

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES

# VIRTUAL CONGRESS

March 24-26, 2022



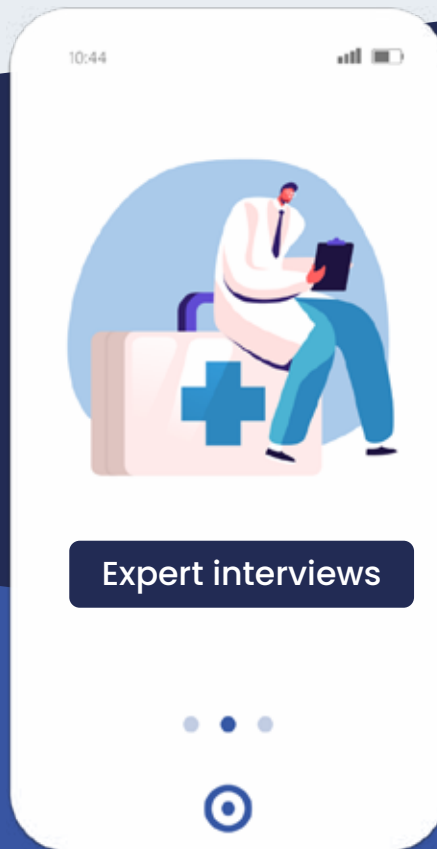
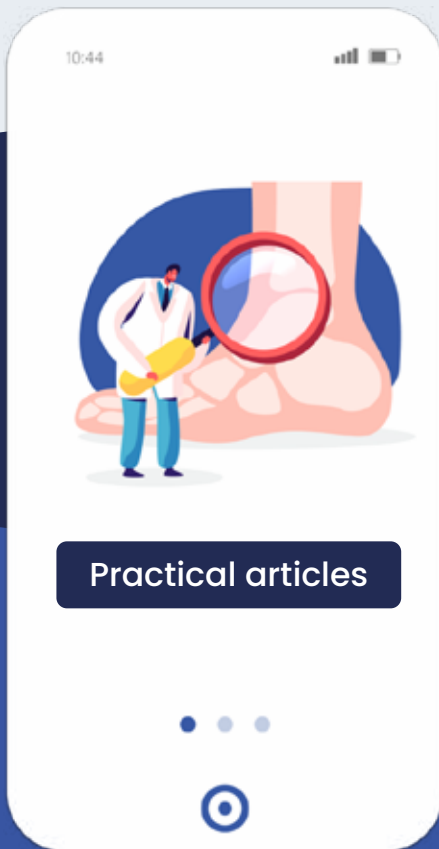
2022 VIRTUAL



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**These abstracts will be soon published as a dedicated supplement of a first-line journal in the field, under the umbrella of ESCEO and IOF.**

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## 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 disorders, 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 302 societies in 102 locations around the world.

[www.osteoporosis.foundation](http://www.osteoporosis.foundation)

### 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



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## DEAR COLLEAGUES,

**It is with great pleasure that we welcome you to the 2022 IOF-ESCEO World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases.**

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 **28** oral communications selected from the very best of hundreds of submitted abstracts, and **25** oral presentations of selected posters. In addition, participants can choose among **20** different Meet-The-Expert sessions and a

myriad of special sessions and symposia on issues of clinical importance. We also encourage you to attend many of the scheduled poster sessions, the **4** industry sponsored satellite symposia and to visit the large commercial exhibition presented by the leading companies in the bone field.

The past two years has been a difficult time for face-to-face scientific communication. Once again, we need to organise a virtual congress. We believe that the situation will now ease and that we will be able to go live next year. In the meanwhile, we are especially thankful for your participation.

**We will do our best to ensure that this meeting is a memorable and enriching experience for all.**



**John A. Kanis**

**Jean-Yves Reginster**

A handwritten signature in black ink, appearing to read 'John A. Kanis'.

A handwritten signature in blue ink, appearing to read 'Jean-Yves Reginster'.

## EVENT

**WCO-IOF-ESCEO**  
**March 24-26, 2022**

WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

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**Channel 1**  
**13:30 - 15:15**  
**Scientific Session I**  
**Chairpersons: René Rizzoli & Cyrus Cooper**

**13:30**  
**Channel 1**  
**Best clinical papers published in 2021**  
 ▶ *René Rizzoli*

**14:10**  
**Channel 1**  
**Opening of the meeting**  
 ▶ *Cyrus Cooper*

**14:25**  
**Channel 1**  
**Award Presentation**  
**Presentation of the ESCEO-Islene Araujo de Carvalho Grant**  
 ▶ *Docteur Anshu Banerjee, Director, Department of Maternal, Newborn, Child and Adolescent Health and Ageing, World Health Organization Headquarters, Geneva, Switzerland & Jean-Yves Reginster*

**14:35**  
**Channel 1**  
**Awards Presentation**  
**Presentation of the IOF Olof Johnell Science Award, the IOF President's Award and the ESCEO-IOF Herbert Fleisch Medal**  
 ▶ *Cyrus Cooper*

**14:40**  
**Channel 1**  
**Award Presentation**  
**Presentation of the IOF CSA Medal of Achievement, the IOF Skeletal Rare Disease Academy Awards, the IOF Nutrition Awards**  
 ▶ *Nicholas Harvey*

**14:45**  
**Channel 1**  
**Plenary Lecture 1**  
**Can we expect new chemical entities for the management of osteoporosis in the coming years**  
 ▶ *Michael McClung*

**Channel 1**  
**15:30 - 17:00**  
**Scientific Session II**  
**Chairpersons: Nicholas Harvey & Teréza Hough**

**15:30**  
**Channel 1**  
**Plenary Lecture 2**  
**Update of the management of patients at imminent fracture risk**  
 ▶ *Nicholas Harvey*

**16:00**  
**Channel 1**  
**Meet-The-Expert Session**  
**Role of biochemical assessments in the management of osteoporosis**  
 ▶ *Etienne Cavalier*

**16:30**  
**Channel 1**  
**Meet-The-Expert Session**  
**German guidelines for the management of post-menopausal osteoporosis**  
 ▶ *Friederike Thomasius*

**Channel 1**  
**17:00 - 18:30**  
**Sponsored Satellite Symposium**  
 \* See details on the Sponsored Satellite Symposia page

## Channel 1

08:15 - 09:15

**Sponsored Satellite Symposium**

\* See details on the Sponsored Satellite Symposia page

## Channel 2

08:15 - 09:15

**ESCEO SYMPOSIUM**

**Multimodal multidisciplinary management of patients with moderate to severe pain in knee osteoarthritis: a need to meet patients expectancies**

**Chairpersons: Cyrus Cooper & Olivier Bruyère**  
**Introduction: Why do we need a multimodal multidisciplinary management of osteoarthritis**

▸ *Cyrus Cooper*

**Multimodal multicomponent approach using oral medications**

▸ *Nicola Veronese*

**Multimodal multicomponent approach combining injectable and oral medications**

▸ *Alberto Migliore*

**Conclusion**

▸ *Ali Mobasheri*

## Channel 1

09:15 - 11:45

**Scientific Session III**

**Chairpersons: Jean-Yves Reginster & Elaine Dennison**

09:15

Channel 1

**Meet-The-Expert Session**

**Which drugs do impact fracture healing?**

▸ *Peter Ebeling*

09:45

Channel 1

**Plenary Lecture 3**

**Added value of the new version of the FRAX® algorithm**

▸ *Eugene McCloskey*

10:15

Channel 1

**Meet-The-Expert Session**

**Treatment of disorders of phosphate homeostasis**

▸ *Maria Luisa Brandi*

10:45

Channel 1

**Plenary Lecture 4**

**Cross-talking between the immune system and the skeleton**

▸ *Martina Rauner*

11:15

Channel 1

**Plenary Lecture 5**

**How long should we treat osteoporotic patients under sequential therapy?**

▸ *Thierry Thomas*

## Channel 2

09:15 - 10:15

**IOF Educational Lecture**

**Challenges and opportunities in the bone field, an IOF perspective**

▸ *Philippe Halbout & Cyrus Cooper*



## Channel 1

12:00 - 13:30

**Sponsored Satellite Symposium**

\* See details on the Sponsored Satellite Symposia page

## Channel 2

12:00 - 13:30

**Sponsored Satellite Symposium**

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## Channel 1

13:30 - 16:00

**Scientific Session IV****Chairpersons: Claudia Campusano & John A. Kanis**

13:30

Channel 1

**Plenary Lecture 6****Calcium or vitamin D: both or neither?**▶ *Bess Dawson-Hughes*

14:00

Channel 1

**Meet-The-Expert Session****Assessment of quality of life in sarcopenia: an urgent issue**▶ *Olivier Bruyère & Charlotte Beaudart*

14:30

Channel 1

**Meet-The-Expert Session****Role of registries in musculoskeletal management**▶ *Cris Ojeda-Thies*

15:00

Channel 1

**Sponsored Meet-The-Expert Session**

\* See details on the Sponsored Satellite Symposia page

## Channel 2

13:30 - 17:40

**Scientific Session V****Chairpersons: Stefania Maggi & Andreas Kurth**

13:30

Channel 2

**Educational Lecture****Post-fracture care: State of the Art?**▶ *Cyrus Cooper*

14:20

Channel 2

**Oral communication selected from abstracts****OC1: COMPARATIVE EFFECTIVENESS AND CARDIOVASCULAR SAFETY OF ABALOPARATIDE AND TERIPARATIDE IN POST-MENOPAUSAL WOMEN NEW TO ANABOLIC THERAPY: A US REAL-WORLD DATABASE STUDY****Presenting author:** *Cyrus Cooper***Author:** *F. Cosman, Y. Wang, B. Mitlak, S. Varughese and S. Williams*

14:30

Channel 2

**Oral communication selected from abstracts****OC2: USE OF ROMOSOZUMAB IN THOSE WHO EXPERIENCED AN ON-STUDY FRACTURE: RESULTS FROM THE RANDOMISED FRAME AND ARCH PHASE 3 TRIALS****Presenting author:** *J. Lane***Author:** *F. Cosman, B. Langdahl, B. Langdahl, M. Stone, M. Oates, J. Timoshanko, Z. Wang, C. Libanati and A. Kurth*

14:40

Channel 2

**Oral communication selected from abstracts****OC3: CONCOMITANT PPI USE NEGATES ORAL BIPHOSPHONATE ANTI-FRACTURE EFFICACY: A POST HOC ANALYSIS FROM A RANDOMIZED CONTROLLED TRIAL OF CLODRONATE****Presenting author:** *E. McCloskey***Author:** *N. C. Harvey, M. Lorentzon, L. Vandenput, E. Liu, John A. Kanis and H. Johansson*

14:50

Channel 2

**Oral communication selected from abstracts****OC4: FRACTURE RISK IN WOMEN WITH OSTEOPOROSIS TREATED WITH GASTRO-RESISTANT RISEDRONATE VERSUS IMMEDIATE RELEASE RISEDRONATE OR ALENDRONATE: A CLAIMS DATA ANALYSIS IN THE UNITED STATES****Presenting author:** *Friederike Thomasius***Author:** *J. A. Eisman, B. Cortet, A. Alam, M. Boolell, J. Heroux, R. Ionescu-Ittu and F. Vekeman*

**15:00**

Channel 2

**Sponsored Meet-The-Expert Session**

\* See details on the Sponsored Satellite Symposia page

**16:00**

Channel 2

**Oral communication selected from abstracts  
OC5: FRACTURES INCREASE EARLY AND LONG-  
TERM MORTALITY IN CANCER PATIENTS: A  
POPULATION-BASED COHORT STUDY**Presenting author: *C. Ye*Author: *W. D. Leslie, S. Al-Azazi, L. Yan, L. M. Lix, C.**Czaykowski and H. Singh***16:10**

Channel 2

**Oral communication selected from abstracts  
OC6: IMPROVED FRACTURE RISK PREDICTION  
BY ADDING VFA-IDENTIFIED VERTEBRAL  
FRACTURE DATA TO BMD BY DXA AND  
CLINICAL RISK FACTORS USED IN FRAX**Presenting author: *M. Lorentzon*Author: *L. Johansson, H. Johansson, N. C. Harvey, E. Liu, W. D.**Leslie, L. Vandenput, E. McCloskey and John A. Kanis***16:20**

Channel 2

**Oral communication selected from abstracts  
OC7: MACHINE LEARNING AND COMPUTER  
VISION OF BONE MICROARCHITECTURE CAN  
IMPROVE THE FRACTURE RISK PREDICTION  
PROVIDED BY DXA AND CLINICAL RISK  
FACTORS**Presenting author: *N. Fuggle*Author: *S. Lu, M. O. Breasail, L. D. Westbury, K. A. Ward, Elaine**Dennison, S. Mahmoodi, M. Niranjana and Cyrus Cooper***16:30**

Channel 2

**Oral communication selected from abstracts  
OC8: PRIMARY HYPERPARATHYROIDISM,  
BONE MINERAL DENSITY AND INCIDENT  
FRACTURE RISK: A DANISH REGISTER STUDY**Presenting author: *N. C. Harvey*Author: *E. Liu, L. Vandenput, M. Lorentzon, E. McCloskey, John**A. Kanis, B. Abrahamsen, L. Rejnmark and H. Johansson***16:40**

Channel 2

**Meet-The-Expert Session****Management of tumoral bone disease**► *Cyrille Confavreux***17:10**

Channel 2

**Oral communication selected from abstracts  
OC9: VERTEBRAL FRACTURES ON ROUTINE CT  
SCANS PREDICT MAJOR OSTEOPOROTIC  
FRACTURES AND HIP FRACTURES:  
OBSERVATIONAL COHORT STUDY**Presenting author: *M. K. Skjød*Author: *J. Nicolaes, C. S. Smith, K. R. Olsen, C. Libanati, Cyrus**Cooper and B. Abrahamsen***17:20**

Channel 2

**Oral communication selected from abstracts  
OC10: THE PROPORTION OF PATIENTS WHO  
REACH THE BMD SURROGATE THRESHOLD  
EFFECT ON ROMOSUZUMAB: A POST HOC  
ANALYSIS OF THE RANDOMISED FRAME AND  
ARCH PHASE 3 TRIALS**Presenting author: *R. Chapurlat*Author: *J. van den Bergh, S. H. Ralston, S. Ferrari, M. McClung, M.**Lorentzon, P. Makras, M. Lewiecki, T. Matsumoto, J. Timoshanko, Z.**Wang and C. Libanati***17:30**

Channel 2

**Oral communication selected from abstracts  
OC11: RISK OF FALLS AND FRACTURES  
FOLLOWING THE INITIATION OF ANTI-  
HYPERTENSIVES IN THE ELDERLY: SELF-  
CONTROLLED CASE SERIES ANALYSES FROM THE  
UK**Presenting author: *A. M. Jödicke*Author: *E. H. Tan, D. E. Robinson, A. Delmestri and D. Prieto-**Alhambra*

**Channel 1****16:00 - 17:40****Scientific Session VI****Chairpersons: Olivier Bruyère & Patricia Clark****16:00**

Channel 1

**Plenary Lecture 7****Skeletal and extraskeletal effects of FGF23**▶ *Dieter Haffner***16:30**

Channel 1

**Sponsored Meet-The-Expert Session**

\* See details on the Sponsored Satellite Symposia page

**17:30**

Channel 1

**Awards Presentation****Presentation of the 2022 ESCEO Medal of Excellence, the IOF CNS Medal, the ESCEO-IOF Pierre Meunier Young Scientist Award and the ESCEO-IOF Young Investigator Awards**▶ *Jean-Yves Reginster***17:35**

Channel 1

**Award Presentation****Presentation of the ESCEO-AgNovos Healthcare Young Investigator Awards**▶ *Jean-Yves Reginster & James Howe*



Channel 1

09:00 - 12:00

Scientific Session VII

Chairpersons: Manju Chandran &amp; Emmanuel Biver

09:00

Channel 1

**Plenary Lecture 8****How to treat bone fragility in chronic kidney disease**▶ *Jorge Cannata-Andia*

09:30

Channel 1

**Meet-The-Expert Session****Assessment and management of primary hyperparathyroidism**▶ *Marise Lazaretti-Castro*

10:00

Channel 1

**Meet-The-Expert Session****Cardio-vascular effects of bisphosphonates**▶ *Bo Abrahamsen*

10:30

Channel 1

**Meet-The-Expert Session****Development of fracture prevention services in low- and middle-income countries**▶ *Kate Ward*

11:00

Channel 1

**Meet-The-Expert Session****Management of osteoarthritis in 2022: How to reconcile divergent guidelines**▶ *Elaine Dennison*

11:30

Channel 1

**Meet-The-Expert Session****Pharmacological and non-pharmacological management of patients following hip fracture**▶ *Toshitaka Nakamura*

Channel 2

09:30 - 11:20

Scientific Session VIII

Chairpersons: Martina Rauner &amp; Etienne Cavalier

09:30

Channel 2

**Oral communication selected from abstracts****OC12: MISALIGNMENT BY PRODUCING INEFFECTIVE LOAD CONDUCTION (TRANSFER) MAY BE RESPONSIBLE FOR ATYPICAL FEMORAL FRACTURES (AFFS)****Presenting author:** *R. Zebaze***Author:** *H. Nguyen, C. Shore-Lorenti, F. Milat, N. Napoli, C. Chiang and R. Ebeling*

09:40

Channel 2

**Oral communication selected from abstracts****OC13: BONE MINERAL DENSITY AND BONE MICRO-ARCHITECTURE EVOLUTION AFTER KIDNEY TRANSPLANTATION: 3-MONTHS RESULTS OF A PROSPECTIVE COHORT STUDY****Presenting author:** *O. Malaise***Author:** *L. Seidel, C. Bonvoisin, L. Weekers, F. Jouret, M. Malaise, E. Cavalier, P. Delanaye and A. Bouquegneau*

09:50

Channel 2

**Oral communication selected from abstracts****OC14: HEALTHCARE EXPENDITURE IN FRAGILITY FRACTURE PATIENTS ACROSS 10 COUNTRIES: A MICRO-COSTING STUDY****Presenting author:** *J. Talevski***Author:** *K. Sanders, A. Lal, J. Watts, A. Beauchamp, G Duque, F. Borgstrom, A. Swedbom, John A. Kanis and S. Brennan-Olsen*

**10:00**

Channel 2

**Meet-The-Expert Session****The Use of Bisphosphonates to Manage Muscle Wasting**▶ *Gordon Klein***10:30**

Channel 2

**Oral communication selected from abstracts  
OC15: GENETICS OF ATYPICAL FEMUR FRACTURES****Presenting author:** *C. Aurilia***Author:** *F. Marini, G. Palmini, F. Giusti, E. Biver, G. Iolascon and M. L. Brandi***10:40**

Channel 2

**Oral communication selected from abstracts  
OC16: ASSOCIATIONS OF CALCIUM INTAKE AND CALCIUM SOURCES WITH BLOOD LIPIDS IN A POPULATION OF OLDER WOMEN AND MEN WITH HIGH CALCIUM INTAKE****Presenting author:** *M. Papageorgiou***Author:** *F. Merminod, S. Ferrari, René Rizzoli and E. Biver***10:50**

