conclusion:** We are convinced that although the cost of acquisition is relatively high, the addition of cervical prostheses allows a restoration of function and a social and professional reintegration of patients.

## P920

### PREVENTION OF PHYSICAL DECONDITIONING IN A CASE WITH SARCOPENIA, OSTEOPOROSIS AND OBESITY

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Sarcopenic obesity is a term describing the coexisting of two opposite pathologies, age related sarcopenia and obesity, which is being used more and more nowadays due to an increasing trend

in aging and obesity. A 70 year-old female patient was hospitalized in the Medical Rehabilitation Clinical Hospital Baile Felix, Romania. Physical examination revealed height 158 cm, weight 82 kg, BMI -32.85; static and dynamic vertebral syndrome: slightly accentuated dorsal kyphosis; left lumbar paravertebral muscle contracture; cervical spine with slightly limited mobility, mobilization causing dizziness; lumbar spine - limited mobility on lateral flexion and extension. Joint testing: right shoulder- mobilization crackles; knees - pain and tenderness on mobilization and peripatellar pressure; Right hip joint - slightly limited mobility, mobilization causes pain. Her medical history revealed osteoporosis with dorsal vertebral calcifications, sarcopenia, hypertension, chronic venous disease stage C1, obesity class 1.

The initial 10 meter walk test (on admission) and after 14 d (on discharge), showed normal walking speed: 1.20 and 1.24 m/s, respectively, (normal values 0.99-1.24 m/s). The timed up and go test indicated an initial value of 13.91 m/s and 12.14 m/s at discharge, and the functional mobility ability indicated - independence. Dynamometry revealed 28 kg force for the right hand and 26 kg force for the left hand. BMD by DXA: T-score lumbar spine-3.0; total body (ALM - appendicular lean mass)=0.51. Moderate risk of falling, on the John Hopkins Health System Corporation Scale 13 points. Sarqol - 81.3.

Objectives of rehabilitation treatment: decreasing pain; maintaining joint mobility, trunk stability, and coordination, improving venous circulation; prevention of falls/fractures, increase in muscle and bone mass. She was recommended foods with high calcium content, drug treatment for her conditions, and complex medical rehabilitation focused on physical therapy (joint mobilization, spinal extensor muscles toning), hydrokinetotherapy (36° oligomineral thermal water pool), underwater shower, analgesic electrotherapy, veno-lymphatic drainage.

Conclusion: Prevention of physical deconditioning through medical rehabilitation treatment maintained daily activities within functional parameters.

## P921

### FORMATION OF THE SKELETAL BONES IN JUVENILE RATS AFTER 90-DAY EXCESSIVE CAFFEINE INTAKE

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**Objective:** Caffeinated energy drinks may contain 3-fold or even 5-fold dose present in a cup of coffee. Excessive caffeine affects calcium turnover yet its effects on bone morphogenesis is unclear. Aim of the study is to investigate growth rate of the femur, the hipbone, and the first lumbar vertebra in juvenile rats after long-term caffeine intake.

**Methods:** 18 juvenile rats with body weight 130-140 g were equally distributed into 3 groups. Animals of the first group (K-90j) were the intact controls; the second group (C-90j) comprised the animals that received intragastric caffeine daily at 120 mg/kg of

body weight. Animals of the third group (CM-90j) received caffeine in the same way as group 2 did. Also these rats received treatment with subcutaneous injections of mexidol in dosage 50 mg/kg of body weight daily. In 90 days after administration of both drugs animals were euthanized by anesthetized decapitation. The hipbone, the femur, and the first lumbar vertebra were excised and prepared for gross measurements. All data were analyzed with the use of standard software.

**Results:** In the group C-90j by the 90<sup>th</sup> day length, width, and thickness of the hipbone decreased by 3.02%, 6.04%, and 6.33% respectively. Sizes of the femur also decreased like the following: length - by 3.40%, width of the proximal epiphysis - by 3.20%, mid-shaft width - by 7.06%, mid-shaft thickness - by 7.20% and width of the distal epiphysis - by 5.21%. Length and width of L1 body decreased by 5.60% and 11.55% respectively. In animals of the group CM-90j (in comparison with C-90j group) length and width of the hipbone and the femur increased.

**Conclusion:** Excessive 90-day caffeine intake results in decrease of bone growth rate. Administration of mexidol to animals taking excessive caffeine results in restoration of growth rate of the skeletal bones.

## P922

### OS ODENTOIDEUM ABOUT 03 CASES

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**Objective:** Bone odontoidum or mobile odontoid process is one of the malformations of the cervico-occipital hinge. It is about a defect of union of the center of ossification of the odontoid on the body of the axis. The malformation exposes you to atlo-axoid instability and the risk of bulbo-medullary compression.

**Methods:** We report the observation of 03 active men whose age varied between 18-247 years with a notion of craniocervical trauma and who presented progressively in 2 years persistent cervical pain and stiffness with heaviness of the four limbs with discreet sphincter disorders.

**Results:** The clinical examination objectified spastic tetraparesis with associated sensory disturbances Lateral flexion and extension radiographs can provide useful information about C1-C2 instability. Computed tomography (CT or simple) is useful to define bony relationships at the base of the skull, C1 and C2. The degree of C1-C2 instability identified on cervical radiographs is not correlated with the presence of myelopathy. A sagittal diameter of the spinal canal at the C1-C2 level of 13 mm correlates with the myelopathy detected on clinical examination. MRI can show spinal cord compression and signal changes in the cord that correlate with the presence of myelopathy. To behave given the clinical examination, the patients show signs of deficit associated with imaging objectifying a compression of the bulb, a surgical indication is posed, the intervention consisted of an occipital craniectomy opening of the occipital foramen and the posterior arc of C1 followed by C3 occiput osteosynthesis using polyaxial rods and screws.

**Conclusion:** The mobile odontoid process or os odontoideum is a rare anomaly of the cervico-occipital hinge for which we will recall the clinical, radiological, etiological and prognostic aspects for an adequate management. Clinical examination revealed spastic tetraparesis with associated sensory disturbances. Cervical CT and MRI confirmed the odontoid-axoid dislocation, the CT on the one hand revealing a corticalized ovoid ossicle in place of the odontoid and the MRI on the other hand the myelomalacia. The therapeutic result was conclusive after surgical approach by posterior approach. The os odontoideum designates a small bone in a position cranial to the axis and independent of the odontoid. The embryonic, vascular or even traumatic origin are evoked to explain the pathogenesis. It can be discovered incidentally in asymptomatic patients or cause sudden death without the diagnosis being recognized. If symptomatic, the age of discovery is variable and the clinical signs are upper neck pain, neck stiffness, torticollis, spinal cord or cervical radicular compression syndrome without any notion of recent spinal cord injury. Standard radiographs, better cervico-occipital CT, show a rounded or ovoid ossicle, separated from the base of the odontoid and corticalized, unlike recent fractures of the odontoid. MRI shows the repercussions on the bulbo-medullary junction. The approach of choice is the posterior approach to decompress the nervous structures and stabilize the spine. Functional rehabilitation is essential. In asymptomatic subjects, prophylactic surgery is discussed after dynamic X-rays.

P923

### CERVICAL SPINAL INJURY SECONDARY TO A SPORTS ACCIDENT ABOUT 29 CASES

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**Objective:** Trauma to the cervical spine can be differentiated from a therapeutic point of view, in two situations: The unstable spine (fracture + ligament rupture) where the potential neurological risk, medullary or radicular, guides in a completely hierarchical and validated way the conduct to be held on the ground and then at a distance. The microtraumatic spine where, as we know, the frequency of 'common' spinal pain, and the functional, socio-professional and athletic repercussions, which vary greatly from one patient to another for the same lesion, involve more diagnostic and therapeutic pathways. individualized and, for the majority, primarily or even solely conservative.

**Methods:** We report a series of 29 patients admitted as part of the emergency at the level of the neurosurgery department/central hospital of the army and treated surgically in emergency following various sports accidents. all the difficulty of management is based on the right indication:- Should a great sportsman be operated on or not?- If so, what is the benefit?- And above all can he resume his sporting activity of competition?

**Results:** Of the 29 athletes who had spinal cervical lesions without medullary, 21 were indicated for surgery: - 07 patients operated by an anterior approach with dissection followed by placement of a cervical cage and anterior osteosynthesis on one level.

- 04 patients via the posterior route due to articular collisions, having benefited from fixation via the posterior route. 08 patients when to them were of orthopedic indication with installation of a cervical collar with a rigorous clinical radio control.

**Conclusion:** The surgical indication is always posed in front of spinal instability, this must be discussed at length and with the consent of the patient in athletes. orthopedic treatment is indicated when the elements of spinal stability are not compromised, otherwise surgery is the only therapeutic recourse. The management of high-level athletes requires in-depth compression of the lesion mechanisms, careful reading of radiological images and multidisciplinary management. not only surgical but functional and rheumatological rehabilitation.

P924

### THERAPEUTIC MAINTENANCE AND ADVERSE EFFECTS OF csDMARDS IN RHEUMATOID ARTHRITIS

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**Objective:** Despite the advent of new targeted therapies in rheumatoid arthritis (RA), conventional synthetic disease-modifying drugs (csDMARDs) remain the gold standard as first-line treatment, or in combination with other therapeutic classes. The aim of our study was to evaluate the therapeutic maintenance of csDMARDs, the different causes of discontinuation and the adverse effects (AEs) reported in our series.

**Methods:** This is a retrospective study carried out on patients with RA meeting the ACR/EULAR 2010 criteria. Clinical, immunological and therapeutic data were collected. Therapeutic maintenance is defined by the time before stopping treatment as a measure of the drug efficacy of csDMARDs. All of the AEs attested by pharmacovigilance were noted.

**Results:** 135 patients followed for RA were included, with a sex ratio (M/F) of 0.13. The average age was 55 years [21-78]. The average duration of the disease was 15 years [1-56]. RA was erosive in 88% of cases, immunopositive in 84% of cases. Patients were put on csDMARDs in 92% of cases, distributed as follows: 92% of patients were on methotrexate (MTX), 54% on salazopyrine (SLZ) and 22% on leflunomide (LEF). Therapeutic maintenance was 6 years [1-30] for MTX, 4 years [1-20] for SLZ, 2 years [1-9] for LEF. Among the causes of discontinuation of csDMARDs: a primary failure had occurred under MTX in 8% of cases, 16% under SLZ and 4% under LEF. A secondary failure with MTX in 21% of cases, 7% under SLZ and LEF in 3% of cases. Four patients receiving MTX and SLZ were lost to follow-up and one patient on MTX had a management problem. Adverse effects were the cause of discontinuation, following the intake of MTX in 25% of cases, SLZ (20%), LEF (6%). The main AEs were distributed as follows in Table 1.

**Table 1.** Summarizing the duration of therapeutic maintenance and the side effects of each csDMARD

	MTX	SLZ	LEF
Therapeutic maintenance(-year)	6	4	2
Adverse effects:			
*Digestive intolerance			2 cases
*Hepatic disturbance		25 cases	2 cases
*Alopecia	27 cases	8 cases	
*Vertigo	9 cases		
*Acute tubular necrosis	2 cases		
	1 case		
*Erectile dysfunction	1 case		1 case
*Hematological toxicity	3 cases	1 case	
*Pulmonary involvement	5 cases		
*Allergic reaction	5 cases	4 cases	1 case
*Induced lupus	1 case	2 cases	
*Oral aphthosis		3 cases	6 cases
*High blood pressure			

**Conclusion:** Our study confirms the effectiveness of csDMARDs by prolonged therapeutic maintenance, especially for methotrexate, and that the most frequent cause of discontinuation of csDMARDs is the appearance of adverse effects. Hence, the importance of pre-therapeutic assessments and close follow-up of patients: clinical and biological.

## P925

### ORGANISATIONAL PREDICTORS OF HIGHER PERFORMING FRACTURE LIAISON SERVICE: A CLUSTER ANALYSIS OF THE FLSDA AUDIT OF ENGLAND AND WALES

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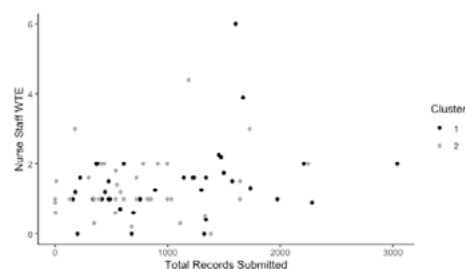
**Objective:** Given the increased risk of another fracture after an index fracture, Fracture Liaison Services (FLSs) are small teams of healthcare professionals and administrators that ensure high-risk patients are identified, assessed, started and stay on treatments

to reduce their risk of another fracture. We aimed to describe the organisational predictors of higher-performing FLS to share best practices and improve patient outcomes.

**Methods:** We used data from the FLS database for England and Wales, a mandatory national audit for all FLSs set up in 2016. Each FLS submits an annual organisational audit and individual patient records mapped against ten key performance indicators (KPIs). We used K-means clustering of the 2020 KPIs to identify the optimal number of clusters of FLSs and then compared the organisational characteristics between the clusters.

**Results:** There were 74 FLSs with organisational audit data available. Using K-means clustering, the optimal cluster size was 2. When comparing the clusters, cluster 1 had a higher percentage of caseload identified (48 vs. 38%,  $p=0.018$ ), falls assessment (90 vs. 52%,  $p=0.003$ ), strength and balance class initiation (5 vs. 0%,  $p<0.001$ ), 16-week monitoring – contact (30 vs. 0%  $p<0.001$ ), anti-osteoporosis medication (AOM) commenced (44 vs. 0%,  $p<0.001$ ) and 52-week AOM prescription (40 vs. 0%,  $p<0.001$ ). Of the organisational characteristics, there was no difference in age of the FLS ( $p=0.12$ ), type of funding ( $p=0.07$ ) or staff per nurses or administrators ( $p>0.7$ ). In addition, no differences were found in the highest grade of nursing or administrator staff or patient groups assessed. While overall there was a positive correlation between nursing hours and number of patient records (Spearman  $r=0.32$ ,  $p=0.049$ ), this was stronger in cluster 1 ( $r=0.32$ ,  $p=0.052$ ) compared with cluster 2 ( $r=0.11$ ,  $p=0.5$ ) (Figure).

Relationship between total records submitted in 2020 by FLSs and the Nurse staff whole time equivalents by cluster



**Conclusion:** Despite significant differences in KPI between the 2 clusters for cases identified and monitoring, no differences were found in staff size per 1000 records, highest grade between the cluster or FLS age. These findings suggest significant improvements in FLS KPI could be achievable by increasing staff resources to improve patient identification and monitoring.

## P926

### PARADOXICAL REACTIONS INDUCED BY ANTI-TNF $\alpha$ : ABOUT 9 CASES

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**Objective:** Tumor necrosis factor antibody (anti-TNF $\alpha$ ) represents a therapeutic alternative for idiopathic uveitis and cutaneous

psoriasis, which are refractory to conventional treatment. However, few cases of ocular inflammation and psoriatic reactions secondary to anti-TNF $\alpha$ , have been reported in literature. The aim of our study is to highlight the paradoxical reactions induced by anti-TNFs.

**Methods:** In this regard, we report a series of cases of paradoxical reactions observed in one hundred and thirty-two patients with chronic inflammatory rheumatism (spondyloarthritis and rheumatoid arthritis) treated with anti-TNF $\alpha$ . Clinical and therapeutic data were collected. All of these events have been confirmed by pharmacovigilance.

**Results:** These are nine patients (7%) with a sex ratio (M/F): 2 and an average age of 46 years [32-76], 88% followed for spondyloarthritis (SpA): (five cases of spondyloarthritis ankylosing and three psoriatic arthritis) and 12% for rheumatoid arthritis. The average age of onset of the disease was 34 years [19-66] and the average age of initiation of biotherapy was 42 years [24-72]. Seven patients were treated with etanercept, one with certolizumab and another patient received golimumab. Ophthalmic involvement was objectified in seven patients: anterior uveitis in six patients and panuveitis in one patient. Two paradoxical reactions of the cutaneous psoriasis type were noted in two other patients. Average time between the start of anti-TNF $\alpha$  treatment and the adverse effect was 4 years [1-8]. All the patients were stable from the point of view of their rheumatic diseases. It was ocular involvement and de novo psoriasis which appeared under anti-TNF $\alpha$  in all cases. One of the nine patients had two flare-ups of uveitis. These inflammatory episodes resisted conventional treatments and required the discontinuation of anti-TNF $\alpha$  in all patients and the switch to another anti-TNF $\alpha$  (77%) or another biotherapy, in particular tofacitinib (11%) and tocilizumab (11%). The evolution was marked by the disappearance of these side effects for the most part (except for the case of panuveitis which recurred under another anti-TNF $\alpha$  (adalimumab)).

**Conclusion:** In our series, the occurrence of paradoxical uveitis or psoriasis under anti-TNF $\alpha$  therapy was 7%. Patients had a controlled disease activity under treatment except the side effect. The evolution was favorable after stopping the treatment.

## P927

### CORRELATIONS BETWEEN BODY MASS INDEX AND APPENDICULAR LEAN MASS IN SARCOPENIA

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**Objective:** To analyze the prevalence of sarcopenia and factors influencing body composition in a group of patients admitted to the Clinical Rehabilitation Hospital "Baile Felix", Romania.

**Methods:** The study was conducted in our hospital and enrolled 117 patients (inpatients and outpatients) with multiple comorbidities, different ages, sex, body weight, and menopausal age

for female patients, who underwent whole-body DXA between January 2022 and January 2023. We extracted the appendicular lean muscle mass (ALM) determined by whole-body DXA, and we established the diagnosis of sarcopenia considering the recommended EWGSOP2 cut-off points for ALM. Patients with missing data were excluded from the analysis. The statistical analysis was made using the SPSS Statistics Software. In order to analyse the data, Mann-Whitney U and chi-square test were used, with a statistical significance p-value threshold of 0.05. Data distribution was non-normal, therefore the results are presented between the 25th and 75th percentiles.

**Results:** 99 patients were females (84.6% female, 15.4% male). 32.47% of the patients were diagnosed with sarcopenia. From the total of 99 women, 35 (35.35%) had sarcopenia. 90 (90.9%) women were at menopause at the time of the study. Out of 18 male patients, 5 (27.77%) had sarcopenia. Regarding the age of the patients and the onset of sarcopenia the median age was 65 years (ranging between 56-72 years); the median menopausal age was 50 years (ranging from 48-51 years). There was a statistical correlation between body weight and sarcopenia (p=0.001).

**Conclusion:** Sarcopenia had high prevalence. There was a statistically significant correlation between body mass index and skeletal muscle mass.

## P928

### THERAPEUTIC MAINTENANCE AND REASONS FOR STOPPING BIOTHERAPIES IN RHEUMATOID ARTHRITIS: ABOUT 135 CASES

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**Objective:** The advent of biological therapies (bDMARD) has considerably revolutionized the management of rheumatoid arthritis (RA). The aim of our study is to determine the duration of therapeutic maintenance of biotherapies and the reasons for stopping during RA.

**Methods:** A retrospective study was performed on patients with RA meeting the ACR/EULAR 2010 criteria. Clinical, immunological, radiological and therapeutic data were collected. Therapeutic maintenance is defined by the time before stopping treatment as a measure of the efficacy of bDMARDs. All of the adverse effects (AEs) attested by pharmacovigilance have been noted.

**Results:** 135 patients followed for RA were included, with a sex ratio (M/F) of 0.13. The average age of the patients was 55 years [21-78]. The average duration of the disease was 15 years [1-56]. RA was erosive in 88% of cases, immunopositive in 84% of cases. Regarding the targeted therapies received: anti-TNF $\alpha$  (51%), tocilizumab (19%), rituximab (28%) and 1% anti JAK. The anti-TNF $\alpha$  prescribed were: infliximab (INF) (22%), etanercept (ETA) (20%), adalimumab (ADA) (11%), golimumab (GOLI) (5%) and certolizumab (CERTO) (12%). Therapeutic maintenance was 3 years with INF and ETA, 4 years with ADA, 2 years with GOLI, CERTO and anti CD20 and 3 years with anti IL6. Among the causes of discontin-

uation of these biotherapies, a primary failure had occurred with INF (4%), with ETA (6%), with ADA (2%) and with antiCD20 (10%), a secondary exhaust to INF, CERTO, antiCD20, antiIL6 (4%), to ETA (5%) and GOL1, ADA (2%). Four patients receiving INF, antiIL6 and antiCD20 were lost to sight. Six others receiving antiCD20, ADA, ETA and antiIL6 had a treatment problem. Adverse effects (AEs) were the cause of discontinuation following taking INF, ADA, CERTO, antiCD20 (2%) each, 6% following ETA, and 4% following taking antiIL6. The main AEs were distributed as follows in Table 1.

**Table 1.** Summarizing the duration of therapeutic maintenance and the side effects of each biotherapy

	INF	ETA	ADA	GOLI	CERTO	AN-TICD20	AN-TIIL6
Therapeutic maintenance(-year)	3	3	4	2	2	2	3
Adverse effects:							
*Infection							3 cases
*Basal cell carcinoma			1 case				
*Erythema nodosum	1 case	4 cases					
*Paradoxical reactions		1 case					
*Allergic reactions		1 case				1 case	
*Neutropenia					1 case: PSO		
*Pruritus	2 cases	1 case			1 case		4 cases
*Hematological impairment			1 case				
*Lipoma				1 case			1 case
*Vaso-occlusive crisis						1 case	

**Conclusion:** Our study showed that the main cause of discontinuation of biotherapies was secondary escape. Therapeutic maintenance was noted up to 4 years for ADA. ETA was the most common source of adverse effects.

## P929

### INVESTIGATION OF THE CORRELATION BETWEEN NESFATIN-1 AND THE PREVALENCE OF OSTEOPOROSIS IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To study the correlation between nesfatin-1 and the prevalence of osteoporosis in patients with rheumatoid arthritis.

**Methods:** The study included 110 RA patients. The level of nesfatin-1 in serum was assessed using ELISA. We investigated the level of 25-hydroxycalciferol (25(OH)D), the C-ter-

minal telopeptide type I collagen (CTX-1); and type I procollagen N-propeptide (P1NP). Non-parametric characteristics are presented as Me [Q1-Q3]. The Mann-Whitney (Z) test was performed to determine differences between groups. The Spearman coefficient q was used to describe the correlation.

**Results:** The median level of nesfatin-1 was 44.5 [25.9-67.2]. Serum levels of nesfatin-1 were higher in patients with osteoporosis (45.2 [27.3-74.5] ng/mL vs. 40.1 [21.4-53.4] ng/mL; Z=-2.06;p=0.040). No correlation between serum levels was observed. nesfatin-1 with 25(OH)D and CTX-1 (q=-0.10; p=0.304 and d=0.09; p=0.351, respectively). There was a weak positive correlation observed between serum nesfatin-1 and P1NP levels (q=0.25;p=0.009).

**Conclusion:** The level of nesfatin-1 in the blood serum was higher in patients with osteoporosis. A weak positive correlation has been observed between serum levels of nesfatin-1 and P1NP. According to our study, nesfatin-1 has a positive associated with the level of bone metabolism and osteoporosis. More research is needed.

## P930

### STRENGTH OF THE HUMERUS AFTER IMPLANTATION OF OC-015 INTO THE TIBIA AND INTRAVENOUS ADMINISTRATION OF MESENCHYMAL STEM CELLS ON THE 10TH DAY AFTER INTERVENTION

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**Objective:** Allogenic mesenchymal stem cells (MSC) are widely used for treatment of various bone diseases yet general state of the skeleton under effect of MSC is not well clear. Aim of the study is to test strength features of the humerus in rats after implantation hydroxyapatite material OC-015 into the tibia and intravenous injections of allogenic MSC on the 10<sup>th</sup> day after intervention.

**Methods:** In the study 72 male rats were distributed into several groups. Group C consisted of intact animals. In animals of group OC the openings in the tibiae were filled with hydroxyapatite material OC-015. Animals of MSC10 group received intravenous injections of MSC (5E6 per injection) on the 10<sup>th</sup> day after implantation of OC-015. Observation terms were 15, 30, 60, and 90 days after implantation. MSC were obtained from the red bone marrow of donor animals. Strength features were tested with the help of three-point bending technique at loading speed of 0.25 mm/min up to destruction. Distance between supporting points of the loading device was 10 mm. Statistical analysis of the data was performed by means of standard software.

**Results:** In the OC group the minimum work of destruction of the humerus from 7<sup>th</sup> to 30<sup>th</sup> days decrease as compared with the controls by 10.90%, 13.01% and 6.89%, a tensile strength - by 11.13%, 6.61%, and 4.95%, and breaking moment on the 7<sup>th</sup> and the 60<sup>th</sup> days decrease by 7.71% and 4.79%. Comparing data from MSC10 group with OC group we found out that breaking moment

decreased on the 15<sup>th</sup> day by 6.46% but the minimum work of destruction of the humerus increased on the 30<sup>th</sup> day by 5.96%.

**Conclusion:** Administration of MSC on the 10<sup>th</sup> day after implantation of OC-015 into the tibia slightly optimizes strength of the humerus on the 30<sup>th</sup> day after implantation.

### P931

#### BONE-RELATED OUTCOMES IN SEVERELY OSTEOPOROTIC POSTMENOPAUSAL WOMEN ON DENOSUMAB AFTER A YEAR OF ADD-ON TERIPARATIDE VS. ONGOING MONOTHERAPY

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**Objective:** To study bone-related outcomes after a year of add-on teriparatide treatment vs. ongoing denosumab monotherapy in severely osteoporotic postmenopausal women.

**Methods:** 38 women (aged 74.1±10.8 years, 47.8±5.5 years at menopause, BMI 27.1±4.5 kg/m<sup>2</sup>) with severe primary (26) or glucocorticoid-induced osteoporosis (GIOP) (12) on long-term denosumab with add-on teriparatide treatment (COMBO group) were retrospectively compared to 37 women (aged 72.6±7.8 years, age 48.3±5.3 years at menopause, BMI 25.1±6.2 kg/m<sup>2</sup>) with matching osteoporosis types (23 primary, 14 GIOP) on denosumab monotherapy (DMAB group). Their biochemical parameters (25(OH)D, corrected calcium, intact PTH (iPTH), cross-linked C-telopeptide of type I collagen (CTX), procollagen type I N-terminal propeptide (P1NP) levels) and BMD by DXA at standard sites were measured at baseline and after a year of treatment. Data were presented as mean±SD. Differences were statistically tested using a paired and unpaired t-test as appropriate.

**Results:** At baseline (i.e., just before the next denosumab application), CTX (877.4±1302 vs. 2952.7±1898.9 pmol/L; p<0.001) and P1NP levels (28.1±20 vs. 41.3±19.4 µg/L; p=0.01) were significantly higher in the DMAB group. There were no differences in other biochemical parameters between the groups (25(OH)D (76±19.1 vs. 75.6±28.1 nmol/L; p=0.94), corrected serum calcium (2.2±0.1 vs. 2.3±0.1 mmol/L; p=0.055), and iPTH (48.9±33.8 vs. 55.7±21.6 ng/L; p=0.388). After a year, corrected calcium (2.3±0.1 vs. 2.2±0.1 mmol/L; p<0.001) and P1NP levels (40.3±53.8 vs. 16.8±12 µg/L; p=0.018) were significantly higher in the COMBO group. In the COMBO group, BMD significantly increased at all sites (LS 0.867±0.169 vs. 0.906±0.180 g/cm<sup>2</sup>; p=0.001), FN 0.620±0.085 vs. 0.638±0.098 g/cm<sup>2</sup>; p=0.011), and TH 0.746±0.103 vs. 0.760±0.111 g/cm<sup>2</sup>; p=0.006). In the DMAB group, the increase in BMD was only significant at LS (0.740±0.120 vs. 0.747±0.096 g/cm<sup>2</sup>; p<0.001). None of the differences in mean BMD change between the groups reached statistical significance.

**Conclusion:** After a year of treatment, P1NP levels were significantly higher in the COMBO group. However, the mean BMD gain was not statistically significantly different between the groups at any measured site.

### P932

#### AN EXECUTIVE SUMMARY OF NATIONWIDE OSTEOPOROSIS CAMPAIGNS 2019-2021: BRIEF REPORT

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**Objective:** World Osteoporosis Day inaugurated on October 20 every year by International Osteoporosis Foundation to initiate bone health and osteoporosis as a global health agenda for policymakers, health care providers and the public. This brief report aimed to present the campaign activities in three years 2019, 2020, and 2021. The purpose of this campaign was to promote osteoporosis awareness in order to close osteoporosis awareness gap and data gap.

**Methods:** World osteoporosis day campaign were held for three consecutive years 2019-2021 through the "close awareness gap" and "close data gap" phases. Also, a short survey regarding the knowledge of women aged ≥ 50 years of osteoporosis was used in campaigns to gather data for future planning. This nationwide campaign was established by Osteoporosis Research Center in collaboration with the Non-communicable diseases management office of the Iran ministry of health.

**Results:** To close the awareness gap, 1972, 1881, and 2538 women aged ≥ 50 were participated in the world osteoporosis campaign and educated in 2019, 2020, and 2021 respectively from 63 cities in Iran. The slogan of "early detection and timely diagnosis of osteoporosis" were followed in different public awareness and healthcare professional educational events. More than thousands of online and published educational materials were provided and disseminated in groups and face to face and also virtual education via celebration meetings in primary healthcare facilities, parks and so on and answered the questionnaire at the end of the education (Table 1). Also, the in-person and virtual events such as up-date osteoporosis symposiums, national osteoporosis research network meetings, osteoporosis essential courses and subspecialty one day seminars was provided to translate knowledge for the health care teams and policy makers. To close the data gap, establishing three main population and clinical based projects such as the National osteoporosis registry, Fracture Liaison Services, and Iranian Multi-center Osteoporosis Study (IMOS) have been started (Table 2).

Table 1. Results of the survey in 2019, 2020 and 2021.

Questions	2019 (Total: 1972) N (%)			2020 (Total: 1888) N (%)			2021 (Total: 2538) N (%)		
	Correct	No information	Wrong	Correct	No information	Wrong	Correct	No information	Wrong
1. Very few persons are at increased risk of fractures.	1135 (57.6)	573 (29.1)	264 (13.4)	1147 (60.8)	176 (9.3)	560 (29.7)	1354 (53.3)	358 (14.1)	819 (32.3)
2. Alcohol consumption does not affect osteoporosis.	1129 (57.3)	364 (18.5)	479 (24.3)	1148 (60.8)	286 (15.1)	448 (23.7)	1227 (48.0)	437 (17.2)	1367 (53.9)
3. Daily physical activity of fewer than 30 minutes results in losing skeletal muscle mass.	971 (49.2)	270 (13.7)	731 (37.1)	1037 (55.0)	226 (12.0)	599 (31.7)	1489 (58.5)	340 (13.4)	693 (27.3)
4. The history of fracture in parents, increases its risk for an individual.	1203 (61.0)	313 (15.9)	456 (23.1)	1193 (63.2)	224 (11.9)	466 (24.7)	1540 (60.7)	363 (14.3)	628 (24.7)
5. Osteoporosis accompanies pain in all cases.	1010 (51.2)	249 (12.6)	713 (36.2)	773 (40.9)	195 (10.3)	915 (48.5)	1322 (52.1)	297 (11.7)	900 (35.8)
6. Smoking increases the risk of osteoporosis.	1619 (82.1)	212 (10.8)	141 (7.2)	1609 (85.2)	138 (7.3)	133 (7.0)	2004 (79.0)	279 (11.0)	241 (9.6)
7. Early menopause increases the risk of osteoporosis.	1399 (70.9)	393 (19.9)	180 (9.1)	1446 (76.6)	296 (15.7)	141 (7.5)	1779 (70.1)	503 (19.8)	246 (9.7)
8. Familial history of osteoporosis, increases its risk for an individual.	1267 (64.2)	333 (16.9)	372 (18.9)	1290 (68.3)	242 (12.8)	347 (18.4)	1693 (66.7)	393 (15.5)	442 (17.4)
9. There is no treatment for osteoporosis.	1048 (53.1)	319 (16.2)	605 (30.7)	1091 (57.8)	200 (10.6)	589 (31.2)	792 (31.2)	350 (13.8)	1389 (54.7)
10. Individuals who are exposed to the sun more frequently, are at lower risk of osteoporosis.	1466 (84.5)	158 (8.0)	148 (7.5)	1679 (88.9)	88 (4.7)	112 (5.9)	2130 (83.9)	201 (7.9)	197 (7.8)

Table 2. The summary and main objective of approaches to close the data gap.

Approach	Summary of main objective
National osteoporosis registry	The national osteoporosis registry gathers clinical data on participants with osteoporosis, osteopenia, or individuals at risk. It will provide gaps in treatment and will be used to enhance national evidence-based guidelines.
Fracture Liaison Service (FLS)	The objective of FLS is to deliver the best care to individuals with a fragility fracture to prevent any new fractures. Also, this service ensures the primary prevention of fractures among individuals aged more than 50 years with an early DXA scan.
Iranian Multi-center Osteoporosis Study (IMOS)	IMOS investigates the epidemiology of osteoporosis in both urban and rural areas with an emphasis on sarcopenia and its epidemiological characteristics in the context of osteoporosis research.

**Conclusion:** Closing the osteoporosis treatment gap was approached by a nationwide campaign to make an appropriate intervention to emphasize early diagnosis and awareness of osteoporosis to close the care gap.

### P933 EFFECTS OF THE COVID -19 PANDEMIC ON PATIENTS WITH OSTEOPOROSIS TREATED WITH DENOSUMAB

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**Objective:** In December 2019, a new variant of coronavirus, the SARS-COV-2, developed into a new infection called coronavirus disease (COVID-19). The world expansion of this contagious disease caused a lockdown of the population and frequent health care consultations at the hospitals. We aimed to epidemiologically describe the patients in current treatment with denosumab and assess whether during confinement and post-confinement they were able to continue treatment.

**Methods:** Cross-sectional observational study with prospective data collection. Consecutively inclusion of patients: December 2021 - May 2022. Patients with a treatment of denosumab starting during or before 2019 were included.

**Results:** Data from 74 patients were analyzed: 71 women (96%) and 3 men (4%). The mean age was 77.31 years (61-93). The previous pathologies were: arterial hypertension in 28 patients (38%), diabetes mellitus in 8 patients (11%), immunosuppressive treatment in 9 patients (12%), history of neoplasia in 16 patients (22%), history of fracture in 34 patients (43%) and glucocorti-

coid use in 17 patients (23%). The mean time of treatment with denosumab was 5 years (2-8 years). Twelve patients (16%) had COVID-19 and 1 of them, required admission. During the period of the study, 62 patients (84%) followed the treatment correctly and 12 patients (16%) had few difficulties as: 3 patients missed one dose, 4 patients delayed denosumab administration by more than 2 months, and 5 patients delayed treatment by less than 2 months. The cause of the administration delay, in nine patients, was the impossibility of administration (in 4 of them due to positive to COVID-19). Statistically significant differences (p=0.006) were found when comparing the difficulty in carrying out the treatment correctly and being COVID-19 positive. Four patients presented fractures: 2 vertebral, 1 femur and one carpal; none of them discontinued the treatment. Of these, three patients were under treatment with glucocorticoids and one of them was affected by COVID.

**Conclusion:** Most of the patients (84%) were able to keep the treatment correctly. Statistically significant differences were found between presented COVID-19 and having discontinued the treatment. It was not possible to analyze the treatment dropout or deaths. Four patients presented fractures despite not having discontinued treatment.

### P934 BONE MINERAL DENSITY AND TYPES OF FRACTURE IN A FRACTURE LIAISON SERVICE

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**Objective:** Osteoporosis is a disease characterized by low BMD and loss of bone microarchitecture. It is known that lower values of T-Score are related to the risk of fracture. But can it correlate with a specific type of hip fracture? We aimed to evaluate if there are any differences in the femoral neck and total hip T-scores between types of hip fractures in a group of patients followed in an FLS.

**Methods:** We retrospectively registered data about types of hip fracture (neck, intertrochanteric and subtrochanteric fractures) and also femoral neck and total hip T-scores. We also register deaths that happened before the 2-year follow-up period. Descriptive and comparative analysis was made using the means, Pearson correlation and ANOVA tests.

**Results:** Of the 107 patients included, 83.2% were female. Mean of age was 78.0±8.6 years. 54.2%, 35.5% and 10.3% of the patients had respectively femoral neck fracture, intertrochanteric and subtrochanteric fracture. 7.5% of the patients died (n=8). Intertrochanteric fractures had a lower mean femoral neck and total hip T-score of -2.546±0.8 and -2.242±1.1, respectively. There was a difference between fracture type and femoral neck T-scores (p=0.029) but no differences were found when comparing with total hip T-scores (p=0.281). Only intertrochanteric fractures had



a weak correlation with femoral neck T-score, with a Pearson correlation of -0.217 ( $-0.4 < P < -0.2$ ). None type of fracture had a correlation with the total hip T-score (Pearson correlation of 0.070, -0.169 and 0.128 for neck, intertrochanteric and subtrochanteric fractures, respectively).

**Conclusion:** Neck T-scores appeared to be more related than total hip T-scores with the different types of hip fractures.

### P935

#### AUGMENTATION AS A REINFORCEMENT IN ENDOMEDULLARY NAILING WITH PFNA NAIL IN EXTRACAPSULAR PROXIMAL FEMORAL FRACTURES

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**Objective:** The use of augmentation in extracapsular femoral fractures increases the anchorage of the implant to the bone, which can be very useful in these fractures associated with fragile bone. The use of a standardized augmentation technique should increase the reliability and reproducibility of the fixation, as well as decrease mechanical complications and shorten the recovery period. Our aim is to assess the possible short-, medium- and long-term complications of PFNA augmentation nail osteosynthesis, to determine the safety of the technique and to evaluate the functional results of the patients throughout the follow up.

**Methods:** During the period between January 2014 and December 2021, a total of 68 consecutive patients with extracapsular proximal femoral fracture who underwent internal fixation with PFNA-augmentation nail were included in our retrospective analysis. Demographic data, AO classification, cement quantity and distribution, complications associated with cement use, and outcomes during follow up (mechanical complications and functionality) were collected.

**Results:** The mean age was 85.88 years [54-101, SD-7.71]. Of the 68, 59 walked before the fracture (18 without mechanical aids, 18 with simple assistance and 23 with a walking frame). The most frequent fracture types were 31A2.3 (20), 31A3.3 (13) and 31A2.2 (17). The mean volume of cement used was 3.5 ml [3-5, SD-0.54]. Cement distribution did not show a clear pattern. The mean operative time was 52.7 min [25-120]. Up to 10 different surgeons performed 3 or more interventions. There was one intraoperative complication, with no clinical consequences for the patient: minimal leakage of cement into the hip joint (1.47%). The mean follow-up was 11.07 months [1-60; SD-8'53]. 17 patients were not able to walk after the fracture. Mechanical complications were observed in 8 cases (11.76% - 1 peri-implant fracture, 1 nail mobilization, 1 cut-out, 1 cut-through and 4 back-out), but no complications were associated with augmentation; no signs of femoral head necrosis were observed.

**Conclusion:** The PFNA-augmentation technique is a reliable, safe and reproducible in osteoporotic pertrochanteric fractures,

with low complication rate when adequate surgical technique is performed. It is of utmost importance to inject contrast into the helical blade before the introduction of the cement to prevent leakage. Furthermore, it could be a good alternative to increase implant anchorage on osteoporotic bone and decrease the rate of failures.

### P936

#### LOW FRAX SCORE AND FRAGILITY FRACTURES: A CLOSER LOOK

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**Objective:** Fracture Risk Assessment Tool (FRAX<sup>®</sup>) is a widely used tool for evaluating the risk of fractures in individuals. Despite its widespread use and validation, a small proportion of patients with a low FRAX score still suffer osteoporotic fractures. We aimed to characterise patients who had a fragility fracture, with a previous low FRAX score.

**Methods:** We conducted an unicentric, retrospective study of patients admitted to a Portuguese district hospital with a fragility fracture between January 2017 and September 2022. Demographics, comorbidities, and clinical outcomes data were collected. A Portuguese model FRAX (FRAX<sup>®</sup>Port) without BMD was calculated and patients whose FRAX score was not able to be determined were excluded. FRAX scores were categorized according to Portuguese Society of Rheumatology guidelines. A descriptive analysis and comparison between low FRAX score group and non-low FRAX score group was made using both parametric and non-parametric tests.

**Results:** A total of 464 patients were included, from which 34 (7.3%) had a low FRAX score, 37 (8.0%) an intermediate score and 393 (84.7%) a high score. The mean age of patients with low FRAX score was 64.5 years, while the mean age of patients with non-low FRAX score was 80.2 years ( $p < 0.001$ ). Patients with a low FRAX score had a higher BMI ( $p < 0.001$ ), more non-hip fractures ( $p < 0.001$ ), more alcohol consumption ( $p < 0.001$ ) and depression ( $p < 0.05$ ). Vitamin D deficiency was highly prevalent in both groups. Furthermore, only 55 (14%) patients categorized as high risk were previously on an anti-osteoporotic drug.

**Conclusion:** These findings suggest that other risk factors may contribute to fragility fractures in patients with a low FRAX score. Moreover, most patients with high fracture risk were not receiving an anti-osteoporotic treatment, underlining the need to improve the earlier identification of osteoporosis in the community.

P937

**REHABILITATION CHALLENGES IN ALZHEIMER'S DISEASE AND OSTEOPOROSIS**M. R. Pacurar<sup>1</sup>, D. Pacurar<sup>1</sup>, M. I. Popescu<sup>1</sup>, K. Babes<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine and Pharmacy, Oradea, Romania

**Objective:** Alzheimer's disease is the leading cause of neurodegenerative dementia. Is characterized by progressive cognitive decline and is recognized by its limitations on daily activities. Cerebral extracellular amyloid plaques and intracellular neurofibrillary tangles are pathognomonic for Alzheimer's disease. Osteoporosis and Alzheimer's disease are common degenerative diseases, encountered in the elderly. The prevalence of this two pathologies increases in the past few decades and represent great social burden worldwide.

**Methods:** We present the case of a 75 years old female, that came to our hospital with intense pain in the spinal cord, bilateral hip and knee pain and antalgic gait. She denies any recent trauma. Her past medical history is positive for Alzheimer's disease, arterial hypertension and diabetes mellitus. The patient has been keeping her blood pressure and glucose level in normal range on chronic medication.

**Results:** The patient vital signs include: BP=130/70 mmHg, HR=82/min, T=36.6°C and SO<sub>2</sub>=97% on room air. The physical exam: normal heart rhythm with no audible murmurs and normal lung auscultation, osteoarticular system—dorsal moderate kyphosis, cervical hyperlordosis, neck pain and stiffness, paravertebral muscle contracture in the lumbar region, antalgic lumbar flexion, bilateral negative Lasegue, bilateral knee pain and crackles. Lab workup: a jeun hyperglycemia but with adequate HbA1c and hypercholesterolemia for which we initiated 20 mg atorvastatin. ECG- sinus rhythm with left ventricular hypertrophy and mixed ST-T changes. DXA: Osteoporosis. Echocardiography- hypertensive heart with mild mitral and tricuspid regurgitation. We considered the patient for rehabilitation treatment (physical therapy, massotherapy, thermotherapy and electrotherapy) associated with nonsteroidal anti-inflammatory and chondroprotective drugs with gastric protection (pantoprazole). The rehabilitation program was partially beneficial because of patient low adherence, limited by her cognitive impairment.

**Conclusion:** The elderly are a group of specific population with comorbidities, that needs close follow up and special attention. Several observational studies have shown that patients with osteoporosis have a higher risk for Alzheimer's disease than general population. Falls and fractures associated with osteoporosis are more often in patients with impaired cognitive status than other older adults. Future studies are warranted to clarify the link between this to coexisting disease and a standardized treatment guideline.

P938

**PERCEPTIONS AND USES OF TELEREHABILITATION IN THE CARE OF GREEK ADULTS AGED 50 YEARS AND OLDER DURING COVID-19 PANDEMIC**A. Antiflioti<sup>1</sup>, M. Tsekoura<sup>1</sup>, C. Matzaroglou<sup>1</sup>, T. Bania<sup>1</sup>, D. Makrynioti<sup>1</sup>, E. Tsepis<sup>1</sup><sup>1</sup>Physiotherapy Dept., School of Health Rehabilitation Sciences, University of Patras, Rio, Greece

**Objective:** To explore knowledge and beliefs of Greek adults aged 50 years and older towards the use of telerehabilitation during the COVID-19 pandemic.

**Methods:** In this cross-sectional study, Greek adults completed an online survey between November 2022 and January 2023. Responders were eligible to participate if they were 50 years and older. The questionnaire involved 35 items on demographic background, use of technology, overall perceptions, the experience of telerehabilitation, and their opinion on the future of telerehabilitation. The study protocol was approved by the Ethical Committee of the University of Patras, Greece.

**Results:** Participants in this study were 109 adults (female 60.6%;male 39.4%; mean age 62.6±8.8 years). Overall, only 18 participants (16.5%) have received telerehabilitation strategies during the COVID-19 pandemic. Most participants (n=60;55%) believed that telerehabilitation may be beneficial as a supplementary way of patient management. In addition, 67 participants (61.5%) reported that they want to receive more information about digital technology and applications in order to increase physical activity and overall health. A Pearson's correlation coefficient matrix for willingness to receive training regarding health digital applications was performed. Moderate correlations were recorded with age ( $r=0.47$ ;  $p\leq 0.001$ ), internet usage ( $r=0.42$ ;  $p\leq 0.001$ ), and strong correlation was recorded with positive attitude toward telerehabilitation ( $r=0.71$ ;  $p\leq 0.001$ ).

**Conclusion:** The majority of Greek participants expressed a positive perception of this form of rehabilitation and were willing to use telerehabilitation in the future. Future research is needed in larger samples regarding telerehabilitation practices. Researchers highlight the importance of strengthening the expertise regarding telerehabilitation services.

P939

### THE CORRELATION BETWEEN KNEE OSTEOARTHRITIS PAIN, FUNCTION AND DEPRESSION

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**Objective:** To estimate the correlation between pain, function and psychologic variables in patients with knee osteoarthritis.

**Methods:** This cross-sectional study included 64 patients with radiographic knee osteoarthritis (Kellgren-Lawrence grade 2 or 3) who were treated at the Dept. of Medical Rehabilitation, Clinical Centre of Vojvodina. Functional status was evaluated by WOMAC Osteoarthritis Index and the Get Up and Go test. For psychologic variables assessment the Beck Anxiety Inventory and the Centre for Epidemiological Studies Depression Scale were used. Pain was measured by numeric pain rating scale. We calculated bivariate correlation coefficients to look at associations among physical function variables and psychological variables.

**Results:** Patients' mean age was 64.80±9.8 years, half of the patients were female (N=32). Mean value of knee pain in our research was 5.54±3.21. Women had significantly lower scores on the WOMAC physical function subscale and higher levels of depression and pain. High levels of anxiety and depression were associated with higher levels of knee pain and lower WOMAC physical function subscale. Also, high levels of anxiety showed significant correlation with slower performance in the Get Up and Go test and lower scores on WOMAC physical function subscale. Greater severity of radiographic knee osteoarthritis was associated with worse function on the WOMAC physical function subscale.

**Conclusion:** Anxiety and depression are associated with functional status in patients with knee osteoarthritis. The results of our study support the notion that psychologic variables can influence the perception of pain in people with knee osteoarthritis.

P940

### BONE TURNOVER MARKERS AND BONE MINERAL DENSITY 1 YEAR AFTER KIDNEY TRANSPLANTATION

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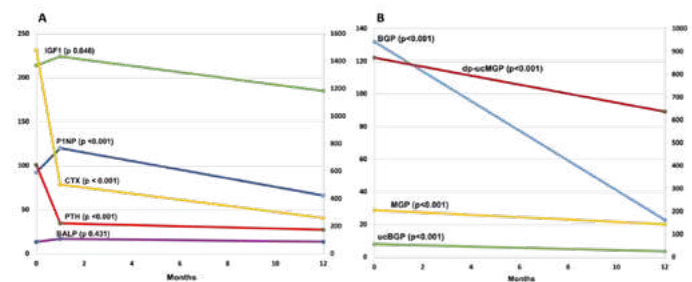
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**Objective:** Alterations of bone metabolism are a hallmark of chronic kidney disease (CKD) patients and do not completely ameliorate after kidney transplantation. In the setting of a secondary analysis of a RCT, we evaluated changes of bone turnover biomarkers (BTM) and their associations with changes of BMD as assessed by DXA.

**Methods:** Sixty-six kidney transplant (KTx) recipients were enrolled between 2014-2017. In these patients, at baseline (T0) and 12 months (T12) we measured BTM (Figure 1) The prevalence of vitamin K deficiency was assessed based on undercarboxylated-BGP (uc-BGP) cut-off:  $\geq 4.5$  ng/ml, whilst dephosphorylated-ucMGP (dp-ucMGP) we considered a cut-off  $>500$  pmol/L levels. DXA data were assessed at lumbar spine, femoral neck, total hip, one-third and ultradistal radius both baseline and after one year, evaluating the changes in areal BMD (aBMD). Results were expressed as mean±SD or median and inter-quartile range, as appropriate. Correlations were investigated by Spearman's analysis.

**Results:** The mean age of enrolled patients was 51±13 years, 34% were female. BMI was on average 27.8±5.5 kg/m<sup>2</sup>. 24 patients (39.3%) were pre-emptive and 37 (60.7%) on dialysis and 19% of patients had a history of fracture. Patients highlighted osteopenia (T-score -1 to -2.5) and osteoporosis (T-score  $< -2.5$ ) by DXA at baseline, in the following different skeletal sites: 21%-10% at total radius site, 43%-11% at femoral neck and 28%-8% at lumbar spine, respectively. Whilst, at 1 year after kidney transplantation, osteopenia and osteoporosis became 21%-13% at total radius site, 43%-9% at femoral neck site, and 23%-11% at lumbar spine, respectively. In Figure 1 the trend of BTM 1 year after KTx. We highlighted a significant reduction of PTH, CTX, P1NP, and VKDPs. This latter while improving but was not completely restored. Table 1 shows the correlations between the percentage variation of BTM and percentage variation of BMD at several sites evaluated.



**Figure 1.** Significant changes of BTM (A) and VKDPs (B) in first-year post-transplant.

**Table 1.** Spearman Correlation between BTM and percentage change of aBMD at 12 months. Significant correlations are expressed in bold. P values are given when <0.05.

	LS BMD%	FN BMD%	One-third radius BMD%	Ultradistal radius BMD%	Total Hip BMD%
<b>MGP</b>					
T0	<b>0.4119</b> (0.0102)	0.2987	-0.2549	-0.0294	<b>0.3423</b> (0.0354)
T12	-0.0140	-0.2405	-0.1296	0.0789	-0.1990
% change	-0.2816	<b>-0.4674</b> (0.0053)	0.0778	0.1704	<b>-0.5374</b> (0.0010)
<b>Dp-ucMGP</b>					
T0	0.2262	0.1062	0.1003	-0.1069	0.0844
T12	-0.2112	<b>-0.3465</b> (0.0265)	-0.0293	0.1239	-0.2495
% change	<b>-0.3806</b> (0.0264)	-0.2639	-0.2388	0.0827	-0.3137
<b>ucBGP</b>					
T0	<b>0.4478</b> (0.0048)	<b>0.4900</b> (0.0018)	-0.0197	0.0167	<b>0.4554</b> (0.0041)
T12	-0.1396	-0.1085	-0.0204	0.0786	-0.2136
% change	-0.3381	<b>-0.3702</b> (0.0312)	-0.1453	0.0301	<b>-0.5141</b> (0.0019)
<b>BGP</b>					
T0	<b>0.6226</b> ( <b>&lt;0.001</b> )	<b>0.3771</b> (0.0196)	-0.1196	-0.0286	<b>0.5060</b> (0.0012)
T12	0.2017	0.0326	<b>-0.3117</b> (0.0473)	-0.0071	-0.1596
% change	<b>-0.4735</b> (0.0047)	<b>-0.3678</b> (0.0324)	-0.2358	-0.1413	<b>-0.6306</b> (0.0001)
<b>P1NP</b>					
T0	<b>0.5015</b> (0.0002)	<b>0.4602</b> (0.0009)	0.1517	0.0156	<b>0.5757</b> ( <b>&lt;0.001</b> )
T12	-0.0570	-0.1400	-0.2670	-0.1862	-0.1548
% change	<b>-0.4616</b> (0.0011)	<b>-0.4593</b> (0.0013)	<b>-0.3602</b> (0.0139)	-0.1255	<b>-0.5373</b> (0.0001)
<b>CTX</b>					
T0	<b>0.4160</b> (0.0027)	<b>0.4162</b> (0.0029)	-0.0126	0.0630	<b>0.5430</b> (0.0001)
T12	0.0308	-0.2228	<b>-0.3988</b> (0.0045)	-0.1295	-0.2585
% change	-0.2254	<b>-0.4343</b> (0.0029)	<b>-0.4107</b> (0.0051)	-0.1730	<b>-0.5514</b> (0.0001)
<b>Bone ALP</b>					
T0	<b>0.4270</b> (0.0028)	0.2900	-0.0363	-0.1596	<b>0.3967</b> (0.0063)
T12	0.1072	-0.1982	<b>-0.3133</b> (0.0267)	<b>-0.3100</b> (0.0284)	-0.2231
% change	-0.2282	<b>-0.3917</b> (0.0094)	-0.2289	-0.1007	<b>-0.5405</b> (0.0002)
<b>PTH</b>					
T0	-0.2866	<b>-0.4607</b> (0.0021)	<b>-0.4274</b> (0.0048)	-0.1002	<b>-0.5666</b> (0.0001)
T12	0.1918	-0.2071	<b>-0.3390</b> (0.0160)	-0.0570	<b>-0.2911</b> (0.0402)
% change	0.4891 (0.0006)	<b>0.4098</b> (0.0052)	0.1555	0.1044	<b>0.4504</b> (0.0019)

**Conclusion:** In the first-year post-transplant, along with the improvement of renal function, PTH values were reduced as well as those of CTX and P1NP. Moreover, we observed an inverse correlation between BTM and BMD, the reduction of bone turnover expressed by the trend of BTM translates into an improvement of BMD.

P941

## OSTEOPOROSIS AND SARCOPENIA IN A CASE WITH LEOPARD SYNDROME

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LEOPARD syndrome is a rare condition, with multiple congenital anomalies and autosomal dominant inheritance. It is mainly characterized by multiple lentigines, cardiomyopathy, pulmonary stenosis, growth retardation. A 34-year-old patient with Leopard syndrome was hospitalized in Medical Rehabilitation Clinical Hospital, Baile Felix, Romania. The physical examination revealed height-136 cm, weight-53 kg, craniofacial dysmorphism, lip protrusion (predominantly the lower lip) with impact on verbal expression; prognathism; generalized lentigines; limping gait; lumbar hyperlordosis; lack of upper and lower dorsal kyphosis; limitation of cervical spine mobility, predominantly on rotations and inflection; shoulder asymmetry with prominent bone masses; clavicle, acromion and scapula more pronounced on the right; limited mobility of the left hip; bilateral pes cavus; lower left limb shortened by 3 cm; patellar, Achilles and mid-plantar osteotendinous reflexes-hyperreflexia; anomalies of the external genitalia. Laboratory abnormal findings: hyperglycemia. X-rays of the cervical, dorsal and lumbar spine, pelvis, palms, bilateral distal radio-ulnar joints, carpals and epiphyses of radius and ulna revealed bone malformations and advanced arthrosis. Osteodensitometry revealed: lumbar T-score=-3.1, Z-score=-3.1; right hip T-score=0.7, Z-score=0.5; left hip T-score=0.6, Z-score=0.6. ALM was 0.56. She did not take corticosteroids or any other medication affecting bone metabolism. The morphological and psychological evaluation revealed cooperative behavior, mild pronunciation deficit (nasalization of sounds), difficult writing, deficient comprehension and retention of read information, mild mental retardation. **Conclusion:** We reported an unusual occurrence of osteoporosis and sarcopenia in a relatively young patient with Leopard syndrome.

P942

### PAIN FOLLOWING OSTEOPOROTIC HIP FRACTURE: DOES THE LEVEL OF FRACTURE MATTER?

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**Objective:** Hip osteoporotic fractures have a higher impact on morbidity and mortality. Some studies suggest that the level of pain varies based on the fracture level (neck, inter or subtrochanteric), while others suggest that there's no difference. We aimed to evaluate if there is any difference on pain level between the different types of hip fractures after surgical treatment.

**Methods:** In our FLS we registered socio-demographic data, types of hip fracture and level of pain according to Visual Analogue Scale (VAS). We included deaths that happened before the 2-year follow up. Descriptive and comparative analysis was made using the means, Pearson correlation, T-tests and ANOVA tests.

**Results:** Of the 107 patients included, 83.2% were female. Mean of age was 78.0±8.6 years. 54.2%, 35.5% and 10.3% of the patients had respectively femoral neck fracture, intertrochanteric and subtrochanteric fracture. In the first appointment, the mean level of pain was 1.8±2.0. 7.5% of the patients died (n=8). Subtrochanteric fractures had a higher mean level of pain of 2.5±2.5. None of the fractures type had a correlation with the level of pain, with the Pearson correlation being <0.2 or >0.2. We performed ANOVA test to compare the levels of pain between type of fractures and didn't find any differences in pain between groups (p=0.366). No correlation or differences between pain and sarcopenia were found (Pearson of 0.077, p=0.517). Females had more pain than males (1.9±2.1 vs. 1.4±1.8), but the difference was not significative (p=0.391). No differences were found between patients who took antidepressants vs. those who didn't (p=0.536). No correlation was found between age and level of pain (Pearson of 0.139). No correlation or differences were found in the group with connective tissue diseases (Pearson of 0.048, p=0.770).

**Conclusion:** In our FLS, the level of pain was not significantly different between the different types of hip fractures.

P943

### EVOLUTION OF TREATMENTS IN A MULTIDISCIPLINARY FLS UNIT: BEFORE AND AFTER THE PANDEMIC

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**Objective:** The implementation of FLS (Fracture Liaison Service) units helps to improve the care of patients with osteoporotic fractures, to prevent falls and to avoid new fractures. We aimed to analyze what has happened 1 year after the pandemic with the map of previous anti-osteoporotic treatments in a hospital with multidisciplinary FLS.

**Methods:** A cross section from June 2019 has been used and compared with a cross section from May 2021, both obtained through prescription of antiosteoporotic treatment from our center and from all the ABS (reference population 111,000 inhabitants).

**Results:** In 2019, 1,325 active treatments were obtained, 1,199 (90.5%) were women and 126 (9.5%) men. Average age: 74.6 years (26-99 years). In 2021, 1,283 active treatments were obtained, 1,144 (89%) were women and 139 (11%) men. Mean age 74.4 years (27-100 years). Significant changes have been found in the use of risedronate (p<0.05), motivated by the appearance of gastro-resistant treatment that improves the tolerability of oral treatment.

**Conclusion:** In our population as in the general population, osteoporosis mainly affects women over 50 years of age. The majority treatment is oral bisphosphonates, although we have observed an increase in the use of parenteral or subcutaneous treatments (especially in >75 years) to improve compliance and absorption. We believe that the increase in the use of intravenous is a consequence of avoiding subsequent visits in patients who have been admitted with fractures. Despite the pandemic, osteoporosis continues to be a present disease and patients have remained in treatment. We need more studies to compare these data with fractures.

Table.

	2019						2021									
	Men		Women		Total		Age		Men		Women		Total		Age	
	N	%	N	%	N	%		N	%	N	%	N	%			
Alendronate	34	26,98	718	59,88	752	56,75	72	38	27,34	602	52,62	640	49,88	71		
Ibandronate	1	0,79	22	1,83	23	1,74	70	0	0,00	20	1,75	20	1,56	71		
Risedronate*	26	20,63	20	1,67	46	3,47	72	26	18,71	64	5,59	90	7,01	71		
Zoledronic	31	24,60	131	10,93	162	12,23	80	44	31,65	173	15,12	217	16,91	81		
Denosumab	26	20,63	262	21,85	288	21,74	79	27	19,42	253	22,12	280	21,82	74		
Teriparatide	8	6,35	46	3,84	54	4,08	75	4	2,88	32	2,80	36	2,81	75		
Total	126		1199		1325		74,6	139		1144		1283		74,4		
Oral	61	48,41	760	63,39	821	61,96	71	64	46,04	686	59,97	750	58,46	71		
Others	65	51,59	439	36,61	504	38,04	78	75	53,96	458	40,03	533	41,54	77		
				*P<0.05												

P944

**BONE MARROW ASPIRATE CONCENTRATE FOR AVASCULAR NECROSIS FEMORAL HEAD**A. Roskidailo<sup>1</sup>, M. Makarov<sup>1</sup>, V. Kuznetsov<sup>1</sup><sup>1</sup>Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** AVNF is a disease of unclear etiology with poor blood supply and high bone resorption. The disease affects young people, it reduces their quality of life, leading to disability. Because of the young age of patients, we should use organ-preserving treatment. Mesenchymal stem cells (MSC) have a high regenerative potential, and their concentrate can be obtained using the patient's bone marrow. The purpose of the study was to evaluate the effectiveness of using bone marrow aspirate (stem cell concentrate) in the treatment of various stages of aseptic necrosis of the femoral head.

**Methods:** Harvest of bone marrow we perform at the anterior or posterior superior iliac spine. We used the Angel Arthrex system for centrifugation and concentration of bone marrow. Procedure included core decompression femoral head and injection BMAC. 6 weeks after procedure patients had weight bearing, use of crutches. The injection was performed 1 time. Preoperatively and postoperatively demographic information, stage of AVNF per Association Research Circulation Osseous (ARCO) classification on MRI and radiograph, visual analogue pain scores (VAS) of the hip and Harris hip score (HHS) were recorded. We checked patients 3, 6, 12 and 24 months after procedure.

**Results:** We performed 23 procedures injection bone marrow aspirate concentrate (BMAC) in femoral head in 19 patients. 16 of them were men (84%), 3 were women (16%). The average age was 45.7 years. According to the ARCO classification, out of 23 cases, 2 cases had stage 1 disease (4%), 20 cases had stage 2 disease (92%), and 1 case had stage 3 disease (4%). The average pre-operative VAS of pain was 50. Post operatively, the average VAS score decreased to 2.5 ( $p < 0.0001$ ) (by 3<sup>rd</sup> month). After 6, 12, 24 months were no significant changes in VAS. HHS increased from 59 to 75 (by 3<sup>rd</sup> month). After 6, 12, 24 months were no significant changes in HHS.

**Conclusion:** Using an autologous concentrate of mesenchymal stem cells in the treatment of early stages of aseptic necrosis of the femoral head showed its effectiveness in cases of its use in patients with 1-2 stages of ANFH in 75% of cases.

P945

**STUDY OF PREVALENCE AND FACTOR ASSOCIATED SARCOPENIA IN PRE-RETIREMENT AGED WITH CHRONIC NON-SPECIFIC LOW BACK PAIN**S. Roongsaiwatana<sup>1</sup><sup>1</sup>Dept. of Rehabilitation Medicine, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

**Objective:** To study the prevalence of sarcopenia in pre-retirement aged with chronic non-specific low back pain and associated factor.

**Methods:** Population aged from 50-59 years old 164 subjects. The patient's demographic data, international physical activity questionnaires (IPAQ) and health-related quality of life questionnaires (EQ-5D-5L) were recorded. Sarcopenia data based on the Consensus of the Asian Working Group of Sarcopenia (AWGS) criteria was assessed by bioelectrical impedance analysis, handgrip dynamometer and 6-meter walk test. Additionally, in chronic low back pain subjects were assessed severity of pain and functionality by visual analog scale and Oswestry Disability Index (ODI).

**Results:** Subjects were 164 participants (29 males and 135 females). The mean (standard deviation; S.D.) age was 55.1 (2.6) years. The mean (standard deviation; S.D.) BMI was 24.7 (4.3) kg/m<sup>2</sup>. The IPAQ was low to moderate level. The median (min,max) of EQ-5D-5L was 0.94 (0.34,1.00) score. Sarcopenia was noted in 10 (17.2%) of 58 chronic low back pain subjects and 6 (5.7%) of 106 normal subjects. There was no significant factor associated between sarcopenia and chronic low-back pain.

**Conclusion:** The prevalence of sarcopenia in pre-retirement aged with chronic low back pain was 17.2%, which was significant higher compared to non-chronic low back pain. This study revealed no significant factor associated between sarcopenia and chronic low-back pain in the pre-retirement age.

P946

**DOES DENOSUMAB CONTRIBUTE TO FUNCTIONAL RECOVERY IN HIP FRACTURE PATIENTS?**F. Cunha-Santos<sup>1</sup>, D. Augusto<sup>1</sup>, A. S. Pinto<sup>1</sup>, S. P. Dinis<sup>1</sup>, N. Madeira<sup>1</sup>, L. Matos<sup>1</sup>, I. Campos<sup>1</sup>, P. Rocha<sup>1</sup>, G. Monteiro<sup>1</sup>, I. Neves<sup>1</sup>, C. Pontinha<sup>1</sup>, A. R. Batista<sup>1</sup>, S. Venâncio<sup>1</sup>, G. Cunha<sup>1</sup>, S. C. Anunciação<sup>1</sup>, C. Vaz<sup>2</sup>, J. F. Ferreira<sup>2</sup><sup>1</sup>Local Health Unit of Guarda, <sup>2</sup>Local Health Unit of Guarda, Faculty of Health Sciences - Beira Interior University, Guarda, Portugal

**Objective:** To determine if denosumab (DSM) contributes to a better functional recovery after osteoporotic hip fracture.

**Methods:** This is a retrospective nested case-control study, including patients over 50 years, after operation for osteoporotic hip fracture and followed at our Fracture Liaison Service, which includes rehabilitation nurses and a nutritional appointment, between September 2019 and January 2023. We compared demo-

graphic and clinical features, as well as timed up and go (TUG), 5-meter walk test (5MWT) and 30-s sit to stand (30STS) at discharge and at 52-weeks between patients treated with DSM and those treated with bisphosphonates (BP) (controls).

**Results:** Of 114 patients, 51 had one-year follow-up and were treated either with BP (n=10, 19.6%) or DSM (n=41, 80.4%). Patients treated with DSM were older than those treated with BP (78.4±6.5 vs. 70.4±10.9 years, p=0.004) and had a worse femoral neck T-score (-2.3±0.7 vs. -1.7±0.7, p=0.028). No statistically significant difference was found in the delta of TUG, 5MWT or 30STS at 52-weeks and baseline (p=0.887, p=0.561 and p=0.509, respectively). Mean 30STS at 52-weeks and baseline was statistically significant difference (p=0.047 and p=0.013, respectively).

**Conclusion:** No difference was found in functional recovery outcomes between patients treated with BP or DSM. Despite this, and even though the DSM group was older, they achieved a similar functional recovery. We can't ignore the limitations of this work, namely low number of included patients and inexistence of randomization.

Table 1 - Baseline characteristics of Included patients according to received treatment.

	Treated with bisphosphonates (n=10)	Treated with denosumab (n=41)	p value
Age (years), mean±SD	70.4±10.9	78.4±6.5	0.004
Sex, female n (%)	9 (90.0%)	36 (87.8%)	0.666
BMI (kg/m <sup>2</sup> ), mean±SD	25.9±3.2	24.2±3.5	0.174
Hand grip strength (kg), mean±SD	20.6±7.4	19.2±4.2	0.421
Sarcopenia at baseline, n (%)	3 (30.0%)	12 (29.3%)	0.621
FRAX major (%), median (min; max)	19.0 (4.6; 37.0)	22.0 (5.4; 50.0)	0.585
FRAX minor (%), median (min; max)	7.4 (0.2; 29.0)	10.2 (1.7; 43.0)	0.233
T-score lumbar spine, mean±SD	-1.0±1.8	-1.8±1.2	0.083
T-score femoral neck, mean±SD	-1.7±0.7	-2.3±0.7	0.028
TUG, median (min; max)			
Δ	-123.5 (-144.0; -11.0)	-104.0 (-141.0; -21.0)	0.887
52-weeks	13.7 (8.0; 76.0)	16.8 (9.0; 67.0)	0.342
Baseline	150.0 (19.0; 150.0)	150.0 (31.0-150.0)	0.817
5MWT, mean±SD			
Δ	-82.53±54.9	-74.7±32.4	0.561
52-weeks	16.24±15.1	16.2±10.7	0.984
Baseline	98.7±54.9	90.9±35.1	0.575
30STS, mean±SD			
Δ	9.8±2.8	9.0±3.5	0.509
52-weeks	12.0±4.1	9.3±3.6	0.047
Baseline	2.2±3.7	0.3±1.5	0.013

30STS 30-seconds sit to stand, 5MWT 5-meter walk test, BMI Body mass index, SD Standard deviation, TUG timed up and go

## P947

### THE EFFECTS OF IMPLANTATION OF CERAMIC HYDROXYLAPATITE INTO THE TIBIA ON HISTOLOGICAL STRUCTURE OF THE ADRENAL GLANDS

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**Objective:** Bone damage is accompanied by changes in the endocrine status, but studies of the morphology of the adrenal gland are scarce. Aim of the study is to investigate changes of histological structure of the adrenal glands after implantation of ceramic

hydroxyapatite into defect in the tibia.

**Methods:** In the experiment we used 90 rats with body weight of 190-225 g. Animals were separated into three groups. Group 1 - control, group 2 comprised animals with 2 mm opening in the proximal parts of both tibiae, and group 3 comprised animals with openings in tibiae filled with hydroxyapatite material OK-015. Observation terms constituted 7, 15, 30, 60, and 90 days after intervention. HE stained sections of the adrenal glands were measured with the help of light microscopy.

**Results:** After defect formation, glomerular and fascicular zones widened in the period from the 7<sup>th</sup> to the 60<sup>th</sup> day by 9.12%, 9.32%, 11.71%, 8.19%, 4.29% and 9.42%, 13.71%, 15.05%, 9.53%, and 7.24%. Medulla thickness increased from the 7<sup>th</sup> to the 30<sup>th</sup> day by 10.41%, 10.91% and 6.21%. After OK-015 implantation, cortex zones and medulla widened in comparison with the values of the group 2 on the 7<sup>th</sup> and the 15<sup>th</sup> day by 5.69-8.86%. From the 30<sup>th</sup> to the 90<sup>th</sup> day fascicular zone narrowed in comparison with the values of the group 2 by 4.61%, 4.67% and 6.12%, and the glomerular zone narrowed from 60<sup>th</sup> to the 90<sup>th</sup> day by 6.65%, and 3.72%. Also, medulla thickness on 90<sup>th</sup> day decreased by 4.22% (p<0.05).

**Conclusion:** Formation of a bone defect results in hypertrophy of both cortex and medulla of the adrenal gland from the 7<sup>th</sup> up to the 90<sup>th</sup> day after intervention. Implantation of OK-015 results in alterations in the beginning of the experiment with faster restoration from the 30<sup>th</sup> day.

## P948

### INCIDENCE OF PE IN PATIENTS WITH PNEUMONIA WHO WERE ADMITTED WITH AFEMORAL FRACTURE: A RETROSPECTIVE STUDY

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**Objective:** Pulmonary embolism is on the common and serious complication of lower limb fracture. Patient often develop community and hospital acquired pneumonia. Patients are also high risk of pulmonary embolism in lower limb fracture. Both pneumonia and pulmonary embolism can coexist. Treating only pneumonia or only pulmonary embolism will always not have a favourable outcome. We aimed to assess the incidence of pulmonary embolism in patient's presenting with femoral fracture and had also developed pneumonia

**Methods:** A retrospective study of 725 patient with femoral fracture between October 2021 to 31st July 2022. We looked at the notes of all the patients admitted in Liverpool university hospital with femoral fracture. patients diagnosed with pulmonary embolism were identified. We then looked into how many of those patients pulmonary embolism had pneumonia. Patient were diagnosed by clinical and radiological finding in the notes as pneumonia These patients were also treated as pneumonia It was further assessed whether patients had community' acquired pneumonia

or hospital acquired. Inclusion criteria: All patients with femoral fracture and were operated, fracture included were hip femur distal femur periprosthetic hip and periprosthetic knee who had operation. Exclusion criteria: Opted out of data collection, no valid Rq or NHS number, did not had operations.

**Results:** There were 725 patients. No. of patient who had pulmonary embolism was 34. Out 34,23 patients were found to have pneumonia. Community acquired pneumonia was found in 6 patients (17%) and Hospital acquired pneumonia was found in 17 (50%).

Patient age

Age	All patients.	Male.	Female
n	725	205	520
Range	41 (60-101)	41 (60-101)	41 (60-101)
Median	81	80	82
Median (IQR.	81 (74 – 87)	80(73-85)	82(75-88)

**Conclusion:** Female 502(71%)sustained fracture more than two times than male 205(28.27%) Mean age of the patients who had femoral fracture was early eighties. Half of the patients who had pulmonary embolism had Hospital acquired pneumonia and 23 patient (67.64%) patient had pneumonia. A very high percentage of patients will have both pneumonia and pulmonary embolism. 34 patients (4:6%) out of 725 had pulmonary embolism.

## P949

### PRIMARY HYPERPARATHYROIDISM AND RESISTANT HYPERTENSION

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**Objective:** Secondary hypertension of endocrine etiology include primary aldosteronism, pheochromocytoma, Cushing's disease, acromegaly, hyperparathyroidism and hypo/hyperthyroidism. Primary aldosteronism is the most common cause of secondary endocrine hypertension and may be a result of aldosterone-producing adenoma and idiopathic hyperplasia. The mechanism by which inappropriate elevation of aldosterone causes resistant hypertension remains unclear.

**Methods:** A 78-year-old female patient with hypertension, chronic bronchitis and total right hip replacement was referred for clinical evaluation and rehabilitation therapy. Her past medical history also includes multiples falls and fractures. She's on chronic medication for hypertension and bronchitis, but she states that her BP values are out of range despite of daily treatment.

**Results:** At presentation: BP=167/97 mmHg (on four antihypertensive drugs), HR=64/min, SO2=95-96% on room air, T=36.4°C. Physical exam- systolic murmur with no audible rales or crackles, flattening of CL lordosis, DL paravertebral muscle contracture, painful lumbar flexion, Negative bilateral Lasague test, right lower limb hypotrophy, negative bilateral Patrick test, painful right hip movement, limping gait. ECG: sinus rhythm, left ventricular hypertrophy with antero-superior hemiblock. Lab work: hyposid-

eremia, hypercalcemia and hypercholesterolemia. Echocardiography: concentric left ventricular hypertrophy, diastolic dysfunction with preserved ejection fraction, dilated left atrium and moderate mitral regurgitation. We considered further investigation for secondary hypertension. The tests were positive for primary aldosteronism and hyperparathyroidism and we had a conservative approach for this particular case. DXA revealed osteoporosis and we choose bisphosphonates as treatment. The stress test couldn't be performed because of patient comorbidities.

**Conclusion:** Resistant hypertension is defined as elevated blood pressure in a patient despite the concomitant use of 3 or more antihypertensive drug classes, commonly including a blocker of the rennin-angiotensin system, a long-acting calcium channel blocker and a diuretic. Resistant hypertension still represents a major challenge for doctors worldwide.

## P950

### POLYARTHRALGIA PRESENTED WITH DIGITAL CLUBBING: A GENE AS THE KEY STEP TO DIAGNOSIS

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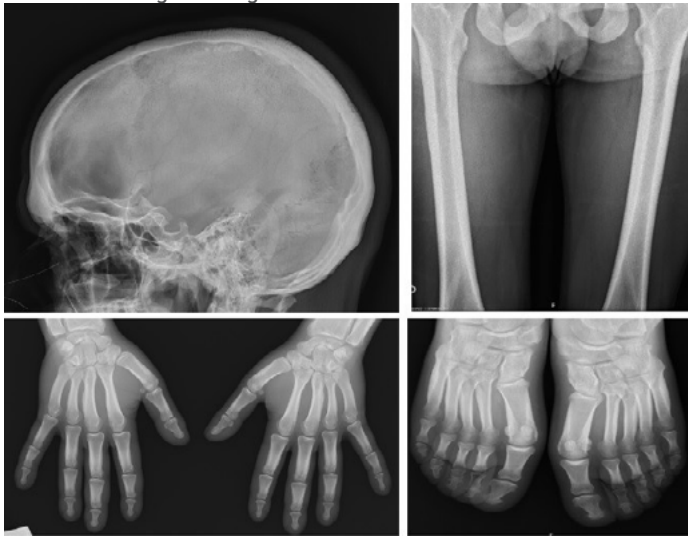
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**Objective:** Primary hypertrophic osteoarthropathy (PHO), also known as pachydermoperiostosis, is a rare, multisystemic autosomal recessive disorder caused by pathogenic variants in the *HPGD* or *SLCO2A1* genes. PHO usually starts in childhood or adolescence, presenting with digital clubbing, osteoarthropathy, and pachydermia. Men are more commonly affected than women with a ratio of 9:1.

**Case report:** A 20-year-old male was referred to our Rheumatology Clinic with a five-year history of painful and swollen hands, knees, ankles and feet, prolonged morning stiffness and relief with NSAIDs. He also reported late onset facial acne and palmo-plantar hyperhidrosis. Family history was irrelevant and parents were non-consanguineous. On clinical examination, he presented clubbing of the fingers and toes, moderate acne and marked facial skin thickening with prominent scalp folds. He had hand, knee, ankles and feet swelling. Laboratory investigation showed elevated inflammatory markers. Complete blood count, renal and hepatic function, bone biochemistry were normal, as well as immunological panel. Plain radiographs revealed soft tissue swelling, periosteal ossification and cortical thickening of the skull, phalanges, femur and toe acroosteolysis. Due to the absence of other clinical signs suggesting a secondary cause, we suspected PHO. A genetic study revealed a likely pathogenic variant,



c.1259G>T (p.Cys420Phe), in homozygosity in the *SLCO2A1* gene, thus confirming the diagnosis.



**Figure 1.** Plain radiographs show marked soft tissue swelling and periosteal hypertrophy with subperiosteal bone formation of the skull, femur and phalanges.

**Conclusion:** PHO should be kept in the differential diagnosis of pediatric inflammatory arthritis affecting children, often misdiagnosed as JIA. To the best of our knowledge, the homozygosity of this variant has not yet been described and it constitutes the second genetically confirmed case of PHO in a Portuguese patient.

## P951

### STRENGTH OF THE MANDIBLE AFTER IMPLANTATION OF CERAMIC HYDROXYLAPATITE INTO THE TIBIA AND INTRAVENOUS ADMINISTRATION OF MESENCHYMAL STEM CELLS ON THE 3RD DAY AFTER INTERVENTION

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**Objective:** Treatment of several bone diseases may involve allogenic mesenchymal stem cells (MSC), yet their effects on structure and functioning of the facial skeleton are not quite clear. Aim of the study is to test strength features of the mandible in rats after implantation hydroxyapatite material OC-015 into the tibia and intravenous injections of allogenic MSC on the 3<sup>rd</sup> day after intervention.

**Methods:** In the study 120 male rats were distributed into four groups. Group C - control, group D comprised animals with 2-mm openings in the proximal parts of both tibiae, group OC comprised animals with openings in tibiae filled with hydroxyapatite material OK-015. Animals of MSC3 group received IV injections of MSC (5E6 per injection) on the 3<sup>rd</sup> day after implantation of OC-015. Observation terms were 7, 15, 30, 60, and 90 days after implantation. Strength features of the mandible were tested with the help of three-point bending technique at loading speed of 0.25 mm/

min up to destruction.

**Results:** In group D in the period from the 15<sup>th</sup> to the 90<sup>th</sup> day ultimate strength and fracture energy decreased; the lowest values were observed on the 30<sup>th</sup> day. In animals of OC group in the period from the 7<sup>th</sup> to the 15<sup>th</sup> day strength of the mandible decreased but recovery started on the 30<sup>th</sup> day. In animals of the group MSCS in the period from the 15<sup>th</sup> to the 90<sup>th</sup> day values of fracture energy exceeded those of the group OC by 7.83%, 9.86%, 6.22%, and 5.12% and ultimate strength increased by 8.17%, 10.26%, 7.19%, and 5.34%.

**Conclusion:** Administration of IV MSC on the 3<sup>rd</sup> day after implantation of OK-015 into the tibia reduces negative effects of intervention on strength of the mandible in the period from the 7<sup>th</sup> to the 15<sup>th</sup> day of observation.

## P952

### HIP FRACTURE MANAGEMENT BEFORE AND DURING THE COVID-19 PANDEMIC IN IRAN

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**Objective:** The COVID-19 pandemic affected the management of chronic conditions such as hip fractures worldwide. This study aims at investigating if the COVID-19 pandemic has affected hip fracture management in referral orthopedic hospitals in Iran.

**Methods:** We collected data on the management of hip fracture of the patients aged  $\geq 50$  admitted to one referral orthopedic hospital located in Tehran, Iran, during February 20, 2019 to February 19, 2020 (before the COVID-19 pandemic period) and February 20, 2020 to November 21, 2021 (during the COVID-19 pandemic period). Number of patients admitted, number of patients operated, hospital stay and time from admission to surgery were recorded from the hospital information systems (HIS) and compared between the two time periods using independent samples and Mann-Whitney tests.

**Results:** The median number of admitted hip fracture patients per month increased by 14.3% during the pandemic compared to the pre-pandemic period, (20cases( IQR=10) compared to 17.5 cases (IQR=5) per month), however, it was not statistically significant( $p=0.124$ ). The mean of hospital stay was significantly lower in the pandemic period ( $5.01\pm 3.36$  days) compared to pre-pandemic period.

demic period (5.65±3.55 d), adjusted for potential confounders (P=0.019). Time from admission to surgery was statistically significantly longer before pandemic {3(IQR=3)} compared to the pandemic period {2(IQR=3)}, adjusted for the potential confounders (p=0.004). The median number of hip fracture surgeries per month was {14(IQR=5)} in the pre-pandemic period and {16(IQR=8)} in the pandemic period (p=0.068). In total, 79.4% of patients before the pandemic were operated compared to 84.8% during the pandemic (P=0.132).

**Conclusion:** The COVID-19 pandemic has not negatively affected the hip fracture management in referral hospitals that we investigated in Iran. However, further research is needed to investigate other aspects of services especially in general hospitals.

### P953

#### OSTEOARTHRITIS AND THE NUMBER OF METABOLIC SYNDROME COMPONENTS

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**Objective:** To study the effect of the number of metabolic syndrome (MS) components on the clinical manifestations of knee osteoarthritis (OA).

**Methods:** The prospective study included 176 pts 40-75 y. with knee OA (according to ACR) of X-ray stage I-III (Kellgren- Lawrence) who signed an informed consent. Pts were divided into 2 groups according to the presence (n=100) or absence (n=76) of MS. An individual card was filled out for each patient, including clinical and anamnestic data, the results of a clinical examination, VAS pain and WOMAC.

**Results:** Women with MS compared to pts without MS were older (60.5 [52;67] vs. 49 [90;106] y, respectively, p<0.05) and had a higher weight (85 [75;96] vs. 69 [60;77] kg, respectively, p<0.05). Pts with MS had more severe clinical symptoms of OA: higher VAS pain (51.5 [41.5;69] vs. 25 [7;48] mm, respectively, p<0.05) and total WOMAC (970 [555;1280] vs. 337.5 [100;792] mm, respectively, p<0.05). A comparative analysis of the main clinical characteristics of pts with knee OA, depending on the number of MS components, was carried out. Accumulation of 2 or more MS components is associated long duration OA (>5 y). Thus, the median duration of OA disease in pts with 2 or more MS components was 7.3 y (6.0–8.0) compared with pts with 1 MS component, in whom the duration of OA was 5.4 y (2.0–11.0), p<0.05. Pts with the accumulation of 2 MS components had a more severe clinical manifestations of OA: VAS pain is more intense (51.5 [41.5;69] vs. 20.0 [5.0; 40.0] mm, respectively, p<0.05) and worse indicators of WOMAC (970 [555;1280] vs. 530 [210;870] mm, respectively, p<0.05). Spearman correlation analysis showed significant correlations between the number of MS components and the duration of OA (r=0.56, p<0.05), age (r=0.57, p<0.05), BMI (r=0.48, p<0.05), VAS pain (r=0.36, p<0.05), WOMAC (r=0.46, p<0.05).

**Conclusion:** Accumulation of 2 or more MS components is asso-

ciated with more severe clinical manifestations of knee OA.

### P954

#### CHEMICAL COMPOSITION OF MAXILLA IN ADULT RATS AFTER IMPLANTATION OF HYDROXYAPATITE MATERIAL OK-015 INTO THE TIBIA

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**Objective:** Bone damage is accompanied by changes in the dental alveolar system, but studies of the morphology of the maxilla have not been carried out. Aim of the study is to investigate chemical composition of the maxilla in adult rats after implantation of hydroxyapatite material OK-015 into the tibia.

**Methods:** The experiment involved 90 male rats with the body weight of 190-225 g. Animals were separated into three groups: group 1 – the controls, group 2 that comprised animals with 2.2-mm round openings in the proximal parts of tibiae, and group 3 that comprised animals with the same openings filled with hydroxyapatite material OK-015. On reaching the respective observation term (7, 15, 30, 60, and 90 days after intervention) the animals were withdrawn from the experiment and maxillae were collected for chemical analysis of bone mineral.

**Results:** Perforation of the tibia resulted in instability of chemical composition of bone mineral beginning from the 7<sup>th</sup> day. Calcium levels were lower than those of the controls in all terms - by 6.91%, 8.55%, 10.68%, 7.42%, and 4.36% and Ca/P ratio decreased by 9.02%, 12.09%, 15.42%, 10.42%, and 6.90%. Restoration of chemical composition thus was observed only by the 90<sup>th</sup> day of observation. After implantation, in 7 and 15 days disorders grew and water contents increased in comparison with the group C by 3.36% and 9.07%, phosphorus levels increased by 4.72% and 5.86% sodium levels increased by 5.92% and 5.85%, and potassium levels increased by 5.48% and 6.05%. On the 30<sup>th</sup> day and later recovery was faster and calcium level and Ca/P ratio exceeded comparison data by 5.31% and 8.60% (p<0.05 in all cases).

**Conclusion:** Implantation of OK-015 into fracture area reduces negative effects of fracture formation on chemical composition of maxilla beginning from the 30<sup>th</sup> day of the experiment.

P955

### ARE BISPHOSPHONATES EFFECTIVE TO REDUCE REVISION RATES AFTER ARTHROPLASTY?

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**Objective:** To know if the use of antiresorptive drugs that attenuates the periprosthetic bone loss during the 24 months following hip or knee arthroplasty is related to a diminution in non-septic revision rates.

**Methods:** We revised the literature, starting in August 2022, in the databases: PubMed, Scopus, Web of Science, and ScienceDirect, about the implication of antiresorptive and anabolic in the non-septic revision and complication rates. After selecting the studies and reviewing the articles, we retrieved and contrasted them to cross-validate the selection. We conducted an additional search to detect possible related studies that did not appear in the classic. Included studies should have at least two years of patient follow-up.

**Results:** We retrieved five studies (three prospective and two retrospective) with 447,117 patients who underwent hip and knee arthroplasty; of the ones, 92,418 were taking bisphosphonates. In the patients taking bisphosphonates, the non-septic revision rate was half that of the ones without treatment, with relative risks from .26-.58 CI95% (.20-.85) except for one study in which the methodology was not transparent. Some of the other factors that influenced were age above 65 and comorbidities. However, most studies do not have a preoperative BMD or osteoporosis diagnosis approach in all patients nor the evaluation for bone loss risk factors. Thus the results cannot desegregate to see the osteoporosis relation to the revision rates. Also, in some studies, the periprosthetic fracture incidence increased in the patient receiving bisphosphonates, being this rate most notable in the younger patients below 65 or with normal BMD or no preoperative BMD.

**Conclusion:** Using bisphosphonates after arthroplasty in selected cases could help decrease non-septic complications and revision rates. The periprosthetic increased BMD loss can be associated with more implant-related complications.

P956

### POSITION STATEMENT OF IRANIAN GUIDANCE AND RECOMMENDATION FOR THE DIAGNOSIS AND MANAGEMENT OF OSTEOPOROSIS AND SARCOPENIA

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**Objective:** Osteoporosis is the most common metabolic bone disease, a chronic disease, and a socio-economic threat. In Iran, the prevalence of osteoporosis is 24.6% in men and 62.7% in women, while the diagnosis gap is 68% and the treatment gap is 71% respectively. The aim of this study was to develop a clinical guideline for osteoporosis in order to integrate service delivery.

**Methods:** This study was designed in two phases: comprehensive review and expert panel method. The search for sources was conducted in reliable databases. According to the screening indices, the guidelines were selected. In the next step, the committee reviewed clinical questions and related recommendations. Recommendations were submitted to a panel of experts for review and approval. In the expert panel phase, the clinical questions and recommendations were presented to members of the panel of experts to score their final judgment on the clinical advantage and localization of each of the recommendations as "low, medium, and high". Considering the above, choose a more appropriate recommendation. Finally, the recommendation, which was approved by more than 70% of the panel of experts, was chosen as the final recommendation.

**Results:** Five guidelines were selected according to the screening criteria of the study and entered the study (Table 1). After holding several sessions of the panel of experts and reviewing the recommendations in the initial version, 28 questions and 181 recommendations were extracted. The final version of the guideline update, in the form of 34 questions and 111 recommendations in the field of bone health (four questions, 12 recommendations), diagnosis and Evaluation (six questions, 19 recommendations), treatment and rehabilitation (17 questions, 67 recommendations), and Sarcopenia (seven questions, 13 recommendations), were presented.

Table 1: Selected guidelines

Name	year
1. American Association of Clinical Endocrinologists/American College of Endocrinology clinical practice guidelines for the diagnosis and treatment of postmenopausal osteoporosis	2020
2. Pharmacological Management of Osteoporosis in Postmenopausal Women: An Endocrine Society Clinical Practice Guideline	2019
3. European guidance for the diagnosis and management of osteoporosis in postmenopausal women. Osteoporosis International	2019
4. Screening for osteoporosis to prevent fractures: US Preventive Services Task Force recommendation statement	2018
5. UK clinical guideline for the prevention and treatment of osteoporosis	2017

**Conclusion:** Due to the emphasis on the need to access valid protocols to provide optimal and useful services to patients in this region, the Osteoporosis Research Center of Tehran University of Medical Sciences in collaboration of the Iran ministry of health has developed the Osteoporosis Clinical Guide to address the gap in the diagnosis and treatment of osteoporosis by providing an integrated treatment protocol.

### P957

#### HEART FAILURE AND CARDIOVASCULAR RISK SECONDARY TO OSTEOPOROSIS TREATMENT

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**Objective:** Heart failure, osteoporosis and associated falls/fractures are a public health concern with huge impact on healthcare system, morbidity and mortality worldwide. The link between heart failure and osteoporosis is dependent by age, gender and the heart disease severity. In fact advanced age, chronic renal disease, low vitamin D level, diabetes mellitus and common pathogenic mechanism affect both osteoporosis and cardiac insufficiency.

**Methods:** We present the case of a 67-year-old female patient, referred to our hospital for moderate/severe continuous lumbar pain. Her past medical history is significant for traumatic fracture in the lumbar region (falling from approx. 3 m), heart failure with moderate reduced ejection fraction, hypertension, chronic kidney disease and pulmonary emphysema. She denies smoking and alcohol. She is very compliant with her chronic treatment.

**Results:** Her vital signs at presentation: BP=130/70 mmHg, HR=73/min, SO<sub>2</sub>=96%, RR=18/min, T=36.8°C. Physical exam: systolic murmur, ventricular gallop, prolonged expiration without rales or crackles, DL paravertebral muscular contracture, negative bilateral Lasegue test, negative bilateral Patrick test, painful L flexion, hypersensitivity on lumbar apophysis percussion, no obvious motor deficit. Lab workup: nonspecific inflammatory syndrome, dyslipidemia, hypomagnesemia and hypocalcemia. ECG: sinus rhythm, left ventricular hypertrophy and grade I atrioventricular block with left QRS axis deviation. Echocardiography revealed left ventricular hypertrophy with mild dilation, diastolic

and systolic dysfunction, moderately reduced ejection fraction, biatrial dilation, with normal systolic function of the right ventricle, moderate mitral and tricuspid regurgitation. DXA: osteoporosis. We initiated treatment with bisphosphonates and statins. Also corrected the associated risk factors: hypomagnesemia, hypocalcemia and low vitamin D level. We adjusted heart failure treatment and begun the rehabilitation program, concurrent with antalgic drugs with favorable results.

**Conclusion:** The prevalence of heart failure and osteoporosis increases with age, and the proportion of old/very old people is rising. Also the percentage of people treated with antiosteoporotic medications is rising too. This particular profile of patient needs close monitoring to identify cardiovascular risk and complications associated to antiosteoporotic drugs. Observational research demonstrates conflicting results and further trials are necessary.

### P958

#### THE VALUE OF BONE HISTOMORPHOMETRY IN MANAGEMENT OF METABOLIC BONE DISEASES: HOW IT AFFECTS THE CLINICAL PRACTICE?

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**Objective:** Transiliac bone biopsy (BB) and histomorphometry play a major role in the understanding of the pathophysiology of metabolic bone diseases (MBD) and guiding therapeutic decisions. We aimed to evaluate the usefulness of histomorphometry findings in management of MBD patients in a Portuguese rheumatology centre.

**Methods:** 5-year retrospective analysis, evaluating patients who underwent a transiliac tetracycline-labelled BB. The histopathological diagnosis, therapeutic strategy and procedure-related complications were assessed.

**Results:** 17 patients (65.4±16.6 years; 64.7% female) were included. Table 1 presents the indications of BB. Histopathological findings allowed the following diagnoses: 8 (47.1%) adynamic bone disease, 5 (29.4%) osteomalacia, 3 (17.6%) hyperparathyroidism bone disease and 2 osteoporosis (5.9%). 11 (64.7%) patients did not receive anti-osteoporotic treatment. After 2 years of follow-up, 2 patients with adynamic bone disease were re-biopsied, revealing histological improvement only in 1 case. Procedure-related complications were not reported.

**Table 1.** Indications of transiliac crest bone biopsy

Indication of Bone Biopsy	Patients (%)
Fragility fracture and stage 4-5 chronic kidney disease	64.7%
Suspicion of osteomalacia	29.4%
Atypical femoral fracture	5.9%

**Conclusion:** BB findings induced a different therapeutic strategy from standard anti-osteoporotic treatment, emphasizing the role of this approach in a specific subset of patients.

P959

### PREVENTION OF OSTEOPOROSIS IN LUMBAR SPINE OSTEOPENIA USING CALCIUM AND VITAMIN D SUPPLEMENTATION

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**Objective:** Assessment of changes in BMD in lumbar spine osteopenia patients receiving calcium and vitamin D supplements.

**Methods:** This is a retrospective cohort study that included 72 patients diagnosed with lumbar spine osteopenia that were taking calcium and vitamin D supplements in order to prevent osteoporosis. The blood concentration of calcium and vitamin D3 was measured every six months to determine the exact dose to be administered to each patient. We evaluated the BMD changes after one year.

**Results:** 5.55% of cases had normal lumbar spine BMD after receiving 1 year of calcium and vitamin D supplementation; 54.17% of cases had higher T-score values for lumbar spine osteopenia; 25% of cases had reduced T-score values for lumbar spine osteopenia; 15.28% of cases were found to have lumbar spine osteoporosis.

**Conclusion:** A year of calcium and vitamin D supplementation raised T-score BMD in 59.72% of cases of lumbar spine osteopenia. 40.28% of cases were subject to a T-score reduction and 15.28% of cases were found to have lumbar osteoporosis.

P960

### THE MOST COMMON RHEUMATOLOGIC DISORDERS ASSOCIATED WITH CARPAL TUNNEL SYNDROME IN ADULTS

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**Objective:** Carpal tunnel syndrome (CTS) is the most common peripheral neuropathy of the upper extremity, caused by chronic compression of the median nerve in the area of the carpal tunnel, with multifactorial etiology. The purpose of this study was to present the frequency of CTS in different rheumatologic disorders in adults.

**Methods:** A prospective clinical study was conducted at the University Clinic for Orthopedic Diseases in Skopje. 116 patients with

clinical diagnosis of CTS and positive finding of compressive neuropathy on nerve conduction studies (NCS) were included in the study and surgically treated. Relevant demographic data, patient history, findings of NCS, ultrasound examination of the cross-sectional area of the median nerve and soft tissue changes of hands, and radiographic examinations, were recorded and statistically analyzed.

**Results:** 75% of patients were female with a mean age of 55.41 years. 63.8% of patients suffered from one or more chronic diseases. 24% were treated for osteoarthritis, 5% for rheumatoid arthritis and 18% had tenosynovitis. Trigger fingers and de Quervain's disease, were concomitantly diagnosed in 15.51% on ipsilateral hand with CTS and were surgically treated as "one stage procedure", under local anesthesia.

**Conclusion:** Carpal tunnel syndrome is a clinical diagnosis with similar symptoms that could be found in most of the rheumatologic disorders. The clinical study showed the necessity of different diagnostic methods in preoperative confirmation of carpal tunnel syndrome.

P961

### TREATMENT FAILURE AND A SWITCH FROM ONE BISPHOSPHONATE TO ANOTHER

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**Objective:** WHO has further defined osteoporosis according to the T-scores from DXA assessment for postmenopausal women as a BMD >2.5 SD below the young normal mean value. Osteopenia is defined as BMD between 1 and 2.5 SD below the young mean value. After a long term therapy with bisphosphonates through comparison of the past and current DXA scans we concluded that the efficiency of treatment is diminished. So, switching to another bisphosphonate drug was a reasonable treatment for this patient.

**Case report:** 70-year-old female, 158 cm height, weight 60 kg, menopause at 48 y, familiar anamnesis (mother), DM type 2, history of chronic low back pain. A physical examination included also labs, X-ray and DXA scans. X-rays of the lumbar spine showed degenerative scoliosis, spondyloarthrosis and polydiscopathy. The patient was treated with one bisphosphonate during a 3-year term and was switched to another bisphosphonate drug. DXA scan (12.2019) results in a total T-score L -2.9 SD, LH -1.9 SD when the patient was referred to our practice. Lab results: ionized calcium 1.24; total body calcium 2.46; vitamin D3 37.79. First control DXA scan after switching treatment showed improvement (01.2021) total T-score L -2.7 SD / LH -1.4 SD. Comparing with the second scan results (05.2022) total T-score L -2.4 SD / LH -1.1 SD that is improvement towards osteopenia and relief of low back pain.

**Conclusion:** Switching to another bisphosphonate drug was a reasonable treatment option for this patient and it showed a favourable outcome towards preventing fractures.

P962

### OSTEOARTICULAR SYSTEM IN PATIENTS WITH DILATED CARDIOMYOPATHY

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**Objective:** Dilated cardiomyopathy(DM) is a progressive disease with a worldwide prevalence of 1:2500 in general population, being one of the most common causes of heart failure. DM is characterized by left ventricular chamber enlargement (with/without right ventricle enlargement) and global systolic dysfunction. This disease has numerous complications like: supraventricular/ventricular arrhythmias, conduction system abnormalities, thrombosis and increased risk for sudden cardiac arrest.

**Methods:** We present the case of a 78-year-old male, referred to our hospital for rehabilitation program. His past medical history is positive for dilated cardiomyopathy, right hip fracture (repaired with Gamma nail osteosynthesis), multiple respiratory infections and polyarthritis. He currently quit smoking and alcohol.

**Results:** The physical exam reveals an alert and oriented man with a regular pulse of 111/min, BP=118/72 mmHg, RR=22/min, normal temperature and oxygenation on room air. His neck is supple without jugular venous distension. Cardiac exam: regular rhythm, systolic murmur and ventricular gallop with no rales/crackles and no peripheral edema. Osteoarticular system exam reveals: right hip scar with normal appearance, right thigh hypotrophy, painful movement of the right hip with crackles and antalgic gait. Lab workup: nonspecific inflammatory response and hypochromic microcytic anemia. ECG: normal sinus rhythm with left bundle branch block <150 ms. Echocardiography: biventricular and biatrial dilatation, thin left ventricle wall with severely reduced ejection fraction, moderate mitral regurgitation and severe tricuspid regurgitation, PASP >60 mmHg, mild pericarditis. Stress test on Bruce protocol revealed <5 mets. DXA: osteoporosis. We adjusted patient treatment and initiated bisphosphonates and ferric carboxymaltose than begun the rehabilitation program adapted to patients actual status.

**Conclusion:** Reduced BMD and osteoporosis affects not only postmenopausal women but also men, especially those with comorbidities. Bone quality in patients with advanced heart failure and dilated cardiomyopathy had been rarely studied and there are no guidelines so far.

P963

### THE EFFECT OF HYPERURICEMIA ON THE COURSE OF OSTEOARTHRITIS

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**Objective:** To evaluate the effect of hyperuricemia (HU) on the course of knee osteoarthritis (OA) in a multicenter program.

**Methods:** The study included 200 pts 40-75 y. with knee OA (according to ACR) of X-ray stage I-III (Kellgren-Lawrence) who signed an informed consent. The mean age was 55.9±10.3 y, the BMI was 29.4±6.2 kg/m<sup>2</sup>, the duration of OA was 5 (1-10) y. An individual card was filled out for each patient, including anthropometric indicators, anamnesis and clinical examination data, assessment of VAS pain and WOMAC. All patients underwent knee X-ray, MRI (WORMS), laboratory tests.

**Results:** HU is an elevated uric acid (UA) level in the blood over 360 umol/l or 6 mg/dL. HU was detected in 57 individuals (28,5%). Pts were divided into 2 groups according to the presence or absence of HU. Pts with HU and without HU were comparable in age and OA duration, but significantly differed in BMI, (p<0.05). Statistically significant differences were also revealed when assessing the severity of the course of OA, so in the case of HU, the VAS pain and the total WOMAC were noted higher. Pts with HU had a bone marrow lesions (BML) in the medial condyle of the tibia according to knee MRI (OR=5.75, 95%CI 1.29-25.6, p=0.03). Individuals with HU were more often diagnosed: obesity (OR=1.44, 95%CI 1.07-1.93, p=0.02), hypertensive heart disease (HHD) (OR=1.4, 95%CI 1.1-1.8, p=0.01) and coronary heart disease (OR=2.75, 95%CI 1.28-5.92, p=0.01). Spearman's correlation analysis (p<0.05) confirmed the relationship between HU and OA duration (r=0.23), X-ray stage (r=0.23), BML in the medial condyle of the tibia according to knee MRI (r=0.42), VAS pain (r=0.16) and WOMAC (r=0.17).

**Conclusion:** HU is a predictor that aggravates the course of OA. So, at high levels of UA, there are large values of pain according to VAS and worse indicators WOMAC. BML in the medial condyle of the tibia according to knee MRI is more often detected in people with HU.

P964

## STUDY PROTOCOL FOR IRAN OSTEOPOROSIS REGISTRY: TOWARDS NATIONWIDE IMPLEMENTATION

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**Objective:** Fractures of osteoporosis are associated with significant morbidity and mortality. nationwide registry based studies generate information about disease and help explore therapeutic management practices, monitor treatment performance and patient's outcomes. Our study describes the protocol for osteoporosis registry in Iran.

**Methods:** This registry is a prospective, multicenter cohort study that recruits' patients with osteoporosis from Iran. The registry is set in secondary and tertiary care settings. The inclusion criteria of the study are individuals diagnosed primary or secondary osteoporosis with the diagnostic criteria of the study; and age  $\geq 50$  years. The measurements of the Iranian Osteoporosis Registry included four parts: (i) variables measured by the specific questionnaires package, (ii) BMD, (iii) clinical examination, and (iv) lab data. The baseline questionnaires will be filled out right after patients are diagnosed with osteoporosis and then osteoporosis patients regularly visit every year (Table 1). In Follow up visits variables that may change over time are updated. The main outcome of this registry is the 5-year overall survival. An online web based user-friendly software was also developed for data collection. Data analysis will be conducted with collaboration of data-mining specialists, and epidemiologists after end of each follow up.

Table 1. Timetable for data collection and follow-up

Data elements	variables	Baseline visits	Follow up visits
Informed Consent *		✓	-
Demographic information *	Age, sex, education, marital status	✓	Update*
Socio-economic status **	employment status, insurance, Assets	✓	Update
Life style (smoking behavior) **	Smoking, alcohol and illegal drugs consumption	✓	Update
Physical activity **	Days and minutes having intense and moderate activity	✓	Update
Sunlight exposure **	Duration of sun exposure, use sunscreen, sunburn, work outdoors, use sunglasses	✓	Update
Reproductive health (for women only) *	Menarche and menopause age, use alternative sex hormones and OCP, pregnancies and breastfeeding	✓	-
Medical history*	History of having special health conditions and chronic disease like Hypothyroidism, malnutrition, liver disease, renal failure, Rheumatoid Arthritis, cancer, etc.	✓	Update
Medication use ***	Drug name, form, dose, frequency, number and duration	✓	Update
Lab data ***	Hematology, biochemistry, liver, kidney and thyroid tests	✓	Update
Osteoporosis diagnosis gap *	bone density test, see a doctor to follow up and receive treatment, reason for not seeing a doctor	✓	Update
Osteoporosis adherence and treatment gap *	forgetting to take medication, stop medication, main reason for not taking the prescribed medication(s)	✓	Update
Fracture history and fall risk assessment *	history of spontaneous falls, kind of injury after falling, height reduction, fracture side and age, frequency of fracture	✓	Update
BMD *	Total hip, Femoral neck, Lumbar spine (L1-L4), TBS (L1-L4)	✓	Update
FRAX *	Major Osteoporosis Fracture	✓	Update
Clinical examinations *	blood pressure, BMI, Waist, neck and hip circumference	✓	Update
Hospitalization and death outcomes *	Duration of hospitalization, Hospitalization reason, Cause of death, Date of death	✓	✓
Low back pain ***	Intensity of pain, gait, posture, travels, chores	✓	-
Musculoskeletal health	status of sitting, walking, climbing stairs, getting out of bed	✓	-
Hospitalization history *	reason for hospitalization, days of hospitalization	✓	✓
Attitude towards osteoporosis ***	Complications and serious effects of osteoporosis, Follow the medication regimen under any circumstances, Factors affecting the risk of osteoporosis	✓	-
Osteoporosis awareness ***	Knowledge of the risk factors of osteoporosis and fractures, Methods of diagnosis and prevention of osteoporosis	✓	-
Osteoporosis related-performance *	go to the doctor to follow the treatment, take the prescribed medication, Follow the doctor's instructions, smoke and alcohol consumption	✓	-
Quality of life ***	Self-reported overall health status, Limitations in daily functioning	✓	-
Food frequency ***	Kind of food, Amount of consumption per day, week, month and year	✓	-

\* if the results have changed, they will be updated | \*These elements contain mandatory questions | \*\* These elements contain partially mandatory and optional questions | \*\*\* These elements are optional

**Conclusion:** Iran Osteoporosis Registry will be a valuable source for osteoporosis outcomes information include fractures, hospitalizations, adherence and death at the national level, and the results can be used in evaluating health system interventions and policymaking in the field of musculoskeletal diseases.

P965

## RELATION BETWEEN HAND BONE MINERAL DENSITY, DEGREE OF JOINT DESTRUCTION AND HAND FUNCTION IN RHEUMATOID ARTHRITIS PATIENTS

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**Objective:** Rheumatoid Arthritis (RA) is a chronic systemic disease that affects the functional hand capacity due to inflammatory arthritis and joint destruction. The prevalence of osteoporosis is estimated to be about twice that of the general population. We aimed to investigate the relation between BMD, hand joints destruction and hand function to find out their possible role in assessment of rheumatoid hand disability.

**Methods:** Fifty patients diagnosed as RA based on the 2010 ACR Rheumatoid Arthritis Classification Criteria were included in this study. All patients were subjected to the following scores: Duruöz Hand Index (DHI), Grip Ability Test (GAT), Grip strength test, and Pinch strength tests for assessing the function of the dominant hand of each patient. The participants were also subjected to plain x-ray evaluated by van der Heijde-modified total Sharp score (vdH-S) to assess the damage of the joints of the dominant hand, and DXA to assess the BMD.

**Results:** The wrist BMD was positively correlated with grip strength, pinch strength, GAT, and van der Heijde modified sharp score of the dominant hand ( $P < 0.001$ ). The X-ray joint findings were significantly correlated with each of total grip ability test, grip strength, and pinch strength ( $P < 0.002$ ) as the hand disability manifested more with joint damage.

**Conclusion:** Both osteoporosis and joint damage in RA are positively correlated. Osteoporosis affects the hand function as well. Furthermore, DXA scan can be an alternative assessment tool for RA joint destruction scores and hand function tests.

P966

### MULTICENTRIC CARPO-TARSAL OSTEOLYSIS SYNDROME MIMICKING JUVENILE IDIOPATHIC ARTHRITIS

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**Objective:** Multicentric carpo-tarsal osteolysis (MCTO) is a rare skeletal disorder commonly caused by MAFB bZIP transcription factor B (MAFB) mutation, characterized by aggressive osteolysis of the carpal and tarsal bones. Its onset is during early childhood, being often misdiagnosed as juvenile idiopathic arthritis (JIA).

**Methods:** Based on clinical observation of 38 years old male with previous diagnosis of refractory juvenile idiopathic arthritis (JIA).

**Results:** A 38-year-old male, with previous diagnosis of JIA, was referred to the rheumatology department due to extensive articular deformities on the hand and feet. The patient describes swollen and painful metacarpal, carpal, knee and ankles around the age of 7 years of age, which progressed to severe deformities over the span of about 1 year. At the time, he received a diagnosis of JIA and was treated with NSAIDs and steroids, with no clinical improvement. Follow-up was lost and patient was referred to our department 30 years later. Current physical examination of these joints demonstrated extensive hand and feet deformities. X-ray of the hands was ordered (Figure 1), which showed severe erosion of the carpal bones and the proximal metacarpal bones. These facts lead to clinical suspicion of multicentric carpo-tarsal osteolysis, and a genetic test was ordered, which confirmed a MAFB

mutation.



**Conclusion:** MCTO is a rare skeletal disorder and is often misdiagnosed as JIA. This case report reinforces the importance of genetic tests and a systemic approach for JIA patients who show inadequate response to treatment.

P967

### EVALUATION OF THE IMPACT OF EMS TRAINING ON BODY COMPOSITION IN WOMEN WITH LOW AND MODERATE PHYSICAL ACTIVITY

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**Objective:** Currently, an increasingly popular trend in the field of modern training and physiotherapy is the use of electrostimulation during exercise. This innovative type of activity has been popularized under the name of EMS training or "electro muscle stimulation training". The EMS training is addressed to people of all ages, struggling with various ailments originating from the musculoskeletal system. The aim of the study was to assess the impact of an 8-week EMS training program on body composition parameters in women with a low or moderate level of physical activity.

**Methods:** The study group consisted of 34 women. Subjects were divided into groups of people with low and moderate physical activity on the basis of IPAQ questionnaire. The study involved a training program combined with electrostimulation of the entire muscle corset using a 20-electrode suit. Trainings were performed once a week for 8 weeks, 25 minutes at a time. Basic anthropometric measurements and body composition analysis using bioelectrical impedance before and after the training program were also performed.

**Results:** The muscle mass of the examined women increased by an average of 0.5 kg. The BMR (basal metabolic rate) value increased by 10.7 kcal, while the body fat mass decreased by 0.7



kg. The level of visceral fat of the subjects decreased by an average of 0.3 points. There was no significant difference in the effectiveness of the training program between the group of women with moderate and low physical activity. There was no correlation between age and initial BMI, and the effectiveness of the training program in terms of changes in muscle tissue mass, visceral fat level and WHR index.

**Conclusion:** Systematic and long-term EMS training significantly affects the change of body composition parameters such as muscle and fat mass, as well as the basic metabolism and the distribution of visceral fat. The effectiveness of the results achieved after the training program does not depend on the initial level of physical activity and BMI, and age.

## P968

### TRABECULAR BONE SCORE REFLECTS DIMINISHED BONE QUALITY IN PREMENOPAUSAL BREAST CANCER PATIENTS TREATED WITH ENDOCRINE THERAPY

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**Objective:** Breast cancer is a common malignancy of women. While endocrine therapy is effective for treatment in hormone-receptor positive breast cancer, bone loss and increased fracture risk are also induced. Improving survival of women with breast cancer can be limited by the osteoporotic fractures. We evaluated mass and non-mass bone properties in premenopausal breast cancer women with hormone therapies.

**Methods:** In total, 71 women with breast cancer (age: 48.2±9.0 ys, follow up: 4.6±3.8 ys) were grouped according to the type of treatment: aromatase inhibitors (AI), gonadotropin-releasing hormone agonist with AI (GAI), G with tamoxifen (GT) and G with sequential AI and T (GAIT). Low-trauma fractures occurred in 10 cases. Spine, hip and forearm BMD were measured by DXA, and TBS was calculated from L1-L4 spine BMD. QUS-derived stiffness was assessed at calcaneal site. Results were retrospectively collected, and FRAX was calculated with and without fracture.

**Results:** Osteopenia was observed in 36.6% of patients, 2 patients had osteoporosis. The lowest lumbar BMD in the GAIT group (1.046±0.112 g/cm<sup>2</sup>), and the highest BMD in the GT group (1.212±0.210 g/cm<sup>2</sup>, p<0.05) was observed. There were no significant differences in TBS and stiffness among treatment groups. Significantly lower TBS (1.273±0.3 vs. 1.430±0.9, p=0.002), higher fracture probability (by FRAX with fracture, MOP: 7.2±4.5 vs. 2.9±3.7, p=0.005, and by FRAX without fracture, MOP: 5.1±3.5 vs. 2.9±3.7, p=0.05, respectively) were shown in previously fractured patients compared to non-fractured women. In contrast, no significant differences were found in BMD and stiffness.

**Conclusion:** Premature menopause due to endocrine therapy increases the risk of osteoporosis and fracture. Higher FRAX score calculated without fracture plus lower TBS in fractured patients

suggest the role of non-mass bone properties in the increased fragility in hormone-treated premenopausal breast cancer.

## P969

### IS STANDARD BONE EVALUATION USEFUL IN PATIENTS WITH ACROMEGALY?

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**Objective:** In the clinical practice guidelines, it is suggested to perform spinal RX and DXA as part of the bone evaluation in acromegalic patients. Several HR-QCT studies found that excess GH/IGF-1 can cause abnormalities in trabecular and cortical bone architecture with decreased bone strength, what best explained the increased risk of vertebral fractures (Fv) of these patients. The aim of this prospective study is to describe bone and muscular quality and quality of life in a group of patients with acromegaly, regardless of the stage of the disease. In this cross-sectional analysis, we described baseline characteristics of first patients included up to January 2023.

**Methods:** We designed this study to assess clinical and densitometric features (spine and hip), bone microarchitecture by HR-pQCT, muscle health (hand grip, IMME by DXA) and spine RX. Fatigue (FACIT), sarcopenia and quality of life (AcroQoL) were assessed by specific questionnaires. We defined remission as normal IGF-1 without treatment, controlled disease with normal IGF-1 under treatment and active disease with elevated values of IGF-1.

**Results:** We analyzed 14 patients (2 men and 12 women), mean age 57,5±5 years. Regarding acromegaly status, 4 were in remission, 7 controlled disease and 3 actives. Only 2 patients (1 man and 1 woman) required testosterone/estrogen replacement due to hypogonadism. None of the patients reported a history of vertebral fracture, nor did they have evidence of fracture on spinal radiography. Fat mass index showed that most except 3 patients have abnormal values: 4 in the category of excess fat, 3 in the category of grade 1 obesity and the rest in grade 2 obesity. Muscle evaluation showed the following results: handgrip 20±4,3 in active disease, 17,5±4,2 in controlled disease and 28±2,3 in remission. Regarding fatigue questionnaires, all patients in remission had normal values, the group with active disease had low to moderate fatigue values, and the group of patients with controlled disease was the most variable. DXA values were within normal range in all patients but one. TBS values were as follow: active disease: 1,454±0,182, controlled disease: 1,331±0,085, remission disease: 1,485±0,060. Significant trabecular parameters deterioration was found in all patients.

**Conclusion:** In this preliminary report, we can observe how regardless of the stage of the disease and even when the densitometric values may be normal, the impact on microarchitecture is

much more severe than expected. we found a severe compromise of trabecular bone with indemnity of cortical compartment both in radius and tibia. It is important to be able to continue the evaluation of these patients and mainly to determine during follow-up whether the change in acromegaly status has an impact on the evolution of microarchitectural parameters.

Table 1

	MEN	WOMEN ACTIVE DISEASE	WOMEN CONTROLLED DISEASE	WOMEN IN REMISSION
<b>Radius microarchitecture</b>				
Tt BMD (mgHA/cm <sup>3</sup> )	444.6±388.7 (SD +38)	311.1±126 (SD +21.7)	312.8±35.4 (SD +23)	405.4±398 (SD +22)
Ct. BMD (mgHA/cm <sup>3</sup> )	943.5±45.2 (SD +11)	923.1±77.1 (SD +2)	880±32 (SD +9)	937.4±78 (SD +4)
Ct. Th (mm)	1.46±0.5 (SD +78)	0.75±0.7 (SD 0)	0.95±0.14 (SD +66)	0.99±0.4 (SD +24)
Tb. BMD (mgHA/cm <sup>3</sup> )	161.5±228.6 (SD -11)	117.5±59 (SD -27)	104.1±15.5 (SD -15)	112.4±29.7 (SD -25)
Tb. BV/TV (%)	13.5±2.3 (SD -11)	9.8±4.9 (SD -27)	8.7±1.3 (SD -15)	9.4±2.5 (SD -25)
Tb. N (1/mm)	1.78±0.06 (SD -15.5)	1.76±0.5 (SD +3)	1.5±0.3 (SD +5)	1.4±0.4 (SD -3)
Tb. Th (mm)	0.08±0.01 (SD +8)	0.06±0.01 (SD -30)	0.06±0.003 (SD -30)	0.07±0.01 (SD -14)
<b>Tibia microarchitecture</b>				
Tt BMD (mgHA/cm <sup>3</sup> )	301.4±66.1 (SD +10)	340±59.4 (SD +23)	257.2±32 (SD +7)	354±122 (SD +11)
Ct. BMD (mgHA/cm <sup>3</sup> )	905.8±36.5 (SD +7.3)	922.2±33.1 (SD +8)	882.1±24 (SD +9)	921.5±70.3 (SD +3)
Ct. Th (mm)	1.6±0.3 (SD +44)	1.2±0.5 (SD +43)	1.2±0.1 (SD +15)	1.4±0.7 (SD +15)
Tb. BMD (mgHA/cm <sup>3</sup> )	124.7±64 (SD -25)	127.3±42 (SD -25)	108.4±39.1 (SD -21)	140.6±44.7 (SD -17)
Tb. BV/TV (%)	10.4±5.4 (SD -25)	10.6±3.5 (SD -25)	9.1±3.2 (SD -21)	11.7±3.7 (SD -17)
Tb. N (1/mm)	1.85±0.7 (SD -8)	1.57±0.3 (SD -2)	1.66±0.4 (SD +17)	1.39±0.7 (SD -13)
Tb. Th (mm)	0.06±0.01 (SD -20)	0.07±0.01 (SD -22)	0.06±0.02 (SD -25)	0.07±0.01 (SD -13)

[\*] **Abstract**, y col. In Vivo Assessment of Trabecular Bone Microarchitecture by High-Resolution Peripheral Quantitative Computed Tomography. JCEM. Dec 2005; 50(12):6508-6515.

**P970**  
**COMPILING, IMPLEMENTATION AND EVALUATION OF THE COMPREHENSIVE OSTEOPOROSIS VIRTUAL COURSE**

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**Objective:** The prevention and treatment of osteoporosis requires familiarizing health care providers with the principles and patient care. In this regard, the Osteoporosis Research Center, while cooperating with non-communicable disease office of the Ministry of Health, compiling a virtual osteoporosis training course for general practitioners across the country with the aim of empowering doctors, preventing and minimizing the complications and burden of this disease.

**Methods:** Compilation, implementation and evaluation of the virtual course on the principles of osteoporosis management design four phases: 1) the systematic review of electronic modules to assess similar courses, 2) expert panel phase to provide content of electronic modules and syllabus 3) implementation of course include recorded modules on the management panel, and obtaining continuous medical education points, inviting interested doctors to participate in the course, 4) evaluating the knowledge and the educational effectiveness of the course (quasi-experimental study).

**Results:** Following the systematic review, the basic concepts of prevention and treatment of training courses and available articles were extracted and discussed in the expert panel meeting consisting of experts from different fields involved in the management of patients with osteoporosis. Finally, five main modules and 25 sub-modules were designed to improve the knowledge of doctors in the field of diagnosis, control and treatment (Table 1). After that, the electronic courses were recorded, and uploaded on the leaning management systems. The physician who participated in the course, at the end of the course, answered 100 questions in the virtual final exam on the specified date and time. Learners who scored 70 points out of 100 received a certificate. From 300 physicians participated in the virtual osteoporosis training course, 288 physician pass the final exam. Most of the participants were female (78.1%). The average score of the pre-test was 36.77 and the post-test was 81.80 out of 100 points, and a significant difference was observed (P>0.000) (Table 2).

Table 1: Osteoporosis virtual course content

	Modules	content
1	Bone measurement and Fracture Risk Assessment	Bone Measurement Device: Operating principles of Measurement Device
		Bone Measurement Device: X-Ray Science, Radiation Safety
		Clinical Evaluation of Bone Health
2	Diagnosis of Osteoporosis	Fracture Risk Assessment: FRAX and other devices
		Diagnosis of Osteoporosis
		Principles of DXA Scan Interpretation
3	Clinical Management	Principles of DXA Scan Reporting
		Non-Pharmacologic, calcium and vitamin D
		Pharmacologic Treatment: Bisphosphonate
		Pharmacologic Treatment: HRT ,SERMS
		Pharmacologic Treatment: PTH and RPTH analogs
		Pharmacologic Treatment: Denosumab
4	Monitoring and follow-up	Pharmacologic Treatment: Further Pharmacologic Treatment
		Surgical treatment: kyphoplasty and vertebroplasty
		TBS and osteoporosis management
		Monitoring and treatment failure
		Bone turnover markers
5	Sarcopenia	Fracture Liaison Services: Introduction and fundamentals
		Fracture Liaison Services: Implementations
		Introduction and epidemiology Management

Table 2: Comparison of scores before and after course

	N	Mean	SD	Sig
Pre-Test	288	36/77	8/66	0/000
Post-Test	288	81/80	10/26	

**Conclusion:** The results of this educational intervention showed the impact of this training on the participants. The results of this plan led to the development of the first virtual osteoporosis training course for doctors across the country. This course was developed with the aim of empowering the treatment team, taking into account the time constraints of doctors, to carry out actions that lead to promote quality of care for patients with osteoporosis.

### P971

#### THE CLINICAL EFFICACY OF INJECTABLE CELL-BASED THERAPIES IN THE MANAGEMENT OF OSTEOARTHRITIS OF THE HIP: A SYSTEMATIC REVIEW AND ANALYSIS

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**Objective:** Current treatments for hip osteoarthritis (OA) involve self-management with exercise and oral analgesia for mild to moderate OA, and joint-replacement surgery for those with severe OA. Unfortunately, many patients fall into the interim group of not gaining any relief from non-surgical methods and either being ineligible for or on waiting lists for surgery. This systematic review focuses on finding a suitable treatment option for these patients. Stem-cell therapy is a novel treatment that involves a non-surgical, injectable cell-based approach aiming to increase quality of life, activity levels and provide pain relief.

**Methods:** The initial search yielded 1,996 papers across different databases that related to stem-cell based therapies in treating OA based on the decided inclusion criteria. Duplicates were removed and 1616 titles and abstracts were screened resulting in 7 studies in our final report. The clinical outcomes measured include the Harris Hip Score (HHS) and WOMAC, which were used to test the efficacy of the intervention. A meta-analysis was conducted on 3 of the included studies due to insufficient data on HHS and WOMAC.

**Results:** Meta-analysis demonstrated a significant ( $p < 0.005$ ) improvement in WOMAC score and HHS at 6 months post-final treatment compared to baseline. This was also compared to corticosteroid injections which showed a 1.95 times greater mean improvement in WOMAC score, however no statistical analysis could be conducted on this comparison.

**Conclusion:** The meta-analysis concluded stem-cell therapy is effective in improving both HHS and WOMAC at a significant level. However, high levels of heterogeneity and low numbers of papers provide substantial limitations to this review. We therefore conclude the current evidence supporting this finding is weak and further research of more robust study designs (e.g. randomised

control trials) into this area is required.

### P972

#### THE EFFECT OF HYPERTRIGLYCERIDEMIA ON THE COURSE OF OSTEOARTHRITIS (PRELIMINARY RESULTS)

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**Objective:** To evaluate the effect of hypertriglyceridemia (hTG) on the course of knee osteoarthritis (OA) in a multicenter program.

**Methods:** The study included 133 pts 40-75 y. with knee OA (according to ACR) of X-ray stage I-III (Kellgren-Lawrence) who signed an informed consent. The mean age was  $55.5 \pm 11.1$  y. An individual card was filled out for each patient, including anthropometric indicators, VAS pain, WOMAC, KOOS. All patients underwent knee X-ray, ultrasound (US), MRI and laboratory tests.

**Results:** hTG was detected in 27.8% of individuals. Pts were divided into 2 groups depending on the presence or absence of hTG (Table 1). Pts with hTG had higher indicators of VAS pain, WOMAC pain and WOMAC functional insufficiency (FI), worse data during X-ray examination - smaller dimensions of the medial articular cavity ( $p = 0.005$ ). Pts were comparable in age and OA duration, but significantly differed in BMI (with predominance in hTG). Pts with hTG had high values cholesterol, leptin, uric acid, CRP and lower values of HDL ( $p < 0.05$ ) during laboratory examination. The Spearman correlation analysis confirmed positive correlations ( $p < 0.05$ ) between hTG and VAS pain ( $r = 0.27$ ), pain ( $r = 0.28$ ) and FI ( $r = 0.29$ ) according to WOMAC, OA duration ( $r = 0.32$ ), generalized form of OA ( $r = 0.24$ ), hip OA ( $r = 0.31$ ), hand OA ( $r = 0.23$ ), synovitis ( $r = 0.23$ ), X-ray stage ( $r = 0.48$ ), bone marrow lesions ( $r = 0.48$ ) and subchondral cysts ( $r = 0.47$ ) in the medial condyles of the tibia according to MRI; negative correlations between hTG and the size of cartilage determined by US ( $r = -0.28$ ), KOOS ( $r = -0.27$ ). Significant positive associations with the following laboratory parameters were also noted: CRP ( $r = 0.49$ ), leptin ( $r = 0.51$ ), uric acid ( $r = 0.38$ ).

**Table 1.** Comparative characteristics of pts with OA who had and did not have hTG

Parameters	Pts with hTG (n=37)	Pts without hTG (n=96)	p
Duration of OA, y, Me	6 (3-12)	4 (1-11)	0.06
VAS pain, mm, Me	32 (25-50)	25 (10-42)	0.04
WOMAC Pain, mm, Me	162 (118-220)	130 (50-180)	0.05
WOMAC FI, mm, Me	577 (451-800)	375 (100-715)	0.04

**Conclusion:** Pts with hTG had a more severe course of OA, worse clinical, instrumental and laboratory indicators.

P973

### ASSESSMENT OF QUALITY OF LIFE IN OLDER ADULTS WITH OSTEOSARCOPENIA: BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

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**Objective:** Osteosarcopenia is a prevalent condition among the elderly population with widespread consequences and is defined by the co-occurrence of osteopenia/osteoporosis and osteosarcopenia. Considering the rising portion of the global elderly population, the health-related Quality of life (HR-QoL) in older adult is increasingly important. The present cross-sectional study, based on the framework of the BEH program stage II, includes individuals aged  $\geq 60$  residing in Bushehr, Iran. The goal of this study is to assess HR-QoL in individuals with osteosarcopenia compared to those without, and the possible factors associated with it in the affected participants.

**Methods:** A sample of 2346 individuals, aged  $\geq 60$ , were enrolled in the study. Demographic and anthropometric data were gathered, and the participants were interviewed using several questionnaires including the SF-12 questionnaire contains 12 questions in 8 distinct domains, health questionnaire module 9 (PHQ-9), Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL). Body composition was measured using DXA (Discovery Wi, Hologic, Inc., USA). Appendicular skeletal mass (ASM) for each participant was derived as the sum of upper and lower limb skeletal mass. The skeletal muscle mass index (SMI) was defined as  $ASM/height^2$  ( $kg/m^2$ ). The regression models were used to look for potential variables correlated to HR-QoL levels in participants with osteosarcopenia.

**Results:** Some SF-12 items (SF-2a, SF-2b, SF-3a, SF-3b and SF-6b) among men and one SF-12 item among women (SF-3a), one SF-12 domain (PF) among women and three SF-12 domains among men (PF, RP, GH, VT) and the SF-12 physical component summary (PCS) score were significantly different among participants with and without osteosarcopenia (Table 1). Sex, age, and chronic disease in both genders, history of fractures in women, and chronic disease, physical disability (ADL and IADL) and depression were correlated to a lower PCS and/or MCS score in participants with

osteosarcopenia (Table 2).

Table 1: demonstrates participants' physical and mental component summary scores.

	Osteosarcopenia-	Osteosarcopenia+	P-value <sup>a</sup>
Women	N=932	N=289	
Physical component summaries	39.24 $\pm$ 8.80 (38.68-39.81)	38.72 $\pm$ 8.62 (37.72-39.72)	0.37
Mental component summaries	44.12 $\pm$ 10.82 (43.43-44.82)	43.75 $\pm$ 11.10 (42.47-45.04)	0.61
Men	N=904	N=209	
Physical component summaries	46.34 $\pm$ 6.61 (45.91-46.77)	42.43 $\pm$ 8.35 (41.37-43.50)	<0.001
Mental component summaries	47.64 $\pm$ 7.81 (47.14-48.15)	48.66 $\pm$ 7.81 (47.67-49.66)	0.07

<sup>a</sup> Independent t-test was used to compare the component summary scores of participants with and without osteosarcopenia

Table 2: Regression model for Physical component summaries and Mental component summaries

	Physical component summaries		Mental component summaries	
	Univariate	Multivariate	Univariate	Multivariate
Sex	<0.001	0.019	<0.001	0.015
Age	<0.001	<0.001	0.002	0.015
Years of schooling	0.001	0.737	0.130	0.592
BMI	0.195	0.132	0.717	-
Diabetes mellitus	0.203	-	0.139	0.446
Hypertension	0.008	0.033	0.318	-
History of fractures	0.039	0.239	0.021	0.298
Waist circumference	0.419	-	0.816	-
Chronic disease	<0.001	<0.001	0.036	0.991
Disabled (IADL)	<0.001	<0.001	0.526	-
Disabled (ADL)	<0.001	<0.001	0.999	-
Depressed	<0.001	<0.001	<0.001	<0.001

**Conclusion:** Osteosarcopenia is associated with a lowered HR-QoL in men (esp. regarding the physical aspects of HR-QoL). Several factors including age and chronic disease are correlated to a diminished HR-QoL in participants with osteosarcopenia.

P974

### QUANTITY AND QUALITY OF DAIRY PRODUCTS INTAKE AND THEIR RELATIONSHIP WITH BODY COMPOSITION IN URBAN MEXICAN PEDIATRIC POPULATION

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**Objective:** Dairy intake during childhood and adolescence is almost universal worldwide. However, dairy products' quantity and quality may affect the body composition (BC) of children and adolescents. We aimed to assess the association between total dairy intake (TDI) and dairy quality (DQ) with respect to BC of the urban Mexican pediatric population.

**Methods:** This was an urban-population-based cross-sectional study from a representative sample of Mexican children and adolescents. BC was assessed by DXA, from which we calculated: fat mass index ( $FMI=(fat/height^2)$ ) and lean mass index ( $LMI=lean/height^2$ ). TDI was estimated as servings/day. To assess DQ each

servings was categorized as dairy of good quality (DGQ): without added sugar, flavorings, excess sodium, or saturated fats; or dairy of poor quality (DPQ): with added sugar, flavorings, sodium  $\geq 1$  mg/kcal or  $\geq 300$  mg, and/or excess saturated fat ( $\geq 10\%$  total energy).

**Results:** We evaluated 1,840 children/adolescents aged 4.5-18 years, 52% female, from which 64% had normal weight, 31% had overweight or obesity, and 5% underweight. The mean TDI was  $4.0 \pm 2.4$  servings/d. DGQ represented  $2.3 \pm 1.4$  servings/d, with whole milk as the most frequently ingested dairy. Linear correlations adjusted for sex, age, physical activity, and total energy intake documented a significant inverse correlation between TDI and FMI ( $\beta = -0.1$ , CI95% -0.12 to -0.01,  $P = 0.019$ ) and between DGQ and FMI ( $\beta = -0.12$ , CI95% -0.21 to -0.03,  $P = 0.011$ ). We did not find any other association between the TDI or DQ with other relevant BC variables.

**Conclusion:** The mean TDI of the urban-Mexican pediatric population complies with age and sex-specific recommendations of Dietary Guidelines for Americans and is mostly of good quality. Attention to the quantity and quality of dairy intake during childhood and adolescence should be considered relevant given their association with FMI.

## P975

### WHICH PATIENTS WOULD BENEFIT FROM ROMOSUZUMAB? A REAL-LIFE DESCRIPTIVE STUDY

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**Objective:** According to recent guidelines romosuzumab (ROMO) should be considered as initial therapy for women with a very high risk for fracture (very low T-score ( $< -3.0$ ); very high fracture probability by FRAX; or multiple vertebral fractures), Also in the evidence of failure of a previous osteoporosis therapy, with the purpose of reduction of vertebral, hip, and nonvertebral fractures. In Argentina ROMO has been available since August 2021. Our aim was to describe the patient's profile of the first patients on ROMO in our institution.

**Methods:** We designed a prospective study to assess clinical and densitometric features (spine, hip and radius), bone microarchitecture by HR-pQCT, muscle health (performance, hand grip, IMEE by DXA), spine RX, fatigue (FACIT) and bone biomarkers. In this cross-sectional analysis, we described baseline characteristics of patients who started up to January 2023.

**Results:** We analyzed 20 postmenopausal women; median age was 70 (61-77 years). All patients had fracture history: wrist (4), hip (4) and vertebral (15); 53% had 2 or more vertebral fractures. All but two patients had clinical fractures, in 65% the fracture occurred within the last 24 months. Almost half of the patients were treatment naive (45%), the rest had received one or more drugs; mean treatment duration was 4 years (2-14y). Baseline bio-

chemical mean values were: PTH 44,75 pg/ml (36-55, RR:10-65); calcium 9,85 mg/dl (9,5-10, RR 8,8-10,5), BAP 11.3 ug/L (8.7-2, RR:5.9-20), CTX 529 pg/ml (237-588, RR 74-550); VIT D 45 ng/ml (36-58, RR>30) and osteocalcin 26 (18-35, RR 11-43). On average, densitometric values (T-score) reflected osteoporosis in some of the regions analyzed: LS -2.9 (-3.9 to -2.1); FN -2.5 (-2.8 to -1.7); TH -2.5 (-2.7 to -1.9). Muscle strength tests (fist strength and sit-stand test) yielded the following results: 14 (12-17) kg and 11 (9.9-13) s, respectively, while IMME was 6 (5.45-6.45) kg/m<sup>2</sup>. Microarchitecture parameters were clearly deteriorated both in the trabecular and cortical compartments, in radius and tibia (Table 1).

**Table 1**

	Radius	Range Reference*	Difference %	Tibia	Range Reference*	Difference %
Tt.BMD HA/cm <sup>2</sup> (mg)	205 $\pm$ 49	254 $\pm$ 62	-19	187 $\pm$ 45	240 $\pm$ 46	-22.2
Ct.BMD HA/cm <sup>2</sup> (mg)	749 $\pm$ 86	804 $\pm$ 81	-6.7	735 $\pm$ 70	806 $\pm$ 56	-8.8
Ct.Th (mm)	0.43 $\pm$ 0.16	0.57 $\pm$ 0.17	-25	0.62 $\pm$ 0.20	0.88 $\pm$ 0.22	-30
Tb. BMD HA/cm <sup>2</sup> (mg)	95.6 $\pm$ 27	123 $\pm$ 36	-22.3	110.5 $\pm$ 35	137 $\pm$ 31	-19.4
Tb. BV/TV (%)	8 $\pm$ 2.2	10.3 $\pm$ 3	-22.3	9.2 $\pm$ 2.9	11.4 $\pm$ 2.6	-19.4
Tb. N (1/mm)	1.46 $\pm$ 0.3	1.44 $\pm$ 0.29	1.6	1.44 $\pm$ 0.44	1.42 $\pm$ 0.27	+1.5
Tb. Th (mm)	0.05 $\pm$ 0.01	0.07 $\pm$ 0.01	-23	0.07 $\pm$ 0.02	0.08 $\pm$ 0.02	-18.1

(\*) Boutroy S. y col. In Vivo Assessment of Trabecular Bone Microarchitecture by High-Resolution Peripheral Quantitative Computed Tomography. JCEM. Dec 2005; 90(12):6508-6515.

**Conclusion:** We had described the patient's profile of our first patients on ROMO, finding a group of very high-risk patients, with many prevalent fractures, failure to previous treatments and imminent fracture risk. Consequently, bone microarchitecture was significantly deteriorated. In the future, we hope to assess the impact of ROMO on bone microarchitecture, muscle quality and other parameters evaluated.

## P976

### COST AND RESOURCE IMPLICATIONS OF EXTENDING INCLUSION IN FRACTURE LIAISON SERVICES TO NON-MINIMAL TRAUMA FRACTURES

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**Objective:** Fracture Liaison Service (FLS) protocols traditionally exclude non minimal trauma fractures (non-MTFs). The advisability of this practice has been questioned. We investigated the refracture rate of non-MTFs compared to MTFs over a 3-year period from January 2018. To estimate the cost of inclusion of non-MTFs into an FLS program, we referred to a cost analysis conducted by Major et al in 2018 [1].

**Methods:** Individuals aged >50 years presenting to JHH between January-December 2018 with a fracture were identified using the electronic Medical Record (eMR). The rate of refracture was determined by identifying re-presentations at Hunter New England Hospitals between Jan 2018-December 2020. Mechanism of injury and fracture location were recorded. The refracture rate of non-MTFs was compared to MTFs and analysed the data using

Cox proportional hazards regression models with a competing hazard of time to death. Models included age, sex, and incident fracture type.

**Results:** We found that patients >50 years with incident non-MTFs were 44% less likely to refracture compared to patients with incident MTFs. Patients with non-MTFs were more likely to be male, and younger, than those with incident MTFs. Based on the 2022 adjusted dollar cost for processing 1000 patients, inclusion of the 498 non-MTF patients in the cohort would have cost an additional \$198,732.48 [2].

**Conclusion:** Our study demonstrates that non-MTFs have a lower refracture rate compared to nMTFs. Inclusion of all non-MTFs into an FLS would entail a 47% increase in costs, however it is evident from the literature and our study that at least a subset of these patients warrant consideration for evaluation for osteoporosis.

**Reference:** 1. Major G et al. JBMR Plus 2018;3:56

## P977

### HYPOTHYROIDISM IN RHEUMATOID ARTHRITIS PATIENTS

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**Objective:** To study the presence hypothyroidism in patients with rheumatoid arthritis (RA) and to determine its correlation with disease activity.

**Methods:** A total of 102 RA patients and 105 non-RA patients were included in the study, with the mean age of 58,2±5,6 and 56,1±8,4 years respectively. The presence of thyroid gland pathology was estimated by TSH, free thyroxine (fT4), antithyroglobulin antibody (TgAb), and antithyroid peroxidase antibody (TPOAb). RA disease activity was measured by DAS-28-CRP. All the data were analyzed statistically.

**Results:** Mean disease duration of RA was 7,6±4,6 years. Mean duration of menopause was 8±2,4 years in RA group and 3,9±1,8 years in non RA group (p<0,05). RA patients were in 89% positive for rheumatoid factor and in 92% positive for anti CCP antibodies. Clinical hypothyroidism was reported in 25.31% patients with RA and 2.08% without RA (p<0,05). Subclinical hypothyroidism was reported in 13.38% patients with RA and in 5.08% patient without RA. The presence of anti Tg Ab and TPO Ab was found predominantly, 37,3%, in patients with RA with statistically important difference. The disease activity measured by DAS28 CRP was 3,83±1,4. Duration of rheumatoid arthritis positively correlated with the disease activity and presence of hypothyroidism (r=0,36 and r=0,48, respectively), as well as age at the menopause onset correlated with subclinical hypothyroidisms (r=0,52).

**Conclusion:** The relationship between RA and hypothyroidism is confirmed in this study. Presence of hypothyroidism correlated positively with disease activity, disease duration and the age of menopause onset.

## P978

### OSTEOARTHRITIS IN DIABETES MELLITUS: LABORATORY AND INSTRUMENTAL CHARACTERISTICS

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**Objective:** To evaluate the effect of diabetes mellitus (DM) type 2 on the course of the knee osteoarthritis (OA) during laboratory and instrumental examination in a multicenter study.

**Methods:** The study included 532 patients 40-75 y. with knee OA (according to ACR) of X-ray stage I-III (Kellgren-Lawrence) who signed an informed consent. An individual card was filled out for each patient, including anthropometric indicators, anamnesis and clinical examination data. All patients underwent knee X-ray, ultrasound (US) and MRI (WORMS).

**Results:** DM type 2 was diagnosed in 64 (12%) patients with OA (n=532). Patients were divided into 2 groups according to the presence or absence of DM. People with DM were older, had a higher BMI and more severe manifestations of OA. MRI more often diagnosed a bone marrow lesions (BML) in the medial condyle of the tibia (OR=4.9, 95%CI 2.5- 9.6, p=0.005), X-ray III stage of OA (OR=2.15, 95%CI 1.4-3.3, p=0.002), US – smaller thickness cartilage, large synovial membrane (p<0.05). Laboratory tests revealed high values of glucose, glycated hemoglobin, ALT, and alkaline phosphatase (p<0.05). The Spearman correlation analysis confirmed positive associations (p<0.05) between DM and X-ray stage (r=0.21), osteophyte size (according to X-ray) (r=0.27), BML in medial (r=0.49) and lateral (r=0.39) condyles of the tibia (MRI), subchondral cysts in medial (r=0.66) and lateral (r=0.47) condyles of the femur (MRI), subchondral cysts in medial (r=0.8) and lateral (r=0.7) condyles of the tibia (MRI), thickness of the synovial membrane determined by US (r=0.26); negative associations between DM and the size of the medial articular cavity (according to X-ray) (r=-0.27) and cartilage tissue according to US (r=-0.22) (p<0.05 for all values).

**Conclusion:** In our research work we demonstrated that more severe manifestations of OA are observed in DM (including after age adjustment) during a complex examination using laboratory and instrumental methods.

P979

**BONE MINERAL DENSITY LEVEL IN EARLY MENOPAUSE OF OBESE WOMEN**R. Assadi<sup>1</sup>, K. Nassar<sup>1</sup>, S. Zaher<sup>1</sup>, S. Janani<sup>1</sup>

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**Objective:** To evaluate the relation between T-score level of spine and hip, and BMI, we measured BMD in early menopausal women before the age of 40.

**Methods:** We conducted a retrospective study in the rheumatology department over 3 years (2020-2023). Obese female patients of different age groups were included. BMD expressed as Z-score was measured using DXA technology apparatus, we have considered two sites; lumbar spine and femoral neck. Phosphocalcic anomalies were corrected before the measurement of BMD. Height, weight, and BMI were subsequently measured. Obesity was defined as BMI >30 kg/m<sup>2</sup>.

**Results:** 95 early postmenopausal women were enrolled. Average age was 50.4 years. They were grouped into obese (n=42, 44.2%) and non-obese (n=53, 55.8%). Average age of obese female entering menopause was 38.7 years. Obese women presented higher BMD in lumbar spine and femoral neck (0.964 and 0.912 g/cm<sup>2</sup>, respectively) in comparison with non obese participants (0.833 and 0.814 g/cm<sup>2</sup>, respectively). Regarding Z-score, we found that it was higher in obese patient in lumbar spine (- 0.51 vs. -1.25, respectively) and femoral neck (- 0.87 vs. -1.09, respectively). the characteristics of the patients are summed up in the table.

**Conclusion:** Early Menopause-related hormonal changes predispose women to bone loss, mobility disability and fall-related fractures in later life (1). In the other hand, adipose tissue may provide relative bone strengthening due to mechanic and hormonal factors (2). Our study confirm this; in fact, obese women with BMI >30 kg/m<sup>2</sup> have a less pronounced BMD decrease on spine and hip.

**Table.** Characteristics of the participant

Total	n=93
Age (years) Mean	50.4
Early postmenopausal	100%
Obese Non obese	44.2%, (n=42) 55.8%, (n=53)
<b>Mean BMD: obese</b> Lumbar spine Femoral neck	0.964 g/cm <sup>2</sup> (Z score: - 0.51) 0.912 g/cm <sup>2</sup> (Z score: -1.25)
<b>Mean BMD: non obese</b> Lumbar spine Femoral neck	0.833 g/cm <sup>2</sup> (Z score: - 0.87) 0.814 g/cm <sup>2</sup> (Z score: -1.09)

References:

1. Sipilä S et al. J Cachexia Sarcopenia Muscle 2020;11:698.
2. Zandona. Climacteric 2022;25:96.

P980

**VITAMIN D IN KNEE OSEOARTHRTIS MANAGEMENT**E. Deseatnicova<sup>1</sup>, M. Curchi<sup>1</sup>, L. Groppa<sup>1</sup>

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**Objective:** Low levels of serum 25OH vitamin D are frequently determined in patients with knee osteoarthritis (OA). We aimed to monitor the effects of vitamin D supplementation of clinical presentation of the patients with knee OA.

**Methods:** An observational, case control study included 98 of the patients with knee OA II by Kellgren-Lawrence and vitamin D deficiency determined by serum 25OH vitamin D level which were divided in 2 equal groups. Both groups received the following treatment: meloxicam 15 mg/d for one month, local diclofenac 50 mg/g, 2 FTU (fingertip units) pe day for 3 months, Chondroitin sulfate 1500 mg+glucosamine sulfate 1500 mg/d for 3 months. In the first group vitamin D supplementation was made with the target 25OH vitamin D level of 50 ng/ml in 3 months. The second group did not receive vitamin D supplements.

**Results:** BMI of the patients was - 29,13 (95%CI 31,08-24,83) vs. 27,74 (95%CI 29,38-24,51) kg/m<sup>2</sup>, p>0,05. 25(OH) vitamin D level - 11.3±4,4 (95%CI 5,84 - 25,21) ng/ ml. Pain level by VAS in the second group was statistically more significant 6,1±1,3 (95%CI 8,32-4,29) vs. 3,2±2,7 (95%CI 6,91-3,04) (p<0.05).

**Conclusion:** Routine screening for vitamin D level and its correction by active supplementation may be recommended in combined management of pain in the knee osteoarthritis of low to moderate radiological stage.

P981

**MORTALITY AFTER HIP FRACTURE BEFORE AND DURING THE COVID-19 PANDEMIC IN IRAN**F. Yalamchi<sup>1</sup>, K. Khalagi<sup>2</sup>, N. Fahimfar<sup>2</sup>, M. Sanjari<sup>3</sup>, P. Tabrizian<sup>4</sup>, M. J. Mansourzadeh<sup>5</sup>, A. Ostovar<sup>2</sup>, M. Asadi-Lari<sup>1</sup>

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**Objective:** The risk of mortality increases dramatically after oc-

currence of hip fracture in older adults. This study aims to investigate if the COVID-19 pandemic affected the mortality outcome in people aged  $\geq 50$  years admitted due to hip fracture in a referral hospital in Iran.

**Methods:** We collected data on the mortality of the patients aged  $\geq 50$  admitted due to hip fracture to one referral orthopedic hospital located in Tehran, Iran, during February 20, 2019 to February 19, 2020 (before the COVID-19 pandemic period) and February 20, 2020 to November 21, 2021 (during the COVID-19 pandemic period). Occurrence and time of death were obtained from the Iranian population-based death registry database or calling the patients and their families. One-month, all-cause mortality rate was calculated during the first month after admission and first month after surgery of hip fracture by the number of hip fracture patients and compared between the periods before and amid the pandemic using chi-square tests and logistic regression.

**Results:** A total of 634 hip fracture patients were included, of which, 199 cases (mean age:  $72.30 \pm 10.92$  years; 114 (57.3%) women) were admitted during the pre-pandemic period and 435 cases (mean age:  $73 \pm 10.91$  years; 235 (54%) women) were admitted during the pandemic period. In total, 527 cases were operated (158 cases during the pre-pandemic period and 369 cases during the pandemic period). From all the patients admitted, 4 (2.01%) and 21 (4.82%) cases died during 30 days after admission during the pre-pandemic and the pandemic periods, respectively, (adjusted OR: 3.33, 95%CI: 1.02-10.84,  $P=0.046$ ), also 2 (1.27%) and 17 (4.60%) cases died during 30 days after surgery during the pre-pandemic and the pandemic periods, respectively (adjusted OR: 10.22, 95%CI 1.71-61,  $p=0.011$ ).

**Conclusion:** Imminent mortality after hip fracture was significantly higher in the COVID-19 pandemic compared to the pre-pandemic period. Contributing factors should be investigated through further research.

## P982

### THE IMPORTANCE OF OSTEOPENIA IN THE DEVELOPMENT OF OSTEOPOROTIC FRACTURES

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**Objective:** BMD derived T-score below -2.5 is considered as diagnostic threshold for osteoporosis. However, former publications issued that 40% of fragility fractures occur in patients with osteopenia (T-score between -1 and -2.5). Adequate treatment is barely available for osteopenic patients, as -2.5 or lower T-score is required to initiate therapy, although antiresorptive drug treatment has been proven efficient in osteopenia as well.

**Methods:** Our trial included 1883 osteopenic women ( $66.6 \pm 9.7$  ys). History of fragility fractures was recorded ( $n=723$ ). DXA scans were performed (GE Lunar Prodigy, WI, USA) and BMD ( $g/cm^2$ ) was assessed at the L1-L4 vertebrae, hip and radius. At

least one of the three sites needed to result in osteopenia while patients with T-score below -2.5 at any site were excluded. The 10-year probability of hip and major osteoporotic fractures was calculated by FRAX tool. In the previously fractured patients the FRAX calculation was also done without signing the fracture as a risk factor.

**Results:** The incidence of at least one fragility fracture was 38% in the total group. The patients with previous fracture were older ( $69.2$  vs.  $65.7$  ys,  $p<0.05$ ) and had a greater BMI ( $28.4$  vs.  $27.8$  kg/m<sup>2</sup>,  $p<0.05$ ). No differences in BMD and T-score has been found. Both hip and major osteoporotic fracture probability were higher in the fractured subgroup (MOP 14.1 vs. 7.8%,  $p<0.05$ ; FRAX-HIP 4.6 vs. 2.4%,  $p<0.05$ ) than in non-fractured participants. FRAX calculated without previous fracture in the fractured subgroup remained still higher than that of non-fractured persons (MOP 9.6%, HIP: 3.3%). Several FRAX risk factors like parental fractures and secondary osteoporosis were found more frequently in patients with previous fracture.

**Conclusion:** Our results point to the robust role of osteopenia in the growing number of fractures. Accurate evaluation and active treatment approaches should be essential in the management of osteopenia to prevent further fragility fractures.

## P983

### BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN WITH OBESITY AND OSTEOARTHRITIS: ABOUT 358 CASES

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**Objective:** In last decades, musculoskeletal system disorders had increased noticeably, especially in postmenopausal women (1). The aim of the study was to evaluate the association between obesity and BMD in postmenopausal women with obesity and osteoarthritis (OA).

**Methods:** We conducted a retrospective observational study in the rheumatology department over 2 y (2021-2023). Inclusion criteria: All postmenopausal patients aged over 50 y followed or not for osteoarthritis of the knee (OA). We divided them into groups by age decades: 50-59, 60-69, and over 70 years old. Classified by WHO, obesity was established when BMI was above 30 kg/m<sup>2</sup>. All of them underwent DXA. Exclusion criteria: Patients with other osteoarthritis site and nonmenopausal women.

**Results:** 358 postmenopausal women were included, aged between 50-84 years old. 182 women had OA (50.8%), average age was 61.2 y. Obesity was detected in 46% of postmenopausal women with OA ( $n=84$ ). There were found no differences with the groups of BMI  $\leq 30$  kg/m<sup>2</sup> in BMD of femoral necks (0.920 and 0.917 respectively). However, obese women with symptomatic OA had higher level of lumbar spine BMD compared with woman having normal weight (0.981 and 0.837). In the age group of 50-59 y, OA was detected in 31.8% of women with normal BMI and



in 68.2% of those with high BMI. In the next group aged between 60-69 y, OA was diagnosed in 27.2% of women with normal BMI and in 72.8% of those obese. Among the over 70-year-old women, 25.0% of cases had OA with a normal BMI while 75.3% had no OA and normal BMI. Results are summed up in the Table below.

**Table.** Characteristics of the population

Total	n=358
Age (years) Mean Range	60.25 50 - 84 years
Postmenopausal	100%
Knee osteoarthritis Obese Non obese	182 (50.8%) 84 (46%) 98 (54%)
<b>OA (obese)</b> group of 50-59 years group of 60-69 years over 70 years	68.2% 72.8% 75.3%
<b>OA (normal weight)</b> group of 50-59 years group of 60-69 years over 70 years	31.8% 27.2% 25%

**Conclusion:** In the knee OA patients, the frequency of obesity is significantly higher compared to persons without OA which is consistent with data from the literature (2). Postmenopausal women with OA had higher BMD of lumbar spine, however, in our study, there were no differences of hip BMD in women with OA.

**References:**

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2. Zheng H, Chen C. BMJ Open 2015;5:e007568.

**P984**

**THE EFFECT OF HYPERCHOLESTEROLEMIA ON THE COURSE OF OSTEOARTHRITIS (PRELIMINARY RESULTS)**

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**Objective:** To evaluate the effect of hypercholesterolemia (HC) on the course of knee osteoarthritis (OA) in a multicenter program.

**Methods:** The study included 183 patients 40-75 y. with knee OA (according to ACR) of X-ray stage I-III (Kellgren-Lawrence) who signed an informed consent. An individual card was filled out for each patient, including anthropometric indicators, anamnesis and clinical examination data, VAS pain, WOMAC, KOOS and concomitant diseases. All patients underwent knee X-ray, ultrasound (US) and laboratory tests.

**Results:** HC was detected in 59% of individuals, while statins were taken by 23% of patients. Patients were divided into 2 groups (Table 1) depending on the presence or absence of HC. Individuals with HC had higher VAS pain, worse data WOMAC and KOOS, smaller sizes of cartilage tissue by US. The Spearman correlation analysis confirmed positive correlations ( $p < 0.05$ ) between HC and age ( $r = 0.25$ ), VAS pain ( $r = 0.2$ ), WOMAC ( $r = 0.28$ ) and CTX-II; negative correlations between HC and thickness of cartilage tissue (US) ( $r = -0.26$ ) ( $p < 0.05$ ).

**Table 1.** Comparative characteristics of patients with OA who had and did not have HC

Parameters	Patients with HC (n=108)	Patients without HC (n=75)	p
Age, y, Me	59.5 (52-66)	51 (43-61)	0.001
Duration of OA, y, Me	6 (2-10)	3 (1-10)	0.07
BMI, kg/m <sup>2</sup> , Me	29.4 (26-32.8)	27.3 (23.1-33,2)	0.15
The size of the cartilage on the anteromedial surface (US), mm, Me	1.5 (1-1.6)	1.6 (1.4-1.8)	0.005
The size of the cartilage on the anterolateral surface (US), mm, Me	1.6 (1.4-1.7)	1.7 (1.5-1.8)	0.007
VAS pain, mm, Me	45 (30-58)	34.5 (10-55)	0.02
WOMAC, mm, Me	861 (560-1108)	502.5 (135-804.5)	0.0003
KOOS, points, Me	45 (30-54)	34 (15-45)	0.006
CTX-II, Me	3.1 (2.3-4)	2.4 (0.9-3.1)	0.02
Liver steatosis,%	22.8	4.5	0.002
HHD,%	60.2	44.1	0.04

**Conclusion:** The results of the study confirmed the high frequency of HC in OA (59%), low adherence to statin treatment. Patients with HC had a more severe clinical course of OA, worse instrumental (smaller sizes of cartilage tissue) and laboratory indicators (a higher marker of cartilage tissue degradation), HHD and liver steatosis.

P985

**RELATION BETWEEN BMI AND VERTEBRAL FRACTURES**R. Assadi<sup>1</sup>, K. Nassar<sup>1</sup>, S. Zaher<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Dept. of Rheumatology, Ibn Rochd University Hospital Center, Hassan II University, Faculty of Medicine & Pharmacy, Casablanca, Morocco

**Objective:** Bone fragility fractures are associated with high mortality rate. Lower BMI has been classically associated with fragility fractures (1). Because of the overweight and obesity are increasing to assess BMI in patients with fragility vertebral fractures. We aimed to evaluate the relationship between BMI and vertebral fractures (VF) in patients followed in rheumatology department in Morocco.

**Methods:** We included all VF admitted at rheumatology department between 2020-2023. BMI of all patients was obtained, as well as the age, sex and number of vertebral fractures. According to WHO definition, BMI <18.5 kg/m<sup>2</sup> was defined as underweight, ≥18.5 to <24.99 kg/m<sup>2</sup> as normal weight, ≥25 to <29.99 kg/m<sup>2</sup> as overweight and ≥30 kg/m<sup>2</sup> as obese. Multiple vertebral fractures were considered in patients with more than one fracture.

**Results:** 63 patients were enrolled, all were women. Mean age of the participant was 50.1 years. 39.1% of patients with VF had a BMI equivalent to being obese. Of the remaining patients, 33.2% had normal overweight, 25.1% had normal weight and only 2.4% were underweight. 19 patients (30.1%) had ≥1 VF complicating low energy trauma. In the group of obese fractured patients, 73% were osteoporotic with mean T-score of - 2.9 in lumbar spine and - 3.1 in total hip. Results are summed in the Table below.

**Table 1.** Characteristics of the population:

BMI	Frequency	Percentage	Multiple vertebral fractures
Normal	15	25.1%	36.8% (n=7)
Overweight	21	33.2%	31.6% (n=6)
Obese	25	39.3%	26.3% (n=5)
Underweight	2	2.4%	5.3% (n=1)

**Conclusion:** In obese patient, despite an apparent strengthening of the bone witnessed by the increased BMD, the risk of fracture is higher due to various factors (2). Our study confirms this, because of overweight and obese patients represent most patients who have vertebral fractures. Considering BMI, no difference was noted in term of the number of vertebrae fractured. However, these results must be confirmed by large sample of patients.

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P986

**OBESITY AND VITAMIN D STATUS IN POSTMENOPAUSAL MOROCCAN WOMEN: ABOUT 182 PATIENTS**R. Assadi<sup>1</sup>, K. Nassar<sup>1</sup>, S. Zaher<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Dept. of Rheumatology, Ibn Rochd University Hospital Center, Hassan II University, Faculty of Medicine & Pharmacy, Casablanca, Morocco

**Objective:** To describe the impact of obesity on serum 25-hydroxyvitamin D status in Moroccan postmenopausal women between 45-65 y of age.

**Methods:** We conducted a retrospective study in the rheumatology department between 2021-2023. Inclusion criteria: All postmenopausal patients between 45-65 y of age followed in the department. Data related to age, weight, chronic diseases and use of medication were collected. patients were classified as normal (BMI 18-24.9 kg/m<sup>2</sup>), overweight (BMI 25-29.9 kg/m<sup>2</sup>) and obese (BMI ≥30 kg/m<sup>2</sup>). Serum 25-hydroxyvitamin D was measured in all participants.

**Results:** Were included 351 women, the average age was 53.72 years. According to BMI, 28.3% of participants had normal weight, 31.4% had overweight and 40.3% were obese. In comparison with the non obese group (n=187), obese women (n=164) presented higher BMD in femoral neck (0.912 vs. 0.813 g/cm<sup>2</sup>, respectively) and higher T-score (-0.51 vs. -1.25, respectively). 71.5% of participants had serum 25-hydroxyvitamin D <20 ng/mL, no differences were found between non obese and obese group (12.1 vs. 12.4 ng/ml, respectively).

**Conclusion:** Among the literature, the prevalence of vitamin D deficiency is more elevated in obese subjects irrespective of age (1-2). However, our findings revealed that in the group of women under 65 y, obesity seems to not impact in 25-hydroxyvitamin D status; larger samples are necessary to confirm this disparity.

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P987

**VITAMIN D DEFICIENCY IN OBESE PATIENTS WITH CHRONIC RHEUMATIC DISEASES**R. Assadi<sup>1</sup>, K. Nassar<sup>1</sup>, S. Zaher<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Dept. of Rheumatology, Ibn Rochd University Hospital Center, Hassan II University, Faculty of Medicine & Pharmacy, Casablanca, Morocco

**Objective:** To assess vitamin D status in rheumatic obese patients followed in the university rheumatology department in Casablanca, Morocco.

**Methods:** We conducted a retrospective study over 3 years (2020-2023). Inclusion criteria: obese patients followed for rheumatic arthritis. 25(OH) vitamin D, intact PTH, calcium and phosphorus

were measured. Patients who were taking drugs with potential to alter bone mineral metabolism or followed for osteoporosis were excluded.

**Results:** 182 patients were evaluated. The mean age was 53.3 years old, most of patients had a diagnosis of axial or peripheral osteoarthritis (62.5%), rheumatoid arthritis (26.8%). The average value of 25(OH) D was 13.7 ng/mL. No difference was found between the subgroups stratified by age (<60, 61-70 and >70 y) in the values of calcium, phosphorus, 25(OH) vitamin D and PTH. We found values of 25(OH)D <20, between 20-30 and ≥30 ng/mL in 37.5%, 39.3% and 23.2% of patients respectively. The average values of 25(OH)D were lower in the obese patients, compared to the non-obese ones (15.9 vs. 19.2 ng/mL). Obese participants were divided in 2 groups regarding rheumatism activity; 64% had active disease. The proportion of subjects with vitamin D deficiency was high in patients with active rheumatoid arthritis.

**Conclusion:** Vitamin D insufficiency is highly prevalent in patients with rheumatic diseases (1); our study found 37.5% of patients with deficiency of 25(OH)D, which require pharmacological correction due its impact in different parameters of health (2).

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## P988

### HIGH FREQUENCY OF ACUTE AND PERSISTENT ADVERSE EVENTS AFTER ZOLEDRONATE INFUSION

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**Objective:** Zoledronate (ZOL) is a potent bisphosphonate used in the treatment of several osteopathies. Reported frequency of adverse events (AEs) after the infusion is widely variable. We aim to describe the frequency and characteristic of AEs after ZOL infusion and to analyze if there is any difference according to the number of infusions.

**Methods:** This is an observational, descriptive, and prospective study to characterize the AEs associated with ZOL. Patients receiving a 5 mg infusion at our institution by experienced technicians, were invited to participate. After written consent they received 2 electronic questionnaires (Google Form) at 3 days and 7 days after ZOL. For the analysis, we divided the symptoms in fever, musculoskeletal (ME) (myalgia, arthralgia, bone pain), general (malaise, fatigue, headache, dizziness, chills), gastrointestinal (GI) and ocular, and were classified in relation to the time of ZOL infusion as acute when occurred within the first 3 days, persistent when lasted more than 3 days, and late when occurred between 3<sup>rd</sup> and 7<sup>th</sup> day. To analyze differences according to the number of previous infusions, we compared patients who received the first vs. second or subsequent infusion by Pearson's chi-squared test.

**Results:** 263 patients signed consent and completed any questionnaire, and 182 of them completed both. 95% were women,

mean age (±SD) 66±9. Of the 182 patients who responded both surveys, 27% had acute fever, 56% acute ME, 62% acute general symptoms, 21% GI, and 10% ocular symptoms. 4% had persistent fever, 35% persistent ME, 42% persistent general, 10% persistent GI, and 5% persistent ocular symptoms. All acute symptoms and most of persistent were significant more frequent after the 1<sup>st</sup> vs. the 2<sup>nd</sup> or subsequent infusions (Table). 8% of patients had late ME, general and GI symptoms. Mean intensity for all symptoms was 5.6 on a scale of 1-10, and 90% of patients responded that, if necessary, they would receive another infusion of ZOL.

Table. Symptoms frequency and characteristic.

Time	Symptoms	Total (n=182)	1 <sup>st</sup> infusion (n=94)	2 <sup>nd</sup> or subsequent infusion (n=88)	P Comparison between 1 <sup>st</sup> vs 2 <sup>nd</sup> or subsequent infusion	OR (95% CI) for 1 <sup>st</sup> infusion to present symptoms
Acute symptoms	Fever	49 (26.9%)	32 (34%)	17 (19.3%)	0.025*	2.16 (1.09-4.25)
	ME	102 (56%)	64 (68.1%)	38 (43.2%)	0.001*	2.81 (1.53-5.14)
	General	113 (62.1%)	74 (78.7%)	39 (44.3%)	<0.001*	4.45 (2.43-8.09)
	Gastrointestinal	39 (21.4%)	27 (28.7%)	12 (13.6%)	0.013*	2.55 (1.20-5.43)
	Ocular	18 (9.9%)	16 (17%)	2 (2.3%)	0.001*	8.8 (1.97-39.6)
Persistent symptoms	Fever	8 (4.4%)	7 (7.4%)	1 (1.1%)	0.060*	-
	ME	84 (45.2%)	42 (44.7%)	22 (25%)	0.005*	2.42 (1.29-4.55)
	General	77 (42.3%)	51 (54.3%)	26 (29.5%)	0.001*	2.82 (1.53-5.21)
	Gastrointestinal	18 (9.9%)	13 (13.8%)	5 (5.7%)	0.066*	-
	Ocular	10 (5.5%)	9 (9.6%)	1 (1.1%)	0.013*	9.21 (1.14-74.2)
Late symptoms	Fever	2 (1.1%)	2 (2.1%)	0 (0%)	0.212*	-
	ME	15 (8.2%)	4 (4.3%)	11 (12.5%)	0.050*	-
	General	15 (8.2%)	5 (5.3%)	10 (11.4%)	0.118*	-
	Gastrointestinal	16 (8.8%)	8 (8.5%)	8 (9.1%)	0.890*	-
	Ocular	5 (2.7%)	3 (3.2%)	2 (2.3%)	1.000*	-

Acute symptoms within the first 3-days, persistent when lasted more than 3 days, and late when occurred between 3<sup>rd</sup> and 7<sup>th</sup> day.

**Conclusion:** In this real-life study AEs after ZOL infusion were very frequent, especially general and ME symptoms, clearly more frequent after the first infusion. The persistence of events after 3 days was remarkable, probably due to active assessment. However, it is very important to note that most of them would receive ZOL again.

## P989

### THE EFFECT OF DIABETES MELLITUS ON THE CLINICAL COURSE OF OSTEOARTHRITIS

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**Objective:** To evaluate the effect of diabetes mellitus (DM) type 2 on the clinical course of knee osteoarthritis (OA) in a multicenter study

**Methods:** The study included 532 patients 40-75 y. with knee OA (according to ACR) of X-ray stage I-III (Kellgren-Lawrence) who signed an informed consent. An individual card was filled out for

each patient, including anthropometric indicators, anamnesis and clinical examination data, assessment of pain in the knee according to VAS, WOMAC, KOOS, and concomitant diseases.

**Results:** DM type 2 was diagnosed in 64 (12%) patients with OA (n=532). Patients were divided into 2 groups according to the presence or absence of DM. Patients with DM were older ( $p=0.0001$ ) and had a higher BMI ( $p=0.0001$ ). Patients with DM had more severe manifestations of OA: higher VAS pain ( $p=0.001$ ), WOMAC ( $p=0.0003$ ), worse indicators of KOOS ( $p=0.003$ ); generalized form of OA was more often noted (OR=1.47, 95%CI 1.15-1.86,  $p=0.006$ ): hip OA (OR=1.6, 95%CI 1.34-1.89,  $p=0.0001$ ) and hand OA (OR=1.27, 95%CI 1.03-1.57,  $p=0.05$ ), synovitis (OR=1.4, 95%CI 1.12-1.75,  $p=0.01$ ) and quadriceps hypotrophy (OR=2.22, 95%CI 1.53-3.22,  $p=0.0002$ ) were detected. Patients with DM had obesity (OR=4.48, 95%CI 2.22-9.03,  $p=0.0001$ ), hypertensive heart disease (OR=1.35, 95%CI 1.2-1.5,  $p=0.0005$ ), coronary heart disease (OR=3.0, 95%CI 1.4-6.5,  $p=0.01$ ) and steatosis liver (OR=2.5, 95%CI 1.38-4.6,  $p=0.02$ ). The Spearman correlation analysis confirmed positive associations ( $p<0.05$  for all values) between DM and age ( $r=0.2$ ), duration of OA ( $r=0.25$ ), VAS pain ( $r=0.24$ ), WOMAC ( $r=0.2$ ); negative – between DM and KOOS ( $r=-0.23$ ).

**Conclusion:** Patients with DM had a more severe clinical course of OA. The results obtained require further study, and it is possible that preventive measures aimed at reducing the traditional risk factors of the development of DM, as well as correct drug therapy, will contribute to a more favorable clinical course of OA.

## P990

### DELAYED UNION AND NON-UNION OF FRAGILITY FRACTURES: IS TERIPARATIDE AN EFFECTIVE NON-SURGICAL TREATMENT?

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**Objective:** Teriparatide (TPTD), recombinant human PTH(1-34), is the first anabolic agent in clinical use for the treatment of severe osteoporosis. The latest IOF guidelines consider the anabolic therapy as the first treatment option after a fragility fracture, with the main aim to reduce the overcoming risk to get a further fracture. In our Institution, many of these patients often present fractures of the long bones, in addition to the most common vertebral or proximal femur fractures. In 5-30% of these patients, due to poor bone quality, we observe a delayed or absent consolidation of the fracture that may require further surgical treatments. In the last decade, both in several animal models and clinical studies, TPTD has shown a significant efficacy in accelerating the physiological fracture healing process. Therefore, TPTD should be considered a cornerstone in the treatment strategies of these very fragile and severe patients. We aimed to study the efficacy of TPTD on fracture healing, both in fragility fractures patients and in young patients with major trauma with delayed or non-union.

**Methods:** We present a selection of patients with severe osteoporosis who reported multiple vertebral fractures and complex long bone fractures (humerus A012-C1, femur A031-B3, A032-A3, A033-A3, and tibia A042-B1, A043-C3) with delayed union treated with TPTD (20 µg/d for 24 months, as per guidelines and according to the Italian NHS eligibility criteria). Furthermore, we also present a group of young patients (males, mean age 32 yrs), who sustained a Gustilo III 3B fracture (2 cases a 33A, and 2 cases a 43A fracture, according to the AO classification system). These patients with traumatic fractures of the lower limb (1 distal femur, 3 tibia) were treated with an open fixation; all presented non-unions and, after approval of the hospital ethical committee, we started TPTD treatment (20 µg/d until the nonunion healed) before discharging.

**Results:** All patients, both fragile as young traumatic groups, healed (avg follow up 4 yrs) without any systemic or local complications on the fracture site. In particular, X-rays showed bone healing at the delayed union site in the fragile group after 3-6 months of TPTD administration, while in the young traumatic group with non-union the bone healing was seen after 3-9 months.

**Conclusion:** In our clinical experience, TPTD confirmed, in different patients population, its efficacy by improving and accelerating fracture healing process. We could speculate that intermittent exposure to human PTH peptide may induce an angiogenic response, which counteracts the pathological features responsible for development of bone union disorders. In summary, our clinical experience in fragility fractures patients, as well as in young major trauma fractures patients, clearly demonstrate the importance of using the anabolic treatment (TPTD) as first therapeutic option after surgery for both fragility and traumatic fractures, having also beneficial effects in patients presenting with delayed union or non-union.

## P991

### ORTHOPEDIC SURGEONS' OSTEOPOROSIS SCREENING, PREVENTION AND TREATMENT PRACTICES IN A SINGLE CENTER

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**Objective:** To evaluate osteoporosis screening, prevention and treatment practices of orthopedic surgeons; to assess their attitude towards the importance of osteoporosis evaluation and treatment in fragility fracture patients.

**Methods:** Questionnaire was administered to specialist orthopedic surgeons at a single center (University Clinic of Orthopedic Diseases in Skopje, Republic of North Macedonia). 24 surgeons responded to the survey.

**Results:** 2 surgeons did not get involved in osteoporosis screening and treatment at all. Following results pertain to 22 surgeons. DXA referral after fragility fracture was more frequent for female patients for hip, spine and other fractures ( $p=0,004$ ;  $p=0,002$ ;

p=0.004 respectively). Referrals were more frequent for vertebral fractures compared to hip and other fractures (p=0.0001). 64% of surgeons referred patients for DXA if they were in menopause, 82% women above 65, 36% men over 70, 18% smokers, 82% patients on long-term corticosteroid therapy, 9% long-term anticoagulant therapy, 32% for family history of fragility fracture. Treatment of choice was alendronate for 59% of surgeons, ibandronate for 39%, 5% were indeterminate. 57% recommended 1000mg calcium supplementation during treatment and 33% 1200mg. 5% gave recommendations according to age and 5% didn't recommend it. Vitamin D was recommended in doses of 800 IU by 19%, 1000 IU 33%, 2000 IU 29% and other 19%. 41% often prescribed bisphosphonates to fragility fracture patients without DXA testing. Follow-up DXA was recommended after 6 months, 1 year, 1,5 years or 2-year period by 8%, 82%,5% and 5% of surgeons respectively. 9% didn't recommend follow-up for osteopenia.

**Conclusion:** Although awareness of importance of osteoporosis in orthopedic surgeons has risen in the past years, there is large number of patients with fragility fractures and other risk factors that remain undiagnosed and untreated, with men being more likely to "fall through the cracks". Continuing education is needed for updating knowledge about latest diagnostic and treatment recommendations.

## P992

### PREDICTIVE FACTORS OF OSTEOARTHRITIS PROGRESSION AND TOTAL KNEE ARTHROPLASTY ON NON-OBESE PATIENTS WITH CARDIOVASCULAR RISK FACTORS

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**Objective:** Osteoarthritis (OA) lacks effective disease-modifying treatment. Its progression and need for surgery are still the mainstay, deepening morbidity. Cardiovascular risk factors (CVRF) have a systemic effect on joints, irrespective of obesity's weight load, which aggravates the outcome. We aimed to assess the predictive factors of knee OA (KOA) progression and total knee arthroplasty (TKA) on non-obese patients with CVRF.