Channel 2

**Oral communication selected from abstracts  
OC17: PRUNES PRESERVE HIP BONE MINERAL DENSITY AND FRAX RISK IN A 12-MONTH RANDOMIZED CONTROLLED TRIAL IN POSTMENOPAUSAL WOMEN: THE PRUNE STUDY****Presenting author:** *M. J. De Souza***Author:** *N. C. Strock, N. I. Williams, H. Lee, K. J. Koltun, C. Rogers, M. G. Ferruzzi, C. H. Nakatsu and C. Weaver***11:00**

Channel 2

**Oral communication selected from abstracts  
OC18: PREVALENCE OF OSTEOPOROSIS AND OSTEOPENIA IN MEN AND WOMEN FROM SUB-SAHARAN AFRICA, THE UK AND US: A GLOBAL PROBLEM****Presenting author:** *C. M. Parsons***Author:** *T. Madanhire, A. Zengin, A. N. Wade, J. Fabian, J. Cauley, R. Fielding, A. Newman, Cyrus Cooper, C. L. Gregson and K. A. Ward***11:10**

Channel 2

**Oral communication selected from abstracts****OC19: GENETIC BIOMARKERS, SNP GENES AND MTDNA HAPLOGROUPS, PREDICT OSTEOARTHRITIS STRUCTURAL PROGRESSORS THROUGH THE USE OF SUPERVISED MACHINE LEARNING****Presenting author:** *J. Martel-Pelletier***Author:** *H. Bonakdari, J.-P. Pelletier, F. Bianco, F. Abram, I. Rego-Pérez, A. Duran-Sotuela and A. Jamshidi*

Channel 2

**11:20 - 14:10****Scientific Session IX****Chairpersons: Famida Jiwa & Mickaël Hiligsmann****11:20**

Channel 2

**Oral communication selected from abstracts****OC20: EROSIVE OSTEOARTHRITIS OF THE HAND: EFFICACY OF PRESCRIPTION-GRADE CRYSTALLINE GLUCOSAMINE SULFATE AS AN ADD-ON THERAPY TO CONVENTIONAL TREATMENTS****Presenting author:** *S. Tenti***Author:** *N. Veronese, S. Cheleschi, I. Seccafico, Jean-Yves Reginster and A. Fioravanti***11:30**

Channel 2

**Oral communication selected from abstracts****OC21: HEALTH ECONOMICS EVALUATION OF A HIGH AND LOW MOLECULAR WEIGHT HYALURONIC ACID FORMULATION IN PATIENTS WITH KNEE OSTEOARTHRITIS. ANALYSES FROM A RANDOMIZED CLINICAL TRIAL****Presenting author:** *O. Bruyère***Author:** *Jean-Yves Reginster and G. Honvo***11:40**

Channel 2

**Oral communication selected from abstracts****OC22: LOWER LIMB MUSCLE STRENGTH AND MUSCLE MASS ARE ASSOCIATED WITH INCIDENT SYMPTOMATIC KNEE OSTEOARTHRITIS: A LONGITUDINAL COHORT STUDY****Presenting author:** *N. Veronese***Author:** *S. Stefanac, A. Koyanagi, N. Al-Daghri, S. Sabico, Cyrus Cooper, René Rizzoli, Jean-Yves Reginster, M. Barbagallo, G. Di Bella, C. Mandalà, L. Dominguez, L. Smith and S. Maggi*

**11:50**

Channel 2

**Oral communication selected from abstracts**  
**OC23: DOES LOW MUSCLE STRENGTH MODIFY**  
**RELATIONSHIPS BETWEEN INDIVIDUAL**  
**COMORBIDITIES AND MORTALITY? FINDINGS**  
**FROM THE HERTFORDSHIRE COHORT STUDY**

Presenting author: *L. D. Westbury*Author: *F. Laskou, Elaine Dennison and Cyrus Cooper***12:00**

Channel 2

**Oral communication selected from abstracts**  
**OC24: THE LONGITUDINAL ASSOCIATIONS OF**  
**SARCOPENIA DEFINITIONS WITH ADVERSE**  
**OUTCOMES: A COMPARATIVE STUDY**

Presenting author: *M. E. Bozkurt*Author: *G. Bahat, N. M. Catikkas, C. Kilic and M. A. Karan***12:10**

Channel 2

**Educational Lecture**

**How can artificial intelligence impact the**  
**management of musculoskeletal diseases**

▶ *Hans Peter Dimai***13:00**

Channel 2

**Oral communication selected from abstracts**  
**OC25: WHAT ARE THE MAIN RISK FACTORS**  
**FOR LOWER EXTREMITY RUNNING-RELATED**  
**INJURIES? A RETROSPECTIVE SURVEY BASED**  
**ON 3669 RESPONDENTS**

Presenting author: *J.-F. Kaux*Author: *D. Sanfilippo, C. Beaudart, A. Gaillard, S. Bornheim and O. Bruyère***13:10**

Channel 2

**Oral communication selected from abstracts**  
**OC26: WHAT IMPACT HAS THE COVID-19**  
**PANDEMIC HAD ON LIFESTYLE FACTORS**  
**IMPORTANT TO MUSCULOSKELETAL HEALTH?**  
**RESULTS FROM TWO COHORT STUDIES**

Presenting author: *G. Bevilacqua*Author: *S. D'Angelo, C. Linaker, A. Paul, I. Bloom, J. Zhang, F. Laskou, Cyrus Cooper, K. A. Ward, Elaine Dennison and K. Walker-Bone***13:20**

Channel 2

**Oral communication selected from abstracts**  
**OC27: GERAS FRAILTY REHABILITATION AT**  
**HOME RANDOMIZED CONTROLLED TRIAL:**  
**VIRTUAL BUNDLED CARE FOR SENIORS WHO ARE**  
**FRAIL TO BUILD STRENGTH AND RESILIENCE**  
**DURING COVID-19**

Presenting author: *G. Ioannidis*Author: *P. Hewston, J. D. Adachi, S. Marr, C. C. Kennedy, J. Lee, D. Mangin, M. Welsford, T. Woo, B. Misiaszek, A. Rabinovich, C. Patterson, D. Armstrong, K. De Wit, S. Bray, C. McArthur, C. Okpara and A. Papaioannou***13:30**

Channel 2

**Oral communication selected from abstracts**  
**OC28: THE ASSOCIATION BETWEEN SOCIAL**  
**ISOLATION AND LONELINESS AND SARCOPENIA**  
**AND OSTEOPOROSIS AMONG OLDER ADULTS:**  
**RESULTS FROM THE CANADIAN LONGITUDINAL**  
**STUDY ON AGING (CLSA)**

Presenting author: *A. Lee*Author: *C. McArthur, G. Ioannidis, J. D. Adachi, L. E. Griffith, L. Thabane, A. Mayhew and A. Papaioannou***13:40**

Channel 2

**Meet-The-Expert Session**

**Managing your FLS/PFC center more efficiently**  
**and cost optimized with Lysis Software**

▶ *Werner Fehn*

Channel 1

**12:30 - 14:30****Scientific Session X**Chairpersons: **Radmila Matijevic & Roland Chapurlat****12:30**

Channel 1

**Plenary Lecture 9****Muscle and joint: Sarcopenia and Osteoarthritis**▶ *Roland Chapurlat***13:00**

Channel 1

**Sponsored Meet-The-Expert Session**

\* See details on the Sponsored Satellite Symposia page

**14:00**

Channel 1

**Meet-The-Expert Session****Fall prevention strategies**▶ *Stefania Maggi*

Channel 1

**14:30 - 15:30**

**Scientific Session XI**

**Chairpersons: Friederike Thomasius & Peyman Hadji**

**14:30**

Channel 1

**Plenary Lecture 10**

**Health Economics in osteoporosis : which model for which assessment**

▸ *Mickaël Hiligsmann*

**15:00**

Channel 1

**Meet-The-Expert Session**

**Hormonal contraception and bone health**

▸ *Peyman Hadji*

17:00 - 18:30

Channel 1

**UCB Sponsored Satellite Symposium - Embracing multidisciplinary teams for stronger secondary fracture prevention**

Chairperson: Eric Hesse

**Welcome and Introduction**

▸ *Eric Hesse*

**Identifying those postmenopausal patients at higher risk of fracture: When, who and how?**

▸ *Mattias Lorentzon*

**Clinical decision-making with bone-forming therapy: Where do we begin?**

▸ *Bente Langdahl*

**Optimising management through a co-ordinated approach to care**

▸ *Sherwin Criseno*

**Q&A/panel discussion**

▸ *All*

**Conclusion and closing remarks**

▸ *Eric Hesse*

08:15 - 09:15

Channel 1

**AGNOVOS BREAKFAST SATELLITE SYMPOSIUM - Redefining Possible: Procedural Treatment for Bone Loss in Hips of Very High-Risk Patients**

Chairperson: Serge Ferrari

**Introduction to symposium**

▸ *Serge Ferrari*

**Osteoporotic Bone Loss Leads to Fragile Bone at the Proximal Femur**

▸ *Claus Glüer*

**Foundations in Bone Formation in Orthopedics: a Surgeon's Perspective**

▸ *Andreas Kurth*

**LOEP Forms Bone in Multiple Pre-Clinical and Clinical Studies**

▸ *Maria Luisa Brandi*

**Treating High-Risk Patients with LOEP – Experiences in First 100 Procedures**

▸ *Jo De Schepper*

**Roundtable Discussion**

▸ *Moderator: Serge Ferrari*

**Q&A**

▸ *All*

12:00 - 13:30

Channel 2

**VIATRIS Sponsored Satellite Symposium : Holistic considerations for the thoughtful long-term management of OA**

**Welcome and Introduction**

▸ *Jean-Yves Reginster*

**A Research Framework on Osteoarthritis for the UN Decade on Healthy Aging**

▸ *Stefania Maggi*

**Non Pharmacological Approach: Diet and its Impact on Osteoarthritis**

▸ *Nicola Veronese*

**Multimodal Pharmacological Approach: from evidence-based to daily practice**

▸ *Jean-Yves Reginster*

**Q&A Session**

▸ *All*

12:00 - 13:30

Channel 1

**AMGEN Sponsored Satellite Symposium - Can we use real-world evidence to optimize management of osteoporosis?**

Chairperson: Lorenz Hofbauer

**Chair's Welcome**

▸ *Lorenz Hofbauer*

**The importance of real-world data: gathering evidence to guide osteoporosis care**

▸ *Daniel Prieto-Alhambra*

**Trends in hip fracture incidence and treatment – latest global data using population-based databases**

▸ *Cyrus Cooper*

**Comparing the effectiveness of osteoporosis therapies for fracture risk reduction using real-world data**

▸ *Jeffrey Curtis*

**Panel discussion - Audience questions**

▸ *All*



15:00 - 16:00

Channel 1

**UCB Sponsored Meet-The-Expert Session -  
Strength in sharing: Insights on optimising  
outcomes with bone-forming therapy**

▶ *Friederike Thomasius & Margareta Berglund Rödén*

16:30 - 17:30

Channel 1

**IBSA Sponsored Meet-The-Expert Session -  
SySADOA and viscosupplementation: from guidelines  
to the experts' perspectives**

▶ *François Rannou*

15:00 - 16:00

Channel 2

**Viartis Sponsored Meet-The-Expert Session -  
Erosive and Non-erosive Osteoarthritis of the Hand:  
focus on clinical aspects and multimodal disease  
management**

▶ *Sara Tenti*

13:00 - 14:00

Channel 1

**Viatrix Sponsored Meet-The-Expert Session - An update on Osteoarthritis; a serious disease, with consideration of the latest phenotypic research**

▸ *Francis Berenbaum*

## NSS Symposia

### NSS1

#### Capture the fracture celebrating 10 years - Learnings and successes

Chairperson: K. Åkesson

- ▶ *Introduction – why Capture the Fracture is so important to IOF - C. Cooper*
- ▶ *Best Practise framework – development and why organisational audits support FLSs becoming effective - K. Åkesson*
- ▶ *Getting mapped – were we started and where we are now - T. Thomas*
- ▶ *Development of patient level performance indicators – why and how - K. Javaid*
- ▶ *Capture the fracture in the next decade - S. Ferrari*
- ▶ *Summary & Conclusion -*

### NSS2

#### Implementing Physical activity for older adults at risk in various and specific situations

Chairperson: M. Aubertin-Leheudre

- ▶ *Implementing physical activity as a care for older adults following in geriatric outpatient clinics - M. Aubertin-Leheudre*
- ▶ *Implementing physical activity for community-dwelling, pre-disabled seniors during isolation periods (e.g. Covid 19 Pandemic) - F. Buckinx*
- ▶ *Implementing physical activity for older adults in nursing homes - O. Bruyère*

### NSS3

#### Build Better Bones: a multi-stakeholder informed website to support rehabilitation for people with osteoporosis

Chairperson: S. Silverman

- ▶ *Rehabilitation interventions in patients with osteoporosis and fragility fracture - O. Bruyère*
- ▶ *Development of the Build Better Bones website to support rehabilitation for people with osteoporosis - D. Pinto*

### NSS4

#### Combined and sequential therapies mostly recommended or to be avoided in clinical practice

Chairperson: B. Muzzi Camargos

- ▶ *Sequential and combined treatment: Concepts, Rationales and Guidelines - L. F. Vidal Neira*
- ▶ *Combinations and sequences to be avoided - J. Carey*
- ▶ *Successful Associations, Timing and Endpoints - B. Muzzi Camargos*

### NSS5

#### Audit LATAM 2021. Epidemiology, costs and burden of osteoporosis and fragility fractures in Latin America

Chairperson: S. Cerdas Pérez

- ▶ *Introduction and demographic regional overview - S. Cerdas Pérez*
- ▶ *Epidemiology and costs of fragility fractures in Latin America - P. Clark*
- ▶ *Comparative situation and challenges for osteoporosis diagnosis among the participant Latin America countries - B. Muzzi Camargos*
- ▶ *Access to pharmacological and non-pharmacological treatment in Latin America - C. Campusano*
- ▶ *Approach to secondary fracture prevention. The LATAM experience - A. Medina*

### NSS6

#### Osteoporosis and Challenges in its Management: Commonalities and differences in three different world regions- the Asia Pacific, Europe and Latin America

Chairpersons: P. Clark & O. D. Messina

- ▶ *Osteoporosis in the Asia Pacific. Challenges and solutions - M. Chandran*
- ▶ *Fragility fractures in Europe: diagnosis and treatment in daily practice - W. F. Lems*
- ▶ *Osteoporosis in Latin America. Challenges and Solutions - S. Cerdas Pérez*

## NSS7

### Ulcerative colitis as a paradigm of secondary osteoporosis

Chairperson: Y. Dionyssiotis

- ▶ *Osteoporosis in the context of ulcerative colitis* - Y. Dionyssiotis
- ▶ *Pathogenesis of osteoporosis in the context of ulcerative colitis* - I. Kostoglou-Athanassiou
- ▶ *Ulcerative colitis and ankylosing spondylitis* - L. Athanassiou
- ▶ *Treatment of osteoporosis in the context of ulcerative colitis* - P. Athanassiou

## NSS8

### Osteosarcopenia School

Chairperson: I. Kostoglou

- ▶ *Osteosarcopenia School* - Y. Dionyssiotis
- ▶ *Physical activity for treatment and rehabilitation in osteoporosis and sarcopenia* - M. A. Lissens

## NSS9

### Approaches to optimum bone health services in standard practice

Chairpersons: Y. El Miedany & T. Mathias

- ▶ *Osteoporosis, Fracture Prevention and Falls Risk Assessment – Closing the Gap between Treatment Guidelines and Clinical Practice* - N. A. Gadallah
- ▶ *Sarcopenia assessment in standard clinical practice: Who, How and When?* - M. Hassan
- ▶ *Using social media as a patient education tool: Is there a room for bone health educational hub?* - Y. El Miedany

## NSS10

### African Society for Bone Health: Towards Better Bone Health

Chairperson: Y. El Miedany

- ▶ *Osteoporosis: A major challenge in Africa* - A. Kalla
- ▶ *Osteoporosis and HIV: an African perspective* - F. Paruk
- ▶ *Fracture risk centric approach for the management of osteoporosis* - M. Ngandeu
- ▶ *DXA scanning in clinical practice* - A. El Maghraoui

## NSS13

### Orthogeriatric care across Europe: Geriatricians vs. Orthopaedicians

Chairpersons: G. Bahat & A. Ranhoff

- ▶ *Assessment of older acute hip fracture patients: From the view of geriatricians* - N. Muge Catikkas
- ▶ *The analysis of costs derived from hip fracture hospital attention* - J. Tarazona Santabalbina
- ▶ *Orthogeriatric care in Turkey: From orthopaedicians' view* - T. Kizilkurt
- ▶ *What the orthopaedic surgeon can do to avoid morbidity and mortality following an osteoporotic fracture?* - C. Ojeda Thies

## NSS14

### Imaging in musculoskeletal pathology: what should clinicians know?

Chairperson: A. Ionescu Răzvan

- ▶ *Practical aspects in the radiographic evaluation of inflammatory and degenerative arthropathies* - C. Avram
- ▶ *Ultrasonography in Rheumatology: tricks and tips* - F. Ananu Vreju
- ▶ *Magnetic resonance imaging (MRI) in musculoskeletal pathology* - M. Bojinca
- ▶ *Molecular imaging in Rheumatology: the "new kid in town"* - R. A. Ionescu

## NSS15

### The role of training education in the development of healthcare professionals for prevention and qualitative management of osteoporosis and other chronic musculoskeletal diseases

Chairperson: F. Kamberi

- ▶ *Training education to improve healthcare professionals knowledge and skills for prevention and quality management of osteoporosis* - F. Kamberi
- ▶ *Encouraging the promotion of musculoskeletal training among healthcare professionals as a cost-effective method for the prevention* - E. Sinaj
- ▶ *Evaluation of continuing education for health care professionals related to musculoskeletal diseases and osteoporosis during the* - G. Sinanaj
- ▶ *Assessing the needs of nursing staff for training related to Osteoporosis and musculoskeletal diseases* - B. Subashi

## NSS16

### Covid-19, post Covid-19 disease. Limitation of human mobility, comorbidities and effects on musculoskeletal disease

Chairperson: I. Kostoglou-Athanassiou

- ▶ *Limitation of human mobility due to pandemics. From ancient times to the SARS-CoV-2 virus era* - Y. Athanassiou
- ▶ *Covid-19 and post-Covid. The role of inflammation and musculoskeletal manifestations* - L. Athanassiou
- ▶ *Covid-19, post-Covid. Mobility problems* - Y. Dionyssiotis
- ▶ *Covid-19, post-Covid. Antiinflammatory therapeutic interventions* - P. Athanassiou

## NSS17

### COVID-19 and the Musculoskeletal System

Chairperson: Y. Gökçe-Kutsal

- ▶ *What are the effects of COVID-19 on skeletal muscle?* - Y. Kirazli
- ▶ *Does COVID-19 have an impact on bone and joint?* - Y. Gökçe-Kutsal