**Methods:** Cohort retrospective study among non-obese patients with primary KOA, seen at a Portuguese hospital from 2017-2020. Clinical records were reviewed for sociodemographic and clinical data [age at the diagnosis, radiographic scoring through Kellgren-Lawrence (KL) classification system at baseline (diagnosis) and 5 years later, and KL progression]. CVRF (essential arterial hypertension-EAH, dyslipidemia-DLP, type 2 diabetes mellitus-T2DM) prior to OA diagnosis, and medication history were recorded. We performed a univariate analysis and subsequently a binary logistic regression, using the significant independent variables and others clinically relevant.

**Results:** A total of 304 patients were eligible, 71.7% women. Of those with CVRF (n=169), 76.4% had EAH, 72.2% DLP, and 50.8% T2DM. KL progression associated with EAH, CVRF (p<0.001), DLP

(p=0.017), statins (p=0.002), older present age (p=0.028) and at diagnosis (p=0.020); TKA associated with EAH, DLP, CVRF, statins, KL progression and KL at 5 years (p<0.001). Predictors for KL progression were EAH, older age and higher KL staging at baseline; and for TKA were CVRF and higher KL staging at 5 years (Table 1).

**Table 1.** Binary logistic regression for predictive factors of KL progression and TKA

Coefficients	KL progression			TKA		
	b	Exp(b)	95.0% CI	b	Exp(b)	95.0% CI
Constant	-1.46	0.23		0.95	2.57	
EAH, yes	1.77*	5.88	2.04-16.96			
DLP, yes	0.31	1.37	0.55-3.35	-0.96	0.38	0.11-1.39
Age, yes	0.04*	1.05	1.00-1.09	-0.03*	0.97	0.94-0.99
Baseline KL=3	-1.19*	3.30	0.01-0.66			
Statin, yes				0.84	2.30	0.74-7.17
CVFR, yes				1.43*	4.18	1.62-10.81
5y KL=3-4				1.92*	6.80	2.28-20.23

\*p<0.005

**Conclusion:** In non-obese patients, CVRF (mainly EAH) contribute to KOA progression. Monitoring KL staging, both at diagnosis and 5 years later, provides predictive information on progression and need for TKA. Overall, CVRF should be integrated into the KOA caring.

## P993

### DEVELOPMENT AND PSYCHOMETRICS OF A TOOL FOR MEASURING TREATMENT ADHERENCE SPECIFIC TO OSTEOPOROSIS PATIENTS

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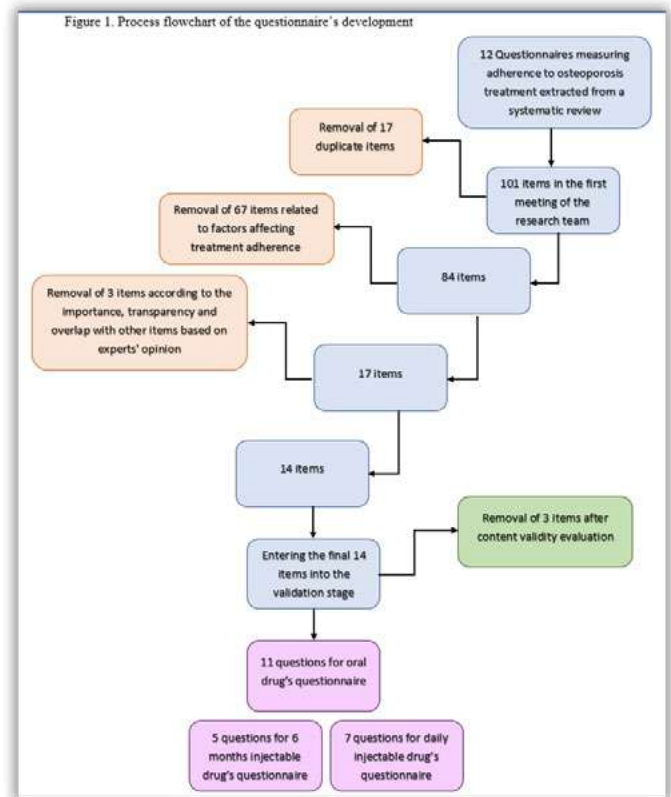
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**Objective:** Poor treatment adherence in patients with osteoporosis impairs the effectiveness of treatment and increases the risk of fracture. Therefore, the aim of this study was to develop three questionnaires to evaluate treatment adherence in patients with osteoporosis and assess their validity and reliability.

**Methods:** The deductive method was used to design the three questionnaires for oral, monthly, and 6-month injection drugs. PubMed, Embase, Web of Science, and Scopus databases were searched, and a bank of items was formed. Second, duplicate items were removed and the remaining items were sent to 8 experts to score them in terms of importance and transparency. The opinion of a team including 16 experts and 10 patients was received for calculating CVR and CVI indexes to evaluate content validity. The impact score of the questions was calculated to evaluate the face validity. Exploratory and confirmatory factor analyses were used to check to construct validity. Finally, Cronbach's alpha was used to check the reliability of the tools. Excel, SPSS, and STATA software were used to check content validity, exploratory factor analysis, and confirmatory factor analysis.

**Results:** In total, 101 questions were extracted from the review. After applying the expert's opinions, 14 questions remained. Then, 14 questions specific to oral drugs, 10 to daily injectable drugs, and 8 questions specific to 6-month injectable drugs were designed. The impact score on two questions in the oral drugs questionnaire and one from each of the daily and 6-month injectable drugs questionnaires was less than 1.5, so these questions were revised. After applying CVR and CVI results, three questions were removed from each questionnaire. Exploratory factor analysis extracted three factors for the oral drugs questionnaire and two factors for each questionnaire of daily injectable and 6-month injectable drugs. All indicators of confirmatory factor analysis (CFI >0.9, TLI >0.9, RMSE <0.1, SRMR <0.1) confirmed the appropriate fit of the final model. Cronbach's alpha coefficients were 0.85, 0.80, and 0.86 for oral drugs, daily injection drugs, and 6-month injection drug questionnaires, respectively.

**Conclusion** Three questionnaires were developed to measure adherence to osteoporosis treatment (oral treatment, daily injection, 6-month injection) with a good validity and reliability.



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## GENE EXPRESSION IN METABOLIC OSTEOARTHRITIS

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**Objective:** To study the gene expression of mTOR, cathepsin K and IL-1 $\beta$  in the metabolic osteoarthritis (OA).

**Methods:** The prospective study included 176 pts 40-75 y. with knee OA (according to ACR) of X-ray stage I-III (Kellgren-Lawrence) who signed an informed consent. Pts were divided into 2 groups according to the presence (n=100) or absence (n=76) of metabolic syndrome (MS). An individual card was filled out for each patient, including clinical and anamnestic data, the results of a clinical examination, VAS pain and WOMAC. All patients underwent knee X-ray and MRI (WORMS). The relative expression of genes was determined by polymerase chain reaction in real time using the device model 7300 Applied Biosystems.

**Results:** Significant expression of m-TOR in patients with the metabolic OA was observed compared to the group without MS (1.73 [1.194; 2.574] vs. 1.23 [0.69; 1.86], respectively, p<0.05). The expression of IL-1 $\beta$  and cathepsin K were comparable. The Spearman correlation analysis confirmed positive correlations between the expression of m-TOR and the number of MS compo-

nents ( $r=0.3$ ;  $p<0.05$ ), damage to the anterior horn of the lateral meniscus (MRI) ( $r=0.92$ ;  $p<0.05$ ). The analysis of correlations by Kendall Tau revealed direct associations between the expression of m-TOR and intense pain in the knee joints  $>40$  mm by VAS ( $\tau=0.26$ ;  $p<0.05$ ). To assess the prognostic value of determining the expression of m-TOR in patients with OA and MS, a ROC analysis was performed, which confirmed the relationship between the expression of m-TOR and the occurrence of intense pain in the analyzed knee joint: the threshold values of m-TOR were: 1.93 (AUC=0.772; 95%CI 0.984-3.801;  $p=0.049$ ).

**Conclusion:** During the study, we established significant associations between the m-TOR expression and intense pain in the knee. The role of high expression of mTOR as an important predictor of intense pain in the knee OA and MS was confirmed.

## P995

### BONE MINERAL DENSITY IN PATIENTS WITH TYPE 1 DIABETES MELLITUS IN INTENSIVE TREATMENT WITH MULTI-INJECTION AND INSULIN PUMP

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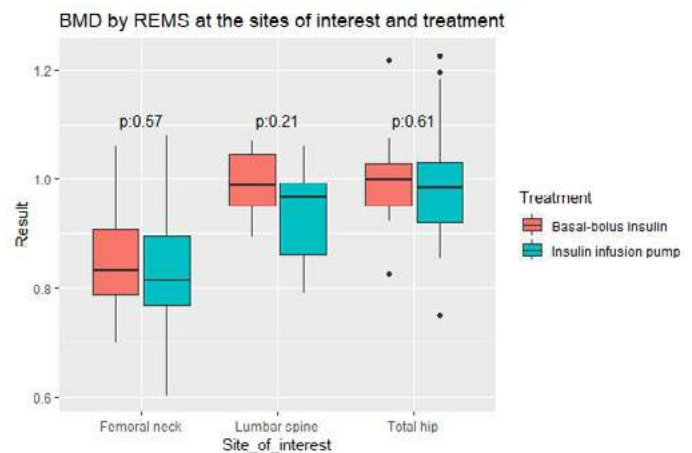
**Objective:** It has been shown that one of the least studied complications of type 1 diabetes mellitus (DM1) is osteoporosis and fragility fractures; factors such as glycemic control, time from diagnosis and microvascular complications have been associated with bone mass deterioration. The objective of this study is characterizing BMD in patients with DM1 under treatment with basal-bolus insulin (multi-injection) or insulin infusion pump and continuous glucose monitoring (IIP/CGM).

**Methods:** This is a cross-sectional study in 32 patients with DM1 in insulin treatment with multi-injection or IIP/CGM, determining BMD by radiofrequency echographic multispectrometry (REMS) technology. Variables of glycemic control were evaluated. The Mann Whitney test, chi-square and Spearman's correlation test were performed respectively.

**Results:** 32 patients between 18-68 y diagnosed with DM1 were included; 53% were female and received multi-injection and IIP/CGM treatment 47% and 53%, respectively. There were no significant differences between glycemic control, microvascular complications and both treatment schemes. All patients underwent BMD by REMS at the sites of interest (SOI): lumbar spine (LS), femoral neck (FN) and total hip (TH). 20% of patients  $<50$  y presented low BMD based on Z-score. In terms of BMD: For LS a median of  $0.96$  g/cm<sup>2</sup> was found in the IIP/CGM group, and  $0.98$ g/cm<sup>2</sup> in the multi-injection group with a statistically significant difference  $p=0.098$ . For FN and TH there were no significant differences in both groups. In terms of Z, the medians were the same between both treatment groups according to the SOI, without a statistically significant difference. Additionally, an inverse correlation not statistically significant was found between treatment time, time from

diagnosis, and BMD in both treatment groups.

**Conclusion:** despite 1/5 of DM1 patients  $<50$  y regardless of multi-injection scheme or IIP/CGM presented BMD deterioration, there were no significant differences in Z-score and BMD for the SOI in both treatment groups except for LS. More studies with REMS are needed to better detect loss of BMD in diabetic patients.



## P996

### PASSIVE RANGE-OF-MOTION EXERCISE AND BONE MINERALIZATION IN PRETERM INFANTS: A RANDOMIZED CONTROLLED TRIAL

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**Objective:** To assess the effect of range-of-motion exercise program on bone mineralization and somatic growth of very low birth weight (VLBW) infants.

**Methods:** A total of 36 VLBW infants were randomized into 18 VLBW infants receiving range-of-motion exercise and 18 VLBW control infants receiving tactile stimulation for 4 weeks. The intervention started at the first week of life and involved 8 weeks of daily passive extension and flexion range-of-motion exercise of the upper and lower extremities. Laboratory investigations were performed at baseline and postexercise and included serum calcium, serum phosphorus (s.PO<sub>4</sub>), magnesium, alkaline phosphatase (ALP), urinary calcium/phosphate ratio, and serum carboxyterminal crosslinked telopeptide of type 1 collagen (CTX). Bone strength was measured weekly by quantitative ultrasound measurement of tibial bone speed of sound (SOS). DXA was performed at the end of the exercise protocol to measure bone mineral content, BMD, bone area, lean mass, and fat mass.

**Results:** The weight and the rate of weight gain were significantly higher ( $p<0.001$ ) in the exercise group compared with controls

postexercise. Also, higher s.P04, lower ALP, and lower urinary calcium/phosphate ratio were observed postexercise in the exercise group ( $p \leq 0.001$ ,  $p \leq 0.005$ , and  $p \leq 0.04$ , respectively) whereas, serum CTX showed no difference between the two groups ( $p = 0.254$ ). Bone SOS decreased significantly in the control group ( $-108.1 \pm 33.7$  m/second,  $P < 0.0001$ ) during the study period (Figure 1), while remaining stable in the exercise group ( $11.3 \pm 22.8$  m/s). The main beneficial effect of exercise occurred in the first 4 weeks of the intervention. Postexercise BMD significantly improved in the exercise group ( $p < 0.001$ ) compared with controls.

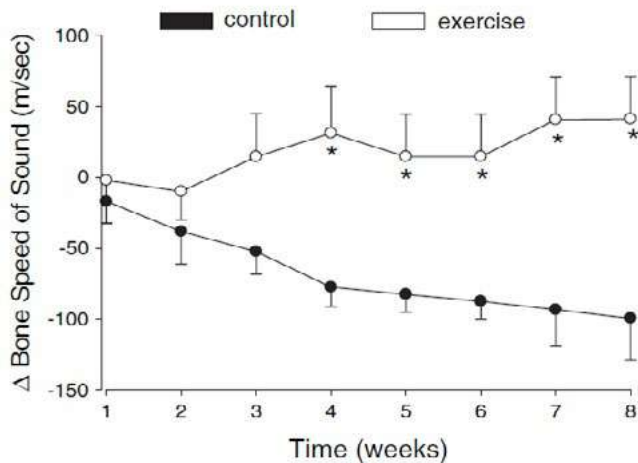


Figure 1.

**Conclusion:** Although the sample size was small, we may be able to suggest favorable effects of range-of-motion exercise vs. tactile stimulation on bone metabolism, BMD, and short-term growth in VLBW infants.

## P999

### COMPARISON OF BONE MATERIAL STRENGTH INDEX VALUES FOR OLDER MEN AND WOMEN IN AUSTRALIA

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**Objective:** Bone material strength index (BMSi) values are obtained using impact microindentation. Differences in BMSi between men and women are unclear, and to date, BMSi sex differences have not been compared for individuals from the same population. Therefore, we compared BMSi values for men and women drawn from the same geographical location in Australia.

**Methods:** Participants ( $n=128$ ) were from the Geelong Osteoporosis Study. BMSi was measured using an OsteoProbe for participants at recent follow-up phases (women 2022-2023 and men 2016-2022), following international published guidelines. Women ( $n=32$ ) were age matched to men ( $n=96$ ) in a 1:3 ratio. A two-sample t-test was used to determine the intergroup difference in mean BMSi. Linear regression was also performed, adjusting for weight and height.

**Results:** Median (IQR) ages for men and women were 66.7 (63.2-69.6) and 66.5 (63.2-69.7) years ( $p=0.928$ ). Men were heavier ( $83.4 \pm 11.1$  vs.  $70.4 \pm 14.2$  kg,  $p < 0.001$ ) and taller ( $174.9 \pm 6.9$  vs.  $162.2 \pm 8.0$  cm,  $p < 0.001$ ) than women. Mean ( $\pm$ SD) BMSi for men ( $83.2 \pm 7.1$ ) was higher than for women ( $75.6 \pm 7.6$ ) (Figure,  $p < 0.001$ ). The difference persisted after adjustment for weight and height (mean $\pm$ SE:  $83.2 \pm 0.8$  vs.  $75.4 \pm 1.5$ ,  $p < 0.001$ ).

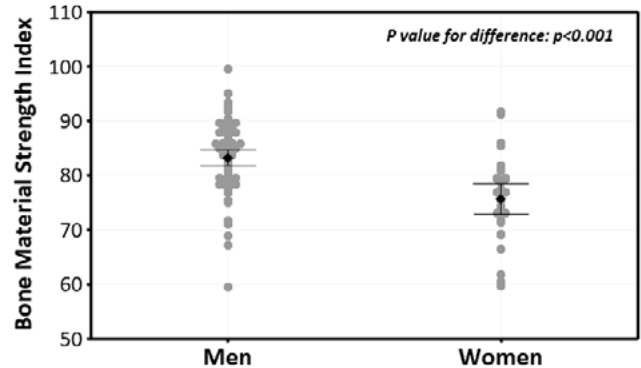


Figure: Bone Material Strength Index values for men and women.

**Conclusion:** These data, collected from a single research site, support previous work that pooled results from different geographical settings. These new measures contribute to baseline data for investigating the ability of BMSi to predict sex-specific fracture risk. Given the higher fracture risk observed among women, the higher mean BMSi values in men is consistent with cross sectional data suggesting this measure may be useful in fracture prediction.

**Acknowledgments:** This study was funded by grant support of Amgen Inc. and the NHMRC.

## P1000

### HANDGRIP STRENGTH MEASUREMENTS STANDARDIZATION FOR BETTER EVALUATION

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**Objective:** Among the methods to assess muscle strength, handgrip strength (HGS) has been widely used. This measure correlate moderately with leg strength; and low HGS is associated with different health events. On the other hand, the diagnosis of sarcopenia is based on low muscle mass and low muscle function (performance or strength). The literature is diverse regarding HGS measurement methodology, and here are no reference values in our country. We aimed to standardize HGS assessment for its



best performance.

**Methods:** An analytical and descriptive prospective study was carried out in Argentine. A total of 117 participants between 18-40 years of age were evaluated consecutively. Muscle strength was evaluated by HGS assessment (Hydraulic Hand Dynamometer, USA). Different measurements were made in 3 groups comparing different situations; group 1 (n=53) sitting vs. standing. group 2 (n=37) 8 vs. 2 pm and group 3 (n=27) with or without verbal encouragement. Measuring instrument was previously calibrated with a known weight (10, 20 and 30 kg). The evaluations were carried out by the same qualified technician in each group.

**Results:** The study sample included 43 (37%) male and 74 (67%) female. The mean age in the 3 groups was similar (24.13±4.75, 31.03±2.95 and 31.88±5.75). In all groups, greater HGS in dominant hand was observed (all  $p < 0.05$ ). No differences in sitting vs. standing HGS were observed (33.30 vs. 33.49;  $p = 0.7093$ ). There were no circadian variations between the morning and afternoon measurements (38.92 vs. 38.88;  $p = 0.9416$ ). Verbal encouragement positively affected performance (29.81 vs. 33.50;  $p = 0.0001$ ).

**Conclusion:** We observed that the absolute values and precision of HGS measurements were influenced by the verbal encouragement. We consider important these aspects that could modify the reference values and therefore the diagnosis in the clinical setting.

## P1001

### BODY COMPOSITION AND LIPID PROFILE ARE CORRELATED WITH BONE MICROARCHITECTURE IN TOPHACEOUS GOUT PATIENTS

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**Objective:** Gout is a disease associated with metabolic syndrome<sup>1</sup>. We aimed to investigate the correlation between body composition, dyslipidemia and bone microarchitecture parameters using HR-pQCT in tophaceous gout patients.

**Methods:** 16 male tophaceous gout patients were analyzed in this cross-sectional study. Demographics data were acquired through interviews and medical records. DXA was performed to assess body composition. HR-pQCT at the distal radius and tibia was performed to assess trabecular and cortical volumetric BMD (Tt.vBMD=total volumetric BMD; Tb.vBMD=trabecular volumetric BMD) and microstructure (Tb.N=trabecular number, Tb.Sp=trabecular separation, Ct.Th=cortical thickness, Ct.Po=cortical porosity).

**Results:** The patient's data are described in Table 1. LDL levels had a positive correlation with the number of tophi ( $r = 0.612$ ,  $p = 0.026$ ) and negative correlation with Ct.Po tibia ( $r = -0.705$ ,  $p = 0.015$ ). The lean mass was positively correlated to Ct.Th tibia ( $r = 0.679$ ,  $p = 0.11$ ), Tb.N tibia ( $r = 0.597$ ,  $p = 0.031$ ), Tb.vBMD tibia ( $r = 0.671$ ,  $p = 0.012$ ) and Tt.vBMD tibia ( $r = 0.707$ ,  $p = 0.007$ ) and negatively correlated to the number of tophi ( $r = -0.595$ ,  $p = 0.015$ ) and

Tb.Sp tibia ( $r = -0.646$ ,  $p = 0.017$ ).

**Table 1.** Patient's characteristics

	Tophaceous Gout (n=16)
Age (years)	63.3±9.6
BMI	31.6±6.9
Number of tophi	6.3±9.06
HDL (mg/dl)	39.8±11.1
LDL (mg/dl)	112.3±40.5
Triglycerides (mg/dl)	243.06±105.9
Diabetes	56.3%
Hypertension	75%
Fat (%)	37.7
Lean Mass (kg)	57.03

Results are expressed in mean±SD (standard deviation), or n (%); LDL: low-density lipoprotein; HDL: high-density lipoprotein; BMI: body mass index.

**Conclusion:** The number of tophi was negatively correlated with lean mass and positively correlated with LDL levels. Lean mass was also positively correlated with parameters of better bone microstructure.

**Reference:** 1. Thottam GE et al. *Curr Rheumatol Rep* 2017;19:60.

**Acknowledgment:** We thank Professor Rosa Maria Rodrigues Pereira (in memoriam) for the inspiration for this paper.

## P1002

### HIGHER SECONDARY FRACTURE RATE AMONG MALE ELDERLY VETERANS: A SINGLE VETERANS HOSPITAL-BASED ANALYSIS

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**Objective:** An increasing median age in veteran population was noted in Taiwan. Fragility fractures are common in the elderly. Patients with history of fragility fracture is at high risk of experiencing secondary fractures. The aim of this study was to compare the secondary fracture rate among male elderly veteran and non-veteran patients.

**Methods:** We retrospectively reviewed the records of 368 veterans on their first dose of anti-osteoporotic medication from January 2010 to December 2021 at Taichung veteran general hospital in Taiwan. We excluded patients without DXA examination or without a diagnosis code for osteoporosis. Among them, 92 male elderly veterans were enrolled for analysis. 1: 4 propensity matched-pairs analysis was used to match veteran patients (n=92) with non-veteran patients (n=363) by age, sex, and BMI. We also used the Cox proportional hazards regression model to analyze factors that may be associated with secondary fracture.

**Results:** The average age was no significant difference between veteran group and non-veteran group (82.27±10.03 vs. 82.27±9.85;  $p = 0.99$ ). Patients in the veteran group had signifi-

cantly more co-morbidities, higher baseline BMD ( $p<0.05$ ), and higher T-score over lumbar spine ( $p<0.01$ ). However, we found the secondary fracture rate within one year of anti-osteoporotic medication treatment was significant higher in the veteran group than in the non-veteran group (87.91% vs. 76.86%;  $p<0.05$ ). Based on the results of the cox regression model, patients with diabetes (HR:1.278;  $p<0.05$ ) and veteran group (HR:1.416;  $p<0.01$ ) were associated with higher secondary fracture rate, whereas denosumab treatment was associated with lower secondary fracture rate (HR:0.753;  $p<0.05$ ).

**Conclusion:** Elderly male veterans have higher risk for secondary fracture despite higher baseline BMD. In addition, patients with diabetes also have higher risk for secondary fracture. Our findings suggest a need for tailored interventions and treatment strategies to reduce the risk of recurrent fractures among veterans and individuals with diabetes. The veteran care system should prioritize fracture prevention education for veterans with comorbidities.

### P1003

#### TUBERCULOUS SPONDYLODISCITIS COMBINED WITH BRUCELLOSIS: A CASE REPORT

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**Objective:** To raise awareness of the co-infection between tuberculosis and brucellosis in spondylodiscitis

**Methods:** A 66-year-old male with a 4-month history of back pain, asthenia, sweating, and weight loss was admitted to the department of rheumatology. He has a history of type 2 diabetes, tobacco, and consuming raw milk products. Blood testing revealed a white blood cell count of 6500 cells/mm<sup>3</sup>, erythrocytes sedimentation rate (ESR) of 65 mm/h, C-reactive protein (CRP) level of 48 mg/l. The serum agglutination test for Brucella was positive at 1/640 and a tuberculin purified protein derivative skin test was negative. A radiograph of the thoracic spine indicated a narrowed disc space and sclerosis at the T3-T4 level, spinal computed tomography (CT) scan and MRI indicated vertebral destruction, right paravertebral abscess, and medullary compression. Therefore, the diagnosis of brucellar spondylodiscitis was considered, the patient was treated with doxycycline and rifampicin. However, on the 30th day of treatment, there was no clinical improvement and the pain of the patient continued.

**Results:** To determine further treatment, CT-guided percutaneous drainage of the abscess was performed, the pus was sent for culture, tuberculosis was confirmed with the growth of mycobacterium tuberculosis on the 21st day of cultivation. The patient was then diagnosed as spinal infection with double etiology and the therapy was changed to rifampicin (R), isoniazid (I), ethambutol (E), and pyrazinamide (Z) for 2 months, followed by biotherapy based on (R) and (E) for 10 months. The follow-up of the patient revealed clinical and laboratory improvement.

**Conclusion:** Spinal tuberculosis combined with brucellosis is a relatively rare condition, this report emphasizes that such co-infections should be kept in mind especially in the endemic areas

for tuberculosis and brucellosis.

### P1004

#### ACCURACY OF MOBILE DEVICE-BASED DIGITIZED ACETATE TEMPLATING COMPARED TO CONVENTIONAL METHOD IN HIP ARTHROPLASTY

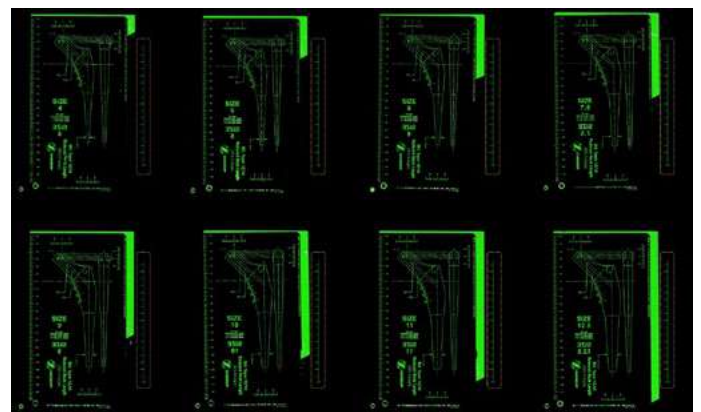
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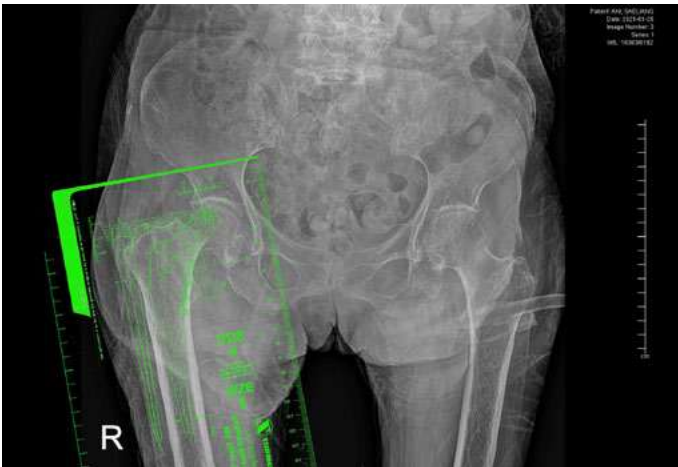
**Objective:** To develop and assess the accuracy of calibrated mobile device-based digitized acetate templating of femoral component for preoperative planning in total hip arthroplasty or bipolar hemiarthroplasty.

**Methods:** Retrospectively review patients' record from January 2015 to June 2020 and obtained pre-operative radiograph and 3-month to 1-year post operative radiograph with 2 implant manufactures. 43 hips per group. (Total=86 hips).

Calibrated mobile device-based digitized acetate  
Calibration: Screen capture the postoperative both hips AP plain radiograph from mobile device and insert the picture to a black background slide in PowerPoint presentation of selected implant. Confirm prosthesis size in plain radiograph with actual size of the stem. Select the same size of template and applied over the post-operative radiograph. Adjust the size of digitized acetate template to be as close to the implant as possible. Imprint the new calibrate scale into all other templates.



**Templating:** Screen capture both hips plain radiograph from mobile device and insert the picture to black slide in PowerPoint presentation. Select the desired size of template and applied over the radiograph. Calibrate template and plain radiograph using calibrate scale. Manipulate the template over the hip joint to the satisfaction of the surgeon in terms of size and orientation.



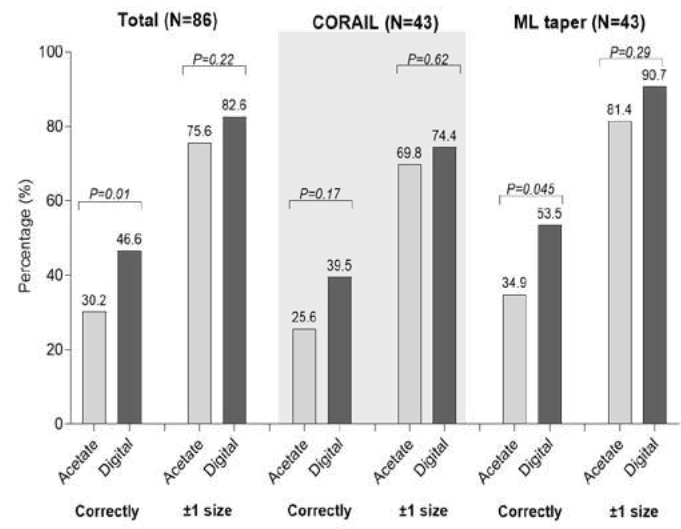
**Conventional acetate template**

Using acetate templates on digital images displayed on a standard LCD monitor in a standard fashion.

Perform templating in 2 methods, carried out by 2 orthopaedic surgeons. Record implant size of choice. Templating results are then compare with the actual implanted components to determine accuracy.

The templating results were considered correct if they were either exactly correct or within ±1 size to the implanted components.

**Results:** The calibrated mobile device-based digitized acetate templating method was more accurate than the conventional acetate templating method to correctly predict the femoral stem size [46.5% (40 hips) vs. 30.2% (26 hips),  $P=.02$ ]. The accuracies of calibrated mobile device-based digitized acetate templating method and conventional acetate templating method were comparable with predict ±1 size of femoral stem [82.6% (71 hips) vs. 75.6% (65 hips),  $P=.22$ ]. Intra-observer ICC values showed almost perfect agreement (ICC >0.8) for femoral components when using both templating methods. We found moderate inter-observer ICC value agreement when using both templating methods (0.724 and 0.694).



**Conclusion:** Calibrated mobile device-based digitized acetate

templating can be a reliable substitute for conventional acetate templating. It is more convenient to perform and much more practical compare to conventional acetate templating.

**P1005**  
**IN OLDER INDIVIDUALS THERE IS GREATER VARIANCE IN LOW MEAN BMSI VALUES OBTAINED WITH THE OSTEOPROBE**

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**Objective:** Bone material strength index (BMSi) quantifies bone strength *in vivo* at the mid tibia using impact microindentation (IMI). Anecdotal evidence suggests that within-participant variance in BMSi may be associated with individual level mean BMSi. This study aimed to investigate associations between mean and variance of IMI measures in a population-based study.

**Methods:** Participants were men (n=419) and women (n=32) from the Geelong Osteoporosis Study who underwent BMSi measurement using the OsteoProbe at recent follow-up phases (men 2016-2022; women 2022-2023). Median age was 63.6 yr (IQR 52.5-71.6). BMSi standard deviation was skewed and therefore log transformed (referred to as log-SD). Linear regression models with log-SD as the dependent variable and mean BMSi as the independent variable adjusting for sex, age, height and weight were performed.

**Results:** In unadjusted models, a trend was observed whereby greater BMSi was associated with lower log-SD ( $\beta=-0.01$ ,  $p=0.073$ ). This association was sustained after adjustment, and an interaction between BMSi and age was observed ( $p=0.013$ ). In those aged 63.6 yr and over (median age), mean BMSi was inversely associated with log-SD ( $\beta=-0.01$ ,  $p=0.010$ ). Sex was not identified as an effect modifier. In younger participants, no BMSi-log-SD association observed ( $p=0.659$ ).

**Conclusion:** In older men and women, there is greater variance in low BMSi values. One potential reason for this observation may be the presence of an increased number of resorption pits in the cortical bone of older individuals. These data support a heightened fracture risk for men and women with low BMSi and poorer bone structure.

**Acknowledgment:** This study was funded by grant support of Amgen Inc.

## P1006

### HIP GEOMETRY AND HIP FRACTURES IN RHEUMATOID ARTHRITIS: PRELIMINARY RESULTS OF THE DXA HIP PROJECT

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**Objective:** Osteoporosis is an important comorbidity in rheumatoid arthritis (RA). Patients greater risk is related to disease severity, activity, duration, treatment and other factors. Although RA is included in some osteoporosis risk and fracture risk algorithms, this limited simply to diagnosis only, limiting validity. A disease specific tool could improve identification and benefit RA patients. **Methods:** The DXA HIP project is an established convenience cohort whose aim is to improve the identification of those at risk for fracture. This includes >33,000 adults  $\geq 40$  years, 2,045 (6.1%) with RA. In this cross-sectional study we compare DXA characteristics at the hip among RA patients with a prior hip fracture to random sample of age and gender matched RA controls in a 1:4 ratio. **Results:** 40 subjects (31 women) were compared to 160 RA controls, shown in the table below. Fracture patients had significantly lower BMD than controls, but in addition had smaller cross-sectional area, greater axis length, lower buckling ratios and strength index.

	Female		Male	
	Hip Fracture	No Fracture	Hip Fracture	No Fracture
Number (%)	31	124	9	36
Age in years	70.07 $\pm$ 11.08	70.027 $\pm$ 11.03	64.32 $\pm$ 15.37	64.39 $\pm$ 14.78
Height in centimeters	156.43 $\pm$ 6.75	159.35 $\pm$ 5.61	169.98 $\pm$ 7.25	170.91 $\pm$ 8.45
Weight in kg	60.46 $\pm$ 12.58	68.98 $\pm$ 13.99	75.89 $\pm$ 12.56	80.50 $\pm$ 15.26
BMI kg/m <sup>2</sup>	24.67 $\pm$ 4.73	27.21 $\pm$ 5.57	26.57 $\pm$ 5.14	27.52 $\pm$ 4.74
Smoking (%)	2 (6.5)	10 (8.1)	1(11.1)	5(13.9)
Corticosteroid therapy (%)	10(32.3)	42 (33.9)	2(22.2)	15(41.7)
Femoral Neck BMD in g/cm <sup>2</sup>	0.713 $\pm$ 0.110	0.817 $\pm$ 0.157	0.816 $\pm$ 0.113	0.975 $\pm$ 0.266
Total Hip BMD in g/cm <sup>2</sup>	0.729 $\pm$ 0.145	0.854 $\pm$ 0.165	0.891 $\pm$ 0.137	0.1.020 $\pm$ 0.209
Buckling Ratio	3.79 $\pm$ 2.26	3.99 $\pm$ 1.28	3.70 $\pm$ 2.20	3.12 $\pm$ 2.98

Cross-sectional Area in cm <sup>2</sup>	116.29 $\pm$ 22.94	129.60 $\pm$ 26.73	140.08 $\pm$ 27.52	179.153 $\pm$ 28.97
Cross-sectional moment of inertia	9754 $\pm$ 2544	9987 $\pm$ 2617	12834 $\pm$ 2709	18899 $\pm$ 9002
Hip Axis Length in mm	108.75 $\pm$ 4.075	106.56 $\pm$ 8.25	127.79 $\pm$ 8.45	120.74 $\pm$ 7.049
Strength Index	1.50 $\pm$ 0.61	1.53 $\pm$ 0.47	1.35 $\pm$ 0.50	1.87 $\pm$ 1.03

**Conclusion:** RA is an important risk factor for fracture risk which is not explained solely on the basis of BMD. Additional DXA biometrics such as hip geometry may improve the identification of those most at risk. Longitudinal studies in additional populations are needed.

## P1007

### TELEHEALTH FOR SECONDARY PREVENTION OF FRAGILITY FRACTURES IS FEASIBLE AND EFFECTIVE AMONG HIGH-RISK OLDER ADULTS

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**Objective:** Telehealth has been proposed as a strategy for providing care and monitoring patients with chronic diseases during the COVID-19 pandemic. We investigated the feasibility and efficacy of televisits among older adults at high risk of fragility fractures already managed at our fracture liaison service. Then, the patients' and caregivers' satisfaction with the service.

**Methods:** Televisit was offered to patients at high risk of fragility fractures already on a specific treatment. An official platform and formal devices were used. They allowed for patients' visualization and clinical evaluation, including comorbidity, polypharmacy, functional status, and adverse events. Patients' and caregivers' satisfaction was also investigated.

**Results:** 246 (62%) over 396 patients at high risk of fragility fractures accepted and received telehealth visits from January-June 2021. Patients were mainly women (n: 222, 90.2%) with a mean age of 80.10 $\pm$ 8.4 years. About 29% had a hip fracture, 28% had multiple vertebral fractures, 16% had vertebral and hip fractures, 10% had a single vertebral fracture, and 17% had minor fragility fractures plus clinical risk factors. Remote visits were effective in 167 (64%) patients, while 79 (36%) were scheduled for a face-to-face assessment. About 68% of patients adhered to the anti-fracture treatment, including specific drugs, vitamin D, and calcium supplements. The majority (86.1%) did not refer to falls, while 3% experienced further fractures in the previous six months. A high degree of satisfaction with the service was reported by 85% of patients and by 90% of caregivers.

**Conclusion:** Televisit may be an effective tool for monitoring older adults at high risk of fragility fractures other than selecting people requiring access to face-to-face visits. It can also be helpful in time away from a pandemic.

P1008

**OSNET: A PROPOSAL FOR A CANADIAN BONE HEALTH RESEARCH NETWORK**S. N. Morin<sup>1</sup>, A. M. Cheung<sup>2</sup>, S. K. Boyd<sup>3</sup><sup>1</sup>McGill University, Montreal, <sup>2</sup>University of Toronto, Toronto, <sup>3</sup>University of Calgary, Calgary, Canada**Objective:** To develop a network for bone health research to address the gap in the Canadian research landscape.**Methods:** We partnered with Canadian key stakeholders involved in bone research across the lifespan to create an organizational structure and 3-year strategic priorities plan.**Results:** OsNET is a comprehensive national network of >120 scientists and clinicians, >75 patient partners, 9 patient and support organizations, 10 academic and professional associations and 7 industry partners. Its mission is to improve bone health across the lifespan through actionable research for all Canadians. It promotes cross-discipline collaborations across 3 research platforms (translational and basic, clinical, health systems, drug and device effectiveness and safety) and 4 strategic platforms (training and mentorship, patient partner engagement, knowledge mobilization and shared methods and technology). In addition to the steering committee and other operational committees, an international external advisory board (8 members, expert in bone research, patient engagement and large networks) will provide advice on the OsNet strategic plan. A web-based platform will have public information about OsNET and its platforms, members, new researchers/trainees, and partner organizations. It will also have a private password-protected section for members – including patient partner members – including general research resources, training materials, and templates.**Conclusion:** OsNET will unite bone researchers and patient partners across Canada. We intend to build capacity through support of trainees, mentorship of faculty, promotion of multi-disciplinary research, integrating patients, leading national multicentre initiatives, and translating our findings through KT activities.

P1009

**A COMMUNITY PHARMACY OSTEOPOROSIS MEDICATION ADHERENCE INTERVENTION**J. Phuong<sup>1</sup>, S. Manon<sup>1</sup>, R. Moles<sup>1</sup>, S. Carter<sup>1</sup><sup>1</sup>University of Sydney, Sydney, Australia**Objective:** Osteoporosis is undertreated despite effective pharmacotherapy due to poor patient persistence, adherence and limited medication management services. We aimed to evaluate a medication management intervention for osteoporosis in community pharmacy.**Methods:** Australian community pharmacists were trained to deliver an osteoporosis medication management intervention. The intervention was delivered to patients with diagnosed osteoporosis, and after 4 weeks and 12 months, the patients were followed up by the research team. Outcomes measured were pharmacists'

competency in service delivery, pharmacists' and patients' perceptions of service, changes in patients' self-reported adherence and beliefs about their osteoporosis medications.

**Results:** Five community pharmacies completed a total of 24 interventions over a 6-week trial period. 17 patients were available for follow up at 4 weeks, 14 were available at 12 months. Patients highly rated the intervention's service quality. Pharmacists reported that providing the intervention is worthwhile for patients and provides professional satisfaction. The main barriers to service delivery were time and workload, particularly relating to the COVID-19 pandemic. There were no significant changes in patients' self-reported adherence and beliefs about their osteoporosis medicines.**Conclusion:** An osteoporosis medication management intervention in community pharmacies can be feasible and acceptable for both patients and pharmacists. Future studies should aim to directly measure adherence.

P1010

**AN IMPLEMENTATION SCIENCE APPROACH TO COMMUNITY PHARMACY OSTEOPOROSIS SCREENING**J. Phuong<sup>1</sup>, R. Moles<sup>1</sup>, S. Carter<sup>1</sup><sup>1</sup>University of Sydney, Sydney, Australia**Objective:** Osteoporosis and poor bone health impact a significant proportion of the Australian population. Yet over 60% of Australians have misconceptions about it and 50% don't take their osteoporosis medications as prescribed. Various interventions have been done in the past to combat this increasingly prevalent condition with various degrees of efficacy. Implementation science approaches are used to reduce the gap between research and practice. We aimed to describe the development and pilot implementation of community pharmacy screening for osteoporosis and the barriers and facilitators in its implementation.**Methods:** Semi-structured interviews were completed with a convenience sample of pharmacy stakeholders including patients, pharmacists, and pharmacy staff. Community pharmacies were invited to implement the screening service via social media advertising and networks and training was provided. Community pharmacy staff and consumers were interviewed after the service. The implementation process was documented using the REAIM (reach, effectiveness, adoption, implementation, maintenance) framework.**Results:** An osteoporosis screening service was developed using stakeholder interviews. 16 community pharmacies were recruited and commenced a screening service. 191 pharmacy consumers (average of 11.9 people/pharmacy) were screened for osteoporosis during the study period (1 week in each pharmacy). Participants reported that osteoporosis was not a major disease that pharmacists often focused on, however, both patient and pharmacist participants felt that it is important and that community pharmacies are suited towards screening. Most pharmacists reported time, remuneration, and COVID were major barriers to

implementation.

**Conclusion:** Consulting stakeholders is an important part of developing new pharmacy services to ensure an intervention's success. This study gathered insights into the current state of pharmacy knowledge and practice around osteoporosis and may assist future service development.

## P1011

### HIGH SCHOOL OSTEOPOROSIS EDUCATION CODESIGN BY TEACHERS AND PHARMACISTS

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**Objective:** Osteoporosis has been considered a paediatric disease with geriatric consequences. Fostering healthy bone behaviours during adolescence may reduce the incidence and disastrous outcomes of poor bone health in older age. We aimed to develop and evaluate bone health educational materials for Australian PDHPE students from years 7-10.

**Methods:** A codesign approach was used to develop the modules, involving semi-structured stakeholder meetings with endocrinologists, academic pharmacists, PDHPE teachers, and students. The modules were implemented in 9 Australian high schools. A pre-post quiz was conducted to evaluate knowledge change. Interviews were conducted with students and teachers to guide widespread implementation in the high school curriculum. Thematic analysis was conducted using the Theory of Planned Behaviour.

**Results:** The codesign process resulted in 4 modules which were rated as highly acceptable to teachers and students. Average knowledge scores significantly improved from 81.25% at baseline to 87.50% ( $p < 0.001$ ) in tests taken immediately post-module delivery. Interviews after module delivery revealed high levels of satisfaction among students and teachers. Students expressed increased awareness of the importance of bone health "I realised that I need to be doing a little bit better and taking care of my bones in a more serious way". Students indicated that they intended to undertake some preventive health behaviours, such as obtaining calcium in the diet but seemed only somewhat willing to regularly do weight-bearing exercise.

**Conclusion:** A collaborative approach has resulted in highly engaging modules for high school students that improved knowledge and may result in healthy behaviours to be adopted to improve bone health.

## P1012

### ACTIVITY LIMITATION AND PARTICIPATORY RESTRICTION DUE TO PROLONGED STANDING AMONG SECURITY GUARDS

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Sangli, India

**Objective:** In epidemiological studies, prolonged standing at work has been associated with lower extremity (LE) discomfort. Musculoskeletal disorders [MSDs] develop over time, and this can have a significant impact on their personal and social lives. Since security guards spend the majority of their time standing they frequently suffer from musculoskeletal disorders which develop over time in persons who work in an inconvenient positions. International Classification of Functioning (ICF) provide framework for comprehensively describing person with individual functioning profile, that in turn helps to understand person's need. Thus it is of immense importance to study the effects of prolonged standing among security guards which limits the activity and restricts the participation. We aimed to study the activity limitation and participation restriction due to prolonged standing among security guards using the ICF as a functional tool.

**Methods:** 260 participants of Belagavi city Karnataka India within the age group of 25-65 years with work experience as a security guard for >2 years and duty hours of at least 4-8 h of standing were assessed to know their activity limitation and participation restriction which were evaluated using ICF qualifiers and Lower Extremity Functional Scale (LEFS).

**Results:** Most of the participants when assessed with ICF questionnaire had mild to moderate difficulty on qualifier in performance of the following codes d4101 (squatting), d4102 (kneeling), d4104 (standing), d435 (moving objects with lower extremities), d4552 (running), d4553 (jumping). When correlated LEFS score with each component of SF36 it was found to have a positive correlation and was statistically significant with a p value of  $*p < 0.05$ .

**Conclusion:** Since the security job requires high demand of prolonged standing and vigilance, leads to activity limitations and participation restrictions among them. ICF and LEFS were found to be equivalent in measuring activity limitation and participation restrictions. The present study also concluded that LEFS can be correlated with SF -36 questionnaire. Further in this study ICF documentation form had detailed questions which made the work favourable in assessing activity limitations and participation restrictions in security guards.

## P1013

### EVALUATION OF BONE MINERAL DENSITY AND OSTEOPOROSIS AND ASSOCIATED FACTORS AMONG PEOPLE LIVING WITH HIV IN KERMAN, IRAN IN 2021-22

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**Objective:** After antiretroviral therapy (ART) initiation, the life expectancy of people living with HIV (PLHIV) has improved. Thus, chronic diseases have become of major concern in PLHIV. However, our understanding of the prevalence of osteoporosis among PLHIV especially in a developing country like Iran remains limited. This study aimed to evaluate BMD and risk factors for osteoporosis among PLHIV in Kerman, Iran.

**Methods:** We recruited PLHIV from voluntary counseling and testing in Kerman, from September 2021 to February 2022. To examine BMD, we used DXA. Other required variables were collected through interview or reviewing the medical records. Blood tests were performed to measure needed parameters, including bone turnover markers and sex hormones. Based on WHO, osteoporosis is defined as T-score  $\leq$  -2.5 standard deviation [SD] in postmenopausal women and men aged 50 and older. Low BMD is defined using a Z-score  $\leq$  -2.0 SD in younger adults. The outcome of interest was the presence of abnormal BMD as a combination of osteoporosis and low BMD definitions. The association of low BMD with potential variables such as age, sex, anthropometric parameters, time from diagnosis, nadir and current CD4 cell count, HIV viral load, hypogonadism, smoking habit, current antiretroviral therapy (ART), and ART duration associations were investigated using univariable logistic regression model. Multivariable regression analysis was performed considering the variables with p-value  $<0.2$ .

**Results:** Among 94 participants with the mean age of 48 ( $\pm 8$ ) years. 51.1% (95%CI: 40.5%, 61.5%) were diagnosed with abnormal BMD. The multivariable model showed that abnormal BMD was positively associated with hypogonadism (aOR: 3.19 [95%CI: 1.17, 8.68]), and longer ART use duration per month (aOR: 1.02 [95%CI: 1.00, 1.03]), while BMI showed an inverse association (aOR: 0.83 [95%CI: 0.75, 0.93]).

**Conclusion:** This study showed a high prevalence of abnormal BMD among PLHIV in Iran. The findings suggest the need for the screening and timely intervention of abnormal BMD as a comorbidity of HIV on prolonged use of ART to prevent and minimize complications and lower the healthcare system's burden.

## P1014

### DEVELOPMENT AND VALIDATION OF THE NUTRITIONAL COMPONENT FOR "BONE HEALTH IN OLDER ADULTS' INTERVENTION POST-ACUTE STROKE (BOUNCE)" STUDY: A MULTI-DOMAIN INTERVENTIONS FEASIBILITY TRIAL IN A MALAYSIAN STROKE CENTRE

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**Objective:** Stroke increases the risk of falls and quadruples the risk of fracture. To date, there is no nutritional intervention published for post-stroke bone health. We aim to develop and validate the nutritional management protocol for the BOUNCE study.

**Methods:** The draft protocol was developed by a group of experts from three local research centres in geriatrics, bone health, nutrition and exercise with more than fifteen years of experience in their respective fields. They consisted of a dietician, two geriatricians, a family physician, a rehabilitation physician, and an exercise physiologist. A literature search was done for post-stroke nutrition, vitamin D and the European Society for Parenteral and Enteral Nutrition Guideline for the geriatrics population. It was then validated through consensus development conferences by another two independent dietitians with more than ten years of experience in managing nutrition in older and stroke patients. The draft protocol was emailed separately to each dietitian for them to provide consensus on the nutrition intervention content.

**Results:** Seventeen articles were identified to formulate the six components of nutritional intervention to maintain a healthy bone among post-stroke patients. These are; 1) Screening, monitoring and managing malnutrition with Mini-Nutritional Assessment (MNA-SF) and 3-day food diary; 2) Holistic dietary pattern including less salt, less sugar and adequate fibre; 3) Individualised energy intake of an average of 30kcal/kg, 4) High-quality protein diet of 1.2-1.5g/kg/d with 20-25g at each main meal, 5) Sufficient calcium and Vitamin D intake from food (dairy products, fish, fruits and vegetables) and 6) An emphasis on other minerals such as potassium and magnesium (green leafy vegetables, legumes and nuts). The intervention will comprise a nutritional assessment and an individualised diet plan at baseline, followed by a one-to-one

virtual session within the first three months. A 100% agreement was reached after the second consensus development round.

**Conclusion:** We have successfully developed and validated a protocol for nutritional components of the BOUNCE study. A feasibility study will be conducted based on this.

**Acknowledgment:** This study is funded by the Fundamental Research Grant Scheme (FRGS/1/2022/SKK01/UPM/02/2).

## P1015

### ASSOCIATIONS BETWEEN HEALTH LITERACY AND BONE, MUSCLE, AND PHYSICAL FUNCTION OUTCOMES IN COMMUNITY-DWELLING OLDER ADULTS

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**Objective:** Health literacy (HL) refers to the ability to access, understand, and use health information to make decisions about health; and was identified by WHO as a critical enabler to achieve sustainable health by 2030. This study aimed to explore whether bone, muscle, and physical function outcomes differ by HL level.

**Methods:** Data were collected from 300 older adults (mean age: 66.4 years; 62% female; 201 with osteopenia/osteoporosis) including BMD, grip strength, and several physical function measures. Osteopenia/osteoporosis was defined by the WHO definition and sarcopenia by the SDOC definition. HL was measured using the HL questionnaire (HLQ) comprising nine distinct scales: 1) Feeling understood and supported by health providers; 2) Having sufficient information to manage health; 3) Actively managing my health; 4) Social support for health; 5) Appraisal of health information; 6) Ability to engage with health providers; 7) Navigating the health system; 8) Ability to find health information; and 9) Understanding health information.

**Results:** Mean scores were lower in six HLQ scales for participants with osteopenia/osteoporosis compared to those with normal BMD, however these were not statistically significant. Associations in sarcopenia were not calculated due to low prevalence (n=14; 4.7%), though positive associations with HL were seen in related outcomes. Positive correlations were seen between hand grip strength and HLQ scales 4, 6 and 7 (p<0.05); faster sit-to-stand test times were associated with higher scores in all HLQ scales (except scale 4; p<0.05); and positive correlations were reported between gait speed and most HLQ scales (excluding 1, 6 and 7; p<0.05).

**Conclusion:** This is the first study to provide insights into the important role of HL in bone, muscle, and physical function in older adults. Our findings are particularly relevant for clinicians and policy makers seeking to implement and/or develop interventions to improve prevention of musculoskeletal conditions.

## P1016

### ASSOCIATION BETWEEN BONE MINERAL DENSITY AND NUTRITIONAL STATUS IN POSTMENOPAUSAL WOMEN: A SINGLE-CENTER, RETROSPECTIVE STUDY

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**Objective:** We investigated the relationship between nutritional status and BMD in Turkish postmenopausal women.

**Methods:** We retrospectively examined the medical records of 69 postmenopausal women who attended an endocrinology outpatient clinic between January 2014 and December 2017. BMD was measured by DXA. Nutrition status evaluated by the Geriatric Nutritional Risk Index (GNRI) and the Prognostic Nutritional Index (PNI).

**Results:** Osteoporosis was present in 63.4% of all patients. 42% and 21.7% of the patients were identified as having nutritional risk by PNI and GNRI, respectively. There was only a statistically significant difference in the mean femoral neck BMD value between the normal nutrition group and the nutritional risk group only based on the PNI (p=0.02). There was no statistically significant difference in the GNRI and PNI score according to presence of osteoporosis (p>0.05 and p>0.05, respectively). The correlation analysis found no correlation between the GNRI and lumbar BMD, femoral neck BMD. Furthermore, there was no correlation between the PNI and lumbar BMD, femoral neck BMD.

**Conclusion:** This study showed that nutritional status, represented by the PNI, was associated with femoral neck BMD in Turkish postmenopausal women.



P1017

### ANTHROPOMETRIC MEASUREMENTS PROVES THAT METABOLIC LYNCHING OF ALL FOUR LIMBS DUE TO SARCOPENIA, CAN BE ARRESTED, EVEN REVERSED BY DAILY EXERCISING

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**Objective:** To prove that the age related muscle wasting and weakness due to sarcopenia can be arrested and even reversed by daily dose of exercises in older adults.

**Methods:** The principal investigator is a consultant orthogeriatrician. He has home care geriatric facilities. Annual Monitoring Contracts (AMC) are made available for older adults, who cannot attend the Falls Institute of India (FII). In a year, 12 visits of doctors and 24 visits of nursing staff (NS) are being organised, at regular intervals. On doctor's visits hand grip strength (HGS) and on NS visit anthropometric measurements of thigh, calf and biceps are taken.

**Results:** The retrospective data of last 3 years is taken into consideration. The age range varies from 75-91 years. Total 55 older adults, 30 females and 25 males are included. Before joining the AMC, all were taught relevant exercises by PI, and NS either in OPD or by home visits. The HGS with digital dynamometer, that was 'Weak', after regular exercises became and then remain 'Normal'. For example, one male patient, 90 YOA, with measurements of HGS exactly 2 years before were of right hand: 22 kg [Normal], left hand: 17.5 kg [Weak]. Now the measurements on 17 Feb 23, are right hand: 22.9 kg [Normal], left hand: 19.5 kg [Normal].

**Conclusion:** The results shown evidently that daily dose of taught exercises stopped the wasting of muscles all over body, specially of both upper and lower limbs. The feeling of fatigue, fear of fall, balance issues and weakness also overcame significantly. The actual anthropological measurements were also significantly maintained, improved and in some cases reversed. For example, one female patient, 78 YOA, with measurements an year before were biceps (R - 25 cm, L - 22 cm), calf (R - 31 cm, L - 31 cm) and thigh (R 41 cm, L - 41 cm). Now the measurements on 19 Feb 23, are biceps (R - 32 cm, L - 32 cm), calf (R 40 cm, L - 40 cm) and thigh (R - 50 cm, L - 50 cm) respectively.

**Acknowledgment:** The sources, collection of this data is from Falls Institute of India (FII), Indian Geriatrics Society (IGS) and India Home Care Medicine (IHCM).

P1018

### DEVELOPMENT AND VALIDATION OF THE PHYSICAL THERAPY COMPONENT FOR "BONE HEALTH IN OLDER ADULTS' INTERVENTION POST-ACUTE STROKE (BOUNCE)" STUDY: A MULTI-DOMAIN INTERVENTION PROGRAM IN A MALAYSIAN STROKE CENTRE

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**Objective:** Bone-building impact exercises benefit older patients but have yet to be robustly evaluated among post-stroke patients. BOUNCE is a 24-week multi-domain intervention program for older adults aged  $\geq 50$  years with gait impairment who can walk with or without aids. We aim to develop and validate a protocol for the physical therapy component of the BOUNCE study.

**Methods:** A literature search on articles related to bone health, post-stroke exercises and high-intensity and impact training in older persons was done by a group of experts from three local research universities consisting of a dietician, two geriatricians with expertise in bone health, a family physician, a rehabilitation physician, and an exercise physiologist to draft the protocol. A senior physiotherapist and a sports physician validated it through consensus development conferences. The draft protocol was emailed separately to each panelist for their comments, and a 100% consensus was reached after the third round.

**Results:** 24 articles were identified to formulate the 6 components of bone strengthening exercises. These are; 1) Moderate to high-intensity impact exercises and resistance training as defined by impact forces and/or relative 1-RM measures; 2) A variety of forces with multi-directional movement; 3) Short application time with sets of 8-10 repetitions with 1-min rest between sets; 4) Adequate rest periods of 3-minute rest between exercises and 48 h rest for the same muscle groups; 5) Individually-tailored progression of exercises with exercise adaptations based on ability and 6) Multi-joint, dynamic, and covers major muscle groups. Examples of weight-bearing exercises include semi-squats to full squats. Load-bearing exercises include sit-to-stand with weight at the trunk (backpack with sandbag/water bottle), starting with arm support and progressing to without support. Lower limb impact exercises include marching in one place with weight at the trunk and step exercises. Progressive resistance training includes elastic bands at the lower limbs. The physiotherapists will be trained to assess, suggest and adapt relevant exercises based on the six components described above.

**Conclusion:** We have successfully developed and validated a protocol for physical therapy for BOUNCE. A feasibility study will be conducted based on this.

**Acknowledgment:** This study is funded by the Fundamental Research Grant Scheme (FRGS/1/2022/SKK01/UPM/02/2).

P1019

### THE PRACTICALITY OF USING BONE IMPACT MICROINDENTATION IN A POPULATION-BASED STUDY OF WOMEN AT RISK OF OSTEOPOROSIS

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**Objective:** Impact microindentation (IMI) is a minimally invasive indentation technique that allows the assessment of bone material strength index (BMSi) in vivo, by measuring the depth of a micron-sized, spherical tip into cortical bone that is then indexed to the depth of the tip into a reference material. In this study, we aimed to assess the practicality of its application in women from the Geelong Osteoporosis Study.

**Methods:** Participants were 58 women aged 49-78yr from the Geelong Osteoporosis Study. Impact microindentation was performed in the mid-shaft of the right tibia using the OsteoProbe. Immediately following measurement, each participant was requested to rate on a Visual Analogue Scale [0-10] the level of discomfort anticipated and experienced, any initial reluctance towards the measurement and whether they were willing to repeat the measurement.

**Results:** Of 58 potential participants who attended this assessment phase, 32 underwent IMI measurement. Reasons for non-measurement in 26 women were existing skin conditions (n=6), excessive soft tissue around mid-tibial region (n=16); four participants did not provide any reasons for declining. For 32 participants who had IMI performed, the expectation for pain when briefed about the procedure was low ( $2.07 \pm 2.39$ ), as was pain experienced during the measurement ( $0.91 \pm 1.17$ ). Participants were not reluctant to undergo the measurement ( $0.49 \pm 1.17$ ), and all indicated a willingness to repeat the measurement.

**Conclusion:** Results in this study quell such concerns that the minimally-invasive procedure might limit participant and patient involvement in research and/or clinical settings.

**Acknowledgment:** This study was funded by grant support of Amgen Inc.

P1020

### ANABOLIC AND ANTI-CATABOLIC EFFECTS OF BROWN ALGAE EXTRACT ON BONE, A POTENTIAL TREATMENT FOR OSTEOPOROSIS

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**Objective:** Despite the scientific advances in treatments for bone diseases, there continues to be a growing need for new therapies

that allow permanent and more specific therapeutic effects for bone pathologies such as osteoporosis. We characterized the anabolic and antiresorptive effect of sulfated polysaccharides (SulfatedPol) isolated from three marine brown macroalgae: *Macrocystis pyrifera*, *Sargassum muticum* and *Undaria pinnatifida*.

**Methods:** Algae samples were collected on Todos Santos Island, Baja California. Chemical characterization of the extracts confirmed that the content of total carbohydrates, fucose, uronic acids, and sulfates corresponded to SulfatedPol.

**Results:** In vitro cell, proliferation assays using MC3T3-E1 osteoblast precursor cells treated with SulfatedPol showed a concentration-dependent inhibition of cell proliferation after 24 h of culture. In mineralization assays using MC3T3-E1 or mouse bone marrow cells, the sulfatedpol increased the mineralization as measured with alizarin red staining. These results demonstrated the capacity of SulfatedPol to modulate the proliferation and mineralization of osteoblastic cells. In contrast, in osteoclastogenesis assays, SulfatedPol extracts inhibited the formation of osteoclasts induced by RANKL and M-CSF in vitro. Finally, the effect of SulfatedPol on bone remodeling was assessed ex vivo using calvaria from 4-6 days old mice. After 7 d of culture, histomorphometric analysis indicated that SulfatedPol treatment of *M. pyrifera* increased the bone area compared to control-treated calvaria.

**Conclusion:** We demonstrated that SulfatedPol from different brown algae have a dual role in the bone remodeling process by promoting mineralization and inhibiting osteoclast formation in a dose-dependent manner in vitro. Thus, SulfatedPol are potent molecules that could be used to treat bone-related diseases.

P1021

### THE IMMEDIATE EFFECTS OF SINGLE SESSION TREATMENT USING GLUCOSAMINE SULPHATE IONTOPHORESIS VS. METHYL SALICYLATE IONTOPHORESIS ON PAIN AND ACTIVE KNEE EXTENSION RANGE OF MOTION IN PATIENTS WITH UNILATERAL KNEE OSTEOARTHRITIS

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**Objective:** To study the immediate effects of single session treatment using glucosamine sulphate iontophoresis vs. methyl salicylate iontophoresis on pain and Active Knee extension range of motion in patients with unilateral knee osteoarthritis. To determine the effect of glucosamine sulphate iontophoresis on pain and Active knee extension range of motion in patients with unilateral knee osteoarthritis. To determine the effect of methyl salicylate iontophoresis on pain and Active knee extension range of motion in patients with unilateral knee osteoarthritis. To compare the immediate effect of single session treatment using glucosamine sulphate iontophoresis vs. methyl salicylate iontophoresis on pain and Active knee extension range of motion in patients with unilateral knee osteoarthritis.

**Methods:** 50 patients with unilateral knee osteoarthritis were included in this study with 25 patients were in Group A and 25 pa-

tients were included in Group B (15 min of iontophoresis) and both groups had a baseline intervention of Self-Hamstring stretching 3 sets were done each stretch of 30 s hold and in between each set 5 s of rest period.

**Results:** As the p value for the comparison between Group A and Group B for pain is 0.2608, it is not statistically significant. As the p value for the comparison between Group A and Group B for Active knee extension ROM is 0.7134, it is not statistically significant.

**Conclusion:** The present study concludes that Glucosamine sulphate is as effective as methylsalicylate in reducing pain experienced by knee osteoarthritis patients. Also, both the drugs are equally effective in improving Active knee extension ROM in a single treatment session.

## P1022

### SHORT-TERM EFFECTIVENESS OF MULTILOC INTRAMEDULLARY NAILING IN THE TREATMENT OF FOUR-PART FRAGILITY FRACTURES OF THE PROXIMAL HUMERUS

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**Objective:** Whether intramedullary nailing can be used in four-part fractures of the proximal humerus has been controversial for long. This study aimed to investigate the short-term efficacy of Multiloc intramedullary nailing in the treatment of four-part fragility fractures of the proximal humerus.

**Methods:** A retrospective analysis was conducted on 14 patients who underwent Multiloc intramedullary nailing for four-part proximal humerus fractures between March 2020 to March 2022. The patients were followed up for 12 months and clinical outcomes were assessed collected.

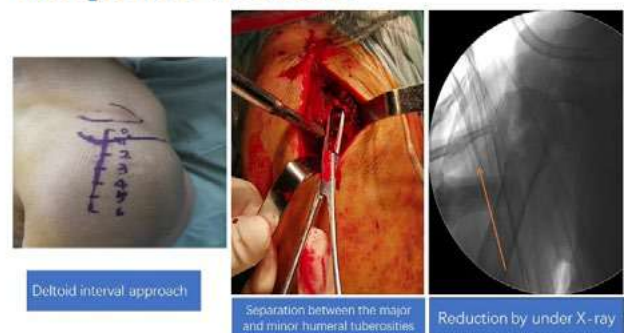
**Results:** All 14 fractures were healed after 12 months follow-up, with a complication rate of 21.4%. The mean operation time was 95 minutes. Mean intraoperative blood loss was 134.6 ml. By the last follow-up, the mean VAS score was 2.7 points. The mean ASES score 71.1 points and mean Constants score reached 69.7 points, indicating significant improvement in shoulder function. One case developed partial AVN 8 months after surgery. One patient with previous Parkinson's disease had a main nail cut out 3 months after surgery.

**Conclusion:** In conclusion, Multiloc intramedullary nailing is a safe and effective surgical technique for treating four-part proximal humerus fractures. It can lead to significant improvement in shoulder function and pain relief in the short term with short operation time, small incision, less soft tissue damage, less blood supply damage, and fewer complications. However, longer term studies with larger sample sizes are needed to further validate these findings.

## Case 1, 83y, male



## Intraoperative Procedure



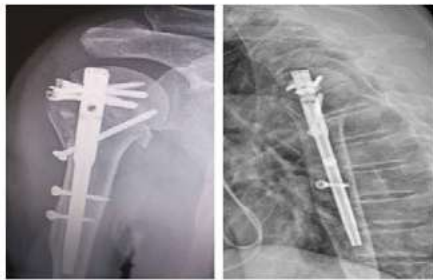
## X-ray taken after completion of surgery



## Suture of rotator cuff and incision



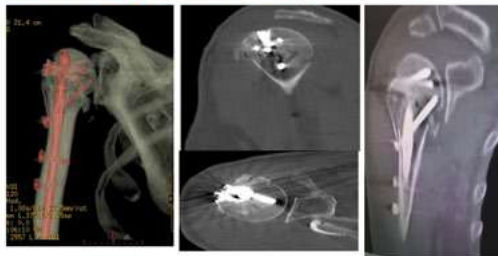
X-ray at first day after surgery



Six month after surgery



CT at first day after surgery



Nine months after surgery



One month after surgery



One month after surgery



P1023

**JOINT PAIN AND RISK OF ALL-CAUSE MORTALITY IN A LOW MIDDLE INCOME COUNTRY: POOLED ANALYSIS OF THREE MALAYSIAN OLDER ADULTS COHORT**

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**Objective:** To determine the risk of mortality among Malaysian older people with joint pain.

**Methods:** This is a longitudinal study utilizing three established Malaysian cohorts; MELoR, PEACE and TUA which now known as AGELESS study. Baseline data of self-reported joint pain were obtained from home-based computer-assisted questionnaires and hospital-based health-checks collected between 2013-2015. Death Registry data was obtained from the National Registry Dept. up to June 2022 with range 7-9 years of follow up.

**Results:** Of 6343 participants, 22% reported to have joint pain at baseline and 24.2% of participants deceased within 9 years of follow up duration. Presence of joint pain was not significantly associated with the risk of mortality among older Malaysian with hazard ratio (95%CI), 1.026 (0.903-1.167).

**Conclusion:** While osteoarthritis have been suggested to increased risk of mortality in the US, our findings were in line with the previous Asian studies focused on knee OA that suggested reduced or no associations with all-cause mortality. The dispari-

ties between US and our populations may be caused by a variety of reasons, such as the US population's increased obesity rates, disabilities, comorbidities, access to healthcare, and low levels of physical activity.

## P1024

### SIMPLER MODIFIED FRIED FRAILTY SCALE AS A PRACTICAL TOOL TO EVALUATE PHYSICAL FRAILTY: CROSS-CULTURAL ADAPTATION AND VALIDATION PROJECT

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Frailty is a common geriatric syndrome that indicates homeostasis and increased risk of disability and mortality. It is amenable to intervention when detected. Hence, screening frailty is of utmost importance to preserve quality-of-life and function in older age. Fried frailty scale is the very first and most commonly used assessment scale for an operational definition of physical frailty with its demonstrated success as a predictor of mobility limitations and mortality. However, using original Fried frailty scale is compelling and generally impractical in practice because it requires some complicated assessments. These make the Fried frailty scale an unhandy tool for a fast and practical evaluation of frailty in clinical practice. Clinicians that take part in the care of older adults need a fast and easy-to-use frailty screening tool that can identify the subjects at high risk of adverse outcomes. Taking the success of Fried frailty scale into account, we developed its simplified modified version recently, i.e., Simpler Modified Fried Frailty Scale, which proved efficacy to predict mortality among Turkish nursing home (NH) residents. It is developed in Turkish and has been shown to predict mortality in nursing home residents. It is modified in its three items that compose the most time-consuming steps. Weakness, slow walking speed, and low physical activity are assessed by questioning the individuals/local close caregivers (if the individual is not cognitively intact) if they judge that, according to their subjective evaluation, HGS, walking speed and physical activity were decreased compared to the same-aged healthy individuals. Considering the variety of languages in Europe, it seems valid to adapt and validate this tool in different European languages. We systematized the validation

process in two phases. In phase 1, translation, cross-cultural adaptation and reliability testing of the Simpler Modified Fried Frailty Scale will be performed. In phase 2, the clinical validation study will be implemented. A clinical validation study will be conducted to evaluate specificity, sensitivity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of Simpler Modified Fried Frailty Scale to diagnose physical frailty. Thereby, if Simpler Modified Fried Frailty Scale would be validated, clinicians will have the possibility to screen for frailty via a variation of well-known Fried frailty scale that will be much quicker and easier than the original Fried scale to be used in practice. This is expected to have a significant positive impact in screening frailty across many countries where the geriatric population is expanding enormously.

## P1025

### ASSESSMENT OF BONE HEALTH IN TRANSGENDER POPULATION OF INDIA: THE 'AIIMS INITIATIVE'

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**Objective:** To determine the status of Bone Mineral homeostasis and BMD in the transgender population.

**Methods:** Through a prospective cross-sectional study design we aimed to determine the current health status of transgender persons with a special emphasis on bone health. Descriptive statistics were used for data analysis. Ethical approval of this study was obtained from the IEC of AIIMS. Transgender subjects were enrolled in the study from their ghettos located in Delhi & NCR region after obtaining their written consent. Written consent was taken from all the recruited subjects and was also informed about the study for their understanding through the subject information sheet.

**Results:** A total of 172 transgender subjects were recruited in the study. The data were analyzed through descriptive statistics using mean, standard deviation (SD), frequency, and percentage. The mean age, BMI, vitamin D, calcium, phosphorous, and ALP were 25.5±6.5 years, 21.8±4.1 kg/m<sup>2</sup>, 13.38±7.9 ng/ml, 9.86±0.86 mg/dl, 3.93±2.17 mg/dl and 186.4±125.3U/L respectively. The major finding of the study was noted that out of 172 recruited subjects, 84.3% had vitamin D insufficiency (<20 ng/ml) (Table 1). Importantly, past history of fracture was noted in 35 transgender persons (20%). The BMD was estimated only in 75 subjects as the majority of transgender subjects did not opt to visit the hospital for BMD evaluation. The mean T-score at the spine and hip region was -1.5±0.9 and -0.72±0.9 respectively. At the spine region, 50 subjects had T-score <-1.5 (osteopenic range) while 10 subjects had at the hip region (Table 1).

**Conclusion:** Transgender population of India has poor bone health status even before the achievement of their peak bone mass (<30 years). A lot is yet to be done to restore the bone health of the transgender population of India.

**Acknowledgments:** Funded by the Indian Council of Medical Research (ICMR)

## P1026

### TOP FIVE REASONS OF DENYING TO PARTICIPATE IN SECONDARY FRACTURE PREVENTION PROGRAMME: A SINGLE CENTRE EXPERIENCE FROM PAKISTAN

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**Objective:** To evaluate the reasons of patients not participating in the ongoing Secondary Fracture Prevention Programme.

**Methods:** This single-centre, multidisciplinary, project in collaboration with the Departments of Pathology and Laboratory Medicine, Orthopedic Surgery, Family Medicine, and Rheumatology started at Aga Khan University Hospital (AKUH) Karachi Pakistan. Following informed consent, male and female patients more than fifty years old or postmenopausal females with presenting complain of hip fracture encountered by low trauma admitted through emergency department and outpatient clinics were recruited. Four types of intervention models were being tested. Consecutive patient presenting with hip fracture included in the following sequence in each intervention arm: First Patient in type A model education material regarding osteoporosis and prevention of secondary fracture prevention, provided to the patients and asked to undergo radiological and biochemical assessment and consultation from rheumatologist. Second patient in the type B model were instructed to see their own primary care physician and education material was provided at the time of recruitment. Third patient in type C model were requested an appointment at community health center at AKUH and education material was provided. Patients in type D had access to educational materials on osteoporosis and preventing secondary fractures.

**Results:** 90 patients out of 135 declined to take part in the trial. Five categories were used to classify the grounds for unwillingness to participate in the study. Majority of the patients refused due to lack of awareness about osteoporosis and bone health (n=30). The second most frequent excuse for not taking part was family didn't wish to initiate any intervention (n=20). Another major barrier in patient recruitment process was patient's physical and psychological health condition (n=17). Another factor contributing to the patient's refusal were logistical issues (n=17). The

recruitment procedure was further hampered by the socioeconomic situation of the patients (n=6).

**Conclusion:** Reasons identified point towards the need to raise the patient awareness and advocacy by physicians and care providers.

**Acknowledgment:** Project is funded by University Research Council at Aga Khan University.

## P1027

### RELATIONSHIP OF CARTILAGE IMPAIRMENT WITH ANTHROPOMETRIC AND LABORATORY INDICATORS IN EARLY KNEE OSTEOARTHRITIS

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**Objective:** To determine the relationship of cartilage damage with anthropometric and laboratory parameters in early osteoarthritis (OA) of the knee joints.

**Methods:** In a prospective study for the period 2021-2022. 40 women were included, meeting the ESKOA criteria being developed and currently being tested, with OA of the knee and radiographic stage I-II stage (Kellgren-Lawrence), who signed an informed consent. The average age of the patients was 44.8±8.0 years (from 35-66), the BMI was 25.56±4.94 kg/m<sup>2</sup>, the duration of pain in the knee joints was 0.95 [0.5; 1] years. For each patient, an individual card was filled out, including anthropometric parameters, anamnesis and clinical examination data, assessment of pain in the knee joints according to VAS, WOMAC scores, articular status, comorbidities, and therapy during the observation period. All patients underwent radiography of the knee joints in the standing position, densitometry of the femoral neck and lumbar spine, and MRI (WORMS MRI) of the knee joints. Signal intensity and cartilage morphology according to WORMS were evaluated according to the following gradation: 0 - normal, 1 - cartilage thinning without defects, 2 - 1 partial defect (not to the full depth), 3 - several partial defects, 4 - defect to the full depth <50% cartilage length, 5 - full depth defect >50% of cartilage length. The presence of HPC was established in case of belonging to 4 or 5 types in accordance with the above gradation. Statistical processing of the material was carried out using Statistica 10.0 software.

**Results:** In accordance with the assessment of cartilage morphology according to WORMS, patients were divided into 2 groups: group 1 (n=18) - with 1 or less partial cartilage defect (in case of belonging to 0.1 or 2 types in accordance with the above gradation) and group 2 (n=22) - with more than 1 partial defect (in case of belonging to 3, 4 or 5 types in accordance with the above gradation). Patients in both groups were comparable in age, disease

duration, BMI, waist and hip measurements, pain levels according to VAS and WOMAC, ESR and CRP, and the duration of NSAID use. It was found that in patients with more than 1 partial defect, valgus deformity of the knee joints was more often detected (100 vs. 0%,  $p=0.01$ ). Also in group 2, there were higher levels of IL-1 $\beta$  ( $3.25\pm 2.89$  pg/ml vs.  $1.72\pm 1.04$ ;  $p<0.001$ ). The correlation analysis according to Spearman confirmed positive relationships ( $p<0.05$ ) between the presence of more than 1 partial defect according to MRI-WORMS and the presence of valgus deformity of the knee joints ( $r=0.40$ ) and higher values of IL-1 $\beta$  ( $r=0.69$ ).

**Conclusion:** In our study, it was shown that the formation of more than 1 partial cartilage defect (according to MRI-WORMS) is associated with the presence of valgus deformity of the knee joints and higher levels of IL-1 $\beta$ , which may indicate a significant role of violation of the knee joint axis and inflammation in the development early OA.

## P1028

### A NOVEL HETEROZYGOUS MUTATION C.1627G>T (P.GLY543CYS) IN THE SLC34A1 GENE IN A MALE PATIENT WITH RECURRENT NEPHROLITHIASIS AND EARLY-ONSET OSTEOPENIA: A CASE REPORT

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**Objective:** Phosphate represents one of the major components of mineralized bone tissue. Correct concentration of serum phosphate is principally controlled by regulation of phosphate reabsorption at the kidneys, mainly dependent by sodium-phosphate cotransporters. Germline mutations in genes encoding these cotransporters have been associated with clinical phenotypes, variably characterized by hyperphosphaturia, hypophosphatemia, recurrent kidney stones, skeletal demineralization, bone pain, and early-onset osteoporosis.

**Methods:** Here, we report a case of a 33-year-old male patient presenting a history of recurrent nephrolithiasis, and an early-onset osteopenia at lumbar spine and femur firstly assessed at the age of 31 years (Z-score -2.1 and -2.2, respectively). Elevated PTH values in the proband and the mother, at the time of the first clinical evaluation, was suspected of a possible diagnosis of familial isolated primary hyperparathyroidism (FIPH), and he was tested by a next generation sequencing (NGS)-based analysis with a customized multigenic panel containing 33 genes whose mutations are known to be responsible for the development of congenital parathyroid diseases. Two additional genes, *SLC34A1* and *SLC34A3*, encoding two sodium-phosphate cotransporter proteins expressed on the membrane of kidney cells, and playing a major role in phosphate homeostasis and bone mineralization,

were tested by Sanger's sequencing.

**Results:** The genetic screening for parathyroid congenital diseases was negative. A novel germline heterozygous mutation was identified in the *SLC34A1* gene, c.1627G>T (p.Gly543Cys), currently, neither reported in databases of human gene mutations (gnomAD, ClinVar, HGMD) nor published.

**Conclusion:** Germline heterozygous mutations of the *SLC34A1* gene have been previously associated with the autosomal dominant hypophosphatemic nephrolithiasis/osteoporosis type 1 (NPHLOP1), a rare disease characterized by an excessive urinary loss of phosphate, leading to hypophosphatemia, recurrent nephrolithiasis, bone demineralization, and early-onset osteoporosis. Consistently with the clinical features of NPHLOP1 our patient had a history of recurrent nephrolithiasis and showed lumbar and femoral osteopenia at a young age. Genetic screening for the p.Gly543Cys missense variant and clinical characterization for phosphate metabolism, history/presence of renal stones and bone status in the first-degree relatives of the proband are necessary to perform a genotype-phenotype segregation analysis, and define a possible pathogenic nature of this novel identified variant.

## P1029

### CONTRIBUTION OF INCREASED TGF-B PRODUCING TREG CELLS LEVELS TO THE PATHOGENESIS OF OSTEOMYELITIS IN LEPROMATOUS LEPROSY

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**Objective:** Leprosy is an infectious diseases caused by gram negative bacilli called mycobacterium leprae. Lepromatous leprosy (LL) showed stigma due to osteomyelitis and bone resorption. Osteomyelitis is an inflammatory bacterial infection and LL patients showed T cell anergy. Immunological basis of osteomyelitis in LL patients is a meter of debate. Thus, understanding the pathogenic involvement of Treg vs. Th17 cells would offer fresh perspective on the intervention and therapy of Leprosy.

**Methods:** The study included 15 LL (osteomyelitis leprosy patients; LL-O) and 15 LL (non-osteomyelitis leprosy patients; LL-NO; control). PBMCs were stimulated with *MLSA* (*Mycobacterium leprae sonicated antigen*) for 48 h. By using flow cytometry, we identified both Tregs and Th17 cells, in the peripheral blood mononuclear cells. Gene expression of cytokines, such as *IL-10*, *IL-17A*, *TGF $\beta$*  and *RUNX2*, *P1NP* (Osteoblast markers) was further examined using real-time PCR (q-PCR) in the cultured and skin lesions of leprosy patients.

**Results:** LL-O patients had significantly ( $p<0.005$ ) higher percent-

ages TGF $\beta$  producing Tregs (CD3<sup>+</sup>CD4<sup>+</sup>CD25<sup>+</sup>FOXP3<sup>+</sup>TGF $\beta$ <sup>+</sup>) cells as compared with LL-NO patients. Of interest LL-0 showed significantly ( $p < 0.002$ ) lower percentages Th17 cells (CD3<sup>+</sup>CD4<sup>+</sup>IL-17A<sup>+</sup>) than LL-NO patients. Surprisingly, Osteoblast markers (*RUNX2* and *P1NP*) showed significant ( $p < 0.02$ ) negative correlation with Treg cells. Moreover, inflammatory cytokines IL-17A mRNA expression were significantly ( $p < 0.01$ ) high in LL-NO patients stimulated PBMC and skin lesions as compared to LL-0 patients. On the other hand TGF $\beta$  and IL-10 were significantly ( $p < 0.03$ ) high in skin lesion of LL-0 as compared to LL-NO patients.

**Conclusion:** In this study, osteomyelitis infection in leprosy patients showed dysregulated "Treg and Th17" cell balance as compared to non-osteomyelitis leprosy patients. Collectively our data for the first time report the role of Treg and Th17 cells in osteomyelitis leprosy patients.

### P1030

#### A NEW TOOL FOR INCIDENT FRACTURE RISK IDENTIFICATION IN MEN: THE REMS-BASED FRAGILITY SCORE (FS)

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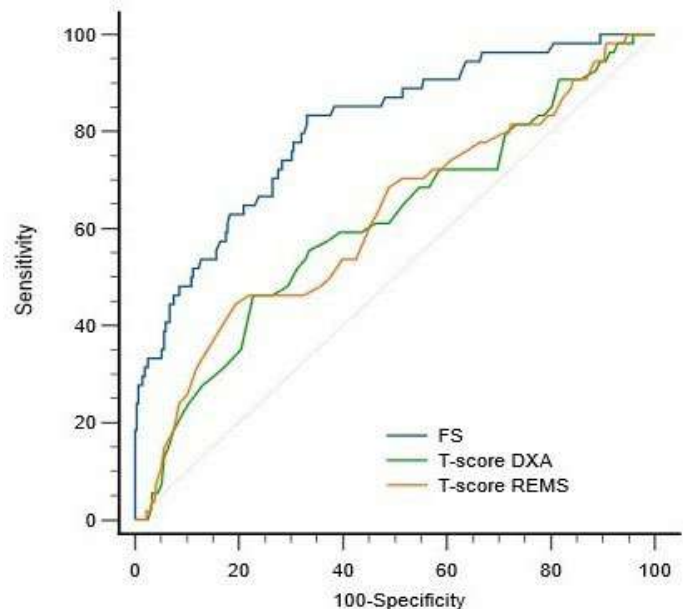
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**Objective:** Through a simple echographic scan of the reference anatomical sites (femur and/or spine), radiofrequency echographic multispectrometry (REMS) allows the assessment of the quality of bone microarchitecture thanks to the fragility score (FS). FS is obtained from the comparison between the patient spectral profiles with reference spectral models of fractured and non-fractured patients. Aim to evaluate the capability of the FS in identifying frail patients, more susceptible to incident fragility fractures, by comparing the discriminative performance of DXA and REMS T-scores with FS ones.

**Methods:** A cohort of 322 Caucasian men (above 55 years) underwent lumbar spine scans with both REMS and DXA. The occurrence of incident fragility fractures was then monitored during a 5-year follow-up. The ability of the FS to correctly discern patients with and without incident osteoporotic fractures was evaluated in comparison with DXA and REMS T-score by means of receiver operating characteristic (ROC) curve analysis.

**Results:** Of 322 patients, 54 had sustained an incident fracture during the follow-up period. The median T-score values measured by REMS and DXA were significantly lower in fractured patients

than in non-fractured ones. On the contrary, the FS values was significantly higher in fractured subjects, confirming their compromised bone status. The FS yielded a value of the ROC area under the curve (AUC) equal to 0.81. This value was significantly higher than the AUC obtained by the REMS T-score (0.62) and DXA T-score (0.61) ( $p < 0.001$ ). ROC curves are shown in Figure 1.



**Figure 1.** Evaluation of the capability of the FS, REMS and DXA T-score values in discriminating between patients with or without incident fragility fractures using ROC analysis.

**Conclusion:** The study demonstrated the superior performance of the FS compared either T-scores obtained by REMS and DXA in the identification of incident fractures. This parameter represents a valuable diagnostic method for the identification of frail and non-frail patients and a useful tool for fracture risk prevention.



P1031

**PRELIMINARY REPORT: EVALUATING THE MODELS OF CARE FOR FRACTURE PREVENTION**

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**Objective:** To find out the feasibility of a model of care for secondary fracture prevention in a tertiary care hospital Karachi, Pakistan.

**Methods:** A multidisciplinary project has encountered at Aga Khan University Hospital Karachi proposed by Ganda et al: to establish the feasible model of care for secondary fracture prevention (1) first at regional level then expand on national level. The project involves the sections of Chemical Pathology, Rheumatology, Family medicine and Orthopaedics. Patients including males and females more than 50 years of age and postmenopausal females admitted to the hospital with the complain of hip fracture encountered by low trauma were included in the study. Study included intervention based four types of models. Education material regarding osteoporosis and its prevention was provided to all the groups. Risk assessment of the models were performed in the hospital by using Surrogate model of fracture risk scoring for Pakistan. (2)

Type A model: Intensive service with all interventions: Patients were offered comprehensive biochemical and radiological investigations. Patients were asked to attend the rheumatology clinic for further management.

Type B model: Patients included in this intervention arm, were requested to see their general physician for management of osteoporosis. Patients were followed after 6 months on telephone, and a questionnaire related to treatment compliance &/or noncompliance was filled by research coordinator.

Type C model: Patients asked to visit general physician at community health center at AKU. Appointment was booked by research associate.

Type D model: Health Education was provided. There is no physician contact with the patient for prevention of secondary fracture.

**Results:** Study participants were n=135 and n=45 patients gave consent to participate. In type A model n=2 patients followed the complete process. In type B model. n=0 participants visit their general physician. In type C model, n=5 patients came to attend their appointment with general physician at community health center. In type D model n=18 patients were working on fracture

prevention strategies.

**Conclusion:** According to the preliminary results type D model has been proven to be the most effective in our setup.

**References:**

1. Ganda K et al. Osteoporos Int 2013;24:393.

2. Naureen G et al. Arch Osteoporos 2021;16:1.

**Acknowledgment:** Project is funded by University Research Council at Aga Khan University.

P1032

**DEVELOPMENT OF RHEUMATOID ARTHRITIS WITH SEVERE MUSCULOSKELETAL MANIFESTATIONS AFTER SARS-COV-2 INFECTION**

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**Objective:** The SARS-CoV-2 virus has been related to the development of autoimmunity. Mechanisms possibly are molecular mimicry and the development of extracellular neutrophil traps. The aim was to describe two cases of patients who developed seropositive rheumatoid arthritis (RA) shortly after infection with the SARS-CoV-2 virus.

**Case reports:** Case 1. The case of a female patient, aged 79, is described who developed late onset RA 2 months after COVID-19 infection. The patient presented with arthralgias of the large joints and morning stiffness (duration >40 min). On clinical examination arthritis of the right shoulder and the left 3<sup>rd</sup> metacarpophalangeal joint was observed along with limited mobility of both knee joints. Laboratory examinations revealed ESR 75 mm, CRP 1.48 mg/dl (normal values <5 mg/dl), RF 256.6 U/ml (<30 U/ml), anti-CCP 584 U/ml (<5 U/ml). Late onset seropositive RA was diagnosed. Prezolon 7.5 mg/d and hydroxychloroquine 200 mg/d were administered with significant improvement.

Case 2. The case of a female patient, aged 74, is described who developed diffuse arthralgias and morning stiffness (duration >60 min) 7 months after COVID-19 infection. She had symmetric polyarthritis with tender and swollen carpal, metacarpophalangeal and proximal interphalangeal joints in both hands. Laboratory evaluation revealed ESR 44mm, CRP 1,16 mg/dl (<0,5 mg/dl), RF 23,8 U/ml (<30 U/ml), anti-CCP >200 U/ml (<5 U/ml), ANA 1/1280. Low dose corticosteroids and methotrexate 12.5 mg/wk were administered with improvement.

**Conclusion:** The development of seropositive RA after clinical COVID-19 infection is described. The SARS-CoV-2 virus may be related to the development of clinical autoimmune disease. In the cases described herein the development of a systemic inflammatory autoimmune disease in elderly female patients after COVID-19 infection is presented.

P1033

### EFFECT OF VITAMIN D3, OMEGA-3S AND A SIMPLE HOME EXERCISE PROGRAM ON BMD IN EUROPEAN OLDER ADULTS: THE DO-HEALTH RANDOMIZED CONTROLLED TRIAL

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**Objective:** Vitamin D, omega-3s and exercise are the most promising non-pharmacological interventions to improve bone health and prevent osteoporotic fractures, however, their combined effects on areal BMD (aBMD) remain unclear. We therefore examined whether vitamin D3, omega-3s, or a strength-training exercise program (SHEP), alone or in combination, improve lumbar spine (LS), femoral neck (FN) or total hip (TH) aBMD among European generally healthy community-dwelling older adults.

**Methods:** This is a secondary analysis of DO-HEALTH, a 3-year multicenter, double-blind, randomized 2x2x2 factorial design trial in generally healthy older adults (age ≥70 years). Participants from 4 out of 7 DO-HEALTH study centers, which were equipped with DXA machines, were included in the present analysis. The study interventions were 2000 IU/d of vitamin D<sub>3</sub>, 1 g/d of marine omega-3s, and a SHEP (3x30 min/wk), applied alone or in combination. Change in LS, FN, and TH aBMD was assessed by DXA at BL and year 1, 2 and 3. Mixed effect models were used. All analyses were based on the intention-to-treat principle and adjusted for age, sex, BMI, prior fall, study site and baseline level of the outcome.

**Results:** DXA scans were available for 1486 participants (75±4 years, 63% women, FN T-score -1.4±1.0). Preliminary results show a significant difference in mean change in TH aBMD for vitamin D3 vs. no vitamin D3 (Δ in least square means [LSMs]: 0.0035 [95%CI 0.0011, 0.0059] g/cm<sup>2</sup>) and vitamin D3+omega-3s vs. no vitamin D3 and no omega-3s (ΔLSM: 0.0038 [95%CI 0.003, 0.0072] g/cm<sup>2</sup>) across the 3-year follow-up. Subgroup analyses revealed a significant interaction between sex and the vitamin D3 group (P=0.003)

for LS aBMD. Vitamin D3 significantly increased LS aBMD compared to no vitamin D3 (ΔLSM: 0.0083 [95%CI 0.0016, 0.0157] g/cm<sup>2</sup>) in men over 3 years, but not in women.

**Conclusion:** Among generally healthy and active older adults, daily vitamin D3 supplementation, alone or in combination with omega-3s supplementation, showed a small benefit for total hip aBMD. Furthermore, vitamin D3 had beneficial effects on LS aBMD in men but not in women.

**Disclosures:** As part of the DO-HEALTH independent and investigator-initiated clinical trial, HAB-F reports as the PI of the DO-HEALTH trial, grants from the European Commission (Grant Agreement No. 176;278588) and within this framework also from the University of Zurich, from NESTEC, from PFIZER Consumer Healthcare, from Streuli Pharma, plus non-financial support from DSM Nutritional Products and from Roche Diagnostics.

P1034

### AN OLDER ADULT CAN LEAD HEALTH RELATED QUALITY OF LIFE (HRQOL), BY RELIGIOUSLY FOLLOWING' VED MANTRA ' OF ALLOPATHY: VACCINATION, EXERCISES AND DIET !

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**Objective:** To show the importance of diet, exercises and immunisations in the life of an older adult for health related quality of life, after religiously following this VED Mantra, that results into significant reduction of polypharmacy.

**Methods:** The principal investigator (PI) is a consultant geriatrician with facilities of home care since last 36 years. Because of mobility issues, many of the older adults are unable to attend the OPD of geriatric facility. PI follows the recommendations of CDC, ACIP, NFID and AGS for immunisations. The geriatric facility has data of fully immunised of over 500 older adults of last 10 years. Recently, the vaccination against COVID-19 is added to the list.

The recommended vaccination against the vaccine preventable diseases (VPD) are COVID 19, H influenza B, Hepatitis A, Hepatitis B, Herpes Zoster, Influenza, MMR, Meningococcal A, C, W, Y, Meningococcal B, Pneumococcal, Tdap and Varicella. Evidence of many decades shows the excellent benefits of vaccination like it avoids hospitalisations. The significance of geriatric exercises and physical activities are well established and forms the main stay of any kind of OrthoGeriatric services. Evidently, regularly doing all four types exercises namely Endurance, Stamina, Flexibility and Strength for lifetime address the mobility issues. Diet, again is of utmost importance by following age related, disease specific diet advice, moderation in alcohol consumption, cessation of smoking will definitely yield positive results towards health promotion.

**Results:** The result shows that those older adults who are being immunised for all recommended vaccine preventable diseases (VPD), do exercises regularly and follow the diet advice religiously are significantly benefited by this VED mantra of allopathy. It reduces the total number of medications leading to deprescribing.

**Conclusion:** The VED mantra of allopathy i.e. following Vaccina-

tion (V), Exercises (E) and Diet (D), guidelines of international academic organisations can lead to health related quality of life. It will also lead to significant de-prescription in polypharmacy.

### P1035

#### DUAL EFFECT OF P,p'-DICHLORODIPHENYLDICHLOROETHYLENE (DDE) EXPOSURE BONE MASS IN C57BL/6J MICE WITH DIFFERENT DIETARY PATTERN

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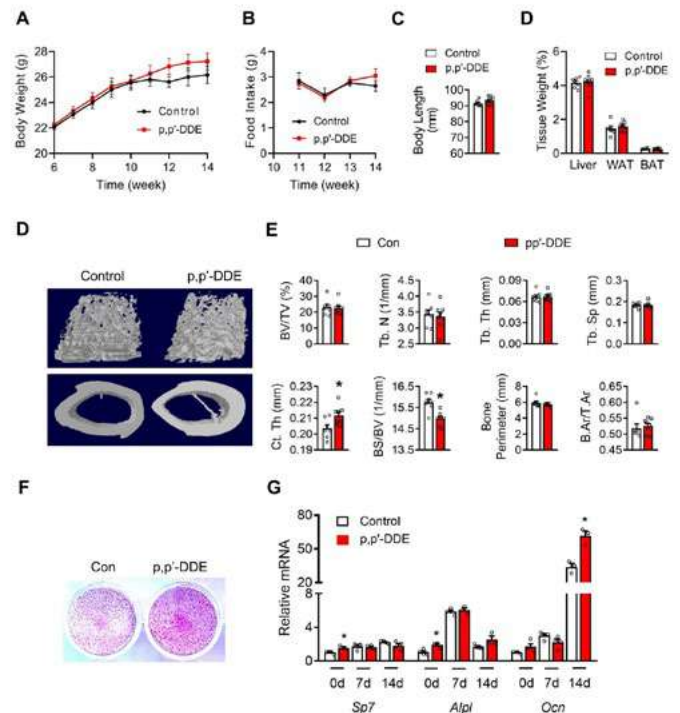
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**Objective:** To study the effects of persistent organic pollutant p,p'-DDE in osteoblasts in regulating bone mass under different metabolic status in mice.

**Methods:** p,p'-DDE were treated chronically in 3 kinds of mouse model: regular adult, high fat diet fed and aging mouse model. Primary osteoblasts was cultured with p,p'-DDE and molecular signaling changed was examined by RNA-seq, RT-PCR and luciferase, etc. In the end, we also tested the effect of chronic p,p'-DDE in the process of fracture healing in young mice.

**Results:** Under regular chow diet, p,p'-DDE increased bone mass in both young and aging mice, and these effect was regulated by regulation the transcription of CCN3 in osteoblast, which induced osteoblast differentiation via osteocalcin. However, under high fat diet, p,p'-DDE induced more bone loss in mice with obesity and insulin resistance. This contradictory effect might be caused by the different transcription factor change under different metabolic status.

**Conclusion:** Our results suggest that p,p'-DDE benefits for bone health and promotes fracture healing in animals under regular chow diet possibly through the CCN3 pathway to control the osteoblast differentiation, but inhibits bone volume via impacting global metabolism in insulin resistance mouse model.



### P1036

#### A SUGGESTION OF SCREENING FOR OSTEOPOROSIS USING OPPORTUNISTIC CHEST CT

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**Objective:** Opportunities for chest CT are increasing due to the COVID-19 epidemic. To evaluate the usefulness of opportunistic chest CT for osteoporosis screening, we assessed the predictive association between CT values of T7 vertebrae (T7CTV) and thoracolumbar vertebral fracture (TLF) and osteoporosis.

**Methods:** All patients who underwent chest CT imaging at a single center in Japan between April 2021 and March 2022 were included. The risk of osteoporosis was classified as high, medium, or low using T7CTV based on the recommended thresholds of <110 HU and  $\geq 160$  HU. First, a modified Poisson regression was employed to calculate the TLF prevalence ratio (PR) for the medium and high-risk groups based on the low-risk group. A C-statistic was calculated as a measure of discrimination. Second, the osteoporosis PR was calculated for the medium and high-risk groups in the subgroup for whom BMD was measured. Osteoporosis was defined as BMD  $< -2.5$  SD or  $< -2.0$  SD and with TLF. In addition, the population with multiple CT scans was divided based on a T7CTV of 110 HU, and the future incidence rate of TLF was compared using Fisher's exact test.

**Results:** A total of 1063 subjects were included, with a mean age of 76 years, of whom 589 (55%) were female. Of the subjects, 226 (21%) had TLF, with a PR of 3.85 (95%CI, 2.20 to 6.76) for medium-risk and 9.99 (6.00 to 16.6) for high-risk. The C statistic was

0.75 (0.73 to 0.79). BMD was measured in 241 patients, of whom 141 (59%) had osteoporosis. The PR was 2.17 (1.27 to 3.71) for medium-risk and 3.14 (1.90 to 5.20) for high-risk; the C-statistic was 0.72 (0.66 to 0.78). Multiple imaging was performed in 235 patients and new TLFs occurred only in four patients (6.8%) with <110 HU (P=0.011).

**Conclusion:** A predictive association between T7CTV on opportunistic chest CT and the prevalence of TLF and osteoporosis was suggested. Assessment of CT values on chest CT may be useful for osteoporosis screening.

### P1037

#### PAIRS OF CLINICAL RISK FACTORS: EFFECT OF INTERACTION ON PREDICTION OF RISK OF HIP FRACTURE

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**Objective:** Multiple clinical risk factors (cRFs) contribute to osteoporotic fracture risk and a considerable number of women have more than one cRF. In these patients, hip fracture (HF) risk estimates may be over- or underestimated if interaction effects are not taken into account.

**Methods:** We investigated frequency and magnitude of significant interaction effects among pairs of cRFs previously identified to significantly influence HF risk based on a systematic literature review (SLR). For each pair of the cRFs identified we calculated absolute 3-year HF risk in a large representative German insurance database (DB). Predictive power of cRFs was examined using age adjusted Cox proportional hazard models. The model included interactions among the pairs of cRF. 2-way and 3-way age-interactions were evaluated in the models but are not included in this abstract due to space restrictions, so all results presented are for age 70.

**Results:** The DB included 381,694 women age 50+. The SLR included 2267 peer reviewed publications on 101 candidate risk factors, 32 of which were considered most relevant based on HRs and prevalence. Among all 31x30=930 cRF pairs, 169 had >50 incident fractures in the hip fracture group. 20 of all possible interactions were significant. The table lists the 14 pairs of cRFs for which the interaction HR was ≤0.8. The upper right part shows the combined risk (HR) of the 2 cRFs without and the lower left part with the interaction. The number in parenthesis denotes the % reduction attributable to the interaction between the 2 cRFs, e.g. including an interaction term between AL and EP in the Cox model caused a 50% reduction of the combined HR, from 11.4 to 5.7.

**Conclusion:** Our SLR and the DB analysis provide high quality evidence on HF risk interaction of cRFs pairs. In 8.3% of the cRF pairs analyzed, interaction resulted in a reduction of the HRs of at least 16%. These data will help to improve accuracy of multivariable risk factor models for HF risk assessment.

	EP	AL	PA	OP	IM	HF	LW	HN	DM	FH
Epilepsy (EP)		11.4	10.3	-	-	-	6.8	-	-	-
M. Alzheimer (AL)	5.7 (50%)		15.7	7.4	13.7	7.7	-	18.9	-	-
M. Parkinson (PA)	5.2 (50%)	7.3 (54%)		6.7	12.5	-	-	-	-	-
Opioids (OP)	-	3.3 (44%)	4.3 (36%)		-	-	-	-	2.5	-
Immobility (IM)	-	5.7 (58%)	5.3 (57%)	-		-	8.2	-	-	-
Heart Failure (HF)	-	5.2 (32%)	-	-	-		-	8.4	-	6.7
Low Weight (LW)	3.8 (45%)	-	-	-	2.6 (68%)	-		-	-	-
Hyponatraemia (HN)	-	5.3 (72%)	-	-	-	3.9 (53%)	-		-	-
DM Typ2 (DM)	-	-	-	2.1 (16%)	-	-	-	-		-
Fracture Humerus (FH)	-	-	-	-	-	3.6 (46%)	-	-	-	

Empty fields (-): interactions between CRFs were not significant

### P1038

#### COMPARISON OF INTRAARTICULAR LUMBAR FACET JOINT STEROID INJECTIONS AND LUMBAR FACET JOINT RADIOFREQUENCY DENERVATION IN THE TREATMENT OF LOW BACK PAIN

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**Objective:** Although the effectiveness of lumbar medial branch radiofrequency ablation (RFA) for the treatment of low back pain has been characterized, few studies have described outcomes. Different therapeutic techniques in the treatment of facet-related pain have been described in the literature, including intraarticular lumbar facet joint steroid injections and radiofrequency denervation. In this study, we compared the effectiveness of intraarticular facet joint steroid injections and radiofrequency facet ablation (RFA).

**Methods:** Our controlled study included 150 patients who received intraarticular steroid infiltrations in the lumbar facet joints (L3/L4-L5/S1) and 130 patients who underwent radiofrequency denervation of L3/L4-L5/S1 segments. The inclusion criteria were based on MRI findings showing hypertrophy of the facet joints L3/L4-L5/S1. The initial control was the Euro-QoL Questionnaire, 1 day post-operative. Secondary control were the VAS (Visual Analog

Scale) and the ODI (Oswestry Disability Index) at 6 months and 1 year postoperatively. Binary logistic regression analysis was performed to explore associations between the primary outcome and covariates, including age, duration of pain, presence of scoliosis, degenerative spondylolisthesis, and >75% disc height loss.

**Results:** 238 patients (228/280) were randomized; 109 of 150 patients in the steroid injection group and the other 119 patients of 130 patients in the radiofrequency denervation group completed the 6-month follow-up. Pain relief and functional improvement were observed in both groups in 84% in the 6-month follow-up. There were no significant statistical differences between the 2 groups for the follow up control (VAS and ODI).

**Conclusion:** Intraarticular steroid infiltration or radiofrequency denervation (RFA), appear to be a managing option for chronic function-limiting low back pain of facet origin with favorable short- and midterm results in terms of pain relief and function improvement, but improvements were similar in both groups. This study shows similar outcomes of therapeutic lumbar facet joint nerve steroid blocks when compared with radiofrequency neurotomy (RFA) as indicated by significant pain relief and cost utility.

## P1039

### TREATMENT HETEROGENEITY IN COMPARATIVE EFFECTIVENESS OF TERIPARATIDE VS. BIPHOSPHONATES: MULTI-DATABASE COHORT STUDY

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**Objective:** Study the comparative effectiveness of teriparatide (TP) vs. oral bisphosphonates (BP) to reduce hip, major osteoporotic and vertebral fracture risk. In addition, we stratified by predicted hip fracture risk to assess treatment effect heterogeneity.

**Methods:** We conducted a network cohort study using data from IBM MarketScan® Commercial Claims and Encounters (CCAE), IBM MarketScan Medicare Supplemental Beneficiaries (MDCR), Optum® De-Identified Clinformatics Data Mart Database – Date of Death (OPTUM-DOD) and Optum de-identified Electronic Health Record Dataset (OPTUM-EHR), all mapped to the OMOP common data model. We included all women aged >50, who initiated TP or BP and had no history of anti-osteoporotic treatment in the prior year. Propensity scores were used for 1:4 matching to minimise confounding by indication. Models to predict hip fracture risk were developed and validated separately in each of the 4 databases. Finally, 147 negative control outcomes were included to calibrate for residual confounding. Cox regression was used to estimate calibrated hazard ratios (HR) and Kaplan-Meier estimat-

ed differences 3 years after treatment initiation to estimate absolute effects. We provide meta-analytic estimates for the overall analysis and for the bottom 75% and top 25% hip fracture risk subpopulations.

**Results:** A total of 8,542 and 322,191 users of TP and BP were included from CCAE, 6,219 and 279,099 from MDCR, 8,542 and 565,659 from OPTUM-DOD, and 12,235 and 251,402 from OPTUM-EHR. Overall meta-analytic calibrated HR were 0.94 [0.84-1.06], 1.04 [0.91-1.19] and 1.07 [0.91-1.27] for hip fracture, major osteoporotic fracture and vertebral fracture respectively. Meta-analytic calibrated HRs for the lower 75% hip fracture risk subpopulation were 1.01 [0.84-1.20], 1.08 [0.97-1.21], and 1.20 [0.98-1.46], respectively. In the top 25% risk subpopulation the respective estimates were 0.92 [0.76-1.12], 0.94 [0.82-1.09], and 0.91 [0.80-1.04]. Our negative control analyses showed evidence of residual confounding.

**Conclusion:** Our study found relevant treatment effect heterogeneity, with a tendency towards favouring TP in patients with high anticipated hip fracture risk. However, negative control outcome analyses pointed towards unresolved confounding.

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## P1040

### LONG-TERM EFFECT OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS) ON SYMPTOMS AND STRUCTURAL DEFECTS OF KNEE OSTEOARTHRITIS: META-ANALYSES OF EMULATED TRIALS USING MULTICOHORT DATA

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**Objective:** Knee osteoarthritis (KOA) is a common degenerative joint disease affecting millions worldwide. Nonsteroidal anti-inflammatory drugs (NSAIDs) are widely used for pain relief in KOA in the short term. However, the long-term effects of NSAIDs on symptoms and structural defects of KOA remain uncertain.

**Methods:** We conducted three emulated target trials to simulate randomized clinical trials using data from three cohorts: the Osteoarthritis Initiative (OAI); the Multicenter Osteoarthritis (MOST); and the Cohort Hip and Cohort Knee (CHECK) study. The trials were designed to compare the effects of the use vs. non-use of NSAIDs from baseline to 1-to-1.25 years on outcomes for KOA over 4-to-5 years in people with or at risk of KOA. Our primary outcomes were the symptoms of KOA (assessed using the score

from WOMAC) and the incidence of total knee replacement (TKR). Our secondary outcomes were the worsening of KOA as assessed by Kellgren-Lawrence grade, and the worsening of joint space narrowing (JSN) and osteophytes on femoral and tibial surfaces on the lateral and medial sides of the knee. We then performed meta-analyses of the results of these trials to obtain overall effect sizes.

**Results:** A total of 1,412 participants were included in all analyses. Compared to non-use, the use of NSAIDs increased the scores for all symptoms of KOA (pain by 0.51 [95%CI 0.26, 0.77] units; disability by 1.40 [95%CI 0.24, 2.56] units; and stiffness by 0.18 [95%CI 0.04, 0.31] units), as well as increased odds of the incidence of TKR (odds ratio [OR] 2.24 [95%CI 1.40, 3.57]). There was no significant difference between the non-use and use of NSAIDs in any of the secondary outcomes investigated, except for worsening JSN on the lateral side of the knee with the use of NSAIDs (OR 1.63 [95%CI 1.14, 2.35]).

**Conclusion:** Our findings suggest potential harm from the long-term use of NSAIDs for KOA. Thus alternative strategies for the long-term management of KOA in people with or at risk of KOA are warranted.

## P1041

### OSTEOPOROSIS, SARCOPENIC OBESITY AND METABOLIC SYNDROME IN THE CONTEXT OF DEPRESSION

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**Objective:** Metabolic syndrome may be associated with sarcopenic obesity. The use of antidepressive agents is associated with obesity and the development of diabetes mellitus. Antidepressants also appear to cause osteoporosis. The aim was to describe 10 cases of female patients who developed metabolic syndrome, sarcopenic obesity, diabetes mellitus and osteoporosis on treatment with antidepressants for major depression.

**Methods:** A cohort of female patients, aged 45-64 years old is described. A cohort of female patients with major depression on treatment with antidepressive agents presented with obesity and diabetes mellitus. Patients had sarcopenia and sarcopenic obesity was diagnosed. BMD was measured along with 25(OH) D<sub>3</sub> levels.

**Results:** Osteoporosis was diagnosed in all patients, T-score ranging from -2.6 to -3.4 and low vitamin D was observed in all patients. Alendronate effervescent tablets 70 mg once weekly was administered along with cholecalciferol and calcium. Additionally, instructions for low intensity exercise in the form of walking daily were given.

**Conclusion:** The dangerous metabolic phenotype of sarcopenic

obesity may accompany major depression and may further aggravate the cardiometabolic risk inherent in depression. The addition of osteoporosis in this phenotype points out that patients with major depression should be counseled to follow a daily program of mild exercise both to improve bone and metabolic health as well as to improve anxiety and depression.

## P1042

### DEVELOPMENT OF MACHINE LEARNING ALGORITHM USING ROUTINELY COLLECTED ELECTRONIC HEALTH RECORD (EHR) VARIABLES FOR FALL-RISK ASSESSMENT IN HOSPITALIZED PATIENTS

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**Objective:** Inpatient falls are a significant concern in hospitals, particularly among elderly patients, and can lead to serious injuries and increased healthcare costs. Conventionally, fall risk is assessed using a patient questionnaire and there is a limitation in its accuracy. In recent years, machine learning algorithms have been used to develop risk assessment tools that can help identify patients at risk of specific diseases or conditions and provide appropriate interventions. In this study, we developed an inpatient fall risk assessment tool using a machine learning algorithm based on the electronic health record (EHR) data.

**Methods:** The data were collected from the EHR of 16,950 patients who were admitted to Yongin Severance Hospital from 2018-2020 and were 50 years of age or older. The predictor variables comprised only routinely collected clinical information, including patients' demographics (Age, gender, and BMI), history of falls, vital signs (SBP, DBP, and PR), and laboratory parameters. Fall risk prediction models were constructed using the eXtreme gradient boosting (XGB) algorithm, and the sensitivity, specificity, and areas under the curves (AUCs) of the receiver operating characteristic (ROC) curve of the developed model were compared to those of the conventional questionnaire-based fall risk assessment tool. A comparative validation of XGB and the questionnaire-based fall risk assessment was conducted with a prospective cohort of 3,650 participants.

**Results:** A total of 295 falls occurred in this analyzed cohort. The XGB model achieved an AUC of 0.81 (95%CI 0.77-0.85), with higher predictive performance compared to the questionnaire-based risk assessment (0.64, 95%CI 0.61-0.67). The history of falls, serum glucose level, serum phosphate level, age, and BMI were considered the most important features for predicting inpatient fall risk.

**Conclusion:** Machine learning algorithm based only on EHR data provides better accuracy in predicting fall risk compared to conventional questionnaire-based risk tool. Our tool has the potential to assist healthcare professionals in identifying and managing

inpatient fall risks, ultimately improving patient outcomes and reducing healthcare costs.

### P1043

#### TAE BO EXERCISES AS A POSSIBLE WAY OF EXERCISE FOR PEOPLE WITH OSTEOPOROSIS

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Osteoporosis is a disease that, in the age of industrialization and the application of new technologies, is present in younger and younger people. As a disease, it represents a major medical, social and economic problem. The aim of this work, in addition to its educational character, is to point out the possibility of positive effects on bone mass, lower FRAX scores and better quality of life in people with osteoporosis with Tae Bo exercises.

Working hypothesis: Subjects who perform Tae Bo exercises have better bone mass, lower FRAX score and better quality of life compared to those who do not exercise.

Null hypothesis: Subjects who do not practice Tae Bo exercises have the same bone mass, the same FRAX score and the same quality of life as subjects who practice Tae Bo exercises.

The research is a prospective randomized controlled study conducted on 92 women aged 55 to 65 with a diagnosis of osteoporosis. At the beginning and at the end of the research, laboratory findings of blood, urine, densitometry were performed, and the ten-year fracture risk assessment questionnaires (FRAX) and the QUALEFFO 31 quality of life questionnaire were filled in. The results of the research confirmed the working hypothesis, although there are positive developments; although significantly smaller observed also in subjects who did not practice Tae Bo.

Research results have shown that regular Tae Bo practice can increase bone mass, improve muscle strength and coordination, and reduce the tendency to fall. It is essential to point out that people who practiced Tae Bo developed a positive attitude about regular exercise, and at the end of the research, a better quality of life can be observed in the subjects of group A, compared to the subjects of group B.

### P1044

#### CAN PATIENTS WITH CHRONIC KIDNEY DISEASE BE TREATED WITH A COMBINATION OF TERIPARATIDE AND DENOSUMAB?

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**Objective:** Osteoporosis is a chronic metabolic disease of the bone which is caused by decrease of bone mass, making it susceptible to breaks. Kidney is one of the key organ in metabolism of vitamin D, transforming inactive vitamin D form into active one, which have a role in building up the bone mass. Patients with chronic renal insufficiency (CRI) have problems with metabolism of vitamin D, and thus with building up the bone mass. A combined therapy with two anti-osteoporosis drugs, Denosumab, a human monoclonal antibody, and Teriparatide, recombinant protein form of PTH, is suggested. In this case report we show how to treat severe osteoporosis in CRI.

**Case report:** Female patient is diagnosed with osteoporosis in 2019. She has diabetes mellitus (DM) since 2010, with developed diabetic nephropathy since 2018, and CRI stage III a year after (eGFR 51 ml/min/1,73m<sup>2</sup>). She is on intensive insulin therapy – glargine and insulin as part which kept her blood glucose in normal ranges. Other comorbidities include hypertension treated with ACEi and Ca antagonist. Since osteoporosis is diagnosed, she has been treated with bisphosphonate drug ibandronate, 150 mg/month, Ca 1500 mg/d and vitamin D3 3200 ij/d. Same year in December, patient had severe back pain, RTG and DXA diagnostic confirmed vertebral fracture. Her lab showed osteocalcin 40,61 ng/ml, β-CrossLaps 875,2 pg/ml, Ca 2,55 mmol/l, vitamin D3 80 nmol/l. After this incident, teriparatide 20 µg s.c. daily for 24 months, and denosumab 60 mg s.c. daily for 6 months, are included in basic therapy, with DXA control after one year, and Ca, vitamin D, osteocalcin and β-CrossLaps control after 3, 6 and 12 months. Control DXA after one year showed no significant changes in bone density, which was to be expected. Another control DXA at the end of 2018, after the end of treatment with denosumab and teriparatide was done. Her lab work showed osteocalcin 85,27 ng/ml, β-CrossLaps 985,2 pg/ml, Ca 2,45 mmol/l, vitamin D3 95 nmol/l, and eGFR 34 ml/min/1,73m<sup>2</sup> (progression to CRI stage IV). Patient generally feels better, she has minimal back pain with orthosis, and her body height decreased 3 cm. During the therapy her blood glucose was in normal ranges, with HbA1c around 7.5% and blood glucose never exceeding 9 mmol/l. She continued therapy with Ca 1500 mg/d, cholecalciferol 3300 ij/d, combined with physical therapy. Two months ago, her eGFR is 42/ml(min and his DXA increase on lumbar spine for 1,2% during 2 years, and cortical measurement on the hip increase for 0,85%. She hasn't had new fracture and her mobility is same as on the starting therapy.

**Conclusion:** With careful control, simultaneous therapy with teriparatide and denosumab in patients with CRI has a favorable effect on the preservation of bone mass and bone strength and may be the best choice for fracture prevention.

P1045

**VERTEBRAL FRACTURES IN CHILDREN WITH OSTEOGENESIS IMPERFECTA**V. Vadzianava<sup>1</sup>, A. Pachkaila<sup>1</sup><sup>1</sup>Belarusian Medical Academy of Post-Graduate Education, Minsk, Belarus

**Objective:** Osteogenesis imperfecta (OI) is one of the most common diseases associated with the primary osteoporosis in children. Children with OI often experience multiple vertebral body fractures contributing to poor quality of life. The aim of study was to evaluate the capabilities of the densitometric method in assessing vertebral fractures in children with OI.

**Methods:** The study group of 33 children aged 11 (7.5; 13) years old, with established OI was examined. Anthropometry, general clinical examination, DXA with analysis of the spine using a program for vertebral fractures assessment (VFA) were performed. We used the Genant classification. Statistical processing was performed using the program Statistica 10.0.

**Results:** A total of 375 vertebrae were evaluated, of which 38 (10%) were excluded from the analysis and were predominantly located in the upper thoracic spine (Th4-Th7). A total of 31 vertebrae met the fracture criteria. The most common localization of vertebral body fractures is the thoracic spine (n=21), followed by fractures of the lumbar spine (n=10). 12 (36%) patients had vertebral fractures, while 9 (75%) patients had two or more at the same time. It should be noted that 4 children had fractures of the vertebral bodies despite normal values of BMD.

**Conclusion:** The use of densitometric VFA evaluation of the spine for method in OI patients makes it possible to evaluate 90% of the vertebrae at the Th4-L4 level, which indicates its high diagnostic potential and applicability in clinical practice. In addition, the method assumes a minimum radiation exposure (0.083 mSv), which is very important especially for pediatric patients who need dynamic monitoring, and allows a comprehensive assessment of BMD and morphological changes in the vertebrae. Since vertebral fractures are common and asymptomatic, it can be recommended to integrate densitometric VFA into the plan for regular examination of these patients.

P1046

**MELORHEOSTEOSIS 14 YEARS - FOLLOW UP**V. Vyskocil<sup>1</sup><sup>1</sup>Charles University Hospital Plzen Centre for Metabolic Bone Diseases, Plzen, Czechia

Author present a case of 39-year-old female. Despite the severe restriction of shoulder and elbow joint movement, palmar flexion of the wrist and concomitant affection of vertebral body of cervical spine and collarbone the diagnosis was confirmed as late as her age of 25 as a consequence of injury. Differential diagnosis, conservative as well as surgery treatment was further discussed. After the diagnose confirmation the patient was treated with 70

mg once weekly alendronate, nifedipine and non-steroidal anti-rheumatics. There was a quick improvement in pain and vasomotor functions. Further medication was needed to solve sleep disturbances. Due to the successful management of subjective symptoms there was no need for nerve oppression surgery.

Pharmacotherapy continued for the period of 4 years without disease progression, impaired movement ability and with manageable level of pain. After cessation of alendronate treatment, analgesics dosing had to be increased and hypnotic were used for emerging sleep disturbances. There were various combination of medication used because of intolerance (tramadol) and prevention of drug abuse. There has been progressive edema of 3rd finger observed as well as deterioration of shoulder and elbow mobility. The patient stopped working. She is monitored by imaging methods currently. Bone alteration unfortunately disables surgical joint release.

The interesting point of this case report is that despite of multimodal affection of skeleton, progression of the disease was localized in left upper arm only.

P1047

**HIGH-INTENSITY INTERVAL TRAINING (HIIT) IMPROVES BONE METABOLISM MARKERS IN HIGH-FAT DIABETIC RATS**M. S. Gorgani-Firuzjah<sup>1</sup>, D. R. Gorgani-Firuzjaee<sup>2</sup>, D. R. Khalagi<sup>3</sup>, D. R. Fahimfar<sup>4</sup>, D. R. Sanjari<sup>4</sup>, D. R. Ostovar<sup>4</sup>

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**Objective:** In patients with type 2 diabetes, bone formation is altered and bone turnover is affected by the patient's blood glycemic control status. Exercise can reduce or delay the process of osteoporosis by increasing effective bone metabolism. This study aims to compare the effect of continuous endurance training (CET) and HIIT on the expression of osteocalcin, alkaline phosphatase, and  $\beta$ -C-terminal telopeptide (CTX) in high-fat diet (HFD)-induced diabetic rats.

**Methods:** 50 male Wistar rats were fed a high-fat, high-calorie diet for 16 weeks. After induction of insulin resistance, 30 rats were randomly selected and divided into three groups of 10 HIIT, CET, and Sedentary. Before and after eight weeks of training, serum levels of bone alkaline phosphatase, osteocalcin, and CTX were measured and their differences were compared between the groups by ANOVA and independent t-test.

**Results:** As shown in Table 1, exercise intervention decreased fasting blood sugar and serum CTX levels, while increasing the levels of osteocalcin and bone alkaline phosphatase in both train-



ing groups. Interestingly, the HIIT intervention was significantly more effective than the CET.

**Conclusion:** The results of the study indicated that regular exercise, especially HIIT has a positive effect on improving metabolic markers affecting bone function in addition to improving glucose and fat control.

**Table 1.** Serum biochemical parameters in the studied group

	NC	DC	CET	HIIT	
Characteristics	Mean±SE	Mean±SE <sup>a</sup>	Mean±SE <sup>b</sup>	Mean±SE <sup>c</sup>	p-value
FBS (mg/dl)	105.33±8.84	356.33±33.21 p<0.0001	244.33±19.38 p<0.0001	197±11.69 p<0.0001	<0.05
BONE ALK (IU/ML)	361.66±25.76	108.66±9.97 p<0.01	200.83±15.43 p<0.01	245.16±12.79 p<0.05	<0.05
Osteocalcin (pg/ml)	67.5±8.82	23.66±6.25 p<0.01	43.16±5.98 p<0.01	63.83±6.46 p<0.01	<0.05
CTX (ng/dl)	28.66±3.01	76±7.26 p<0.01	60.5±7.14 p=0.02	37.33±4.13 p<0.01	<0.05

<sup>a</sup>: All p-values in this column are significantly different vs. NC; <sup>b</sup>: All p-values in this column are significantly different vs. DC; <sup>c</sup>: All p-values in this column are significantly different vs. DC (n=6); NC: non-diabetic control; DC: diabetic control; CET: continuous endurance training; HIIT: high intensity interval training; FBS: fasting blood sugar

## P1048

### EVALUATION OF BONE MINERAL DENSITY, BODY COMPOSITION AND TRABECULAR BONE SCORE IN PATIENTS WITH SEVERE PSORIASIS

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**Objective:** Psoriasis is a systemic disease that evolves with chronic subclinical inflammation, leading to a higher risk of comorbidities. The trabecular bone score constitutes an index to estimate the bone microarchitecture through the analysis of lumbar vertebrae, being a predictor of fracture risk independent of BMD. We aimed to evaluate the trabecular bone score, BMD and body composition in patients diagnosed with severe psoriasis at a dermatology outpatient clinic.

**Methods:** Cross-sectional study, with patients over 18 years old and diagnosed with psoriasis being followed up from July 2021 to March 2022. Patients with diabetes mellitus, chronic kidney disease, systemic arterial hypertension, BMI greater than 35 and diagnosis of psoriasis were excluded. The clinical variables analyzed were gender, age, menopause, smoking, alcohol consumption, disease duration, age at diagnosis, immunosuppression/oral corticosteroid use, current treatment, diagnosis of other autoimmune diseases, abdominal circumference, weight, height and body mass. By means of bone densitometry and body composition tests, mineral density in the femur and lumbar spine,

trabecular bone score, android/gynoid ratio, body fat index and appendicular muscle mass index were measured. The project was approved by the research ethics committee of the institution.

**Results:** The sample contains 17 patients, nine females and eight males, aged between 24-70 years and diagnosed with severe psoriasis. The median disease duration in the analyzed group was 10 years. Only one patient had degraded microarchitecture, six were diagnosed with osteopenia and one with osteoporosis. The proportion of change in bone mass in individuals aged 50 years or older in the sample (87.5%) was statistically significant when compared to the proportion of this change in individuals in the general population of the same age group (43.1%). As for the analysis of body composition, nine patients had higher than expected fat index values, thirteen had a high android/gynoid ratio and four had a reduced appendicular muscle mass index.

**Conclusion:** Our data support a benefit in anticipating the screening of bone changes in patients with severe psoriasis over 50 years of age.

## P1049

### OSTEOPOROSIS ASSOCIATED WITH PREGNANCY AND LACTATION: A DESCRIPTIVE MINI-REVIEW

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**Objective:** When vertebral fractures occur in pregnant or breastfeeding women, it is usually not known whether the skeleton was normal prior to pregnancy. Maternal adaptation slightly increases bone resorption during pregnancy and markedly during lactation. Net bone loss can sometimes lead to fractures, especially in women who had low bone mass or skeletal fragility before pregnancy.

**Methods:** For the period of 2019-2022, 27 women with a diagnosis of OPL applied to our center. All women at the time of treatment had complaints of back pain that arose in the main third trimester of pregnancy or in the first six months of lactation.

**Results:** In 52.1% of patients, a fracture was during the 1st pregnancy (n=14), 18.5% of the patients had a fracture during the 2nd pregnancy (n=5), the same number of patients had a fracture during the 3rd pregnancy, and only 3.7% of patients suffered a fracture during their 4th pregnancy (n=1). No fractures were observed in 7.4% of patients (n=2). Pain during pregnancy was experienced by 13 patients, which accounted for 48.1%, on average they experienced pain at 6 months of pregnancy. Pain during lactation was observed in 51.8% women (n=14). According to the results of the MRI study, the examined participants revealed fractures of the vertebrae, so in 17 patients there was a fracture of an average of 2.4 vertebrae in the L1-L4 spine, in 3 patients in the Th1-Th7 region, a fracture of 2 vertebrae was observed. 18 patients also had 2 fractures in the Th7-Th12 spine, one patient had 1 fracture in another area. Mixed fracture (L and Th) was observed in 7 patients. To assess the state of bone density, patients

underwent DXA. The results of the study showed that the Z-score L1-L4 of the lumbar spine averaged -2.82, the T-score of the same area was at the level of -2.83. BMD L1-L4 was at the level of 0.82 g/cm<sup>2</sup>.

**Conclusion:** Early diagnosis and treatment of osteoporosis in pregnant and lactating women is of great importance for maintaining health and quality of life. More research is needed.

## P1050

### CUT-OFF VALUES WHILE ASSESSING MUSCLE QUALITY FOR SARCOPENIA: MUSCLE RADIATION ATTENUATION (MRA) AND INTRAMUSCULAR ADIPOSE TISSUE CONTENT (IMAC) CUT-OFFS AT L3 VERTEBRA LEVEL BY COMPUTERIZED TOMOGRAPHY

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**Objective:** Assessment of muscle quality is an essential component while evaluating sarcopenia. Computed tomography (CT), which is accepted as a gold standard technique for the evaluation of muscle quantity, is also useful for evaluating skeletal muscle quality via measurement of adiposity. To this end, MRA value (conversely related to muscle fat content) and IMAC are used. We aimed to determine cut-offs for MRA and IMAC at lumbar 3 (L3) vertebra level from a Turkish young reference population.

**Methods:** We retrospectively evaluated the preoperative plain CT images and the data of living adult liver donors who admitted to a single transplantation center between June 2010 and April 2018. The data of the patients aged between 18-40 were included. We derived cut-off values by using the 5th percentile value.

**Results:** A total of 482 participants were included (age: 28.8±5.9; 55.6% male). Mean MRA and IMAC values were 42±7.8, -0.38±0.09 HU for males and 33.4±9.4, -0.29±0.09 HU for females, respectively. Cut-off values for MRA and IMAC were determined as 30 and -0.543 HU for males and 18 and -0.464 HU for females, respectively. The results are outlined in Table 1 and 2 with a comparison with other reported cut-offs so far.

**Conclusion:** We determined sex-specific cut-off values for MRA, IMAC for Turkish population by percentile 5 method. MRA and IMAC cut-offs reported in the literature change by the method used to determine cut-offs and also by the specific population. Our results are comparable with some of them but not with some others.

**Table 1.** Cut-off values of MRA determined by computerized tomography in different populations by different methods

Author	Age	Study population	Method	cut-off value (HU) Female/ Male
Derstine et al.	18-40	Healthy US	-2 SD	34.3/38.5
van der Werf et al.	20-60	Healthy Caucasian	p5	24.8/30.9
Ebadi et al.	56±8	Canadian patients with cirrhosis	Tertile based	28/33
van Dijk DP et al.	69.8±8.7	Dutch patients with pancreatic cancer	Tertile based	30.9/33.9
Martin et al.	64.7±11.2	Canadian patients with cancer		41 for patients with BMI<25 kg/m <sup>2</sup> , 33 for patients with BMI≥25 kg/m <sup>2</sup>
Meister FA et al.	47-66	German liver recipients	Quartile based	26.6/28.6
Our study	18-40	Healthy Turkish adults	p5 Quartile based Tertile based	18/30 27.7/37 29/39

Author	Age	Study population	Method	cut-off value (HU) Female/ Male
Watanabe et al.	≥65	Japanese patients who underwent gastrectomy	area undercurve	-0.160/-0.245
Meister FA et al.	47-66	German liver recipients	quartile based	-0.320/-0.350
Hamaguchi et al.	43-62	LDLT patients	mean+2SD	-0.229/-0.358
Kamigaichi et al.	67.4±10.1	Japanese patients with lung cancer	Quartile based	-0.34/-0.38

Abbreviations: BMI: body mass index; HU: Hounsfield unit; MRA: muscle radiation attenuation; p5: 5th percentile, SD: standard deviation

**Table 2.** Cut-off values for IMAC determined by computerized tomography in different populations by different methods

Author	Age	Study population	Method	cut-off value (HU) Female/ Male
Derstine et al.	18-40	Healthy US	-2 SD	34.3/38.5
van der Werf et al.	20-60	Healthy Caucasian	p5	24.8/30.9
Ebadi et al.	56±8	Canadian patients with cirrhosis	Tertile based	28/33
van Dijk DP et al.	69.8±8.7	Dutch patients with pancreatic cancer	Tertile based	30.9/33.9
Martin et al.	64.7±11.2	Canadian patients with cancer		41 for patients with BMI<25 kg/m <sup>2</sup> , 33 for patients with BMI≥25 kg/m <sup>2</sup>
Meister FA et al.	47-66	German liver recipients	Quartile based	26.6/28.6
Our study	18-40	Healthy Turkish adults	p5 Quartile based Tertile based	18/30 27.7/37 29/39

Kaibori et al.	65-75	Japanese patients with HCC	Area undercurve	-0.31/-0.44
Our study	18-40	Healthy Turkish liver donors	p95 quartile based Mean+2SD	-0.147/-0.258 -0.229/-0.330 -0.103/-0.204

Abbreviations: HCC: hepatocellular carcinoma; HU: Hounsfield unit; IMAC: intramuscular adipose tissue content; LDLT: living donor liver transplant; p95: 95th percentile; SD: standard deviation

## P1051

### THE ASSOCIATION OF REGIONAL BODY MUSCLE MASS AND FATTY LIVER INDEX IN OLDER PEOPLE: BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

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**Objective:** Some studies have found a relationship between hepatic steatosis and sarcopenia. The common pathogenesis of non-alcoholic fatty liver disease (NAFLD) and age-related low muscle mass is insulin resistance and the distribution of fat in these organs. This study aimed to assess the association between body skeletal muscle mass and another parameter of sarcopenia with fatty liver index (FLI), as an invasive and simple tool to establish NAFLD, in Iranian older people.

**Methods:** This cross-sectional study ultimately included 400 participants aged  $\geq 60$  from stage II of the BEH program. FLI was calculated from BMI, waist circumference (WC), serum triglyceride (TG), and gamma-glutamyl transferase (GGT). The body muscle mass was established by DXA and muscle strength was assessed by a dynamometer. The skeletal muscle mass index (SMI) was defined as the appendicular lean mass (ALM) adjusted for the BMI. low SMI was defined as  $ALM/BMI < 0.789$  and  $< 0.512$  in men and women, respectively.

**Results:** There was a pattern of decreasing SMI with increasing quartiles of FLI ( $P < 0.001$ ). Compared with the first quartile (Q1) of FLI, mean lower limbs lean, upper limbs lean, and trunk lean in the fourth quartile (Q4) were lower ( $P < 0.001$ ). Also, percent of

people with lower SMI was 27.6% in Q4 compared to Q1 which was 18.3%. However, there was no significant association between muscle strength and FLI. Multivariate linear and logistic regressions were used to reveal the association between FLI and regional muscle mass and low SMI. In all linear models, the higher quartile of FLI was associated with decreased lower limbs lean., upper limbs lean, trunk lean, and SMI ( $P < 0.05$ ). Also, participants with the higher quartile of FLI were more likely to have the risk of low SMI and this association remained even after adjusting for potential covariates [aOR: 7.81(3.51-17.41)].

**Conclusion:** The findings revealed that FLI, as an index of NAFLD, was a significant and potent risk factor for low skeletal muscle mass in older people.

## P1052

### ENHANCED COMPLIANCE OF A GASTRO-RESISTANT FORMULATION ORAL BISPHOSPHONATE

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**Objective:** To assess compliance of gastro-resistant risedronate (GR cohort) and compare it to other immediate release bisphosphonates (IRBP cohort)

**Methods:** The study was based on THIN<sup>®</sup>, a large Electronic Health Records database collected at the physicians' level, owned by CegeDim. In France, epidemiological observatory THIN consists in 2,000 GPs and 1,000 liberal specialists. All data is collected through the prescription software. Patients with a first prescription of 6 months or less of gastro-resistant risedronate at the beginning of three six months periods: first semester of 2021 (S1-21), second semester of 2021 (S2-22) and first semester of 2022 (S1-22), were included in the study. The Medication Possession Rate (MPR) was calculated through the THIN data. An identical cohort with any IRBP prescription was used as a comparator for the three survey periods.

**Results:** Patients included in the study were 850 for S1-21, 823 for S2-21 and 596 for S3-22 for the GR cohort and 4,117 for S1-21, 3,845 for S2-21 and 2,637 for S3-22 for the IRBP cohort. Prescribers were mainly general practitioners (from 53-64% depending on the study period) and rheumatologists (from 36-45%). The mean MPR in the GR cohort was 70% in S1-21, 73% in S2-21 and 78% in S1-22. A 100% MPR was observed in this cohort for 66% of the patients in S1-21, 66% in S2-21 and 70% in S1-22. In IRBP cohort, a 100% MPR was observed in 47% of the patients in S1-21, 50% in S2-21 and 51% in S1-22. A MPR  $< 50\%$  was observed in 25, 25 and 20% of the patients respectively in S1-21, S2-21 and S1-22 for the GR cohort. In the IRBP cohort a MPR of  $< 50\%$  was observed in 44, 40 and 39% of the patients respectively for the same periods.

**Conclusion:** The results of this "real life" study suggest an improved compliance with gastro-resistant risedronate compared with the overall oral bisphosphonates. This could be explained by the possibility of taking the drug immediately after breakfast, avoiding the constraint of a fasting period in the morning after

taking oral bisphosphonates.

### P1053

#### 3D-DXA ANALYSIS OF THE EFFECTS OF THE ANTICOAGULANT WARFARIN AND DIRECT ACTING ORAL ANTICOAGULANTS (DOACS) ON CORTICAL AND TRABECULAR BONE

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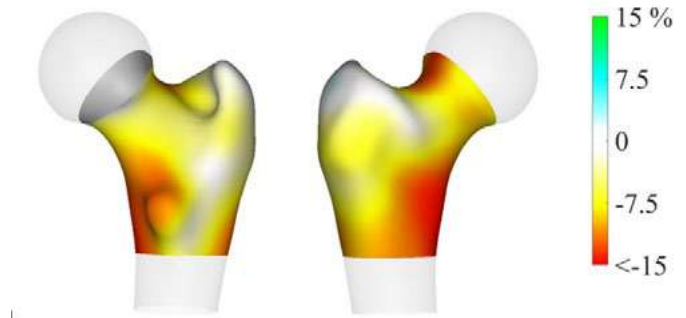
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**Objective:** DOACs are therapeutic alternatives to warfarin, that act independently of vitamin K, thus not affecting bone matrix formation. The aim of this study was to evaluate the effects of the two groups of anticoagulants on areal BMD (aBMD), bone geometry and volumetric BMD determined by 3D-DXA software compared to a control group.

**Methods:** This cross-sectional and observational study includes patients using oral anticoagulants for >1 year grouped into a DOAC (DOACG) or warfarin (WG) groups, and an age-matched control group (CG). All subjects filled out a questionnaire and underwent a hip densitometry exam (DXA) with the evaluation of total areal BMD (aBMD). DXA-based 3D modeling software (3D-Shaper v2.11.1, 3D-Shaper Medical, Spain) was used to compute the cortical thickness (Ct.Th), the integral, cortical and trabecular volumetric BMD (Int.vBMD, Ct.vBMD, Tb.vBMD) and the cortical surface BMD (Ct.sBMD) at the hip from 2D DXA scans.

**Results:** A total of 143 individuals were included: 43 (26 men) in CG, 38 (21 men) in WG and 42 (26 men) in DOACG. Mean age was 62.2±6.7 years and mean BMI was 30.2±5.3 kg/m<sup>2</sup>. No differences between groups were found in age, BMI and comorbidities. In men, no differences between groups were found in aBMD or 3D-DXA measurements. In women, aBMD was lower in WG (0.850±0.105 g/cm<sup>2</sup>) compared to CG (0.945±0.133 g/cm<sup>2</sup>, p=0.027). Besides, women in WG had lower cortical parameters (Ct.vBMD, Ct.Th and Ct.sBMD, p<0.05), compared to CG. No difference was found between women in DOACG and CG, as well as between women in DOACG and WG. However, the 3D-DXA analysis of the anatomical distribution of mean differences between groups showed regions with impaired cortical sBMD in WG, compared to DOACG (Figure).

**Conclusion:** Warfarin was found to be associated with a marked negative impact on the cortical bone, compared to controls. DOACS did not show a negative impact. Further studies are needed to confirm these initial results and possible compensation options for induced bone impairment.



### P1054

#### ECONOMIC EVALUATION OF FOUR TREATMENT STRATEGIES FOR POSTMENOPAUSAL PATIENTS WITH OSTEOPOROSIS AND A RECENT FRACTURE IN MAINLAND CHINA: A COST-EFFECTIVENESS ANALYSIS

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**Objective:** To evaluate the cost-effectiveness of four anti-osteoporosis medications (denosumab, zoledronate, teriparatide, and alendronate) for postmenopausal osteoporotic women in mainland China, using a stratified treatment strategy recommended by the American Association of Clinical Endocrinologists and the American College of Endocrinology (AAACE/ACE).

**Methods:** A microsimulation Markov model was used to compare the cost-effectiveness of the four treatments in postmenopausal osteoporotic patients of different ages (65, 70, 75, and 80 years), with a recent fracture from the Chinese healthcare perspective. The primary outcome was the incremental cost-effectiveness ratio (ICER), which represent the incremental cost per quality-adjusted life-year (QALY) obtained. One-way deterministic sensitivity analysis (DSA) and probabilistic sensitivity analysis (PSA) were performed to assess the robustness of model findings.

**Results:** Alendronate was dominated by denosumab and zoledronate at all ages examined, indicating that the costs of the two drugs were lower, but QALYs was greater. However, teriparatide yielded an ICER of \$76,432.07/QALY, compared with alendronate at age 65, which exceeded the predetermined willingness-to-pay threshold of \$37,653/QALY. The results were similar at other ages. The DSA showed that the most sensitive parameters were drug efficacy for vertebral and wrist fractures, the relative risk of vertebral fractures, and the persistence of the drugs. The PSA showed that zoledronate had a 100% probability of being the most cost-effective treatment, with a willingness-to-pay threshold of \$37,653/QALY.

**Conclusion:** Stratified treatment based on very high fracture risk is more cost-effective than conventional pills in mainland China. Among the stratified treatments, zoledronate is the optimal op-

tion.

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### P1055

#### VITAMIN D SUPPLEMENTATION IMPROVES IRON STATUS AND INFLAMMATION MARKERS IN OLDER PEOPLE WITH RENAL IMPAIRMENT

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**Objective:** Chronic kidney disease (CKD) leads to alterations in FGF23 and the renal-bone axis, which may partly be driven by altered inflammation and iron status. Vitamin D supplementation was reported to reduce inflammation.

**Methods:** Older adults with normal renal function (estimated glomerular filtration rate (eGFR) >90 mL/min/1.73m<sup>2</sup>; CKDG1; n=35) or early CKD (eGFR 30-60 mL/min/1.73m<sup>2</sup>; CKDG3a/b; n=35) received 12,000, 24,000 or 48,000 IU D<sub>3</sub>/month for 1 year. Markers of inflammation, iron and renal-bone axis were investigated pre- and post-supplementation. Predictors of C-terminal and intact FGF23 (cFGF23; iFGF23) were identified by univariate and multivariate regression.

**Results:** Pre-supplementation, plasma cFGF23, iFGF23, PTH (iPTH), sclerostin and TNF $\alpha$  were significantly higher and Klotho, 1,25-dihydroxyvitamin D and iron lower with CKDG3a/b compared to CKDG1. Post-supplementation, only 25-hydroxyvitamin D, cFGF23 and IL-6 differed between groups. The effect of supplementation was eGFR dependent. In the CKDG3a/b group, TNF $\alpha$  significantly decreased and iron increased. In the CKDG1 group, phosphate decreased, cFGF23, iFGF23 and procollagen type I N-propeptide increased. IL-10 and 25(OH)D increased and C-terminal collagen crosslinks decreased in both groups. No significant differences were found between vitamin D doses. In univariate models cFGF23 and iFGF23 were predicted

by eGFR and regulators of calcium/phosphate metabolism at both time points; IL-6 predicted cFGF23 (post-supplementation) and iFGF23 (pre-supplementation) but was not significant in multivariate models. Hepcidin predicted cFGF23 in a multivariate model with eGFR and iFGF23 post-supplementation. **Conclusion:** Alterations in regulators of the renal-bone axis, inflammation and iron status were observed in early CKD. The response to vitamin D supplementation differed between eGFR groups. Plasma IL-6 predicted cFGF23 and iFGF23, hepcidin predicted cFGF23.

### P1056

#### THROMBOPHILIA, PREMATURE MENOPAUSE AND OSTEOPOROSIS

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**Objective:** The presence of factor V Leiden is the cause of one of the most common hereditary hypercoagulability disorders. Premature menopause is associated with osteoporosis. Heparin administration may be associated with osteoporosis, although the results are not as clear for low weight heparin. The aim was to present the case of a patient, heterozygous for factor V Leiden, with premature menopause who presented with osteoporosis.

**Case report:** A female patient aged 47 y presented with osteoporosis, T-score -2.8. The patient had premature menopause at the age of 42. After birth of her first child thrombus formation was observed in the placenta. Therefore, analysis for hypercoagulability disorders was made. She was found to be heterozygous for factor V Leiden. During pregnancy of her second child low molecular weight heparin was administered. After the diagnosis of osteoporosis, denosumab was administered for 2 years and BMD improved, T-score -2.4. The same treatment regimen was continued along with cholecalciferol and calcium.

**Conclusion:** Heparin administration may be associated with osteoporosis. However, low weight heparin may be associated with a decreased risk for osteoporosis. Additionally, the presence of factor V Leiden has been associated with transient hip osteoporosis. Premature menopause is also related to the development of osteoporosis. The successful management of osteoporosis in a patient, heterozygous for factor V Leiden, who had been administered heparin during pregnancy and had premature menopause is presented.

P1057

### ASSOCIATION BETWEEN MALNUTRITION AND OSTEOSARCOPENIC OBESITY AMONG IRANIAN OLDER PEOPLE: BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

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**Objective:** Osteosarcopenia and obesity are two conditions with some adverse outcomes in older people. The association between osteosarcopenia and obesity status newly termed osteosarcopenic obesity, with mal-nutrient, remains unknown. This study aimed to explore the association between the Mini Nutritional Assessment score and osteosarcopenic obesity in older people.

**Methods:** We included 2426 people aged  $\geq 60$  from stage II of the BEH program. Osteopenia/ osteoporosis was defined as a T-score  $\leq -1.0$  standard deviation below the mean values of a young healthy adult. We defined sarcopenia as reduced skeletal muscle mass, low muscle strength, and/or low physical performance. Osteosarcopenia was considered as the presence of both osteopenia/osteoporosis and sarcopenia. Obesity was defined as a percentage of fat mass  $\geq 32\%$  and  $25\%$  in women and men, respectively. Subjects were classified into 2 groups according to their obesity and osteosarcopenic status. The nutritional status was classified using Mini Nutritional Assessment (MNA) questionnaire. People with a score of 24 points or more were considered in an adequate nutritional state, those with scores 17-23.5 were at risk for malnutrition, and those with a score  $< 17$  were considered malnutritional status.

**Results:** The prevalence of osteosarcopenic obesity was 19.3%. Osteosarcopenic obesity residents had lower MNA scores than non- osteosarcopenic obesity residents ( $22.60 \pm 5.34$  vs.  $24.00 \pm 5.01$ ,  $p < 0.001$ ). Also, the prevalence of malnutritional and at-risk malnutrition status was significantly higher in the osteosarcopenic obesity group. The at-risk malnutrition and malnutritional status were associated with an increased risk of osteosarcopenic obesity [at-risk malnutrition: OR: 2.15(1.60-2.88); malnutrition: OR:1.63(1.27-2.11)]. After adjusting for independent variables (i.e. age, sex, total calorie intake, protein intake, physical activity, current smoking, and education), the association between osteosarcopenic obesity and at-risk malnutrition and malnutritional status remained significant [at-risk malnutrition: OR: 1.55(1.13-2.14); malnutrition: OR:1.53(1.16-2.00)].

**Conclusion:** The prevalence of osteosarcopenic obesity was high among Iranian older people. Osteosarcopenic obesity was associated with low nutritional status.

P1058

### IMPROVEMENT IN PATIENT OUTCOMES FOLLOWING INITIATION OF BUROSUMAB IN ADULTS WITH XLH: A SINGLE CENTRE EXPERIENCE

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**Objective:** X-linked hypophosphataemia (XLH) is a rare disease that increases FGF23 causing osteomalacia, pain and reduced mental health in adults. In clinical trials, burosumab significantly reduces pain and stiffness, improves function and increases fracture healing. We aimed to describe the broader benefits of burosumab real-world use in adults with XLH, including patient-reported outcomes, function, laboratory tests and bone scintigraphy.

**Methods:** A cohort of adults with XLH in a single tertiary hospital initiating burosumab. Baseline and one-year measures of EQ5D-5L, 6-minute walk test (6MWT), and timed up and go (TUG) were recorded as well as serum bone profile and whole-body scintigraphy. Paired parametric or non-parametric descriptive statistics were used.

**Results:** 28 adults (20 women) were included in the analysis, with a mean age of 42.8 yr (SD 14.6). As expected, there was a significant ( $p < 0.001$ ) increase in serum phosphate at 2 and 52 weeks compared with baseline values. At baseline, the best health imagined score was 55.11, which increased to 63.9 ( $p = 0.056$ ) at one year. At baseline, the number of adults reporting moderate, severe or extreme limitation were: mobility- 21 (75%); selfcare- 9 (32%); usual activities- 17 (61%); pain- 23 (82%); anxiety- 13 (46%). The proportion that reported no change, improvement or worsening at one year is shown in the Figure.1. Of 24 adults with baseline and follow-up opioid status, 6/14 (42.9%) of opioid users at baseline had stopped by one year ( $p = 0.006$ ), with no new opioid use. There were nonsignificant improvements in TUG (median change 0.8 s,  $p = 0.1$ ) but a significant improvement in 6MWT (median change 38.2 m,  $p = 0.048$ ). 9/28 (32%) adults exceeded the minimally clinically important difference of 80 m for 6MWT. Of the 23 patients with paired scintigraphy, 2 demonstrated healing of a fracture, 3 partial healing and 2 had suspicious new foci of turnover (Table 1).

**Conclusion:** The real-world experience of burosumab in adults with XLH replicates the benefits seen in clinical trials and extends the benefit to reducing opioid use.

**Disclosure:** Dr Gauri Krishna received an unrestricted research grant from Kyowa Kirin to support this real-world data collection

Change in EQSD domain score from baseline to 1 year in adults initiating burosumab for X-linked Hypophosphataemia

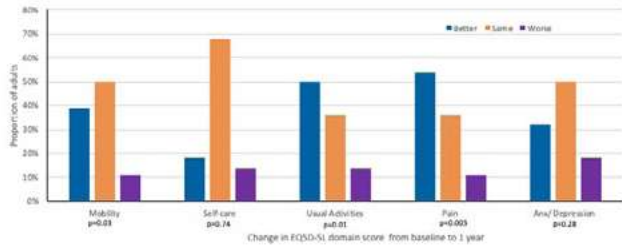


Figure 1.

Table 1.

No	Baseline	Follow-up	Outcome
0017	Degenerative changes in spine and joints	stable appearances of arthropathy	Nil
0020	Acute insufficiency fracture proximal right femur. Degenerative changes in shoulder hips and knees.	Resolution of right proximal femoral osteoblastic activity, no new stress fracture	Heal
0036	Irregular uptake: no acute insufficiency fracture, degenerative changes in ankle and right elbow	stable appearances of arthropathy	Nil
0037	Focal increased uptake in the ribs b/l and right proximal femur in keeping with fractures	Resolution in pathological uptake	Heal
0038	focal uptake along mid tibia, ribs 6-7 b/l may represent old fracture.	findings consistent with partial response to Bur	Partial
0040	Degenerative changes in spine and peripheral joints no pseudofractures	widespread changes of enthesopathy similar to prev. scan	Nil
0041	Irregular uptake: no acute insufficiency fracture	increased uptake in right 7 ribs lateral but no e/o acute insufficiency fracture	Nil
0048	findings consistent with arthropathy at shoulders elbows wrists, small joints of hands, knees, feet and first metatarsophalangeal.	New right hip prosthesis, stable and unchanged from last scan	Nil
0206	femoral shaft, tibial and calcaneal bones previous pseudofracture. Degenerative changes in multiple large and small joints.	previous foci appear less prominent	Partial
0625	Degenerative changes	longstanding arthropathy and bone deformity changes- stable	Nil
0998	degenerative changes with osteoblastic activity in the patella @ small suprapatellar infusion likely pain generator.	degenerative changes at the shoulders, elbows. Left hip and ankles as previously demonstrated	Nil
1772	Focal activity in proximal 3rd of right shaft femur: Enthesopathy	bowing deformity, some increased foci of increased uptake resolved, prominent activity remains in the skeleton	Partial
1929	Irregular uptake: no acute insufficiency fracture	deformity of the long bones, multifocal peri-articular tracer accumulation in the shoulders, elbows, wrists, hips, knees and ankle.	Nil
2383	Small focus of mild uptake of proximal right upper third of femur. old fracture sites. Left total hip replacement noted	arthropathy but no significant change	Nil

2691	structural changes with reduced leg length. Inc uptake knee, bowing of humeri.	no significance change	Nil
4792	right femoral fracture and degenerative full arthropathy	TB reported	
4872	Irregular uptake: no acute insufficiency fracture asymmetric uptake in left hip	stable appearances of arthropathy	Nil
7779	Irregular uptake: no acute insufficiency fracture	mildly increased uptake. Stable appearances	Nil
7841	Irregular uptake: no acute insufficiency fracture, degenerative changes, bone deformity	new small mild focus of uptake in prox rt femur, elsewhere unchanged	Worse
8292	stress fractures in tibia(b/l), right fibula shaft	prev fractures and generalised arthropathy	Nil
9184	degenerative changes	New foci of uptake in the tibia may represent stress fractures. Findings in the left hindfoot and at L5/S1 are suspicious for new insufficiency fractures	Worse
9598	Irregular uptake: no acute insufficiency fracture. Mild increased osteoblastic activity at L1	Multiple joint degenerative uptake, long bone deformity	Nil
9941	Mild skeletal deformity and arthropathic changes	mild worsening activity in elbows and wrists, otherwise stable	Nil

P1059

**CLINICAL CASE: SEVERE PRIMARY HYPERPARATHYROIDISM IN PATIENT WITH PARATHYROID CARCINOMA**

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**Objective:** There are no reliable preoperative markers of parathyroid carcinoma (PC). Clinical features are nonspecific, although the severe hypercalcemia and multiple complications of primary hyperparathyroidism (PHPT) are often described. We present a case report of severe PHPT due to PC.

**Case report:** 50 years old female patient suffered from severe bone pain, height decrease by 7 cm for the last 4 years. She had previously been diagnosed with a lower jaw tumor, a pathological fracture of left tibia and medullary nephrocalcinosis (MN). A year later PHPT was confirmed: serum calcium (Ca) - 3.98 mmol/l (RR 2.2-2.55), PTH - 2102 pg/ml (RR 15-65). Ultrasound (US) and scintigraphy (SG) showed a tumor of the right parathyroid gland (PTG). The selective parathyroidectomy did not lead to remission (PTH 430-1109.3pg/ml, Ca 2.7-2.88mmol/l), thus cinacalcet was prescribed 30-150 mg/d. Histological examination was regarded as a typical adenoma. The repeated SG showed pathological zone in the right lobe of thyroid gland 36x27 mm. By admission to our Centre the labor tests on cinacalcet 30 mg/d were follow: PTH 609 pg/ml, Ca 3.02 mmol/l, hypocalciuria (1,9 mmol/24h), GFR

(CKD-EPI) 68 ml/min/1.73m<sup>2</sup>, osteocalcin 261.4 ng/ml (RR 11-43),  $\beta$ -CrossLaps 2.14 ng/ml (RR 0.3-0.57), alkaline phosphatase 218U/l (RR 40-150). CT confirmed multiple brown tumors, MN, bilateral nephrolithiasis and an ectopic tumor of the right PTG 6.6 cm close to the unpaired vein, trachea, esophagus and aortic arch, brachiocephalic trunk. During the re-operation surgeons suspected a malignant tumor because of an infiltration of vessels, the trachea and soft tissues. After the cytoreductive surgery, PC was confirmed. 5 days after PTH and Ca were 311.7 pg/ml and 2.46 mmol/l respectively. We recommended denosumab 60 mg once every 6 months under regular lab control and assessment of bone complications. In 1 month after the first injection PTH was 1038 pg/ml, albumin-adjusted Ca 2.34 mmol/l.

**Conclusion:** PHPT with severe hypercalcemia, multiple bone complications and nephrolithiasis can be suspicious for PC. High experience multidisciplinary team is required to manage such patients. If radical surgery is not possible, denosumab could be an option.

### P1060

#### DXA SCAN & FRAX SCORE ARE THE BETTER MONITORING TOOL OF ANTI-OSTEOPOROSIS MEDICATIONS AS COMPARED TO BONE TURNOVER MARKER CTX

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**Objective:** To prove that the DXA SCAN is the best monitoring tool for anti-osteoporosis medications as compared to bone turnover marker blood test ' CTX '.

**Methods:** The Principal Investigator (PI) is a consultant orthogeriatrician having home care geriatric facilities since last 36 years. To prevent and treat fragility fractures, falls he has founded Falls Institute of India (FII). Adults >50 YOA and older adults, who are basically suffering from orthogeriatrics issues are mainly advised and treatment is given after doing their comprehensive geriatric assessment (CGA), with special references to mobility matters. Here, to know the fracture risk, DXA scan is done and after that FRAX score of each beneficiary is also calculated. Depending upon the T-score and other clinical risk factors like having diabetes, multiple vertebral fractures patient is advised to go for anti-osteoporosis medications. Such 50 patients are taken into this retrospective study, who are getting denosumab, subcutaneously since last 5 years. The dose of DMAB is once in 6 months (Q6M). All of them are getting their doses regularly. Out total 50 beneficiaries, only 2 patients are male, rest all are females. The age group is between 56 years to 90 years. One male, who is 90 YOA, has stopped the treatment and four females lost to follow up. Now with total 45 beneficiaries, all are getting DMAB regularly. Before every injection, their CTX is done, every 6 monthly and DXA SCAN is done every year. For therapeutic monitoring with anti-osteoporosis therapy, at least 35-55% decrease from base value of CTX is expected response. But, experience over last 5 years do not support the credibility of CTX reports. On the contrary, yearly

DXA SCAN, followed by FRAX score are the dependable, reliable and credible monitoring tools for AOM therapy.

**Results:** The results of last five years of this retrospective study shows that after initiation of denosumab as AOM to any patient for long term therapy DXA scan followed by calculations of FRAX score are the better monitoring tools, as compared to bone turn over marker CTX, blood test.

**Conclusion:** For monitoring long term anti -osteoporosis therapy like Denosumab, which can be safely and successfully given for >10 years, DXA scan followed by calculations of FRAX score are the better monitoring tools than bone turnover marker test blood test CTX.

### P1061

#### LEVEL OF REMODELING MARKERS AND OPG/RANKL RATIO

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**Objective:** To study the causes of OPL according to bone remodeling markers.

**Methods:** Was formed 2 groups of subjects. The first, main group consisted of 27 women who developed back pain, vertebral fractures of various localization during pregnancy and/or lactation. The second, control group consisted of 14 pregnant and/or lactating women without fractures and complaints of back pain during this period. In both groups of women, indicators of bone and mineral metabolism were studied.

**Results:** In women, hormonal and biochemical parameters were assessed. It turned out that in all women the average Ca in the blood of patients of the main group was 2.14 mmol/l, in the control group this indicator was 1.69 mmol/l (P=0.0001). The level of P in the blood of patients of the main group was significantly higher and amounted to 1.2 mmol/l, in the second group 0.88 (P=0.032). Vitamin D in both groups was at the deficiency level, in the main group it was 18.55 ng/ml, and in the control group - 12.3 ng/ml. The average value of PTH in the main group was at the level of 54.5 pg/ml, and in the control group it was 31.1 pg/ml. In the main group, the level of  $\beta$ -CrossLaps as a marker of bone tissue resorption was 0.9 ng/ml, in the control group it was 0.59 ng/ml. P1CP, ALP, osteocalcin, creatinine, ALT and AST in both groups were within the normal range. In the main group, the level of OPG was 0.78 pg/ml and was significantly lower by more than 2 times compared with the control group 1.74 pg/ml (P=0.005). The RANKL level in the main group was 232.4 pg/ml, and was also significantly higher by almost 3 times compared to the control group 80.13±49.3 pg/ml (P=0.005). The OPG/RANKL ratio in the main group was 0.003, and in the control group it was significantly more than 0.02 (P=0.0001).

**Conclusion:** Bone loss is dependent on the RANK-RANKL-OPG system, which is the primary regulatory system for the induc-



tion, activation, and survival of osteoclast differentiation. Further research will allow us to study the function of osteoblasts, osteoclasts, osteocytes in normal conditions and in OPD and will expand our understanding of the pathogenetic nature of the development of osteoporosis and fractures associated with pregnancy and/or lactation.

## P1062

### THE DURATION OF MORE THAN 30 DAYS BETWEEN DUE DATE AND ACTUALLY GIVING DATE OF DENOSUMAB (DELAY) CAN BE LESS YIELDING OF EXPECTED RESPONSE

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**Objective:** To prove that the duration of >30 d between due date of next dose of denosumab and actually giving date of the drug, results into less yields of expected response.

**Methods:** The principal investigator (PI) is a consultant orthogeriatrician having home care geriatric facilities since last 36 years. To prevent and treat fragility fractures, falls he has founded Falls Institute of India (FII). Adults >50 YOA and older adults, who are basically suffering from orthogeriatrics issues are mainly advised and treatment is given after doing their comprehensive geriatric assessment (CGA), with special references to mobility matters. Here, to know the fracture risk, DXA scan is done and after that FRAX score of each beneficiary is also calculated. Depending upon the T-score and other clinical risk factors like having diabetes, multiple vertebral fractures patient is advised to go for anti-osteoporosis medications. Such 50 patients are taken into this retrospective study, who are getting denosumab, subcutaneously since last 5 years. The dose of DMAB is once in 6 months (Q6M). All of them are getting their doses regularly. Out total 50 beneficiaries, only two patients are male, rest all are females. The age group is between 56 years to 90 years. One male, who is 90 YOA, has stopped the treatment and four females lost to follow up. Now with total 45 beneficiaries, all are getting DMAB regularly. Out of these 45 patients, 12 patients were not available on the due date of their various due dates. The reasons were multiple but it resulted into relatively less benefits as compared to the expectations. Out of these 12 patients, 3 of them even shown the further decrease in the T-score, worsening of symptoms as the duration (between due date and actual date of giving injection) was more than 3-4 months in some patients.

**Results:** The clinical records of all the beneficiaries receiving denosumab, have shown that the gap of >30 d between due date and date of actual giving Inj denosumab yields less response than as expected.

**Conclusion:** For adherence of treatment and long term benefits from once in 6 months subcutaneous Inj denosumab, the gap between due date and actual giving date should not be >30 d. The maximum permissible gap should be considered as 30 d, as it affects the expected response.

## P1063

### IMMOBILITY IS MAJOR RISK FACTOR FOR LOW ENERGY FRACTURE IN PATIENTS WITH SPINAL MUSCULAR ATROPHY

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**Objective:** Spinal muscular atrophy (SMA) is hereditary, degenerative, neuro-muscular disease of lower motor neurons that leads to muscle weakness and atrophy. Most studies were done in children, with more severe forms of SMA. We aimed to assess prevalence of low-energy clinical bone fractures in all patients, BMD in ambulatory patients and correlation to muscular strength with Revised Hammersmith Scale (RHS) and Revised Upper Limb Module (RULM).

**Methods:** We evaluated 29 SMA type 2 and 3 (18 (62.1%) males and 11 (37.9%) females) of median age 44 (30-51.5) years. We analysed medical history of patients regarding clinical fractures, measured BMD in lumbar spine (LS), femoral neck (FN) and total hip (TH) and muscular strength according to RHS and RULM.

**Results:** Of 29 patients, 10 (34.5%) were ambulatory and 19 (65.5%) were non-ambulatory. There were overall 22 fractures, 11 (37.9%) patients had at least 1 fracture. More non-ambulatory than ambulatory patients had at least one fracture (10 (52.6%) vs. 1 (10.0%),  $p=0.044$ ). In ambulatory patient's median (IQR) BMD for LS was 1.145 g/cm<sup>2</sup> (1.070 - 1.298), FN 0.764 g/cm<sup>2</sup> (0.690 - 0.864), TH 0.813 g/cm<sup>2</sup> (0.755 - 1.056), median T-value for LS 0.7 SD (0.0 - 2.0), FN -1.25 SD (-1.4 - -0.5), TH -1.35 SD (-1.8 - 0.2). According to BMD, only 1 patient had osteoporosis, 6 patient had osteopenia. BMD was normal in 3 patients. There was no correlation between BMD and T-score with RHS and RULM ( $p>0.05$ ).

**Conclusion:** Low energy bone fractures are common in adult patients with SMA. Major risk factor for fracture is immobility. Majority of ambulatory adult SMA patients have osteopenia. RHS and RULM do not correlate with low BMD. Emerging treatments such as nusinersen, risdiplam and onasemnogene abeparvovec will change course of the SMA and prolong patient mobility, which can decrease risk for fracture. More studies with bigger cohorts of SMA patients should be done, to improve risk assessment and treatment with antiresorptive and osteoanabolic medication.

P1064

**REVIEWING THE ECONOMIC BURDEN OF OSTEOPOROSIS STUDIES**A. Mousavi<sup>1</sup>, M. J. Mansourzadeh<sup>1</sup>, N. Fahimfar<sup>1</sup>, S. Ali-pour<sup>1</sup>, M. Sanjari<sup>1</sup>, K. Khalagi<sup>1</sup>, A. Ostovar<sup>1</sup>, R. Daroudi<sup>2</sup><sup>1</sup>Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, <sup>2</sup>Dept. of Health Management and Economics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran**Objective:** Osteoporosis and its related fractures, in addition to significant morbidity and mortality, impose a heavy economic burden on societies. Therefore, it is important to address the economic aspects of this disease. This study aimed to review the economic studies of osteoporosis across the world.**Methods:** We searched for the economic burden of osteoporosis and all their related keywords in PubMed, Web of Science, and Scopus databases on December 2022. Retrieved papers were screened by title, abstract, and the whole text. Finally, the quality assessment was performed for selected articles by Newcastle-Ottawa Quality Assessment Scale.**Results:** Most studies have examined the costs from a societal perspective. Depending on the design and purpose of the study, costs were reported in different categories. Direct costs (including medical and non-medical) related to the treatment of the incidental osteoporotic fractures accounted for the largest share of the economic burden. The other significant share was related to the costs of long-term care/management and also the QALYs lost due to osteoporotic fractures. In some studies, costs related to the prevention and management of osteoporosis including medication were also reported.**Conclusion:** The prevalence of osteoporosis and its related burden is significant all across the world. In addition to the clinical consequences of osteoporosis, having a thorough knowledge of the costs and economic aspects of this disease is of great importance for policymaking and planning for appropriate interventions. Comprehensive programs to forestall osteoporosis and related fractures, like lifestyle modifications and screening programs to find high-risk population, can decrease the economic consequences of this silent disease.

P1065

**IMPROVING THE CARE OF OLDER ADULTS WITH FRAGILITY FRACTURES WITHIN A MAJOR TRAUMA CENTRE: SAVING BONES, SAVING LIVES**G. Jevons<sup>1</sup>, A. Ali<sup>1</sup><sup>1</sup>Manchester Foundation Trust, Manchester, UK**Objective:** Osteoporosis is a hidden pandemic. Fragility fractures are associated with significant morbidity, mortality and economic implications. Anecdotal evidence within a major trauma service suggested that the bone health of older adults could be improved.The aim of this quality improvement project was to improve the bone health of older adults presenting to a major trauma centre with fragility fractures through improving vitamin D testing, and were 2-fold: (1) 90% of adults over the age of 65 with a fragility fracture to have a vitamin D level requested  $\leq 48$  h of admission and (2) 90% of adults over the age of 65 with a fragility fracture to have a vitamin D level resulted  $\leq 10$  d of admission.**Methods:** Patient level data was collected through use of the Trauma Audit and Research Network (TARN) database, with data collected from 26/10/20 to 20/06/21. Inclusion criteria included patients aged  $>65$  years whom were admitted to the major trauma ward with a fragility fracture; which was defined as fall from a height of  $<2$  m. Patients were excluded if testing was deemed clinically inappropriate, or if those patients were cared for in an alternative environment. We identified 5 patients met this criteria on fortnightly timepoints. Data was expressed as %vitamin D tests requested  $<48$  h, or % vitamin D tests resulted  $<10$  d per timepoint**Results:** At baseline 20% of patients had a vitamin D test requested  $\leq 48$  h of admission, and 40% of patients had a vitamin D level resulted within  $\leq 10$  d of admission. A number of plan, do, study, act (PDSA) cycles were trialled, including an educational poster; multimodal educational sessions; redesigning the major trauma clerking booklet as well as creation and advertisement of an ICE Tab. We showed an improvement in the percentage of patients undergoing vitamin D testing  $\leq 48$  h from 20% to 80%, but no improvement in our second outcome measure.**Conclusion:** Strengths of the project included emphasis on multidisciplinary team working, and the low financial cost of PDSA cycles. Limitations included a limited influence on the vitamin D assay turnaround time, which was subject to external issues during the study period. Through the use of QI methodology, we demonstrated improvement in the bone health care of older adults presenting with major trauma, as well validating the use of TARN in QI projects.

P1066

**PREVALENCE AND ADHERENCE TO THERAPY FOR OSTEOPOROSIS AND CARDIOVASCULAR COMORBIDITIES IN PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS**T. Panafidina<sup>1</sup>, T. Popkova<sup>1</sup>, M. Aristova<sup>1</sup>, Y. Gorbunova<sup>1</sup>, A. Lila<sup>1</sup><sup>1</sup>V.A.Nasonova Research Institute of Rheumatology, Moscow, Russia**Objective:** The risk of cardiovascular disease (CVD), osteoporosis (OP) and fractures in patients with systemic lupus erythematosus (SLE) is higher than age- and sex-matched individuals from the general population. The purpose is to evaluate the prevalence of these comorbidities and their management in SLE patients.**Methods:** This cross-sectional study included 223 patients - 200(90%) females and 23(10%) males, median (Me) age 33 [interquartile range 26;41] years meeting the SLICC/ACR 2012 criteria

for the classification of SLE were enrolled in our cohort, attending a routine visit at our Clinic between February 2015 and February 2023. Exclusion criteria: age <18 years or >65 years at the time of enrollment into the registry, concomitant antiphospholipid syndrome. The following criteria were evaluated: presence of CVD (coronary artery disease (CAD), cardiovascular revascularization procedure, myocardial infarction and stroke), osteoporosis and fractures, traditional cardiovascular risk factors (smoking, family history of CVD, hypertension, dyslipidemia, menopausal status, BMI value, and diabetes mellitus (DM)) and SLE-related factors (age at onset, disease duration, cumulative organ involvement, cumulative serology and ongoing therapy, SLE Disease Activity Index (SLEDAI-2K) and the Systemic Lupus International Collaborating Clinics damage index (SDI), treatment including both biologic and immunosuppressants, steroids).

**Results:** The median age of SLE diagnosis was 25[19;34]years. Positive family history of rheumatic disease was in 9% of SLE pts. In the most patients, there were no connection with any provoking factors-30%, in 9% pts with infection, 7% with insolation, 4% pts the SLE onset was associated with pregnancy, and 2% with combined oral contraceptives use. The median disease duration was 36[6;108]months, SLEDAI-2K-8[4;14] score, SDI- 0[0;1] score. Out of them 33% pts did not receive any antirheumatic therapy, 65% pts were on prednisone therapy at 10[7,5;20] mg/d, 58% on hydroxychloroquine, 26% on immunosuppressants, 11% on biologic. Fractures of various localizations were detected in 11% of SLE patients, OP was diagnosed in 10% pts. CAD was diagnosed in 3% pts, myocardial infarction in 2%, heart failure in 5%, cardiovascular revascularization procedure (coronary artery bypass graft) in 1%, and stroke in 3%. The following rates of traditional cardiovascular risk factors were identified: hypertension in 33%, BMI $\geq$ 25 in 22%, menopause in 12%, dyslipidemia in 30%, smoking status in 20%, family history of CVD in 17%, diabetes mellitus (DM) in 2% of SLE patients. Coverage by therapy for comorbidities was as follows: 59% pts with hypertension received antihypertensive therapy, 75% pts with DM were on diabetes medications, all patients with OP (100%) received vitamin D and half of them (50%) anti-resorptive medications (bisphosphonates only). Only 20% pts with CAD and 7% pts with dyslipidemia were on aspirin and lipid lowering medications respectively.

**Conclusion:** Hypertension, dyslipidemia, overweight and smoking are the most common cardiovascular comorbidities in SLE. In patients with SLE, the adherence to therapy of diabetes, osteoporosis and hypertension is relatively high, in relation to coronary artery disease and dyslipidemia, on the contrary, it is extremely low.

P1067

## CAN SERUM MMP3 LEVEL IDENTIFY EARLY KNEE OSTEOARTHRITIS?

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**Objective:** To assess the ability of serum MMP-3 levels to differentiate between normal knee with primary knee osteoarthritis (KOA) and its ability to differentiate between various severity grades.

**Methods:** The study included 80 cases of primary KOA and 80 young individuals with no features of KOA.

**Results:** The subjects in Case group were younger (52.80 $\pm$ 10.31 years) than in Control group (28.55 $\pm$ 5.98 years) (p=0.001). The BMI of Case group (27.5 $\pm$ 4.81 kg/m<sup>2</sup>) was significantly higher than in Control group (25.40 $\pm$ 5.71 kg/m<sup>2</sup>) (p=0.012). Mean sMMP-3 level in Cases (59.85 $\pm$ 39.92 ng/ml) was significantly higher than in Controls (14.52 $\pm$ 6.09 ng/ml) (p=0.0001). There was no gender difference in biomarker values in Cases (p=0.1) and in Controls (p=0.88). The level of sMMP-3 rises with increasing age in cases only (p=0.0001). MMP-3 values were significantly elevated in cases in the subcategories of BMI within case group and control group (>0.05) but higher in cases in normal, overweight and obese subcategories (p<0.05). Serum MMP-3 level differs significantly between K-L grade 0-I (p=0.004), K-L grade I-II (p=0.000), K-L grade IIIIII (p=0.007) and also between K-L grade III-IV (p=0.02). Biomarker showed moderate positive correlation with KL grade (r=0.68, p=0.000) and age (r=0.38, p=0.000) and weak positive correlation with WOMAC score (r=0.289, p=0.009). The receiver operative curve analysis suggested a cut off value of sMMP-3 as 20.03ng/ml between Control group and Case group, as 12.25 ng/ml between K-L grade 0-I; as 18.37 ng/ml between K-L grade I-II; as 55.60 ng/ml between K-L grade II-III; as 102.0 ng/ml between K-L grade III-IV.

**Conclusion:** Serum MMP-3 estimation as a tool has a good discriminatory power to differentiate between healthy and a diseased knee (KOA) and between severity grades. It can be used as a test to identify individuals with KL grade I and II of KOA.

P1068

**FRACTURE LIAISON SERVICE INITIATIVE IN IRAN**

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**Objective:** The economic burden of osteoporosis in Iran was estimated to be 393.24 million USD, pointing out the necessity for comprehensive programs including post-fracture care activities (1). We aim to present the formation of the Fracture Liaison Services (FLS) in Iran as well as the status of the program.

**Methods:** The first FLS protocol was developed in a joint program with scientific and executive support of the Endocrinology and Metabolism Research Institute and the Ministry of Health. After a thorough literature review, and taking into account the health system structure in Iran, this protocol provides a detailed workflow for rendering prevention services, in a way that best fits the Best practice framework of IOF. The protocol was initially implemented in pilot centers and was modified according to the recommendations received from the fields. Additionally, software was developed for patient registration, delivering services, process monitoring, and follow-up with the possibility of extracting key performance indicators at desired time points.