- ▶ *Management of musculoskeletal consequences in persons with post COVID-19 syndrome* - A. A. Küçükdeveci

## NSS18

### Pain and comorbid disorders: diagnosis and therapeutic approaches

Chairperson: O. Kurushina

- ▶ *Pain, Brain and Biomechanics* - A. Barulin
- ▶ *Patient with the Pain. Why sometimes we fail?* - O. Kurushina
- ▶ *Biokinematic – a new approach to back pain relief* - B. Kalinchenko
- ▶ *Pain management: non-pharmacological approaches* - A. Drushlyakova

## NSS19

### How to optimize monitoring in Osteoporosis?

Chairperson: S. Ferrari

- ▶ *Introduction* - S. Ferrari
- ▶ *Why monitoring matters?* - W. F. Lems
- ▶ *FLS pathway and how the Best Practice Framework capture monitoring* - M. K. Javaid
- ▶ *BPF results* - Z. Mohsin
- ▶ *Discussion on recommendations for monitoring framework for FLSs* - All - Chaired by S. Ferrari

## NSS20

### Balkan Peninsula -regional initiative

Chairperson: Radmila Matijevic & Gulistan Bahat

- ▶ *Introduction* - Gulistan Bahat
- ▶ *Balkan Peninsula -regional initiative* - Radmila Matijevic
- ▶ *Artificial intelligence solutions for osteoporosis management and perception of artificial intelligence* - Ivo Dumic-Cule
- ▶ *The current situation in the approach to osteoporosis in older adults in Turkey: areas in need of improvement with a model for other populations* - Meris Esra Bozkurt

## NSS21

### The role of Vitamin D in rheumatic diseases

Chairpersons: L. F. Vidal Neira & O. D. Messina

- ▶ *Vitamin D in patients with fibromyalgia* - L. F. Vidal Neira
- ▶ *Vitamin D in other chronic rheumatic diseases including rheumatoid arthritis (RA) and systemic lupus Erythematosus* - O. D. Messina

## NSS22

### Phosphorus and human health

Chairperson: M. Miglinas

- ▶ *The Crosstalk between Bone, Kidney and Vasculature: New Insights* - K. A. Hruska
- ▶ *New players in the Chronic Kidney Disease–Mineral and Bone Disorder* - A. F. Perna
- ▶ *Phosphate and vascular calcification: implications for treatment* - J. Voelkl

## NSS23

### Covid-19 and post Covid-19 disease. Autoimmunity, musculoskeletal and psychosocial effects

Chairperson: P. Athanassiou

- ▶ *Pandemics. History, posttraumatic stress and social effects* - Y. Athanassiou
- ▶ *Covid-19, autoimmunity and musculoskeletal diseases* - L. Athanassiou
- ▶ *Covid-19, post-Covid and frailty* - Y. Dionyssiotis
- ▶ *Covid-19 and post-Covid. Autoimmunity and endocrine diseases* - I. Kostoglou-Athanassiou

## NSS24

### Bone health in sports medicine at a glance

Chairperson: S. Tuzun

- ▶ *Low Energy Availability in Sports Syndrome (LEA-s) and Stress Fractures* - U. Akarirmak
- ▶ *How to Assess Bone in Sports Medicine* - J. Carey
- ▶ *How to Optimize Bone Health in Sports Medicine* - S. Tuzun

## NSS26

### Musculoskeletal Consequences of COVID-19

Chairpersons: P. Borman & B. Karaoğlan

- ▶ *Musculoskeletal Problems in post-COVID-19 period* - P. Borman
- ▶ *Pain Management in Covid-19* - B. Duyur Çakıt
- ▶ *Sarcopenia: Postacute sequele of COVID 19* - A. Utkan Karasu

## NSS27

### Beyond status quo: Achievements and aspirations of the Asia Pacific Fragility Fracture Alliance

Chairperson: D. Chan

- ▶ *Systematic review on outcomes of hip fractures in Asia Pacific* - J. Close
- ▶ *Bridging the gap: Bone health education for specialists* - R. Blank
- ▶ *Asia Pacific Fragility Fracture Alliance – Asia Pacific Osteoporosis and Fragility Fracture Society Collaboration* - J.-K. Lee



## Committee of Scientific Advisors Special Session

### CSA

#### CANCER, CORTEX AND COMMUNICATION: FINDINGS FROM IOF CSA WORKING GROUPS 2022

Chairperson: Nick Harvey

- ▶ *Assessing metastatic and non-metastatic fracture risk in patients with cancer: IOF CSA Bone and Cancer Working Group - Cyrille Confavreux*
- ▶ *Role of bone microstructure in diabetes bone fragility: IOF CSA Bone and Diabetes Working Group - Serge Ferrari*
- ▶ *Can we improve communication of risk to patients? A project from the IOF CSA Epidemiology and Quality of Life Working Group - Mickaël Hilgsmann*

## Committee of National Societies Special Plenary Session

### OCs1 - P134

#### LOW BIOAVAILABLE IGF-1 IS THE SINGLE BIOMARKER ASSOCIATED WITH OSTEOSARCOMA IN POST-MENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS

*M. Krikelis, D. Moschou, E. Mole, C. Georgakopoulos, K. Makris, S. Tournis, C. P. Mavragani, E. Chronopoulos, I. Donta, S. Gazi*

### OCs3 - P222

#### GRIP STRENGTH, BONE MINERAL DENSITY AND MORTALITY: LESSONS FROM THE PAST AND HOPE FOR THE FUTURE?

*F. Laskou, L. D. Westbury, H. P. Patel, C. Cooper, E. M. Dennison*

### OCs4 - P232

#### ASSOCIATION BETWEEN EXPOSURE TO FINE PARTICULATE MATTER AND OSTEOPOROSIS: A POPULATION-BASED COHORT STUDY

*G. Adami, A. Fassio, O. Viapiana, D. Gatti, M. Rossini*

### OCs5 - P508

#### CAROTID ATHEROSCLEROSIS IS ASSOCIATED WITH A HIGHER RISK OF FALL-RELATED HOSPITALIZATION IN OLDER AUSTRALIAN WOMEN

*A. Gebre, M. Sim, J. Dalla Via, A. Rodríguez, J. Hodgson, C. Bondonno, P. Thompson, R. Prince, J. Lewis*

### OCs6 - P536

#### DIABETES HAS A GREATER IMPACT ON SUBSEQUENT FRACTURE INCIDENCE IN TIME, THAN PREVIOUS FRACTURES, SEX AND AGE: A SURVIVAL ANALYSIS

*R. Coronado-Zarco, A. Olascoaga-Gómez de León, J. Quinzanos-Fresnedo, A. Olascoaga-Herrera, K. Zarco-Ordoñez, N. C. Centeno-Morales, M. O. Castillo-Macías*

### OCs7 - P554

#### TRABECULAR BONE SCORE BY DUAL-ENERGY X-RAY ABSORPTIOMETRY: A CROSS-SECTIONAL AND LONGITUDINAL ANALYSIS IN HEALTHY ADULT MALES

*Y. Sertons, T. Banica, R. Vandecappelle, B. Lapauw, S. Goemaere*

## OCs8 - P593

GENETIC MODEL FOR PREDICTION OF OSTEOPOROTIC VERTEBRAL FRACTURE RISK IN WOMEN

*P. Marozik, A. Rudenka, K. Kobets, V. Samokhovec, E. Rudenka*

## OCs9 - P621

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN THE FRACTURE LIAISON SERVICE

*R.-S. Yang, F.-P. Tseng, S.-P. Tseng, T.-H. Yang, W.-J. Huang, D.-C. Chan, H.-Y. Chen*

## OCs10 - P732

CHRONIC IRON DEFICIENCY ANAEMIA (IDA) IS AN INDEPENDENT RISK FACTOR TO BE CONSIDERED IN THE MANAGEMENT OF FALLS DISEASE (FD), FEAR OF FALL (FOF) AND FRAGILITY FRACTURES OF OLDER ADULTS.

*S. K. Bajaj*

# ESCEO Symposia

## ESCEO

Management of patients at very high risk of osteoporotic fractures through sequential treatments

Chairpersons: Cyrus Cooper & John A. Kanis

- ▶ *Welcome - Cyrus Cooper*
- ▶ *How to define patients at very high risk of presenting an osteoporotic fracture - Kassim Javaid*
- ▶ *How to manage patients at very high risk of presenting an osteoporotic fracture - René Rizzoli*
- ▶ *Conclusion - Radmila Matijevic*

## ESCEO

Management of hand osteoarthritis: from an US evidence-based medicine guideline to an European patient-centric approach

Chairpersons: Olivier Bruyère & Ali Mobasheri

- ▶ *Welcome - Cyrus Cooper*
- ▶ *Management of hand osteoarthritis: What really matters for the patient - Nick Fuggle*
- ▶ *Management of hand osteoarthritis: how can the ACR guidelines be applied to an European population, in a patient-centric approach - Jean-Yves Reginster*
- ▶ *Conclusion - Maria Concepcion Prieto-Yerro & Ida Haugen*

## ESCEO

Multimodal multidisciplinary management of patients with moderate to severe pain in knee osteoarthritis: a need to meet patients' expectations

Chairpersons: Cyrus Cooper & Olivier Bruyère

- ▶ *Introduction: Why do we need a multimodal multidisciplinary management of osteoarthritis - Cyrus Cooper*
- ▶ *Multimodal multicomponent approach using oral medications - Nicola Veronese*
- ▶ *Multimodal multicomponent approach combining injectable and oral medications - Alberto Migliore*
- ▶ *Conclusion - Ali Mobasheri*

## ISGE-ESCEO-IOF Symposium

Connective tissues and bone after the Menopause: how to protect from natural evolutions ?

Chairpersons: Mark Brincaat & Andrea Genazzani

- ▶ *Connective Tissue Changes and Osteoporosis after the Menopause. Similarities in response to Menopause and Various Treatments* - Mark Brincaat
- ▶ *Hormone Replacement Therapy in post-menopause for bone loss prevention: when, how and for how long* - Andrea Genazzani

## OARSI-ESCEO Symposium

Osteoporosis and Osteoarthritis re-visited: Are they linked, and if so, how?

Chairpersons: Jean-Yves Reginster & Ali Mobasheri

- ▶ *Introduction* - Jean-Yves Reginster
- ▶ *Osteoarthritis and osteoporosis: does the epidemiology suggest an inverse or collinear relationship?* - Elaine Dennison
- ▶ *Can we reach a unifying pathophysiologic framework for these two common musculoskeletal disorders?* - Roland Chapurlat
- ▶ *Obesity, osteoarthritis and osteoporosis: any evidence for shared pathogenesis?* - Nancy Lane
- ▶ *Physical activity, OA and osteoporosis: protective or risky?* - Stephen Messier
- ▶ *Conclusion* - Cyrus Cooper

## EUGMS-ESCEO-IOF Symposium

Assessing frailty to make treatment decisions

Chairperson: Stefania Maggi

- ▶ *Assessing frailty in patients with musculoskeletal conditions* - Alfonso J. Cruz-Jentoft
- ▶ *Using frailty to tailor complex decisions to patient needs* - Jürgen Bauer

## ESPRM-ESCEO joint Symposium

Update in Non pharmacological and Non surgical Approaches in Osteoarthritis

Chairpersons: Fitnat Dincer & Andreas Winkelmann

- ▶ *Update in Non pharmacological and Non surgical approaches in Hand Osteoarthritis* - Fitnat Dincer
- ▶ *Update in Non pharmacological and Non surgical approaches in Knee Osteoarthritis* - Ulku Akarimak
- ▶ *Update in Non pharmacological and Non surgical approaches in Hip Osteoarthritis* - Andreas Winkelmann

## SICOT-ESCEO-IOF Symposium

Fragility fractures in Osteoporotic Patients

Chairpersons: Gershon Volpin & Roman Pfeifer

- ▶ *Fragility Fractures of the Shoulder* - Gershon Volpin
- ▶ *Surgical Treatment of Fragility Fractures of the Spine* - Jordan Saveski
- ▶ *Fragility Fractures of Pelvis: Standards in the therapy of insufficiency fractures of the pelvis* - Roman Pfeifer
- ▶ *Osteoporotic Hip Fractures* - Ilir Hasani
- ▶ *Periprosthetic femoral fractures* - Georg Osterhoff
- ▶ *Conclusion* - All

## Oral Presentations

### OP1 - P102

SKELETAL HEALTH DETERMINANTS AND OUTCOMES AMONG CANADIANS: COMPARISON OF THE CANADIAN MULTICENTER OSTEOPOROSIS STUDY AND THE CANADIAN LONGITUDINAL STUDY ON AGING COHORTS

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## **Educational Lectures Abstracts**



## EL1

## POST-FRACTURE CARE: STATE OF THE ART?

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Fragility fractures are a significant cause of pain, long-term disability, loss of independence, and premature death in the elderly. It is estimated that 500 million people may be affected by osteoporosis worldwide, which causes more than 8.9 million fragility fractures annually. Moreover, a fracture begets other fractures - the imminent risk of subsequent fractures is highest during the first two years following a first fracture. This fact calls for action to identify, assess, treat, and monitor patients who have already sustained a first fracture. Nevertheless, approximately 80% of sufferers remain untreated for osteoporosis, reflecting an immense care gap and the need for systematic secondary fracture prevention strategies.

To address this global care gap, the IOF launched the Capture the Fracture® programme in 2012, to facilitate the implementation of Post-Fracture Care Coordination Programs, such as Fracture Liaison Services (FLS), to ensure FLSs are globally available in all hospitals treating fracture patients.

An FLS is a multidisciplinary, coordinator-based service assessing and managing patients who sustained a low trauma fracture. The benefits are immense: studies have shown that FLS are clinical- and cost-effective for healthcare systems, lowering re-fractures, hospital admissions, surgical interventions, and care home admissions.

The Best Practice Framework (BPF) published in 2012, is the CTF internationally endorsed, peer-reviewed guidance for secondary fracture prevention and sets the standard for post-fracture care. Structured as a series of 13 standards, it addresses key elements essential to FLS success as well as long-term sustainability; and also includes aspirational goals, thus encouraging service excellence. It also provides guidance for health care systems that are yet to establish an FLS.

Since its launch in 2012, the CTF network has been growing exponentially with 687 FLS as of December 2021 compared to 53 FLS in 2012, and so far an estimated 425,000 patients have been managed by FLS within the CTF network.

CTF will continue to drive improvements in the standard of care for osteoporotic patients, by advocating for policy changes, supporting FLS implementation and sustainability, and setting state-of-the-art standards in post-fracture care.

## EL2

## HOW CAN ARTIFICIAL INTELLIGENCE IMPACT THE MANAGEMENT OF MUSCULOSKELETAL DISEASES?

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The term “Artificial Intelligence (AI)” was introduced in association with a research workshop that was carried out in Dartmouth (NH, USA) in 1956. Leading experts from disciplines including mathematics, computer science and communication theory discussed what they believed to be the most urgent problems to be solved before further progress in AI could be realized. Overall, this conference fell short of the participants’ expectations, but it was nonetheless the initial spark for future research related to AI. One of the main obstacles that had to be overcome was the lack of computational power, which fortunately started growing almost exponentially in the early 2000s, more or less in parallel with the tremendous growth of healthcare data, and particularly medical imaging data.

In general, the term AI denotes a field in computer science which enables computers to simulate different aspects of human intelligence, such as natural language understanding, pattern recognition or data driven learning. Subsets of AI are machine learning (ML), and deep learning (DL), with the former denoting the ability of a system to learn automatically from past data without explicitly programming, and the latter being a class of ML using complex multilayered neural networks, similar to the human brain. In order to train such convolutional neural networks (CNN), massive amounts of training data are required.

At present, the impact of AI in the management of musculoskeletal diseases becomes obvious by its increasing use in imaging-based diagnostics. In this regard, one of the biggest challenges is image classification, the procedure of which can be divided into two different categories: pixel-based and object-based. Digitized images consist of pixels which provide spectral information. The more spectral information can be “extracted” from a single pixel, the higher the spectral resolution and the information retrieved. Pixel-based classification on its own lacks spatial information, which means that information of nearby pixels is not taken into account. This limitation can be overcome by object-based classification, which can include other pixels and therefore also regions of pixels to classify specific items, such as (parts of) a fracture line within otherwise healthy bone. It should be noted though that the term “object” used in this context only denotes contiguous regions of pixels, but not the “target object” itself (such as a tumor or fracture line). Currently, object-based classification approaches are the most widely used, but before these data can be entered into one of the image classification algorithms, they must be pre-processed. Among the currently available image classification algorithms, CNNs are the most popular ones.

One of the mainstays of AI supported applications in musculoskeletal diseases is imaging based detection of skeletal trauma. This is not surprising, as it has been shown that fracture detection error rate can be as high as 30%, even for expert radiologists. In addition, radiologists are not necessarily always available in trauma emergency rooms, meaning that skeletal images are interpreted by non-radiologists, and this even under time pressure. Using different methods, such as conventional radiography or computed tomography, CNN-based algorithms presently play the main role in detection of fractures at the spine, the hip or other skeletal regions. However, so far there is no convincing evidence available that clinical performance of such algorithms would surpass detection rates of radiologist experts. Nevertheless, in a recently published study it has been demonstrated that in abdominal and thoracic CT scans, taken for reasons other than skeletal trauma detection, a considerable number of otherwise missed vertebral fractures could be detected.

In another CNN-based study, automatic identification and classification of hip fractures was investigated. It was found that sensitivity and specificity of the model applied achieved expert-level at the very least. Similar results were found in various studies for other fractures such as the proximal humerus, fractures around the knee joint or the malleolar region.

In the context of morphometric vertebral fracture detection, conventional radiographs still constitute the mainstay in day-to-day practice. Given that a considerable percentage of vertebral fractures are missed even by radiologists, the development of AI supported vertebral fracture detection tools is warranted. In this regard, it was shown recently that accuracy, sensitivity, and specificity of such a tool is at least non-inferior to orthopedic surgeons.

Diagnosis of osteoporosis supported by AI models has been investigated in quite a number of studies, most of which were based on bone mineral density (BMD) as assessed by dual X-ray absorptiometry (DXA) and classified according to the WHO categories. It is of note that in one study outcome was improved by applying a novel data preprocessing method which was able to boost CNN performance.

AI supported algorithms have been used to assess bone properties, such as fracture load, microarchitecture and bone mineral density (BMD) at the lumbar spine, the hip and the total body. As for BMD, in some studies otherwise promising results remained of limited relevance, as the method for defining the ground truth (i.e. thresholds for osteoporotic, osteopenic or normal BMD) was quantitative computed tomography (qCT) instead of DXA.

Osteoarthritis (OA) of the knee has been investigated in several studies using AI supported imaging. In this context, early detection of degenerative changes of the knee cartilage is one of the main challenges. Conventional radiography still is the gold standard for quantification of degenerative changes, such as narrowing of joint space width and its grading according to Kellgren-Lawrence (KL). Consequently, most studies have been performed using conventional radiographs. For example, in one study it was investigated how an AI supported model affects physicians' performance in terms of inter-observer variability at assessing KL grades and their accuracy when interpreting plain radiographs. It

was found that use of such a model clearly increases overall accuracy, and consistency between physicians, respectively. In another study, the performance of five different ML classifiers was compared regarding accuracy and KL grading, and the CNN based model was shown to be superior to all other tested classifiers.

Aside from indications listed above, the use of AI-supported tools (including MRT) in clinical workflows of musculoskeletal diseases has also been investigated in various other conditions such as rheumatoid arthritis, spondylolisthesis or meniscus tears.

In conclusion, there are aspects in support of integrating AI based imaging tools into daily clinical practice, even if diagnostic performance of such tools does not always result in meaningful improvement compared to expert radiologists. Reducing reading time and reducing fatigue and stress among musculoskeletal radiologists (or non-radiologists) could be some of them. In view of the potential which is inherent to further developments in computer and AI technologies, benefits to health care systems, including patients and healthcare personnel, are likely to become more visible and meaningful in the near future. There is, however, a clear need for high quality clinical research in this field. This could be achieved, e.g., by an internationally consented "best practice framework" to guide industry- as well as investigator-initiated trials related to the clinical use of AI in healthcare.

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## Plenary Lectures Abstracts

## PL1

**CAN WE EXPECT NEW CHEMICAL ENTITIES FOR THE MANAGEMENT OF OSTEOPOROSIS IN THE COMING YEARS?**M. McClung<sup>1</sup><sup>1</sup>Oregon Osteoporosis Center; Mary McKillop Center for Health Research/Australian Catholic University, Portland, OR, United States

Multiple therapies with different mechanisms of action are available to reduce fracture risk in patients with osteoporosis. Current therapies include potent inhibitors of bone remodeling and powerful activators of bone formation. However, none of our current drugs are ideal treatments. Anti-remodeling agents do not restore bone architecture, and long-term treatment may be associated with serious adverse events. The bone forming activity of osteo-anabolic therapies is transient, and with all drugs, benefits are lost when treatment is discontinued. No therapy or sequence of therapies “cures” osteoporosis. This provides an opportunity for the development of new chemical entities to enrich our menu of treatment options.

The “ideal” therapy would be one that normalizes bone mass while reconstructing the deranged skeletal architecture, is administered in a convenient fashion, and is not associated with serious side effects. Several novel chemical entities have shown therapeutic promise in early-stage pre-clinical development as have molecules that regulate stem cell differentiation into an osteogenic lineage, activate Wnt/ $\beta$ -catenin signaling to induce bone formation or inhibit cellular senescence. Mesenchymal stem cell therapy and extraskeletal therapies to improve muscle mass and function to reduce fall risk and injury have theoretical potential.

Important limitations to bringing new clinical entities into clinical practice include regulatory hurdles, possible off-target effects and other safety issues, potential ethical problems with stem cell-based therapies, the cost of drug development and then the acceptance and use of the new drug in the marketplace.

So, will we have new chemical entities for the management of osteoporosis in the coming years? Despite significant challenges, the prospect for having new drugs in the future is bright. For those of us who believe in the power of science, the answer to the question is an unqualified YES.

## PL2

**UPDATE ON THE MANAGEMENT OF PATIENTS AT IMMINENT RISK OF FRACTURE**N. Harvey<sup>1</sup><sup>1</sup>MRC Lifecourse Epidemiology Centre, University of Southampton, Southampton, United Kingdom

There is increasing support for the greater efficacy and more rapid action of anabolic agents compared with antiresorptives for the prevention of fragility fractures. This development has led to the concept of stratifying patients for different treatments according to baseline fracture risk, for example as set out by recent recommendations from IOF and ESCEO. It is apparent that there are several routes to achieving a very high fracture risk, which usually requires the combination of several risk factors together with older age. Particular contributors might be high dose glucocorticoid treatment or a recent fracture. Several approaches have been developed to characterise either fracture risk over a short time period, usually 2 years, or to quantify the excess risk consequent to an index fracture in the prior 2 years. The most well developed strategy is the modification of FRAX<sup>®</sup> probability to account for recency and site of fracture. In this lecture, I will describe the clinical problem and associated burden, and secondly the approaches to stratification of treatment according to baseline fracture risk and the associated algorithms. I will end with practical thoughts for the implementation of this approach in clinical practice.

## PL3

**ADDED VALUE OF THE NEW VERSION OF THE FRAX<sup>®</sup> ALGORITHM**E. McCloskey<sup>1</sup><sup>1</sup>MRC Versus Arthritis Centre for Integrated research in Musculoskeletal Ageing, Mellanby Centre for Musculoskeletal Research, Department of Oncology & Metabolism, University of Sheffield, SHEFFIELD, United Kingdom

The assessment of fracture risk now plays an integral part in the clinical management of osteoporosis, facilitated by the widespread availability of fracture risk assessment tools such as FRAX<sup>®</sup>. In contrast to many clinical tools derived in single cohorts, FRAX was derived from a comprehensive analysis of variables within a number of international cohorts with the aim of identifying risk factors that performed equally well in different population settings and were independent of other selected risk variables, including bone mineral density (BMD). The resulting algorithm incorporated a small number of well-validated risk factors that are relatively easy to capture in routine clinical practice. The small number of factors has also been seen as a limitation of the tool. Currently, a number of developments are underway to complement and develop the core algorithm at the centre of FRAX and these are outlined below.

Post-FRAX adjustments - These adjustments are usually derived from single or relatively few cohorts without the ability to undertake the full international and independent validation conducted for the core FRAX risk factors; the adjustments should be regarded as ‘illustrative’ of the impact of additional information about the individual undergoing fracture risk evaluation. Adjustments include taking account of recency of fracture, including the site of fracture and time since fracture; trabecular bone score (TBS); glucocorticoid dose; discordance between lumbar spine and fem-



oral neck BMD; a history of falls. For example, in a 70 year old German women with BMI of 24kg/m<sup>2</sup> and a prior fracture as her only risk factor, the major osteoporotic and hip fracture probabilities would increase from 16% to 25% and from 6.1% to 8.8% respectively if the prior fracture was a vertebral fracture within the last 6 months.

Updating the core FRAX algorithm (FRAX-2) – this development aims to optimise and update the core algorithm with respect to current and novel risk factors. The basis for this exercise involves over 60 cohorts comprising over 2.1 million participants with a follow-up of approximately 20 million years and over 110,000 documented incident major osteoporotic fractures. For each known and candidate risk factor for fracture, multivariate hazard functions of fracture (hip and major osteoporotic fracture) will be tested including potential sex-specific differences in risk factor weights. After meta-analyses of the cohort-specific beta coefficients for each risk factor, models comprising 10-year probability of hip and major osteoporotic fracture, with or without femoral neck bone mineral density, will be computed to provide a framework for FRAX-2, thus enabling enhanced assessment of fracture risk in the relatively near future.

## PL4

### CROSSTALK BETWEEN THE IMMUNE SYSTEM AND THE SKELETON

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Osteoimmunology describes the interactions between the immune system and bone. Osteoimmunology in action is best exemplified in humans with chronic inflammatory rheumatic diseases, in which the chronic hyperactivation of the immune system leads to local and systemic bone loss. Therein, various subsets of activated T cells, in particular Th1 and Th17 cells, which produce pro-inflammatory cytokines such as TNF, IL-1b, IL-6, and IL-17, have been shown to activate osteoclasts directly and indirectly via the stimulation of RANKL production by stromal cells and drive bone loss. Moreover, restoration of bone erosions is hampered by the suppression of Wnt signaling, a key promoter of osteoblast function. However, not only T cells alter bone turnover, but also macrophages, neutrophils, and other white blood cell subsets have specific roles during inflammatory bone loss. On top of that, autoantibodies such as ACPA have been shown to be critical inducers of osteoclastogenesis, potentially explaining bone loss that is sometimes observed even before the manifestation of overt autoimmune disease. Osteoimmunology, however, is not only a one-way street of immune cells affecting bone turnover. In fact, osteoblasts, osteocytes, and osteoclasts modulate the genesis of lymphocytes, neutrophils, and platelets, and play a crucial role in the maintenance of hematopoietic stem cells. Thus,

manifold bidirectional interactions exist between the immune and skeletal systems and understanding their interactions may help discover new ways to treat inflammatory bone loss.

## PL5

### HOW LONG SHOULD WE TREAT OSTEOPOROTIC PATIENTS UNDER SEQUENTIAL THERAPY

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There is now good evidence that anabolic compared with antiresorptive therapies provide greater rapidity of action and magnitude of effect for fracture risk reduction. Therefore, and whenever possible sequential therapy with the use of an anabolic agent as the initial treatment for patients at very high fracture risk, followed by maintenance with antiresorptive agent, offers to date the most effective strategy. An interesting and remaining question is the duration of such a strategy as the duration of treatment with teriparatide, the first available anabolic agent was initially limited by safety concerns. We will review the evidence that suggests that 24 months is actually a reasonable time frame over which to recommend teriparatide use. Similarly, we will review the studies supporting the current concept of a short term use of other available anabolics, i.e. abaloparatide and romosozumab. Then, we will discuss whether the duration of antiresorptive therapies as the second leg of sequential therapy could rely on similar approach as their first line use, including treat to target based on BMD monitoring.

## PL6

### CALCIUM AND VITAMIN D – BOTH OR NEITHER?

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We shall consider whether supplemental calcium and vitamin D, alone or in combination, affect risk of falls and fractures in older adults.

Falls

There is little basis for predicting that calcium intake would affect fall risk and little evidence that it does. In contrast, inadequate vitamin D status is expected to influence fall risk because vitamin D is important for muscle strength and balance, both of which are predictors of falls. Clinical trial evidence however is decidedly mixed. Treatment with vitamin D alone has reduced fall risk in adults with vitamin D insufficiency and deficiency. In contrast, recent mega-trials, conducted largely in adults who were replete in vitamin D, as indicated by having 25-hydroxyvitamin D levels

above  $\geq 50$  nmol/L, have found that supplemental vitamin D had no net effect on fall risk. Moreover, several trials have indicated that supplement-induced intra-trial 25-hydroxyvitamin D levels of 100 nmol/L and higher may increase fall risk. Pending further clarification, it is advisable to maintain the 25-hydroxyvitamin D level of older adults in the range of 50 to 100 nmol/L (20-400 ng/ml) to minimize fall risk.

**Fractures**

Both calcium and vitamin D have a physiologic role in bone remodeling and bone loss and they are therefore reasonable candidates to influence fracture risk. A meta-analysis of clinical trials testing calcium alone did not document a significant effect of supplemental calcium on fracture risk. Numerous clinical trials have tested the effect of various doses of vitamin D either alone or with calcium on fracture risk, with divergent results. Early trials tended to test moderate doses of vitamin D, around 800 IU per day, together with 1000 mg per day of calcium. More recent large trials have generally tested larger doses of vitamin D, given at intervals ranging from daily to monthly to every 3 or 4 months, to annually - all without added calcium. The emerging consensus from meta-analyses is that vitamin D plus calcium is effective in lowering fracture risk whereas vitamin D alone is not. It remains unclear whether the effectiveness of calcium plus D observed in early trials relies on the modest daily dosing of vitamin D for its efficacy or whether the calcium per se is essential for the positive outcome. It is clear that intermittent dosing with large amounts of vitamin D alone in generally replete elders has either a null effect or can be harmful.

Current evidence supports use of modest daily doses of vitamin D together with calcium to reduce risk of falls and fracture in older adults with inadequate usual intakes and/or levels of these nutrients.

**PL7**  
**SKELETAL AND EXTRASKELETAL EFFECTS OF FGF23**

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Fibroblast growth factor (FGF) 23 is a bone-derived endocrine-acting phosphaturic hormone. Its levels are increased in X-linked hypophosphatemia (XLH) and various other hereditary or acquired diseases associated with FGF23-induced renal phosphate wasting as well as in chronic kidney disease (CKD). Expression of FGF23 is predominantly regulated by serum phosphate and calcitriol. In the setting of normal kidney function excessive FGF23 levels result in hypophosphatemia and consecutive impaired apoptosis of hypertrophic chondrocytes in the growth plate (i.e. rickets) and osteomalacia. Experimental studies suggest that excessive FGF23 levels can impair linear growth and cause premature closure of cranial sutures (i.e. craniosynostosis) in XLH via increased FGFR receptor 2 and 3 signaling. In the setting of CKD, FGF23 levels

are progressively rising as kidney function declines in order to maintain phosphate homeostasis. FGF23 excess is associated with pathological cardiac remodeling, vascular alterations, and increased cognitive risk in CKD patients. Clinical and experimental studies addressing other FGF23-mediated complications of kidney failure, such as hypertension and impaired bone mineralization, show partly conflicting results, and the causal relationships are not always entirely clear. This review will summarize regulators of FGF23 synthesis in various diseases and the main organ dysfunctions related to high FGF23 levels. Finally, potential treatments to target excessive FGF23 in various diseases will be discussed.

**PL8**  
**HOW TO TREAT BONE FRAGILITY IN CHRONIC KIDNEY DISEASE**

J. B. Cannata-Andia<sup>1</sup>

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Bone fragility fractures represent an important negative complication of chronic kidney disease (CKD), particularly in the more advanced stages of the disease, with a prevalence and incidence much higher than the general population, leading to negative outcomes such as a poor quality of life and increased risk of mortality.

In the pathogenesis of fragility bone fractures in CKD patients, two aspects play an important role: the abnormalities of bone turnover inherent to the renal osteodystrophy plus the bone loss related to the age-driven osteoporosis, a combination that greatly decreases bone strength and increases bone fragility fractures, one the most important components of the CKD bone and mineral disorders (CKD-MBD).

The pathogenesis of the CKD-MBD syndrome and the negative consequences of high and low bone turnover will be analysed. In addition, the current strategies for the management of the bone fragility fractures in CKD such as the control of Biochemical and imaging parameters of CKD-MBD will be addressed, analysing the benefits and limitations of the available therapeutic strategies at the different stages of CKD.

## PL9

**MUSCLE AND JOINT: SARCOPENIA AND OSTEOARTHRITIS**R. Chapurlat<sup>1</sup><sup>1</sup>INSERM UMR 1033, Université Claude Bernard-Lyon 1, Hôpital E Herriot, Lyon, France

Osteoarthritis and sarcopenia are the most frequently described musculoskeletal disorders in older persons but the relationship between these conditions and their functional and cellular causes are complex. We wanted to identify the links between osteoarthritis and sarcopenia described 1-in clinical studies, 2-in in vitro studies, and 3-the available treatment strategies for both conditions.

Electronic databases were used for the literature search of all studies investigating the relationship between sarcopenia and the presence of concomitant osteoarthritis.

We have found a limited number of clinical and morphometric studies on the complex relationship between osteoarthritis and sarcopenia. Studies present a number of methodological limitations due to definition and assessment of both entities. Low lean mass is one of the main actors of this cross-talk between muscle and bone, and adipose tissue plays a major role that had been underestimated. Bone Morphogenetic Proteins and myostatin pathways are key mediators and play an important role in both muscle and bone homeostasis.

Common therapeutic recommendations are still missing. There is a need for good quality prospective studies on concomitant sarcopenia and osteoarthritis, more translational research, and pharmacological and non-pharmacological therapies in order to describe common denominators for the management of sarcopenia, osteoarthritis, and their comorbidities.

## PL10

**HEALTH ECONOMICS IN OSTEOPOROSIS: WHICH MODEL FOR WHICH ASSESSMENT**M. Hiligsmann<sup>1</sup><sup>1</sup>Department of Health Services Research, CAPHRI Care & Public Health Research Institute, Maastricht University, Maastricht, Netherlands

Considering the limited availability of healthcare resources alongside major innovations in the management of osteoporosis, health economics analysis has played an increasing important role in decision-making in osteoporosis. This session will introduce types of health economic analyses (in particular cost of illness, cost-effectiveness, budget impact analysis, preference research) and discusses their roles and value in research and development, and reimbursement decisions. It will further introduce

main results and challenges of economic studies conducted in the field of osteoporosis, including for the assessment of the burden of osteoporosis, the cost-effectiveness of anti-osteoporosis interventions (such as drugs), the benefits of fracture liaison service or the potential role in determining intervention thresholds. It will finally provide some recommendations for the appropriate conduct and reporting of health economic studies, and will conclude by summarizing which model is appropriate for which assessment.



WORLD CONGRESS  
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DISEASES



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Abstract Book

## Oral Communications Abstracts

## OC1

### COMPARATIVE EFFECTIVENESS AND CARDIOVASCULAR SAFETY OF ABALOPARATIDE AND TERIPARATIDE IN POST-MENOPAUSAL WOMEN NEW TO ANABOLIC THERAPY: A US REAL-WORLD DATABASE STUDY

F. Cosman<sup>1</sup>, C. Cooper<sup>2</sup>, Y. Wang<sup>3</sup>, B. Mitlak<sup>3</sup>, S. Varughese<sup>3</sup>, S. Williams<sup>3</sup>

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**Objective:** To evaluate real-world effectiveness of abaloparatide (ABL) vs. teriparatide (TPTD) on nonvertebral fractures (NVF) and CV safety (NCT04974723).

**Material and Methods:** This retrospective cohort study used patient level claims data [Symphony Health, IDV® (Integrated Database)] including women ≥50 years with ≥1 prescriptions of ABL or TPTD and no prior anabolic therapy. The primary objective was to evaluate effectiveness of NVF risk reduction for ABL vs. TPTD with secondary objective of CV safety. Index was the date of the initial prescription dispensed at any time between May 1, 2017-July 31, 2019. Comparative effectiveness was evaluated in propensity score (PS) matched cohorts, including time to first NVF within 19 months of index. Comparative CV safety included MACE (Major Adverse Cardiac Events: composite endpoint of new MI, stroke, and CV death following hospitalization) and MACE plus heart failure (HF). Cox proportional hazards model was used to compare the time to first fracture or CV event between two cohorts.

**Results:** 1:1 PS-matching yielded 11,616 patients (pts) in each cohort. Overall median (interquartile age range) was 67 (61, 75) years; 25.6% had a history of fracture. Over 19 months, 335 pts in the ABL cohort and 375 in the TPTD cohort had a NVF [HR (95% CI): 0.89 (0.77, 1.03)] and 121 and 154 pts, respectively, had a hip fracture [HR (95% CI): 0.78 (0.62, 1.00)]. This pattern of numerically lower events with ABL was consistent in sensitivity analyses of anabolic treatment duration and when excluding pts with prior denosumab or zoledronic acid use. CV event rate was similar between ABL and TPTD cohorts: MACE [HR (95% CI): 1.00 (0.84, 1.20)] and MACE+ HF [HR (95% CI): 1.05 (0.93, 1.19)].

**Conclusions:** In this retrospective real-world database study of pts initiating ABL or TPTD, ABL was comparable to TPTD in the prevention of NVF, resulted in fewer hip fractures and demonstrated similar CV safety.