**Results:** The first two FLS centers were set up in tertiary hospitals in Tehran and Gorgan. These two centers are flagged in the map of best practice on the IOF website with silver and bronze ratings, respectively. The third center was recently set up in Sari. The latest results of the program show that 1780 (64.3% female) patients with the mean age of 65.4 years have been registered in these centers. Fracture prevention clinics offer services such as patient identification, fracture and osteoporosis medical assessment, fall assessment, patient education, and treatment initiation. Results also show that more than 98% of patients have received medical treatment. Since then, several seminars have been held to advocate for establishing FLS centers across the country. Moreover, workshops to train staff on efficient service delivery are regularly planned.

**Conclusion:** Considering the high burden of osteoporosis in Iran, improving fracture prevention programs is essential. Increasing the number of centers in the country along with the quality of service delivery is among the most important intents of the Ministry of Health in this field.

**Reference:** 1. Ostovar A et al. Osteoporos Int 2022;33:2337.

P1069

**BONE MARROW-DERIVED CELL TRANSPLANTATION IN TREATMENT OF OSTEOCHONDRAL LESIONS: EVALUATION IN ANIMAL MODEL**

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**Objective:** In an experimental study on 24 rabbits, the effectiveness of BMDCT in the treatment of osteochondral defects was evaluated by conducting morphological studies and analyzing the obtained data.

**Methods:** The study includes 3 groups, of which 2 are control and 1 is experimental. The formed regenerate was evaluated (integration into the surrounding tissues, structure, content of cellular structures, non-cellular elements, which formed in the defect) using morphometric analysis. The modified histological scale of S. W. O'Driscoll et al and S. R. Frenkel et al was used for assessment.

**Results:** Analysis of the obtained results showed that hyaline cartilage is present only in the control group, where the BMDCT procedure was used. A high structural integrity was found, the density of articular cartilage at the edges of the defect was higher, compared to the control groups, no significant delamination of the articular cartilage was found on the surface of the regenerate. Statistical analysis revealed a significant difference between the experimental and control groups ( $p < 0.001$ ) in the nature of subchondral bone repair. Degenerative changes of chondrocytes prevailed only in the control groups. All this indicates that BMDCT is an effective procedure.

**Conclusion:** The results reflect the effectiveness of BMDCT in the treatment of osteochondral lesions.

P1070

### PREVALENCE OF OSTEOSARCOPENIC OBESITY AND RELATED FACTORS AMONG IRANIAN OLDER PEOPLE: BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

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**Objective:** To determine the prevalence and factors related to osteosarcopenic obesity in the elderly population of Iran.

**Methods:** The data from the second stage of the BEH program was used. Bone density, fat mass, and muscle mass were obtained using DXA. We defined osteopenia/osteoporosis as t-score  $\leq -1$ . Sarcopenia was defined as a low skeletal muscle index (SMI) of 7.0 kg/m<sup>2</sup> in men and 5.4 kg/m<sup>2</sup> in women, low hand grip strength of <26 kg for men and <18 kg for women, and walking speed <0.8 m/s for both sexes. Obesity was defined as a body fat percentage  $\geq 25\%$  for men and  $\geq 32\%$  for women. Osteosarcopenic obesity (OSO) was considered the simultaneous presence of these characteristics.

**Results:** In all, 2339 elderly with an average age of 69.08( $\pm 6.24$ ) for women and 69.53( $\pm 6.42$ ) for men were examined. In general, 464 elderly suffered from osteosarcopenic obesity (266 women and 198 men). The standardized prevalence of OSO was 23.6% (95%CI: 21.1-26.1) in women and 18.5% (95%CI 16.3-20.8) in men. OSO was related to age [odds ratio (OR)=1.06 (95%CI: 1.04-1.09) in women and 1.14 (95%CI: 1.11-1.17) in men], education level [OR=0.93 (95%CI: 0.89-0.97) in women and 0.96 (95%CI: 0.92-0.99) in men], physical activity [OR=0.66 (95%CI: 0.45-0.97) in women and 0.58 (95%CI: 0.35-0.94) in men], and protein intake [OR=0.98 (95%CI: 0.97-0.99) in women and 0.98 (95%CI: 0.98-0.99) in men]. OSO was associated with diabetes in men [OR=1.74 (95%CI: 1.20-2.52)]. In women, the inverse association was detected for hypertension [OR=0.62 (95%CI: 0.45-0.84) and hypertriglyceridemia [OR=0.65 (95%CI: 0.47-0.90)].

**Conclusion:** A high prevalence of OSO was detected among the Iranian elderly population. It was inversely related to education, physical activity, and protein consumption. Considering the side effects of this geriatric syndrome, there is a need to implement intervention strategies to control OSO in at-risk populations.

P1071

### RISK FACTORS AND BONE MINERAL DENSITY IN MEN WITH AND WITHOUT HIP FRACTURE

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**Objective:** Osteoporosis represents one of the leading health problems worldwide and is reaching epidemic proportions. Two demographic processes contribute to this: the constant aging of the populations of developed countries and the expansion of the populations of underdeveloped countries. Currently, more than 200 million people in the world suffer from osteoporosis, mostly women of an older age. The most common osteoporotic fractures are fractures of the vertebral bodies of the spinal column, neck of the femur, and pelvic bones. The aim of the work is to examine the influence of bathing, sunbathing, alcohol consumption, sedatives and smoking on BMD in men with and without hip fractures.

**Methods:** The survey included 100 male respondents. They were divided into two groups: the test group (50 subjects) with a hip fracture and the control group (50 subjects) without a fracture. All had a detailed clinical examination. BMD was measured on a Hologic densitometer.

**Results:** The intake of dairy products in childhood was statistically significantly more frequent in subjects of the control group (88.0% vs. 50.0%,  $p < 0.001$ ). The intake of dairy products in adulthood is also statistically significantly more frequent in subjects of the control group compared to subjects with a fracture (48.0 vs. 16.0%,  $p = 0.001$ ). Subjects of the control group sunbathed statistically significantly more often than subjects with a hip fracture (70.0 vs. 40.0%,  $p = 0.005$ ). Alcohol consumption, as well as the use of corticosteroids, was uniform in relation to the studied groups ( $p = 0.156$ , respectively  $p = 0.050$ ). The use of sedatives is statistically significantly more common in subjects with a fracture (44.0 vs. 22.4%,  $p = 0.039$ ). Subjects of the control group smoked significantly less than subjects with a fracture (48.0 vs. 72.0,  $p = 0.025$ ).

**Conclusion:** Alcohol consumption, smoking, use of corticosteroids and sedatives are risk factors for reduced bone density in men. Proper nutrition in childhood and adulthood with sufficient intake of dairy products and exposure to sunlight play a role in the prevention of fractures. Risk assessment and recognition of clinical risk factors for the occurrence of OP, as well as their prevention, are important factors in the prevention of falls and the occurrence of fractures.

P1072

### RELATIONSHIP OF SARCOPENIA AND MULTIFOCAL ATHEROSCLEROSIS IN MEN WITH CORONARY HEART DISEASE

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**Objective:** To study the relationship between sarcopenia and severity of multifocal atherosclerosis in men with coronary heart disease (CHD).

**Methods:** 79 men aged over 50 years with verified CHD were examined (mean age 63 (57; 66) years). Sarcopenia was identified in accordance with EWGSOP 2010 criteria. Muscle mass was determined using multispiral computed tomography at the 3<sup>rd</sup> lumbar vertebra level (LIII). Muscle strength was performed using a mechanical wrist dynamometer. Muscle function was examined using a short physical performance battery. The severity of atherosclerotic lesions of the carotid arteries was assessed by color duplex scanning with the study of the intima-media thickness (IMT), the presence of atherosclerotic plaques and the degree of artery stenosis. The variant of coronary atherosclerosis was assessed according to coronary angiography: variant A - one- and two-vessel lesion; variant B - three-vessel lesion; variant C - lesion of the left trunk of the coronary artery (LTCA) in combination (or without) with significant narrowing of any other coronary arteries. In accordance with EWGSOP, 2010, the patients were divided into 3 groups: 1<sup>st</sup> - 31 patients without sarcopenia, 2<sup>nd</sup> - 21 patients with presarcopenia, and 3<sup>rd</sup> - 27 patients with sarcopenia.

**Results:** IMT in patients with sarcopenia was significantly higher than in men without sarcopenia ( $p=0.005$ ). The most severe lesion of the carotid arteries was significantly more frequent in men with sarcopenia compared with the group of patients with presarcopenia (48.15 vs. 9.5%,  $p=0.015$ ) and without sarcopenia (48.15 vs. 12.9%,  $p=0.013$ ). According to the results of the correlation analysis, a significant negative relationship was established between the severity of carotid atherosclerosis and the musculoskeletal index ( $r=-0.227$ ,  $p=0.047$ ). A higher incidence of lesion of LTCA±any other arteries was found in the group of patients with CHD and sarcopenia compared to that in patients with CHD and presarcopenia and without sarcopenia (29.6 vs. 20.0% and 13.3%, respectively,  $p>0.050$ ). The severity of coronary atherosclerosis in patients negatively correlated with the musculoskeletal index ( $r=-0.227$ ,  $p=0.047$ ).

**Conclusion:** The presence of sarcopenia in men with CHD is associated more severe course of multifocal atherosclerosis in men with CHD.

P1073

### EFFECT OF SMOKING ON LOW DENSITY LIPOPROTEIN RECEPTOR-RELATED PROTEIN POLYMORPHISM RS3736228 IN PAKISTANI MALES: A SUSCEPTIBILITY TO OSTEOPOROSIS

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**Objective:** Smoking is linked to a higher incidence of osteoporosis and fractures from osteoporosis. Beside direct cellular effects of smoking on bone cells, many aspects of bone biology are influenced by low density lipoprotein receptor-related protein 5 (LRP5), a coreceptor in the Wnt/ $\beta$ -catenin pathway. Low BMD is correlated with the coding single nucleotide polymorphism (cSNP) C>T (rs3736228) of *LRP5*, which affects the amino acid A1330V. Smoking is a significant and controllable risk factor for osteoporosis that may cause genetic variation in the *LRP5* gene, making those who have it more vulnerable to osteoporosis development. Therefore, this study aimed to determine effect of smoking on polymorphism and its susceptibility to osteoporosis in Pakistani males.

**Methods:** Total 70 males were included in the study among them 41 males were non-smokers and 29 were smokers. Five ml blood was collected from all the subjects, DNA was extracted and PCR-RFLP was performed to detect rs3736228 C>T *LRP5* polymorphism among the smokers and non-smokers. Bone strength was assessed by measuring BMD levels in terms of T-score by peripheral ultrasound bone densitometry. Serum nicotine and calcium levels were measured along with oxidative stress in smokers and nonsmokers by spectrophotometric methods.

**Results:** Frequency of variant T allele was higher in smokers (15.5%) as compare to non-smokers (7.3%) with odds ratio 2.3 (95%CI=0.8-6.9), although the association of variant T allele with smokers was not statistically significant ( $\chi^2=2.4$ ,  $p=0.12$ ). The serum levels of nicotine were significantly higher in smokers than nonsmokers ( $p<0.001$ ) while BMD levels were found to be significantly low in smokers ( $p<0.05$ ).

**Conclusion:** Findings revealed association of smoking with reduced bone strength in smokers as compared to nonsmokers but smoking was not found to be a risk factor for *LRP5* polymorphisms and osteoporosis susceptibility in Pakistani males by this investigation. The significance of *LRP5* as a genetic predictor of osteoporosis in male smokers requires additional research with BMD scan on larger sample size.

P1074

### BONE MINERAL DENSITY AND RISK OF FALLS IN MEN WITH CORONARY HEART DISEASE AND SARCOPENIA

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**Objective:** To study the relationship between sarcopenia, BMD and the risk of falls in men with coronary heart disease (CHD).

**Methods:** 79 men aged over 50 years with verified CHD were examined (mean age 63 (57; 66) years). Sarcopenia was identified in accordance with the EWGSOP 2010 criteria. Muscle mass was determined using multispiral computed tomography at the 3<sup>rd</sup> lumbar vertebra level (LIII). Muscle strength was performed using a mechanical wrist dynamometer. Muscle function was examined using a short physical performance battery. BMD (g/cm<sup>2</sup>) and T-score (standard deviation) of the femoral neck and lumbar spine (L1-L4) were evaluated using DXA. The risk of falls were assessed using Morse's scale. In accordance with EWGSOP, 2010, the patients were divided into 3 groups: 1<sup>st</sup> - 31 patients without sarcopenia, 2<sup>nd</sup> - 21 patients with presarcopenia, and 3<sup>rd</sup> - 27 patients with sarcopenia.

**Results:** The prevalence of low BMD in patients with sarcopenia was higher compared with patients with presarcopenia (p=0.050) and without sarcopenia (p>0.050). A significant decrease in BMD and T-score in femoral neck was revealed in men with sarcopenia compared to patients without sarcopenia (p=0.009 and p=0.013) and with presarcopenia (p=0.027 and p=0.024). There were no significant differences in BMD and T-score in lumbar spine in the groups of patients (p>0.050). The total score of the Morse scale in patients with sarcopenia was significantly higher than that in men without sarcopenia (25 (15; 35) points vs. 15 (10; 25) points (p=0.049)) and comparable to that in the group of men with presarcopenia (25 (15; 30) points (p>0.050)). According to the results of the correlation analysis, a significant negative relationship was established between the total risk of falls on the Morse scale and the total area of skeletal muscles at the LIII level (r=-0.292, p=0.009).

**Conclusion:** Presarcopenia and sarcopenia are associated with low BMD in femoral neck and increased risk of falls in men with CHD.

P1075

### PARTICIPATION OF A LIFE PARTNER IN THE EFFECTIVE TREATMENT OF GOUT AND GOUTY ARTHRITIS

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**Objective:** Primary gout, debuting with a single attack of gouty arthritis with rare relapses. Patients are set for short-term therapy with nonsteroidal anti-inflammatory drugs. Adherence to urate-lowering therapy is low: in the first month after the appointment, it is 40-50%, decreasing to 5-3% by the end of the first year of treatment. The reasons for withdrawal are due to the lack of sufficient understanding by the patient of the purpose of prescribing these drugs outside of the exacerbation of the disease. It is noted that patients who come to see relatives better follow the recommendations of the attending physician on medication and non-drug therapy. We aimed to analyze the adherence to gout therapy of single patients living in a family and coming to see a relative.

**Methods:** Outpatient records of 120 patients were analyzed. 3 groups were recruited: 1st - single patients, N=40, 2nd - living in the family N=40, 3rd - coming to the appointment with a close relative interested in treatment, N=40. The results of treatment were evaluated after 1-3-6-12 months.

**Results:** 15.8% withdrew from the study due to non-appearance for return visits, lack of contact by phone. 82.4% started and continued treatment: 23.33% of group 1, 28.33% of group 2, and 32.5% of group 3. Another 37.6% of the remaining 101 patients discontinued treatment during the first 6 months of follow-up: 15.8%, 10.8% and 5%. The indicators of the distribution of adherence to urate-lowering therapy by groups had significant differences. Of the 40 single patients, 22.5% of patients continued urate-lowering therapy during the year, even fewer patients observed the diet - 12.5%, 82.5% of the 3rd group maintained adherence to drug treatment, 45% followed dietary recommendations.

**Conclusion:** interest in the results of treatment of a loved one when prescribing therapy for gout and gouty arthritis to a patient, ensuring compliance with dietary recommendations significantly increases adherence to treatment. As a rule, a patient with gouty arthritis visits the attending physician after the pre-examination to clarify the diagnosis after the pre-examination and determine the target levels of uric acid in the blood serum. Considering that men are more likely to suffer from gout, we strongly recommend that you repeat the appointment with close relatives who are directly involved in the control of treatment and the formation of dietary habits.

P1076

### GERAS VIRTUAL FRAILTY REHABILITATION PROGRAM FOR FRAIL OLDER ADULTS: A PILOT RANDOMIZED CONTROLLED TRIAL

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**Objective:** Older adults living with frailty are at risk of adverse health outcomes. This pilot randomized control trial evaluated the feasibility of a virtual model of care comprising physical exercise, nutrition, medication review and socialization support to build strength and resilience in vulnerable frail older adults during the peak of COVID-19 pandemic.

**Methods:** Participants aged  $\geq 65$  were recruited and randomized to two arms for 12-weeks multi-modal frailty rehabilitation and of socialization only. The multi-modal group received 2X/week small group physiotherapy-led livestreamed exercise sessions, protein supplementation and medication review with a pharmacist via videoconferencing and 1x/week phone calls from student volunteers. The socialization group received 1x/week phone calls only. Feasibility outcomes threshold for success were  $\geq 10\%$  recruitment rate,  $\geq 75\%$  retention, adherence, and participant satisfaction. The safety of the intervention was assessed by comparing the proportion of adverse events between the two study arms.

**Results:** A total of 72 participants were enrolled out of 220 referrals, representing 33% recruitment rate. Of these, 70 were randomized (35 multimodal and 35 socialization arm) and 61 (85%) completed the study. The mean age of participants was 77.3 (SD: 6.4) and 12 (18%) were frail, 39 (58%) were prefrail and 16 (23%) were non-frail. About 14% of participants were given I-pad devices and internet to participate in the study. Virtual exercise session attendance was 81% (CI: 75-88%) and was comparable between the groups who had their own device and those who received study devices were (82% vs. 81% p-value=0.958). No adverse events occurred during the virtual exercise session and assessments. There was no difference in the number of falls at home between the socialization and multimodal arms (36 vs. 38%, p-value=0.872). Most participants 36/42 (85%) were satisfied with the program and 32/42 (76%) would recommend it.

**Conclusion:** Virtual rehabilitation presents a potentially safe and feasible alternative to reach frail older adults who may be chal-

lenged to attend in-person programs due to mobility impairments, remoteness of services and long wait times.

P1077

### ATORVASTATIN DOSE IS NOT ASSOCIATED WITH RISK OF HIP FRACTURE IN MEN AFTER ADJUSTMENT FOR COMORBIDITY: THE NORWEGIAN EPIDEMIOLOGIC OSTEOPOROSIS STUDIES (NOREPOS)

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While cohort studies have found hydroxymethylglutaryl-CoA reductase inhibitors (statins) to be associated with a decreased risk of osteoporosis, observational studies suggest that this association is dose dependent, and that higher doses may be accompanied with higher risk of osteoporosis. We aimed to study risk of hip fracture in Norwegian men using atorvastatin, a commonly used statin. We have earlier presented results using the medication possession ratio as exposure. We have now carried out updated analyses using commonly used doses as exposure and adjusting for comorbidity has been performed.

Information about all dispensed prescription drugs in outpatient pharmacies in Norway 2004-2016 were available in the Norwegian Prescription Database. The study population included men with no previous hip fracture who filled a first statin prescription at age 50 years or older during 2005-2016 (1-year washout). Statins were defined as filled prescriptions with ATC codes C10A A with all subgroups. Atorvastatin was defined as ATC group C10A A05. Information about incident hip fractures were obtained from the Norwegian Epidemiologic Osteoporosis Studies (NOREPOS) hip fracture database. Exposure to statin dose was updated at each fill date (with monthly precision) and defined as low (10-20 mg, reference), medium (40 mg) and high (80 mg) doses. Hazard ratios (HRs) with 95CIs for hip fracture according to time-dependent statin exposure were estimated using a Cox proportional hazards model with attained age as time scale. Individuals were followed from the date of their first atorvastatin fill until the first occurrence of a hip fracture (outcome), emigration, death, end of a 3-month period without statin prescriptions, switch to another statin type, 4th change of statin dose, or until 31.12.2016 (censored). We adjusted for time-updated comorbidity expressed by the prescription-based Rx-Risk Comorbidity Index. The study population comprised 83 245 men of whom 501 had a hip fracture during follow-up.

HR (95% CI) for hip fracture in those receiving medium dose compared to low dose was 1.19 (0.95-1.50), the corresponding figures for high vs. low dose was 1,05 (0.78-1.43). Adjustment for comorbidity did not alter the results. In conclusion, high doses of atorvastatin did not significantly increase the hip fracture risk in men aged  $>50$  compared to low doses.



P1078

### EVALUATION OF TRABECULAR BONE SCORE (TBS) IN YOUNG WOMEN WITH REDUCED T-SCORE ON BONE DENSITOMETRY

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**Objective:** In women in menopause, bone densitometry is analyzed through the Z-score that compares the BMD with people of the same age. However, in many cases, the Z-score analysis is normal, but the T-score shows a reduction in bone mass, which will only be relevant after menopause. The TBS constitutes an index to estimate the bone microarchitecture through the analysis of lumbar vertebrae, being a predictor of fracture risk independent of BMD. We aimed to evaluate the TBS in young women with normal Z-score and altered T-score in bone densitometry.

**Methods:** Cross-sectional study with 127 healthy women during menopause, who underwent BMD between December 2021 and January 2023. The altered T-score group was considered if the T-score was less than -1 in any of the three evaluated sites. Of these, 36 (26%) had an altered T-score with a normal Z-score. Four patients with BMI >37 kg/m<sup>2</sup>, Diabetes Mellitus and rheumatoid arthritis were excluded. The analysis was performed using EPI INFO 7.2.5.0. BMD was performed using the Lunar Prodigy Advance device and the TBS insight 3.0.3.) software.

**Results:** Mean age was 44±3.9 years, BMI 26.7±4.7 years. There was a significant reduction in BMD in the total femur, spine and femoral neck in the altered T-score group according to the attached table P<0.01 (student t-test). TBS was normal in all women and there was no difference between the two groups.

**Conclusion:** Although there is a reduction in BMD in young patients with altered T-score and Z-score normal, there was no difference in bone microarchitecture across trabecular bone assessment.

	BMD femoral neck	BMD total femur	BMD (L1-L4)	TBS
Normal T-score	0,8409±0,1046	0,8754±0,0739	1,2684±0,1300	1,4447±0,0654
Altered T-score	1,0131±0,0671	1,0513±0,1080	1,0951±0,1173	1,4758±0,0915
Anova Test	0,0000	0,0000	0,0000	0,06

Epi info 7.2.5.0

P1079

### CORRELATION BETWEEN 4 AT AND SARC-F IN OLDER PATIENTS HOSPITALISED WITH ACUTE MEDICAL ILLNESS

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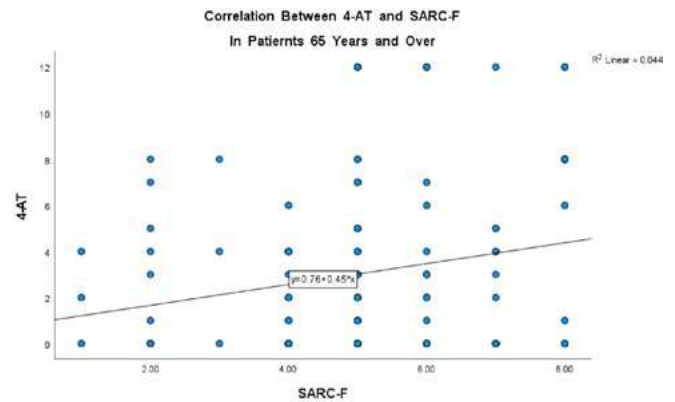
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**Objective:** Delirium and sarcopenia are common in older people, and each is associated with poor outcomes including increased length of hospital stay, institutionalization and all-cause mortality. We aimed: 1. to explore the correlation between 4-AT (a validated tool to detect delirium) and SARC-F (a screening tool to identify patients at risk of Sarcopenia) in older patients admitted to hospital with acute medical illness; 2. to explore the effect of gender on this correlation.

**Methods:** A cross-sectional retrospective observational study of older patients admitted with acute medical illness to the Elderly Care Wards in a UK University Hospital. Patients 65 years and older were included. Patients with incomplete data were excluded. The 4-AT was done by the clerking doctor. The SARC-F questionnaire was obtained from interviews with patients or their family by the occupational therapists. The SPSS IBM 29 software was used for statistical analysis. Descriptive statistics was used for baseline characteristics of the patients and Pearson's correlation coefficient and linear regression was used to compute correlation.

**Results:** 120 patients were included; 62 males and 58 females with median age of 79.4 years (IQR 11) and 83.5 years (IQR 12) respectively. There was a statistically significant positive correlation between 4-AT and SARC-F in all patients (r=. 209; p=. 02). There was statistically significant positive correlation between 4-AT and SARC-F in female patients but not in male patients (r=. 271;p=. 04 and r=. 146;p=. 25 respectively).

**Conclusion:** There was statistically significant correlation between 4-AT and SARC-F in all older patients admitted to the Elderly Care Wards with acute medical illness and in female patients but not in male patients. Larger studies are needed to explore this correlation and to validate these findings.



P1080

### EFFECTIVENESS OF SELECTIVE ROOT INJECTION GUIDED BY ULTRASOUND IN PATIENTS WITH NEUROCOMPRESSIVE PAIN SYNDROMES IN THE LUMBAR SPINE

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**Objective:** Considering the extreme prevalence of pain syndromes in the back, doctors of many specialties face this problem every day. Most often, such patients turn to a family doctor, a neurologist, a neurosurgeon, a rheumatologist, so doctors must differentiate radiculopathy, inflammatory back pain, mechanical and reflex pain syndromes. Radicular pain syndrome is characterized by symptoms that spread to the innervation zone of the affected root, the innervation zones of which are well known. Recently, pain medicine - pain management - has been actively developing, especially considering the fact that no more than 1-2% of patients with neurocompressive pain syndromes are subject to surgical treatment. The effectiveness of selective root injection under X-ray control is generally recognized, but recently such manipulations are performed under ultrasound control, especially with the advent of portable ultrasound devices. We aimed to determine the effectiveness of selective root injection guided by ultrasound in patients with neurocompressive pain syndromes in the lumbar spine.

**Methods:** A study was conducted of patients in whom clinical manifestations of radicular neurocompressive pain syndromes in the lumbar spine were confirmed using radiological examination methods (CT, MRI). The level of pain syndrome was assessed on the VAS scale before the start of treatment, one day after the manipulation, one week and 1 month after the start of treatment. Along with traditional treatment (NSAIDs, muscle relaxants, etc.), selective root injection was performed under ultrasound control.

**Results:** 70 patients (32 women and 38 men) were included. The average age was 45.28±0.80 years. 56.42% of patients were overweight. 31 patients (44%) had an intervertebral hernia at the L4-L5 level and 39 patients (56%) at the L5-S1 level. Patients were divided into 2 groups of 35 people. Patients of both groups were prescribed drug therapy with NSAIDs and muscle relaxants. The patients of the first group were additionally subjected to a selective root injection guided by ultrasound, a corticosteroid solution and a local anesthetic were injected into the affected roots. Before the procedure, the average pain level according to VAS in patients of the 1st group was 86±2.3 mm, in the 2nd group 85±4.3 mm. After 1 d, the pain level in the patients of the 1st group was 29±4.2 mm, and in the 2nd group 72±2.8 mm. 7 d after the start of treatment and manipulation, the pain level was 31±2.9 mm in the 1st group and 59±3.7 mm in the 2nd group of patients. 1 month after the start of treatment and manipulations, the pain level was 33±2.9 mm in the 1st group and 56±3.7 mm in the 2nd group (without manipulation).

**Conclusion:** The method of selective root injection under ultrasound control is a modern, minimally traumatic, highly effective method in the complex treatment of neurocompressive pain syndromes in the lumbar spine.

P1081

### RELATIONSHIP BETWEEN MUSCULOSKELETAL PAIN AND MOOD DISORDERS IN PATIENTS ON ANTI-CYTOKINE THERAPY

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**Objective:** Rheumatoid arthritis (RA), ankylosing spondylitis (AS) and psoriatic arthritis (PsA) are the most common rheumatic diseases which may cause musculoskeletal pain. Anti-cytokine therapy is one of the therapeutic approaches in the management of inflammatory joint diseases. Musculoskeletal pain includes arthralgia and myalgia and it is influenced to varying degrees by biological, physiological and social factors. The presence of pain is largely determined by the inflammatory activity of the underlying disease, but subjective factors which depend on the psycho-emotional state of the patient are involved in the assessment of the severity of pain symptoms. The aim of the study is to assess the intensity of arthralgia and myalgia and its correlation with anxiety and depressive mood disorders among a Bulgarian cohort of patients with chronic inflammatory diseases.

**Methods:** A single-center, observational study including patients with RA, AS and PsA, dispensary in the Rheumatology clinic, St. Marina UMBAL - Varna. All the patients were diagnosed according to the criteria for the specific inflammatory joint disease and were treated with a biological medication. We used visual analogue scales (VAS) to assess pain intensity for muscular and joint pain and Zung self-report scales for depression (SDS) and anxiety (SAS). Inflammatory markers were investigated in all patients. Descriptive statistics, one-sample T-test, correlation and linear regression analyses were used. A significance level of p<0.01 was accepted.

**Results:** 130 patients with inflammatory joint disease (RA, AS, PsA), were included in the study. The average age of the study population was 56.37 years (from 21-76 years). 41.5% (n=54) of them were women, 58.5% (n=76) were men. No significant differences were found in evaluating the VAS for assessing joint and muscle pain between men and women (p=0.177 for joint pain and p=0.717 for muscular pain). On the other hand women scored higher on the anxiety and depression scales, and the difference was again significant (p<0.001 for the depression scale and p=0.001 for the anxiety scale). The SDS shows a significant correlation with the self-assessment of muscle and joint pain, but the SAS showed a significant correlation only with the self-reported joint pain (SDS and VASm, p=0.008; SDS and VASa, p<0.001; SAS and VASm, p=0.031, SAS and VASa, p=0.004 respectively). Inflammatory indicators (predictors) determine about 8% of the

variation of the two pain indicators - for joint pain –  $R^2$  7.8%, for muscle pain -  $R^2$  8.1%

**Conclusion:** Musculoskeletal pain is one of the most common clinical presentations of inflammatory joint diseases. Chronic pain can lead to mood disorder. The intensity of the pain correlates with anxiety and depressive symptoms in these patients.

## P1082

### TRAINING FOR OSTEOPOROSIS CAREGIVERS INCREASES THERAPY ADHERENCE

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**Objective:** The adherence of patients to the treatment of osteoporosis (OP) remains low. Additional factors: advanced age of patients, cognitive disorders, high comorbidity, fear of side effects of drugs, fear of calcium deposits in blood vessels, kidneys and gallbladder, absence of obvious clinical manifestations of OP lead to refusal or unreasonable interruptions in OP therapy. We aimed to analyze the adherence to treatment of OP in single patients living in the family and patients who come to the appointment with a caring relative.

**Methods:** 300 outpatient records were analyzed. 3 groups were recruited: 1st - single patients, N=100, 2nd - living in a family N=100, 3rd - coming to an appointment with a caring relative/social worker, N=100. The following were assessed: the completeness of the examination, the frequency of visits, adherence to therapy and the result of treatment according to densitometry data and repeated fractures. The observation period is 3 years.

**Results:** 15.7% dropped out of the study, 6% were going to start treatment, 9.7% started taking vitamin D and continued to take it until the package was over, 5% started taking basic drugs, after 1-3 months they stopped taking them. 2.3% died within 3 years from various causes. The final analysis included 246 people. The highest adherence to examination, therapy in patients applying for a caregiver - 94.7% of patients completed all the prescribed examinations, adhered to therapy in 90% of cases, the results are lower for patients living in the family (69%; 70-87%), even lower for single patients (30.7%; 27-49%). Caregivers have a better cognitive status, mobility, use of modern means of communication, and are aimed at rehabilitation. As a result of higher adherence to non-pharmacological and pharmacological treatment by all groups of drugs, the increase in BMD in the 3rd group of patients is maximum. In the 1st group of patients, due to low adherence to therapy and the worst arrangement of life, by the 3rd year of observation, a higher percentage of fractures (6.2%) was revealed, differences in the frequency of fractures in the 2nd and 3rd groups over 3 years observation was not detected (1.2% and 1.1%) due to the short observation period and a relatively small sample of patients.

**Conclusion:** At the stage of referring an elderly patient for examination for OP, it is recommended to come to the appointment

with a caregiver. Participation in the process of examination and treatment of a caregiver leads to an increase in the patient's adherence to all types of therapy, contributes to a better increase in BMD and a decrease in the number of low-energy fractures.

## P1083

### COGNITIVE IMPAIRMENTS IN PATIENTS WITH RHEUMATOID ARTHRITIS RECEIVING ADEQUATE PSYCHOPHARMACOTHERAPY OF ANXIETY AND DEPRESSIVE DISORDERS

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**Objective:** To assess the rates of cognitive impairments (CI) in patients with rheumatoid arthritis (RA) and comorbid anxiety and depressive disorders (ADD) receiving conventional antirheumatic drugs and biologics with or without adequate psychopharmacotherapy (PPT), and to determine factors associated with CI after 5 years.

**Methods:** 128 RA-patients (pts) were enrolled, 86% were women with a mean age of  $47.4 \pm 11.3$  (M $\pm$ SD) yrs. All pts met the full ACR criteria for RA. Disease activity was assessed using DAS28, mean RA activity was high ( $5.27 \pm 1.78$ ) at baseline. ADD were diagnosed in 123 (96,1%) of RA-pts in accordance with ICD-10 in semi-structured interview by a licensed psychiatrist. Severity of depression and anxiety was evaluated with MADRS and HAM-A. CI were diagnosed during clinical and psychological examination using the battery of pathopsychological and projective techniques including remembering the ten words, indirect memorization with pictograms, incomplete-sentence test, Wechsler scale, Raven's Progressive Matrices. Patients missing 1 or more cognitive test results were excluded from the study. Biologics treatment duration varied from 1-6 years, antidepressants from 6-96 weeks. RA-pts with ADD were divided into the following treatment groups: 1 – conventional disease-modifying antirheumatic drugs (DMARDs) (n=39), 2 – DMARDs+PPT (sertraline or mianserine) (n=43), 3 – DMARDs+biologic DMARDs (bDMARDs) (n=32), 4 – DMARDs+bDMARDs+PPT (sertraline or mianserine) (n=9). Stepwise multivariate logistic regression analysis was conducted to determine factors associated with CI after 5 years.

**Results:** At baseline CI were diagnosed in 25 (64,1%) patients in 1<sup>st</sup> group, 35 (81,4%) in 2<sup>nd</sup>, 24 (75%) in 3<sup>rd</sup> and 6 (66,7%) in 4<sup>th</sup>. At 5-yrs endpoint 83 RA-pts were assessed and 74 included in analysis (1<sup>st</sup> group – 22, 2<sup>nd</sup> – 23, 3<sup>rd</sup> – 20, 4<sup>th</sup> – 9). After five years CI rates increased in no-PPT groups (81,8% and 90% for 1<sup>st</sup> and 3<sup>rd</sup>) and decreased in PPT groups (65,2% and 55,6% for 2<sup>nd</sup> and 4<sup>th</sup>),  $p \geq 0,05$ . Risk of CI after five years was two times higher in no-PPT groups vs. PPT-groups (RR 1,93,  $p=0,021$ ). According to univariate logistic regression, female sex, RA duration, DAS28, CRP, RF positivity, major depression, recurrent depression, history of glucocorticoids usage and no PPT in treatment regime were associated

with cognitive impairments at five years follow-up. Variables were subjected into multivariate logistic regression: higher DAS28 (OR 1,48 [95%CI 1,22–1,79],  $p < 0,001$ ) and no-PPT treatment plan (OR 0,263 [95%CI 0,07–0,942],  $p = 0,04$ ) were independently associated with CI after 5 years.

**Conclusion:** CI rates are very high in population of RA-patients with ADD, increasing gradually over time. Adequate psychopharmacotherapy of anxiety and depressive disorders shows potential to lessen the rates of CI in patients with RA.

## P1084

### THE CLINICAL IMPACT OF FRACTURE LIAISON SERVICE IN A SUBSPECIALIZED ORTHOPEDIC HOSPITAL OF IRAN: A PRELIMINARY REPORT

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**Objective:** Osteoporotic Patients who are referred with a fragility fracture are at increased risk of sustaining a re-fracture, which is associated with significant economic and health burdens. A fracture liaison service (FLS) is a coordinated care system serving to prevent later fractures in patients referred to the orthopedic setting. In this study, we aimed to evaluate the success of FLS is reducing the risk of subsequent fractures in patients referred to the Shafa Orthopedic Hospital of Iran.

**Methods:** During the two years of the administration of FLS in the Shafa Orthopedic Hospital, 1532 patients with fragility fractures were registered, including 986 females and 546 males, with a mean age of  $65.3 \pm 10.1$  years. Menopause before the age of 45 years was noticed in 13.6% of females. 21.3% of patients had diabetes mellitus. 13.8% of patients were active smokers. 6.5% of patients were using narcotics. 15.5% of patients were taking anti-coagulants. 2.2% of patients had a history of Glucocorticoid consumption. 2.9% of patients had a history of rheumatoid arthritis.

**Results:** 269 patients (17.5%) had a history of previous fragility fracture at the referral, most of which occurred in the past two years (87%). During the two years running the FLS program in Shafa Orthopedic Hospital, 11 re-fracture (0.7%) were recorded in our dataset. Six of these 11 patients (54.5%) had a history of fragility fracture before registration, and all of them were occurred in the last two years before registration.

**Conclusion:** FLS program remarkably reduces the incidence of re-fracture in osteoporotic patients referred with fragility fractures. The incidence of re-fracture seems to be attributed to a prior fragility fracture and its recency. However, such interpretation needs to be tested in a larger set of re-fracture patients registered in long-term FLS programs.

## P1085

### HYPERCALCEMIA IS ASSOCIATED WITH GERIATRIC CONDITIONS AND PREDICTS MORTALITY IN OLDER HIP FRACTURE PATIENTS

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**Objective:** Hypercalcemia has not been widely studied in older hip fracture patients. It is usually caused by primary hyperparathyroidism (PHPT), a mostly asymptomatic condition increasing fracture risk. We measured calcium levels in hip fracture patients and studied factors associated with hypercalcemia, and whether it increases the risk of mortality.

**Methods:** This prospective cohort study included 1448 Finnish hip fracture patients 65 years and older, who sustained their first low-energy hip fracture between 2009-2019. Albumin corrected calcium and 25(OH)D concentrations were measured during acute hospital period. Factors associated with hypercalcemia were analysed with multivariable logistic regression models. Cox proportional hazard models were constructed to examine the age- and gender-adjusted and multivariable adjusted associations of hypercalcemia with mortality.

**Results:** Hypercalcemia was detected in 23.1% of all subjects (in 17% mild; P-Ca 2.15-2.65, and in 6% moderate to severe; P-Ca  $> 2.65$  mmol/l). Female gender (odds ratio [OR] 1.93, 95%CI 1.41–2.64), chronic kidney disease (glomerular filtration rate  $< 45$  ml/min/1.73 m<sup>2</sup>; OR 1.40, 95%CI 1.04–1.90), malnutrition (Mini Nutritional Assessment Short form 0–7p; OR 1.78, 95%CI 1.05–3.01), and assisted or institutionalized living arrangement (OR 1.49, 95%CI 1.08–2.04) were independently associated with hypercalcemia. Moreover, hypercalcemia increased independently the risk of two-year mortality (hazard ratio [HR] 1.59, 95%CI 1.32–1.91). In addition, age over 90 years (HR 1.46, 95%CI 1.09–1.96), malnutrition (HR 1.47, 95%CI 1.19–1.81) or risk thereof (HR 2.43, 95%CI 1.76–3.34), assisted or institutionalized living (HR 1.34, 95%CI 1.06–1.70 and HR 1.74, 95%CI 1.32–2.29, respectively) and non-independent mobility (HR 1.81, 95%CI 1.43–2.29) were all associated with increased risk of mortality. The serum 25(OH)D concentration was not significantly associated with mortality.

**Conclusion:** Hypercalcemia was a frequent finding in our older hip fracture cohort. It was associated with common geriatric conditions, and increased the risk of mortality. The findings suggest more active screening of PHPT in fragility fracture patients. Measurement of PTH with lower levels of P-Ca may be warranted.

P1086

### MODERN POSSIBILITIES OF PHARMACOLOGICAL CORRECTION OF BONE METABOLIC DISTURBANCES IN ANKYLOSING SPONDYLOARTHRITIS

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**Objective:** The mechanisms of bone metabolism disorders in idiopathic ankylosing spondylitis (IAS) are still not well understood. It is believed that the severity of IAS, the age of the patient, the intensity of autoimmune inflammation, as well as the use of glucocorticosteroids and their doses, can play an important role in the pathogenesis of osteoporosis (OP). In this regard, the study of bone metabolism disorders in ankylosing spondylitis is extremely important. The purpose of our work was to study the prevalence of OP in IAS, to investigate the clinical and laboratory characteristics of bone metabolism and the possibility of correcting their disorders.

**Methods:** In the course of the work, 168 patients with IAS were examined by DXA using the Lunar DPX Pro device (GE, USA).

**Results:** In 80 patients (47.62%), a decrease in BMD was detected. They often complained of bone pain, decreased muscle strength compared with patients with normal BMD. In patients with OP, bone resorption markers were increased: CrossLaps, acid phosphatase, urine calcium. Indicators of bone formation: osteocalcin, total alkaline phosphatase were within normal limits. In addition, AP in IAS was predominantly found in patients with a low BMI.

**Conclusion:** Osteoporosis is a common complication of idiopathic ankylosing spondylitis, its signs were detected in 48% of patients. This complication often develops in patients with high activity, duration of the disease for >5 years, receiving glucocorticosteroids and having a low BMI. Clinically, osteoporosis in IAS is manifested by pain in the bones and spine, decreased muscle strength, fractures of long bones and spine. The study of bone remodeling markers revealed an increase in bone resorption markers, while markers of bone formation remain within the normal range. Intravenous administration of zoledronic acid at a dose of 5 mg once a year significantly increases BMD, reduces initially elevated markers of bone resorption, and reduces bone pain.

P1087

### ASSESSMENT OF THE RISK OF HOSPITALISATION BY MORSE FALL SCALE FOR ELDERLY PATIENTS AND AVAILABLE MEASURES TO REDUCE IT

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**Objective:** To identify risk factors for falls of elderly patients, to assess the risks, to propose measures aimed at minimizing the risks of hospitalisation after falls.

**Methods:** 76 patients of therapeutic, pulmonological, neurological departments aged 75-95 years (average age 78.2±3.3 years). During the initial examination by a geriatrician, all patients underwent a risk assessment on the Morse Fall Scale, indices of basic and instrumental activity, nutritional risk, and tests to detect cognitive decline were calculated.

**Results:** In 35% of patients, senile asthenia of varying severity was detected, in 29% - preasthenia, in 41% of patients, a satisfactory condition was revealed. According to the Morse scale, all patients with asthenia and preasthenia had a risk of falls of 55 points or higher. 90% of the examined patients had hearing and vision disorders, 68% had gait disorders, 48% had balance disorders, dizziness, frequent urination. 30% of patients received drug therapy that worsens the risk of falls (diuretics, tranquilizers, sedatives, sleeping pills, analgesics). The following additional risk factors for falls were identified: the absence of special railings in wards and corridors for additional support of patients, the absence of special handles for supporting patients and staff call buttons in toilet rooms, the presence of wires from oxygen concentrators on the floor in wards, rare training of secondary and junior medical personnel on the rules of transportation and movement of patients, the absence of additional information about patients at high risk of falls in case histories, on bracelets, ward doors, only a small number of patients at medium and high risk of falls are accompanied by qualified medical personnel trained in the fall prevention program. As initial measures to reduce the risk of falls, it is proposed that a nurse maintain a daily high-risk patient safety plan. Absolutely all patients should be informed about the need to comply with a number of special measures: do not get out of bed abruptly, if necessary, call the medical staff to the floor, do not lay out foreign objects on the floor. In addition, when moving the patient to the wheelchair, the chair should be fixed in the "brake" position, the footrests should be raised up, the sides of the gurneys should be raised.

**Conclusion:** Assessment of the risk of falls in elderly patients by the Morse Fall Scale is a simple and informative tool in predicting the risk of falls in the hospital and a starting point in planning measures to reduce this risk. We consider it necessary to focus the attention of medical personnel on the principles of safe behavior and strengthen control by the doctor and the hospital administration on compliance with preventive measures.

P1088

**MEDICATION BELIEFS AND RELIANCE IN PATIENTS WITH KNEE OSTEOARTHRITIS**A. Faza<sup>1</sup>, I. Cherif<sup>1</sup>, S. Miladi<sup>1</sup>, Y. Makhoulf<sup>1</sup>, H. Boussaa<sup>1</sup>, K. Ouenniche<sup>1</sup>, L. Souabni<sup>1</sup>, S. Kassab<sup>1</sup>, S. Chekili<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup><sup>1</sup>Mongi Slim Hospital, La Marsa, Tunisia

**Objective:** Therapeutic compliance is a major pillar of chronic disease management. It is based on the individual's confidence and belief in the prescribed treatment as well as on the patient's subjective assessment of the benefit/risk ratio. We aimed to assess trust and beliefs on medicine in patients treated for knee osteoarthritis (OA).

**Methods:** We conducted a cross-sectional study in the rheumatology outpatient department. Patients with knee osteoarthritis were included and sociodemographic data, comorbidities as well as disease related characteristics were reported. All patients answered the WOMAC Arthritis Index and the BMQ-specific (Belief on medicine questionnaire). Both are validated questionnaires that respectively assess the impact of knee OA on pain, stiffness and physical activity and the patients' medication beliefs and adherence. The BMQ-specific consists of two parts: the first part is related to the necessity of the treatment (5 questions), the second part is related to concerns about to the medication (5 questions). Each item has five levels (from 1=strong disagreement to 5=strong agreement). The BMQ is therefore rendered as two scores ranging from 5-25 (BMQ necessity and BMQ concern). It also provides information on the patient's perceived benefit-risk ratio through the necessity-concern differential which ranges from -20 to +20.

**Results:** 30 patients, 2 males and 29 females, with a mean age of 65.8±9.8 years [40-83] were included. Among them, 12 were illiterate, 11 finished primary school and 8 went to high school. 68% (n=21) had cardiovascular diseases and 29% had diabetes (n=9). 13 patients (41%) were obese and 10 (32%) were overweight. Mean disease duration was 7.9±6.9 years [0.2-30]. Mean WOMAC-pain, WOMAC-stiffness and WOMAC-physical activity scores were 11.6±4.9, 2.8±1.9 and 31.1±15.1 respectively. Mean BMQ necessity and concern were 15.2 ±3.9 and 11.6 ±3.5 respectively. Mean necessity-concern differential was 3.6 ±4.3 [-3-14], demonstrating a positive benefit-risk ratio according to patients. Regarding the necessity scale, question 5 (My medicines protect me from becoming worse) had the highest mean value (3.26±1.1). In the Concerns scale, question 10 (I sometimes worry about becoming too dependent on my medicines) had the highest value (2.58±0.8). BMQ necessity was higher in patients who had BMI <30 (p=0.05). BMQ concern was significantly lower in patients with cardiovascular disease (p=0.05). There was no significant association between BMQ and disease duration (p=0.7 for BMQ necessity and BMQ-concern) as well as educational attainment (p=0.5 for BMQ necessity and p=0.6 for BMQ-concern). Necessity-concern differential was significantly lower in illiterate patients (p=0.005). No significant correlations were found between the different WOMAC scores and both BMQ-necessity and BMQ-con-

cerns. Necessity-concern differential was not correlated with the different WOMAC scores either.

**Conclusion:** In our series, educational attainment, obesity and cardiovascular disease impacted the patient's belief and trust in medicine as well as their perception on the benefit/risk ratio. No association between WOMAC score and BMQ was found. Further studies with larger sample size are needed to better identify what influences patients' beliefs.

P1089

**DUCHENE MUSCULAR DYSTROPHY AND BONE MINERAL DENSITY**C. Matzaroglou<sup>1</sup>, E. Trachani<sup>2</sup>, S. Lampropoulou<sup>2</sup>, A. Marouda<sup>3</sup>, E. Chroni<sup>1</sup>

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**Objective:** Neuromuscular diseases (NMDs) are a heterogeneous group of diseases affecting the anterior horn cell of spinal cord, neuromuscular junction, peripheral nerves and muscles. NMDs cause physical disability usually due to progressive loss of strength in limb muscles and some NMDs also cause respiratory muscle weakness. More specifically, problems into systems such as cardiac, bone health and osteoporosis. One of the most known neuromuscular diseases with reduction of bone density is the Duchene muscular dystrophy (DMD).

**Methods:** This study was aimed at evaluating BMD and the calcitropic hormone vitamin D in a group of children affected by DMD, with or without steroid therapy. BMD was measured by DXA scan on lumbar spine and leg (T- and Z-scores).

**Results:** 18 males (mean age 13±8.52 years) affected by DMD were studied: 8 on long-term prednisone therapy (60±56,56 mg/d), ten (10) not taking corticosteroids. In the group of steroid-treated children, spine DXA Z-score was -1,3± 0,5 spine DXA T-score -3,05±2.47, leg DXA Z-score -3,75±3,47 and leg DXA T-score -2,75± 2,05. Mineral density was lower than normal for age in all patients, and even lower in the group of steroid-treated children. In the steroid-treated children vitamin D was 25,84±10,49 mg/dl. Intra-groups statistical analysis showed significant difference between BMD at lumbar spine and proximal femur in both mentioned groups (P<0.05). Vitamin D deficiency was detected in 4/18 patients (22.22%) and its serum level was significantly lower in non-ambulates compared with ambulates.

**Conclusion:** In DMD, the progressive skeletal and cardiac muscle dysfunction and degeneration is accompanied by low BMD and bone fragility. Glucocorticoids, which remain the standard of care for patients with DMD, increase the risk of developing osteoporosis and pathologic fractures. We provide a comprehensive review of the following 4 phases of bone health management: (1) bone health monitoring, which is used to identify early signs of compromised bone health; (2) osteoporosis stabilization, which is aimed to mitigate back pain and interrupt the fracture-refracture cycle

through bone-targeted therapy; (3) bone health maintenance, which has the goal to preserve the clinical gains realized during the stabilization phase through ongoing bone-targeted therapy; and (4) osteoporosis therapy discontinuation, which places those who are eligible for discontinuation of osteoporosis treatment back on a health monitoring program.

## P1090

### THE MOST IMPORTANT CLINICAL SIGNIFICANCE OF SCHOOLS FOR PATIENTS IN THE PREVENTION OF FRACTURES IN OSTEOPOROSIS

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**Objective:** Currently, in many countries there is an increase in the prevalence of severe forms of osteoporosis (OP), accompanied by low-traumatic fractures. This problem has a great socio-economic impact. One of the ways to reduce the severity of this problem may be the education of patients with OP in schools for patients. The aim of our study was to assess the impact of patient compliance on the effectiveness of osteoporosis therapy and the incidence of new fractures.

**Methods:** Study design: Stage 1: retrospective analysis of outpatient records of examined patients for 2019-2021 in the regional OP center. Stage II: telephone survey of these patients to identify new fractures in December 2022. OP was diagnosed by osteodensitometry using the LUNAR DPX pro device (GE, USA). The analysis included outpatient records of 2236 patients aged 40-92 years. Of these, 1897 women and 339 men.

**Results:** Group I (control) consisted of 715 patients who refused treatment (31.98% of all included in the study). Of these, 115 patients had a history of low-traumatic fractures at the time of the examination, of which 509 people (71%) were diagnosed with low bone mass. According to the results of a telephone survey, it was shown that without OP therapy, 158 patients of this group (26.51%) had new low-traumatic fractures during the indicated period. Of the remaining patients, 1262 (82.97%) had low bone mass. All of them were trained at the school for patients and they were prescribed therapy. These patients were divided according to the degree of compliance. Group II consisted of patients with high compliance (784 patients (62.12%)), who fully complied with the recommendations of doctors. Only 11 new fractures (1.4%) were registered in this group. Group III consisted of patients with low compliance (478 patients (37.88%)), who only partially followed the recommendations: they violated the schedule for taking or administering pathogenetic drugs, took breaks in therapy. Here, 42 new low-traumatic fractures (8.79%) were identified.

**Conclusion:** The education of patients with OP in schools for patients is of great importance in the prevention of new fractures.

## P1091

### TRIPLE SCREW FIXATION IN NON-DISPLACED SUBCAPITAL FEMORAL FRACTURES IN THE ELDERLY: ARE WE DOING IT COMPLETELY RIGHT? REVIEW OF OUR EXPERIENCE

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**Objective:** To evaluate the complications of triple screw fixation osteosynthesis in non-displaced subcapital fractures of the femur (according to the Garden I and II classification) in the elderly and to analyze the predictors of failure.

**Methods:** A retrospective study was carried out on a sample of 154 subcapital fractures treated by osteosynthesis with triple screwing between the years 2011 and 2020 in our center. A stratification of the sample was carried out, obtaining 118 patients older than or equal to 65 years with non-displaced Garden I-II fractures. Two subgroups were established according to age (Group 1: patients between 65-79 years, and Group 2:  $\geq 80$  years). Statistical analysis was carried out using the IBM SPSS Statistics V23 program.

**Results:** 66% of the sample were women. More than 90% of cases suffered from a low energy mechanism. Complications occurred in 27.27% (17.5% osteosynthesis failure and only 11.7% reinterventions). It was evidenced that a shortening  $>5\text{mm}$  and a varus  $>7^\circ$  in the postoperative X-ray is related to greater osteosynthesis failure. In the comparative analysis, group 2 showed a statistically significant higher rate of dementia, mortality, longer hospital stay and admissions to social-health centers with respect to group 1. As well as a deterioration in functionality (in relation to the previous state of surgery) and lower survival related to the failure of osteosynthesis in a statistically significant way. Osteosynthesis failure was not associated with the presence or absence of previous dementia or the previous basal state.

**Conclusion:** In accordance with the published bibliography, it has been shown that osteosynthesis in non-displaced subcapital femoral fractures in patients  $\geq 80$  years of age presents lower implant survival, lower functionality and higher patient mortality, so there is a trend with a high level of evidence in favor of the use of hemiarthroplasty in these patients. Group 2 and the presence of a shortening  $>5\text{mm}$  and a varus  $>7^\circ$  in the postoperative radiograph are presented as predictors of failure.

P1092

### CORRECTION OF HYPERPHOSPHATEMIA IS SUFFICIENT TO PROTECT BONE MASS AND MICRO-ARCHITECTURE IN RATS WITH CHRONIC KIDNEY DISEASE-INDUCED MINERAL BONE DISEASES

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**Objective:** Chronic kidney disease (CKD) patients with secondary hyperparathyroidism (sHPT) and hyperphosphataemia have heightened fracture risk due to low bone mass and deterioration in bone microarchitecture. sHPT and hyperphosphataemia frequently develop during stages 3 and 4 of CKD, and are associated with cardiovascular calcifications and morbidity, and when progress to stage 5 causes mortality in patients. Calcimimetic drugs are calcium-sensing receptor (CaSR) modulators that regulate the function of CaSR in the parathyroid gland (PT) and kidney by increasing its sensitivity to calcium thereby decreasing PTH secretion. Phosphate binder (sevelamer), on the other hand, is a commonly prescribed drug to lower phosphate levels in dialysis patients (stage 5 CKD) by reducing intestinal absorption of dietary phosphate. Since high phosphate causes mineralizing defects resulting in bone fragility, we tested calcimimetic drugs (cinacalcet (10 mg/kg) and etelcalcitide (0.6 mg/kg)) as well as sevelamer (3% of diet) in rats with CKD-induced-mineral bone disease (CKD-MBD). We aimed to assess the relative contribution of calcium and phosphate correction in protecting bone mass and microarchitecture in CKD-MBD rats.

**Methods:** CKD-MBD was developed by 5/6th nephrectomy (Nx) and feeding high phosphate (P) diet (1.8% HPD). Post-Nx, rats were randomized to 7 groups (n=10 rats/group): [1] sham-operated (0.6% normal P diet (NPD)), [2] sham-operated-HPD, [3] CKD-NPD, [4] CKD-HPD, [5] CKD-HPD+cinacalcet, [6] CKD-HPD+etelcalcitide and [7] CKD-HPD+sevelamer for 4 weeks.

**Results:** Serum renal parameters (urea, blood urea nitrogen, and creatinine) were pathologically elevated in CKD-MBD rats. These rats had hypocalcemia and hyperphosphatemia, and such alterations in mineral homeostasis led to the loss of bone mass and deterioration of bone micro-architecture at all the skeletal sites (femur, tibia, and vertebrae) studied. Calcimimetics and phosphate binder suppressed renal parameters of CKD-MBD rats to the CKD-NPD (uremic) levels. Etelcalcitide restored calcium and phosphate to normal levels. Cinacalcet and sevelamer although restored phosphate levels to normal however failed to achieve normocalcemia – hypocalcemic condition continued with cinacalcet whereas sevelamer caused hypercalcemia. All three drugs significantly preserved bone mass and microarchitecture in CKD-MBD rats at all skeletal sites.

**Conclusion:** These findings suggest that normalization of serum phosphate but not calcium was required for skeletal protection in CKD-MBD rats.

P1093

### USE OF INTRA-ARTICULAR CORTICOSTEROID INJECTIONS AMONG OSTEOARTHRITIS PATIENTS IN UK GENERAL PRACTICE

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**Objective:** To establish the current practice of use of intra-articular corticosteroid injection in osteoarthritis (OA) patients.

**Methods:** We conducted a cohort study using data from general practice (CPRD GOLD) in the UK linked to hospital data (HES). We followed patients with a first diagnosis of OA in any joint (ankle and foot, elbow, hand, hip, knee, shoulder, or wrist) between 2005-2020. The main outcome was intra-articular injection of corticosteroids. Incidence of first injection per 100 person-years (py), and prevalence was estimated for each joint and stratified by calendar year, gender, and geographical region. Injections per OA patient and mean number of injections per injected patient's joint were calculated. Median time from OA diagnosis to injection was calculated per each joint.

**Results:** 220,125 OA patients were identified (58.8% women; mean age of 65 yr). 23,899 (10.8%) patients were injected. Shoulder and knee OA patients had a higher prevalence of injection any time after OA, 15% and 13% respectively. The least injected joints were the elbow and wrist (6% and 9%). Of those injected, 40% had more than 1 injection. The joints with most injections per patient were the knee and hand (mean of 2 injections per injected patient). The earliest injected joints were the shoulder (median time of 94 d after OA diagnosis) and knee (median 295 d). Incidence of first injection after OA diagnosis was higher in women. Incidence of first injection in any joint was higher in Yorkshire & The Humber, and East Midlands with incidences of 3.8 (95%CI 3.4-4.1) and 3.4 (3.0-3.7) injections per 100 py. The regions with the lowest injection usage were South East with 1.2 (1.1-1.3) injections per 100 py, and South West with 1.4 (1.3-1.5). Incidences of injections were stable for all joints during the study period, except for a significant decline for all joints in 2020.

**Conclusion:** Around 1 out of 9 patients diagnosed with OA receive an intraarticular corticosteroid injection, and of those, 40% receive more than one. The most injected joints are the shoulder and knee, and median time from OA to first injection for those joints is less than 1 year. The use of injections has been unchanged over the past 15 years. However, there is wide heterogeneity in use of injections between UK regions which needs exploring.



P1094

### OUTCOMES DURING ADMISSION AND DISCHARGE OF NONAGENARIAN PATIENTS WITH HIP FRACTURE

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**Objective:** To compare the clinical evolution and the outcomes of nonagenarian patients during admission and discharge after hip fracture with a cohort of younger patients admitted to an Orthogeriatric Dept.

**Methods:** Descriptive and retrospective study of patients consecutively admitted to the Orthogeriatric Dept. of the Hospital Clinic of Barcelona during the year 2016. It has been collected epidemiological data, comprehensive geriatric assessment, medical and surgical outcomes during hospital admission, as well as mortality at admission and one year after the fracture and hospital readmission rate within a month.

**Results:** 303 patients were analyzed and classified in two cohorts distributed by age: <90 years (N=215) and ≥90 years (N=88). In both groups, women predominate, being more prevalent in the group of nonagenarians (87.5 vs. 76.7%). Both groups had similar functional and cognitive impairment, but the oldest had a higher rate of institutionalization and prevalence of geriatric syndromes. During admission, the older had a lower rate of medical (acute urinary retention, urinary or respiratory infection, acute heart failure, constipation) and surgical outcomes (infections, etc.), as well as a lower in-hospital mortality (1.14 vs. 1.90%). Nonagenarian had higher percentages of delirium (22.7 vs. 17.2%). At hospital discharge, the same percentage of patients were readmitted within a month (12.5%) but the annual mortality was higher in the nonagenarian group (29.5 vs. 17.6%).

**Conclusion:** Nonagenarian patients with hip fracture had similar baseline situation, without more adverse events associated during admission and while the first month, except for an increase in delirium associated with a higher prevalence of dementia in that group. The increase in annual mortality could be attributed to aging.

P1095

### METABOLIC SYNDROME AND CHRONIC INFLAMMATION AFFECT LEVELS OF ANGIOPOIETIN-LIKE PROTEINS TYPES 2 AND 3 IN PATIENTS WITH PSORIATIC ARTHRITIS

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**Objective:** To evaluate the possibility of using angiotensin-like proteins (ANGPTL) types 2 and 3 as predictors of progression of psoriatic arthritis (PsA) and comorbid conditions.

**Methods:** 30 PsA patients aged 38-68 years (women, 83.3%; duration of disease, 10.47±6.02 years) and 33 healthy donors aged 24-58 years (women, 75.8%) were included in the study. An ELISA was used to examine serum concentrations of ANGPTL types 2 and 3. Metabolic syndrome (MS) in PsA patients was determined by the National Cholesterol Education Program's Adult Treatment Panel III criteria.

**Results:** ANGPTL 2 and 3 levels were significantly higher in patients with PsA than in healthy individuals (p<0.05). In PsA patients with MS (n=11; 36.7%), ANGPTL 2 levels (10.46±6.94 ng/mL) were significantly different from PsA patients without MS (n=19; 5.38±3.77 ng/mL; p=0.014). There was a correlation between ANGPTL2 levels and BMI (r=0.43, p=0.011), serum cholesterol levels (r=0.31, p=0.02) and systolic blood pressure parameters (r=0.29, p=0.042). ANGPTL3 was considered as positive in 17 (56.7%) patients with PsA (>3SD of healthy subjects; range 454-810 ng/ml), the result was negative in 13 (43.3%) (range 253-419 ng/ml). There were statistically significant differences in ANGPTL3 content in PsA patients with high disease activity (n=12, DAS>3.7) compared with low/moderate disease activity (n=18, DAS≤3.7) (τ=-3.97, p<0.001).

**Conclusion:** The serum levels of ANGPTL2 in patients with PsA depend on the presence of metabolic syndrome, which may indicate its potential role in the pathogenesis of PsA. ANGPTL3 can qualify for the role of a diagnostic marker of PsA activity.

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### CLINICAL IMPACT OF MUSCULOSKELETAL PATHOLOGY IN PATIENTS WITH TRANSTHYRETIN-ASSOCIATED AMYLOIDOSIS (ATTR): RETROSPECTIVE ANALYSIS OF THE CASE SERIES FROM OUR CENTER

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**Objective:** Early diagnosis of transthyretin-associated amyloidosis (ATTR)-cardiomyopathy (CM) is crucial to improve the outcome of these patients. Several authors have proposed new extra-cardiac manifestations: carpal tunnel syndrome (CTS), trigger finger (TF), lumbar canal stenosis (LCS), cuff rotators (CR), knee osteoarthritis (KO) and hip osteoarthritis (HO) that may be significantly relevant in the early diagnosis of the disease. Our hypothesis is that musculoskeletal manifestations precede the diagnosis of ATTR and may serve as predictors to prevent cardiac manifestations. In addition, we think that those extra-cardiac manifestations related to ATTR may present a more aggressive course of the disease and may be a more powerful and specific

predictor of the disease. The aim of this study is to evaluate the incidence of cardiovascular events (CV) (death, Heart Failure (HF) decompensation or admission for CV causes) and the natural course of the disease in patients affected by ATTR in its variant and wildtype forms according to the presence or absence of concomitant musculoskeletal manifestations.

**Methods:** A retrospective study of a sample of 128 patients with ATTRwt, ATTRv or genetic carriers treated in a comprehensive HF management program and included in the THAOS registry with follow up until September of 2021. A stratification of the sample was carried out, obtaining 99 patients with confirmed diagnosis of ATTRwt or ATTRv. Statistical analysis was carried out using the IBM SPSS Statistics 23 program.

**Results:** Patients with ATTRwt had a statistically significantly higher prevalence of musculoskeletal manifestations (CTS p0.001; TF p0.002; LCS p0.002; CR p0.037; KO p0.001; HO <0.001). In addition, a greater number of adverse cardiovascular manifestations appeared in patients with ATTRwt (AF/Flutter p0.001; HF <0.001; Heart Failure (HF) decompensation p<0.001). Latency between musculoskeletal manifestations and first diagnosis of TTR amyloidosis was significantly longer in ATTRwt compared to ATTRv except in KO and HO: CTS 7,00 years (0,00-14,00) p0,042, TF 6,50 years (2,00-11,00) p0,027, LCS 14,00 years (8,00-17,00) p0,001, CR 7,00 years (3,50-11,50) p0,035, KO 9,00 years (5,00-13,00) p0,130, HO 7,50 years (2,00-14,50) p0,131. Finally, we performed Kaplan-Meier curves to assess the difference in survival until the non-fatal heart failure event according to the presence of musculoskeletal manifestations, in which patients with ATTRwt presented lower survival with log rank (Mantel-Cox) p<0.001.

**Conclusion:** As seen in the literature, musculoskeletal manifestations may precede the diagnosis of ATTRwt and may serve as predictors to prevent cardiac manifestations. In addition, we think that those extra-cardiac manifestations related to ATTRwt may present a more aggressive course of the disease and may be a more powerful and specific predictor of the disease.

## P1097

### INCREASED LEVELS OF CIRCULATING ANGIOPOIETIN-LIKE PROTEIN 8 ARE ASSOCIATED WITH RENAL DYSFUNCTION IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** Early detection of renal dysfunction is important to

prevent the progression of rheumatoid arthritis (RA). Angiotensin-like protein type 8 (ANGPTL8) is associated with metabolic and inflammatory parameters as well as oxidative stress. We aimed to evaluate the association of ANGPTL8 and renal dysfunction (RD) in RA.

**Methods:** The study included 96 patients with a reliable diagnosis of RA (mean age 54.4±11.6 years, disease duration 10.7±8.56 years; 57.3% with moderate RA activity). All patients underwent calculation of glomerular filtration rate (GFR) according to the CKD-EPI formula (2009). Renal dysfunction (RD) was determined when calculated GFR was <60 mL/min/ per 1.73 m<sup>2</sup>. Circulating ANGPTL8 levels were measured by enzyme immunoassay.

**Results:** Reduced renal function (GFR<60 mL/min/1.73 m<sup>2</sup>) was observed in 28 (29.2%) patients with RA. Serum ANGPTL8 levels were significantly higher in patients with RD compared with the group of RA patients with normal renal function (695±324 pg/mL vs. 543±248 pg/mL, respectively; p=0.015). Serum ANGPTL8 was inversely related to calculated GFR (r=-0.29, p=0.039) and directly related to age (r=0.25, p=0.04), C-reactive protein level (r=0.31, p=0.007) and blood creatinine level (r=0.34, p=0.019). The results indicate that ANGPTL8 may affect glomerular filtration rate and inflammation.

**Conclusion:** High serum levels of ANGPTL8 can adversely affect renal function in RA.

## P1098

### THE ROLE OF PAIN CATASTROPHIZING IN PHYSICAL AND MENTAL FUNCTIONING IN INDIVIDUALS TREATED FOR SPONDYLODISCITIS

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**Objective:** Catastrophizing is a negative cognitive and affective response to an anxiogenic stimulus such as pain. It plays a role in amplifying and sustaining chronic pain. The aim of this study is to describe the prevalence and factors associated with catastrophizing in patients treated for spondylodiscitis.

**Methods:** A prospective study was conducted on patients treated for spondylodiscitis over a two-year period at a single spine center. The socio-demographic data, clinical, radiological, biological and therapeutic parameters were collected. A questionnaire was conducted on all eligible patients with the pain catastrophizing scale: PCS, hospital anxiety and depression scale: HAD and the Oswestry disability index: ODI. All data was collected after patient consent and was analyzed using the SPSS statistical package.

**Results:** 36 patients were selected for the study, with a sex ratio (M / F) of 1.57. The average age was 56 [18\_73]. 44% of them were married. Half of the patients lived in an urban setting 22% had comorbidities. Mycobacterium tuberculosis was the predominant pathogen (33%) followed by Staphylococcus aureus (22%).

Culture was negative in 5% of patients. The lumbar spine was the most frequent level of spinal focus (55%). 22% of patients had more than one focus in the spine. 54% of patients had neurological impairment: paraplegia 33%, sensory deficit 11% and confusion 6%. All patients were treated surgically: 32% internal corset, 31% fixation, 20% arthrodesis, 11% corporectomy, 6% laminectomy. The mortality rate was 6%. 22% of patients presented depression and 25% of them had anxiety according to the HAD score. Mild, moderate and severe functional disability was noted in 44%, 18% and 6%, respectively. Mean PCS was 15.2[0-50]. 12% of patients had PCS >30 which indicates a clinically relevant level of catastrophizing, and only one of them reported severe functional disability. PCS score was higher in patients with moderate to severe functional disability: 35,5[20-50] compared to non-disabled to mildly disabled patients: 13.1[0-18]. PCS score was lower in patients without mental disorders (no anxiety: mean score: 9.3, no depression: mean score:10.7) compared to those with certain anxiety (mean score:31.4) and confirmed depression (mean score:30.7). In our series, there were positive correlations between functional impairment levels, anxiety, depression and high PCS scores:( $p=0.002$ ,  $p=0.003$ , $p=0.002$ ), respectively.

**Conclusion:** In our series, only 12% of patients with spondylo-discitis have high pain catastrophizing scores. However, we acknowledge a clear association to different parameters such as functional impairment and mental health disorders, making its detection and management relevant.

### P1099

#### SAFETY OF INTRA-ARTICULAR CORTICOSTEROID INJECTIONS AMONG OSTEOARTHRITIS PATIENTS IN UK GENERAL PRACTICE

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**Objective:** To assess the short-term safety of intra-articular corticosteroid injections (IACI) on mortality, bleeding, infection, and cardiovascular disease incidence.

**Methods:** We conducted a cohort study using data from general practice (CPRD GOLD) in the UK linked to hospital data (HES). We followed patients with a first diagnosis of OA on any studied joint (ankle and foot, elbow, hand, hip, knee, shoulder, or wrist). Patients  $\geq 20$  years old with a first diagnosis of OA during 2005-2019 were included, except those with a prior orthopaedic surgery referral. Primary outcomes were mortality, bleeding, hemarthrosis, infection, diabetes, stroke, ischaemic heart disease (IHD) and myocardial infarction (MI). We calculated incidence of outcomes per 100 person-years (py) during 6 months after the first IACI and after OA diagnosis. Follow up was censored at subsequent OA diagnosis, IACI, joint replacement, or death. Incidence was further stratified by joint. We excluded patients with previous diabetes,

stroke, IHD, and MI for those events.

**Results:** Of 220,125 OA patients, 209,543 remained after exclusions (58.8% women; mean age 65 yr). 19,613 (9.35%) patients were injected. Mortality rates were 1.22 deaths per 100 py (95%CI 1.15 to 1.29) after OA and 1.23 (1.00 to 1.52) after IACI. There were no bleeding events, and 2 hemarthrosis – both after OA diagnosis. For local infection the incidence was 0.41 events per 100 py (0.37 to 0.45) after OA and 0.27 (0.18 to 0.42) after IACI. 6-month diabetes incidence was 1.00 events per 100 py (0.94 to 1.07) for OA and 0.88 (0.67 to 1.14) for IACI. As for cardiovascular events, stroke incidence was 0.57 events per 100 py (0.52 to 0.62) for OA and 0.68 (0.51 to 0.90) for injection, IHD 0.35 (0.32 to 0.39) and 0.49 (0.36 to 0.69), and MI 0.73 (0.68 to 0.79) and 0.96 (0.75 to 1.23) respectively after OA and IACI. There were no differences between OA and injection incidences of any outcome when stratifying by joint.

**Conclusion:** Our findings suggest that the incidence of death, infection, bleeding, and cardiovascular events are similar for the 6 months after IACI as compared to after OA diagnosis, globally and for each specific joint. Small non-significant differences in some outcomes may be due to confounding and will be investigated using confounding minimisation methods.

### P1100

#### IS CALCIUM SUPPLEMENTATION REQUIRED IN OSTEOARTHRITIS PATIENTS?

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**Objective:** Osteoporosis is a condition in which the BMD is decreased. Osteoarthritis consists of a group of mechanical abnormalities causing degradation of articular cartilage and subchondral bone. Physicians tend to prescribe calcium supplementation in cases of osteoarthritis, as it was thought to be helpful in this case. This study was done to find out if there was any correlation between osteoarthritis and osteoporosis and in turn to assess the usefulness of calcium supplementation in osteoarthritis.

**Methods:** A multicentric study of 1500 patients ageing 45 years and above was done in Lucknow, Allahabad and Varanasi. After an informed consent the patients were assessed using Kellgren-Lawrence grading and Singh and Maini Index. All the patients with any history predisposing them to secondary arthritis were excluded along with patients on long term use of corticosteroids. Both the KL grading and the Singh and Maini index were compared using the Pearson's coefficient of correlation.

**Results:** On comparing 1500 patients it was seen that osteoporosis was most commonly seen in postmenopausal females. The urban population was affected with osteoporosis more than rural population and vice versa in osteoarthritis. There was a slight positive correlation between Kellgren-Lawrence grading and Singh and Maini Index. This indicated that osteoarthritis and osteoporosis were slightly inversely proportional to each other.

**Conclusion:** This study shows that there is a slight negative correlation between osteoarthritis and osteoporosis. Hence, this

puts into question the use of calcium supplementation in cases of osteoarthritis.

P1101

### BONE TURNOVER MARKERS PRE- AND POST-TREATMENT ON POSTMENOPAUSAL OSTEOPOROSIS: ONCE UPON A THRESHOLD

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**Objective:** Bone turnover markers are useful tools on approaching to an osteoporotic patient. The matter has been reviewed and here was quite a standardization for technical requirements to perform an optimal biochemical assay; and clinical also situations where biomarkers could be of major assistance in the decision-making process of osteoporosis treatment. Our hypothesis is to test if CTX in plasma varies according to drug potency. compare the clinically expected CTX value according to patient's history vs. the actually measured level of CTX pre- and post-pharmacological interventions with different agents. Not randomized observational one year follow-up.

**Methods:** 50 postmenopausal women assisted at Fracture Liaison Service (FLS) during pre- and post-treatment follow-up. For each patient, it was determined an expected biochemical result of CTX, according to patient history, pre- and post-treatments. For denosumab users, CTX values under 0,150 were expected. For bisphosphonates, the expected CTX range was between 0,150-0,250. For women under SERMs, Tibolone or hormone replacement therapy CTX range from 0,250-0,350 was expected. Patients with CTX levels higher than 0,350 were considered free from anti-resorptive effects of medications. CTX levels higher than 0,600 were found in one patient at discontinuation of denosumab therapy. The expected CTX range was compared to the biochemically measured CTX. The consistency of CTX thresholds proposed for different anti-osteoporosis pharmacological agents was established for this group of patients. Collagen type one peptide (CTX-1) is an electrochemiluminescence immunoassay (ECLIA) obtained from centrifugated frozen plasma and also known as:  $\beta$ -CTx,  $\beta$ -CrossLaps, C-telopeptide, or simply CTX. CTX is a peptide fragment considered a marker of bone resorption, reflecting osteoclast activity.  $\beta$ -CTx sampling was collected in the morning, at overnight fast. Avoidance of vigorous activity on the night before is required. All plasma samples were submitted to a one single analysis center.

**Results:** 50 postmenopausal women evaluated sequentially at an FLS facility in Belo Horizonte. Group age average of 69 years old, and menopause mean at 47 yearsold. From all the patients, 34% had previous osteoporotic fragility fractures. The CTX measured fitted into the expected CTX range on 90% of the cases evaluated.

**Conclusion:** Biomarkers are relatively inexpensive and non-invasive tools which provide information about pathophysiological responses, thus supporting its use for accessing therapeutic outcomes related to pharmacological treatment. Nevertheless,

biomarkers reference values have a significant overlapping of pre- and postmenopausal women values. To date, CTX drug intervention cutoffs are not available. CTX levels expected for different situations are proposed, pre- and post-treatment with different medications: raloxifene, risedronate, zoledronate and denosumab. On- and off-treatment conditions may vary according to the history of use of pharmacological agents in osteoporosis. Different agents determine different CTX response leading to different ranges of CTX. More robust studies, addressing expected thresholds for CTX under different anti-osteoporotic agents effect may identify ranges where one would expect this bone marker to express.

P1102

### THE CORRELATION OF FUNCTIONAL DISABILITY AND MENTAL DISORDERS IN PATIENTS TREATED FOR SPONDYLODISCITIS

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**Objective:** Although it still remains a rare disease, spondylodiscitis has been on the rise in the past decades. Early diagnosis can be difficult, but improved diagnostic techniques and modern treatments have reduced patient mortality. However, studies reporting the outcome of spondylodiscitis are scarce. The aim of this study is to assess the influence of functional impairment on mental health in patients surgically treated for spondylodiscitis.

**Methods:** A prospective study was carried out on patients treated for spondylodiscitis over a two-year period at a single spine center. The socio-demographic data, clinical, radiological, biological and therapeutic parameters were collected. A questionnaire was conducted on all eligible patients with the hospital anxiety and depression scale: HAD and the Oswestry disability index: ODI. All data was collected after patient consent and was analyzed using the SPSS statistical package.

**Results:** Thirty-six patients were selected for the study, with a sex ratio (M / F) of 1.57. The average age was 56 [18-73]. 22% had comorbidities: 16% diabetes, 6% psychiatric illnesses. 22% were smokers. 72% had a sedentary lifestyle. Mycobacterium tuberculosis was the predominant pathogen (33%) followed by Staphylococcus aureus (22%). Culture was negative in 5% of patients. Of these, 33% patients received antituberculosis medical treatment. The lumbar spine was the most frequent level of spinal focus (55%). 22% of patients had more than one focus in the spine. 54% of patients had neurological impairment: paraplegia 33%, sensory deficit 11% and confusion 6%. All patients were treated surgically: 32% internal corset, 31% fixation, 20% arthrodesis, 11% corporectomy, 6% laminectomy. The mortality rate was 6%. Average HAD score was 13.3[0-40]: depressive dimension: 6.6[0-20], anxiety dimension 6.8[0-20], with scores indicating very likely depression

and anxiety in 22% and 25% of patients, respectively. Mild, moderate and severe functional disability was noted in 44%, 18% and 6%, respectively, according to the ODI score. In our series, there were positive correlations between gender, VAS (visual analog scale) spinal pain and ODI score:  $p=0.025$  and  $p=0.007$ , respectively. In the same way, there were positive correlations between the ODI score and the HAD depression dimension ( $p=0.001$ ) and the anxiety one ( $p=0.001$ ).

**Conclusion:** Two years after surgery, patients treated for spondylodiscitis have significant functional disability. Anxiety and depression, mainly due to interaction with the disability level, are two comorbidities to consider in spondylodiscitis. Screening and psychological support is then necessary.

## P1103

### THE ROLE OF KINETOTHERAPY AMONG PATIENTS WITH FIBROMYALGIA

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**Objective:** Fibromyalgia is a condition present among patients with chronic musculoskeletal pain and frequently creates differential diagnosis problems. Many times the objective clinical examination highlights vertebral static disorders that accentuate the existing joint pains. The aim was to observe the role of physical therapy through the Jacobson exercises on fibromyalgia pain.

**Methods:** 30 females diagnosed with fibromyalgia were followed according to WHO criteria from 1993, the patients presented generalized pain lasting at least 3 months that symmetrically affects the trunk and limbs and presented pain when palpating at least 11 of the 14 known painful points. The patients completed the VAS scale (Visual Analogue Scale) on the first day of treatment and at the end of the 10 days of treatment and throughout this time they followed a physical therapy program focused on Jacobson exercises.

**Results:** At the end of the treatment, the initial VAS values improved significantly VAS ( $p<0.06$ ).

**Conclusion:** The Jacobson exercises used in physical therapy sessions are effective in reducing pain in patients with fibromyalgia, knowing that an important role in the treatment of fibromyalgia is the reduction of stressful factors and, in conclusion, excessive drug consumption can be avoided.

## P1104

### IT'S TIME TO END THE STIGMA SURROUNDING INFECTIOUS MUSCULOSKELETAL DISEASES: A Q-METHODOLOGY STUDY

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**Objective:** Although it still remains a rare disease, spondylodiscitis has been on the rise in the past decades. Early diagnosis can be difficult, but Improved diagnostic techniques and modern treatments have reduced patient mortality. However, the management of these patients comes up against a certain number of issues, including stigma. This stigmatization of the spondylodiscitis patient represents a real problem on the daily life. This considerably hinders his reintegration. The aim of this study is to explore prevailing perspectives concerning stigma among patients treated for spondylodiscitis and so to identify potential determinants of these beliefs.

**Methods:** A Q-methodology study was carried out on patients treated for spondylodiscitis over a 2-year period at a single spine center. The socio-demographic data, clinical, radiological, biological and therapeutic parameters were collected. Participants ranked 20 opinion statements about the impact of their disease on their daily life (social life, mental health, professional life, sex life) on an agreement scale. A by-person factor analysis identified common patterns in the rankings. These patterns represent the different viewpoints among the patients. Data from interviews, in which they explained their ranking, was used to further interpret the viewpoints. All data was collected after patient consent and was analyzed using the SPSS statistical package.

**Results:** Thirty patients were selected for the study, with a sex ratio (M/F) of 1.57. Their average age was 56 [18-73]. The analysis revealed four viewpoints. At least 2 participants were significantly associated with each factor ( $p<0.05$ ).

- 1) The subject of stigma must be seriously addressed by health professionals and authorities.
- 2) Lack of self-esteem has limited my social life.
- 3) Challenged doubly, both by the disease and by the stigma associated with it.
- 4) Physical changes make me feel less confident about sex. In our series, there were positive correlations between gender, VAS (visual analog scale) spinal pain, presence of spinal syndrome and viewpoint 2:  $p=0.035$ ,  $p=0.04$  and  $p=0.008$ , respectively. In the same way, there were positive correlations between high pain catastrophizing scores and viewpoint 3:  $p=0.02$ . Viewpoint 4 was associated to depression thoughts, according to the hospital anxiety and depression scale: HAD:  $p=0.03$ .

**Conclusion:** We identified 4 viewpoints on the impact of spondylodiscitis on daily life. In fact, we have noticed that this disease affects relationships and self-confidence. It can lead also to the exclusion of the individual. Therefore, Various strategies are needed to combat the stigma related to infectious musculoskeletal diseases such as spondylodiscitis, which remains a frequent problem with multiple consequences.

P1105

### VALIDATION OF THE OSTEOARTHRITIS QUALITY OF LIFE SCALE FOR FIVE EUROPEAN COUNTRIES AND ASSESSMENT OF CULTURAL EQUIVALENCE

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**Objective:** Osteoarthritis Quality of Life Scale (OAQoL) is a disease-specific 22-item quality of life measure for use in upper limb, lower limb and combination osteoarthritis. Developed in the UK, the scale has recently been adapted to various European languages. The aim of this paper is to validate the OAQoL for five European countries - Germany, Hungary, Italy, Spain, Turkey, and to assess its cultural equivalence together with the UK original.

**Methods:** Data were collected from a minimum of 120 osteoarthritis patients at each centre. These data included recently translated OAQoL, demographic and disease characteristics, pain severity by Numeric Rating Scale (0-10) as well as physical function by WOMAC 3.0, and Health Assessment Questionnaire (HAQ). Reliability was tested by internal consistency, test-retest reliability and Person Separation Index (PSI). Internal construct validity was tested through Rasch analysis and cross-cultural validity by differential item functioning (DIF), including data from the original English version. External construct validity was investigated by known-group and convergent validity.

**Results:** 681 patients (mean age 64.8, mean disease duration 10.8 years) were included. Reliability of OAQoL was high with Cronbach's  $\alpha > 0.94$ , PSI 0.81-0.90, test-retest reliability 0.87-0.98 across the countries. Fit of OAQoL data to the Rasch model was good in all countries. There was no DIF by age, gender, disease duration. Some cultural variability was observed when data from all countries were pooled. This was accommodated within the Rasch measurement framework by a testlet design, except for Hungary. External construct validity was confirmed by expected correlations with comparator scales and strong associations with all known groups.

**Conclusion:** OAQoL has been found to be reliable and cross-culturally valid for these five countries, and consistent with the original UK version, while allowing for a different metric for Hungary. This transformation to the metric is available to facilitate international pooling and comparison of data.

P1106

### THE NON-INFLAMMATORY RHEUMATIC DISEASES AND CARDIOVASCULAR RISK: THE UNKNOWN COMORBIDITY

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**Objective:** Several factors were associated with non-inflammatory rheumatic diseases such as diabetes and overweight. As far as we know, no previous research has studied cardiovascular risk in this population. For this goal, we used the carotid intima-media thickness (cIMT) screening as a relevant tool for CV risk assessment. This study mainly aimed to determine the importance of CV risk in non-inflammatory rheumatic diseases.

**Methods:** The present study is a study conducted on Tunisian non-inflammatory rheumatism patients in the rheumatology department. We collected the characteristics of the patients and those of the disease. The CV risk was assessed using the measurement of cIMT. According to the American Society of Echocardiography guidelines, the cIMT thickness was measured using high-resolution B-mode carotid US with a Philips machine with the patient in the supine position. The cIMT was measured using the two inner layers of the common carotid artery and an increased IMT was defined as  $\geq 0.09$  cm.

**Results:** Fifty patients were collected, of which 82% were women. 64% of them were followed for knee osteoarthritis, the rest were chronic low back pain patients. The mean age was  $53 \pm 11.08$  years. 10% of patients were active smokers. Two percent were hypertensive and 4% were diabetics. The average BMI was  $28.1 \pm 4.5$  kg/m<sup>2</sup>. It was greater than 25 kg/m<sup>2</sup> in 76% of them. [cholesterol] was  $4.9 \pm 0.9$  mmol/l. 48.9% had a high rate. Cholesterol HDL was  $1.1 \pm 0.2$  mmol/l. The mean cholesterol LDL was  $3.3 \pm 0.8$  mmol/l. Triglyceride was  $1.3 \pm 0.6$  mmol/l. The mean IMT in the left common carotid was  $0.06 \pm 0.02$ , in the left internal carotid was  $0.06 \pm 0.01$ , in the left external carotid was  $0.05 \pm 0.01$ . The mean IMT was  $0.05 \pm 0.018$  in the right common carotid,  $0.06 \pm 0.01$  in the right internal carotid, and  $0.05 \pm 0.01$  in the right external carotid. 36% had an atheroma plaque. 26% had a high CV risk according to the IMT. There was no correlation in our series between diabetes, high blood pressure, smoking, BMI, and high CV risk  $p=1$ ;  $p=1$ ;  $p=1$ , and  $p=0.5$ , respectively.

**Conclusion:** While the absence of systemic inflammation in non-inflammatory osteoarticular diseases, the CV risk is higher in our study. Therefore, CV risk screening should not be limited to chronic inflammatory rheumatism.

P1107

### ROMOSUZUMAB VS. ZOLEDRONIC ACID IN WOMEN WITH SPINAL CORD INJURY AND LOW BONE MINERAL DENSITY

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**Objective:** Spinal cord injury (SCI) triggers immobilization and unloading resulting in dramatic bone loss and fractures. There is a paucity of data regarding bone-protective treatment in patients with chronic SCI. Targeting immobilization-induced sclerostin pathway showed promise in animal models of SCI. We aimed to investigate the effect of romosozumab vs. zoledronic acid (ZA) in women with SCI.