**Funding:** Radius Health, Inc.

**Disclosures:** BM, SAW, SV, and YW are employees and shareholders of Radius. FC reports grants and personal fees from Radius Health and personal fees from Amgen, Haoma Medical, Pfizer/

Myovant, Obseva, and Biocon. CC reports personal fees from Alliance for Better Bone Health, Amgen, Eli Lilly, GSK, Medtronic, Merck, Novartis, Pfizer, Roche, Servier, Takeda and UCB.

## OC2

### USE OF ROMOSUZUMAB IN THOSE WHO EXPERIENCED AN ON-STUDY FRACTURE: RESULTS FROM THE RANDOMISED FRAME AND ARCH PHASE 3 TRIALS

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**Objective:** In this post hoc analysis of results from the FRAME (NCT01575834) and ARCH (NCT01631214) phase 3 trials,<sup>1,2</sup> we evaluated romosozumab (Romo) safety in patients (pts) who experienced an on-study clinical fracture (fx).

**Materials and Methods:** Postmenopausal women with OP were randomised to receive Romo 210 mg monthly (QM) or comparator (FRAME: placebo [PBO] QM; ARCH: alendronate [ALN] 70 mg weekly) for 12 months (M) followed by antiresorptive therapy (FRAME: denosumab; ARCH: ALN). In pts who experienced clinical fx during the trials, we report relationship to timing of Romo dose after fx, treatment emergent adverse events (TEAEs) and specific skeletal AEs.

**Results:** Occurrence of on-study clinical fx was lower with Romo vs PBO in FRAME (Romo: 58/3589; PBO: 92/3591) and with Romo vs ALN in ARCH (Romo: 79/2046; ALN 110/2047). The most common first clinical fx was of the radius (about 30%) in both FRAME (Romo: 22/58; PBO: 27/92) and ARCH (Romo: 28/79; ALN: 33/110). Fx occurred with no specific pattern relative to the timing of Romo administration. Following a fx, the next Romo dose was administered after a median of 15 days (mean: 21 [range: 0–159]) in FRAME and 14 days (mean: 21 [range: 0–197]) in ARCH.

The number of pts who discontinued after clinical fx was low (FRAME: 3 Romo, 5 PBO; ARCH: 3 Romo, 13 ALN). Overall and serious TEAEs in pts with a clinical fx are reported (**Table**). No TEAEs of interest related to fx healing or skeletal AEs (nonunion, malunion, delayed healing, chronic pain, osteomyelitis) were reported by Romotreated pts in either trial through to end of study in ARCH and 36M in FRAME.

**Conclusion:** Fewer clinical fx occurred during the first year in Romo-treated pts compared with comparator groups in both FRAME and ARCH. Continued Romo administration did not appear to delay fx healing or contribute to reports of other skeletal AEs in pts who sustained a clinical fx.

**Table:** TEAEs after first clinical fx in FRAME and ARCH

	FRAME		ARCH	
	Romo/Dmab (N=58)	PBO/Dmab (N=92)	Romo/ALN (N=79)	ALN/ALN (N=110)
Overall TEAEs by 12M, n (%)	32 (55.2)	57 (62.0)	41 (51.9)	52 (47.3)
Serious TEAEs by 12M, n (%)	2 (3.4)	7 (7.6)	9 (11.4)	9 (8.2)
TEAEs of interest by 36M in FRAME and EOS in ARCH, <sup>a</sup> n (%)	0 (0.0)	1 (1.1)	0 (0.0)	1 (0.9)

<sup>a</sup>Nonunion, malunion, delayed healing, chronic pain, osteomyelitis. ALN: alendronate; Dmab: denosumab; EOS: end of study; N: number of patients with clinical fx at 12M; PBO: placebo; Romo: romosozumab; TEAE: treatment-emergent adverse event.

**References:** 1. Cosman F. NEJM 2016;375:1532-431; 2. Saag K. NEJM 2017;377:1417-27.

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**Disclosures:** **JL:** received grants from Radius and Merck; served on the speakers' bureau for UCB Pharma; **FC:** received institutional grants and research support from Amgen and from Radius Health; served as a consultant for Amgen and Radius Health; served on the speakers' bureaus for Amgen and Radius Health; **BL:** received fees and honoraria for lectures and advice from Amgen, Eli Lilly, Gedeon-Richter, Gilead, and UCB Pharma; research grants for Aarhus University Hospital from Amgen Inc. and Novo Nordisk; **MS:** payments received for lectures and Advisory Boards for UCB, Amgen and Gedeon Richter; **MO:** employee and stockholder of Amgen; **JT:** employee and shareholder of UCB Pharma; **ZW:** employee and stockholder of Amgen; **CL:** employee and shareholder of UCB Pharma; **AK:** served as a consultant for Amgen, UCB, Eli Lilly, Theramax; served on the speakers' bureaus for Amgen, UCB, Eli Lilly, Theramax.

OC3

**CONCOMITANT PPI USE NEGATES ORAL BISPHOSPHONATE ANTI-FRACTURE EFFICACY: A POST HOC ANALYSIS FROM A RANDOMIZED CONTROLLED TRIAL OF CLODRONATE**

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**Objectives:** Oral bisphosphonates are frequently co-prescribed with antacid drugs that may interact with bisphosphonate anti-fracture efficacy [1]. We explored the relationship between antacid use and clodronate efficacy on osteoporotic fracture risk within a well-documented, randomised, placebo-controlled study.

**Material and Methods:** Concurrent medication use at baseline was used to identify those prescribed proton pump inhibitors (PPI), histamine 2 receptor antagonists (H2RA) or other antacids (OAA).

**Results:** Of 5212 women recruited to the trial, 1339 (25.7%) were taking at least one antacid at entry, of whom 451 took H2RA (8.7%), 436 took PPI (8.4%) and 652 took OAA (12.5%, predominantly [89%] sodium alginate-based products). There was no significant difference in baseline antacid exposure between the clodronate and placebo groups and, as previously reported, clodronate was associated with a 23% reduction in osteoporotic fractures (HR 0.77, 0.63-0.93, p=0.002). In the placebo group, none of the antacid classes were significantly associated with future osteoporotic fracture risk over the three year intervention study. In contrast, in the clodronate arm, while OAA and H2RA had no statistically significant effect on fracture risk, PPI was associated with a 2.13-fold increase (95%CI 1.44-3.16, p=0.001). Thus, the anti-fracture efficacy of clodronate in women not using PPI was substantial (HR 0.72, 95%CI 0.59-0.88, p=0.002) but with no apparent fracture reduction in women using PPI (HR 1.16, 0.69-1.97, NS). The p-value for interaction between PPI use and clodronate efficacy was 0.09.

**Conclusion:** In this post hoc analysis, the efficacy of oral clodronate to reduce fracture risk was inhibited in the presence of concomitant PPI use, consistent with the observation by Abrahamsen and colleagues. While the mechanism is unclear, this potentially clinically significant observation requires further exploration in studies of commonly used bisphosphonates.

**Reference:** 1. Abrahamsen B et al (2011) Proton pump inhibitor use and the antifracture efficacy of alendronate. Arch Intern Med 171:998-1004

OC4

**FRACTURE RISK IN WOMEN WITH OSTEOPOROSIS TREATED WITH GASTRO-RESISTANT RISEDRONATE VERSUS IMMEDIATE RELEASE RISEDRONATE OR ALENDRONATE: A CLAIMS DATA ANALYSIS IN THE UNITED STATES**

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**Objective(s):** Risedronate (Ris) in immediate release (IR) and gastro-resistant (GR) formulations and alendronate (Ale; IR formulation) are commonly used therapies by women diagnosed with osteoporosis (OP) in the US. We compared risk of fractures between women initiated on GR Ris and those initiated on (a) IR Ris and (b) Ale.

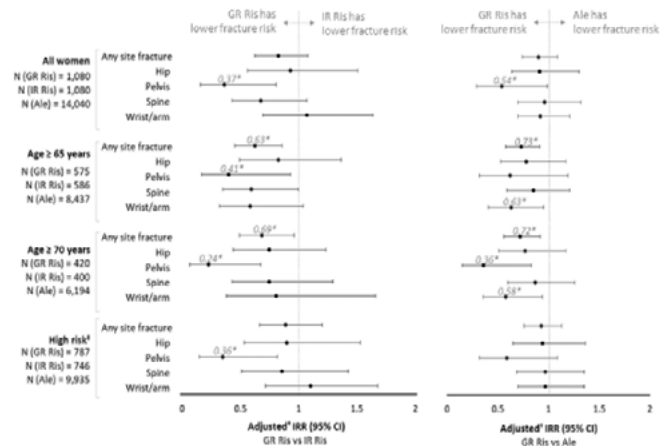
**Material and Methods:** Women aged ≥ 60 yr with ≥ 2 oral bisphosphonate (OBPs) prescription fills having an OP diagnosis and/or history of fracture were selected from a US claims database (2009-2019). The index date and study cohorts (GR Ris, IR Ris, Ale) were defined based on the first observed OBPs dispensing. Women were followed for ≥1 yr post-index date. All eligible women initiated on GR Ris were analyzed (N = 1,080). Comparator cohorts were randomly selected from eligible women initiated on IR Ris and Ale to match the index year distribution of women initiated on GR Ris (with 1:1 and 13:1 selection ratios, respectively). Incidence rate ratios (IRRs) adjusted for pre-index covariates were used to compare risk of fractures between GR Ris and IR Ris/Ale; overall and in women with high fracture risk due to older age or comorbidity/medications.

**Results:** Women in the GR Ris, IR Ris and Ale cohorts were followed on average for 3.0, 3.2, and 3.2 yr, respectively (mean age: 69, 69, and 70 yr). Unadjusted rates of any fracture per 1,000 women-yr were highest among women aged ≥70 yr (GR Ris: 67 vs. 58 among women aged ≥65 yr, 60 among those at high risk due to comorbidity/medications, and 51 among any GR Ris; IR Ris: 97 vs. 88, 77, 65; Ale: 102 vs 87, 80, 67; respectively). Adjusted IRRs for GR Ris vs IR Ris /Ale generally indicated lower risk of fracture for the GR Ris (IRRs <1; Figure). IRRs were statistically lower for GR for pelvis fractures in the full cohorts and for select fracture categories among high-risk women due to older age (e.g., any fracture, pelvis, wrist/arm) or comorbidity/medication (i.e., pelvis) (Figure).

**Conclusions:** The study results suggest GR Ris is associated with a lower risk of fracture than IR Ris or Ale among women with OP who have higher baseline risk of fracture. Further studies are needed to investigate possible mechanisms that mediate a reduction in risk of fracture with GR formulations.

**Disclosures:** The study was funded by Theramex.

**Figure.** Fracture risk IRRs for GR Ris vs (a) IR Ris and (b) Ale



CI, confidence interval; IRR, incidence rate ratio (estimated from negative binomial or Poisson regression models).  
 \* IRRs with p < 0.05.  
 † High risk of fracture due to comorbidity or medication; includes patients with baseline diagnosis for heart failure, chronic pulmonary disease, dementia, depression, diabetes, or Parkinson's disease; or baseline dispensing of systemic corticosteroids, sedatives, proton pump inhibitors, or loop diuretics.  
 ‡ Regression models were adjusted for age, census region, healthcare insurance type, baseline comorbidities, pre-index fractures, baseline dispensing of drugs positively/negatively affecting bone density, duration days supply for first index therapy prescription fill, and year of index date.

**Conflict of interest disclosures:** JAE has received grant support and/or consultant fees from Amgen, MSD, Lilly, Theramex. BC has received grant support and/or consultant fees from Amgen, Novartis, MSD, Alexion, Aptissen, Expanscience, Ferring, Lilly, Kyowa-Kirin, Novartis, Roche diagnostics, Sublimed, Theramex, UCB, Viatrix and is a board member in UCB. AA and MB are employees of Theramex, which has funded this study. JH, RII, and FV are employees of STATLOG, a consultancy company that has received funds from Theramex for the conduct of this study. FT reports personal fees, consultancy, lecture fees and honoraria from AMGEN, Fresenius, Gedeon-Richter, Hexal, HOLOGIC, Kyowa-Kirin, Stadapharm, Theramex, UCB outside abstract work.



## OC5

**FRACTURES INCREASE EARLY AND LONG-TERM MORTALITY IN CANCER PATIENTS: A POPULATION-BASED COHORT STUDY**

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**Objective:** Currently there are no population-based data among cancer patients on post-fracture mortality risk across a broad range of cancer diagnoses. Our objective was to estimate the association of fracture with mortality in cancer survivors.

**Methods:** Using Manitoba Cancer Registry data we identified all women and men with cancer diagnosed between January 1, 1987 and March 31, 2014. We then linked cancer data to Manitoba Health healthcare administrative data and ascertained fractures after cancer diagnosis and mortality to March 31, 2015. Hazard ratios for all-cause mortality in those with versus without fracture were estimated from time-dependent Cox proportional hazards models adjusted for multiple covariates.

**Results:** The study cohort consisted of 122,045 cancer patients (median age 68 years, IQR 58-77, 49.2% female). During the median follow up of 5.8 years from cancer diagnosis, we ascertained 7120 (5.8%) major fractures. All fracture sites, except for the forearm, were associated with increased mortality risk, even after multivariable adjustment. Excess mortality risk associated with a major fracture was greatest in the first year after fracture (HR 2.42, 95% CI 2.30-2.54) and remained significant >5 years after fracture (HR 1.60, 95% CI 1.50-1.70) and for fractures occurring >10 years after cancer diagnosis (HR 1.93, 95% CI 1.79-2.07).

**Conclusion:** Fractures among cancer patients are associated with increased all-cause mortality. This excess risk is greatest in the first year and persists more than 5 years post-fracture; increased risk is also noted for fractures occurring up to and beyond 10 years after cancer diagnosis.

## OC6

**IMPROVED FRACTURE RISK PREDICTION BY ADDING VFA-IDENTIFIED VERTEBRAL FRACTURE DATA TO BMD BY DXA AND CLINICAL RISK FACTORS USED IN FRAX**

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**Objective:** Clinical and occult vertebral fractures (VF) can be identified using vertebral fracture assessment (VFA) with dual-energy X-ray absorptiometry (DXA). The aim of this study was to investigate to what extent VFA-identified VFs improve fracture risk prediction, independently of bone mineral density (BMD) and clinical risk factors used in FRAX.

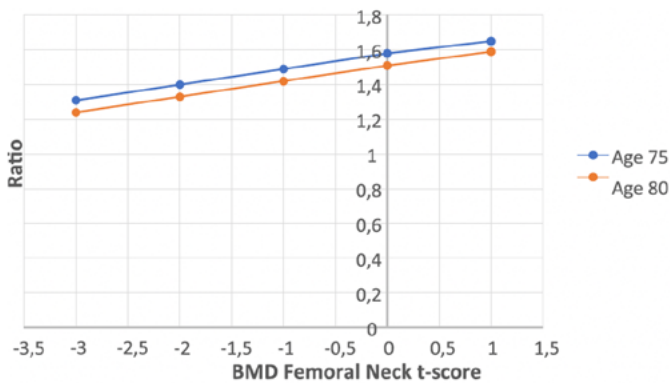
**Methods:** 2852 women, 75-80 years old, from the prospective population-based study SUPERB cohort, were included in this study. At baseline, BMD was measured by DXA, VFs diagnosed by VFA, and questionnaires used to collect data on risk factors for fractures. Incident fractures were captured by x-ray records or by diagnosis codes. An extension of Poisson regression was used to estimate the association between VFA-identified VF and the risk of fracture and the 5- and 10-year probability of major osteoporotic fracture (MOF) was calculated from the hazard functions (extrapolated in time) for fracture and death.

**Results:** During a median follow-up of 5.15 years (interquartile range 4.3-5.9 years), the number of women who died or suffered a MOF, VF or hip fracture was 229, 422, 160 and 124, respective-

ly. A VFA-identified VF was associated with an increased risk of incident MOF (hazard ratio [HR] = 1.78; 95% confidence interval [CI] 1.46-2.18), VF (HR = 2.88; 95% [CI] 2.11-3.93), and hip fracture (HR = 1.67; 95% [CI] 1.15-2.42), adjusted for age, height and weight. For women with a self-reported fracture, at age 75 years, a VFA-identified VF was associated with 1.2-1.4-fold greater 10-year MOF probability compared with not taking VFA into account, depending on BMD. The corresponding probability increase for a VFA identified grade 3 VF was 1.3-1.6 (Figure 1).

**Conclusion**

Identifying an occult VF using VFA has a substantial impact on fracture probability, indicating that VFA is an efficient method to improve fracture prediction in older women.



**Figure 1.** The ratio between the 10-year probability of a major osteoporotic fracture with a VFA-identified grade 3 VF and without considering VFA results, shown for women 75 and 80 years old, according to femoral neck BMD T-score. In the used model, BMI is set to 26 kg/m<sup>2</sup>, previous fracture to yes, but all other clinical risk factors set to no.

OC7

**MACHINE LEARNING AND COMPUTER VISION OF BONE MICROARCHITECTURE CAN IMPROVE THE FRACTURE RISK PREDICTION PROVIDED BY DXA AND CLINICAL RISK FACTORS**

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<sup>1</sup>MRC Lifecourse Epidemiology Centre, Southampton, United Kingdom, <sup>2</sup>University of Southampton, Southampton, United Kingdom, <sup>3</sup>University of Bristol, Bristol, United Kingdom

**Objectives:** Traditional analysis of High Resolution peripheral Quantitative Computed Tomography (HR-pQCT) images results in a multitude of cortical and trabecular parameters which would be potentially cumbersome to interpret for clinicians compared to user-friendly tools such as FRAX®. A computer vision approach, where the entire scan is ‘read’ by a computer algorithm to ascer-

tain fracture risk, would be far simpler. Thus, we investigated whether a computer vision and machine learning technique could improve the current methods of assessing fracture risk.

**Materials and methods:** Participants attended research visits at which height and weight were measured; 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 XtremeCT) and bone mineral density measurement and lateral vertebral assessment were performed using dual X-ray absorptiometry (DXA) (Lunar Prodigy Advanced). Images were cropped and pre-processed and texture analysis was performed using a 3-dimensional local binary patterns method. These analyses, together with age, sex, height, weight, BMI, and dietary calcium, were used in the random-forest classification algorithm. Receiver operating characteristic (ROC) analysis was used to compare fracture risk identification methods.

**Results:** Overall, 247 males and 149 females were included in this study with a mean age of approximately 76 years. Using clinical risk factors alone gave an area under the curve (AUC) of 0.70 (95% CI: 0.56-0.84), which improved to 0.71 (0.57-0.85) with the addition of DXA-measured BMD. The addition of the machine learning classifier to clinical risk factors and DXA-measured BMD lead to an improved AUC of 0.90 (0.83-0.96) with a sensitivity of 0.83 and specificity of 0.74.

**Conclusions:** The results of this preliminary work demonstrate that using a 3-dimensional computer vision method to HR-pQCT scanning can enhance the identification of those at risk of fracture beyond that afforded by clinical risk factors and DXA-measured BMD. This approach has the potential to make the information offered by HR-pQCT more accessible and applicable to healthcare professionals in the clinic if the technology becomes more widely available.