**Methods:** Women with SCI of at least 24 months duration and a T-score of -2 or less at either lumbar spine, femoral neck or total hip, were randomized to an open-label SC romosozumab 210 mg/monthly for one year vs. single-dose IV ZA 5 mg. The primary outcome was total hip (TH) BMD change at 12 months. Secondary endpoints were femoral neck BMD and bone turnover markers.

**Results:** Five women with Grade A (motor and sensory complete) according to American Spinal Injury Association (ASIA) impairment scale were randomized and completed one year of follow-up. One patient in the romosozumab group was excluded from analysis due to sacral osteomyelitis secondary to preexisting pressure sore and a significant catabolic state. At baseline, TH BMD T-score ranged between -2.4 and -5.7. Results are presented in a Table. Two participants received Romosozumab and two, ZA. Following 3 month of romosozumab treatment, N-terminal propeptide of type 1 collagen (P1NP) increased by 1.6% and 44%, yet both subjects exhibited an increment in TH BMD of 6.6% and 9.8%, at 12 months, respectively. In ZA-treated subjects, a 5.2% and 10.3% increase in TH BMD was also demonstrated (percentage change is not adjusted to baseline BMD). Medication-related adverse events were limited to injection site reactions in Romosozumab and flu-like symptoms in ZA-treated subjects.

**Conclusion:** In this small study, monthly romosozumab and single-dose ZA seem to induce a BMD gain in women with chronic SCI. Larger studies targeting bone loss in this unique group of patients are warranted.

Patient, treatment	Age, years	Time from SCI, years	Base-line TH BMD, g/cm <sup>2</sup>	Base-line TH BMD, T-score	TH BMD increment at 12 months, g/cm <sup>2</sup>	TH BMD increment at 12 months, %
1, Romosozumab	30	7	0.701	-2.5	0.069	9.8
2, Romosozumab	26	3	0.531	-3.8	0.035	6.6
3, ZA	44	4	0.710	-2.4	0.037	5.2
4, ZA	55	11	0.289	-5.7	0.030	10.3

**Disclosure:** The study was investigator-initiated and supported by Amgen.

P1108

### EVOLUTION AND TRENDS OF THE UPPER LIMB MUSCULOSKELETAL DISORDERS: A 10-YEAR PERIOD STUDY

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**Objective:** To determine the frequency of the musculoskeletal disorders (MSDs) of the upper limb and their evolution over a 10-year period.

**Methods:** This is a descriptive epidemiological study of all cases of upper limb musculoskeletal disorders recognized by the National Health Insurance Fund in the central region of Tunisia over a 10-year period. A synoptic sheet related to socio-medical and administrative data was completed.

**Results:** This study involved 2155 cases of work-related upper body MSDs. The prevalence of upper body MSDs was arranged in the following order: carpal tunnel syndrome (CTS) (60.7%), shoulder tendinopathy (29.5%), elbow epicondylitis (11.1%) and thumb tendinopathy (4.7%). Work-related upper body MSDs represented 56.7% of all cases of occupational diseases reported and 75% of all MSDs. The majority of the employees (80.3%) worked in the textile industry followed by the electronics sector (6.5%). The study of the evolution of MSD cases showed a statistically significant increase in the number of MSD cases over time ( $P=0.001$ ;  $r=0.86$ ). There was a statistically significant difference between the two study periods by gender ( $P=0.05$ ). CTS and elbow epicondylitis affected more women during the second period ( $RR=2.17$ , 95%CI [1.25-3.75];  $RR=2.29$ ; 95%CI [1.07- 4.88]). Seamstresses had a higher risk of developing CTS ( $P=0.001$ ) and elbow epicondylitis ( $P=0.09$ ) during the second period than other workers.

**Conclusion:** work-related upper body musculoskeletal disorders are common in Tunisia. This indicates the need for more attention to musculoskeletal disorders and designing effective preventive interventions.

P1109

## A TRICYCLE DESIGNED WITH OVERHANGING METALLIC BARS ON WHICH A RIDER-PATIENT CAN SUPPORT THE SPINE WILL TOTALLY ELIMINATE THE REACTION FORCE ON HIS COCCYX AREA AND THUS TO THE SPINAL CANAL

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**Objective:** Narrowing of the spinal canal is a common finding in spine imaging of the elderly. Symptoms such as severe back pain, radiating pain, and neurogenic claudication are very often and have as result severe sarcopenia of these patients. A new modified tricycle designed, has as result, relief of the pain help the exercise of these patients, and improve sarcopenia.

**Methods:** As shown in the Figure 1 below, the classical bicycle design suffers by an extreme spinal load, concentrated only at a single. The human's weight is counterbalanced by a reaction force acting from the saddle K plus a small force from the handles. It is estimated that this second force is about only a of the human's weight (including both handles) and thus the main balance is done by the force. Using an average human weight of (male rider) and assuming a balance from the reaction force at point K, then we estimate  $R=720\text{ N}$ . As this force is concentrated at the coccyx area of an approximately cross section of, the average stress if of the order of  $720/0,01 \times 0,01 = 7,2\text{ MPa}$ , a number which can cause a chronic strain on a regular bicycle user. Additionally, the single support is causing a forward rotation of the bicyclist in the case of an accident, leading to a quick ejection of him/her towards the impact point with obvious injuries. As shown in the following Figure 2, a new tricycle design is proposed in the current document which aims to bring a revolution to the rehabilitation use of bicycles, by introducing a tricycle with overhanging metallic bars on which a rider can support him/her self with the help of a harness which will totally eliminate the reaction force on his coccyx area and thus to his/her spinal.

**Results:** The new tricycle design is proposed in the current document will distributed the same force to both his shoulders areas, with a 2-fold benefits: (a) the previous reaction force, will be divided by two as it is acting at the two shoulder areas, and (b) these areas are larger than the single narrow coccyx area, and depending of the harness design, they can become quite larger so as to distribute more evenly the load. In the new design tricycle Figure 2, it is estimated that a much smaller stress of about will be acted on the human body which is a manageable load for an average human body, well below the comfort level.

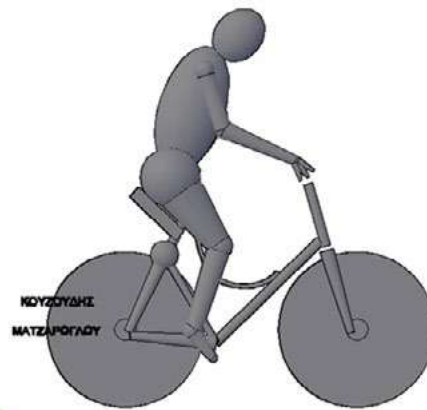


Figure 1.



Figure 2.

**Conclusion:** Results suggest that tricycle-based exercise with the "special bicycle" designed by Matzaroglou C and Kouzoudis D, with this bicyclist support holding the spinal stenotic patient from the shoulders and pelvis, was more effective than home-based exercise for improving functional performance and sarcopenia in elderly patients with severe spinal stenosis. Additionally, the classic single support at the saddle, is causing a forward rotation of the bicyclist in the case of an accident, leading to a quick ejection of him/her towards the impact point with obvious injuries. The above structure protects the rider as he/she is surrounded by a metal frame which can take a large load without a serious failure. Of course, the metal bars can include an additional shield to protect against impacts.

### References:

1. Matzaroglou C et al. Osteoporos Int 2020;31(Suppl 1):S511.
2. Matzaroglou C et al. Aging Clin Exp Res 2022;34 (Suppl 1):S346



P1110

### ASSOCIATIONS BETWEEN HANDGRIP STRENGTH, PHYSICAL ACTIVITY AND COGNITIVE IMPAIRMENT IN OLDER ADULTS

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**Objective:** To investigate the relationship of handgrip strength, physical activity and cognitive function in community-dwelling older adults.

**Methods:** A cross-sectional study was performed in community-dwelling older adults. Inclusion criteria were: age 60 years or more, unrestricted mobility. Handgrip strength was evaluated by hand held dynamometer (Jamar, Patterson Medical, UK), physical activity was evaluated by the Physical Activity Scale for the Elderly (PASE). Cognitive function was assessed by Montreal Cognitive Assessment. A score of 25 or less was suggestive of cognitive impairment. Relationship between handgrip strength, physical activity and cognitive impairment was assessed using binary logistic regression.

**Results:** The study was performed on 100 subjects: 20 (20%) men and 80 (80%) women. Mean age was 68.78±6.12 years. Mean handgrip strength was 27.47±9.33 kg, 42.35±7.48 kg in men, and 23.75±5.06 kg in women. On average PASE score was 173.4±79.31, 209.6±112.12 in men, and 164.35±66.67 in women. A total of 52 participants were classified as having cognitive impairment, of which 6 (11.53%) were men and 46 (88.47%) were women. Logistic regression analysis showed that lower handgrip strength was associated with cognitive impairment (OR: 1.09 (1.01-1.18)). No association was found between physical activity and cognitive impairment.

**Conclusion:** Results of our study show that lower handgrip strength was associated with increased risk of cognitive impairment.

P1111

### EXAMINING BONE HEALTH ACROSS DIVERSE ETHNICITIES AND GENDERS

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**Objective:** We evaluated differences in T-scores among different ethnic groups in a population of males and females who underwent DXA scan for bone health status.

**Methods:** A total of 17,331 individuals, including 15,714 females

and 1,617 males, who underwent DXA scan between May 2019 and December 2022 were included in this retrospective analysis by SPSS 29 statistics. Independent t-test and one-way ANOVA analysis were applied as indicated. The dependent variables analyzed included age, T-scores of spine, femur (total), femur neck, and 1/3 forearm. The individuals were categorized into different ethnic groups, including Black (B), Asian (A), White (W), and Hispanic (H).

**Results:** Statistically significant discrepancies in T-scores were observed among various ethnic groups. B had the highest mean T-score (less osteoporotic) for the spine and femur (total) in both male and female populations, while A had the lowest mean T-score (more osteoporotic) for all dependent variables in both populations. W had the lowest mean T-score (more osteoporotic) for the femur neck and 1/3 forearm in both populations. H had a significantly better mean T-score for the femur neck in both male and female compared to A and W (p<0.001).

**Conclusion:** This retrospective study revealed significant T-score differences between ethnic groups in males and females. B had the least evidence for osteoporosis while A had the most evidence of osteoporosis. H had intermediate values to A and W. When comparing males to females, females were older and more osteoporotic in B, H, and W but not in A. These findings emphasize the need for tailored interventions to improve bone health in different populations based on their ethnic background and gender. Further research is needed to explore the underlying mechanisms that contribute to these ethnic differences in bone density.

Ethnicity	Number	Age	Spine T-score	Femur Total T-score	Femur Neck T-score	1/3 Forearm T-score
Asian (A)	525	65.7±0.527	-1.4962±0.589	-1.5967±0.051	-1.5967±0.051	-1.5088±0.59
Black (B)	6481	68.3±0.147	-0.2348±0.022	-0.1192±0.171	-0.6310±0.0175	-0.4893±0.01871
White (W)	2495	67.7±0.130	-1.0162±0.337	-0.8884±0.025	-1.5253±0.249	-1.521±0.0306
Hispanic (H)	7830	67.9±0.255	-1.1506±0.1733	-0.6611±0.0132	-1.2706±0.0132	-1.2806±0.0166

P1112

### IS THERE A LINK BETWEEN C-REACTIVE PROTEIN WITH INDICES OF OSTEOPOROSIS AND SARCOPENIA IN COMMUNITY-DWELLING OLDER ADULTS? FINDINGS FROM THE SEBA STUDY

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**Objective:** C-reactive protein (CRP) has been widely used as a marker of inflammation, which has been associated with functional parameters in aging populations. The aim of this study was

to explore the relationship between high-sensitivity CRP (hs-CRP) and several components of osteoporosis and sarcopenia in an older community-dwelling population.

**Methods:** Data from 227 older adults (males: n=89; females: n=138) aged 65.3±7.9 years were gathered in Melbourne (Australia) from 2016 to 2019. Using a high-sensitivity assay, CRP levels were measured, while anthropometric parameters such as height, weight, and total body fat were also collected. The Short Physical Performance Battery, gait speed, maximum hand grip strength (HGS), 5-sit-to-stand test, and lowest values of BMD from the spine and the hip were used to evaluate the status of sarcopenic and osteoporotic parameters, respectively. Multiple linear regression was employed to assess the relationship among indices with hs-CRP.

**Results:** Following a multivariate analysis after controlling for sociobehavioural and anthropometric factors, and comorbidities, hs-CRP was significantly associated with HGS only in the male group. A significant link was also found in females, however, adjustment for age and total body fat ameliorated their statistical association. Linear regression analyses after adjusting for confounders did not reveal a link between hs-CRP and the rest of sarcopenic and osteoporotic parameters in both groups.

**Conclusion:** Hs-CRP may be a probable link between inflammation and HGS deterioration in older adults, particularly in males.

### P1113

#### OCCUPATIONAL RISK FACTORS OF SHOULDER TENDONITIS AMONG TEXTILE INDUSTRY WORKERS

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**Objective:** To assess socio-professional characteristics and occupational risk factors of shoulder tendonitis among workers in the textile industry.

**Methods:** This was a cross-sectional study of all cases of shoulder tendonitis in the textile sector reported to the National Health Insurance Fund during a period of 5 years in the central region of Tunisia. Data collection was based on a synoptic sheet containing the socio-demographic characteristics of the participants.

**Results:** A total of 197 employees were included: 181 women and 16 men. The mean age was 43.35±6.8 years. The majority of employees were manual workers (47.7%) and seamstresses (38.6%). The mean job tenure was 14.8±8.2 years. The right shoulder was the most affected (51.2%). Repetitive movements were incriminated in the genesis of shoulder tendonitis in 196 patients (99.4%) and awkward postures in 46 patients (23.3%). Rotator cuff tendinopathy was isolated in the majority of cases (80.7%). 150 patients were examined by Shoulder ultrasound. It showed a supraspinatus tendinitis in 37.6% cases, a partial or total rupture of the supraspinatus in 22.8% cases and a subacromial bursitis in 8.1% cases.

**Conclusion:** Shoulder tendonitis is common in the textile sector. Therefore, this sector should be a priority target for preventive measures.

### P1114

#### ASSOCIATION OF OPG/GGT RATIO WITH LIVER AND KIDNEY INDICES IN POSTMENOPAUSAL FEMALES AS A PREDICTIVE VALUE FOR THE DIAGNOSIS OF OSTEOPOROSIS

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**Objective:** An imbalance between bone formation and resorption causes osteoporosis, which is defined as a decrease in bone mineralization that results in bone fracture. (OPG), a RANKL decoy receptor thought to be a key inhibitor of bone resorption. The goal of this study was to look into the circulating levels of OPG and GGT, as well as their associations with BMD, and other factors that influence these markers in postmenopausal women.

**Methods:** In this study, one hundred and forty-five women were chosen. They were divided into two groups (osteoporotic 95 and control group 50). BMD was assessed by DXA scan. Serum levels of OPG was analyzed by ELISA method. Liver function and renal function tests were measured using Roche diagnostics, Cobas 6000, COBI-CD, manufactured by Hitachi high technologies corporation, Tokyo, Japan.

**Results:** 145 women were chosen for this investigation (osteoporotic 95 and control group 50). The mean age of osteoporotic individuals was 59.65±5.74, while the mean age of the control group was 55.44±4.87. The OPG level did not differ substantially between the two groups (12.65±2.49 vs. 11.81±2.59, p=0.06). The comparison of serum OPG, kidney, and liver indices ratio in controls and osteoporotic groups showed OPG/GGT ratio (0.6422±0.33 vs. 0.5192±0.27; p=0.01), OPG/Urea ratio (0.5558±0.20 vs. 0.0699±0.02; p<.001) and OPG/Cr ratio (21.8596±7.21 vs. 18.1824±6.09; p=0.002) were significantly lower in osteoporotic subjects

**Conclusion:** Serum-levels of OPG/GGT ratio, OPG/Urea ratio and OPG/Cr ratio are potential biomarkers for detection of osteoporosis in postmenopausal females

P1115

### MARKED IMPROVEMENT OF PAIN IN OSTEOCHONDRAL EROSION OF KNEE CARTILAGE WITH INTRA-ARTICULAR OXYGEN-OZONE THERAPY: A CASE REPORT

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**Objective:** To report the improvement in advanced knee osteoarthritis (Kellgren-Lawrence grade IV) with demonstration of osteochondral erosion at MRI, with associated bone marrow edema with intra-articular oxygen ozone therapy.

**Methods:** Data of the patient, instrumental exams and VAS of pain was collected at baseline, after one day and after 2 weeks from the infiltration.

**Results:** After intra-articular injection of oxygen ozone therapy the patient reported a marked improvement with a VAS of pain reduction (from 10 out of 10 to 3 out of 10), that lasted after 2 weeks. The patient also reported marked improvement in daily life activity after the injection.

**Conclusion:** This case illustrates that oxygen-ozone therapy should be considered for short term pain relief of patients with osteochondral erosion. Although longer term follow-up is needed and larger cohorts are needed to confirm the efficacy of the treatment, this report suggest that oxygen-ozone could be beneficial in this type of patients. Many hypothesis have been made in the past circa the mechanism of action of Oxygen ozone for osteoarthritis. It is reported that O<sub>3</sub> therapy can block the activation of NFκB and therefore inhibiting the release of proinflammatory cytokines.<sup>1</sup>

**Reference:** 1. Manoto SL et al. Saudi J Biol Sci 2018;25:672.

P1116

### THE EPIDEMIOLOGY OF WORK-RELATED ROTATOR CUFF TENDINITIS IN THE CENTRAL REGION OF TUNISIA

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**Objective:** To examine the prevalence of work-related Rotator cuff (RC) tendinitis in the center of Tunisia.

**Methods:** It is a cross-sectional study among workers with occupational RC tendinitis recognized by the National Health Insurance Fund in the central region of Tunisia. A synoptic sheet related to socio-medical and administrative data was completed.

**Results:** The study involved 251 cases of work-related RC tendinitis with a mean age was 43±7 and a female predominance (81.3%). work-related RC tendinitis represented 14.47% of all cases of occupational diseases reported, 25.9% of all musculoskeletal disorders (MSDs) and 24.1% of MSDs of the upper limbs. The

majority of the employees (78.5%) worked in the textile industry and 4.4% worked in the construction industry. RC tendonitis was isolated in the majority of cases (84.5%), associated with carpal tunnel syndrome in 5.2% of cases and epicondylitis in 9.6% of cases. The mean duration of exposure to the risky gestures was 14.71 years. The right shoulder was affected in 54.6% of cases. Work involving repetitive forced flexion-extension movements of the shoulders was observed in 248 cases (98.8%), and awkward postures (keeping one's arms above shoulder level) were noted in 67 cases (26.7%).

**Conclusion:** This research found that a high proportion of workers were exposed to the ergonomic risks of work-related RC tendonitis. Therefore preventive interventions, such as improvement in work posture and ergonomic designs of workstations, are needed.

P1117

### EFFECT OF THE COVID-19 PANDEMIC ON ROMANIAN HIP FRACTURE HOSPITAL ADMISSION RATES

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**Objective:** The objective of our study was to investigate the impact of the COVID-19 pandemic and associated lockdown on the incidence of hip fractures and the time spent in the emergency department. We also aimed to analyze patient demographics in individuals presenting with hip fractures before and during the COVID-19 pandemic.

**Methods:** We conducted a retrospective study with data collected from the Emergency County Hospital of Targu Mures of patients ≥40 years old that presented to the emergency department with hip fractures (femoral neck and pertrochanteric fractures) in the period 2016-2022. Demographics, hospital admissions, and time spent in the emergency department were analyzed before and during the pandemic.

**Results:** During the lockdown there was a 27% decrease in the number of patients presenting with hip fracture (p<0,05). Among the patients admitted to hospital during the pre-pandemic period 25.8% were male and 74.2% were female with an average age of 84 years old. During the pandemic period there were 34.5% male patients and 65.5% female patients with a mean age of 81 years old. Femoral neck fractures were more frequent than pertrochanteric in both time periods (53.3 vs. 46.7% pre-pandemic, 55.2 vs. 44.8% pandemic). The median time spent in the emergency department was 4.3 h in the pre-pandemic period vs. 6.15 h during the pandemic period (p<0.001).

**Conclusion:** We noticed a significant decrease in the incidence of hip fractures as well as in the rate of female patients during the pandemic period compared to the pre-pandemic period. Moreover, patients spent more time in the emergency department during the pandemic period, potentially due to SARS-CoV-2 testing and alterations in triage management. This could potentially

delay hip fracture treatments which may have a detrimental effect on patients' outcomes.

P1118

### SARCOPENIA AND ITS INDIVIDUAL COMPONENTS AS PROGNOSTIC FACTORS OF ALL-CAUSE MORTALITY IN PATIENTS WITH HEART FAILURE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** Patients with heart failure (HF) are accompanied by increasing rates of secondary sarcopenia, increasing dependency, hospitalization, and mortality risk. The aim of this systematic review and meta-analysis was to evaluate the prognostic factor of sarcopenia and its individual components in patients with HF.

**Methods:** A literature search of observational studies was conducted through PubMed, Scopus, Web of Science and Cochrane Library from inception until December 2022. Eligible cohorts assessed the hazardous risk of sarcopenia components in patients with HF from any cause. Statistical significance was assessed using the random effects model and inverse-variance method by utilizing hazard risk (HR).

**Results:** 33 studies were included in the systematic review and 19 studies in the meta-analysis exploring the prognostic impact of sarcopenia and its components on all-cause mortality in patients with HF. Our analysis showed that low L3-L4 psoas muscle index was a significant prognostic factor of all-cause mortality in patients with HF [HR: 2.20, 95% CI 1.26-3.83,  $I^2=87%$ ,  $P<0.01$ ]. Identical findings were shown in relation to slow gait speed (HR: 1.45, 95%CI 1.20-1.74,  $I^2=0%$ ,  $P<0.01$ ) and low Short Physical Performance Battery score (score of 0) (HR: 6.06, 95%CI 2.19-16.76,  $P=0.01$ ), but no link with handgrip strength (HR: 1.24, 95%CI 0.94-1.62,  $I^2=0%$ ,  $P=0.13$ ).

**Conclusion:** Sarcopenia is a prevalent condition in HF and its indices are linked to a greater prognosis of all-cause mortality. It is crucial to rapidly identify sarcopenia in patients with HF and integrate effective treatments in clinical practice.

P1119

### THE EPIDEMIOLOGY OF OCCUPATIONAL DE QUERVAIN TENOSYNOVITIS IN TUNISIA

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**Objective:** To assess the prevalence and socio-professional characteristics of workers suffering from De Quervain tenosynovitis in Tunisia.

**Methods:** This was a cross-sectional study of all cases of De Quervain tenosynovitis reported to the National Health Insurance Fund during a period of 15 years in the central region of Tunisia. A synoptic sheet related to socio-medical and administrative data was completed.

**Results:** A total of 68 cases were included. De Quervain tenosynovitis represented 1.3% of all cases of occupational diseases reported and 3.1% of all musculoskeletal disorders. The mean age was  $43\pm 13$  years with a female predominance (94.1%). Half of the employees were seamstresses (50%). The mean job tenure was  $14.5\pm 8.2$ . The right thumb was the most affected (56.4%). De Quervain tenosynovitis was bilateral in 13.2% of cases, associated with carpal tunnel syndrome in 28% of cases, shoulder tendinitis in 11.7% of cases and epicondylitis in 8.8% of cases. The Finkelstein test was positive in 29 patients.

Repetitive thumb movements were incriminated in 97.1% of the cases and prolonged thumb movements were incriminated in 39.7% of the cases.

**Conclusion:** This research found that De Quervain tenosynovitis represents 3.1% of all musculoskeletal disorders in the central region of Tunisia. Preventive interventions in the of workplace are needed.

P1120

### PREVENTION OF RISK OF FALL IN ELDERLY PEOPLE WITH REDUCED MOTILITY DUE TO SEVERE OSTEOPOROSIS

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**Objective:** This study evaluates the differences in the physical performance and risk of fall among elderly people affected by severe osteoporosis.

**Methods:** This study includes subjects affected by severe osteoporosis whose age is  $\geq 75$ : 43 women (mean age  $78\pm 3$ ) and 12 men (mean age  $77\pm 2$ ). We discovered a new spinal fracture after pharmacological treatment for osteoporosis in 8 women and 1 men. 38 women and 6 men showed multiple spinal fractures ( $>3$ ). The subjects all assumed teriparatide (PTH 1-34). Patients were administered the following tests at T0-T24: 1) spine and hip DXA densitometry; 2) spine X-ray with morphometry; 3) blood tests. The Short Physical Performance Battery (SPPB) final score was comprised between 0-12. The Tinetti balance and gait scale shows a variability in score: score  $\leq 1$  indicates nonwalking;  $2 < \text{score} < 19$  walking but with a high risk of fall; score  $\geq 20$  walking with a low risk of fall.

**Results:** At T0 we considered: 1) SPPB Geriatric: mean score 7 in 78.5% subjects ( $p < 0.05$ ); 2) Tinetti balance and gait scale: mean

score 10 (high risk of fall) 69.3% subjects ( $p<0.5$ ); mean score 20 (low risk of fall) 30.7% subjects ( $p<0.5$ ). At T24 we evaluated: 1) SPPB: mean score 9 in 61.3% subjects ( $p<0.05$ ); 2) Tinetti balance and gait scale: mean score 15 (high risk of fall) 51.3% subjects ( $p<0.5$ ), mean score 22 (low risk of fall) 48.7% subjects ( $p<0.5$ ). At T24 all subjects showed no new spine fractures through spine X-rays and morphometry. All subjects included in the study were prescribed a home programme of occupational therapy on a 6-month-based verification.

**Conclusion:** Since a reduced physical performance and an increasing risk of fall indicate frailty in the elderly affected by severe osteoporosis, after prolonged teriparatide treatment we detected changes in the markers for severity joined with an improvement of physical performance associated with a home programme of occupational therapy.

## P1121

### PROMETHEUS: THE FRACTURE LIAISON SERVICE FOR PREVENTING SECONDARY FRACTURES FOR PATIENTS WITH OSTEOPOROSIS

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**Objective:** A cross-sectional study among the urban Russian's population showed that 24% of women and 13% of men aged 50 years and older had previously one pathological fracture, with the most common vertebral fractures. A prior fracture doubles the risk of a future fracture and multiple fractures increase the risk of future fractures up to 5 times. The PROMETHEUS multicenter project program was launched in the Russian Federation («The Fracture Liaison Service for preventing secondary fractures for patients with osteoporosis») on the initiative of the Russian Association Of Osteoporosis (President of the RAOP and author of the project idea - MD, Prof. O.M. Lesnyak) The PROMETHEUS program started in Yaroslavl in 2019, today there are 19 Russian centers in the project. We aimed to analyze the register of patients with fragility fractures of FLS PROMETHEUS for 4 years and evaluation of the effectiveness of the centers by key performance

indicators (KPI).

**Methods:** Multicenter observational cohort study with retrospective and prospective data collection from October 2019 with the possibility of further development of the project. The register PROMETHEUS contains the following information: gender and age of patients, anthropometric data, concomitant diseases, risk assessment of falls, data the fragility fractures at the time of treatment at the center, laboratory (to exclude secondary causes of osteoporosis) and instrumental studies, the osteoporosis therapy, both before and after the index fracture. Calculation FRAX®, Get Up and Go test and the Morse Fall Scal. BMD is measured by DXA. The analysis of the registry database was carried out from October 2019 to November 2022. Inclusion criteria: referral to FLS, patients aged 50 years and older who received fragility fracture no more than 1 year ago, typical for the localization of osteoporosis (hip, spine, wrist or humerus), who will choose the center; signed consent of the patient to the processing of personal data. Exclusion criteria: refusal of the patient to participate in the project; severe illness that shortens the patient's life.

**Results:** The study included 895 patients: 111 men (12%) and 784 women (88%) aged 50-95 years, the average age was 71.7±9.76 years. 784 (87.6%) women, average age 71.7±9.7 years and 111 (12.4%) men, average age 71.1±10.0 years. 470 patients (52.1%) had repeated visits. There was no significant age difference depending on gender. 333 (37%) patients had normal body weight, 317 (35%) were overweight, 161(18%) had obesity. The register included 200 (22%) patients with a hip fracture, 113 (13%) with a humerus fracture and 140 (16%) with a vertebral fracture. In 18 (3.6%) of patients, there was no data on fractures. 194 (22%) patients had already a history of fractures at the time of inclusion in the register. In total, 333 fractures were recorded for 194 patients, which is an average value of 1.7 fractures per patient. The 115 (13%) patients' parents had hip fractures. 434 (48%) of patients had a high risk and 410 (46%) of patients had a low risk of fractures based on FRAX and age. Among women, OR of a high risk of fractures based on the assessment of FRAX and age is 14 times higher than among men (OR=14.242). Get Up and Go test was performed for 239 (27%) patients, 86 (36%) of the patients had a test time ≥14 s. The Morse Fall Scale has become the most widespread as a method of assessing the risk of falls among hospitalized elderly and senile patients, 210 (23%) patients were assessed, 97 (46%) of them had a high risk of falls, 108 (52%) patients had a low risk of falls, 5(2%) patients had no risk of falls. The risk of falls was determined to be high among 423 (84%) patients. The presence of comorbid pathology was detected in 409 (46%) patients of the register. The most common are diabetes mellitus 2 type 127 (14%), early menopause for women 105 (12%) and rheumatoid arthritis 40 (4%). DXA was applied for 415 (46%) patients. Osteoporosis was diagnosed in 222 (57%) out of 393 patients, osteopenia in 142 (36%), and the normal in 29 (7%). The most common patients had a decrease in 25(OH)-vitamin D (66%), of whom vitamin D deficiency occurs in 31%, deficiency in 29%, severe deficiency in 5% of patients. 13% of patients had a decrease in calcium below normal. Calcium and/or vitamin D preparations were not prescribed to 542 (61%) patients after index fracture, 94 (10%) were regularly taken, periodically

taken 180 (20%). 121 (14%) the patient had previously received pathogenetic therapy, 63 (7%) patients received pathogenetic therapy regularly and 58 (7.5%) of patients periodically. Pathogenetic drugs were prescribed to 433 (48%) patients, of which 329 patients were prescribed for the first time, and 63 patients received a recommendation to continue previously prescribed pathogenetic therapy. In 67% of cases, as a reason for refusing to prescribe pathogenetic drugs, it is indicated that additional examination is required, in 27% - contraindications. As a pathogenetic therapy, alendronate is most often prescribed weekly to 191 (45%) patients and less often zoledronic acid is prescribed to 142 (33%) patients out of 427 patients who have data. A common reason for refusing pathogenetic therapy at the reception is hypocalcemia 85 (10.6%). A repeat visit was entered into the database in 469 patients (52.4%), in most cases the turnout was reflected after 12 months. One of the most important sections of the organization of FLS is the availability of an electronic patient registration system. Using the database allows you to provide such a section of the work of the FLS as quality control and audit. In our study, we evaluated the work of the centers using 11 KPI. Indicator 1: Identification of patients with fractures unrelated to spinal fragility and Indicator 2: Identification of patients with spinal fractures were not evaluated at the centers. KPI 5 (assessment of the risk of falls), KPI 6 (determines the proportion of patients prescribed anti-osteoporotic drugs due to the identification of a high risk of subsequent fractures) were implemented at the highest "green" level, that is, more than 80% of patients passed these assessments. The remaining indicators require the necessary information for each of the KPIs in at least 80% of patients. Therefore, it is necessary to improve the control system for entering data into the register and conduct trainings for personnel responsible for collecting and entering information.

**Conclusion:** The register of patients included in the FLS allows you to summarize and analyze information about the diagnosis of fragility fractures, secondary prevention, predisposition factors, the effectiveness of therapeutic measures, adherence to treatment in patients of the older age group. Currently, in order to increase the effectiveness of prevention and treatment, it is necessary to increase the number of repeated visits to the FLS and increase the motivation of patients to follow the recommendations of a specialist. The control system for entering data into the register should be improved.

## P1122

### THE IMPACT OF THE PRESENCE OF THE BUFFALO HUMP ON PROFESSIONAL ACTIVITY

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Buffalo Hump is characterized by an excessive accumulation of fat in the cervical region. The frequent cause of the appearance of Buffalo Hump is determined by the increase in serum cortisol secondary to the administration of drugs containing steroids or the

medication used in the treatment of HIV. An increased prevalence of Buffalo Hump is found among obese patients. The mechanical stress from the professional activity cannot be quantified, the pain subsides temporarily after the administration of NSAIDs, it is accentuated after 3-4 h of work, decreasing the ability to work lately. The pain in the Buffalo Hump is maintained by the fat deposit, the insufficiency of the muscles of the cervical spine, the static postural imbalance of the cervical spine by maintaining a vicious professional position for a long time.

In patients with Buffalo Hump, functional neck pain requires functional rehabilitation treatments. The role of rehabilitation treatment is to combat the postural static imbalance of the deficient cervical muscles. The final stage of medical recovery restores the patient's ability to perform usual and professional gestures in a corrected antalgic position.

## P1123

### ASSOCIATION BETWEEN DYNAPENIC ABDOMINAL OBESITY AND FALL RISK IN OLDER ADULTS: BIRJAND ELDERLY HEALTH STUDY

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**Objective:** Currently, the prevalence of overweight and obesity is increasing all over the world, and it seems that with age, obesity, especially abdominal obesity, increases and muscle strength decreases. Since these factors of overweight and obesity and decreased muscle strength can lead to adverse psychological and physical consequences and low quality of life in old age and complications including the risk of falling, we decided to investigate this study to investigate the association between abdominal obesity and decreased muscle strength (dynapnea) with the risk of falls in the elderly over 60 years of age Birjand Elderly Health Study.

**Methods:** This cross-sectional study is based on the Birjand Phase One Longitudinal Cohort Study, which is conducted on 1420 elderly people over 60 years old based on cluster sampling. In this cross-sectional study, according to waist circumference ( $\geq 102$  cm for men and  $\geq 85$  cm for women) and handgrip strength ( $< 28$  kg for men and  $< 18$  kg for women), 551 older adults were divided into four groups: dynapenic abdominal obese (D/AO), dynapenic nonabdominal obese (D/NAO), nondynapenic abdominal obese (ND/AO) and nondynapenic nonabdominal obese (ND/NAO). Handgrip strength in both hands was measured using a digital dynamometer, and dyspnea was defined as a fist strength of less than 20 kg in women and less than 30 kg in men, and therefore dyspneic abdominal obesity as the simultaneous presence of abdominal obesity and Dynapnea is considered in people. Fall risk assessment is also measured based on the POMA criteria, which includes balance and walking subscales with a maximum score of 28, with scores greater than 24 as low risk for falling and scores from 0 to 24 as moderate risk or it is considered too much to fall.

**Conclusion:** This study suggests that older adults with D/AO have a higher risk of falls. Therefore, it is necessary to strengthen the attention to D/AO and relevant interventions should be implemented.

P1124

### TYPE OF SURGICAL INTERVENTION AS A RISK FACTOR FOR LONG-TERM MORTALITY AFTER HIP FRACTURE

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**Objective:** Hip fractures are surgically treated with either prosthesis or various kinds of fracture fixation devices, to allow immediate mobilization with full weight-bearing. Osteoporotic hip fractures are especially challenging in choosing the optimal type of surgical intervention. Although the guidelines have created standards of care regarding the use of different surgical treatment for each type of hip fractures, in the clinical practice the choice is based on clinical experience and availability of surgical dispositive. We aimed to assess the long-term mortality risk associated with the type of surgical procedure used in osteoporotic hip fracture treatment.

**Methods:** We retrospectively assessed for 3 years, all hip fractures admitted during 12 months in all the hospitals with an Orthopaedic Dept. in the capital city of Romania, Bucharest and the suburban area. We selected only osteoporotic fractures based on the fall mechanism (fall from a standing height or less). We evaluated the long-term mortality risk associated with factors like the type of surgical intervention, internal fixation or arthroplasty with prosthetic devices, hemi or total hip replacement type and also length of stay in hospital.

**Results:** We included a total of 2269 patients with a fragility hip fracture, of which 969 died at 3 years (mortality rate of 42.3%). 1536 of patients (67.69%) had osteosynthesis while 733 (32.31%) received a prosthesis of which only 224 (30.55%) received a total hip replacement device. Using a prosthesis was associated with a better survival outcome compared to osteosynthesis,  $P < 0.001$ . In the same time, only total hip replacement showed increased survival with important difference compared to hemiarthroplasty and to osteosynthesis with the highest risk (RR=3.95, CI 95% 1.95-7.99,  $p < 0.001$ ).

**Conclusion:** Total hip replacement is associated with increased survival compared with internal fixation or hemiarthroplasty at 3 years after an osteoporotic fracture. The low percentage use of prosthetic devices can be secondary to national guidelines standard of care or to a low availability of devices due to cost. Further studies are needed to address this concern.

P1125

### OCCUPATIONAL UPPER BODY MUSCULOSKELETAL DISORDERS IN THE ELECTRONICS SECTOR IN TUNISIA

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**Objective:** To study the prevalence of occupational upper body musculoskeletal disorders (MSDs) in workers in the electronics sector.

**Methods:** This is a retrospective descriptive study of all cases of occupational upper body MSDs among workers in the electronics sector reported to the National Health Insurance Fund (NHIF) of the Central Tunisian region. A synoptic sheet related to socio-medical and occupational data was completed.

**Results:** The study involved 135 cases of occupational upper body MSDs with a mean age of  $41.6 \pm 7.7$  and a female predominance (94.1%). The mean job tenure was  $15.7 \pm 8.9$  years. Among these patients, a history of an occupational accident leading to osteoarticular damage was noted in ten patients. Carpal tunnel syndrome was the most frequent MSD (62.2%), followed by shoulder tendonitis (16.3%). Recognition as an occupational disease was granted for 76 patients out of 94.

**Conclusion:** This research found that 20.7% of the workers in the electronics sector suffered from upper body MSDs. More in-depth studies should be conducted in this sector in order to identify risk factors and to introduce appropriate preventive measures.

P1126

### AN INDIAN RURAL CROSS-SECTIONAL SURVEY TO STUDY THE IMPACT OF FRACTURES ON THE QUALITY OF LIFE AMONG OLDER PERSONS WITH OSTEOPOROSIS

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**Objective:** The negative impact of osteoporosis is rising as the global population ages and fractures with osteoporosis are additional health burdens. In rural India, the increasing aging population faces multiple challenges due to changes in social structure and inaccessible healthcare facilities. This study is to evaluate the impact of osteoporosis-related fractures on health-related quality of life (HRQoL) among older persons in rural India.

**Methods:** Data were obtained from the record of the Odisha state health department, and a cross-sectional Patient Reported Outcomes (PRO) survey of older persons of 60 years and above with osteoporosis was done in selected villages. The PRO measures included the European Quality of Life 5 Domains (EQ-5D) and Osteoporosis Assessment Questionnaire short-version (OPAQ-SV).

Associations between PRO scores and available social support, accessibility to public health centers, and the site of fractures were also evaluated using ANOVA.

**Results:** Of the total 937 patients with osteoporosis, 551 (58.1%) completed the survey, and data for the number of fractures were available for 423/551 (76.7%) patients. Although, having fractures significantly influenced scores on all PRO measures ( $p < .0001$ ), leg, hip, and spine fractures had linked with the greatest PRO scores reduction. The number of members in the family, accessibility to public health specialists, fracture sites, number of fractures, age, pre-medical conditions, and obesity were significantly associated with PRO measures ( $p < .05$ ) in the multivariate analyses.

**Conclusion:** In patients with osteoporosis, all types of fractures are associated with lower HRQoL and lower overall health status. Support from family members and access to the public health system significantly influence HRQoL in individuals with osteoporosis. In the rural area, adequate social support systems and primary care providing essential services must be addressed to improve the HRQoL of older persons with osteoporosis.

## P1127

### SARCOPENIA IN PATIENTS WITH COVID-19: A SCOPING REVIEW

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**Objective:** To evaluate all recent literature regarding the prevalence rates of sarcopenia in patients with COVID-19.

**Methods:** A scoping review of existing observational studies was conducted. An electronic search was performed in MEDLINE/PubMed, Scopus and Web of Science to identify studies regarding sarcopenia and COVID-19. Relevant systematic reviews were also included to reduce the possibility of missing studies. Keywords used were "sarcopenia", "SARS-CoV-2", "COVID-19", and "prevalence".

**Results:** A total of 22 studies were included in the present scoping review, including 5679 patients. The prevalence rates of sarcopenia in patients with COVID-19 varied from 0.8 to 90.2%. Prevalence rates were higher among hospitalized patients and/or patients in ICU. Some risk factors associated with sarcopenia were ageing, depression, and being a woman.

**Conclusion:** Results of the present study record that sarcopenia is frequently observed in patients with COVID-19. Further studies are needed to better understand the association of specific characteristics of patients with sarcopenia and COVID-19. Current evidence reveal the importance of providing specific care in patients with COVID-19 with specific care by healthcare professionals.

## P1128

### THE IMPACT OF OSTEOPOROSIS ON QUALITY OF LIFE IN POSTMENOPAUSAL WOMEN

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Osteoporosis is a metabolic bone disease which is characterized by a reduction in bone mass and disruption of the microarchitecture of bone tissue which leads to an increased risk of fractures. The aim of this study was to assess the impact of osteoporosis on quality of life (QoL) of postmenopausal women in Kosovo. We investigated 100 postmenopause women in the period from September 2020 to October 2022 in Private Clinic "Rheuma". BMD was measured at lumbar spine and hip by using DXA scan DXA-Stratos 800. QoL was assessed using the EuroQoL-5D questionnaire. Clinical and demographic data like age, BMI, menstrual status, vitamin D, calcium level, phosphorus were measured. Demographic variables were significantly associated with QoL. Odds ratios of EQ-5D for disability were 1.90 (95%CI=1.45-2.51,  $p < 0.001$ ). Findings of this study show that osteoporosis has a significant impact on QoL, thus prevention and early treatment of osteoporosis may significantly improve quality of life in postmenopausal women.

## P1129

### ASSESSMENT OF BARTHEL ACTIVITIES OF DAILY LIVING (ADL) INDEX IN ELDERLY PATIENTS WITH HIP FRACTURE DURING 1 YEAR AFTER FRACTURE

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**Objective:** Hip fractures lead to a decrease in physical activity in elderly patients for a long time after injury. We aimed to assess the score of Barthel index in patients  $\geq 60$  years with hip fracture.

**Methods:** We investigated all patients ( $n=140$ ) with a hip fracture  $\geq 60$  yrs admitted to Yaroslavl Regional Emergency Care Hospital n.a. N.V. Solovyev from 1.04.2021 to 1.07.2021. The Barthel scale was measured before fracture, after 3 and 12 months after it. We used Fisher's test and Student's test.

**Results:** The mean age of patients was  $81.3 \pm 7.67$  yrs. 40 (30.7%) were not assessed due to dementia. Before the fracture 3 (2.5%) were completely dependent on, 12 (10.2%) very dependent, 38



(32.2%) moderately, 8 (6.8%) mildly, 57 (48.3%) were independent. After 3 months 77 (81.1% among alive to this time) were interviewed. 5 (6.5%) were completely dependent on, 17 (22.1%) very dependent, 42 (54.5%) moderately, 2 (2.6%) mildly, 11 (14.3%) were independent. The number of people who needed outside help significantly increased for: bathing ( $p<0.03$ ), transfers ( $p<0.02$ ), walking ( $p<0.0002$ ), toilet use ( $p<0.001$ ) personal hygiene and climb stairs ( $p<0.0001$ ). After 1 year we interviewed 63 (56.76% among alive) patients. 11 (21.1%) were completely dependent on, 10 (19.2%) very dependent, 15 (28.8%), moderately and 16 (30.9%) were independent. Decline of ADL compare to initial data was noted in: transfers ( $p<0.0001$ ), climbing stairs ( $p<0.007$ ), walking ( $p<0.002$ ), toilet use ( $p<0.05$ ), urinary disorders ( $p<0.05$ ) and problems with self-dressing ( $p<0.0001$ ). After 12 months comparing with 3 month more patients were dependent for: dressing ( $p<0.02$ ), eating ( $p<0.05$ ), personal hygiene ( $p<0.01$ ), bathroom use ( $p<0.002$ ), more patients were with urinary disorders ( $p<0.03$ ) and fecal incontinence ( $p<0.007$ ).

**Conclusion:** Among patients with hip fractures before fracture 48% were independent, after 3 months 14% and after 12 months 31%. After 3 months, indicators of mobility and self-care decreased significantly. One year after fracture, difficulties persisted in the same sections, and problems in dressing, eating, personal hygiene, using the bathroom, and controlling urination and defecation occurred more often than after 3 months, which probably indicates a progression of geriatric syndromes.

### P1130

#### COMPARATIVE STUDY OF RADIOGRAPHIC AND NON-RADIOGRAPHIC AXIAL SPONDYLOARTHRITIS

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**Objective:** To compare disease characteristics and outcomes between patients with radiographic axial spondyloarthritis (r-axSpA) and non-radiographic axial spondyloarthritis (nr-axSpA).

**Methods:** We conducted a retrospective study, including patients followed for axial spondyloarthritis meeting the ASAS 2009 criteria over 7 years. Socio-demographic, disease characteristics, treatment and patient-reported outcomes were compared between patients with r-axSpA and nr-axSpA.

**Results:** In total, 118 patients were included, of whom 94 (79.7%) and 24 (20.3%) were classified as r-axSpA and nr-axSpA, respectively. The cohort was predominantly male (60.2%) with a mean age of  $38.8\pm 12.8$  years. Nr-axSpA patients were older at onset symptoms ( $p=0.07$ ) and showed a significantly lower prevalence of positive HLAB27 ( $p=0.01$ ). The age at diagnosis and the diagnostic delay were similar and we identified no statistical difference in the proportion of male patients and smoking status between the groups. The prevalence of ever-inflammatory back pain and peripheral signs were similar between the two groups. There were no differences in extra-articular manifestations ex-

cept psoriasis, which was more frequently recorded in nr-axSpA patients ( $p<0.0001$ ). The proportion of patients with elevated ESR was higher in r-axSpA ( $p=0.04$ ). We found differences in neither ASAS-CRP, BASDAI or BASFI; nor in treatment modalities, including the use of NSAIDs, csDMARDs and bDMARDs, between r-axSpA and nr-axSpA.

**Conclusion:** Nr-axSpA patients had older disease onset with less frequent HLA-B27 positivity and more extra-articular manifestations such as psoriasis. This study highlights the need to expand the use of MRI to optimize diagnostic strategies for accurate diagnosis of nr-axSpA patients.

### P1131

#### AXIAL PSORIATIC ARTHRITIS VS. AXIAL SPONDYLOARTHRITIS: SIMILARITIES AND DIFFERENCES

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**Objective:** To compare characteristics of axial psoriatic arthritis (axPsA) with axial spondyloarthritis (axSpA).

**Methods:** This retrospective, observational, single-center study included patients with axPsA and axSpA followed over a period of 7 years. We compared clinical, laboratory and radiographical characteristics, treatment and comorbidities between axPsA and axSpA patients.

**Results:** In total, 118 patients were included: 101 (85.6%) axSpA and 17 (14.4%) axPsA. 20 patients had psoriasis at any time during the follow-up (4 within axSpA and 16 within the axPsA group). Patients with axSpA were younger than those with axPsA. Gender, smoking status and disease duration did not differ between the two groups. Similarly, there were no differences in clinical features such as inflammatory back pain, enthesitis, uveitis and inflammatory bowel disease. In addition, no significant differences were observed regarding the degree of disease activity as measured either by ASDAS, BASDAI or C-reactive protein and the function as measured by the BASFI. However, a few differences between the two groups in some relevant characteristics were observed. AxSpA patients were younger at symptom onset ( $25.8\pm 10.8$  vs.  $33.5\pm 14.7$  years,  $p=0.01$ ) and at diagnosis ( $32.8\pm 12.4$  vs.  $41.8\pm 9.9$  years,  $p=0.007$ ), had a higher percentage of radiographic sacroiliitis (84.1 vs. 52.9%,  $p=0.003$ ) and showed more sacroiliac joint complete ankylosis (36.6 vs. 13.3%,  $p=0.002$ ). In contrast, axPsA presented more arthritis (82.3 vs. 49.5%,  $p=0.01$ ) and dactylitis (35.3 vs. 6.9%,  $p=0.001$ ) and had a higher percentage of syndesmophyte (75 vs. 40%,  $p=0.02$ ). Regarding csDMARDs, axSpA patients were more often prescribed sulfasalazine (40 vs. 6.2%,  $p=0.008$ ) whereas methotrexate (39.1 vs. 75%,  $p=0.01$ ) and leflunomide (1.1 vs. 18.7%,  $p=0.008$ ) were less frequently administered to axSpA. The prescription of NSAIDs and biological therapies was similar between the two groups.

**Conclusion:** Patients with axSpA and axPsA had important similarities. Nevertheless, some differences regarding clinical and

radiographical features were apparent. AxPsA patients presented more peripheral involvement and spondylitis without sacroiliitis.

## P1132

### STUDY OF KNOWLEDGE, ATTITUDE AND PRACTICE AMONG WOMEN WITH OSTEOPOROSIS IN IRAN

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**Objective:** Lifestyle play an important role in osteoporosis prevention. The aim of this study was to determine osteoporosis knowledge, attitude, and practice among women with osteoporosis over 50 years in Iran.

**Methods:** A cross sectional study was conducted in 10 provinces in Iran on 186 women with a definite diagnosis of osteoporosis over 50 years, selected by convenience sampling. The data was collected by directly interacting with the participants through face-to-face interview or telephone contacts using a self-administered questionnaire that comprised 6 sections on sociodemographic, health history, KAP and information needs regarding osteoporosis. Content validity and face validity of the questionnaire were evaluated. Also, Cronbach's alpha coefficient were evaluated for assessing reliability. The study was approved by ethical committee of Tehran University of Medical Sciences. Written and verbal informed consent was obtained from all participants and they had the right to withdraw their consent at any time during the study. Excel and SPSS V.22 software was used for statistical analysis.

**Results:** A questionnaire with 79 questions was designed with Cronbach's alpha of the questionnaire was calculated as 0.6 and it also had a good content validity. The average age of the participants was 86.23±135.99 and 121(65.1) of participants was married. The mean (SD) scores of knowledges, attitude and practice of the participants was 13.00(3.92), 29.22(4.49) and 18.18(3.83), respectively. Attitude score had a statistically significant association with university education ( $\beta$ : -0.003, P value: 0.001, 95%CI: -0.005, -0.001). Knowledge score had a statistically significant association with university education ( $\beta$ : -0.003, P value: 0.000, 95%CI: -0.005, -0.002), history of fracture in parents ( $\beta$ : -0.004, P value: 0.000, 95%CI: -0.007, -0.002) and menopause ( $\beta$ : -0.43, P value: 0.000, 95%CI: -0.72, -0.14). Practice score had a statistically significant association with habitation ( $\beta$ : -2.53, P value: 0.05, 95%CI: -5.10, -0.03) and basic insurance type ( $\beta$ : -0.003, P value:

0.01, 95%CI: -0.005, -0.001).

**Conclusion:** Generally, the knowledge, attitude and practice levels of osteoporosis patients were medium. It is the responsibility of health policymakers to plan programs to increase knowledge, to decrease the risk factor behaviors in women with osteoporosis.

Table 1. Knowledge, Attitude and Practice level in osteoporosis women

KAP Components	Mean (SD)	Minimum	Maximum	Total rang of scores	Status
Knowledge	13.00(3.92)	2	19	0-20 (16-20: Good 11-15: Medium, 0-10: Poor)	Medium
Attitude	29.22(4.49)	17	38	0-40 (32-40: Good 20-31: Medium 0-19: Poor)	Medium
Practice	18.18(3.83)	8	24	0-24 (19-24: Good 12-18: Medium 0-11: Poor)	Medium

## P1133

### DOES OMEGA-3 SUPPLEMENTATION ALLEVIATE INFLAMMATORY CYTOKINE LEVELS IN PATIENTS WITH HEART FAILURE? A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** Omega-3 fatty acids have shown promise in exerting anti-inflammatory effects, which may be promising in reducing the burden of certain conditions including heart failure (HF). The aim of this review was to systematically assess the published literature in the efficacy of omega-3 supplementation in reducing the inflammatory cytokine levels of TNF $\alpha$ , IL-6, and C-reactive protein (CRP), in patients with HF.

**Methods:** A literature search of randomized controlled trials (RCTs) was conducted through PubMed, Scopus, Web of Science and Cochrane Library from inception until October 2022. Eligible RCTs compared the effect of omega-3 supplementation vs. placebo on inflammatory cytokine profile in patients with HF. A meta-analysis employing the random effects inverse-variance model and standardised mean differences (SMD) was performed to assess group differences.

**Results:** Fourteen eligible RCTs examining the anti-inflammatory effect of omega-3 supplementation on patients with HF were included in our study. Our main analysis ( $k=5$ ) revealed a significant impact of omega-3 supplementation to lower TNF- $\alpha$  levels compared to placebo (SMD: -1.13, 95%CI: -1.75 - -0.50,  $I^2=81%$ ,  $P=0.0004$ ). Similarly, a significant impact of omega-3 supplementation on suppressing IL-6 levels was shown ( $k=4$ ; SMD: -1.27, 95%CI: -1.88 - -0.66,  $I^2=81%$ ,  $P<0.0001$ ), however, no changes were observed pertaining to serum CRP levels based on six RCTs

(SMD: -0.14, 95%CI: -0.35 – 0.07, I<sup>2</sup>=0%, P=0.20).

**Conclusion:** In a limited number of studies, omega-3 supplementation may have a positive impact on HF patients' inflammatory profiles, as seen by a decline in TNF $\alpha$  and IL-6 levels. Further research examining the clinical effects of omega-3 fatty acids supplementation in patients with HF may be warranted.

### P1134

#### PREVALENCE OF GERIATRIC SYNDROMES IN PATIENTS 60 YEARS AND OLDER WITH PROXIMAL HUMERUS FRACTURE ENROLLED IN FRACTURE LIAISON SERVICE

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**Objective:** The presence of geriatric syndromes is associated with an increased risk of falls and the occurrence of osteoporotic fractures in elderly patients. We aimed to assess the prevalence of GS in patients aged 60 years and older with proximal humerus fractures enrolled in Fracture Liaison Service (FLS).

**Methods:** We investigated all the patients (n=46) with a proximal humerus fracture  $\geq$  60 years admitted to Yaroslavl Regional Emergency Care Hospital n.a. N.V. Solovyev hospitalized from 01 APR 2021 to 01 SEP 2021. We used Barthel activities daily living index, Lawton instrumental activities of daily living scale, a National validated questionnaire for identification of frailty «Age is not a hindrance», the Morse Fall Scale, SARC-F questionnaire, the Mini-Cog test, Mini Nutritional assessment, Visual Analogue Scale, the Overactive Bladder Questionnaire Short Form, Geriatric depression scale, Insomnia Severity Index.

**Results:** The mean age of the patients was 73.02 $\pm$ 8.37 yrs. We revealed severe dementia in 2 (4.35%) patients, 32 (69.57%) had probable dementia. 2 (4.35%) patients were completely dependent on assistance, 7 (15.22%) severely dependent, 1 (2.17%) moderately, and 36 (78.26%) mildly. For complex activities 11 (23.91%) were dependent on assistance. Frailty was detected in 4 (8.70%) patients, 17 (36.97%) were pre-frail. A high risk of falls was noted in 16 (34.78%) patients. Probable sarcopenia was revealed in 20 (43.47%) patients. 2 (4.35%) patients had increased risk of malnutrition. Chronic pain syndrome disturbed 16 (34.78%), mild pain – 8 (17.39%) people, moderate – 7 (15.21%), severe – 1 (2.17%). Depression was detected in 16 (34.78%) respondents. 12 (26.09%) patients had mild sleep disturbances, 9 (19.57%) moderate. Nicturia was detected in 26 (56.52%) patients, stress urinary incontinence in 4 (8.70%), combined urinary disorders in 3 (6.52%). Visual impairment was noted in 27 (58.70%) patients, hearing impairment in 9 (19.57%). Among all patients 5 (10.87%) patients had no GS, 10 (21.74%) had 1-2 GS, 15 (32.61%) were with 3-4 syndromes, 14 (30.43%) with 5 or more GS.

**Conclusion:** The results of the study revealed the high prevalence

of GS in elderly patients with proximal humerus fracture.

### P1135

#### THE INFLUENCE OF COGNITIVE IMPAIRMENTS ON THE REHABILITATION PROCESS IN ORTHOPEDIC PATIENTS IN THE LATE POSTOPERATIVE PERIOD

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**Objective:** To study the dependence of rehabilitation outcomes in the treatment of hip fracture in elderly people, depending on their cognitive status.

**Methods:** 60 patients aged 75-95 years (mean age 72.2 $\pm$ 5.7 years) receiving rehabilitation treatment after hip fracture surgery. Cognitive functions were assessed using a MoCA test for the 6th month of the postoperative period. All patients were examined to diagnose late postoperative complications. Evaluation of the functional results of surgical treatment was carried out using the American Academy of Orthopedic Surgeons Assessment (R.A. Goodwin, 1968), Harris Evaluation System of the Hip (W.H. Harris, 1969).

**Results:** According to the results of the MoCA test, 2 groups of patients were formed: 30 people with mild or moderate cognitive impairment - scored less than 26 points (22.4 $\pm$ 2.05 points) and 30 patients without cognitive impairment (28.8 $\pm$ 3.77 points). Mild and moderate cognitive dysfunction was manifested in errors in demonstrating executive skills (drawing a broken line, optical-spatial activity – drawing a cube and a clock), memory (delayed reproduction of control words), abstract thinking (determining the similarity of objects), attention (naming numbers in forward and reverse order) and speech (repeating sentences). It is these thought processes that underlie the assessment of the rehabilitation potential of the patient to predict the level of recovery. There was no significant statistical difference between the operations performed (metal osteosynthesis of the femur, total hip replacement with a cement version of the endoprosthesis). Also, the groups of patients did not differ in the prescribed set of methods of medical and physical rehabilitation. In the late postoperative period, 9 cases of metal structure migration, slow consolidation and 4 cases of contracture were detected. Complications were observed only in patients with cognitive impairments, which is most likely due to a violation of the regime of gradual increase in the load on the operated limb, performing hip flexion, turning the feet in or out, crossing the legs. However, even in the absence of severe postoperative complications, in patients with cognitive dysfunction, we noted a later and incomplete restoration of the function of the damaged lower limb and joint, which did not allow patients to return to their usual life

six months after the injury. In the group of patients without cognitive dysfunction, excellent and good results for Goodwin were 2.5 times more often, and for Harris – 1.5 times more often. There is no doubt that the patient's responsible and conscious attitude to treatment is the basis for the success of rehabilitation measures. The violation of mental functions revealed by us is an important factor leading to a decrease in the speed and volume of restoration of mobility of the operated lower limb. **Conclusion:** A decrease in the cognitive function of elderly patients is an important factor leading to the development of late postoperative complications associated with the migration of metal structures, slowing consolidation, the development of contractures, as well as later and incomplete restoration of the function of the damaged lower limb and joint.

### P1136

#### COMORBIDITIES IN PATIENTS WITH SPONDYLOARTHRITIS

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**Objective:** To investigate the prevalence of comorbidities in spondyloarthritis (SpA) and to evaluate their impact on the disease activity and the functional status.

**Methods:** This retrospective, monocentric study included 136 patients with diagnosed SpA according to ASAS 2009 criteria. Data collected were demographics, disease characteristics, treatment and comorbidities. We divided the patients into two groups: group 1 with at least one comorbidity and group 2 without comorbidities.

**Results:** 58.1% were men, the mean age was 39.72±13.1 years, and the mean disease duration was 11.6±9.98 years. HLAB27 status was available for 14% of patients and was positive in half of these cases. Current smoking was reported by 17.6% of patients and past smoking by 1.5%. The mean ASDAS-CRP was 3.39±1.2, the mean BASDAI was 4.0±2.0 and the mean BASFI was 4.53±2.68. 87.2% of patients had received NSAIDs, 13.2% corticosteroids, 73.7% csDMARDs, and 26.5% TNF inhibitors (TNFi). At least one comorbidity was reported in 42.6% of patients, and 17.6% had two and more comorbidities. The mean number of comorbidities was 1.6 (range 1-4); the most common were hypertension (10.3%), obesity (9.6%), osteoporosis (8.8%), gastrointestinal disorders (8.1%), pulmonary diseases (5.1%), diabetes (4.4%), cardiovascular diseases (3.7%), and renal diseases (3.7%). Comorbidities were associated with older age (p=0.001) and longer disease duration (p=0.01). A higher prevalence of diabetes was observed in patients with peripheral involvement (p=0.02). Current smoking was significantly associated with high ASDAS-CRP (p=0.03), BASDAI (p=0.01), and BASFI (p=0.03). Cardiovascular and renal diseases were significantly associated with a high level of CRP (p=0.02, 0.04 respectively). The prescription of NSAIDs, csDMARDs, and TNFi was similar between the groups.

**Conclusion:** We found an increased frequency of comorbidities in

patients with SpA, with an increased prevalence of hypertension, obesity and osteoporosis.

### P1137

#### SARCOPENIA IS ASSOCIATED WITH A GREATER RISK OF POLYPHARMACY AND NUMBER OF MEDICATIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** Independent of the existence of underlying medical disorders, polypharmacy in older adults is linked to a number of detrimental effects that may impair muscle function. The aim of this systematic review and meta-analysis was to investigate the association of sarcopenia with polypharmacy and higher number of medications.

**Methods:** From the time of publication to June 2022, a thorough study literature search was carried out utilizing the PubMed, Web of Science, Scopus, and Cochrane Library databases. A meta-analysis employing a random-effects model was performed to compute the pooled effects to assess whether sarcopenia is linked to a higher likelihood of polypharmacy and a greater number of drugs (CRD42022337539).

**Results:** Twenty-nine studies were included in the systematic review and meta-analysis. Sarcopenia was associated with a higher prevalence of polypharmacy (odds ratio [OR]: 1.65, 95%CI [1.23, 2.20], I<sup>2</sup>=84%, P<0.01) and higher number of medications (mean difference: 1.39, 95%CI [0.59, 2.19], I<sup>2</sup>=95%, P<0.01) compared with individuals without sarcopenia. Using meta-regression, a high variance was observed due to different populations (i.e., community-dwelling, nursing home residents, inpatients, outpatients) for both outcomes of polypharmacy (r=-0.338, SE=0.1669, 95%CI [-0.67, -0.01], z=-2.03, P=0.04) and number of medications (r=0.589, SE=0.2615, 95%CI [0.08, 1.10], z=2.25, P=0.02).

**Conclusion:** People with sarcopenia had a much higher risk of polypharmacy and receive more prescription drugs than people without this condition, according to this systematic review and meta-analysis. Future studies should determine if the quantity and specificity of drugs directly contribute to sarcopenia in older people by accelerating the progression of muscular loss and dysfunction.

P1138

### COMPARISON OF THE DISEASE ACTIVITY, THE FUNCTIONAL STATUS AND THE QUALITY OF LIFE IN PATIENTS WITH CLINICAL AND IMAGING ARM OF NONRADIOLOGICAL SPONDYLOARTHRITIS

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**Objective:** Changes in spondyloarthritis diagnosis and classification (SpA) over the last 12 years include evidence of axial inflammation using magnetic resonance tomography (MRT) in the absence of radiographic data for changes. The axial SpA (axSpA) diagnosis includes patients with radiographic changes and those who have only clinical characteristics suggestive of axial inflammation. Although the non-radiographic axSpA is associated with a lesser degree of inflammation and change in vertebral mobility compared to AS, the two phases of the disease reflect similarity in terms of impairment of physical function and impact on quality of life. The aim of the study is to attempt to compare the level of disease activity, the changes in the functional status and the quality of life of patients with clinical and imaging arms of the disease.

**Methods:** 45 with clinical arm of non-radiological SpA and 40 with the imaging arm of the disease, age- and sex-matched patients were compared with regard of disease activity (BASDAI, ASDAS-CRP, ESR and CRP), physical function (BASFI) and axial status (BASMI). The quality of life was assessed using the ASQoL questionnaire. Inter-group comparisons were tested using t-test or Mann-Whitney U test if appropriate.

**Results:** The mean disease duration in clinical arm of nr-axSpA was  $0.6 \pm 0.2$  and of imaging arm  $0.7 \pm 0.3$  years. The results reveal lack a difference in the means of BASDAI ( $4.34 \pm 0.8$  vs.  $4.6 \pm 2.1$ ,  $p=0.201$ ), BASFI ( $4.8 \pm 1.2$  vs.  $4.9 \pm 1.4$ ,  $p=0.32$ ), ESR ( $42 \pm 26$  vs.  $50 \pm 32$ ,  $p=0.5$ ) and CRP ( $18.4 \pm 2.6$  vs.  $21.3 \pm 3.5$ ,  $p=0.220$ ), ASDAS-CRP ( $3.2 \pm 1.5$  vs.  $3.4 \pm 1.2$ ,  $p=0.12$ ) and BASMI ( $0.5 \pm 0.9$  vs.  $0.7 \pm 1.0$ ,  $p=0.35$ ) between both study groups. We found no statistically significant difference between the ASQoL between the two patients groups ( $5.3 \pm 1.5$  vs.  $5.8 \pm 1.8$ ,  $p=0.23$ ).

**Conclusion:** The levels of disease activity, functional activity and the impact on quality of life (ASQoL) are significant in patients with non-radiological axSpA. Both the clinical and imaging arms share similar burden of the disease activity as well as impact on daily physical.

P1139

### INFLUENCE OF MUSCLE STRENGTH AND FUNCTIONAL PERFORMANCE ON QUALITY OF LIFE IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS

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tation Dept. / Rehabilitation Hospital, <sup>2</sup>University of Medicine and Pharmacy Iuliu Hatieganu / Rehabilitation Dept., Cluj-Napoca, Romania

**Objective:** To evaluate muscle strength and functional performance in postmenopausal osteoporosis women and to correlate them with quality of life.

**Methods:** 51 postmenopausal women ( $59.4 \pm 5.8$  years) diagnosed with osteoporosis were included in this cross-sectional study. The weight, height, menopausal duration, history of fragility fractures were registered. BMD measurement was performed at the lumbar spine ( $L_2-L_4$ ) and at the femoral neck, by the DXA method. Osteoporosis was retained at T-score  $\leq -2.5$ . Knee extensor strength was measured by the isokinetical method at the angular velocity of  $120^\circ/s$ , using a Gymnax Iso 2 Dynamometer. Functional performance was assessed using the timed up-and-go (TUG), chair rising test (CRT) and 6-minute walk (6MW) tests. Quality of life was assessed by Qualeffo-41 questionnaire (Romanian version). Analyses of the relationship between strength and functional performance parameters and quality of life scores were done.

**Results:** TUG score negatively correlated with knee extensor strength ( $r=-0.328$ ,  $p<0.05$ ) and positively correlated with Qualeffo-41 ( $r=0.671$ ,  $p<0.05$ ). Positive correlation was found between the CRT score and the knee extensor strengths ( $r=0.403$ ,  $p<0.05$ ), while negative correlation was found between the CRT score and the Qualeffo-41 Jobs around the house subscale ( $r=-0.562$ ,  $p<0.05$ ). 6MW score positively correlated with knee extensor strength ( $r=0.432$ ,  $p<0.05$ ) and negatively correlated with Qualeffo-41 ( $r=-0.522$ ,  $p<0.05$ ). Qualeffo-41 also negatively correlated with knee extensor strength ( $r=-0.473$ ,  $p<0.05$ ).

**Conclusion:** Muscle strength and functional performance significantly correlated with quality of life in postmenopausal osteoporosis women. These findings emphasize the importance of physical exercise in patients with osteoporosis, in which rehabilitation programs should focus on muscle strengthening and functional training, in order to improve quality of life.

P1140

### ASSESSMENT OF INDICES OF QUALITY OF LIFE IN PERIMENOPAUSAL WOMEN

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**Objective:** To assess the indices quality of life (QoL) in perimenopausal women.

**Methods:** We examined 102 women in the perimenopausal period (average age  $48.4 \pm 5.3$  years). Women were divided into 2 groups depending on whether they suffer from AH or not: group I comprised 41 women without AH, group II included 61 women with stage 2 AH. They underwent a computerized questionnaire with automated express techniques (NAIF) to assess QoL. According to the survey data the indices of quality of life – the integrated index and its constituents: physical activity, emotional state, sexual, social and cognitive functions and economic status – have been

analyzed. The indices were calculated in scores and summed up by means of the key. The indices of QoL were translated into percentage (%). In a person being content with all aspects in his/her life the integrated index of QoL was 100%. If QoL was slightly reduced, the integrated index was up to 75%. If QoL was moderately reduced, the integrated index was up to 50%. If QoL was significantly reduced, the integrated index made up 25%. The statistical processing was performed by means of «STATISTIKA 10».

**Results:** In group I the integral index was 65,6±14,4% and in group II it was 55,6±13,8% (p<0,001). The constituents of the integral index in group I and II were as follows: physical activity in group I was 65,6±16,6% and in group II it was 48,1±17% (p<0,005); emotional state in group I was 63,7±28,3% and in group II it was 51,3±22,4%, (p<0,02); sexual function in group I was 65,4±26,2% and in group II it was 53,5±27,8%, (p<0,04); social function in group I was 57,9±11,1% and in group II it was 53,3±16,5%; cognitive function in group I was 75,0±23,9% and in group II it was 71,3±22,5%; economic status in group I was 71,2±37,9% and in group II it was 58,5±22,5%.

**Conclusion:** Perimenopausal women were noted to have a moderate reduction in all the indices of QoL. The indices of physical activity, emotional state and sexual function were particularly reduced in women with AH.

## P1141

### SARCOPENIA INCREASES THE RISK OF MORTALITY IN PATIENTS AWAITING OR UNDERGOING LIVER TRANSPLANTATION: A SYSTEMATIC REVIEW AND META-ANALYSIS OF OBSERVATIONAL STUDIES

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**Objective:** Liver transplantation is an efficacious treatment option for those with liver cirrhosis, however, the prognostic role of sarcopenia in these patients is unknown. In light of this context, we conducted a systematic review and meta-analysis of the effects of sarcopenia on mortality in patients who were listed, assessed, and receiving liver transplants.

**Methods:** From the beginning until December 2022, various databases were searched for observational studies relating to sarcopenia in liver transplant and mortality. Using the most corrected estimate available, we estimated the risk of mortality in sarcopenia vs. no sarcopenia and summarised the results as risk ratios (RRs) with their 95% CIs. For all studies, a random-effect model was taken into account.

**Results:** Among 1135 studies initially considered, 33 articles were included for a total of 12,137 patients (mean age: 55.3 years;

39.4% females). Over a median of 2.6 years and after adjusting for a median of 3 covariates, sarcopenia increased the risk of mortality approximately 2-fold (RR: 2.01; 95%CI: 1.70 – 2.36). After accounting for publication bias, the recalculated RR was 1.75 (95%CI: 1.49-2.06). The quality of the studies was generally low.

**Conclusion:** Patients who were listed, assessed, and receiving liver transplants had a considerably higher risk of mortality when they had sarcopenia, proving the necessity for interventional studies in this particular cohort.

## P1142

### CUSTOMIZED ORTHOTICS AND FRACTURES PREVENTION

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The risk of falling in people over 65 is extremely high. These falls can result in various types of fractures, hip fractures being the most severe. The aim of this study is to demonstrate that by using customized foot orthotics in the elderly, it can be prevented the risk of falls and therefore the fractures. Custom plantar orthotics are medical devices used to correct both postural and foot disorders.

We included in the study a number of 35 postmenopausal women, ages between 58-79 years, with diagnosis of osteoporosis (DXA T-scores between -2.7SD and -4.3SD) treated with bisphosphonates. The main inclusion criteria were normal range of motion, no traumatic injuries or surgeries during last 6 months in lower limbs or spine, no pathologic condition or neurologic disorder in feet, and no leg length discrepancy. The custom foot orthotics were made after the patient walked on a baropodometric platform that allows the analysis of the pressure points that the foot applies to the ground, both in a static and dynamic position. As part of this analysis, a videographic test, a complete morphological study and an exact identification of body asymmetries and/or postural defects were performed.

The study demonstrates, a marked reduction in lower limb pain as well as an improvement in balance while using the customized plantar orthotics after 1 year of observation. Also, no falls were recorded in any patient while using the customized foot orthotics. Custom foot orthotics are a very important part of management of osteoporosis, being a large contributor to fall risk reduction. They can support the feet and also adjust the pressure that each foot applies to the ground, with the goal of making each step less painful and more comfortable and supported.

P1143

### ULTRASOUND VALUE IN ASSESMENT OF ANKLE AND FOOT IN RHEUMATOLOGY PRACTICE: A CROSS -SECTIONAL MULTICENTERIC STUDY

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**Objective:** A properly functioning ankle and foot are essential for gait and other activities of daily living. The ankle is a frequently affected joint in a number of rheumatic & musculoskeletal diseases in both young and older populations, resulting in pain, limited mobility, and decreased quality of life <sup>(1)</sup>. Ultrasound (US) is particularly suited for evaluating soft tissue structures, including the joint capsule, tendons and ligaments and is used for diagnosis and monitoring of patients with both inflammatory rheumatic diseases and degenerative joint disease <sup>(2)</sup>. We aimed to investigate the prevalence and different pathologies of soft tissue lesions (tenosynovitis/tendon damage & ligament injury) and synovitis of the ankle and foot in patients presenting with foot and ankle complaints using US.

**Methods:** A cross-sectional, multicenter observational study on consecutive patients who are attending the rheumatology outpatient clinics of Medical University of Vienna and Benha University Hospitals due to ankle or foot pain or swelling. All patients were subjected to clinical and ultrasound examination of the ankle and foot. Sonographic evaluation was performed for the joints of both ankles, forefoot, mid foot and hind foot for the presence of synovitis on gray scale (GS), power Doppler (PD), erosions (GS) and osteophytes (GS). The tendons and ligaments of Anterior, medial, lateral and posterior compartments were evaluated for the presence of tenosynovitis and/or tendon damage on GS and PD. Ankle or foot pain and disability were assessed by Foot Function Index (FFI) <sup>(3)</sup>.

**Results:** A total of 200 ankles and feet were examined in 100 patients with mean age of 41 years. 65% of cases were females and 35% of cases were males. The majority of cases had a diagnosis of rheumatoid arthritis (RA) (34%), followed by spondyloarthritis (SpA) (23%) and (16%) of cases were undiagnosed. Most of patients (25%) presented with swelling at right ankle joint while (80%) of patients presented with tenderness at the fore-foot area. US examination revealed that joints were more affected than tendons and ligaments of different compartments of ankle and foot. Metatarsophalangeal (MTPs) joints were the most common affected joints (83%) followed by talonavicular (TNJ) joint (63%), subtalar joint (46%) and tabiotalar joint (TTJ) (35%). Achilles tendon was the most commonly affected tendon followed by tibialis posterior tendon. Anterior-inferior tabio-fibular ligament (ATIFL) ligament was the most commonly affected ligament (28%). Among different cases, the most common involved joint by US in RA patients were MTPs, while in SpA patients; Achilles tendon was the most commonly involved tendon. There were significant association between clinical and US Findings in tabiotalar ( $p<0.001$ ), MTPs

( $p<0.001$ ) joints and Achilles tendon ( $p<0.001$ ) whereas no significant association between clinical and US findings in the remaining joints, tendons and ligaments. Regarding functional assessment, We found a significant correlation between synovitis in US of most of MTPs joints and pain and disability in FFI ( $p<0.001$ ). There were significant correlation between the presence of synovitis and erosions in naviculo-cunifform joint and pain and disability in FFI ( $p=0.004$ ), also between the presence of synovitis in talonavicular joint and pain and disability in FFI ( $P=0.005$ ).

**Conclusion:** Ultrasound is an essential tool in identifying different pathologies of the ankle and foot as well as clinical examination due to their complicated anatomy. It clearly distinguish between synovitis, tenosynovitis, enthesitis and ligament injury. Ankle and foot pathologies have a significant impact on patients' function and disability, and they should be evaluated accurately using US.

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P1144

### THE THERAPEUTIC APPROACH OF THE RHEUMATIC FOOT

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Daily activity is closely related to orthostatism and locomotion, and walking is very important in human existence.

Pathological functional disorders are identified by: inspection of the lower limb assembly, digital type, deformities, forefoot type, plantar arch, integument inspection, nail lesions, vasculo-trophic balance, neurological balance and radiological stage.

Among the methods of functional recovery of walking, physical therapy occupies the first place and must be applied early before the establishment of joint restorations, passive mobilisations, postures, active mobilisations, actual re-educational exercises and walking exercises are used.

The massage is valuable for improving blood and lymphatic circulation as well as for normalizing muscle tone.

P1145

### PREVALENCE OF OSTEOPOROSIS AND HYPOVITAMIOSE D AND THEIR RELATIONSHIP IN BUSHEHR, IRAN: THE POCOSTEO STUDY

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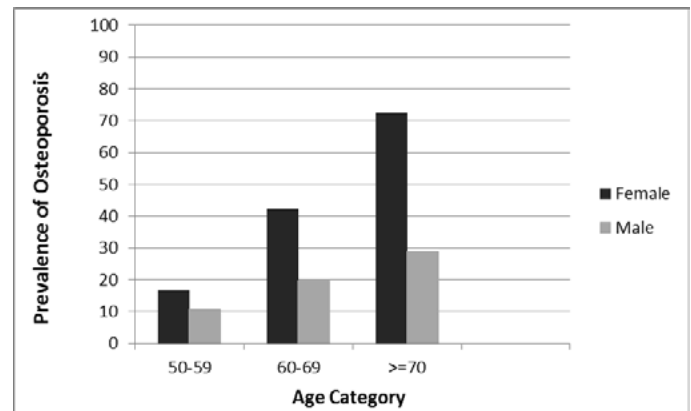
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**Objective:** There is an association between osteoporosis and hypovitaminosis D. This study aimed to estimate the prevalence of osteoporosis, osteopenia, and hypovitaminosis D and their relationship in populations aged  $\geq 50$  years of Bushehr, Iran.

**Methods:** We used the cross-sectional data of the first stage of the PoCOsteo study. In this stage, 2000 people  $\geq 50$  years who lived in Bushehr, Iran participated in the study in 2018-2020. Bone mineral densitometry was measured by the Hologic discovery DXA system. Osteoporosis was defined as T-score less than -2.5 in each of the spine, hip, or femoral neck sites, and osteopenia as a T-score between -2.5 and -1.5. Serum vitamin D was measured on the blood samples. Hypovitaminosis D was considered as serum vitamin D  $< 20$  ng/ml.

**Results:** 1142 (57.1%) of the participants were female. The mean age was 62.2 ( $\pm 8.1$ ) years. Due to BMD results, from 1988 participants whom DXA had been done for them 546 people (27.5%) and 951 people (47.84%) were diagnosed with osteoporosis and osteopenia, respectively. The prevalence of osteoporosis among different age groups is shown in Figure 1. Additionally, 769 people (38.6%) of the participants were diagnosed with hypovitaminosis D. It was more prevalent in men (43.2%) than women (35.1%). The difference in hypovitaminosis D prevalence between osteoporotic (36.3%) and non-osteoporotic people (39.3%) was not statistically significant (P-value=0.22).

**Conclusion:** A high prevalence of low bone density and hypovitaminosis D were detected in Bushehr. A special focus on bone health is one of the most important national priorities and needs comprehensive interventions because of increasing life expectancy and the elder population.



**Figure 1.** The prevalence of osteoporosis among different age groups

P1146

### THE IMPACT OF KNEE OSTEOARTHRITIS ON THE QUALITY OF LIFE OF OLDER PATIENTS

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**Objective:** Osteoarthritis (OA) is a common chronic condition affecting the musculoskeletal system among older adults. Knees are the most commonly affected joints by primary OA. Knee osteoarthritis (KOA) is frequently associated with pain, stiffness and joint impairment which affects patient's functioning and quality of life. The aim of this study was to evaluate the impact of primary KOA in older patient's quality of life.

**Methods:** We conducted a cross-sectional study including patients with primary KOA. All the patients fulfilled the American College of Rheumatology (ACR) criteria for diagnosis of OA. Sociodemographic data as well as disease characteristics were collected. Plain X-ray for both knees postero-anterior and lateral views in standing position were obtained and scored using Kallgren-Lawrence radiographic score. The quality of life was assessed by WHOQOL-OLD questionnaire. It's a specific questionnaire for the elderly validated by the WHO. It includes 24 questions scaled in the form of a 5-point Likert scale and grouped into 6 dimensions which are: The sensory capacity, Autonomy, Past, present and future activities, Social activity, Death and End of life fears and loving and affectionate relationships. The score varies from 0-100. The higher the score, the better the quality of life. P-values  $< 0.05$  were considered significant.

**Results:** 50 patients were included. The mean age was 71.9 years [65-84]. 47 females (94%) and 3 males (6%) were included. 30 were illiterate (60%), 12 had primary level (24%) and 8 secondary level (16%). The professional activity of patients before retirement was distributed as follows: 52% were housewives, 10% had an office work and 38% had a physical labor. 28 patients were married (56%), 20 patients were widower (40%) and two patients were



divorced (4%). When it comes to comorbidities, 42 patients had blood hypertension (21%), 15(7.5%) had diabetes and 14(7%) had osteoporosis. The BMI was  $29.9 \pm 4.55 \text{ kg/m}^2$ . Disease duration was  $8.2 \pm 7.2$  years. 35 patients (70%) suffered from bilateral KOA. 26 patients had moderate KOA (52%), while 24 had minimal KOA (48%). Analgesics, NSAIDs, Slow acting anti-arthritis, intra-articular injections of steroids and functional rehabilitation were prescribed for respectively 90%, 58%, 28%, 18% and 38% of patients. The global WHOQOL-OLD was:  $84.2 \pm 13.4$  [31-100]. A significant association was found between a poor quality of life and diabetes as a comorbidity ( $p=0.037$ ), a long disease duration ( $p<0.03$ ), the one sided KOA ( $p=0.04$ ), the absence of physical activity ( $p<0.02$ ) and the absence of analgesic treatment ( $p=0.008$ ). **Conclusion:** KOA causes impaired joint function and disability especially among older patients which affects their quality of life. Disease duration, comorbidities, unilaterality and the absence of pain management were the main factors related to a poor life quality of life according to our study.

### P1147

#### CAN CREATINE SUPPLEMENTATION ENHANCE MUSCLE STRENGTH, PHYSICAL AND ENDURANCE PERFORMANCE IN PATIENTS WITH HEART FAILURE? A SYSTEMATIC REVIEW OF CLINICAL STUDIES

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**Objective:** Research has shown lower levels of total creatine, phosphocreatine (PCr), and adenosine triphosphate in patients with heart failure (HF). The aim of this systematic review was to assess the potential effect of creatine supplementation on aerobic and physical performance, and muscle strength in patients with HF through randomized controlled trials (RCTs).

**Methods:** A systematic literature search of PubMed, Cochrane Library, Scopus, and Web of Science was employed from inception until November 2022 for RCTs based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, exploring the impact of creatine supplementation on indices of muscle strength, aerobic and physical performance. For quality assessment of the included RCTs, the Risk of bias (RoB2) tool was utilized.

**Results:** Five trials were included for qualitative synthesis. Creatine supplementation compared to placebo exhibited higher cycling working capacity, elbow flexion strength, and isometric maximal voluntary contractions, but did not alter 6-minute walking test, peak isometric torque, and maximal oxygen capacity. A meta-analysis was not employed due to the low number of studies for each outcome.

**Conclusion:** Creatine supplementation may be an effective meth-

od to improve muscle strength in patients with HF, however, its impact on aerobic performance seems limited. Future studies should assess for baseline creatine and PCr levels and experiment with various doses to test further its efficacy on components of muscle strength, especially ones that are used in clinical practice.

### P1148

#### WEAK OPIOIDS USE DURING NON-INFLAMMATORY RHEUMATIC DISEASES: A SURVEY AMONG TUNISIAN PRIMARY CARE PHYSICIANS

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**Objective:** Primary care physicians are often in the first line in diagnosing and treating non-inflammatory rheumatic diseases. The treatment relies on analgesics, non-steroidal anti-inflammatory drugs (NSAIDs) and weak opioids. These treatments can have side effects and a risk of addiction to opioids. The aim of this study was to evaluate primary care physician's use of weak opioids in non-inflammatory rheumatic diseases.

**Methods:** We conducted a cross-sectional survey among Tunisian primary care physicians using an anonymous questionnaire distributed online through a social network. The French version was available on Google forms from January 15 to February 19, 2023, and included 19 questions on weak opioids prescription in non-inflammatory rheumatic diseases.

**Results:** 54 physicians responded to the questionnaire within the timeframe. The mean age was  $32 \pm 8.5$  years [25-66] with a female predominance (75.9%). The participants were interns (68.5%), public health physicians (20.4%) and private physicians (11.1%) with an average seniority of 4.7 years [1-39]. More than half of the physicians (55.6%) have had a rheumatology internship, but only three (5.6%) had a master degree in chronic pain. Cervicobrachial neuralgia (51.9%), lumbosciatica (47%), knee osteoarthritis (31.5%) were the most reported indications for the prescription of weak opioids. They were used in case of failure of paracetamol (63%) and NSAIDs (55.6%) or in first intention according to the visual analogue scale (VAS) of pain (55.6%). The majority of participants (59.3%) prescribed opioids for a  $VAS \geq 6/10$  while 40.7% prescribed them for a  $4 \leq VAS < 6$ . The most reported side effects were somnolence (81.5%), nausea-vomiting (77.8%), constipation (66.7%). Two participants reported pruritus and convulsion. Benzodiazepines (75.9%), antidepressants (64.8%), vitamin K antagonists (44.4%) and gabapentin (35.2%) were reported as interacting drugs with opioids. In case of treatment intolerance, 48.1% of participants opted for an immediate stop, 38.9% opted for a dose adjustment and 18.2% opted for an adjuvant treatment. In case of inefficiency, 66.7% of doctors optimize the treatment posology up to the maximum dose, 40.7% will switch to another

opioid, 16% combine step 2 and step 3 analgesics and 13% prefer to switch to morphine.

**Conclusion:** This survey showed that the majority of primary care physicians had great knowledge of weak opioid use in non-inflammatory rheumatic diseases; however, we noticed some weakness in the way these treatments are prescribed.

### P1149

#### THE PERCEPTION OF BIOMECHANICAL STRAINS AMONG COMPUTER WORKERS SUFFERING FROM MUSCULOSKELETAL DISORDERS

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**Objective:** To compare the biomechanical strains perception of computer workers and the prevalence of musculoskeletal disorders (MSDs).

**Methods:** This was a cross-sectional multicentric exhaustive study carried out in three public hospitals in Tunisia over a 6-month period. Medical secretaries (MS) who have been working for more than one year and who agreed to participate were included in this study. The study was based on a structured self-administered questionnaire in French language consisting of two main parts. The French validated version of the Nordic Questionnaire was used for screening and evaluating MSDs among the participants. Operators were asked to rate their workstations using binary questions about the chair, the working postures, the height of the table, the height of the screen.

**Results:** The response rate was 81.8% and the total staff was 72 medical secretaries. The study population was entirely female. The mean age was 43.75±8.9 years. The prevalence of low back MSDs was 63.6% in the last 7 d and 69.4% in the last 12 months. The prevalence of neck MSDs was 83.3% in the last 7 d and 79.2% in the last 12 months. The occurrence of these disorders was statistically correlated with age ( $p=0.05$ ) and job tenure ( $p=0.05$ ). MS considered their chairs as unsuitable in 69.9% of cases. The working posture was considered uncomfortable in 39.7% of cases. The height of the table and the screen were perceived as unsuitable in 37% and 28.8% of cases, respectively. In the univariate analysis, a statistically significant association was found between the perception of an unsuitable chair and the presence of low back MSDs during the last seven days ( $p=0.01$ ) and neck MSDs ( $p=0.04$ ). Perceived poor work posture was significantly associated with the presence of elbow MSDs during the past 12 months ( $p=0.04$ ).

**Conclusion:** Work-related MSDs have become an alarming health problem worldwide. The literature data converge towards a high prevalence of MSDs among computer workers in particular. In Tunisia, this phenomenon is considered as one of the biggest challenges facing this occupational sector. These indicators integrate the results of subjective assessment of biomechanical strains generating musculoskeletal disorders. It is important to involve

the operators in the design of computer workstations.

### P1150

#### THE INTERRATER VARIABILITY OF SACROILIAC JOINTS MAGNETIC RESONANCE IMAGING INTERPRETATION IN SPONDYLOARTHRITIS

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**Objective:** The group of spondyloarthritis includes a number of pathologies which are characterized by axial skeleton and enthesal manifestations, in the presence of the human leukocyte antigen (HLA) B27 and frequent association with extraarticular manifestations. The aim of our study was to assess the difference between rheumatologists and radiologists in interpreting the inflammatory and structural damage of the sacroiliac joints on MRI examinations.

**Methods:** The study included 30 patients diagnosed with axial spondyloarthritis diagnosed according to the Assessment of SpondyloArthritis International Society (ASAS) criteria for axSpA. The patients were examined in the Dept. of Rheumatology, while the MRI examinations were performed in the Radiology and Medical Imaging of the University of Medicine and Pharmacy of Craiova. The images were interpreted by a radiologist and a rheumatologist.

**Results:** The overall  $\kappa$  was 0.756 for the rheumatologist (substantial agreement) in comparison with the Radiologist. With regard to the overall inflammatory changes, the rheumatologist and radiologist had substantial agreement ( $\kappa=0.742$ ). The structural damage observed by the rheumatologist proved to have substantial agreement ( $\kappa=0.689$ ) with the radiologist.

**Conclusion:** Our study showed substantial agreement between the radiologist and rheumatologist in interpreting MRI examinations of the sacroiliac joints.

P1151

### ASSOCIATIONS OF MECHANICAL LOADING FROM PHYSICAL ACTIVITY WITH BONE MINERAL DENSITY, PHYSICAL FUNCTION AND KNEE IMPAIRMENT IN OLDER ADULTS: THE TASMANIAN OLDER ADULT COHORT (TASOAC) STUDY

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**OBJECTIVE:** Physical activity that induces high mechanical loading may benefit bone, but there are concerns of harm to joints in older adults. This longitudinal study aimed to investigate associations between loading intensities and application rates, estimated from self-reported physical activity, with bone mineral density (BMD), physical function, knee pain, knee cartilage defects and bone marrow lesions (BMLs) over 2.7 years.

**METHODS:** 943 community-dwelling older adults (mean age 63.0±7.5 years) from the Tasmanian Older Adult Cohort (TASOAC) study were assessed at baseline and 2.7 years later. Self-reported physical activity over the past year was assessed using the Global Physical Activity Questionnaire (GPAQ; estimates metabolic equivalents of task or METs), from which loading scores (product of peak force and application rate) were estimated using previously reported load ratings for different activities. Hip and lumbar spine BMD was measured by dual-energy x-ray absorptiometry scans, dynamometry assessed knee extension strength and the Western Ontario McMaster Osteoarthritis Index (WOMAC) assessed knee pain, stiffness and dysfunction (higher scores indicate poorer outcomes). Magnetic resonance imaging measured cartilage defects and BMLs at the medial and lateral tibia and femur. Linear mixed models investigated associations between physical activity scores and outcome measures accounting for repeated measures.

**RESULTS:** Loading scores, but not METs, were significantly positively associated with femoral neck BMD (standardised  $\beta=5.49\text{mg}/\text{cm}^2$  [95% CI=0.09, 10.9mg/cm<sup>2</sup>]) and knee extension strength (5.40kg [0.13, 0.95kg]) after adjustment for covariates including sex and body mass index. Neither loading scores nor METs were associated with spine BMD, WOMAC scores, knee cartilage defects or BMLs in unadjusted and adjusted models.

**CONCLUSION:** In community-dwelling older adults, self-reported physical activity of high and rapid impact maintains higher femoral neck BMD and knee extension strength over 2.7 years without apparent deleterious effects on knee joint structure or pain.

P1152

### A CASE OF STERNOCLAVICULAR OSTEOARHRITIS

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**Objective:** Primary osteoarthritis of the sternoclavicular joint (SCJ) is relatively common, occurring in 90% of people over age 60, and must be considered in the differential of chest wall pain. Lesions typically appear after age 40 years and are either bilateral or slightly more common in the SCJ of the dominant hand. Diagnosis by plain x-rays is confounded by overlapping structures; therefore SCJ osteoarthritis is most easily diagnosed by classic radiographic findings on computed tomography of the sternoclavicular joint. Treatment consists of rest, physical therapy, non-steroidal anti-inflammatory drugs, or local corticosteroid injection, with surgery for those with intractable pain.

**Methods:** A 71-year-old lady, presented with pain in the right sternoclavicular joint with swelling and pain on palpation. The pain is accentuated during physical activities and especially at night. Initially, a X-ray of the two sternoclavicular joints was made. Due to ascertained destructive changes of the right sterno-clavicular joint and manubrium sterni, as well as its subluxation, additional investigations are indicated – lab. CRP, LDH, CPK, rheumatism factor, alkaline phosphatase, calcium in blood where there were no deviations. Chest CT with contrast and MRI was performed, as well as bone scintigraphy - bone scan with Tc 99.





**Results:** With all the mentioned additional investigations, the existence of a bone neoplasm was ruled out, and the degenerative etiology of the disease was confirmed. Treatment: conservative with ampullary anaesthetic therapy occasionally and NAIL almost daily. Occasional application of cortisone intra-articular and more often topical non-steroidal anti-inflammatory drugs. Due to associated osteoporosis, she regularly takes bisphosphonate therapy and a combined with calcium, vit. D3 and vitamin K2 intake.

**Conclusion:** Sternoclavicular osteoarthritis is very often an accidental finding during an x-ray of the chest, without any particular clinical finding or manifestation. It occurs more often on the dominant limb. But in some cases, although less often, it is manifested by strong pain, dislocation and instability of the sterno-clavicular joint, for which there is only symptomatic therapy, unfortunately.

### P1153 IN SILICO ELECTROPHYSIOLOGICAL STUDY REVEALS THE ROLE OF CAV1.1 ION CHANNELS IN FAILURE OF EXCITATION CONTRACTION COUPLING IN MOUSE SKELETAL MUSCLE

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**Objective:** During the excitation-contraction coupling (ECC), the electrical excitation of muscle is converted into force generation

for skeletal muscle contraction. Any dysfunction in the internal biophysical mechanism of the ECC causes several neuromuscular diseases. This study aims to investigate the role of calcium ( $\text{Ca}^{2+}$ ) Cav 1.1 ion channel in modulating the ECC by implementing an in-silico electrophysiological technique.

**Methods:** We have established an in-silico electrophysiological setup for an isolated mouse skeletal muscle cell. The voltage clamp and current clamp protocols were utilized to record the individual ion channel currents, resting membrane potential (RMP), Action potential (AP), depolarization, AP propagation, and the  $\text{Ca}^{2+}$  transients. The Cav 1.1 ion channel antagonist was also mimicked to study the changes in the electrophysiological properties.

**Results:** By keeping all ion channel parameters in the physiological ranges, the RMP was set to  $-60$  mV as this value is mentioned in various published experimental studies. Under the voltage clamp protocol, it was found that any positive shift from this RMP value causes a decrease in the  $\text{Ca}^{2+}$  transient. Simultaneous recordings of  $\text{Ca}^{2+}$  transients APs demonstrated failure to generate  $\text{Ca}^{2+}$  transients when APs peaked at potentials more negative than  $-32$  mV. Placing of recording electrode at a distance location revealed that AP conduction also fails when AP peaks were below  $-20$  mV. Inhibition of Cav 1.1 ion channel causes a positive shift of the RMP, a negative shift of the AP peak, and failure to generate  $\text{Ca}^{2+}$  transients.

**Conclusion:** This in-silico electrophysiological study has revealed that the RMP value, propagation of APs, and generation of  $\text{Ca}^{2+}$  transients are governed by the gating mechanism of the Cav 1.1 ion channel. We hypothesize agonists of the Cav 1.1 ion channel might be useful in treating diseases such as periodic paralysis, intensive care unit-acquired weakness, and possible fatigue of the muscle.

### P1154 ASSESSMENT OF OSTEOPOROSIS IN PSORIATIC ARTHRITIS USING CALCANEAL QUANTITATIVE ULTRASOUND

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**Objective:** Psoriatic arthritis is an autoimmune disease comprised in the spondyloarthritis group which is characterized by peripheral and/or axial joint involvement, usually in the presence of cutaneous psoriasis. The aim of our study was to assess the presence BMD alterations using calcaneal quantitative ultrasound.

**Methods:** The study included 54 patients with non-axial psoriatic arthritis (39 females, 25 males) with mean age of  $51.35 (\pm 5.23)$  years and 54 age and sex matched controls. Neither of the patients or controls has undergone corticosteroid therapy. We evaluated the patients clinically, biologically and measured BMD using calcaneal quantitative ultrasound.

**Results:** The BMD measured using quantitative ultrasound was

lower in the study group with a mean value of -1.48 standard deviations ( $\pm 0.25$ ) than in the control group with a mean value of -1.12 standard deviations ( $\pm 0.18$ ).

**Conclusion:** Although the assessment of BMD through heel ultrasound scanning is not ideal, the results in our study show that psoriatic arthritis has an impact on BMD and patients should be evaluated for osteoporosis.

## P1155

### A CASE REPORT OF CARDIAC ARRHYTHMIA AND HEART FAILURE SHORTLY AFTER STARTING ROMOSUZUMAB FOR OSTEOPOROSIS: A COINCIDENCE OR ASSOCIATION?

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**Objective:** Romosozumab is licensed for the treatment of osteoporosis in postmenopausal women. Its cardiac adverse events are uncommon. We present a patient who had cardiac complications shortly after romosozumab intake.

**Methods:** A 77-year-old postmenopausal woman of Arabic descent has a past medical history of controlled type 2 diabetes mellitus, mild chronic kidney disease, a history of ischemic stroke in 2018, a history of treated esophageal cancer in 2006, and light-chain monoclonal gammopathy of unknown significance. She has osteoporosis with partial compression collapse of T9 vertebra. Her osteoporosis was treated with strontium ranelate from 2011 to 2014 and with denosumab from December 2014 to April 2021. Due to worsening bone densitometry, denosumab was replaced with Romosozumab which was only taken for 2 doses starting in February 2022. In May 2022, she was admitted with acute pulmonary edema due to new-onset atrial fibrillation. Echocardiography revealed preserved ventricular ejection fraction, normal left atrium, moderate aortic regurgitation and mild pulmonary hypertension. In December 2022, denosumab was restarted as anti-resorptive medication for osteoporosis.

**Results:** A recent systematic review and meta-analysis by Singh et al<sup>1</sup> revealed total adverse events and serious adverse events, with romosozumab were comparable to the control group. Another recent systematic review and meta-analysis<sup>2</sup> revealed romosozumab did not increase or reduce specific cardiovascular outcomes in primary osteoporosis, including myocardial infarction, atrial fibrillation, or heart failure. However, the short period that our patient took romosozumab without taking a new potentially cardio-toxic medication highly suggests that it is associated with cardiac adverse event.

**Conclusion:** Romosozumab can rarely be associated with atrial fibrillation and heart failure. Having a real-world registry of Arabic osteoporotic patients who are taking romosozumab should help study potential adverse events.

#### References:

1. Singh S et al. Osteoporos Int 2022;33:1.
2. Lv F et al. Bone 2020;130:115121.

P1156

### BODY COMPOSITION EFFECT ON THE LOW BONE MINERAL DENSITY IN CHILDREN WITH TYPE 1 DIABETES MELLITUS

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**Objective:** People with type 1 diabetes mellitus T1DM have lower BMD and greater fracture risk than individuals without diabetes. The aim of study was to investigate the association between the body composition (BC) and BMD in type 1 diabetic children.

**Methods:** We examined 34 type 1 diabetic children (17 males, 17 females, age: 14 (10;15) yrs., BMI: 18 (16;20) kg/m<sup>2</sup>. BC and BMD (L1-L4 and total body less head (TBLH)) were assessed with DXA Stratos DR; body size corrections were made by dividing by height squared (kg/m<sup>2</sup>) giving fat mass index (FMI) and appendicular lean mass index (ALMI). Statistical processing was performed using the program Statistica 10.0.

**Results:** We received following median values: BMD L1-L4 0.677 (0.564;0.826) g/cm<sup>2</sup>, BMD TBLH 0.775 90.625;0.905) g/cm<sup>2</sup>, FMI 5.65 (4.6;7.6) kg/m<sup>2</sup>, ALMI 5.1 (4.3;5.5) kg/m<sup>2</sup>, square of the visceral adipose tissue 65 (50-90) cm<sup>2</sup>. BMI was equal in women vs. men, but FMI (U=62.5, p=0,004) and visceral fat were higher in women (U=87, p<0,047). BMD L1-L4 showed a statistically significant tendency of correlation with BMI (0.554 p=0,007) and ALMI (0.812 p<0,0001). The low BMD (Z-score $\leq$ -2) was found in 6 children with T1DM. When assessing the relationship between the low BMD and ALMI no statistical significance was established. The presence of low BMD in children was associated with higher FMI (U=33.5, p=0,023) and the square of the visceral adipose tissue (U=22.5, p=0,005). There was no statistically significant correlation between low BMD and ALMI (-0.019, p<0,912). Low BMD showed a statistically significant tendency of correlation with FMI (0.397 p=0,019) and visceral adipose tissue (0.485 p=0,004).

**Conclusion:** Increase of FMI and square visceral adipose tissue was a negative predictor for low BMD. Visceral adiposity has been associated with greater marrow fat and may represent potential mechanisms for the probable effects of diabetes on bones. A larger study had to be performed to confirm these data.

## P1157

### THE BONE DENSITY EVALUATION DURING PREGNANCY AND LACTATION IN RHEUMATIC PATIENTS

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**Objective:** Pregnancy has an impact on the mother's physical health since it increases the risk of musculoskeletal pain, osteoporosis, and vertebral fracture. Prenatal and lactation osteopo-

rosis is still a poorly understood condition that has a significant influence on women during a challenging period. Moreover, the majority of rheumatic diseases are another risk factor for adverse pregnancy outcomes and articular pain both during pregnancy and after delivery. The objective of this study was to evaluate the prevalence of pregnancy and lactation related back pain and osteoporosis in a rheumatology department.

**Methods:** In this cross-sectional retrospective study were enrolled 63 patients with rheumatologic disorders (rheumatoid arthritis (AR), psoriatic arthritis (PsA), ankylosis spondylitis (AS) and antiphospholipid syndrome (APS) who got pregnant and had a live birth delivery between 2015-2022, from a rheumatology department in Romania.

**Results:** From 63 patients, 46 were diagnosed with AR, 4 with PsA, 10 with AS and 3 with APS. The lactation period had an average of 76.5 weeks. Back pain was evaluated during pregnancy and during lactation. In the first trimester 44.4% reported the presence of back pain, 31.7.0% in the second trimester, 82.5% in the third trimester and 88.9%, post-partum during lactation. The bone density was evaluated by osteodensitometry post-partum for 56 patients and the Z-score had a mean of -1.6. The rate of osteoporotic patients was 7.9% during lactation. All patients had vitamin D supplementation during pregnancy and during postpartum period.

**Conclusion:** Our study reveals a high rate of back pain among pregnant rheumatic patients, but a low osteoporosis frequency.

## P1158

### OSTEOMALACIA RELATED TO BARIATRIC SURGERY: HOW FREQUENT IS IT?

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**Objective:** Osteoporosis (OP) is a documented complication of bariatric surgery (BS). Nevertheless, these subjects can also develop osteomalacia (OM). Differentiation between OP and OM is crucial since different therapeutic approaches are necessary. We aimed to analyse the prevalence of OM and the main clinical characteristics of subjects with previous BS.

**Methods:** Retrospective study of a cohort of 46 subjects referred to the Rheumatology Dept. for evaluating OP treatment. Clinical data were obtained from medical records, including type of BS, time since surgery, previous treatment, clinical, and laboratory, radiologic and densitometric findings. OM was diagnosed by compatible bone biopsy and/or Bingham and Fitzpatrick criteria<sup>1</sup> (2 of the following: low calcium, low phosphate, elevated total alkaline phosphatase [TAP] or suggestive radiology).

**Results:** 5 of the 46 patients presented OM criteria, two confirmed by bone biopsy. All subjects with OM were Caucasian and mostly women (4/5). These 5 patients presented increased serum TAP values and most showed low serum calcium (4/5) and vitamin D serum levels. PTH levels were increased in all 5 subjects. Bone

scan showed a pattern compatible with OM in all the subjects evaluated (4/4) and bone densitometry values were compatible with densitometric OP in 4/5. In 2/5 cases higher doses of calcium (3 g/d) and/or parenteral vitamin D administration were necessary to achieve serum vitamin D levels >30 ng/ml and decrease serum PTH levels.

**Conclusion:** Nearly 10% of subjects with previous BS referred for OP treatment may have OM. Increased serum TAP values should alert clinicians, since OM requires a different therapeutic approach and some patients may need high doses of calcium or even parenteral vitamin D supplementation.

**Reference:** 1. Bingham CT, Fitzpatrick LA. Am J Med 1993;95:519.

## P1159

### THE INFLUENCE OF DIABETES ON ELDERLY POPULATION WITH OSTEOPOROSIS

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**Objective:** Osteoporosis is a systemic disease that is more common in postmenopausal women and causes increased bone fragility, making the patients more vulnerable to fracture. Furthermore, diabetes mellitus, another common condition, especially in elderly, increases the risk of fractures. The purpose of this study is to evaluate the characteristics of osteoporotic patients with diabetes compared with those without.

**Methods:** In this cross-sectional observational, pilot study, we enrolled 10 patients with osteoporosis and diabetes mellitus (OS-DM) and 10 patients with osteoporosis without diabetes (OS), evaluated in a rheumatology center in Romania, from January 2022 to January 2023.

**Results:** The median age of the OS-DM group was higher than OS group (69 vs. 65 years old). In the OS group all the subjects were females, while in OS-DM there was a male enrolled. All diabetes patients were diagnosed with DM type II, before osteoporosis. The rate of secondary osteoporosis was comparable between the two groups (30.0% vs. 40.0%). BMI was greater for OS-DM patients, while the majority of OS patients had a BMI score in the healthy weight range (30.15 vs. 21.65 kg/m<sup>2</sup>). Five of the 10 patients (50.0%) with OS and DM were diagnosed with shoulder adhesive capsulitis, and two of the patients (20.0%) had Charcot foot. Femoral neck T-score was registered for all patients, with a lower mean for OS-DM group (-2.7 vs. -2.0). The prevalence of fracture was 80.0% for OS-DM group, while 70.0% suffered a fracture in OS group.

**Conclusion:** Patients with diabetes mellitus and osteoporosis had lower bone density, and higher rate of fracture.

P1160

### BALLOON-KYPHOPLASTY IN THE TREATMENT OF OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURES (VCF): OLD RESULTS IN A NEW LIGHT

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**Objective:** The current DVO guidelines 2017/2019 (currently version 2023 in preparation) states: Kyphoplasty and vertebroplasty show an analgesic effect, especially in fresh Vertebral fractures (VAS >5). However, the analgesic effect size of both methods is not consistent. Long-term results on benefits and risks are insufficient. Both methods are lumped together and not a word is mentioned about the possibility of re-erection of a fractured vertebral body by balloon kyphoplasty. Against the background of the DVO guidelines 2023, which are currently being prepared, older research results will be discussed again in an updating.

**Methods:** From May 2001 - Oct. 2003 a total of 85 vertebrae were treated in 54 patients (48 women, 6 men, mean age 72 years). These 85 vertebrae can be divided into 49 with acute fractures (AF, operation less than four weeks after fracture) and 20 subacute fractures (SAF, operation from four to eight weeks after fracture). From these 54 patients, 11 had adequate trauma, 15 had a non-adequate accident and 28 had spontaneous fractures. For pain-estimation we used the VAS scale, for measurement of kyphosis angle the lateral X-ray of the spine. The interval of checkup control was between 3-30 months (average 13 months). In addition, we followed the occurrence of new fractures in the adjacent vertebrae in 54 patients over 18 months depending on any additional prophylactic vertebroplasty/osteoplasty performed.

**Results:** AF- group (n=49) showed an improvement of kyphosis angle of 11.5° postoperative (p.o.) and 10.7° after 4 weeks. In the SAF -group we could see an improvement of 1.8/1.7°. Regarding the pain-score the AF-group showed the following VAS-values: 8.8 preoperative, 4.1 postoperative and 3.2 after four weeks. SAF-group showed: 8.3, 4.7 and 4.2. In no case did we observe any disturbance of wound-healing. Leakage of cement oc deckplattennah cured in 12 cases (14% of 85), in only one case a radiculopathy (1.2% from 85 vertebrae, 1.85% from 54 patients). In the 54 patients followed up for 18 months, no neighbouring fractures occurred when the non-fractured neighbouring vertebrae were reinforced with bone cement by vertebroplasty/osteoplasty immediately during initial treatment. in the case of a cover plate fracture in the cranial vertebral body near the base plate, in the case of a base plate fracture in the caudal vertebral body near the cover plate.

**Conclusion:** 1. Fresh osteoporotic vertebral fractures can be well restored within the first 4 weeks after fracture. 2. Subacute fractures don't allow such a good improvement of the angle of kyphosis. 3. In both cases good pain relief is possible. 4. The complications occurred during the first month using this method,

in other words within the learning phase. Therefore a good training is necessary. 5. In some cases new fractures occurred in the vertebrae close to the operated segment. 6. Our two years experience shows that endangered, adjacent segments should also be treated prophylactically with vertebroplasty/osteoplasty. 7. The Balloon-kyphoplasty procedure is a very safe therapy option in the treatment of the acute vertebral fracture. 8. Furthermore, osteoporotic patients, with fractures must also be treated with changes in their nutritional behaviour, movement therapy, evidenced based medical therapy (modern bisphosphonates, SERMs, PTH, romosozumab, calcium and vitamin D) as well as psychological care. 9. From our experiences with balloon-kyphoplasty we conclude that there is no indication for vertebroplasty (high pressure and high rate of complications) in the treatment of VCF.

P1161

### CHALLENGES IN THE MANAGEMENT OF SPINE PAIN IN ELDERLY PATIENTS WITH MULTIPLE COMORBIDITIES

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**Objective:** Spine pain, especially the lumbar spine pain is a major public health problem due to the social implications determined by morbidity and absence from the workplace. Lumbar pain implies a very high social cost of both medical and surgical treatment (up to 50 billion dollars per year in Great Britain). Lumbar disc herniation is the main cause of cessation of the activity of young people in the field of work, according to the WHO. In the last decades, the progress registered in the field of medicine together with other social and economic improvements have brought an important increase in life expectancy worldwide, both in developed countries and in those with middle incomes. The most frequently encountered diseases in the elderly population are represented by neurological pathology followed by osteoarticular and cardiovascular pathology.

**Methods:** We will present the case of a 78-year-old patient, known to be hypertensive, with diabetes mellitus type 2, bilateral knee arthroplasty and osteoporosis, who was investigated in our hospital for the persistence of the following complaints: mixed pain of moderate intensity at the level of the cervico-lumbar spine, painful left shoulder, antalgic gait.

**Results:** physical examination at admission highlights the following pathological elements: BMI=35.1; postoperative scar on the bilateral knees of normal appearance, knee mobility within normal limits, augmentation of cervical lordosis, flat lumbar spine, painful flexion/extension of the cervico-lumbar spine, sensitivity to percussion of the lumbar spinal apophyses, cervical and lumbar paravertebral contracture, no motor deficit, limited left shoulder joint movement (abduction=90°, flexion 90°, RI-police at L5). Biologically: non-specific inflammatory syndrome, hyposideremia, hypercholesterolemia, microscopic hematuria. Imaging tests: cervico-dorso-lumbar polydiscopathy, cervico-dorso-lumbar

spondylarthrosis, C4 spondylolisthesis grade II, osteoporotic appearance, left shoulder arthrosis, bilateral total knee arthroplasty of normal appearance. DXA-osteoporosis. Drug treatment was initiated: analgesics, anti-inflammatory, vitamins, anti-osteoporotic, recovery treatment: anti-algesic electrotherapy, physical therapy, thermotherapy. Neurosurgeon considered that this particular patient was not proper for neurosurgical intervention, based on his clinical status.

**Conclusion:** In recent years, the number of known patients with spinal pain has increased, the mechanism of rachialgia being intensively researched. The multidisciplinary medical team, the judicious approach to each individual case and the establishment of effective therapeutic strategies have the effect of alleviating the patients' suffering in the shortest possible time, reducing the financial impact at the macroeconomic level.

## P1162

### COVID -19: CAUSE, TRIGGER OR INOCENT BYSTANDER TO ANCA- POSITIVE VASCULITIS? CASE SERIES

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**Objective:** COVID 19 pandemic radically changed our lives: a new disease with a multisystemic involvement and an unpredictable course and consequences, as seen in the huge number of specific medical reports and studies. We aimed to examine the cases with ANCA- positive vasculitis from our center and their relationship with SARS-Cov-2 vaccination and/or infection.

**Methods:** A retrospective observational study on the ANCA-positive vasculitis cases treated in the last 3 years (march 2020-february 2023) in a single rheumatology tertiary center in Romania.

#### Results:

Case 1: male, 72 years old, controlled high blood pressure, long COVID, new onset vasculitis with pulmonary, neurological, cardiac, renal involvement, dialysis deceased.

Case 2: woman, 56 years old, vasculitis relapse with ophthalmologic involvement

Case 3: woman, 35 years old, vasculitis relapse after COVID-19, with neurologic and renal involvement, remission re-induced

Case 4: woman, 62 years old, vasculitis relapse with neurologic involvement

Case 5: woman, 32 years old, newly onset vasculitis with pulmonary involvement, successfully induced remission

Case 6: women, 72 years old, vasculitis in remission under low-dose immune suppression, new pulmonary bacterial infection, admission postponed due to pandemic wave, severe lethal course

Case 7: woman, 32-34 years old, newly onset vasculitis with pulmonary regressive involvement and renal progressive course to permanent dialysis

Case 8: woman, 59 years old, vasculitis in remission, relapse, cutaneous necrosis, remission re-induced

**Conclusion:** SARS-CoV-2 infection may act as a severe vascular inflammatory cause for ANCA-positive vasculitis, as an auto-

immunity trigger, or as an obstacle in the medical examination and decision-making as well. Our cases are concordant with the available updated literature. 1. During COVID-19 pandemic, ANCA vasculitis cases were more frequent and severe. 2. Rheumatologists should be aware of the vascular pathology induced by SARS CoV-2 and of the possible new cases of subsequent vasculitis in previously healthy persons. 3. We need to carefully follow-up the patients with ANCA-positive vasculitis in any stages of disease in order to induce and maintain remission, to prevent new manifestations of disease, and to promptly treat any acquired infections.

## P1163

### PHYSICAL ACTIVITY ASSESSMENT IN TUNISIAN PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** Nowadays, the positive effect of physical activity (PA) in osteoarthritis (OA) is well documented and recent guidelines on exercise prescription were set. However, maintaining a physically active lifestyle remain a challenge for people with OA. The main objective of our study was to assess the level of PA in Tunisian patients with knee OA.

**Methods:** We conducted a cross-sectional study, carried out in the Rheumatology Dept., involving patients with knee OA. Socio-demographic and clinical data were collected. PA was assessed using the Global Physical Activity Questionnaire (GPAQ) developed by the WHO To analyse data in the GPAQ, metabolic equivalents (METs), were used to express the intensity of the PA. Responders were considered not meeting WHO recommendations if the total physical activity MET minutes per week was less than 600. WOMAC has also been used to evaluate pain, stiffness and physical disability.

**Results:** Thirty patients, 3 men (10%) and 27 women (90%) with a mean age of 63.5 years [40-81] were included. The mean disease duration of OA was 7 years [1-18]. 11 patients (36.8%) didn't have a remunerated job, 10 (33.3%) were retired and 8 (26.7%) practiced a job requiring high strength. 18 patients (60%) were literate. The mean BMI was 28.7 [19.3-36] and the mean Lequesne index was 7.16 [1-14]. The mean total WOMAC score was 44.32/96. The mean total PA was 14887 MET-min/week [1560-36960] reflecting a high, medium, and low level of activity for 21 (70%), 6 (20%) and one (3,3%) patient respectively. All patients have responded to WHO recommendation. The mean number of min/d spent in work, transport and leisure was 283.13, 26.38 and, 18.03 respectively. The mean number of minutes spent in sedentary activities was 203.28. Age ( $r=-0.2$ ;  $p=0,3$ ) and BMI ( $r=-0.1$ ;  $p=0,4$ ) were not correlated to the level of PA. There was also no significant association between PA level and Lequesne index ( $p=0.8$ ) and WOMAC score ( $p=0.5$ ) respectively.

**Conclusion:** PA in Tunisian patients with knee OA was significant-



ly high in terms of number of minutes as well as energy expenditure. Strategies including therapeutic patient education as well as information of rheumatologist about different programs is important to promote and spread PA.

P1164

### OSTEOPOROSIS IN YOUNG ADULT: CASE OF BILATERAL FEMORAL NECK FRACTURE

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**Objective:** Osteoporosis is a condition characterized by decrease in bone mass and alterations in normal bone architecture that could lead to fractures. It's maybe idiopathic or secondary to drugs or metabolic conditions.

**Case report:** Male 49 years, former volleyball player, presents in emergency department with right hip pain after minor trauma and inability to walk. The patient has no past record of medical disorder or drug abuse. It was diagnosed femoral neck fracture. The patient submitted to an osteosynthesis with DHS. Because of the fact that patient has femoral neck fracture in young age and history of low energy trauma, we conducted a medical and laboratory evolution to exclude secondary cause of osteoporosis. The patient was diagnosed with thyroid nodule and hypothyroidism and alterations of serum calcium and vitamin D levels. The patient operated by general surgery. A partial thyroidectomy was performed and the patient was treated with calcium and vitamin D. The fracture on the right hip has consolidated uneventful. During the follow-up assessment as external patient, the patient begins complains of pain on the contralateral side with no trauma history. The X-rays was normal. CT scan e MRI showed fracture proximal femur and the patient was treated with surgery on his left hip (osteosynthesis).

**Conclusion:** Proximal femur fractures context of osteoporosis represents a challenge in diagnosis and proper treatment. To make the right diagnosis, its necessary high index of suspicion. These lesion need to be managed we a multidisciplinary team in order to preserve the patient autonomy and quality of life.

P1165

### CORRELATION BETWEEN ADMISSION HAEMOGLOBIN AND SARC-F IN OLDER PATIENTS HOSPITALISED WITH ACUTE MEDICAL ILLNESS

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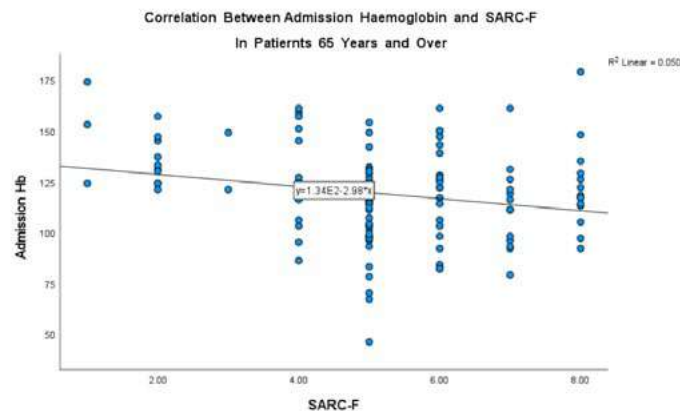
**Objective:** Low haemoglobin (Hb) is associated with adverse outcomes including increased risk of delirium, falls, length of stay,

readmission rate, and mortality. Anaemia was shown to be significantly associated with Sarcopenia. Sarcopenia, as a geriatric syndrome, is also associated with increased risk of cognitive impairment, functional decline, falls, fractures, hospitalization, institutionalization and all-cause mortality. SARC-F is a screening tool used to identify patients at risk of sarcopenia. Aims: 1. to explore the relationship between admission Hb and SARC-F in older hospitalized patients admitted with acute medical illness to elderly care wards; 2. to assess the role of gender in this relationship.

**Methods:** A cross-sectional, retrospective observational study of older patients admitted with acute medical illness to elderly care wards. Consecutive patients 65 years and older in a 2-month period were included. Patients with incomplete data were excluded. The Hb was done on admission as part of the routine investigations and the SARC-F questionnaire was obtained from interviews with patients or their family by the occupational therapists during the patients' hospital stay. SPSS IBM 29 software was used for statistical analysis. Descriptive statistics was used to determine baseline characteristics. Pearson's correlation coefficient and linear regression were used to calculate correlation.

**Results:** A total of 118 patients were included in the analysis; 62 males and 56 females, with median age of 79.4 years (IQR 11) and 83.5 years (IQR 12) respectively. There was a statistically significant inverse relationship between admission Hb and SARC-F in all patients and in males but the relationship was not statistically significant in females ( $r=-.224$ ;  $p=.014$ ,  $r=-.288$ ;  $p=.026$ , and  $r=-.116$ ;  $p=.39$  respectively).

**Conclusion:** There was significant inverse correlation between admission Hb and SARC-F, which was present in males but not in females. Larger studies are required to verify these findings and to explore the reason that the correlation has been stronger in males than in females.



P1166

### PREDICTING TRABECULAR BONE SCORE (TBS) USING AGE, BMI, AND SPINE T-SCORE: INSIGHTS FROM A DXA STUDY

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**Objective:** This retrospective study aimed to analyze the performance of TBS and T-scores in predicting bone density in a multi-ethnic female patient population.

**Methods:** Data from approximately 278 patients who underwent DXA scan from 2019 to 2021 June was analyzed by SPSS 29. Independent t-test and one-way ANOVA analysis were applied as indicated. In addition, TBS was calculated. The study assessed several variables, including age, BMI, TBS T-score, spine T-score, femur T-score, and 1/3 Forearm T-score, in accordance with the WHO guidelines.

**Results:** The results showed that there were significant differences in TBS T-score among ethnic groups in females. TBS T-score was predicted by age, BMI, spine T-score but not by femur or 1/3 forearm T-scores. TBS T-score in black vs. Hispanics showed a significant difference ( $P < 0.004$ ). Spine T-score in black vs. Hispanics ( $P < 0.001$ ), white ( $P < 0.006$ ) and others ( $P < 0.001$ ) were different. Forearm T-score in black vs. Hispanics ( $P < 0.001$ ), white ( $P < 0.004$ ) and others ( $P < 0.002$ ) were different. Femur T-score in black vs. Hispanics ( $P < 0.021$ ), and white ( $P < 0.011$ ) were different.

**Conclusion:** The findings suggest that ethnic differences play a role in bone density. This study highlights the need for continued research into the usefulness of TBS in predicting bone health particularly in diverse patient populations.

P1167

### EVALUATION PAIN INTENSITY IN COMPLEX REGIONAL PAIN SYNDROME BY INFRARED THERMOGRAPHY

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**Objective:** Complex regional pain syndrome type I is characterised by continuous regional pain and abnormal changes in skin

temperature of the affected region. The aim of this study is to examine the correlation between the values of the regional hyperthermia of the affected extremity and the intensity of pain in the patients with unilateral complex regional pain syndrome.

**Methods:** The prospective randomized study included 24 patients diagnosed with unilateral complex regional pain syndrome type I after ankle fracture, that had been diagnosed clinically on the basis of the modified research diagnostic criteria defined by the Budapest consensus group. The intensity of pain at rest as well as pain intensity during active movements was measured by visual analogue scale (VAS). Infrared thermovision camera (Varioscan high resolution 3021) recorded the symmetrical regions of interest in lower extremities (ROIs). Quantitative analysis of the obtained thermograms was calculated the values of the regional hyperthermia of the affected extremity ( $\Delta T_{max}$ ) as the temperature difference in maximal temperature values between ROIs of unaffected and affected lower extremity. The correlation of the values of the regional hyperthermia with the intensity of pain was then determined.

**Results:** Significant and strong correlation was found between values of regional hyperthermia and pain intensity at rest ( $r = 0.858$ ;  $p < 0.001$ ), as well as pain intensity during active movements ( $r = 0.871$ ;  $p < 0.001$ ).

**Conclusion:** In patients with unilateral complex regional pain syndrome, the values of regional hyperthermia of the affected lower extremity are correlated with pain intensity.

P1168

### OSTEOPOROSIS IN ADULTS WITH AXIAL SPONDYLOARTHRITIS

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**Objective:** Osteoporosis (OP) is common in ankylosing spondylitis, related to both systemic inflammation and decreased mobility. Vertebral fracture risk is increased. Most of the studies show that patients with axial spondyloarthritis (axSpA) have a higher prevalence of OP than that expected in the general population. We performed a transversal, descriptive, observational study on osteoporosis (OP) in adults with axSpA.

**Methods:** We performed a monocentric observational, transversal study involving patients fulfilling ASAS spondyloarthritis classification criteria followed in a Rheumatology Unit, in Portugal, between 2011-2022. We used the database retrospectively collecting axSpA related variables (sociodemographic and clinical variables) including biological parameters. Bone health parameters were added including DXA, presence for syndesmophytes, history of fragility fractures and anti-osteoporotic treatment. OP was defined by a femoral or lumbar spine T-score below -2.5 and/or history of main osteoporotic fracture and/or prescription of anti-osteoporotic drugs.

**Results:** A total of 43 patients (22 female (51.2%); 21 male (48.8%))

took part in the study with a mean age of  $52.19 \pm 10.9$  years and disease duration  $6.69 \pm 8.9$  years. BMI median was  $26.84 \text{ kg/m}^2$ . Regarding disease-modifying antirheumatic drugs, only 1 patient (2.33%) was under methotrexate. 21 patients (48.84%) were on biologics. 5 patients (11.63%) were smokers. The 2 most prevalent comorbid conditions were hypertension and obesity (each with 11 and 9 patients, respectively). Vitamin D levels (T0) were lower ( $19.54 \text{ ng/ml}$ ) than the normal range ( $>30 \text{ ng/ml}$ ). Bone density was assessed by DXA at the lumbar spine and femoral neck in 10 patients (26.26%). According to WHO criteria, 3 (30%) of patients displayed OP and 5 (50%) osteopenia. 3 were on anti-osteoporosis treatment. 15 patients (34.88%) were on supplementation with vitamin D, and 1 (2.33%) simultaneously with calcium plus vit. D. 2 patients had previous low impact fractures. The presence of syndesmophytes was found in 3 patients (6.99%).

**Conclusion:** Screening for OP was possible in 10 patients being followed for axSpA. Due to limited resources, access to DXA was reduced, contributing for a potential delay in diagnosing low BMD. In this 10 patients this study showed that 30% displayed OP and 50% osteopenia according to WHO criteria. The prevalence of vertebral fractures in our study was 4.65%, lower than those usually reported in the literature. The relationship between OP and vertebral fractures in axSpA needs to be established but the sample size was not large enough to enable us to draw definite conclusions.

### P1169

#### A CASE STUDY: THE IMPACT OF A 24-WEEK HOME-BASED EXERCISE INTERVENTION AND AN L-LEUCINE/VITAMIN D3-ENRICHED ESSENTIAL AMINO ACID SUPPLEMENT ON BODY COMPOSITION, MUSCLE STRENGTH AND FUNCTION IN A FEMALE WITH MULTIPLE SCLEROSIS

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**Objective:** Multiple sclerosis (MS) is associated with reductions in bone, muscle, strength, and function. The aim of this study was to investigate the effectiveness of a 24-week intervention in a 57-year-old frail female with MS.

**Methods:** The participant completed a 2x/week exercise intervention and ingested 2x/d a supplement containing 7.5g essential amino acids and 500 IU cholecalciferol. Body composition, 6-m gait speed (GS), handgrip strength (HGS), 30-s arm-curl test (30ACT), 6-min walking test (6MWT), 30-s chair-stand test (30CST), and plasma concentrations of 25-hydroxyvitamin D3 [25(OH)D3], IGF-1, and amino acids were assessed at baseline, week 12, and week 24.

**Results:** Plasma 25(OH)D3 increased from  $23.2\text{-}41.3 \text{ ng/mL}$  and

IGF-1 from  $131.6\text{-}140.7 \text{ ng/mL}$  from baseline to post-intervention. BMI, total lean tissue mass (LTM), fat mass, bone mineral content, and the sum of 17 amino acids were increased by 3.8, 1.0, 3.5, 0.2, and 19% respectively at week 24. There were clinically significant increases in regional LTM (6.9% arms and 6.3% legs), and large increases in GS (67.3%), dominant HGS (31.5%), non-dominant HGS (11.8%), dominant 30ACT (100%), non-dominant 30ACT (116.7%), 6MWT (125.6%), and 30CST (44.4%).

**Conclusion:** The current intervention was effective at improving components of physical fitness and body composition in a female with MS.

### P1170

#### ASSESSMENT OF OSTEOPOROSIS IN INFLAMMATORY BOWEL DISEASE

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**Objective:** Inflammatory bowel disease (IBD), comprising Crohn's disease (CD) and ulcerative colitis (UC), is characterized by chronic relapsing intestinal inflammation. Alterations of BMD including osteopenia and osteoporosis have been described in both types of IBD. The aim of our study is to assess the presence of BMD alterations in a group of patients with IBD.

**Methods:** The study group included 23 patients with IBD, 10 with CD and 13 with UC which had not undergone corticosteroid treatment. We evaluated the patients clinically and biologically. We evaluated the BMD using DXA of the forearm and lumbar spine.

**Results:** The mean age of the patients in the study group was  $33.2 (\pm 8.3)$  years. The mean BMD of the forearm was  $-1.2$  standard deviations (SD) ( $\pm 0.3$ ) in the CD group, compared to the UC group in which the mean BMD was  $-1.5$  SD ( $\pm 0.7$ ). The mean BMD of the lumbar spine was  $-0.7$  SD ( $\pm 0.2$ ) in the CD group, while in the UC group it was  $-0.9$  SD ( $\pm 0.5$ ).

**Conclusion:** Even though the patients were of young age, the low BMD proves that inflammatory bowel disease is a risk factor for the development of osteoporosis.

P1171

### USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE IN DEGENERATIVE RHEUMATIC DISEASES: LACK OF TRUST IN DOCTORS OR IN MEDICATIONS?

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**Objective:** Trust is an essential ingredient in patient-physician relationship. The use of complementary and alternative medicine (CAM) is frequent, raising doubts about patients' beliefs in medications and doctors. The aim of this study was to evaluate the relationship between the use of CAM and the patient's trust in their doctor and their beliefs about analgesic medication.

**Methods:** We conducted a cross-sectional study including patients with degenerative rheumatic diseases. Socio-demographic and disease data were collected. We used the Beliefs in Medicines Questionnaire (BMQ) and the Trust in Physician Scale (TPS) to assess the patients' beliefs about analgesics and their trust in their doctors. A "p" value inferior to 0.05 was considered statistically significant.

**Results:** We included 30 patients (27 women and 3 men) with a mean age of 58 years [40-81]. Almost half of patients (46.4%) were illiterate, and 92.2% lived in an urban environment. Among them, 46.7% had common low back pain, 26.7% had cervical osteoarthritis, and 33.3% had knee osteoarthritis. They were treated with paracetamol, NSAIDs and local corticosteroid injections in 100%, 85.7% and 3.6% cases, respectively. Fifty-three percent of patients used CAM at least once in their lives. They have heard of CAM from their family in 53.3% of cases, from health professionals in 33.3% of cases, and from their friends in 13.3% of cases. Among them, 33.3% used acupuncture sessions, 66.7% used herbal therapy such as rosemary, thyme, and laurel, 40% used vitamins and minerals, and 46.7% have had chelation therapy. The visual analogue scale of pain before and after using MAC is on average 6.7 cm and 5.3 cm, respectively. The mean score of TPS was 40.82/55 reflecting a high level of patients' trust in doctors. The mean score of BMQ was 32.3 indicating that patients strongly endorsed beliefs that medications are necessary for their health. There was no significant association between the use of CAM and the patients' trust in physicians ( $p=0.5$ ). In the other hand, the higher were the beliefs and the adherence to the treatment, the less patients resorted to CAM. However, this association was not statistically significant ( $r=-0.2$ ;  $p=0.4$ ).

**Conclusion:** Although most patients have already used CAM, they reported high trust in their doctors and strong perceptions of personal need for medications to maintain health.

P1172

### IMPACT OF KNEE OSTEOARTHRITIS ON FUNCTIONAL CAPACITY OF OLDER PATIENTS

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**Objective:** Knee osteoarthritis(KOA) causes a number of physical ailments, which results in the deterioration of a person's general health and reduction of their ability to move freely. The natural course of pain and the degree of physical functioning in patients with knee osteoarthritis is highly individual and variable, as the factors limiting physical activity. The aim of this study was to evaluate the functional impact of primary KOA on older patients.

**Methods:** We conducted a study including patients with primary KOA according to the American college of Rheumatology (ACR) criteria for diagnosis of osteoarthritis(OA). Sociodemographic data as well as disease characteristics were collected. The functional impact was assessed with WOMAC which is a specific and validated instrument to assess the condition of patients with osteoarthritis of the knee and hip. It is a questionnaire with 24 questions grouped in 3 dimensions: 5 questions on pain, 2 on rigidity and 17 on the degree of difficulty in performing activities of daily living. The total score varies from 0-96. The higher the score, the greater the functional impact of OA. P-values <0.05 were considered significant.

**Results:** Fifty patients diagnosed with primary KOA were included. The mean age was 71.9 years[65-84]. 47 females (94%) and 3 males (6%) were involved. Sex Ratio (M/F) was 0,06. 30 patients were illiterate (60%), 12 had primary level (24%) and 8 secondary level (16%). All patients were retired, their anterior professional activity was distributed as follows: 26 were housewives (52%), 5 had an office work (10%) and 19 had a physical labor(38%). 28 patients were married (56%), 20 patients were widower (40%) and tow patients were divorced (4%). 42 patients had blood hypertension (84%),15 had diabetes (30%) and 14 had osteoporosis (28%). 15 patients (30%) had regular physical activity. The mean BMI was 29.9±4,55. Disease duration was 8.2±7.2 years. 35 patients (70%) presented with bilateral KOA, 15 patients with one-sided KOA. 26 patients had moderate KOA (52%), while 24 had minimal KOA (48%). Analgesics, NSAIDs, slow acting anti-arthritis, intra-articular injections of steroids and functional rehabilitation were prescribed for respectively: 90%, 58%, 28%, 18% and 38% of patients. 12 patients (24%) were using a walking aid. The global WOMAC score was 49.2±21.7 [7-95]. A significant association was found between a better functional capacity and physical activity ( $p=0.017$ ), analgesic treatment use ( $p=0.017$ ), Functional rehabilitation ( $p=0.019$ ) and the use of walking aid ( $p=0.017$ ).

**Conclusion:** The functional capacity of elderly with KOA can be affected by different factors. That's why targeted management measures should be taken to reduce pain, stiffness and joint impairments frequently associated to this common condition.

P1173

**METABOLIC-ASSOCIATED FATTY LIVER DISEASE AND SARCOPENIA: A SYSTEMATIC REVIEW**S. Fouda<sup>1</sup>, J. M. Pappachan<sup>2</sup><sup>1</sup>RMIT University, Melbourne, Australia, <sup>2</sup>Lancashire Teaching Hospitals NHS Trust, Preston, UK

**Objective:** Sarcopenia is a muscle degenerative disease characterised by loss of skeletal muscle mass, strength and function. It has been linked to the metabolic syndrome and more recently to its manifestation the metabolic-associated fatty liver disease (MAFLD). Given that MAFLD and sarcopenia share numerous similar pathophysiological processes and due to scarcity of data on whether sarcopenia causes MAFLD directly/indirectly or vice versa may lead to inappropriate clinical decisions. The aim of this study is to conduct a systematic review to critically review available literature on the relationship between sarcopenia and MAFLD.

**Methods:** This systematic review is conducted according to the PRISMA (Preferred Reporting Items for Systematic Review) guidelines (Moher et al., 2009). The databases of PubMed, CINAHL and EMBASE were searched from inception to 31 December 2022 for clinical/research studies published on the association between sarcopenia combined with non-alcoholic fatty liver disease (NAFLD) or metabolic-associated fatty liver disease (MAFLD).

**Results:** A total of 386 articles were retrieved from searches of which 14 articles were included in the qualitative synthesis. The articles were of high degree of heterogeneity. Sarcopenia has been associated with advanced MAFLD-associated liver inflammation and fibrosis with a positive correlation between sarcopenia and liver histological lesions severity. In addition, the presence of sarcopenia seems to increase the risk for cardiovascular, T2DM-related, cancer and all-cause mortality in patients with MAFLD indicating the impact of sarcopenia on the metabolic consequences and outcome in MAFLD patients.

**Conclusion:** Patients with MAFLD/NAFLD should be screened for the presence of sarcopenia. In addition, further studies are needed in order to develop updated guidelines for early detection and appropriate treatment but also for better comprehension of muscle-liver interactions which will aid in development of precision medicine for optimal treatment.

**Reference:** Moher D et al. PLoS Med 2009;6:e1000097.

P1174

**CHARACTERISTICS OF PEDIATRIC PATIENTS WITH SPINAL MUSCULAR ATROPHY**M. D. Graure<sup>1</sup>, M. Monteagudo Santamaría<sup>1</sup>, A. Miras García<sup>1</sup>, M. Hinojosa Ballesta<sup>1</sup>, R. Fernandez Dios<sup>1</sup>, J. C. Hurtado Borrego<sup>1</sup>, P. Ibarrolla Izu<sup>1</sup><sup>1</sup>Virgen de la Arrixaca Hospital, Murcia, Spain

**Objective:** To describe the epidemiological, clinical and therapeutic characteristics of pediatric patients with spinal muscular atro-

phy (SMA) in our region

**Methods:** A descriptive, observational, cross-sectional study including all pediatric patients with neurophysiological and genetic diagnosis of SMA treated in our Rehabilitation Service, was carried out. Variables: demographic data, age at onset, initial symptoms, SMA type, genetics, respiratory complications, respiratory support (domiciliary oxygen therapy, noninvasive motion ventilation-NIMV, respiratory physiotherapy, mechanically assisted coughing), pharmacological treatment (intrathecal, intravenous), functional rating scale, feeding route, scoliosis, walking ability.

**Results:** 12 patients with ages between 11 months and 17 years were included. A predominance of male patients was observed (66,66%). 50% of the patients had at least one parent with different nationality other than Spanish, the most common one being the Moroccan (25%). The median age at clinical diagnosis was 4 months (75 days for SMA I and 10 months for SMA II). The most common symptoms at onset were generalized hypotonia (41,66%), growth delay (33,33%) and breathing difficulty (25%). Type I SMA was the most common in our study (66,66%). 83,33% had homozygous deletion of exon 7 and 8 of the survival motor neuron 1 gene (SMN1). All patients received daily respiratory physiotherapy. 83,33% had NIMV during the night (all SMA I and 50% of SMA II). Mechanically assisted coughing was used in 58,33% of the patients, most of them SMA I. Nusinersen treatment was used in 11 patients. Percutaneous endoscopic gastrostomy (PEG) was used as feeding route in 41,66% of the patients to prevent aspiration pneumonia due to dysphagia. Severe scoliosis was present 58,33% of the cases. No patient achieved the ability to walk.

**Conclusion:** Our study shows that SMA affects mostly male patients and with symptoms at onset as generalized hypotonia, growth delay and breathing difficulty. Respiratory treatment including intensive physiotherapy to increase airway clearance, early NIMV and mechanically assisted coughing especially in SMA I, prevents deadly complications such as pneumonia and respiratory failure. Due to early diagnosis and treatment, the survival rate and quality of life of SMA children have increased substantially.

P1175

**INACTIVATING THE GENE ENCODING PROCALCITONIN INHIBITS JOINT INFLAMMATION AND PRESERVES BONE INTEGRITY IN ANTIBODY-INDUCED ARTHRITIS**T. Maleitzke<sup>1</sup>, T. Dietrich<sup>1</sup>, A. Hildebrandt<sup>1</sup>, J. Weber<sup>1</sup>, J. Appelt<sup>2</sup>, D. Jahn<sup>2</sup>, E. Otto<sup>1</sup>, D. Zocholl<sup>1</sup>, A. Baranowsky<sup>3</sup>, G. N. Duda<sup>2</sup>, S. Tsitsilonis<sup>1</sup>, J. Keller<sup>3</sup><sup>1</sup>Charité - Universitätsmedizin Berlin, Berlin, <sup>2</sup>Julius Wolff Institut, Berlin, <sup>3</sup>Universitätsklinikum Hamburg-Eppendorf, Hamburg, Germany

**Objective:** Rheumatoid arthritis (RA) is associated with an increased risk of septic arthritis. Procalcitonin is a sensitive biomarker to detect and exclude bacterial infections in patients with rheumatic flare-ups. Beyond procalcitonin's role as a diagnostic

marker, little is known about its pathophysiological function in inflammatory joint diseases. Thus, this study explored the role of procalcitonin in experimental RA. Mice lacking procalcitonin, were exposed to collagen antibody-induced arthritis and compared to wildtype animals.

**Methods:** Collagen antibody-induced arthritis was induced in Calca-deficient mice (n=15) and wildtype mice (n=13), while control animals (n=8 for each genotype) received phosphate-buffered saline. Acute inflammatory and chronic resolution phases of experimental arthritis were assessed by monitoring animals over 10 or 48 days with daily assessments of arthritis severity and grip strength. Articular inflammation, cartilage degradation, and bone lesions were assessed by histology, gene expression analysis, and  $\mu$ -computed tomography.

**Results:** Following arthritis induction, intra-articular expression of procalcitonin and serum procalcitonin levels increased. While wildtype animals displayed a full arthritic phenotype, Calca-deficient mice showed no clinical signs of arthritis and grip strength was preserved. Decreased bone surface and increased subchondral porosity were present in arthritic wildtype mice, while mice deficient for Calca maintained bone integrity. Calca-deficient animals further showed lower histological scores for joint inflammation, cartilage degradation and bone erosion. Cartilage turnover markers and Tnfa were exclusively elevated in wildtype mice, while mice deficient for Calca showed increased levels of Il1a, Il1b and Ccl2.

**Conclusion:** The inactivation of procalcitonin signaling protected animals from joint inflammation, cartilage degradation and bone alterations when exposed to collagen antibody-induced arthritis. Together with previous findings on the role of Calca-derived peptides in experimental arthritis, these data show that procalcitonin plays a fundamental pro-inflammatory role in RA.

## P1176

### VERTEBRAL OSTEOPOROTIC FRACTURES AND INCIDENCE OF COVID-19

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**Objective:** COVID-19 is a respiratory disease, which has caused a global pandemic with a high incidence of severe illness and death. Patients with pulmonary diseases might be more susceptible for COVID-19. Osteoporosis-associated vertebral fractures of the thoracic spine are known to reduce the lung volume and vital capacity. We proposed the hypothesis that patients with vertebral fractures of the thoracic spine would experience a higher incidence of COVID-19 as compared to patients with vertebral fractures of the lumbar spine,

**Methods:** We studied 163 patients with osteoporosis and vertebral fractures (56 patients with thoracic spine fractures, 81 patients with lumbar fractures, and 26 patients with both lumbar and thoracic fractures). The data were obtained post hoc by analyzing ICD10-codes and patient records. Statistical analyses was performed by Chi-Square-Test).

**Results:** There was no significant difference of COVID-19 incidence between patients with thoracic or lumbar spine vertebral fractures. Patients with both lumbar and thoracic vertebral fractures exhibited a higher incidence of COVID-19 as compared to patients with only lumbar or thoracic spine fractures (chi-square test,  $p=0.05$ , borderline significant).

**Conclusion:** Osteoporosis patients with vertebral fractures of the thoracic spine have no increased risk for COVID-19 as compared to patients with lumbar spine fractures. However, patients with fractures located at both lumbar and thoracic spine exhibit an increased risk for symptomatic COVID-19. This may be due to a higher grade of spine deformity and thorax volume reduction, however, the higher number of vertebral fractures may represent a decreased general health status.

## P1177

### ORTHOPEDIC AIDS IN THE REHABILITATION OF PERTROCHANTERIC FRACTURES AS A RESULT OF OSTEOPOROSIS

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**Objective:** The use of orthopedic aids plays a major role during physical treatment and rehabilitation, helping patients walk and maintain balance. Orthopedic aids include crutches, walker and canes. The aim of the paper is to demonstrate the effect of the use of orthopedic aids during and after the rehabilitation of per-trochanteric fractures.

**Methods:** Patients are divided into two groups: Examined group - 45 patients treated with kinesiotherapy and magnetic therapy and control group - 45 patients treated with kinesiotherapy and therapy with interference currents. Respondents from both groups were analyzed in relation to the way of walking, where they were divided into five groups, namely: a) use of a walker; b) two crutches; c) one crutch; d) cane and e) without aid. The analysis is done at four time points, at admission, discharge, 6 months and 12 months.

**Results:** Between the two groups in the four measurement times, for  $p>0.05$ , there is no significant difference regarding the results of the physical examination for the use of a walker and cane, but there is a significant difference regarding the results for the use of two and one crutch. An analysis was made of the patients from both groups according to the way of walking after 12 months and for  $p<0.05$ , a significant difference was observed between the two groups in relation to all ways of walking and walking without an aid in addition to the examined group.

**Conclusion:** Rehabilitation and the use of orthopedic aids after a hip fracture is beneficial for the patient, his functionality and independence in daily life activities.

P1178

### BETWEEN INFLAMMATION AND BONE PROTECTION: THE DUAL ROLE OF CALCITONIN GENE-RELATED PEPTIDE ALPHA IN EXPERIMENTAL PRIMARY OSTEOARTHRITIS

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**Objective:** Calcitonin gene-related peptide  $\alpha$  ( $\alpha$ CGRP), a nociceptive neuropeptide, mediates and modulates knee pain in osteoarthritis (OA). Anti-CGRP antibodies were recently introduced for the prevention and treatment of migraine. While CGRP was previously described to be involved in neurogenic inflammation, data on a pro-inflammatory role of  $\alpha$ CGRP in inflammatory joint disease are still missing. In this study we investigated if  $\alpha$ CGRP contributes to low-grade inflammation, cartilage degradation and bone changes in a murine model of age-dependent OA.

**Methods:** Aged 16-18 months old  $\alpha$ CGRP-deficient ( $\alpha$ CGRP<sup>-/-</sup><sub>OA</sub>) and wildtype (WT<sub>OA</sub>) mice were compared to young 4-5-months old non-OA  $\alpha$ CGRP-deficient ( $\alpha$ CGRP<sup>-/-</sup><sub>CTRL</sub>) and non-OA WT animals (WT<sub>CTRL</sub>). Knee and hip joints were assessed for inflammation, cartilage degradation, and bone destruction by histology (OARSI histopathological grading), gene expression analysis, and  $\mu$ -computed tomography.

**Results:** OA-induced cartilage degradation was significantly less pronounced in  $\alpha$ CGRP<sup>-/-</sup><sub>OA</sub> animals when compared to WT<sub>OA</sub> mice.  $\alpha$ CGRP<sup>-/-</sup><sub>OA</sub> animals showed a decrease in catabolic cartilage markers *Mmp13*, *Ctsk*, *Tnfs11* (*Rankl*), and *Cxcr4* and a protection from increased levels of pro-inflammatory cytokines (*Tnfa*, *Il1b*, and *Il6*), which were elevated in WT<sub>OA</sub> mice.  $\alpha$ CGRP-deficiency was however associated with marked subchondral bone sclerosis of the medial tibial plateau and significant bone loss in the epiphyseal and metaphyseal trabecular tibial bone during age-dependent OA.

**Conclusion:** We describe a dual pro-inflammatory and bone-protective function of  $\alpha$ CGRP in murine age-dependent OA. Our data suggest that  $\alpha$ CGRP plays a relevant role in the development and progression of primary OA, but that it's indispensable to preserve bone integrity.

P1179

### ARTHRITIS OF THE LEFT KNEE JOINT AFTER SARS-COV-2 INFECTION

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**Case report:** The association between arthritis, SARS-CoV-2, and COVID-19 vaccination have been investigated and discussed in scientific literature. This is a documented case of arthritis after Pfizer vaccination without other possible causes of arthritis. A previously healthy nurse, 37 years old, who has been working in the gynecology department during five years. During the first wave of the SARS-CoV-2 pandemic, this caregiver contracted COVID-19 infection. This infection was moderate, did not required hospitalisation and was certified by a rapid diagnostic test. This patient had an isolation of 10 days. During the second wave of the SARS-CoV-2, this patient had suffered from a moderate COVID-19 infection, certified by a rapid test. Fifteen days following his infection, the patient presented inflammatory pain and effusion of the left knee. The patient was admitted to the rheumatology department because of increased pain, functional impotence, and effusion of the left knee. Performed twice, Infectious and immunological tests were negative. The diagnosis of monoarthritis post COVID-19 infection was retained (in view of a negative workup and a bibliographic search).

**Conclusion:** Monoarthritis may be either a complication of vaccination against SARS-CoV-2 infection or a symptom of CoV-2 infection. Currently, the causation between vaccination and arthritis is still difficult to establish. The diagnosis of arthritis after vaccination for the SARS-CoV-2 infection should retained after spreading all the possible causes for arthritis must be thoroughly investigated.

P1180

### IMPORTANCE OF EARLY DIAGNOSIS AND TREATMENT IN SECONDARY OSTEOPOROSIS

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**Objective:** To stand out the importance of early diagnosis and treatment in secondary osteoporosis in patient with very high and imminent risk of fracture.

**Methods:** Report of clinical case of secondary osteoporosis in a Fracture Liaison Service (FLS) consultation. We investigated a 76-year-old female patient from Spain with no drugs allergies. Personal history: arterial hypertension. type 2 diabetes mellitus. dyslipidemia; monoclonal gammopathy of undetermined significance (MGUS) IgG kappa; chronic axonal sensory-motor polyneuropathy associated to IgA kappa paraproteinemia; humerus proximal bilateral limb (HPL) in 2020. The patient was referred from Primary Care to the Locomotor Unit (August 2021) for presenting low back pain secondary to an acute D12 fracture, treated with a rigid thoracolumbar orthosis. She narrated an increase of lumbar pain without trauma for 1 month ago. She denies alarm symptoms. A lumbar spine MRI, a DXA and a bone metabolism blood test were requested.

**Results:** In the first visit to FLS (March 2022), physical examination didn't reveal neurological deficits. MRI indicated multiple compression fractures: one chronic (D12) and others acute (L2, L3 and L4). DXA revealed a low BMD: L1-L4, T-score -4.62 and

femoral neck, T-score -4.24. Blood test revealed normal parameters laboratory in calcium, phosphorus, alkaline phosphatase and PTH, but low serum levels of 25 OH vitamin D. A 10-year risk of major osteoporotic fracture of 29% and of hip fracture of 11% was obtained, using the FRAX index in Spanish. Treatment was started with denosumab 60 mg, cholecalciferol 25,000 UI, calcium/vitamin D and tapentadol 100 mg. The follow-up was at 3 months (May 2022). It was decided to remove the orthosis and she was included in physiotherapy treatment with the aim of instructing in exercises to strengthen and make the spine more flexible.

**Conclusion:** Secondary osteoporosis induced by MGUS deserves clinical attention. An early identification and treatment is important in order to prevent fractures. We should pay special attention in the 2 years following a fracture, since there is an imminent risk of a new fracture.

## P1181

### DIAGNOSTIC DELAY OF SPONDYLOARTHRITIS

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**Objective:** To assess the diagnostic delay in spondyloarthritis (SpA) and to identify factors associated with it.

**Methods:** We conducted a retrospective study including patients with a diagnosis of SpA according to ASAS 2009 criteria. The diagnostic delay was defined as the time between symptom onset and a diagnosis of SpA. Data were collected from files of patients followed for SpA over a period of 7 years. Univariable and multivariable linear regression analysis was performed to explore factors associated with the diagnostic delay with a focus on epidemiological characteristics, clinical and biological presentation and sacroiliitis.

**Results:** A total of 130 patients with a diagnosis of SpA were included, 76 males (58.5%) and 54 females (41.5%) with a sex ratio of 1.4. The mean age at the diagnostic was 35.1±12.6 years and the mean age at symptom onset was 28.2±11.8 years. HLAB27 status was available for 14.6% of patients and was positive in 52.6% of these cases. The mean duration of symptoms was 11.5±9.6 years and the average time from initial symptoms to diagnosis was 6.7±8.7 years with a median of 3.0 years. Univariable linear regression showed that younger age at symptom onset ( $p=0.004$ ), current smoking ( $p=0.02$ ), early-onset arthritis ( $p=0.04$ ) and the presence of uveitis ( $p=0.05$ ) were associated with a longer diagnostic delay. Multivariable linear regression analysis confirmed the significant association of the mentioned factors with a diagnostic delay except for uveitis. There was no statistically significant association between the delay of diagnosis and gender, HLAB27 status or sacroiliitis.

**Conclusion:** The diagnostic delay in SpA is still unacceptably long. Younger age at symptom onset, current smoking and early-onset arthritis were factors associated with an increased diagnostic delay in the studied population.

## P1182

### THE ORTHOGERIATRIC UNIT AT SAN GERARDO HOSPITAL: REFLECTIONS FROM AN ITALIAN CO-MANAGED EXPERIENCE

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**Objective:** In 2007, perceiving the need of a co-managed approach for providing care to elderly patients experiencing fragility fractures, we established an Orthogeriatric Unit (OGU) at San Gerardo Hospital in Monza, Italy. From 2007-2017 this unit provided multidisciplinary care to more than 1400 patients. The aim of this study is to describe and review the characteristics and activity of our OGU, discussing the reasons that made it a reference center for hip fracture care in Italy, its strengths and flaws, and future directions in terms of research and clinical improvement.

**Methods:** The OGU consisted in a 6-bed unit within the Acute Geriatrics Unit, dedicated to the care of patients experiencing hip fracture. The geriatrician acts as the primary attendant, while the orthopedic surgeon, anesthesiologist, specialist in rehabilitative medicine and physical therapists act as consultants. Among all hip fractures diagnosed in the Emergency Room, the most complex patients are admitted to the OGU according to the following criteria: age  $\geq 70$  years, femur fracture, and at least one among  $\geq 2$  comorbidities, polypharmacy, pre-existing cognitive or neuro-motor impairment, inadequate nutrition and hydration, and lack of social support. Each patient is assessed within 48 hours from admission collecting information belonging to different domains (comprehensive geriatric assessment).

**Results:** During the study period, the OGU admitted 1421 patients (76.5% females), with a mean age of 84.4 years. The mean length of stay was 11.2 days. Among complications, acute infections occurred in 7.8% of patients during hospitalization, while anemia requiring blood transfusion occurred in 27.1% of them. The in-hospital mortality rate was of 1.3%. Interestingly, the mean age of the treated population increased almost every year steadily.

**Conclusion:** During the years of activity of the OGU we collected data that allowed us for a continuous improvement of the care protocols thanks to regular internal audits. The pandemic period, which started in March 2020 with a huge demand of bed-space for SARS-CoV-2 patients, showed us the sustainability limits of this model. Since then, our model of care has been adapted and transformed into an orthogeriatric daily consultation care program and developed a follow-up dedicated to promote functional autonomy and the compliance to anti-osteoporotic treatment.



P1183

**ANALYSIS OF A POPULATION OF PATIENTS WITH HIP FRACTURE IN ARGENTINA**M. C. Tibaldo<sup>1</sup>, S. Giordano<sup>1</sup>, M. González Pernas<sup>1</sup>, V. Longobardi<sup>1</sup>, M. B. Zanchetta<sup>1</sup><sup>1</sup>Instituto de Investigaciones Metabólicas (IDIM), Buenos Aires, Argentina

**Objective:** Hip fracture (HF) represents an important comorbidity, especially in elderly patients. A history of osteoporosis is one of the most important risk factors; however, its definition by densitometry alone would be insufficient for the assessment of this risk. The objectives of the study were to describe the clinical characteristics and risk factors associated with HF in a local population.

**Methods:** Retrospective descriptive study of a population of patients over 18 years of age with a diagnosis of HF evaluated at the Institute of Metabolic Research in Buenos Aires, Argentina, during the period 2012-2022. HF secondary to neoplasms, traffic accidents or atypical femoral fractures and pregnant women were excluded.

**Results:** 80 patients with HF were included, of which 77 (96.3%) were women, the mean age was 73.7 years (interquartile range 25-75%: 66-80 years). The most frequent site was the femoral neck (n=74, 92.5%), and the left side (n=44, 55%). Of the total number of patients, 31 (38.8%) had a history of previous bone fracture, 20 (64.5%) of them more than one. The most frequent sites of previous bone fracture were vertebral (n=14, 45.2%), wrist (n=12, 38.7%), and hip (n=8, 25.8%). The HF occurred secondary to a fall from one's own height in 70 (87.5%) cases, of which 41 (58.6%) were at home. Most of the HF occurred in autumn (n=28, 35.4%) followed by spring (n=22, 27.8%) and summer (n=19, 24.5%). In the peri HF period, 62 patients had trabecular bone densitometry (of which 41.93% were in the osteoporotic range and 37.1% osteopenia) and 54 patients of cortical bone (of which 50% were in the osteoporotic range and 48.1% osteopenia). Of the total number of patients, 44 (55%) had previously received treatment for osteoporosis. The treatments used by these patients were 36 (81.8%) bisphosphonates, 12 (27.3%) with denosumab and 1 (2.3%) teriparatide. 17 HF occurred while on treatment. The time of prior bisphosphonate use was 44.7 months (interquartile range 25-75% 13.5-60 months).

**Conclusion:** Among the patients with HF, half had a history of hip osteoporosis and close to a third were undergoing treatment at the time of the fracture, with falling from their own height at home being the main mechanism.

P1184

**DIABETES AND OBESITY AS RISK FACTORS FOR OSTEOPOROSIS: A CASE REPORT**A. Mediolini<sup>1</sup>, S. Collu<sup>1</sup>, S. Orsucci<sup>1</sup>, N. Loubadi<sup>1</sup>, G. Civardi<sup>1</sup><sup>1</sup>Clinica Sant'Antonino, Piacenza, Italy

**Objective:** Some recent epidemiological and clinical studies have shown that high levels of fat mass, especially in the abdomen, can be a risk factor for low BMD, and for fragility fractures. When you put fat at the level of the muscle fascia, there is consequently a decrease in the strength of the muscles that act at the level of the bones. This results in a decrease in the fraction of muscle on bone. For this reason, it is easier to have osteoporosis problems since it is the muscle that binds to the bone that increases the tension and consequently strengthens it. Furthermore, vitamin D, which is a fat-soluble vitamin (i.e. it has a high affinity for fats) is more easily absorbed by fat mass than by muscle mass. For this reason, if a subject has a high fat mass, it is easy for him to have a vitamin D deficiency, which in turn leads to bone demineralization

**Methods:** The data taken from the international literature were compared with a case of a patient who came to our observation for anatomical neck fracture of the right proximal humerus, left patella fracture due to accidental fall in a diabetic patient with abdominal obesity

**Results:** The patient had no risk factors other than obesity and diabetes. The patient is female 72 years old. Remote history arterial hypertension in good compensation. Previous cholecystectomy and appendectomy. At the time of hospitalization BMI 36.2; natural menopause at 54 years old. Not addicted to alcohol or smoking, not a coffee consumer, does not take steroid therapy. She reported eating a varied diet and having normal physical activity before the fall. In addition to analyzing lifestyle habits, we have also analysed blood chemistry values showing: albuminemia 48.6%; PTH 63.3 ng/ml; calcium 8.95 mg/dl; vitamin D(25-oh) 12.5 ng/ml. The patient had also fallen accidentally a few years earlier causing a previous fracture. She also performed in recent months on BMD which showed initial signs of osteoporosis

**Conclusion:** The decrease in vitamin D and the decrease in muscle strength on the bone are situations in which, where there is a high fat mass, due to the reduction in muscle strength, bone strengthening is also reduced, favoring the onset or progression of osteoporosis with a consequent increased risk of fracture. The case analyzed here agrees with what is reported by the international literature.

P1185

**RELATION BETWEEN SUBCLINICAL ULTRASONOGRAPHIC CHANGES OF THE ANTERIOR CHEST WALL JOINTS AND RESTRICTIVE PULMONARY FUNCTION TESTS IN ANKYLOSING SPONDYLITIS PATIENTS**E. Abdelrahman<sup>1</sup>, M. Mortada<sup>1</sup><sup>1</sup>Zagazig University/ Rheumatology and Rehabilitation, Zagazig, Egypt

**Objective:** Anterior chest wall (ACW) joints may be involved during the course of ankylosing spondylitis (AS), and this can affect the chest expansion and pulmonary function tests to a various degree. Ultrasonography can detect subclinical ACW changes. We aimed to detect the relation between ultrasonographic changes of

asymptomatic ACW joints in patients with AS pulmonary function tests (PFTs) and chest expansion.

**Methods:** The study included 88 sternoclavicular joints (SCJ) and 44 manibrusternal joints (MSJ) in 44 subjects (22 AS and 22 control). None of the participants had a history of respiratory complaints such as dyspnea, chronic cough, or chest pain. high resolution computed tomography (HRCT) was done on the chest to exclude interstitial lung problem that may affect chest expansion and PFTs. Ultrasound (US) assessments were performed to detect synovitis, erosions, ankylosis, osteophytes, or doppler signals. Chest expansion was measured. PFTs was done and included measurement of the forced expiratory volume in 1 s (FEV1), forced vital capacity (FVC), and the ratio of forced expiratory volume in 1 s to the forced vital capacity (FEV1/FVC). In AS group, Ankylosing Spondylitis Disease Activity Score (ASDAS), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and Bath Ankylosing Spondylitis Functional Index (BASFI) were recorded.

**Results:** US detected subclinical changes of ACW joints in (77.3%) of AS patient with significant difference between total US changes in AS (77.3%) and control (21.2%) ( $p < 0.001$ ). MSJ ankylosing was highly associated with limited chest expansion in AS group ( $P < 0.001$ ). PFTs found restrictive in 14 AS patient (63.6%) and was associated with SCJ synovitis ( $p = 0.03$ ), SCJ PD activity ( $p = 0.03$ ), SCJ erosions (0.05) and highly associated with MSJ ankylosing ( $p < 0.001$ ). All AS patients (100%) with ankylosed MSJ by US had limited chest expansion and restrictive PFTs. In AS group, ultrasonographic changes and restrictive PFTs were found to be higher with older age, male sex, smoking, longer disease duration and high BASDAI and BASFI.

**Conclusion:** Our study demonstrated that Ankylosing of the MSJ is highly associated with limited chest expansion and restrictive PFTs in AS patients. Our data suggest that US is a highly valuable tool as well as PFTs for detecting early changes in ACW joints before being clinically manifested.

## P1186

### IDENTIFICATION OF THE LEVEL OF AWARENESS OF PREVENTION AND THERAPY IN PATIENTS WITH HYPERMOBILITY SYNDROME IN THE JOINTS

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**Objective:** Joint pain is one of the most common complaints when visiting an outpatient healthcare provider for the first time. The leading cause of musculoskeletal pain in young patients is joint hypermobility syndrome (JHMS), a manifestation of hereditary connective tissue dysplasia with an obligate combination of generalized articular hypermobility and various musculoskeletal pathologies. Musculoskeletal pain in JHMS occurs as a result of microtraumatization of soft tissues or overload of hypermobile joints, in which inflammatory and degenerative changes occur with disabling consequences over time. The true prevalence of

JHMS is practically unknown. Constitutional JHMS is determined in 7-20% of the adult population. Although most patients first complain during adolescence, symptoms can appear at any age. We can talk about the frequency of detection of JHMS according to individual clinics. Thus, in one of the major European rheumatological clinics, this diagnosis was made in 0.63% of men and 3.25% of women out of 9275 patients admitted for inpatient examination. But these data do not reflect the true picture, since the majority of patients with JHMS do not require inpatient treatment. According to domestic data, the proportion of patients with JHMS is 6.9% at an outpatient appointment with a rheumatologist (data for 2015). Due to insufficient knowledge of doctors about this pathology, these patients are often registered under other diagnoses (early osteoarthritis, periarticular lesions, etc.). Morphofunctional changes and progression of the course of articular hypermobility, the introduction and active use of preventive, including non-drug strategies, seem appropriate in patients with hypermobility syndrome. The range of drug interventions in JHMS is very limited and is mainly reduced to the situational use of non-steroidal anti-inflammatory drugs for pain relief. It is obvious that such therapy is symptomatic and does not lead to the prevention of microtraumatization of the joints and the prevention of complications of hypermobility syndrome, including dislocations, subluxations, periarticular lesions, and the development of osteoarthritis, which is detected in people with JHMS more often and earlier than in the general population. Strengthening the muscles around problem joints and the formation of the correct movement pattern is the basis for the treatment of hypermobility syndrome and helps prevent the onset and chronicity of musculoskeletal pain symptoms. That is why an individualized mode of motor activity with a rational combination of the main types of physical exercises, adequate load and training pace is the basic integrating element of primary counseling and education of patients with SHMS. We assessed the level of awareness and degree of involvement of patients with hypermobility syndrome in multicomponent preventive programs in the focus of the main clinical manifestations and complications of JHMS at the stage of outpatient care.

**Methods:** To assess hypermobility, a 9-point scale by P. Bayton, F. Horan was used, according to which 1 point is awarded for each of the movements performed. The first 4 movements are paired, 1 point is awarded for the ability to perform the movement on one side, 2 points - if the movement is performed symmetrically on both sides. The fifth movement (forward tilt of the torso with palms touching the floor with straight legs) is unpaired; when performing this exercise, the subject also receives 1 point. Most researchers assess the degree of JHMS as 1st if the subject scores from 1 to 3 points, as 2nd - at 4-6 points and as 3rd - at 7-9 points on the Beighton scale. It is believed that signs of JHMS of the 1st degree can be found in almost all people in the population, and in most cases it is a physiological norm. JHMS of the 2nd degree is regarded as moderate, the 3rd degree - as pronounced, these signs can occur in pathology. The prevalence and nature of dislocations, subluxations, pathology of the periarticular soft tissues at the time of examination or in the anamnesis were studied in 214 patients (128 men and 86 women) aged 18 to 34 years. The study did not include patients with hereditary diseases and rheu-

matic pathology. The control group included 40 people comparable in sex and age, without external signs of connective tissue dysplasia. The results obtained were statistically processed.

**Results:** The severity of hypermobility in the joints most often (56%) corresponded to 5 points. In 22.6% of the examined, this indicator was 4 points, 7 and 9 points each - in 14.8% and 6.6% of patients, respectively. Arthralgias were registered in 71.1% of patients with JHMS. Most often, the pains were localized mono- and oligoarticularly, as a rule, in the knee or ankle joints. Polyarthralgia involving the joints of the hands, and in 16.1% of cases in combination with carpal tunnel syndrome, was observed in 12 (38.7%) women. In patients with JHMS, a high prevalence of dislocations and distortions in the joints was revealed - 41.6%, which were recurrent in 27.1% (the so-called "habitual"). Soft tissue periarticular lesions: tendinitis, bursitis, enthesitis were noted in 35.4% of patients with JHMS. Conducted purposeful questioning with the use of questionnaires demonstrated low awareness of patients about the methods of non-drug treatment and prevention in JHMS, as well as adherence to these strategies. Only 27% of those surveyed with hypermobility syndrome had knowledge about recommended and undesirable sports and physical activity, rules and methods for the formation of rational motor stereotypes, the need for regular use of programmed dosed physical exercises. In addition, every sixth of the respondents (16.8%) with various formulations refused active supervised participation in group or individual training programs, while 34.1% of those surveyed showed a willingness to conduct drug therapy courses.

**Conclusion:** The data obtained dictate the need for more active counseling and education of patients with JHMS on the elements of non-drug correction with the inclusion of programmed physical activity regimens and the creation of sustainable motivations for their regular implementation to prevent chronic musculoskeletal pain syndromes.

## P1187

### FEATURES OF THE PAIN SYNDROME AMONG MILITARY SERVICEMEN: DATA FROM A RHEUMATOLOGY CENTER IN DNIPRO (UKRAINE)

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**Objective:** Musculoskeletal disorders are one of the most common reasons military servicemen disability and hospitalization. This study aims to review the features of the pain syndrome among military servicemen from a Rheumatology Center in Dnipro (Ukraine).

**Methods:** Analysis of case histories from the Rheumatology Center in Dnipro (Ukraine) during the study period February 24, 2022, to February 14, 2023, were retrospectively studied.

**Results:** There were 46 case histories of Ukrainian military servicemen (male). The median age was 32.75 [21.17; 46.52]. The most common diagnoses were gout (17, 40.0%), spondyloarthritis (12, 26.1%), rheumatoid arthritis (8, 17.4%), osteoarthritis (4,

8.7%), systemic vasculitis (3, 6.5%), and psoriatic arthritis (2, 4.3%). Median baseline VAS score was 8.5 [6.7; 9.2], 40.8% of patients had high-intense pain, 34.8% - medium-intense pain, 24.4% - low-intense pain. The first X-ray stage was estimated in 45.7% of military servicemen, the second - in 34.8%, the third - in 19.6%. No statistical relationship was found between VAS pain intensity and C reactive protein levels.

**Conclusion:** In servicemen with pain syndrome caused by rheumatologic diseases the intense of the pain does not fully correspond to the degree of organic changes in the musculoskeletal system. Adjuvant therapy for correcting pain intense should be considered in this category of patients.

## P1188

### BODY COMPOSITION IN CHILDREN WITH DUCHENNE MUSCULAR DYSTROPHY

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**Objective:** Duchenne muscular dystrophy (DMD) and milder Becker muscular dystrophy (BMD) are caused by mutations in the gene encoding the dystrophin protein. In clinical practice, monitoring body composition (BC) is a critical component of nutritional assessment and weight management. Common anthropometric measures are not suitable for dystrophic patients because they evaluate only the amount of subcutaneous fat and not the progressive intramuscular fat infiltration. We aimed to evaluate the BC, in boys with DMD.

**Methods:** We examined 49 boys with DMD diagnosis by genetic testing, age: 10 (8;11) yrs., BMI: 18 (16;22) kg/m<sup>2</sup>. BC and BMD (L1-L4 and total body less head (TBLH)) were assessed with DXA Stratos DR; body size corrections were made by dividing by height squared (kg/m<sup>2</sup>) giving fat mass index (FMI) and appendicular lean mass index (ALMI). Statistical processing was performed using the program Statistica 10.0.

**Results:** We received following median values: BMD L1-L4 0.492 (0.453;0.557) g/cm<sup>2</sup>, BMD TBLH 0.510 (0.474;0.540) g/cm<sup>2</sup>, FMI 7.7 (6.1;11.2) kg/m<sup>2</sup>, ALMI 3.8 (3.5;4.3) kg/m<sup>2</sup>. The low BMD (Z-scores<=-2) height- and age-adjusted was found in 16 (33%) children with DMD. DMD patients with low BMD had higher fat tissue count (U=168, p=0.041) and were oldest (U=117, p=0.002). BMD L1-L4, BMI, lean tissue, FMI and ALMI were not different between group with and without low BMD. DMD patients with low BMD had lower BMD TBLH (U=146, p=0.012) and percentage of bone tissue (U=170, p=0.045). The presence of low BMD in children with DMD showed a statistically significant tendency of correlation with age (0.46, p=0,001), % fat mass (0.28, p=0.049), fat tissues (0.29, p=0.039), % lean mass (-0.28, p=0.049), % bone mass (-0.29, p=0.042), BMD TBLH (-0.36 p=0,010).

**Conclusion:** Patients with low bone mass have more adipose tissue due to progressive destruction skeletal muscles followed by their replacement with adipose tissue. Obviously, these changes progress with age and progressive changes of disease.

P1189

### LEUKOCYTOCLASTIC VASCULITIS ASSOCIATED WITH COVID-19 WITH EFFECTIVE TREATMENT WITH CYCLOPHOSPHAMIDE: CLINICAL CASE

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**Objective:** To describe a clinical cases of successful treatment of COVID-19 associated vasculitis with cyclophosphamide.

**Methods:** A 58-year-old woman with no previous rheumatological pathology had a confirmed mild form of COVID-19 in September 2022. After 4 weeks, multiple rashes of the skin of the legs appeared, a clinical examination was performed, including an auto-immune panel, a skin biopsy, and a diagnosis of leukocytoclastic COVID-19 associated vasculitis was estimated.

**Results:** Patient was initially treated with glucocorticoids, anti-coagulants, however the manifestations of vasculitis persisted. Subsequently patients were treated using intravenous administration of 600 mg of cyclophosphamide against the background of medium doses of methylprednisolone. Patient received 3 infusions during 3 months of treatment by a rheumatologist, the treatment continues. On the background of treatment there was a positive trend: the absence of fresh rashes and regression of the previous ones. No clinically significant side effects of the therapy were found.

**Conclusion:** clinical case demonstrate the high efficacy of cyclophosphamide in the treatment of COVID-19 associated leukocytoclastic vasculitis.

P1190

### THE EPIDEMIOLOGY AND MANAGEMENT OF POSTMENOPAUSAL OSTEOPOROSIS: WHAT WAS CHANGED IN THE LAST 10 YEARS IN BRAZIL?

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**Objective:** To compare epidemiological change and burden of fragility fracture in the last ten years in Brazil.

**Methods:** review of relevant articles publish in the last 10 years on PubMed and LILACS. The search terms were "osteoporosis" and "Brazil", "burden"; "prevalence"; "fracture".

**Results:** Overall, depending on age and the characteristics of the study population, the reported prevalence of osteoporosis in postmenopausal women varies from 15% to 33%, based on self-reporting or bone densitometry. The prevalence of fragility vertebral fractures for women over 50 years was 11-17%, therefore there was an increase of 34%, rising from 2,9 to 3,9 million between 2012-2019. Hip fractures increase with advancing age, being more frequent among women and the prevalence raised between 2012 and 2019, from 113.8 to 145.9 per 100,000 wom-

en over 50 years, showing an increase of 28%. The number of hospitalizations related to hip fractures had an annual growth of 5.6%, with a proportional increase in costs for public health. Hip fractures have a hospital mortality ranging from 5% to 14.4%. The one-year mortality rate after hip fracture was 23% to 35% and functional disability rate of >50%. The percentage of patients in rehabilitation related to a hip fracture increased from 14% to 40% in the last 10 years. In Brazil there are 2,296 densitometry (DXA); representing a growth of 19.4% in the last 10 years, but two-thirds are from private sector. In 2014, the Brazilian Ministry of Health issued Clinical Protocol and Therapeutic Guidelines for Osteoporosis. Drugs with different mechanisms of action are available to treat postmenopausal osteoporosis: hormone replacement therapy, selective estrogen receptor modulators, bisphosphonates, and calcitonin. Recently zoledronic acid and romosozumab were included for patients with special clinical conditions. Secondary fracture prevention through Fracture Liaison Service is not part of the strategies promoted by Ministry of Health.