## OC8

**PRIMARY HYPERPARATHYROIDISM, BONE MINERAL DENSITY AND INCIDENT FRACTURE RISK: A DANISH REGISTER STUDY**

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**Objective :** We examined prospective associations between primary hyperparathyroidism (PHPT), femoral neck BMD and incident fracture.

**Material and Methods:** We undertook a cohort study in Danish hospital records defining cases as those patients diagnosed with primary hyperparathyroidism (1997-2015). Cases were matched on sex, age and index date to 10 population controls. Those with prior parathyroidectomy were excluded. All 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 method was used to calculate the hazard ratio for fracture comparing PHPT versus control. Within a subset of patients with femoral neck BMD, the gradient of risk (GR: increase in fracture risk/SD decrement in BMD) was compared to that in BMD controls, together with the incidence of hip fracture by absolute BMD.

**Results:** After adjustment for sex, current age, current time since index and calendar year, comparing the 6,884 cases with 68,665 controls (79% female; mean age 65.2 years), the hazard ratio for major osteoporotic fracture in PHPT was 1.36(95% CI:1.24, 1.50) and for hip fracture 1.48(1.29, 1.69).

Mean femoral neck BMD was 0.02g/cm<sup>2</sup> (0.15SD; p<0.001) lower in PHPT patients (n=2858) than in BMD controls (n=8212). For hip fracture the GR for BMD was similar in PHPT patients [1.77(1.39-2.25)] compared with controls [(1.86(1.65, 2.09)]. However, for hip fractures, at any given femoral neck BMD, fracture incidence was higher in PHPT than control.

**Conclusions:** Risk of fracture is increased in primary hyperparathyroidism. Despite a similar gradient of risk of hip fracture with BMD, the greater incidence at any given BMD suggest that consideration could be given to including PHPT as a specific variable in tools such as FRAX.

## OC9

**VERTEBRAL FRACTURES ON ROUTINE CT SCANS PREDICT MAJOR OSTEOPOROTIC FRACTURES AND HIP FRACTURES: OBSERVATIONAL COHORT STUDY**

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**Objective:** To assess the risk of fractures according to subsequent fracture location in subjects with vertebral fractures (VF) vs subjects with no identifiable VF on routine CT scans, in the absence of osteoporosis treatment.

**Methods:** Prespecified secondary outcome in observational cohort study including 2,000 men and women ≥50 years with CT chest/abdomen in 2010-11. Scans reevaluated by external, blinded radiology service to identify VF. Subjects treated with osteoporosis medications in the year prior to baseline (date of CT) were excluded. Remaining subjects with VF matched on age and gender in 1:2 ratio against those with no VF. Subjects followed for up to 7 years in national registers.

We used adjusted Cox regression analyses to evaluate the risk of major osteoporotic fractures (MOF; composite of hip, vertebral, humerus and distal forearm fractures), hip, vertebral, humerus, distal forearm, and all non-major osteoporotic fractures, respectively. Confounder set identified for primary outcome (risk of any fracture, except face, skull and fingers) by backwards stepwise selection (p<0.1 for confounder inclusion) with gender and age forced into the model. Confounder set applied consistently throughout these analyses.

**Results:** In 2,000 scans, 423 (21.1%) had ≥1 prevalent VF. After exclusion and matching, 321 and 606 subjects constituted the VF and no VF cohorts, respectively. Table shows total fracture counts and hazard ratios for the VF vs no VF cohorts for primary outco-



me (reported for comparison) and according to fracture location. Adjusted for age, gender, any prior fracture, anorexia, and use of antidepressants or proton pump inhibitors.

	Fractures during follow-up	Hazard ratio (95% CI)
Any fracture (primary outcome)	96	1.31 (0.85-2.03)
MOF	66	1.72 (1.03-2.86)
Hip fractures	27	3.02 (1.39-6.55)
VF	12	2.44 (0.77-7.76)
Humerus fractures	16	0.87 (0.28-2.73)
Distal forearm fractures	20	0.67 (0.22-2.07)
Non MOF	49	1.03 (0.55-1.93)

**Conclusion:** Subjects with VF identified on routine CT scans and not treated for osteoporosis are at increased risk of MOF and hip fractures as compared to subjects with no visible VF on the CT. This echoes the need for identification and management of subjects with opportunistically identifiable VF.

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**OC10**

**THE PROPORTION OF PATIENTS WHO REACH THE BMD SURROGATE THRESHOLD EFFECT ON ROMOSUZUMAB: A POST HOC ANALYSIS OF THE RANDOMISED FRAME AND ARCH PHASE 3 TRIALS**

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**Objective:** The FNIH-ASBMR SABRE project<sup>1</sup> defined the bone mineral density (BMD) surrogate threshold effect (STE) required to predict a significant reduction in fracture (fx) at the study level. STEs in the FNIH-ASBMR SABRE project were calculated using difference in BMD percentage change at 24 months (M) between active and placebo (PBO).<sup>1</sup> In practice, a more clinically relevant measure is whether patients' (pts') BMD has improved with treatment from their own baseline (BL) values. This post hoc analysis of data from FRAME (NCT01575834) and ARCH (NCT01631214) assessed the percentage of pts achieving the established FNIH STE thresholds<sup>1</sup> with romosuzumab (Romo) or alendronate (ALN) at 12M and 24M when compared to their own BMD values at BL.<sup>2,3</sup>

**Materials and Methods:** Postmenopausal women with osteoporosis were randomised to Romo 210mg monthly (QM) or comparator (FRAME: PBO QM; ARCH: alendronate [ALN] 70mg QW) for 12M). After 12M all pts received ALN in ARCH or denosumab (DMAB) in FRAME. Here, we report the proportion of pts that achieved total hip BMD percentage changes at 12M and 24M that meet STEs for vertebral, nonvertebral, hip and any fx risk reduction (observed case), without comparison to PBO.

**Results:** The table displays the percentage of patients achieving BMD changes from BL corresponding to the STEs for each fracture category.

**Conclusion:** Within 12M of treatment with Romo, most patients achieved the FNIH-SABRE STEs for any reduction in fx risk. At both 12M and 24M, higher proportions of patients met the STEs with Romo compared to ALN for all fx types.

**References:** 1. Eastell, R. JBMR 2021; Epub; 2. Cosman F. NEJM 2016;375:1532-431; 3. Saag K. NEJM 2017;377:1417-27.

**Table:** Proportion of patients with total hip BMD percentage change from baseline  $\geq$ STE at 12 and 24 months

Fracture risk reduction	STE (%) <sup>1</sup>	FRAME		ARCH			
		Romo Month 12 (N=3186) % (n)	Romo-DMAB Month 24 (N=2895) % (n)	Romo Month 12 (N=1773) % (n)	Romo-ALN Month 24 (N=1619) % (n)	ALN Month 12 (N=1778) % (n)	ALN-ALN Month 24 (N=1624) % (n)
<b>All fractures</b>							
Any	1.8	87.1 (2775)	93.6 (2711)	83.1 (1474)	85.1 (1377)	62.1 (1105)	68.6 (1114)
>30%	5.1	57.0 (1815)	77.1 (2233)	55.1 (977)	62.9 (1019)	25.0 (445)	33.7 (548)
<b>Vertebral fractures</b>							
Any	1.4	89.2 (2843)	94.4 (2734)	85.4 (1514)	87.5 (1417)	66.5 (1183)	72.7 (1180)
>50%	4.6	62.3 (1985)	80.9 (2342)	59.8 (1060)	66.8 (1081)	29.4 (522)	38.6 (627)
<b>Hip fracture</b>							
Any	3.2	75.9 (2418)	88.9 (2573)	73.0 (1294)	77.1 (1249)	45.2 (804)	54.8 (890)
>30%	5.8	49.2 (1567)	71.3 (2063)	49.7 (862)	57.9 (938)	18.8 (335)	27.4 (445)
<b>Nonvertebral fracture</b>							
Any	2.1	85.4 (2721)	93.0 (2692)	81.0 (1437)	83.5 (1352)	58.7 (1043)	66.5 (1080)
>20%	6.2	44.8 (1428)	67.9 (1966)	45.7 (810)	54.8 (887)	15.6 (278)	23.5 (382)

For each fracture category, STEs required for any and for maximal reductions in fracture risk (ranging from >20% to >50%) reported by Eastell et al<sup>1</sup> are shown. ALN: alendronate; DMAB: denosumab; PBO: placebo; Romo: romosozumab; STE: surrogate threshold effect.

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## OC11

### RISK OF FALLS AND FRACTURES FOLLOWING THE INITIATION OF ANTI-HYPERTENSIVES IN THE ELDERLY: SELF-CONTROLLED CASE SERIES ANALYSES FROM THE UK

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**Objective:** To assess the risk of falls and fractures associated with initiation of antihypertensives (AH) in older people with complex health needs.

**Material and Methods:** UK primary care data (CPRD GOLD) were linked to the Hospital Episode Statistics (HES) inpatient records and Office for National Statistics mortality data. We included all subjects aged >65 years at start date (01/01/2010) who did not use any AH in 2009. Among these, we identified 3 cohorts of patients with complex health needs based on unplanned hospitalisations, frailty, and polypharmacy in 2009.

Outcomes were identified from CPRD records (falls, fractures) and main hospital diagnoses (fractures). Multiple recordings of an event within 30 days were considered duplicates.

Prescriptions of AH were identified from product-specific codes in CPRD. Continuous exposure periods were created by combining individual prescription durations, allowing for a refill gap of  $\leq$ 90 days. Self-controlled case series (SCCS) were conducted separately for each cohort and outcome. Our SCCS models were adjusted for age, with incidence rate ratios (IRR) comparing (1) overall AH exposed patient-time, and (2) the first 30 days after treatment initiation, to unexposed patient-time. Sensitivity analyses were conducted to test the assumptions of the SCCS model.

**Results:** Among 185,140 AH-naïve patients, 25,210, 18,211, 14,955 were included to the hospitalisation, frailty, polypharmacy cohort respectively. Of these, 16.1%, 19.5%, and 20.9% had at least one fall recorded during follow-up, whereas 12.0%, 13.2% and 14.0% had at least one fracture. AH treatment initiation led to an increased risk for falls in all three cohorts (IRR 1.35 [95%CI 1.09 - 1.66] (hospitalisation), IRR 1.37 [1.10 - 1.69] (frailty) and IRR 1.53 [1.24 - 1.90] (polypharmacy)), which attenuated back to baseline after the first month of treatment. Fracture risk was also increased in the first month of treatment for the frailty cohort (IRR 1.38 [1.03 - 1.84]), but not for the other cohorts. Sensitivity analyses were consistent with the main findings.

**Conclusions:** Our study found a 35-50% increased risk of falls in the 30 days after starting AH therapy in older people with complex health needs.

**Acknowledgements:** This study was funded by the NIHR.

OC12

**MISALIGNMENT BY PRODUCING INEFFECTIVE LOAD CONDUCTION (TRANSFER) MAY BE RESPONSIBLE FOR ATYPICAL FEMORAL FRACTURES (AFFS)**

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**Introduction** The cause of AFFs is a mystery. However, their occurrence in patients treated with highly effective antiresorptive drugs suggests bone loss, decay, or reduced strength (osteoporosis) are not the cause.

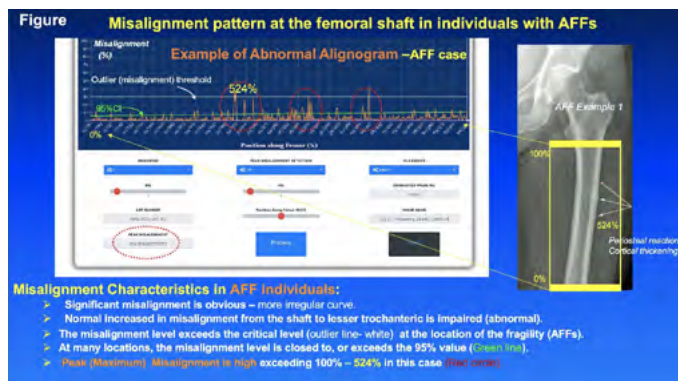
Bone has two key different mechanical functions: (i) Load bearing. This requires high density and strength, (ii) Efficiently conduct (transfer) loads (forces). (Sound conduction by bone for hearing is a well-known example). Different properties are required here – bone does not have to be a good carrier (requiring strength), but a good conductor. This needs “The right amount of bone, at the right place”; a good “fit” or structural cohesion between its components – i.e., *A good alignment*.

As AFFs are unlikely to be due to reduced strength or osteoporosis (they occur during therapy), we propose that there are due to an impairment in the latter i.e., Ineffective Load Conduction (transfer). Hence, by comparing AFFs (n=25) and fracture-free controls (n=27), we tested the hypothesis that femoral misalignment (a proxy of ILC) is associated with AFFs.

**Methods** We developed a **Misalignment Detector (Alignogram)**. Using routine pelvic X-rays, this novel software quantifies and displays as a curve, the misalignment pattern (expressed as %) along the femur. Peak (maximum) misalignment (PMA) and its location are detected.

**Results** Peak misalignment (PMA) was ~20 greater in patients with AFFs (473.82; IQR=292–9648%) compared with controls (IQR=10–52%) (P<0.0001). No patients with an AFF had a PMA<100%, whereas all controls had a value<100%. The **Alignogram** in patients with AFFs showed at least one misaligned zone (see figure); In contrast, none existed in controls.

**Conclusion**–AFFs may be due to ineffective load transfer rather than reduced bone density or strength. Measurement of misalignment from readily available X-ray images may hold the key in identifying patients at risk for AFFs and could help guide appropriate therapeutic decisions. Larger studies are now required.



OC13

**BONE MINERAL DENSITY AND BONE MICRO-ARCHITECTURE EVOLUTION AFTER KIDNEY TRANSPLANTATION: 3-MONTHS RESULTS OF A PROSPECTIVE COHORT STUDY**

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**Background:** Detection of bone abnormalities after kidney transplantation (KT) includes imaging technique (Dual Energy X-ray (DEXA)) and bone biomarkers to assess respectively bone mineral density (BMD) and bone turnover. The high-resolution peripheral quantitative computed tomography (HR-pQCT) provides additional information on bone microarchitecture and volumetric BMD. The goal of our study is to evaluate the evolution of bone structure using HR-pQCT compared to standard technique (DEXA) in a prospective cohort of KT recipients.

**Material & Methods:** All patients referred for a single KT at the university hospital of Liège with no history exposure to antiresorptive agents were eligible for inclusion (NCT04713774). Participants underwent baseline and 3- month biomarkers analysis, DEXA and HR-pQCT (XtremeCT II).

**Results:** 31 patients were prospectively included (mean age: 58.0+/-11.2 years), with a majority of men (71%). 3 months after transplantation, we observed a significant reduction of BMD by DEXA at the total hip and femoral neck. This decrease was clinically relevant (above the least significant change) for 33, 23 and 24% of patients on lumbar spine, total hip and total wrist respectively. The HR-pQCT analysis demonstrated significant reduction of the total (Tt-vBMD) and trabecular (Tb-vBMD) volumetric BMD



and trabecular bone volume ratio (BV/TV), but also of trabecular bone structure (Tb.Th). There was no modification of cortical parameters.

Among HR-pQCT parameters with significant loss, tibial Tt-vBMD (HR-pQCT) loss was correlated with total hip and femoral neck BMD (DEXA) loss, while there was no correlation for tibial BV/TV nor any radius bone parameters (HR-pQCT) loss and BMD (DEXA) variation.

Bone biomarkers (CTX-s, TRAP 5b, BALP and P1NP) showed significant decrease at 3 months. Among them, formation (BALP and P1NP), but not resorption, biomarkers variations significantly correlated with several HR-pQCT parameters modulations.

**Conclusions:** Detecting properly rapid changes in bone density, as soon as 3 months after renal transplantation, seems feasible with DEXA and HR-pQCT. HR-pQCT additionally show a significant decrease of BMD and structure at trabecular site. The sensibility of this technique might be higher than DEXA.

BMD variations observed with DEXA are only associated with total volumetric BMD variation, but not with trabecular BMD and structure, in HR-pQCT. Bone formation biomarkers modulation show a promising association with HR-pQCT after 3 months.

Additional 12-months analyses of this prospective cohort study will be realized to confirm these short-term results.

## OC14

### HEALTHCARE EXPENDITURE IN FRAGILITY FRACTURE PATIENTS ACROSS 10 COUNTRIES: A MICRO-COSTING STUDY

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**Objectives:** We recently identified several fracture site-specific health service use pathways associated with different trajectories of health-related quality of life (HRQoL) at 12-months post-fracture [1]. However, it remains uncertain whether recovery of HRQoL was achieved at an increased cost. The present micro-costing study was undertaken to provide the estimated healthcare costs of each care pathway.

**Methods and Materials:** The study included 4126 adults aged  $\geq 50$  years with a fragility fracture (1657 hip, 681 vertebrae, 1354 wrist, 434 humerus) from the International Cost & Utility Relat-

ed to Osteoporotic Fractures Study (ICUROS) – an observational study in Austria, Australia, Estonia, France, Italy, Lithuania, Mexico, Russia, Spain & the UK. ICUROS participants were asked to recall the frequency and duration (where applicable) of their health and community care service use at 4- and 12-month follow-up visits. Where possible, health care use was verified via review of patient medical records. We used latent class analyses to identify distinct care pathways representing common patterns of health service use in patients over 12-months, and then applied logistic regression models to find associations between each care pathway and HRQoL recovery. For the micro-costing analysis, patient-level costs were identified and aggregated to determine the average cost of health care use related to the fracture in each care pathway (presented in Australian 2021 dollars). Mean cost differences were calculated and analyzed using a one-way analysis of variance (ANOVA) and post-hoc Bonferroni correction to determine any statistically significant differences.

**Results:** The total direct cost of fractures was estimated at \$89564, \$38926, \$18333, and \$38461 per patient for hip, vertebral, wrist and humeral participants, respectively. A Kruskal-Wallis test yielded a statistically significant difference in cost values between most care pathways ( $n=20$ ;  $p<0.001$ ). Care pathways that were associated with increased recovery of HRQoL had lower mean costs per patient across each fracture site.

**Conclusions:** This study identified the costs and HRQoL impacts of several multidisciplinary care pathways for individual fracture sites based on the health service utilization of an international cohort of older adults. These care pathways may assist health care providers worldwide in allocating resources for fractures in more cost-effective ways.

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## OC15

## GENETICS OF ATYPICAL FEMUR FRACTURES

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**Introduction:** Atypical femur fracture (AFF) is a rare condition that have been specifically associated with anti-resorptive therapies, and sometimes with a rare congenital metabolic bone disorder called hypophosphatasia (HPP). The rarity of AFF occurrence suggest that certain people may have intrinsic risk factors that predispose them to develop these fractures, when they are exposed to bisphosphonates or denosumab.