**Conclusion:** The projections of an exponential increase in osteoporotic fractures show the need for timely and effective diagnosis and treatment of osteoporosis to curb the debilitating impact of this disease on patients, society, and health systems. Conscientization programs for general population and health professionals about the importance of osteoporosis would also be beneficial. Efforts are needed to ensure access to information on osteoporosis and the opportunity to receive adequate prevention and early diagnosis and treatment.

P1191

### STUDY OF PREDISPOSING GENETIC FACTORS FOR THE OCCURRENCE OF THYROID DISEASES IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** The incidence of autoimmune rheumatic diseases and their prevalence is quite significant throughout the world. The most common among adults is rheumatoid arthritis. Rheumatoid arthritis (RA) is an autoimmune rheumatic disease of unknown etiology characterized by chronic erosive arthritis and systemic damage to internal organs. The role of hereditary factors in the development of the disease is confirmed by various immunogenetic studies, while approximately 40% of the entire genetic component for RA belongs to the main human histocompatibility complex - the HLA system. A detailed analysis of associations between RA and the HLA system demonstrates that HLA alleles are associated not only with sensitivity, but also with protection (resistance) to the development of the disease. RA is a heterogeneous disease that is supported by data combining genetic risk factors and autoantibodies, influenced by both genetic, epigenetic and environmental factors. We aimed to elucidate possible genetic causes of lesions of the thyroid gland in RA.

**Methods:** Group of patients with RA. Among the total number of examined patients with RA, there were 70 women (70%) and 30 men (30%). The age of the patients was from 20 to 65 years, the average age was 52.3±11.4 years. The age of disease onset ranged from 18 to 60 years, the average age of disease onset was 42.4±14.8 years. All patients were classified into groups according to the classification of rheumatoid arthritis. Among patients with RA, a group of patients with thyroid pathology was identified. We observed 25 patients with thyroid pathology, including 8 men (32%) and 17 women (68%), which confirms the data on the higher prevalence of thyroid diseases in women than in men. The mean age of the patients was 52.48±14.03 years. The average duration of the clinically significant presence of thyroid pathology was 3.82±3.21 years. The onset of the disease was on average 48.6±13.6 years. When making a diagnosis, WHO criteria and generally accepted classifications were used. According to the presence of thyroid pathology, patients were distributed as follows: chronic autoimmune thyroiditis, euthyroidism - 38%, primary hypothyroidism - 25%, diffuse toxic goiter - 23%, mixed toxic goiter - 14%. Typing of HLA genes of class I and II loci DRB1, DQA1, DQB1 was carried out by PCR using DNA-Technology reagent kits and a set of sequence-specific primers. Statistical processing included the calculation of the frequency of occurrence of the gene (Px) and antigen (Ax%), calculated according to the Hardy-Weinberg law, Pearson's X2 test using the Yates correction for continuity and the odds ratio (OR) test.

**Results:** The basis of the pathogenesis of rheumatoid arthritis is a violation of the presentation of antigens. The dominant role in the selection and presentation of antigens in the cooperation of immune cells is played by the HLA genes and the antigens encoded by them. According to the literature data, an association of adult rheumatoid arthritis with the genes of the DRB1\*01, \*03, \*04 locus has been established in Caucasian populations. In our study, when comparing groups of patients, we determined a statistically significant increase in the frequency of occurrence of the DR B1 gene ( $p < 0.05$ , OR=3.2, 95%CI=1.4-6.8), B8 gene ( $p < 0.05$ , OR=2.6, 95%CI=1.8-4.3). But HLA-DR5, HLA-DR2, HLA-DR3 and HLA-DR7 were quite rare, only 8% of the examined. It is believed that these genes prevent the development of the disease, since they are detected less frequently in patients with rheumatoid arthritis than in healthy ones. As for patients with autoimmune thyroid pathology, the most frequently detected genes were HLA-B8 (94% of the examined), HLA-DR3 (67%) and HLA-DR5 (72%). It is assumed that the HLA-DR5 gene may be involved in the mechanism of goiter formation, HLA-DR5 is a receptor of T-suppressors and stimulates them to release prostaglandins, and HLA-DR3 induces the helper function of T-lymphocytes. The hypertrophic form of autoimmune thyroiditis is associated with the HLA-DR5 genes, while the atrophic form is associated with the HLA-DR3 and HLA-B8 genes. Thus, both diseases are seen to be associated with HLA-B8. The obtained materials suggest that certain genes and alleles of HLA class II are involved in the pathological process of autoimmune rheumatic diseases, but the ways of this process implementation are different. Since RA is a polysystemic autoimmune disease in which any target organ can be affected, some authors put forward a hypothesis that the combined autothyroid pathology may be a

consequence of the antithyroid activity of any group of antibodies produced in RA. It is possible that autothyroid pathology is the result of immune damage to the thyroid gland in rheumatoid arthritis, accompanied by the deposition of immune complexes and activation of the complement system.

**Conclusion:** Thus, the revealed carriage of the predisposing gene (HLA-B8) is not an indicator of the inevitability of the development of RA in the presence of autothyroid pathology or thyroid lesions in RA, but under the appropriate influence of certain factors, it can act as one of the reasons for the development of an autoimmune multiple organ process. We believe that it is necessary to include genetic studies in the complex of diagnostic measures in both RA and thyroid diseases.

## P1192

### EVALUATION OF CALCIUM-PHOSPHORUS HOMEOSTASIS AND MARKERS OF OSTEOGENESIS IN PATIENTS WITH BRONCHIAL ASTHMA AND GENERALIZED PERIODONTITIS

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**Objective:** Osteopenic syndrome is not only of great diagnostic value, as it often determines the outcome of the disease. It is known that bone mass depends on the content of minerals in bone tissue. In clinical practice, generalized periodontitis (GP) occupies a significant place. The use of drug therapy to relieve attacks of bronchial asthma (BA) contributes to the violation of the remodeling ability of bone tissue, the development of detraining of the circulatory system, which ultimately leads to the development of osteoporosis. Insufficient effectiveness of rehabilitation therapy, the need for long-term and continuous treatment and rehabilitation make it necessary to search for new methods of treating asthma, taking into account the characteristics of the lesion, which should be carried out against the background of pathogenetically substantiated complex therapy aimed at improving metabolic processes in all body systems. We aimed to assess the indicators of calcium-phosphorus homeostasis and markers of osteogenesis in patients with HP against the background of AD.

**Methods:** We examined 128 patients aged 18-36 years with a diagnosis of GP against the background of BA.

**Results:** When studying the state of calcium-phosphorus homeostasis in children with AD, deviations were noted. The study of the mineral metabolism of GP patients against the background of BA showed a significant decrease in the calcium concentration in the blood serum in 83% ( $p < 0.01$ ), accompanied by an increase in the level of alkaline phosphatase activity by 23.64% ( $p < 0.001$ ). insufficient absorption of calcium in the body. These changes can serve as indirect signs of osteoporosis. The processes of moderate hypocalcemia, hypophosphatemia in patients with HP against the background of BA were accompanied by an increase in the secretion of calcitonin, which has an inhibitory effect on bone tis-

sue. SPS CT scores were also markedly lower.

**Conclusion:** The average content of total calcium and inorganic phosphorus in the blood serum of patients, against the background of an increase in alkaline phosphatase, was within the physiological norm. However, a normal 2:1 ratio was not found between them in 42% of the subjects, which indicates the presence of various deviations and a decrease in the effectiveness of the functioning of the calcium-regulating systems of the body (inadequate bone formation, bone mineralization, or increased resorption).

## P1193

### CHARACTERISTICS OF STRUCTURAL AND FUNCTIONAL PROPERTIES OF BONE TISSUE IN CHILDREN WITH BRONCHIAL ASTHMA

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**Objective:** Recent studies have established that the origins of osteoporosis (OP) in adults lie in childhood and adolescence, since it is during these periods that more than 90% of the genetically determined bone mass is accumulated, which ensures the strength and resistance of the skeleton to the effects of various adverse factors throughout subsequent life. Recently, data have been presented on the incidence of osteopenia (OP) in children and especially in adolescents, which ranges from 45-58% at the age of 10-16 years. In bronchial asthma (BA) there is a systemic lesion. Despite the high therapeutic efficacy, glucocorticosteroids, which are used in the basic therapy of BA, can cause systemic adverse reactions, including those from CT. One of the side effects of glucocorticosteroids is a violation of mineral metabolism, and as a manifestation of long-term therapy - GC-induced OP, the so-called secondary osteoporosis. We aimed to assess the structural and functional properties of bone tissue in children with bronchial asthma.

**Methods:** A survey of 230 children with asthma, aged 7-16 years, was carried out.

**Results:** As a result of the studies, it was found that the causes of the development of AP in these patients with lung diseases are chronic respiratory acidosis, inflammation, and the use of glucocorticosteroids. One of the side effects of glucocorticosteroids, which are used in the basic therapy of AD, is a violation of mineral metabolism. GCS affect various stages of calcium homeostasis and QD remodeling. More pronounced disorders of SPS CT were noted in 46 (47%) patients who took ICS for more than 1 year, a history of fractures in 80 (44.2%) patients and relatives of the 1st degree of kinship, in 62 (63%) with the syndrome of nonspecific connective dysplasia tissue, and a reduced level of BMI in 68 (69%) patients. An analysis of ultrasonic parameters of SPS CT depending on the severity of BA showed that the most pronounced decrease in TI CT was observed in persistent moderate BA and was equal to 64.3±1.4% (P<0.001). In severe BA,

the indicators of PI, SHOW, SRU were also significantly lower than in healthy children. A relationship has been established between the duration of BA and the severity of bone tissue disorders. The most profound disturbances on the part of CT were noted after 4-6 (p<0.001) and 7-9 years (p<0.001) from the onset of the first manifestations of the disease. This dependence can be explained in terms of the activation of the body's compensatory capabilities, and is associated with periods of intensive growth of the skeleton of children.

**Conclusion:** Thus, these changes in CT in the examined patients with BA can be considered as one of the manifestations of systemic disorders of osteogenesis.

## P1194

### CORTISOL AND ACTH LEVELS IN ORAL FLUID IN PATIENTS WITH JUVENILE RHEUMATOID ARTHRITIS

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**Objective:** Preservation and strengthening of the dental health of the population is one of the strategic directions in medicine. The WHO emphasizes that approaches to oral disease are most effective when applied in conjunction with approaches to other chronic diseases." Among the priority areas in the study of somatic pathology, juvenile rheumatoid arthritis (JRA) is of interest. This disease has a systemic nature, unclear etiology, complex autoimmune pathogenesis and a number of extra-articular manifestations. Dental pathology can also be considered as a comorbid condition in patients with JRA. Longitudinal studies and prospective analysis predict a negative JRA trend in a number of countries around the world. The prevalence of caries also remains high. In this regard, in patients with JRA, it is of interest to study the role of humoral factors in the development of pathology of hard dental tissues. We aimed to study the levels of hormones of the pituitary-adrenal axis (ACTH and cortisol) in patients with JRA in the oral fluid (OJ) depending on the pathology of the hard tissues of the teeth (caries, enamel hypoplasia) and the intensity of caries (KPU index).

**Methods:** 65 patients with JRA aged 12-16 years were examined (main group - MG). Of these: 33 people (TG-I) had dental caries, 32 people (TG-II) had caries and enamel hypoplasia. The control group (CG) consisted of 15 somatically and dentally healthy peers. The KPU index, the levels of cortisol and ACTH in the gastric fluid were determined.

**Results:** The CP index in OG-I and OG-II did not differ significantly (p>0.05) and amounted to 5.27±0.32 and 5.3±0.57, respectively. Cortisol concentration in CG, OG-I and OG-II was determined as 2.81±0.22 ng/ml, 7.95±0.81 ng/ml and 8.11±0.96 ng/ml, respectively. The level of ACTH was noted in similar groups at the levels of 16.91±1.44 pg/ml, 10.93±1.08 pg/ml, 9.89±1.09 pg/ml. Thus, a significant increase in the concentration of cortisol (p<0.001) was determined in the GC, and ACTH was reduced (p<0.001) in

comparison with the CG. The data obtained demonstrated an imbalance in the coordination relationship between cortisol and ACTH at the peripheral level in patients with JRA. This can be regarded as a manifestation of the adaptive reaction of the body. At the same time, the levels of hormones depending on the pathology of the hard tissues of the teeth (in OG-I and OG-II) did not differ significantly. A detailed study of the individual parameters of patients with OH showed an increase in the difference in parameters compared with CG in the systemic form of JRA and with a longer course of arthritis. In parallel, there was a correlation between the levels of cortisol and ACTH with the CP index ( $r=0.5$ ,  $p<0.001$  and  $r=-0.43$ ,  $p<0.001$ , respectively), which confirmed the comorbidity of dental caries and JRA.

**Conclusion:** The data obtained indicate a pronounced stress response of the neuroendocrine system at the peripheral level in patients with JRA. This contributes to the formation of pathological conditions in the oral cavity and, in particular, a cariogenic situation. It is of interest to further study the concentrations of hormones of the pituitary-adrenal axis, taking into account the degree of activity of the carious process, the form and debut of JRA.

## P1195

### ANALYSIS OF THE RESISTANCE OF ANTIBACTERIAL DRUGS IN THE TREATMENT OF INFECTIOUS DISEASES OF THE JOINTS

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**Objective:** Native joint infections (NJIs) are rare today, with four to ten cases per 100,000 people per year. However, these infections require the close attention of specialists because they have a high risk of complications. NJI cause a significant risk of secondary osteoarthritis and irreversible joint damage, resulting in loss of function in about 40% of cases. Adequate initial empiric antibiotic therapy is critical. However, treating the predominant pathogens can be a challenge. Regardless of the type of infection, blood cultures are often inconclusive, and possible contamination in tissue tests can produce false negative results. Knowledge of expected pathogens in native joint infections may thus speed up diagnostic procedures and improve patient outcomes. An equally important criterion in choosing a drug for empirical antibiotic therapy is knowledge of microorganism resistance (MR). This is a retrospective study of the resistance of pathogenic microorganisms to antimicrobial drugs based on the analysis of cases among patients with diseases of the musculoskeletal system registered in the AMR map database.

**Methods:** The objects of the study were 70 cases of resistance to antibiotic therapy in patients with diseases of the musculoskeletal system, registered in the electronic database of resistance of microorganisms to antimicrobial drugs in Russia for the period from January 01, 2011 to December 31, 2021. The results of synovial fluid analysis using culture were evaluated to study sensitivity

to antibiotics.

**Results:** Most often, microbiological examination of synovial fluid revealed MOs of the Staphylococcus group - only in 51 cases (72.86%), among them the leader in the frequency of detection was Staphylococcus aureus - in 35 (50%), Staphylococcus epidermidis was found in 13 (18.57%) results of synovial fluid tests. Also, Staphylococcus hominis was detected in 2 cases and Staphylococcus xylosum was detected in one. Of the Gram-positive flora, Streptococcus pneumoniae and Streptococcus pyogenes were found in one more case out of 70 observations, as well as Enterococcus faecalis in 3 cases. Gram-negative flora was found much less frequently, among them such pathogens as Pseudomonas aeruginosa were diagnosed in 7 cases (10%), 4 cases of Escherichia coli (5.71%), Klebsiella pneumoniae was found in 3 analyzes (4.29%). When studying cases of resistance to MO for the period from 2011-2021, the sensitivity of MO remained for antibacterial agents of the oxazolidinone group (linezolid, tedizolid), glycolcyclines (tigecycline), representatives of glycopeptides (vancomycin) and semi-synthetic lipoglycopeptides (telavancin), as well as a fifth generation cephalosporin (ceftaroline). Among antimicrobials, the studied MOs showed resistance to antibiotic groups: macrolides (erythromycin (30.81%)), fluoroquinolones (levofloxacin (24.57%), ciprofloxacin (24.34%)). In addition, it is worth noting that resistance to these drugs has increased, on average, by 20% over 10 years. When considering the resistance of the Staphylococcus MO group, which are most common in the synovial fluid, the highest sensitivity to the drugs linezolid (100%), tigecycline (100%), telavancin (100%) was revealed, they showed moderate resistance to antimicrobial drugs: levofloxacin (92.16%), ciprofloxacin (86.27%), the greatest resistance was shown to drugs of the semisynthetic penicillin group (oxacillin (19.61%)), macrolides (erythromycin (17.65%)), amphenicols (chloramphenicol (15.59%)). MO groups of Pseudomonas and Enterobacterales showed a similar resistance trend.

**Conclusion:** The current situation associated with the growth of antibiotic resistance is explained by the fact that in many countries of the world, including the Russian Federation, national programs for monitoring antibiotic-resistant pathogens, as well as control over the rational use of antibiotic therapy, are not effective enough. Of all the antibacterial drugs that are used in joint pathology, the most common resistance is to erythromycin (30.81%), levofloxacin (24.57%), ciprofloxacin (24.34%). For 10 years it has increased by 20%. At the time of 2021, the effectiveness of treatment with drugs from the groups of glycopeptides, oxazolidinones and the fifth generation of cephalosporins remains. Obviously, in order to increase the effectiveness of empirical antibiotic therapy for joint diseases, it is advisable to take into account data on resistance.

P1196

### PREVALENCE OF DENTAL CARIES IN PATIENTS WITH JUVENILE RHEUMATOID ARTHRITIS

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**Objective:** Juvenile rheumatoid arthritis (JRA) is a systemic chronic connective tissue disease with a predominant joint lesion, combined in a number of patients with severe extra-articular manifestations. In the maxillofacial region, the disease is often manifested by damage to the temporomandibular joint and salivary glands, hard tissues of the teeth and oral mucosa. Among the reasons that aggravate the condition of the oral organs, there are medications. They are prescribed to patients with JRA for long courses and almost constantly. We aimed to study the prevalence of caries in JRA patients with permanent occlusion, depending on the basic therapy used.

**Methods:** 75 patients with JRA aged 12-15 years were examined - the main group (MG). Of these: 28 people (OG-I) took non-steroidal anti-inflammatory drugs, 22 (OG-II) - hormonal drugs, 25 (OG-III) - cytostatics. The control group (CG) consisted of 18 somatically healthy children and adolescents matched in age and gender.

**Results:** It was found that the prevalence of caries in patients with JRA was 92%. This is 47.56% higher than in the CG (44.44%) ( $p < 0.001$ ). In the MG, depending on the basic therapy, the prevalence of caries was as follows: in OG-I - 92.86% (48.42% higher than in CG), in OG-II - 90.91% (46.51% higher than in the CG), in the OG-III - 92% (47.56% higher than in the CG). There were no significant differences in the prevalence of caries depending on the group affiliation of the drugs used for the basic therapy of JRA ( $p > 0.05$ ).

**Conclusion:** The high prevalence of caries in patients with JRA in comparison with practically healthy children and adolescents indicates a significant role of rheumatoid arthritis in the pathogenesis of caries. The absence of a significant difference in the index depending on the scheme of background therapy gives grounds to assume an equivalent effect of drugs on the process of demineralization of hard dental tissues. Given the progressive course of JRA, patients need systematic preventive measures of an exogenous and endogenous nature. This issue is of interest for further study.

P1197

### ASSESSMENT OF THE QUALITY OF LIFE IN PATIENTS WITH OSTEOARTHRITIS IN THE PRESENCE OF COMORBID PATHOLOGY

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**Objective:** Osteoarthritis (OA) is the most common age-related chronic joint disease. This pathology is diagnosed in about 15% of the world's population, of which 65% of patients are over the age of 60 years. Taking into account the fact that one of the key risk factors for the development of OA is old age, it is not surprising that this pathology belongs to diseases with a high level of comorbidity - the presence of two or more diseases in one patient, which are pathogenetically interconnected or coincide in time. Thus, it has been proven that patients with OA have a significantly higher risk of developing comorbid conditions than those without this pathology. We aimed to study the impact of comorbid pathology on quality of life indicators using the SF-36 questionnaire in patients with osteoarthritis.

**Methods:** 126 patients diagnosed with knee OA were examined, among them 64% were women and 36% men, mean age  $48.5 \pm 12.6$  years. The average duration of the disease was  $10.5 \pm 8.9$  months, 72% of the patients included in the study first went to the doctor about pain in the knee joints. All patients were divided into 4 clinical groups depending on concomitant pathology: group 1 - OA without concomitant pathology (24 people), group 2 - OA and arterial hypertension (AH) (36 people), group 3 - OA and obesity (34 people) and group 4 - OA and type 2 diabetes mellitus (32 people). The diagnosis of OA was verified based on the criterion of the American College of Rheumatology, as well as the criterion developed by the Institute of Rheumatology of the Russian Academy of Medical Sciences. The comparison group consisted of 40 healthy volunteers matched in age and sex (39 women and 11 men, mean age  $46.4 \pm 10.4$  years). To assess the quality of life, the SF-36 questionnaire was used, which contains 36 questions, 8 scales. Answers to questions using special algorithms were expressed in points from 0 to 100 (a higher level of quality of life corresponded to a higher score on the questionnaire scale). Statistical processing of the results was carried out using statistical programs Microsoft Excel, Statistica 13. Mean values, standard deviation [ $M \pm SD$ ], significance of differences were determined using Student's t-test, U - Mann-Whitney test.

**Results:** Analysis of the obtained results revealed that the indicators of all scales of the SF-36 questionnaire had lower values in patients with OA in all groups compared to the control group ( $p < 0.05$ ). Thus, in patients with OA in all clinical groups, physical health indicators were reduced to the greatest extent: physical functioning (PF), role-playing physical functioning (RP), pain intensity (BP). In addition, patients with OA who had comorbidities had lower quality of life scores than those without comorbidities ( $p < 0.001$ ).

**Conclusion:** OA has a negative impact on the physical, psychological and social functioning of a person. Using the SF-36 questionnaire for the study of quality of life, you can monitor the condition of patients and use them in assessing the effectiveness of treatment in patients with OA and the presence of comorbid pathology.



P1198

**OSTEOPOROSIS IN PATIENTS WITH DYSBIOSIS**E. Kuliyeva<sup>1</sup>, S. Kulanthaivel<sup>2</sup>, V. Kaliberdenko<sup>1</sup>, A. Useinova<sup>1</sup>, T. Sataieva<sup>1</sup>, A. Zayaeva<sup>1</sup>, K. Balasundaram<sup>1</sup><sup>1</sup>V.I. Vernadsky Crimean Federal University, Simferopol, Russia,<sup>2</sup>Naarayani Multispeciality Hospital, Erode, India

**Objective:** The most common metabolic pathology of the skeleton is osteoporosis; the WHO has named the disease the fourth cause of morbidity and mortality from chronic non-communicable diseases in the world. Osteoporosis is a chronic disease of the skeleton bones, which is associated with metabolic disorders, manifested by a progressive decrease in density and a violation of the structure of bone tissue, which leads to increased fragility of bones and an increased risk of fractures from minimal trauma. In recent years, an increasing number of studies have claimed that the gut microbiota plays a role in bone metabolism and the pathogenesis of osteoporosis.

**Methods:** The analysis of research and scientific literary materials of foreign authors who had working on the study of osteoporosis and gut microbiota, and the relationship of osteoporosis in patients with dysbiosis.

**Results:** There are a number of the reasons involved in occurrence of osteoporosis, among which a special place is occupied by inflammatory processes of dysbiosis. For example, the results of studies have shown: 30-60% of patients with dysbiosis have a lower bone density than in healthy people, which is accompanied by osteopenia or osteomalacia of bones. Throughout life, the bone continuously undergoes changes in response to micro-trauma that occur in various places of the skeleton and include resorption followed by the formation of bone tissue. Dysbiosis or violation of healthy intestinal microflora contribute to an increase in the number of microorganisms in the intestine that are not normal, which in turn, through their own cellular structures, trigger systemic inflammation through TLR4, activating the secretion of pro-inflammatory cytokines, thereby exacerbating systemic inflammation. The main cytokines involved in the process of bone remodeling and playing a role in the development of osteoporosis are interleukins: TNF. IL-1, IL-3, IL-6, IL-11, take part in the development of osteoclasts, which play a significant role in the regulation of local and systemic inflammatory reactions. IL-6, which stimulates the early stages of hematopoiesis and osteoclastogenesis, is of significant importance in the development of osteoporosis. It is synthesized both in the culture of stromal and osteoblastic cells in response to certain hormonal stimuli, such as PTGi calcitriol. IL-6 promotes bone resorption and increases osteoclastogenesis. TNF is synthesized by neutrophils and monocytes and enhances the accumulation of osteoclast precursors in the bone formation zone. IL-11 induces osteoblastic differentiation of progenitor cells and plays an important role in osteogenesis.

**Conclusion:** The gut microbiota is involved in the regulation of various physiological and pathological processes of the human body and is associated with various diseases. Dysbiosis affects the development of osteoporosis through the activation of a system the cytokines that can increase bone mass, inhibiting the pro-

liferation and differentiation of osteoclasts, causing apoptosis and reducing bone resorption.

P1199

**PREVENTIVE USE OF ZOLEDRONIC ACID IN PERSONS AT HIGH RISK OF OSTEOPOROSIS**G. Koshukova<sup>1</sup>, A. Zayaeva<sup>1</sup>, V. Kaliberdenko<sup>1</sup>, E. Dolya<sup>1</sup>, S. Kulanthaivel<sup>2</sup>, K. Balasundaram<sup>1</sup><sup>1</sup>V.I. Vernadsky Crimean Federal University, Simferopol, Russia,<sup>2</sup>Naarayani Multispeciality Hospital, Erode, India

**Objective:** Osteoporosis is a metabolic disease of the skeleton, characterized by a decrease in bone mass, a violation of the microarchitectonics of bone tissue and, as a result, fractures with minimal trauma. Rheumatological diseases and the use of glucocorticoids are significant factors influencing the development of secondary osteoporosis. Until now, about 50% of patients in Russia do not carry out adequate examination and treatment, which is due to both the insufficient level of education of the population and the low availability of modern diagnostic methods. In the Russian Federation, densitometry is not included in the program of compulsory medical insurance, which, with the high cost of this method of examination and insufficient equipment of certain regions with densitometers, leads to insufficient timely diagnosis of OP and the development of osteoporotic fractures. One of the criteria necessary for establishing the diagnosis of osteoporosis is the presence of a high individual 10-year probability of major pathological fractures, regardless of the X-ray densitometry index. In glucocorticoid OP, treatment with BP is effective in preventing fractures. Zoledronic acid preparations are practically the only class of drugs from the group of bisphosphonates approved for the prophylactic treatment of OP. We aimed to analyze the use of zoledronic acid in patients with rheumatic diseases of older age groups with an average risk of developing AP, compared with a similar group of patients without the use of bisphosphonates. We also aimed to identify a group of patients with rheumatological diseases of older age groups, including those taking various doses of GCs, to assess risk factors for the development of AP, to conduct prophylactic treatment with bisphosphonates (zoledronic acid) with subsequent analysis of treatment results compared with a similar group of patients without the use of bisphosphonates for 12 months.

**Methods:** The study was conducted on the basis of GBUZ RK "Clinical Hospital named after N.A. Semashko" by collecting anamnestic data in patients with a rheumatological profile in older age groups, including those taking GCs in various dosages, with filling out FRAX questionnaires. The inclusion criteria for the study were: age over 50 years, verified rheumatological diagnosis 6 or more months ago, the presence of an average individual 10-year probability of major pathological fractures (20-30%), the absence of decompensated conditions on the part of the internal organs, and the presence of informed consent to participation in the study. Exclusion criteria: age under 50 years, the presence of malignant neoplasms, the presence of mental illness, previous

treatment with drugs of the bisphosphonate group. 68 patients were examined, among them men - 44.1% and women - 55.9%. The average age of the respondents was  $64.28 \pm 5.8$  years. The prevalence of patients with rheumatoid arthritis (61.8%) was noted. The study also included patients with ankylosing spondylitis (14.7%), psoriatic arthritis (13.2%) and SLE (10.3%). All patients took calcium preparations (carbonates or citrates) at least 1000 mg per day as an accompanying therapy and vitamin D3 preparations at a daily dose of at least 800 IU, some patients noted regular intake of GC at present or GC intake for 3 months and more in history. All patients were divided into 2 groups matched by sex, age, nosology. Patients of the 1st group (n=35) additionally received a single intravenous infusion of zoledronic acid 5 mg in 100 ml of the solvent for 15 min; patients of the 2nd group (n=33) did not treatment). The observation period was 12 months.

**Results:** As a result of the analysis of anamnestic data, it was found that the average duration of rheumatic disease was  $7.2 \pm 3.8$  years, 57.4% of patients confirmed the intake of GC, and in 47.1% of patients the daily dose did not exceed 7.5 mg (in terms of prednisolone), 10.3% noted the intake of GC in a daily dose of more than 7.5 mg. A history of GC intake was noted in 10.3% of patients. When calculating the results of the FRAX questionnaire, an increase in the individual 10-year probability of major pathological fractures (FRAX) was made by 15% in patients taking glucocorticoids for 3 months or more at a dose of 7.5 mg/d or more (in terms of prednisone) in order to correct the risk of fracture. With a dose of GC  $>7.5$  mg/d (in terms of prednisolone), the individual 10-year probability of major pathological fractures increased by 20% in accordance with the clinical recommendations of the Russian Federation. The FRAX index in the examined category of patients was  $25.06 \pm 0.36\%$ . DXA of the lumbar spine and proximal femur was performed in selected patients (n=17) using a partial randomized sampling method. In the vast majority of patients (88.2%) who underwent DXA, the t-test was recorded in the range from -1 to -2.5. The data obtained indicate the presence of osteopenia in the majority of patients meeting the inclusion criteria in the study, which justified the advisability of prescribing prophylactic treatment of OP in the form of a single intravenous infusion of 5 mg zoledronic acid in 100 ml of a solvent. During the 12 months of follow-up of patients in both groups, 2 episodes (6.1%) of low-energy fractures were registered in patients of the 2nd group, there were no fractures in patients of the 1st group. During DXA (at the initiative of the patient) during the observation period, patients of the 1st group did not have a single case of progression of bone loss with the development of OP, while in patients of the 2nd group in 3 cases (9.1%) an increase in the t-test  $>-2.5$ , which corresponded to the diagnosis of OP. A strong positive correlation ( $R=0.901$ ;  $P<0.001$ ) between the development of OP and the total cumulative dose of HA was revealed, which confirms the mutually aggravating effect of risk factors for the development of OP and requires preventive measures.

**Conclusion:** Screening of older patients with rheumatological diseases who have a history of GC use using X-ray densitometry of the lumbar spine and proximal femur is not economically feasible, since it is 2-10 times higher than the cost of treating all pathological fractures. This category of patients should be considered

as a high-risk group for developing AP and prophylactic use of zoledronic acid preparations should be recommended. In patients with an average individual fracture probability (20%-30% according to FRAX), that is, when the appointment of treatment for AP is doubtful, it is recommended to perform X-ray densitometry of the lumbar spine and proximal femur, or in the absence of this study, recommend prophylactic treatment of AP with zoledronic acid preparations. The proactive principle of OP therapy has shown its feasibility and cost-effectiveness in real clinical practice.

## P1200

### THE EFFECT OF PAIN COPING TRAINING ON RESILIENCY AND QUALITY OF LIFE-RELATED OUTCOMES AMONG INDIVIDUALS WITH OSTEOARTHRITIS: A SYSTEMATIC REVIEW

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**Objective:** Pain coping skills training (PCST) is a non-pharmaceutical pain management practice that uses cognitive and behavioural techniques to manage pain and improve sense of control. The purpose of this study was to examine the impact of pain coping training on resiliency and quality of life in osteoarthritis patients.

**Methods:** The PICOS (Participants, Intervention, Comparison, Outcomes, and Study Design) framework guided this study. CINAHL, Cochrane Library, PubMed, and Web of Science were searched for key concepts. Studies included were (a) RCTs, (b) utilized PCST alone or combined with other treatment, (c) Measured QoL and resilience, (d) had a mean age of 50+, (e) had knee or hip OA. Two raters assessed articles for inclusion and evaluate study quality using modified PEDro scale.

**Results:** Search strategies identified 12284 articles for screening; seven met inclusion criteria. Included studies varied by intervention type, and methodological quality. The average modified PEDro score for each research was 14, suggesting that high-quality RCTs were chosen. All studies demonstrated preliminary treatment benefits for pain and QoL; none reported effect on resilience.

**Conclusion:** In older adults with OA, PCST reduced pain and improved QoL. However, no study has examined at the impact of PCST on resilience so far. While, the development of resilience is necessary to fully understand the adaptive status of older persons to OA as a result of pain coping mechanisms, future study reporting the impact of PCST on resilience is crucial.

P1201

### A SYSTEMATIC REVIEW AND CRITICAL APPRAISAL OF QUALITY INDICATORS TO ASSESS OPTIMAL CARE FOR FRAGILITY HIP FRACTURE

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**Objective:** Fragility hip fractures are a public health problem. Quality indicators for hip fracture care can reduce variability among healthcare centers, promote equity, and enable better use of healthcare resources. They have also been shown in other countries to improve patient outcomes. However, there is currently no proposal in Mexico that fits the Mexican healthcare system. We aimed to identify and critically evaluate quality indicators for optimal care for fragility hip fractures.

**Methods:** A systematic review of the literature was conducted in July 2022 to identify quality indicators for fragility hip fractures. English-language articles published from 2012 to 2022 in PubMed, Cochrane Library, and Google Scholar were included. Systematic reviews, meta-analyses, clinical practice guidelines, and consensus documents were included. Publications from the Fragility Fracture Network (FFN) Hip Fracture Registry Working Group were also included. Search strategies were planned and recorded using MeSH terms, Boolean operators, and advanced search techniques for hip fracture, quality indicators, quality standards, and key performance indicators. The abstracts of the articles found were reviewed. Duplicates, lack of agreement between the title, objectives, and body of the article, incorrect identification of the type of published article, and incomplete results were excluded. The Appraisal of Indicators through Research and Evaluation (AIRE) tool was used to establish the indicators' quality. A result greater than 50% for each indicator or domain was interpreted as high methodological quality. The level of evidence and recommendation for each of the indicators found were analyzed using the Scottish Intercollegiate Guidelines Network (SIGN) tool. The study was registered in PROSPERO CRD42022339800.

**Results:** A total of 539 publications were obtained from databases and five from the FFN, of which 15 articles were included for the review of quality indicators. Fifty-four indicators were extracted and evaluated using the AIRE tool, after which ten were removed due to poor methodological quality, leaving a total of 44 indicators. They were classified according to the time of application (preoperative, intraoperative, or postoperative) and type (structure, organization, or results).

**Conclusion:** We systematically derived and assessed a set of quality indicators using a robust framework that provides clear definitions of the fragility hip fracture care. Identifying indicators with high validity represents the first step in adapting and adopting a proposal that can improve patient outcomes for hip fractures in Mexico.

P1202

### YOUNGER AGE AND BEING MODERATELY ACTIVE ARE ASSOCIATED WITH HIGHER RATE OF BONE RESORPTION AMONG MALAYSIAN POSTMENOPAUSAL WOMEN

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**Objective:** Bone resorption is an active process mainly regulated by oestrogen throughout a woman's lifecycle to maintain its balance with bone formation. However, women who undergo menopause have a lower level of oestrogen in the body, which trigger a higher rate of bone resorption. A higher bone resorption rate encourages the development of bone disorders whereby osteoporosis is the most common among older women. The current cross-sectional study determined the factors associated with a higher rate of bone resorption in the body among

**Methods:** Anthropometric measurements (e.g., body weight, height, body fat percentage and waist circumference) of the respondents were taken. The respondents were interviewed to obtain information on their socio-demographic characteristics, smoking behaviour, physical activity and dietary intake. Bone resorption rate was determined based on the amount of serum C-terminal telopeptide of type I collagen (CTX-1) in the fasting blood samples of the respondents.

**Results:** In the stepwise multiple linear regression, being younger ( $b = -0.193$ ,  $p < 0.01$ ) and moderately active ( $b = 0.165$ ,  $p < 0.05$ ) were associated with higher serum CTX-1, but not the duration of menopause, educational level, monthly household income, anthropometric indices, smoking behaviour and dietary intake.

**Conclusion:** Younger age and moderately active women had a higher rate of bone resorption. Future research is warranted to determine the impact of physical activity in terms of frequency, duration and intensity performed by older women on stimulating bone resorption while taking into account the age factor.

P1203

**MUSCULAR FACTORS INVOLVED IN HIP OSTEOARTHRITIS**P. Rivas Calvo<sup>1</sup>, F. Rivas Santirso<sup>2</sup>

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**Objective:** Review what the scientific literature tells about analyzing the musculoskeletal factors involved in hip osteoarthritis.

**Methods:** A literature search was conducted in the electronic databases PubMed, ScienceDirect, Cochrane and Dialnet within the last 10 years applying the selection criteria and including only randomized clinical trials through the search descriptor: "Hip osteoarthritis" AND "Muscle activity" AND "Electromyography, 9 articles were obtained out of the initial 271.

**Results:** Most studies found different musculoskeletal alterations that are at the level of muscle activity of the gluteus medius as in the gluteus maximus, at the level of the force of contraction in the extensor muscles and hip abductor as a knee extensor and an asymmetry in the hip abductor musculature using several measurement techniques that allow us to relate different types of musculoskeletal deficit.

**Conclusion:** In patients with hip osteoarthritis, alterations are observed in: walking, climbing or descending stairs, getting up and sitting in a chair or other activities of daily living with a more or less important severity in relation to the development of the disease. These alterations are directly related to muscular factors at the level of muscle mass or strength potential, at the level of symmetry and activation between the affected limb compared to the unaffected limb. It has been observed that in muscles such as the gluteus maximus (GMx), gluteus medius (GLM), fascia lata tensor (TLF), semitendinosus (ST), vastus lateral quadriceps (VL) and tibialis anterior (TA) there are notable differences between the affected and unaffected limb in a patient suffering from hip osteoarthritis. The results obtained with the different techniques of measures in the different studies allow us to conclude that in a patient suffering from hip osteoarthritis there is a deficit of strength at the level of the flexor / extensor / hip abductor muscles, an alteration of contraction at the level of the middle gluteo and an asymmetry at the level of muscle mass at the level of gluteo major and quadriceps.

P1205

**TUMOR-INDUCED OSTEOMALACIA (TIO) AND ACHONDROPLASIA**N. Elias<sup>1</sup>, F. Pierini<sup>2</sup>, M. Zanchetta<sup>3</sup>, M. Curriá<sup>1</sup>

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**Introduction**

Tumor-induced Osteomalacia (TIO) is a rare paraneoplastic syndrome related to excessive production of FGF-23 by tumors of mesenchymal origin.

**Objective:**

To describe the case of TIO and achondroplasia.

**Clinical Case**

A 37-year-old woman has been complained of weakness, progressive muscle and bone pain for 4 months. She had Achondroplasia, type 2 Diabetes and Hypothyroidism.

Physical Examination: Height 120cm, Weight: 67kg, Body mass index:46. Obesity.

Basal laboratory tests revealed: High serum bone alkaline phosphatase 81.6 UI/l (NR: 6-26), hypophosphatemia 1.83 mg/dl (NR: 2.5-4.5), high urinary phosphorus 1050 mg/24 hrs (NR:350-900), normal serum calcium 9.26 mg/dl (NR: 8.5-10.5), PTH: 65 pg/ml (NR:15-65), 25 OH vitamin D 29: (NR≥ 30).

She received phosphate supplements, vitamin D and calcitriol with clinical improvement.

Bone scan revealed increased condrocostal uptake and positive findings in spine, humerus and femur.

MRI of the knees revealed fractures.

Xtreme CT of distal radius and tibia revealed alteration of trabecular and cortical architecture. FGF23: 170.48 mg /dl (NR 0-134). PHEX: negative.

Ga- DOTATE PET /TC: demonstrating localization of tumor in left humerus.

Biopsy of left humerus was performed and mesenchymal tumor was confirmed.

Surgical resection was performed. The histopathology revealed a mesenchymal tumor.

After the procedure, serum phosphate did not normalize. Medical treatment for hypophosphatemia was resumed and she finally received human anti-FGF23 antibody 0.5mg/kg with excellent response.

**Conclusion**

TIO represents a diagnostic and therapeutic challenge. Surgery is the treatment of choice. There was no relationship between TIO and achondroplasia described. Anyway the patient persist with hypophosphatemia despite the surgery so we decided to prescribe human antiFGF23 antibody.

P1206

### PREVALENCE OF OSTEOPOROSIS AND OSTEOPENIA AMONG OLDER ADULTS IN A COMMUNITY-BASED SETTING IN RIYADH, SAUDI ARABIA

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#### Background:

Osteoporosis is a disease of bone density. It makes bones fragile and easy to break. Osteoporosis is overlooked and undertreated. Saudi Arabia issued a national plan promoting the early diagnosis and management of osteoporosis. Few studies are available in Saudi Arabia estimating the prevalence of osteoporosis in the Saudi older adult population. Our aim is to measure the prevalence of osteoporosis and osteopenia among older adult patients.

#### Methodology:

This retrospective cross-sectional study is based on data gathered from patients  $\geq 60$  years of age. Data were collected from January 1, 2016, to December 31, 2021, for patients who were attending family medicine clinics at King Faisal Specialist Hospital & Research Centre in Riyadh, Saudi Arabia, who were screened using dual-energy X-ray absorptiometry (DXA). Patients who have secondary causes of osteoporosis were excluded.

#### Results:

A total of 1,302 patients were studied during the course of data collection. The mean age was 68.26. Out of the studied subjects, 75% were female and 25% were males. The prevalence of osteoporosis was 8.2% and 11.8% in femoral and lumbar bone mineral density (BMD) results, respectively. The prevalence of osteopenia based on femoral and lumbar BMD results was 50.2% and 41.2%, respectively.

#### Conclusion:

Osteoporosis and osteopenia are prevalent in the Saudi older adult population. Multiple clinical characteristics have been associated with low bone density disease. Thus, it is important to reinforce primary care physicians' efforts for early screening and treatment of the Saudi older adult population based on their clinical and demographic risk factors.

P1207

### AMONG OLDER ADULTS A COMMUNITY-BASED SETTING IN RIYADH, SAUDI ARABIA

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Background: Osteoporosis is defined by low bone mineral density (BMD). BMD can be measured from femoral neck, lumbar spine or other skeletal bones site. Discordance is defined as the presence of different categories of t-scores 2 skeletal sites; of same patient. The aim of this study is to estimate the prevalence of femoral and lumbar bone discordance in a community-based setting in Riyadh, Saudi Arabia.

Methodology: Retrospective cross-sectional study. Included Patient  $\geq 60$  years attending family medicine clinics at King Faisal Specialist Hospital in Riyadh, Saudi Arabia and were screened by dual xray absorptiometry (DXA) between 1/1/2016 –31/10/2022. Discordance is categorized as major (osteoporosis in one site and normal in other site), minor (osteoporosis in one site and osteopenia in other site or osteopenia in one site and normal in another site).

Results: A total of 1431 subjects with mean age of 68.1 years. Major discordance was documented in 32 (2.2%) of participants. Minor discordance was found in 563 patients (39.3%) of participants. Whereas 834 participants (58.3%) were concordant.

Conclusion: Discordance is prevalent among Saudi population. Hence physicians should be vigilant when analyzing DXA results while diagnosing and excluding osteoporosis in high risk patients.

P1208

### COMPARISON OF SAUDI FRAX WITH AND WITHOUT BMD IN THE PREDICTION OF FRACTURE IN A COMMUNITY-BASED SETTING IN RIYADH, SAUDI ARABIA

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Introduction: Osteoporosis is a bone disorder characterized by decreased bone mineral density (BMD). BMD is measured by

Dual-energy X-ray absorptiometry (DXA). The Fracture Risk Assessment Tool (FRAX) is a worldwide risk-assessment tool used to predict the 10-year fracture risk with or without incorporating BMD. Currently, there is limited data to estimate the FRAX score and compare the use of the FRAX score with and without BMD in Saudi Arabia.

**Methodology:** A retrospective cross-sectional study was conducted on patients aged  $\geq 60$  years that were seen at a family medicine clinic in Riyadh, Saudi Arabia between January 2016 and October 2022. Data gathered included baseline characteristics and the FRAX tool requirements.

**Results:** 1431 subjects were included with a mean age of 68.1 years. The mean of the FRAX scores with BMD was 0.78% for hip fractures and 3.3% for major osteoporotic fractures. The mean of FRAX scores without BMD was 0.7% for hip fractures and 3% for major osteoporotic fractures.

**Conclusion:** FRAX without BMD accurately predicted fracture risk compared to FRAX with BMD. This is helpful in situations where access to DXA is limited.

### P1209 CHARACTERISTIC VARIABLES FRAILTY SYNDROME ASSESSED WITH THE SHORT FALLS EFFICACY SCALE-INTERNATIONAL IN GERIATRIC WARD PATIENTS

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**Introduction.** Fear of falling is a very common problem among older people, affecting at least 25% of the population who have experienced falling in the past. Fear of falling is an important psychological consequence associated with falls and a significant public health concern. The study aimed to verify an association between characteristic features of frailty syndrome elderly patients and the fear of falling measured by the short version of The Falls Efficacy Scale-International (Short FES-I).

**Material and methods.** We performed a cross-sectional study of 199 patients consecutively admitted to the geriatric ward at the turn of 2019 and 2020. The number of drugs regularly used by the participants and the number of diseases were recorded. Moreover we analysed comprehensive geriatric assessment results, the severity of fear of falling measured by The Short FES-I, falls in the last 12 months, handgrip strength (HGS), fractures after the age of 60, gait speed and many more variables.

**Results.** The average age of participants was 81 (6.35) years, and 76.3% were women. 23.1% (P=0.037) experienced fractures in old age and 42% of them reported more than one fall in the last 12 months. According to the Short FES-I scale, patients specifying the severity of the fear of falling was classified as "low" (9.0 (8.0-12.0) points; 41% of patients), "medium" (16.0 (15.0-18, 0

points; 23% of patients and "high" (25.0 (23.0-27.0) points; 36% of patients); no patient reported no fear of falling. The higher score of the Short FES-I, suggesting the increased fear of falling, was observed in patients with lower ( $\leq 0.8$  m/s) gait speed [median (Me) 17.0, IQR, 13.0-23.0; versus 11.0 (8.0-15.0) in gait speed  $> 0.8$  m/s, P<0.001] and those with low ( $< 27$ kg in men and  $< 16$ kg in women) HGS [Me, 14.0, IQR (10.0-22.0) versus Me 17.0, IQR (12.5-23.0) in those with normal HGS, P=0.048]. Also, patients who reported fractures after age 60 were more afraid of falls [Me18.5, IQR (14.0-24.0)] than the non-fracture group [Me, 15.0; IQR (10.0-22.0)], P=0.037].

**Conclusions.** We proved that past fractures, decreased walking speed and HGS - characteristic variables features of frailty syndrome were significantly connected with the fear of falling assessed with the Short FES-I during the patient's stay in geriatric ward patients.

**Key words:** fear of falling, fracture, older people, falls, FES-I, frailty

### P1210 FRACTURE FREQUENCY, RISK FACTORS AND OSTEODENZITOMETRIC FINDING WITH POST-MENOPAUSAL WOMEN AT THE FIRST EXAMINATION

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**Background:** Reduced bone density is the most frequent cause of fractures with post-menopausal women.

**Objectives:** Analyse risk factors, types of fractures, age and osteodenzitometric finding with post-menopausal women at the first examination.

**Methods:** data obtained from the first examination are analyzed. All female patients have had osteodenzitometric examination test done on (DXA apparatus Hologic) and risk factors analysis. Fractures have been evaluated based on radiography. Data have been analysed by statistical method of descriptive analysis.

**Results:** 910 patients were examined, average age of 68,67 years. Distribution according to age groups from 51-60 years old 250(27,5%), from 61-70 years old 348(38,2%), from 71-80 years 312(34,3%).

Risk factors with the observed patients are previous fractures:343(37,7%); fractures in the family:298(32,7%); smoking- 209(22,9%); low BMI:95(10,4%); more than three falls per a year:84(6,2%); early menopause:71(7,8%); rheumatid arthritis 36(3,9%).

Regarding the type of fracture observed at the first examination, the most fractures refer to non vertebral fractures 490(53,7%). The most frequent type of non-vertebral fracture is a fracture of forearm 205(22,5%), upper arm 112(12,3%), hip 52(5,8%), thigh 47(5,2%), femoral diaphysis 41(4,5%), ribs 33(3,6%). In regard to age, non-vertebral fractures are present in all age groups and the

most often found are in the group from 61-70 years old out of total number of fractures in 253(51,7%), then in the group from 71-80 years old in 157(32,1%) and the least found are in the age group of patients from 51-60 years old found in 80(16,2%) patients.

Vertebral fractures accounted for 176(19,4%). Vertebral fractures are localized on LS and TH spine part and most often with patients at the age of 61-70, found with 102(58,2%) patients, then in the group of 71-80, found with 61 patients(34,6%), and the most rare in the group from 51-60years old, found with 13 patients(7,2%).

T-scor on LS spine part was in the zone of osteopeny with 443 (48,7%)patients, osteoporosis with 311(34,2) patients, and with 156(17,1) patients it was found to be less than 1SD.

T-scor on the hip was in the zone of osteopeny, found in 351(38,6%), osteoporosis with 438(48,1%), and below 1 SD kfound in 121 patients(13,3%).

**Conclusions:** The analysis with post-menopausal women indicated the most frequent fractures in the zone of osteopeny at the age of 61-70, and when risk factors are concerned, previous fractures and fractures in teh family account for the most frequent ones. High percentage of non-vertebral fractures in regard to vertrebal fractures may be explained by the fact that the analysed data were the data taken during the first examination when practically searching for asymptomatic vertebral fractures starts.

**Disclosure of Interest:** None Declared

## P1211

### BONE STATUS ASSESSMENT WITH REMS: AN UPDATE ON FRACTURE RISK PREDICTION

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Fragility fractures caused by osteoporosis affect 23 million European citizens, representing the most challenging struggle for healthcare systems. Even worse, fractures are projected to increase by 25% in 2034<sup>1</sup>. Clearly, healthcare infrastructures demand for reliable diagnostic approaches with the aim to improve the management of osteoporosis and the prevention of fracture risk or re-fractures.

Despite the longstanding use of the current X- ray densitometric techniques, the main shortcomings that tremendously affect them relate to patient positioning, manual post-processing analysis and artifacts leading to misdiagnoses.

In this context, the ultrasound-based Radiofrequency Echographic Multi Spectrometry (REMS) technology can actually answer unmet clinical needs. This technique overcomes most of DXA pitfalls as it allows to perform a non-invasive, more accurate and less expensive osteoporosis diagnoses through a simple echo-

graphic scan of the main anatomical bone reference sites (lumbar spine and proximal femur). Multicentric clinical studies have demonstrated the applicability of REMS for the diagnosis of osteoporosis along with the fracture risk prevention and prediction<sup>2-4</sup>. Thanks to the automatic data processing, the ultrasound signals containing the whole information backscattered by the bone are kept, allowing for accurate quantitative and qualitative measurement of the bone status independently of patient positioning. In addition, artefacts, such as calcifications, osteosclerosis, surgical clips and metallic prosthesis are automatically excluded, thanks to the recognition of unexpected spectral profiles<sup>5-6</sup>.

As indicated in recently published Italian Institute of Health Guidelines<sup>7</sup>, REMS enables in a safe and accurate monitoring of bone status across a spectrum of different populations and compromised clinical conditions, including pregnant women, paediatric subjects, bedridden patients and individuals at risk of secondary osteoporosis due to pathological conditions (e.g. diabetes, breast cancer, rheumatoid arthritis, chronic kidney disease, anorexia)<sup>8-12</sup>. In this context, the Symposium will discuss about the need to prevent fracture occurrence and reduce the re-fracture probability through the evaluation of bone quantity and quality by means of REMS (Radiofrequency Echographic Multi Spectrometry) technology.

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## P1212

### FRACTURE RISK ASSESSMENT BY REMS IN PRIMARY AND SECONDARY OSTEOPOROSIS

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**Objective:** To review the clinical applications of Radiofrequency Echographic Multi Spectrometry (REMS) for primary and secondary osteoporosis together with fracture risk prediction.

**Material and Methods:** An up-to-date peer-reviewed research on the topic has been performed.

**Results:** REMS is a non-ionizing technology for bone health status assessment [1]-[2] and fracture risk prediction [3] through bone mineral density (BMD) estimation. To improve the management

of fragility fractures, a new parameter based on REMS technology, namely Fragility Score (FS), has been developed to estimate skeletal fragility [1], [2].

This technology results accessible to countless patients categories: from elderly patients at risk of primary osteoporosis [3], [4], to individuals affected by secondary osteoporosis due to pathological conditions [5]– [10]. European multicenter clinical studies confirmed the diagnostic accuracy of this non-ionizing technique in comparison with the clinical gold standard DXA in a wide population spanning from pre-menopausal to post-menopausal women [3], [4].

Concerning secondary osteoporosis conditions, recently published studies reported that REMS investigation improved osteoporosis diagnosis across a myriad of chronic diseases, including kidney disorders (CKD), type 2 diabetes and rheumatoid arthritis, that considerably soar the risk of fragility fractures [5], [8], [11]. Patients affected by a severe eating disorder, anorexia nervosa, were identified to be at higher risk of bone fragility with respect to their healthy counterparts upon a REMS examination [12].

Furthermore, REMS-based FS proved to better discriminate between fractured and non-fractured women compared to DXA- and REMS-based T-scores. When comparing fractured and healthy patients with primary and disuse-related osteoporosis, the FS accurately identified patients with impaired skeletal fragility [7]. Finally, thanks to the absence of ionizing radiation this technology could be safely employed to investigate the bone health status during pregnancy, reporting a marked BMD reduction, as documented in the literature [13].

Conclusion: This whole clinical evidence demonstrates the diagnostic usefulness of REMS not only for early diagnosis of primary and secondary osteoporosis but also for fracture risk prediction. For these reasons, REMS was approved by the Italian Ministry of Health and acknowledged in the National Guidelines for the «Diagnosis, risk stratification and continuity of care of fragility fractures»[14].

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## P1213

### REMS FOR THE EVALUATION OF BONE QUANTITY AND QUALITY

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Objective: To illustrate the clinical applications of Radiofrequency Echographic Multi Spectrometry (REMS) for a reliable assessment of bone quantity and quality.

Material and Methods: REMS-based parameters are calculated by comparing the spectral profiles of the ultrasound signals acquired from a patient under inquiry with healthy or pathological spectral models matched for age, gender, body mass index, and anatomical site.

Results: Upon a spinal and femoral ultrasound examination, the REMS technology is capable to simultaneously determine bone quantity and quality. Bone quantitative assessment results from the estimation of bone mineral density (BMD), T- and Z-scores, allowing for the diagnostic classification of patients into the osteoporotic, osteopenic, or healthy classes. Across several multicenter studies, the REMS approach achieved optimal accuracy in effectively discriminating osteoporotic patients, in addition to show a high diagnostic concordance with the corresponding DXA-measured parameters [1]–[4]. Despite the effectiveness of the REMS-measured T-score as a good predictor for the risk of incident fragility fractures in a female population [5], a unique REMS-based parameter associated to bone quality has been developed. To this end, the Fragility Score (FS) reflects the degree of skeletal fragility regardless of BMD [6], [7]. A recent publication reported the superior performance of FS for the fracture risk prediction compared to REMS- and DXA-measured T-scores [8].

Furthermore, REMS investigation improved osteoporosis diagnosis in individuals suffering from chronic kidney diseases (CKD), including patients undergoing kidney transplant and peritoneal dialysis (PD), confirming a high risk of bone fragility in these patients [9], [10]. Lastly, REMS diagnosis is not affected by the presence of aortic calcifications nor by osteoarthritis-related bone deformities, that in contrast, induce an artefactual BMD alteration with standard DXA [11].

Conclusion:

Overall, this non-ionizing approach represents an effective diagnostic tool for the early detection and subsequent prompt management of bone fragility in primary care. Bibliography

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## P1214

### PRECISION. REPEATABILITY AND DIAGNOSTIC ACCURACY OF REMS TECHNOLOGY

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**Objective:** To report precision, repeatability and diagnostic accuracy of Radiofrequency Echographic Multi Spectrometry (REMS) developed for the diagnosis of osteoporosis and prediction of fragility fractures.

**Material and Methods:** The scientific evidence on precision studies and diagnostic accuracy was collected from the literature. In agreement with the recommendations from the International Society for Clinical Densitometry (ISCD), repeatability was assessed by performing two consecutive measurements by the same oper-

ator (intra-operator) or two different operators (inter-operator) at both spine and femur. Repeatability was calculated as root-mean-square coefficient of variation (RMS- CV).

**Results:** Multicenter clinical studies performed worldwide, indicated optimal accuracy of REMS, expressed as sensitivity and specificity above 90% in discriminating osteoporotic patients along with excellent agreement with DXA of about 88 %) for BMD estimation. From precision studies the best achievable one resulted in RMS-CV=0.38% for spine and 0.32% for femur. Likewise, inter-operator repeatability recorded values in the order of RMS-CV=0.50% at both bone ROIs. Additional precision studies involving a multiracial group of women, demonstrated small precision errors, confirming the accessibility of this technology to distinct populations and clinical scenarios [1]. For instance, high precision was achieved in obese subjects with increasing body mass index similarly to subjects with normal weight. Consistently with the BMD estimation, low precision errors are reported for the REMS-based Fragility Score (FS), a parameter that effectively determined skeletal fragility in patients at risk of fractures [2] in the general population as well as in disused- related osteoporosis [3]. Moreover, thanks to the use of a handy probe, the REMS examination is not affected by improper patient positioning as it typically occurs in conventional densitometry.

**Conclusion:** REMS-based measurements are able to detect minimal bone changes, not attributable to instrument measurement errors nor operator experience. Providing accurate estimations and ensuring correct diagnosis, this non-ionizing technology becomes extremely suitable for short-term monitoring of the bone health status change in routine clinical practice.

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## P1215

### REMS EMPLOYMENT IN CLINICAL ROUTINE: THE POLISH EXPERIENCE

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**OBJECTIVE:** Bone densitometry by dual-energy X-ray absorptiometry (DXA) in patients with rheumatic diseases is often a technical challenge due to some disease-related artefacts such as osteophytes, syndesmophytes, soft tissue calcifications or compression fractures that can falsely increase the bone mineral density value. Radiofrequency echographic multi- spectrometry (REMS) is a new non-ionizing bone densitometry method based on the automatic analysis of ultrasound echoes backscattered from bone. The objective of the study was to share the authors' clinical

experience with the use of REMS densitometry in patients with rheumatic diseases.

**METHODS:** Patients hospitalized in the Department of Rheumatology, Systemic Connective Tissue Diseases and Immunotherapy of Rheumatic Diseases underwent DXA and REMS scans. An in-depth comparative analysis of the obtained densitometric results was carried out based on the patients' full medical history and available imaging tests.

**RESULTS:** Clinical cases were identified in which the DXA results were unreliable due to disease-related artefacts, while the REMS results were clinically reliable thanks to its automatic algorithm that eliminates non-diagnostic scans. The study also identified some potential technical limitations of the REMS method that should be taken into account in clinical practice.

**CONCLUSION:** Clinical experience with REMS in patients with rheumatic diseases – a population in which the performance and interpretation of densitometry can be extremely problematic – showed some particular advantages of REMS over DXA. The observations made may be helpful in planning future studies and specifying the role of REMS densitometry in wider clinical practice.

P1216

### TAKE HOME MESSAGE

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**Objective:** To disseminate the knowledge on a technologically advanced solution, namely Radiofrequency Echographic Multi Spectrometry (REMS) for an accurate and effective osteoporosis diagnosis.

**Material and Methods:** Rigorous evaluation of all the peer-reviewed scientific evidences that support the clinical validity of REMS has been performed. Promising perspectives that this technology can bring concerning early diagnosis of osteoporosis, bone quality assessment, prompt detection of fracture and cost savings have been pointed out.

**Results:**

REMS is a non-ionizing technology for bone health status assessment [1] and fracture risk prediction [2] applied to spine and femur. This approach enables the simultaneous determination/quantification of bone quantity and quality through the estimation of the standard bone parameters along with a unique REMS- based Fragility Score (FS) [3]. The FS is an indicator of skeletal frailty that predicts the fracture risk by providing risk classes, so as to target medical interventions especially for fragile categories.

Precision studies demonstrated that the REMS measurement is accurate, not influenced by random instrument measurement errors or operator experience, but instead enables the true detection of minimal bone changes, thereby being adequate for short-term follow-up examinations. Thanks to its safety, numerous populations from distinct clinical scenarios can benefit from the use of REMS: not only post- menopausal patients at risk of

primary osteoporosis, but also individuals affected by secondary osteoporosis caused by underlying pathologies. In addition, fragile categories including paediatric patients and pregnant women can have access to a safe bone health assessment.

**Conclusion:**

This diagnostic technique paves the way for a more accurate assessment of bone health associated with a variety of bone-related disorders, in the oncological, nephrological, haematological, orthopaedic fields, etc. Exploiting optimal measurement precision along with bone quantity/quality assessment, this technology can facilitate therapeutic short-term follow-up, maximize population prevention programs and cost savings.

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**ADDRESSING LOCAL BONE LOSS THROUGH TARGETED BONE FORMATION – FROM THEORY TO CLINICAL PRACTICE**M. L. Brandi<sup>1</sup>, A. Kurth<sup>2</sup>, E. Guerra-Farfán<sup>3</sup>, A. Fraguas<sup>4</sup>

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This symposium will be guided by an expert panel of clinical researchers who are interested in understanding the role of procedural approaches to address local bone loss in patients at high-risk of hip fracture by leveraging early learnings from clinical implementation.

Index hip fragility fractures are associated with a significant impact on patient mortality, mobility, and future fracture risk. Despite the availability of several clinically proven pharmacological therapies, unmet needs in care persist. Additionally, the use of augmentation techniques to strengthen the hip has been documented but, to date, has not been well adopted. These factors have led to the development, study, and commercial introduction of a novel procedural treatment to address local bone loss. The Local Osteo-Enhancement Procedure (LOEP) has been utilized to treat patients at high-risk of fracture in both clinical study and multidisciplinary clinical care pathway settings.

To explain how this type of treatment may help physicians improve patient care, the panel of experts will discuss key topics related to the target patient population, clinical unmet needs, the rationale for this approach and their early clinical experience.

## SY2

**THE FAST PATH IN OSTEOPOROSIS: CORRECTING THE COURSE**UCB Ucb<sup>1</sup><sup>1</sup>UCB, Brussels, Belgium

We look forward to welcoming you to this interactive clinical case-based symposium, co-chaired by Professor Maria Luisa Brandi (University Hospital of Florence, Italy) and Dr Laia Gifre (Germans Trias i Pujol University Hospital, Barcelona, Spain), to explore the paradigm shift occurring towards starting strong with a bone-forming agent first followed by an antiresorptive in patients with osteoporosis at high risk of fracture.<sup>1,2</sup>

**Bone-forming agents first: Embracing change in the treatment paradigm**

Professor Erik Eriksen (Oslo University, Norway)

Professor Erik Eriksen will lead a case-based presentation focusing on assessment of fracture risk, the rationale that underpins the shift towards a build bone first treatment approach, including guideline recommendations, and finishing with an overview of ro-

mosozumab and its dual mechanism of action.<sup>1-3</sup>**Romozumab first for patients at very high risk of fracture: Standing out from the crowd**

Professor Serge Ferrari (Geneva University Hospitals, Switzerland)

Professor Serge Ferrari will continue the case-based discussion, focusing on the clinical data, supporting romozumab and the benefits of first-line treatment with romozumab in postmenopausal women with severe osteoporosis at high risk of fracture.<sup>4,5</sup> Finally, Professor Ferrari will discuss key data for the benefit-risk profile of romozumab in these patients.<sup>3-5</sup>

**Romozumab first in practice: Clinical conundrums**

Professor Erik Eriksen and Professor Serge Ferrari

In this discursive final session, our experts will present a number of different clinical scenarios, exploring the different treatment options that may be considered in each of these patients.

This promotional symposium is sponsored by UCB Biopharma SRL and is co-supported by Amgen. UCB/Amgen medicines will be discussed at this meeting.

**References**

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<sup>▼</sup> This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions.

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Intended for healthcare professionals

Date of preparation: February 2023

## SY3

**SPOTLIGHT ON HYPOPHOSPHATASIA: SHINING A LIGHT ON YOUR ADULT PATIENTS**K. Dahir<sup>1</sup>, R. Keen<sup>2</sup>, C. Tornero<sup>3</sup>

<sup>1</sup>Division of Endocrinology and Metabolism, Vanderbilt University Medical Center, Nashville, TN, United States, <sup>2</sup>Centre for Metabolic Bone Disease, Royal National Orthopaedic Hospital, London, United Kingdom, <sup>3</sup>Rheumatology Department, Hospital Universitario La Paz, Madrid, Spain

**Objectives**

Hypophosphatasia (HPP) is a rare, inherited, metabolic disorder caused by tissue-nonspecific alkaline phosphatase (TNSALP) deficiency, characterised by poor skeletal mineralisation, muscle weakness, and ambulatory difficulties.<sup>1,2</sup> This presentation discusses the symptoms, known genetic variant characterisation, and management strategies, including enzyme replacement therapy (ERT), in adult patients with HPP.

**Materials and Methods**

A review of published literature and clinical experiences of the multidisciplinary faculty will provide information to recognise HPP symptoms and understand the diagnostic and management approaches in adult patients with HPP. Clinical experience from the UK with ERT in patients will be presented.

**Results**

In adult patients with HPP, commonly reported symptoms include musculoskeletal pain, recurrent and poorly healing fractures and dental abnormalities.<sup>2-4</sup> HPP assessments include persistently low age- and sex-adjusted ALP activity, 6-minute walking test, and validated scales to assess physical functioning, pain, and health-related quality of life (HRQoL).<sup>1</sup> Genetic testing may help confirm a diagnosis and identify other family members with undiagnosed cases.<sup>1</sup> HPP may be associated with a high disease burden, changing clinical manifestations, and increasing HRQoL impairment, regardless of the age of onset, which may reflect disease progression.<sup>2</sup> Management of adults with paediatric-onset HPP involves a multidisciplinary approach and ERT to replace deficient TNSALP to improve bone mineralisation, skeletal abnormalities, patient functioning and HRQoL.<sup>1,3-5</sup> Safety and adverse events associated with ERT will be discussed.

**Conclusions**

HPP is a chronic disorder with increasing impairment over the patient's lifespan. Recognition and diagnosis of adult patients with paediatric-onset HPP is important to initiate disease management strategies, aiming to improve bone mineralisation, patient functioning, and HRQoL.

**References**

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- 3 Hofmann CE et al. *J Clin Endocrinol Metab* 2019;104:2735-47
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**Support**

Supported by Alexion, AstraZeneca Rare Disease

## SY4

**KYOWA KIRIN - SPONSORED MEET-THE-EXPERT SESSION - CHALLENGING THE STATUS QUO: MANAGEMENT OF ADULTS WITH XLH**R. Keen<sup>1</sup>

<sup>1</sup>Royal National Orthopaedic Hospital, Stanmore, United Kingdom

In this highly interactive session, Professor Richard Keen, an expert in metabolic bone diseases, will discuss the latest clinical data on long-term treatment of adults with X-linked hypophosphataemia (XLH). This session offers a valuable opportunity to discuss XLH with an expert and examine the potential impact of the latest data on your future clinical practice and patients.

XLH is a rare, genetic and progressive disorder characterised by excess fibroblast growth factor 23 and subsequent renal phosphate wasting.<sup>1,2</sup> Clinical manifestations of XLH in adults, including early onset osteoarthritis, enthesopathy, fractures and pseudofractures along with symptoms of pain, stiffness and fatigue, place a significant burden on adults living with XLH.<sup>1,3,4</sup>

Prof. Keen will examine the long-term outcomes of maintaining treatment, in addition to the impact of treatment interruption and restart, on biochemical parameters and patient outcomes, including pain, stiffness, fatigue and physical function. Prof. Keen will also share the patient perspective of the treatment journey, assess treatment decisions, and discuss best practice management of adults living with XLH and how this may be affected by the latest clinical data.

This invaluable session will equip delegates with knowledge on the latest clinical data and expert insights, based on Prof. Keen's clinical experience, to inform future clinical decision-making. The audience are encouraged to actively participate and help shape the engaging discussion, with multiple opportunities throughout to ask the expert your questions.

**References**

- 1 Haffner D, et al. *Nat Rev Nephrol*. 2019;15:435-55.
- 2 Carpenter TO, et al. *J Bone Miner Res*. 2011;26:1381-8.
- 3 Skrinar A, et al. *J Endocr Soc*. 2019;3:1321-34.
- 4 Lo SH, et al. *Qual Life Res*. 2020;29:1883-93.

**Disclosure of Conflict of Interest**

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Non-paid: Member of the IFOPA Fibrodysplasia Ossificans Progressiva Registry Medical Advisory Board, Member of the International Clinical Council on Fibrodysplasia Ossificans Progressiva, Chair of the Scientific Advisory Board for the Brittle Bone Society.

**Disclosure**

This promotional session is organised and funded by Kyowa Kirin and will contain data about Kyowa Kirin products. The event is intended for healthcare professionals who are registered for WCO-IOF-ESCEO 2023 only.

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## SY5

**THE IMPACT AND SOCIETAL BURDEN OF NONVERTEBRAL FRACTURES**M. Lorentzon<sup>1</sup>

<sup>1</sup>Geriatric Medicine, Department of Internal Medicine and Clinical Nutrition, Institute of Medicine, University of Gothenburg, Gothenburg, Sweden, Gothenburg, Sweden

A great deal of attention has focused on the clinical and socio-economic consequences of vertebral and hip fractures. There is, however, a case for considering the burden of osteoporotic fractures at other sites ("other fractures" or nonvertebral fractures). These normally include fractures at all sites, with the exception of fractures of the skull, digits, and spine. Collectively, fractures at these sites are more frequent in men and women aged 50 years or more than clinical spine and hip fractures combined. After age 50 years nonvertebral fractures account for 85% of the fracture burden in Swedish women and 84% in men<sup>1</sup>. In a global perspective nonvertebral fractures account for 84% of all fractures worldwide in 2000<sup>2</sup>.

Estimates of the disability occasioned by such fractures is problematic since there is little empirical information available on the loss of quality of life that results from these fractures. In the EU6 countries (the largest five countries of the European Union plus Sweden) in 2016, it was estimated that 66% of the population disability caused by fractures is accounted for by nonvertebral fractures in men and women 50-years and older.

Fractures are generally associated with an increase in age-specific mortality<sup>3</sup>. The pattern of mortality is similar to that after hip or vertebral fracture though the relative risk is lower. Deaths occur most frequently in the first 6 months after fracture, a component of which may be causally related to the fracture event. In the case of hip or spine fractures approximately 30% of excess deaths are causally attributed to one fracture event<sup>4</sup>. An increased risk of mortality is also observed in patients with nonvertebral fractures, other than hip fractures<sup>5</sup>.

The financial consequences of nonvertebral fractures, excluding those of the hip, are, however much less, at least to health care systems. Hospital bed-days and direct medical costs of hip fracture dominate the budgetary consequences of osteoporosis. In Europe, the total hospital costs were estimated at EUR 36.3 billion, of which 54% were accounted for by hip fracture alone<sup>6</sup>. In the EU6 countries, 92% of the overall cost for fractures were due to nonvertebral fractures<sup>7</sup>.

Nonvertebral fractures constitute an important burden to individuals and society. Agents that decrease the risk of such fractures could make an important contribution to our therapeutic armamentarium.

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## SY6

**COMPARATIVE EFFECTIVENESS OF DENOSUMAB VERSUS ORAL BISPHOSPHONATES AMONG POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS IN THE U.S. MEDICARE PROGRAM**J. Curtis<sup>1</sup>

<sup>1</sup>Division of Clinical Immunology and Rheumatology at the University of Alabama at Birmingham (UAB), Birmingham, AL, United States

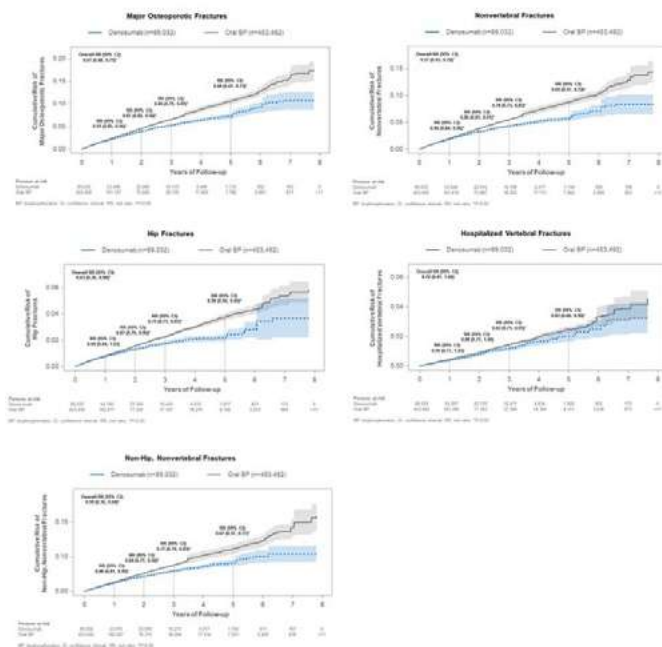
Clinical trials have shown that denosumab (Dmab) significantly increases bone mineral density at key skeletal sites more than oral bisphosphonates (BP); however, evidence is lacking from head-to-head randomized trials evaluating fracture outcomes. This retrospective observational study evaluated the comparative effectiveness of Dmab vs oral BP in reducing fracture risk among postmenopausal women with osteoporosis (PMO) in the U.S.

Female Medicare fee-for-service beneficiaries ≥66 years of age who newly initiated Dmab (n=89,032) or an oral BP (alendronate, ibandronate, risedronate; n=453,492) between January 1, 2012 to December 31, 2018 with no prior history of osteoporosis treatment, were followed from treatment initiation until the first instance of a specific fracture outcome, treatment discontinuation (ie, the end of treatment supply + 60-day allowable gap) or switch, Medicare disenrollment, death, or end of available data (December 31, 2019). A doubly robust inverse-probability of treatment (weights estimated from multivariate logistic regression models) and censoring (weights estimated from multivariate Cox Proportional Hazards regression models) weighted function was used to estimate the relative risk (RR) associated with the use of Dmab vs oral BP for hip, nonvertebral (NV; includes hip, humerus, pelvis, radius/ulna, other femur), non-hip, nonvertebral (NHNV), hospitalized vertebral (HV), and major osteoporotic (MOP; NV and HV) fractures.

Overall, Dmab reduced the risk of MOP by 39% (RR=0.61; 95% CI: 0.48-0.75), hip by 37% (0.63; 0.36-0.90), NV by 43% (0.57; 0.43-0.72), NHHV by 50% (0.50; 0.36-0.64), and HV fractures by 28% (0.72; 0.41-1.02) compared with oral BP. Dmab reduced the risk of MOP fractures by 9% (0.91; 0.85-0.96) at year 1, 13% (0.87; 0.82-0.92) at year 2, 20% (0.80; 0.75-0.85) at year 3, and 32% (0.68; 0.61-0.75) at year 5. An increase in the magnitude of fracture risk reduction with increasing duration of exposure was also observed for other NV outcomes (Figure).

In a cohort of over a half million, treatment-naïve PMO, we observed robust and significant reductions in the risk of MOP, hip, NV, NHHV, and HV fractures for patients on Dmab vs oral BP. Patients who remained on Dmab for longer periods of time experienced greater reductions in fracture risk.

**Acknowledgement:** Amgen Inc



## SY7 SHORT- AND LONG-TERM DENOSUMAB THERAPY

S. Ferrari<sup>1</sup>

<sup>1</sup>Service and Laboratory of Bone Diseases, Geneva University hospital and Faculty of Medicine, Geneva, Switzerland

**Objective:** To review the short- and long-term benefits and risks of denosumab therapy, its mechanisms of action and implication of therapy duration on post-treatment effects.

**Methods:** Literature review of denosumab RCTs (FREEDOM and FREEDOM Extension), post-hoc analyses, and observational studies in post-menopausal women with osteoporosis.

**Results:** Denosumab reduces the risk of vertebral, non-vertebral and hip fractures vs placebo over three years (FREEDOM). Post-hoc analyses in higher risk sub-groups and by FRAX indicate that denosumab efficacy is greater in those at moderate to high risk

of fractures. Treatment up to 10 years (FREEDOM Extension) show continuous BMD gains at spine and hip of approx. 1%/year and 0.5%/year respectively, with a maintenance of low vertebral fracture rates and a progressive decline of non-vertebral fracture rates. This effect is observed as long as hip BMD T-scores remain lower than -1.5 T-score. Although not placebo-controlled, these long-term benefits are unlikely to be fully explained by an attrition of the susceptible patients, as shown by detailed analyses of the patient's profile remaining on therapy for up to 10 yrs. The incidence of ONJ and AFF with long-term therapy remains low and the benefits-risk ratio highly favorable –calculated as the number of fragility fractures prevented to the number of skeletal adverse events using a virtual twin model-. Although the mechanisms for the continuous BMD gain with long-term denosumab therapy remain unclear, bone biopsy studies suggest that secondary mineralization is unlikely to contribute beyond 5 yrs. After that, ongoing modeling-based bone formation in absence of bone resorption probably contributes to BMD accrual. Finally, in subjects stopping denosumab, the risk of vertebral fractures is somewhat greater upon withdrawal when therapy has lasted for more than 3 years, and preservation of BMD gains by zoledronate less than when denosumab has been given for a shorter duration.

**Conclusions:** Denosumab improves BMD and reduces fracture risk short and long-term, including in women at high risk. Despite the greater challenge of preserving BMD by bisphosphonates after long rather than short denosumab therapy, long-term protection against fragility fractures by denosumab should be maintained in high-risk women.

## SY8 ANABOLIC AGENTS IN THE SEQUENTIAL TREATMENT OF OSTEOPOROSIS

M.L. Brandi<sup>1</sup>

<sup>1</sup>F.I.R.M.O, Italian Foundation for the Research on Bone Diseases, Florence, Italy.

Although antiresorptive drugs are regarded as the mainstay of treatment for osteoporosis, bone forming (anabolic) agents are currently considered first therapeutic option for osteoporotic patients at high risk of fracture. The three available anabolics, teriparatide (TPTD), abaloparatide (ABL) and romosozumab (ROM), have been shown to be faster and more efficacious than most antiresorptive agents in increasing bone mineral density (BMD), and may be more effective at preventing vertebral and non-vertebral fractures incidence. Evidence supports the use of bone-forming treatment for limited time, followed by an antiresorptive agent to maintain gains in bone mineral density and to reduce the risk of fractures<sup>1</sup>.

However, there is still an unmet need in selecting the right anabolic with the best therapeutic sequence. There are few head-to-head comparative studies between anabolics. Differences in BMD increase have been observed between ABL and TPTD (AC-

TIVE Study) and between ROM and TPTD; furthermore, an exploratory end-point from the ACTIVE trial found a significantly higher risk reduction in major osteoporotic fractures in ABL vs TPTD. In addition, while there is no evidence of increased major adverse cardiac events (MACE) incidence with ABL and TPTD, a signal of increased MACE risk was observed with ROM on special populations<sup>1,2</sup>.

Elucidating the optimal treatment approach, there are still some controversies regarding the benefits of sequential vs combined, continuous vs cyclic anabolic therapy, and antiresorptive treatment before or after bone forming agents<sup>1</sup>.

From the current evidence, it is widely accepted today that in patients at very high risk of fracture, sequential therapy, starting with an osteo-anabolic agent and followed by a potent antiresorptive drug, would be the best strategy to achieve a fast and sustained fracture risk reduction<sup>1</sup>.

#### References:

1. Curtis EM, et al. *Aging Clin Exp Res.* 2022;34:695–714.
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## SY9

### EFFICACY AND SAFETY OF ABALOPARATIDE IN POSTMENOPAUSAL WOMEN AT HIGH RISK OF FRAGILITY FRACTURE

N.C. Harvey<sup>1</sup>

<sup>1</sup> MRC Lifecourse Epidemiology Centre, University of Southampton, Southampton General Hospital, Southampton, SO16 6YD

Abaloparatide (ABL), a human parathyroid hormone related peptide analog, is a novel potent and selective activator of the parathyroid hormone receptor 1 (PTH1R) signaling pathway, with anabolic effects on bone. In this session, pivotal data from the phase 3 ACTIVE and ACTIVEExtend trials will be presented, demonstrating the efficacy and safety of abaloparatide for the treatment of osteoporosis and prevention of fragility fractures in postmenopausal women.

In a phase 3, placebo-controlled, 18-month, clinical trial (ACTIVE)<sup>1</sup>, ABL 80 µg daily subcutaneous (sc) significantly reduced the risk of new vertebral, nonvertebral, clinical, and major osteoporotic fractures, and increased bone mineral density (BMD) at the lumbar spine, total hip, and femoral neck compared with placebo (PBO) in women with postmenopausal osteoporosis. Furthermore, ABL significantly reduced the risk of major osteoporotic fractures compared with an open-label group of patients treated with teriparatide (TPTD) 20 µg daily sc, in a prespecified exploratory endpoint analysis. Overall, ABL was well tolerated with a mild adverse event (AE) profile. The most commonly reported AEs with ABL were dizziness, headache, nausea, and palpitations. Incidence of hypercalcemia was lower with ABL than with TPTD. Subsequently, in a 43-month extension of the ACTIVE study (ACTIVEExtend)<sup>2</sup>, where a subset of patients from either ABL or PBO were switched to open-label alendronate (ALN) 70 mg/week, patients treated with ABL followed by ALN showed a

greater sustained reduction in fracture risk and increased BMD compared with PBO followed by ALN. Post-hoc sub-group analyses have also confirmed the efficacy and safety findings with ABL independently of diverse baseline risk factors.

Evidence from the ACTIVE and ACTIVEExtend studies supports the efficacy and safety of abaloparatide for the treatment of osteoporosis in postmenopausal women at high risk of fracture.

#### References:

1. Miller PD, et al. *JAMA.* 2016;316(7):722-733.
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## SY10

### COMPARATIVE EFFECTIVENESS AND CARDIOVASCULAR SAFETY OF ABALOPARATIDE AND TERIPARATIDE IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS IN REAL WORLD USE.

E.V. McCloskey<sup>1</sup>

<sup>1</sup>Academic Unit of Bone Metabolism, Centre for Integrated research in Musculoskeletal Ageing, Mellanby Centre for Musculoskeletal Research, Department of Oncology & Metabolism, University of Sheffield, Sheffield, UK.

Complementing drug clinical efficacy and safety from randomized controlled trials (RCT), real-world evidence (RWE) is highly valuable in assessing effectiveness in clinical practice and guiding treatment decisions<sup>1</sup>.

Using RWE, this study evaluated the comparative effectiveness of abaloparatide (ABL), a novel anabolic agent, with that of teriparatide (TPTD) on non-vertebral fracture (NVF) incidence and cardiovascular (CV) safety in postmenopausal women. Outcomes were evaluated over a 19-month period after treatment initiation in an observational retrospective claims database (Symphony Health, Integrated Dataverse (IDV)®)<sup>2</sup>. The index date was the day of initial prescription dispensed for either ABL or TPTD, between May 1, 2017 and July 31, 2019). The primary endpoint was time to first NVF event within 18 months after treatment initiation; the analysis of effectiveness was based on the noninferiority of ABL to TPTD. A secondary endpoint was time to the first composite endpoint of major CV adverse event (MACE), with/without heart failure (HF). An exploratory effectiveness endpoint was time to first hip fracture.

11,616 patients were included in both the ABL and TPTD matched cohorts. Mean age was 67 years and 25% of the patients had a recorded prior fracture. The NVF event rate was lower with ABL vs TPTD, though not significant (2.9% vs. 3.2%, p=0.13). Regarding CV safety, the risks for MACE and MACE + HF were comparable for ABL vs TPTD; for example, the rates of MACE were 3.0% and 3.1% for ABL and TPTD respectively. In the exploratory analysis, a significantly lower hip fracture rate was reported in the ABL cohort (p=0.04). Sensitivity analyses performed in patient subpopulations confirmed consistency with the main study outcomes.

The effectiveness observed in this RWE study confirms the ability



of ABL to deliver fracture reductions at least equivalent to that seen with TPTD in routine clinical practice, with similar CV safety profiles.

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## SY11

### THE DECADE OF HEALTHY AGEING, EARLY DIAGNOSIS AND EARLY TREATMENT

Stefania Maggi<sup>1</sup>

<sup>1</sup>Research Director, CNR Aging Branch, Padova Past-President of the European Geriatric Medicine Society (EuGMS) and currently active in several EuGMS working groups, President of the European Interdisciplinary Council on Aging (EICA).

Osteoarthritis is the most common form of arthritis especially in the developed world and it is the leading cause of pain and physical disability. The prevalence of OA increases with age and is lower in men than in women. It is estimated that OA is affecting over 500 million individuals all over the world, and more than 260 million of OA patients have knee OA. Reduction of disease burden and prevention of long-term physical disability should be the goal for OA management. Unfortunately, so far, efforts have been made to control OA related symptoms, managing patients in their middle-late stages of the disease.

Early-stage OA might represent a window of opportunity to delay disease progression and potentially restore joint homeostasis. From patient's perspective, early diagnosis and intervention are fundamental. Early detection and treatment provide a better chance for optimal OA management, before pain becoming severe or chronic, and joint destruction becoming irreversible, leading to poor quality of life.

Healthy ageing is "the process of developing and maintaining the functional ability that enables well-being in older age". The World Health Organization (WHO) feels that equitable and affordable access to good quality person-centered healthcare is a key for fostering healthy aging. Five domains should be addressed when thinking of older people and their preserved functional ability: ability to meet basic needs, ability to build and maintain relationships, ability to learn, grow and make decisions, ability to contribute to society, and the ability to be mobile. And in this functional ability, the locomotor capacity, which is the capacity to stay mobile, to get where the people want to be and when they need to do it, is of primary importance. The report of the WHO Decade of Healthy Aging aims to embrace healthy aging several actions, including the delivering of integrated care and primary health services that are responsive to the needs of older people.

## SY12

### WHY EARLY TREATMENT PROVIDES A BETTER OPPORTUNITY FOR LONG TERM TREATMENT SUCCESS

Nicholas Fuggle<sup>1</sup>

<sup>1</sup>Associate Professor of Rheumatology at the MRC Lifecourse Epidemiology Center at the University of

Southampton and honorary Consultant in Clinical Rheumatology.

The early stages of osteoarthritis provide a potential window of opportunity to change the disease trajectory and improve patients' quality of life. For this reason, early diagnosis allows timely disease management and burden reduction. By using a multimodal approach at the early stage, there is greater opportunity for symptomatic treatment and to slow disease progression. Dr. Fuggle's presentation will focus on the role played by the symptomatic slow-acting drug for osteoarthritis (SYSADOAs) in the early stages of this important disease."

## SY13

### MANAGEMENT OF CHRONIC PAIN IN RHEUMATIC DISEASES

Frank Buttgerit<sup>1</sup>

<sup>1</sup>Senior consultant and deputy head of the Department of Rheumatology and Clinical Immunology at the Charité (CCM), University Medicine in Berlin. He also directs a liaison research group at the Deutsches Rheuma – Forschungszentrum (DRFZ).

Prof. Buttgerit's presentation will focus on an update on the management of osteoarthritis with consideration of recent literature on non-surgical modalities with a focus on new data for the COX-2 selective NSAID.

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