**Methods:** We screened, by Sanger sequencing, 26 patients, who developed at least one AFF, for rare and common variants of the *ALPL* gene, whose germinal pathogenic mutations have been associated with HPP. Moreover, 20 of these AFF cases were tested by next generation sequencing (NGS), using a customized multi-gene panel containing 76 human genes involved in the regulation of bone mineralization.

**Results:** In one AFF patient (3.8%) we identified the p.Thr273Met missense rare variant in exon 8 of the *ALPL* gene, not previously reported in mutation databases and with conflicting interpretations of its pathogenicity. Analysis of *ALPL* common variants showed a significantly higher frequency of homozygosity in AFF cases, both with respect to non-HPP controls and patients with biochemical and clinical signs of suspected HPP, other than AFF. The NGS analysis identified non-polymorphic variants in *SLC9A3R1*, *SLC34A1*, *BMP1B*, *CYP27B1*, *MEPE*, *PIGO*, *FB1*, *FN1* and *PHOSPHO1* genes. In particular rare variants of either the *SLC34A1* and the *SLC9A3R1* genes, whose mutations have been respectively associated with autosomal dominant hypophosphatemic nephrolithiasis/osteoporosis type 1 and type 2 (NPHLOP1 and NPHLOP2), were found in 20.0% (4/20) of analyzed AFF patients.

**Discussion:** In our AFF series, the presence of homozygosity for one or more *ALPL* common variants was found in almost one of three patients, suggesting that this genetic feature could have a possible pharmacogenetic application in predicting individuals at higher risk of developing these fractures as a consequence of anti-resorptive therapy. The elevated prevalence of heterozygote rare variants in the *SLC34A1* and the *SLC9A1* genes in AFF patients suggested that variations of these two genes could represent a

possible genetic risk factor for these atypical fragility fractures. On the other hand, AFF could represent an unsuspected clinical manifestation or a complication of NPHLOP disorders.

**Acknowledgments:** NGS analysis was performed by Personal Genomics SRL, Verona, Italy.

## OC16

## ASSOCIATIONS OF CALCIUM INTAKE AND CALCIUM SOURCES WITH BLOOD LIPIDS IN A POPULATION OF OLDER WOMEN AND MEN WITH HIGH CALCIUM INTAKE

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**Background:** Promoting calcium intake is a cornerstone for osteoporosis management. Some individuals at risk for bone fragility may refrain from/limit the consumption of dairy products (a major calcium source), due to their high content in saturated fats and their perceived negative impact on blood lipid profile. Whether calcium from dairy products and other sources is associated with lipid parameters remains unclear.

**Objectives:** To explore the associations of total calcium intake and calcium from various sources (diet vs supplements, dairy vs non-dairy sources, and by dairy subtype, fermentation status and fat content) with blood lipids in community-dwelling elderly.

**Methods:** We used data from 717 elderly (80% women, mean age 71±2 years) from the Geneva Retirees Cohort (GERICO). Dietary calcium intake was assessed at several timepoints using a validated FFQ and calcium supplement use was recorded. Blood lipids were treated as categorical variables to distinguish those with normal and abnormal levels.

**Results:** Increasing total calcium intake was associated with lower risks for high total cholesterol [OR (95% CI) 0.90 (0.81, 0.99), P=0.038] and triglycerides [0.83 (0.73, 0.95), P=0.007], and low HDL-cholesterol [0.85 (0.75, 0.96), P=0.010]. These associations were somewhat attenuated after adjustments for age, sex, weight, height, smoking status, alcohol intake, dietary energy intake, physical activity energy expenditure and use of lipid-lowering, anti-hypertensive and antidiabetic drugs. Dairy calcium (P=0.031), and especially, calcium from milk (P=0.044) and milk-based desserts (P=0.039) i.e., low-fat (P=0.022) and non-fermented (P=0.005) dairy products were associated with a lower risk for high total cholesterol. Greater calcium intakes from total dairy products (P=0.020), milk (P=0.020) and non-fermented dairies (P=0.027) were associated with a lower risk for hypertriglyceridemia. No significant association was observed between calcium from non-dairy sources, cheese or high-fat dairy products and blood lipids.

Increasing calcium through supplements was neutral for total and LDL-cholesterol, while it was associated with lower risks for hypertriglyceridemia ( $P=0.022$ ) and low HDL-cholesterol ( $P=0.001$ ). These latter associations did not persist after adjustments.

**Conclusions:** Our results suggest that higher calcium intakes, from dietary sources or supplements are not adversely associated with blood lipids in elderly, whilst total and particularly low-fat dairies are valuable calcium sources potentially related to favorable lipid profiles.

## OC17

### PRUNES PRESERVE HIP BONE MINERAL DENSITY AND FRAX RISK IN A 12-MONTH RANDOMIZED CONTROLLED TRIAL IN POSTMENOPAUSAL WOMEN: THE PRUNE STUDY

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Dietary consumption of prunes has favorable impacts on bone health, however, more research is necessary to improve upon study designs and refine our understandings.

**Objective:** Evaluate the effects of prunes (50g and 100g/day) on bone mineral density (BMD) in postmenopausal women during a 12-month dietary intervention. Secondary outcomes include effects on serum bone biomarkers.

**Materials and Methods:** Single center, parallel arm 12-month randomized controlled trial (RCT; NCT02822378) to test effects of 50g and 100g/day prunes vs. a Control group on BMD (dual-energy X-ray absorptiometry) (every 6 months) and bone biomarkers in postmenopausal women with a BMD T-score of  $<0.0$  and  $>3.0$  at any site.

**Results:** 235 women (age  $62.1 \pm 5.0$ yr) were randomized into Control ( $n=78$ ), 50g Prune ( $n=79$ ), or 100g Prune ( $n=78$ ) groups. Compliance was  $90.2 \pm 1.8\%$  and  $87.1 \pm 2.1\%$  in the 50g and 100g Prune groups. Dropout was 22%; however, the dropout rate was 41% for the 100g Prune group compared to other groups (10% Control; 15% 50g Prune; ( $p < 0.001$ )). A group $\times$ time interaction for total hip BMD was observed in Control vs 50g Prune groups ( $p=0.030$ ), but not in Control vs 100g Prune groups ( $p=0.194$ ). To-

tal hip BMD decreased in the Control group at 6 and 12-month/post timepoints compared to baseline (both  $p < 0.05$ ), while the 50g Prune group preserved BMD at 6 and 12 months timepoints. While FRAX hip fracture risk worsened in the Control group at 6 months, FRAX score was maintained in the pooled (50g+100g) Prune groups.

**Conclusions:** A 50g dose of daily dose of prunes can prevent loss of total hip BMD and prevent increased hip fracture risk in postmenopausal women after just six months, which persisted to 12-months. Given that there was high compliance and retention at the 50g dosage over 12 months, we propose that the 50g prune dose represents a valuable non-pharmacological treatment strategy that can be used to preserve hip BMD in postmenopausal women and possibly reduce hip fracture risk.

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**Disclosures:** CW and CR are members of the Nutrition Advisory Panel for the California Prune Board.

## OC18

### PREVALENCE OF OSTEOPOROSIS AND OSTEOPENIA IN MEN AND WOMEN FROM SUB-SAHARAN AFRICA, THE UK AND US: A GLOBAL PROBLEM

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**Objective:** There is a perception that osteoporosis prevalence in sub-Saharan Africa countries is low and does not pose a health risk to populations. However, recent evidence from across The Gambia, Zimbabwe and South Africa suggests otherwise. We aimed to collate multiple worldwide cohorts to compare total hip BMD T-scores and osteoporosis prevalence.

**Methods:** Data from the Gambian Bone and Muscle Ageing Study(40-94y), The Zimbabwean Menopause study(40-60y), The Agincourt Health and Socio-Demographic Surveillance System(21-80y), South Africa, the Hertfordshire Cohort Study(59-87y), UK, and the Health, Aging and Body Composition Study(68-89y) in the US were compared. T-scores (presented as mean (standard deviation)) were calculated for all study participants, aged >50 years using NHANES III reference data.

**Results:** BMD T-scores in men, and hence osteoporosis prevalence, were relatively similar across all cohorts (Table 1). However, there were marked differences in osteoporosis prevalence in women. Interestingly, Black African women in GambAS and White American women in HealthABC had similar high prevalence of osteoporosis (Table 1).

**Conclusion:** Contrary to common perceptions, osteoporosis and osteopenia exist in sub-Saharan African men and women, in some populations similar to US levels. Immediate action is required to understand risk factors for disease and to prevent growing fragility fracture rates in resource-limited countries.

**Table 1:** Mean T-scores, and prevalence of osteoporosis (T-score <-2.5) and osteopenia (T-score >-2.5 & <-1) in all those aged over 50 years

Study (n)	Country	Men			Women		
		Mean T-score (SD)	% (n) Osteoporosis	% (n) Osteopenia	Mean T-score (SD)	% (n) Osteoporosis	% (n) Osteopenia
GambAS (678 (314 men))	Gambia	-0.17 (1.19)	1.6 (5)	22.6 (71)	-1.72 (1.19)	28.3 (103)	47.3 (172)
HCS (2116 (1067 men))	UK	0.55 (1.23)	0.7 (7)	9.7 (104)	-0.74 (1.16)	5.3 (56)	38.1 (400)
HealthABC Black (4195 (1738 men))	US	0.30 (1.37)	1.7 (30)	13.7 (238)	-1.07 (1.38)	14.6 (359)	38.9 (955)
HealthABC White (6813 (3509 men))	US	-0.32 (1.30)	3.9 (137)	27.4 (961)	-1.83 (1.12)	27.1 (896)	50.1 (1656)
Agincourt (642 (224 men))	South Africa	-0.13 (1.30)	3.6 (3)	22.9 (19)	-0.32 (1.22)	4.2 (7)	23.5 (39)
Menopause study (200 women)	Zimbabwe	-	-	-	0.23 (1.22)	0	17.0 (17)

OC19

**GENETIC BIOMARKERS, SNP GENES AND MTDNA HAPLOGROUPS, PREDICT OSTEOARTHRITIS STRUCTURAL PROGRESSORS THROUGH THE USE OF SUPERVISED MACHINE LEARNING**

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**Objective:** Current treatments of osteoarthritis (OA) are only symptomatic, and the conventional diagnosis and prognosis of the disease are not very effective in the early identification of patients who will progress rapidly. Biomarkers enabling early stratification would assist in a better therapeutic strategy for individuals, thus precision medicine, as well as in the development of disease-modifying OA drugs. Some genetic markers have been linked to knee OA and could be used as biomarkers in such phenotyping. We investigated, using machine learning (ML), whether some single nucleotide polymorphism (SNP) genes and mtDNA haplogroups/clusters, alone or combined, could predict early knee OA structural progression.

**Methods:** Participants (901) from the Osteoarthritis Initiative cohort were classified for the probability of being structural progressors using applied imaging-based prediction, as described<sup>1</sup>. Two major OA risk factors (age and body mass index [BMI]), SNP genes (*TP63*, *FTO*, *GNL3*, *DUS4L*, *GDF5*, *SUPT3H*, *MCF2L*, *TGFA*), and mtDNA haplogroups (H, J, T, Uk, others) and clusters (HV, TJ, KU, C-others) were considered for prediction. Seven supervised ML methods were evaluated; the support vector machine was used to build the models. The models were developed as gender-based and validation assessed under tenfold cross-validation experiments.

**Results:** Models (277) were generated, and sensitivity and synergy analyses led to the development of two gender-based models to predict structural progressors. Both used age and BMI and, for the first model, the SNP genes *TP63*, *DUS4L*, *GDF5*, *FTO* with an accuracy of 87.5%. The second model had one less variable with the same accuracy (87.5%) and profits from the association of haplogroups and the SNP genes *FTO* and *SUPT3H*. For the latter, the highest impact was associated with haplogroup H, the presence of CC alleles at *FTO*, and the absence of AA at *SUPT3H*. The excellent validation accuracy (mean: 82.3%) reinforces the robustness and generalizability of the developed models.

**Conclusion:** This study introduces a novel source of decision support in precision medicine in which, for the first time, two gender-based models using SNP genes, mtDNA haplogroups, and supervised ML were developed for early detection of at-risk knee OA structural progressors.

**Reference:** 1. Jamshidi A et al. *Ther Adv Musculoskelet Dis*. 2020;12:1-12.



## OC20

### EROSIVE OSTEOARTHRITIS OF THE HAND: EFFICACY OF PRESCRIPTION-GRADE CRYSTALLINE GLUCOSAMINE SULFATE AS AN ADD-ON THERAPY TO CONVENTIONAL TREATMENTS

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**Objective:** To evaluate the efficacy of prescription-grade Crystalline Glucosamine Sulfate (pCGS), as an add-on treatment to conventional therapy, compared to usual therapy alone, in patients with erosive osteoarthritis of the hand (EHOA).

**Material and Methods:** This is a 6-months retrospective study including patients with concomitant gonarthrosis and EHOA, defined as the presence of central erosion in at least two interphalangeal joints. Eligibility criteria were symptoms duration for at least 3 months, with a global hand pain score  $\geq 40$  mm on a 0–100 Visual Analogue Scale (VAS) and a Functional Index for Hand Osteoarthritis (FIHOA) score  $\geq 6$ . The participants were stratified into two groups based on whether or not pCGS, at the daily dose of 1500 mg, was added to the conventional therapy for hand osteoarthritis (HOA). The latter consisted in education and training in ergonomic principles, exercise and the use on-demand of acetaminophen or oral non-steroidal anti-inflammatory drugs. Patients were evaluated at baseline, after 3 and 6 months. Primary outcome measures were the change from baseline to month 6 in VAS and in FIHOA score. Secondary outcomes were duration of morning stiffness, health assessment questionnaire (HAQ), medical outcomes study 36-item short form (SF-36), symptomatic drugs consumption and percentage of treatment responders, according to the OMERACT/OARSI criteria.

**Results:** 123 patients were included: 67 treated with pCGS in addition to conventional therapy (pCGS Group) and 56 with conventional therapy alone (Control Group). After 6 months a significant difference in VAS pain and in FIHOA score ( $p < 0.01$  and  $p < 0.001$ , respectively) was observed between groups in favor of pCGS Group. Furthermore, similar results were found for morning stiffness duration ( $p < 0.05$ ), HAQ ( $p < 0.01$ ) and for physical and mental component score of SF-36 ( $p < 0.05$  and  $p < 0.001$ , respectively) at 6 months. A significant reduction of symptomatic drug consumption at 3 and 6 months was reported in the pCGS Group ( $p < 0.001$ ). The rate of responders was greater in pCGS Group than Controls at all time points ( $p \leq 0.001$  between groups). No serious adverse event was recorded in both groups.

**Conclusions:** This study suggests the potential symptomatic effectiveness of pCGS, when used in combination with conventional therapy in EHOA.

## OC21

### HEALTH ECONOMICS EVALUATION OF A HIGH AND LOW MOLECULAR WEIGHT HYALURONIC ACID FORMULATION IN PATIENTS WITH KNEE OSTEOARTHRITIS. ANALYSES FROM A RANDOMIZED CLINICAL TRIAL

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**Introduction:** In a recent randomized placebo controlled trial, a single intra-articular injection of a high and low molecular weight hyaluronic acid formulation (HA-HL) has been shown to be effective in providing a clinically relevant reduction in pain and functional limitation up to 24 weeks in subjects with painful knee osteoarthritis (OA). The objective of the current study is to assess the cost-effectiveness of HA-HL compared with placebo using individual patient data from this clinical trial in a Swiss health care perspective.

**Methods:** A total of 692 patients fulfilling the criteria to enter the trial were randomly allocated to HA-HL or placebo. Each patient received one intra-articular injection of HA-HL or placebo at baseline and was then followed-up for a total duration of 24 weeks with 5 follow-up visits (i.e. week 1, 6, 12, 18 and 24). The EQ-5D-5L 5-point verbal Likert scale was used to calculate the Health Utility Index and the related quality-adjusted life-years (QALY) using the area-under-the-curve (AUC) method. For the costs, price of HA-HL in Switzerland was used. The primary threshold for the incremental cost/effectiveness ratio (ICER) below which HA-HL was considered as cost effective was 91,540 Swiss franc (CHF) per QALY (i.e. 100,000\$ USD).

**Results:** No significant difference between the baseline characteristics of the HA-HL group and placebo group was observed. With a mean ICER of 27,212 CHF per QALY (95% CI 20,135 – 34,289), HA-HL was considered as cost-effective compared to placebo. Sensitivity analyses (e.g. using lower or upper limit prices or using other threshold values) gave similar results, i.e. ICER far below the threshold values of cost-effectiveness.

**Conclusion:** These results confirm the role of HA-HL as an efficient pharmacological modality in the management of OA.

## OC22

### LOWER LIMB MUSCLE STRENGTH AND MUSCLE MASS ARE ASSOCIATED WITH INCIDENT SYMPTOMATIC KNEE OSTEOARTHRITIS: A LONGITUDINAL COHORT STUDY

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**Objective:** Recent literature suggests that sarcopenia, often represented by low lower limbs muscle mass and strength, can be considered a potential risk factor for knee osteoarthritis (OA), but the available literature is still limited. We therefore aimed to investigate whether sarcopenia is associated with a higher risk of radiographic (ROA) and symptomatic knee OA (SxOA) in a large cohort of North American people in the context of the OA initiative.

**Material and Methods:** Sarcopenia at baseline was diagnosed in case of low skeletal muscle mass (i.e., lower skeletal mass index) and poor performance in the chair stands test. The outcomes of interest for this study included ROA (radiographical osteoarthritis) if a knee developed a Kellgren and Lawrence (KL) grade  $\geq 2$  at follow-up, and SxOA (symptomatic osteoarthritis) defined as new onset of a combination of painful knee OA.

**Results:** Altogether, 2,492 older participants (mean age: 68.4 years, 61.4% females) were included. At baseline, sarcopenia was present in 6.1% of the population. No significant difference in ROA prevalence was observed between those with and without sarcopenia ( $p=0.76$ ), whilst people with sarcopenia reported a significant higher prevalence of SxOA ( $p<0.0001$ ). Using a logistic regression analysis, adjusting for potential confounders at baseline and the diagnosis of sarcopenia during follow-up, sarcopenia was associated with a higher incidence of knee SxOA (odds ratio, OR=2.29; 95%CI [confidence interval]: 1.42-3.71;  $p=0.001$ ), but not knee ROA (OR=1.48; 95%CI: 0.53-4.10;  $p=0.45$ ).

**Conclusion:** Sarcopenia could be associated with a higher risk of negative knee OA outcomes, in particular symptomatic forms

## OC23

### DOES LOW MUSCLE STRENGTH MODIFY RELATIONSHIPS BETWEEN INDIVIDUAL COMORBIDITIES AND MORTALITY? FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY

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**Objective:** Ischemic heart disease (IHD), diabetes and chronic obstructive pulmonary disease (COPD) have been individually related to increased mortality: here we report how mortality risks for these conditions differ when coexisting with low muscle strength in a population-based UK cohort study.

**Material and Methods:** Men ( $n=1502$ ) and women ( $n=1330$ ) from the Hertfordshire Cohort Study, aged 59-73 years at baseline, were analysed. Muscle strength was ascertained by grip dynamometry; COPD was defined as a forced expiratory volume in one second (FEV1) / forced vital capacity (FVC) ratio of  $<0.7$ ; diabetes was ascertained through self-report and via a 2-hour fasted oral glucose tolerance test; and previous diagnosis of IHD was ascertained by self-report. Low grip strength was defined according to the Sarcopenia Definitions and Outcomes Consortium thresholds ( $<35.5\text{kg}$  [men],  $<20\text{kg}$  [women]). Deaths were recorded from baseline (1998-2004) until 31st December 2018. Associations between combinations of conditions and mortality were examined using Cox regression with adjustment for sex and age.

**Results:** Low grip strength, COPD, diabetes and IHD were each related to increased mortality risk ( $p<0.001$ ). Having both low grip strength and COPD was related to greater mortality risk than having COPD only (hazard ratio (95% CI): 1.47 (1.11, 1.95),  $p=0.006$ ); the same was the case for having low grip strength and IHD compared to IHD only (1.57 (1.05, 2.34),  $p=0.027$ ). In contrast, mortality risk was not significantly greater for those with low grip strength and diabetes in comparison to having diabetes alone ( $p=0.127$ ).

**Conclusion:** Weaker muscle strength in combination with COPD or IHD was related to greater mortality risk than simply having the individual conditions. However, differential results with individual comorbidities suggest that individual comorbidities impact mortality risk in different ways when combined with low grip strength. Interventions targeted at individuals with low muscle strength in addition to COPD or IHD could be beneficial in reducing mortality risk.

## OC24

## THE LONGITUDINAL ASSOCIATIONS OF SARCOPENIA DEFINITIONS WITH ADVERSE OUTCOMES: A COMPARATIVE STUDY

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**Background:** Frailty, sarcopenia and fragility fractures are closely related to epidemiologically, biologically and clinical implications. Fragility fracture is observed more frequently in sarcopenic older adults. Older persons who have had a fragility fracture should be assessed for sarcopenia to better develop prevention and recovery after fractures. For these reasons global consensus tried to create the definition of sarcopenia that best predicts clinical outcomes in the recent years. There is no global consensus definition of sarcopenia despite the great efforts in the recent years. We aimed to study the longitudinal associations of different sarcopenia definitions with functional outcomes.

**Methods:** We recruited participants admitted to geriatrics outpatient clinics of a university hospital. The patients that have follow-up evaluation for usual gait speed (UGS), activities of daily living (ADL) and instrumental ADL and frailty included. Body composition was assessed by bioimpedance analysis (TANITA BC532). HGS, UGS, ADL, IADL were assessed by Jamar hydraulic hand dynamometer, gait speed at 4m course, Katz and Lawton scales, respectively. Frailty was screened by FRAIL questionnaire. Sarcopenia was defined by EWGSOP1, EWGSOP2 and the two alternative FNIH definitions. EWGSOP2-sarcopenia was evaluated by universally suggested cut-offs (i.e. 27 and 16 kg). EWGSOP2-probable sarcopenia was assessed also by Turkish cut-offs (i.e. 32 and 22 kg) as an additional parameter alternatively. The patients were assessed for deterioration in UGS, ADL, IADL, FRAIL scores and also for decrease in UGS to  $\leq 0.8$  m/s and deterioration to frailty.

**Results:** Among a total of 1881 patients, 264 patients had follow-up data for functional measures and included in the study. The mean age was  $75.3 \pm 6.3$ , 195 (73.9%) patients were female with a mean and median follow-up days of 600 and 511 days. In the first evaluation, the prevalence of sarcopenia ranged between 0.8%-6.1% with standard definitions while it increased to 37% when EWGSOP2-probable sarcopenia was assessed by Turkish cut-offs (probable sarcopenia EWGSOP2-Turkish). The EWGSOP1 or EWGSOP2-confirmed/probable sarcopenia were not associated with adverse outcomes. The EWGSOP2-probable sarcopenia by Turkish cut-offs was associated with deterioration in IADL and decrease in UGS to  $\leq 0.8$  m/s ( $p=0.049$  and pearson chi square=3.9;  $p=0.044$  and pearson chi square=4.1, respectively). The FNIH sarcopenia definition including slow UGS was associated with deterioration in IADL ( $p=0.045$ , pearson chi square=5.0). In

the regression analysis including age, MNA-SF, number of chronic diseases and drugs, dementia and diabetes none of the regression parameters were associated with adverse outcomes.

**Conclusion:** In this follow-up study of about 1.5 years, the adverse outcomes associated with sarcopenia were decrease in UGS to  $\leq 0.8$  m/s and deterioration in IADL. The sarcopenia definitions associated with adverse functional outcomes were EWGSOP2-probable sarcopenia by Turkish cut-offs and FNIH sarcopenia definition including the slow gait speed. EWGSOP2-probable sarcopenia by Turkish cut-offs came forward as having more extensive association with adverse functional outcomes.

## OC25

## WHAT ARE THE MAIN RISK FACTORS FOR LOWER EXTREMITY RUNNING-RELATED INJURIES? A RETROSPECTIVE SURVEY BASED ON 3669 RESPONDENTS

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**Background:** Despite the many studies on running-related injuries (RRIs), risk factors for injury remain unclear in the literature.

**Purpose:** To investigate the risk factors of RRIs.

**Study Design:** Case-control study; Level of evidence, 3.

**Methods:** An online survey was conducted among 3669 injured and noninjured runners. Injury was defined as pain of various kinds, without attention to its consequences on running practice. The survey included 41 questions on 5 main categories—personal characteristics, daily lifestyle, training and running characteristics, practice of other sporting activities, and prevention habits—as well as information about the occurrence of RRI over the previous 12 months. Continuous and qualitative variables were analyzed by Student t test and chi-square test, respectively. Sixteen variables were selected for multivariate binary logistic analysis.

**Results:** Among the 3669 runners, 1852 (50.5%) reported at least 1 injury over the previous 12 months. Overuse injuries were largely represented (60.6%). The variables associated with RRIs that remained significant in the fully adjusted model were previous injury (odds ratio [OR], 1.62; 95% CI, 1.42-1.86), higher weight (OR, 1.006; 95% CI, 1.00-1.012), competitive running (OR, 1.53; 95% CI, 1.19-1.98), running  $>2$  h/wk (OR, 1.28; 95% CI, 1.01-1.62), running  $>20$  km/wk (OR, 1.25; 95% CI, 1.001-1.55), and stretching before running (OR, 1.46; 95% CI, 1.25-1.71).

**Conclusion:** Previous injury remains the most relevant risk factor for RRIs according to the current study and previous data. Many training characteristics seem to be involved but still have to be

confirmed in view of conflicting data in the literature. Further research would help clinicians better understand RRs and how to prevent them.

## OC26

### WHAT IMPACT HAS THE COVID-19 PANDEMIC HAD ON LIFESTYLE FACTORS IMPORTANT TO MUSCULOSKELETAL HEALTH? RESULTS FROM TWO COHORT STUDIES

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**Objectives.** Physical activity, nutrition and other lifestyle factors play important roles in maintaining musculoskeletal health, especially in later life. COVID-19 was declared a global pandemic by the World Health Organisation in March 2020. The UK entered its first national lockdown on 23 March 2020, leading to widespread lifestyle modifications. In this study, we use two existing cohorts of community-dwelling adults, the Hertfordshire Cohort Study (HCS) and Health and Employment After Fifty Study (HEAF), to understand how the COVID-19 pandemic has affected lifestyle factors associated with musculoskeletal health, contrasting our findings at different stages of the lifecourse.

**Methods.** We studied a cohort of participants in midlife (HEAF) and later life (HCS). 2469 HEAF participants, 1086 men and 1383 women (mean (SD) age 65.6 (4.3) years, all Caucasian and community dwelling) completed an online questionnaire in March 2021. 125 HCS participants, 65 males and 60 females (mean age: 84.6 (2.5) years) completed a phone questionnaire administered by a trained researcher between July 2020 and February 2021.

**Results.** In HEAF, 44% participants said they were less physically active than before the pandemic, while 17% reported being more active. 19% participants said they drank more alcohol than before (32% reported drinking above recommended levels), 16% said their diet was less healthy. In HCS, 47% respondents reported being less physically active than before the pandemic (and only 5% more so), 27% said they consumed less alcohol compared to pre-pandemic times (and only 3% more so), although quality of diet was generally unchanged.

**Conclusion.** We have reported the experience of the first wave of the COVID-19 pandemic among participants of two community-dwelling UK cohorts, highlighting the varying impact of the pandemic on lifestyle factors associated with musculoskeletal health. A higher proportion of participants in HEAF increased consumption of alcohol compared to HCS; however, reduced physical

activity levels were reported in a high proportion of respondents in both studies. An investigation of reversibility of these changes is required.

## OC27

### GERAS FRAILTY REHABILITATION AT HOME RANDOMIZED CONTROLLED TRIAL: VIRTUAL BUNDLED CARE FOR SENIORS WHO ARE FRAIL TO BUILD STRENGTH AND RESILIENCE DURING COVID-19

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**Objectives:** Frailty can be characterized as a state of diminished reserves to the extent that function is reduced and the person is more vulnerable to external stressors. Two important considerations regarding frailty from a management perspective are that it may change over time and it is reversible or treatable. Our randomized controlled trial aimed to understand the feasibility and effectiveness of our GREAS frailty rehabilitation at home for vulnerable older adults living with frailty using bundled virtual care with socialization, exercise, nutrition, and medication support.

**Materials and Methods:** Participants were randomized into two arms (35/arm) for 12-weeks of **socialization only (social)** or **multi-modal frailty rehabilitation (multi-modal)**. The social group received 1x/week phone calls from student volunteers and the multi-modal group received virtual care including 1x/week socialization, 2x/week at home exercise (small group physiotherapy live-streamed sessions), nutrition and protein supplementation, and medication support via a videoconferencing service. The RE-AIM framework was used to assess feasibility. Our primary physical function outcome measure was change (seconds) in the 5-Times Sit-To-Stand (5TSTS) (faster time indicated better physical function). The minimal clinically important difference in 5TSTS is 2.3 seconds.

**Results:** The intervention reached 20% (n = 70) of eligible older adults (n = 345) and was adopted by all 3 referral sources: healthcare providers (20.2%), community organizations (18.2%), and self-referrals (18.2%). 80% of participants were satisfied and



>75% would recommend the program. A total of 77.6% of the sample population were female (n=52) and at baseline the average age (standard deviation) was 76.4 (5.8) and 78.2 (7.0) years in the social and multi-modal groups, respectively. For those with 5TSTS measurements at both baseline and follow-up (n=53), the change in 5TSTS was 0.4 (5.3) seconds (baseline= 13.7 (5.1); follow-up= 14.1 (6.0)) for the social and -2.1 (5.7) seconds (baseline= 16.2 (5.8); follow-up= 14.1 (5.0)) for the multi-modal group.

**Conclusions:** Our GERAS virtual frailty rehabilitation intervention is a feasible and effective community based program to improve physical function for older adults living with frailty. This program may be delivered in both urban and rural locations to expand the reach of tailored health care services.

## OC28

### THE ASSOCIATION BETWEEN SOCIAL ISOLATION AND LONELINESS AND SARCOPENIA AND OSTEOPOROSIS AMONG OLDER ADULTS: RESULTS FROM THE CANADIAN LONGITUDINAL STUDY ON AGING (CLSA)

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**Background/Purpose:** Social isolation and loneliness have significantly increased for older adults, especially during the COVID-19 pandemic. Socially isolated or lonely older adults may be at risk of having worse health conditions or behaviours such as decreased physical activity, and these may lead to development of sarcopenia and osteoporosis. However, there is still uncertainty that socially isolated or lonely older adults are vulnerable to the risk of sarcopenia and osteoporosis. The aim of this study is to investigate whether social isolation and loneliness are associated with development of sarcopenia and osteoporosis.

**Methods:** Among participants aged 65 years or older who completed the Canadian Longitudinal Study on Aging (CLSA) 2015 baseline comprehensive interview, the participants without either sarcopenia or osteoporosis at baseline and who were followed up in the 2018 interview were included, respectively (n=7451 for sarcopenia, n=8260 for osteoporosis). Social isolation and loneliness were measured using the CLSA social isolation index (CLSA-SII, higher score indicates greater social isolation, ranged 0-10). Sarcopenia was defined using Appendicular Lean Mass (ALM) adjusted height<sup>2</sup> <7.0kg/m<sup>2</sup> for men and <6.0kg/m<sup>2</sup> for women, and grip strength <27kg for men and <16kg for women according to revised European Working Group Sarcopenia in Older Adults (EWGSOP) definition. Osteoporosis was defined according to World Health Organization definition: osteoporosis [dual

X-ray absorptiometry (DXA) femoral neck T-scores<-2.5], osteopenia (-1.0<T-score<-2.5), and normal bone density (T-score≥-1.0). Logistic and multinomial regression models were stratified by sex, and adjusted for age, total body fat mass, education, total household income, smoking status, alcohol consumption, self-reported osteoporosis, self-reported lifetime history of fracture, self-reported fractures last year, corticosteroid use, perceived mental health, perceived health, the five-item Diener Satisfaction with Life Scale, Center for Epidemiology Studies Depression 9 Scale, Physical Activity Scale for the Elderly score and gait speed. Odds ratios (OR) and 95% confidence intervals (CI) are reported.

**Results:** A total of 151 participants developed sarcopenia at the 3-year follow-up assessment and, of 244 and 3965 participants developed osteoporosis and osteopenia, respectively. Participants with sarcopenia, osteoporosis, and osteopenia at follow-up had higher CLSA-SII at baseline than those without [mean (SD) 3.8 (1.5) vs. 3.4 (1.4), p-value 0.003; 3.7 (1.4) vs. 3.5 (1.4) vs. 3.3 (1.3), p-value <0.001, respectively]. The adjusted odds for developing sarcopenia or osteoporosis was not significantly associated with CLSA-SII for men and women [adjusted OR 1.06 (95% CI 0.87-1.29, p-value 0.594), adjusted OR 1.09 (95% CI 0.85-1.40, p-value 0.478), adjusted OR 1.01 (95% CI 0.80-1.28, p-value 0.952), adjusted OR 1.06 (95% CI 0.92-1.23, p-value 0.432), respectively]. The adjusted odds for osteopenia was significantly associated with CLSA-SII for men [adjusted OR 1.07 (95% CI 1.01-1.14, p-value 0.017)]. The adjusted odds for osteoporosis and osteopenia was not significantly associated with CLSA-SII for women.

**Discussion/Conclusions:** Though social isolation and loneliness were associated with osteopenia for men, they were not linked with osteoporosis and sarcopenia for both sexes. This presents an evidence for older adults' bone health from social isolation and loneliness that can occur due to the COVID-19 pandemic over the long term.



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## ESCEO Symposia Abstracts

## ESCEO1

**MULTIMODAL MULTICOMPONENT APPROACH USING ORAL MEDICATIONS**N. Veronese<sup>1</sup><sup>1</sup>University of Palermo, Palermo, Italy

For multimodal approach, we commonly mean the combination of at least two approaches, either pharmacological or non-pharmacological. Even if the first step for the treatment of knee osteoarthritis (OA) should be to combine pharmacological and non-pharmacological treatments, this often fails due to poor compliance from the patients. Moreover, often the patients want to avoid a "one size fits all" approach searching some kinds of tailor-made approaches. This approach often indicates the necessity of combining different oral medications. In this sense, literature suggests that combining SYSADOAs (Symptomatic Slow Acting Drugs for Osteoarthritis) and NSAIDs (Non Steroidal Anti-Inflammatory Drugs) could provide a synergistic benefit, therefore being the primary option for patients with moderate to severe pain due to knee OA or during flares. Other literature reports that combining NSAIDs and mild opioids might also provide a synergistic benefit and could reduce the need for strong opioids that are often associated with severe side effects. All these evidences, often born from patients' needs and confirmed by recent literature, further indicate the necessity of better tailoring oral medications for improving domains usually affected in knee OA, including pain, disability and stiffness.

## ESCEO2

**MULTIMODAL MULTICOMPONENT APPROACH COMBINING INJECTABLE AND ORAL MEDICATIONS**A. Migliore<sup>1</sup><sup>1</sup>Unit of Rheumatology "San Pietro" Hospital, Rome, Italy

There is a rationale for a combination of injectable and oral medications in the long term of Osteoarthritis (OA) treatment. OA involves multiple clinical phenotypes and several therapeutic targets that require different agents. The products for the pharmacological treatment of OA have different mechanism of action that allow their combined or sequential use.

Different clinical opportunities can be considered according to the different patients' features. The association of HA IA injection plus oral NSAID could be advantageous in case of: High level of pain at baseline, presence of synovitis/effusion (detected by ultra-

sound or MRI), and to facilitate rehabilitation (exercise protocol). Synovitis is strongly associated with knee pain and might be a therapeutic target in OA patients even in early stage.

Combining SYSADOAs with HA injections could be useful in some clinical scenarios. When in addition to a knee other joint are involved by OA at lower symptomatic level than knee, in this case the target knee can be injected with HA and SYSADOAs can be added to manage the other affected joints. In order to maintain low level of pain after viscosupplementation and /or to increase the between-injections interval SYSADOAs can be administered after VS.

Since there are evidence of the delay of Total Knee Replacement (TKR) after repeated courses of VS as well as after chronic administration of patented Crystalline Glucosamine Sulfate lasting for 5 years after treatment cessation, we can suppose their combination increase the possibility to delay TKR.

However further studies are needed to establish: whether the combination of SYSADOAs + HA could increase the delay of TKR compared to each product separately; the right dose and schedule of treatment with combined products; whether the association of HA and oral low doses of NSAIDs could manage inflammatory phenotype and finally if the combination is cost-effective.

In conclusions, combination of HA with oral Sysadoas or NSAIDs can be a good therapeutic option considering: the different mechanism of action of each agent; the presence of several OA phenotypes requiring personalized approach; and the simultaneous involvement of multiple joints with different degree of disease in real world patients.

## ESCEO3

**HOW TO DEFINE PATIENTS AT VERY HIGH RISK OF PRESENTING AN OSTEOPOROTIC FRACTURE**K. Javaid<sup>1</sup><sup>1</sup>NDORMS, University of Oxford, Oxford, United Kingdom

A critical component of the patient pathway in osteoporosis is adequately assessing future fracture risk for two principle reasons. The first is to identify patients who require anti-osteoporosis medication. The second is to identify patients at very high risk who need urgent treatment initiation and be potent therapies. Two clinical trials have now compared anabolic versus antiresorptive agents and demonstrated superiority. The challenge is how to operationalize this evidence into routine clinical care. The impact of identifying patients who are very high risk informs clinical decision making to target patients for urgent initiation of anabolic anti-osteoporosis medication. It also supports the patient to value the benefits of treating their osteoporosis with treatment for other conditions. This can help prioritize osteoporosis care for clinicians and patients.

Existing methods for assessing fracture risk such as Frax, Qfracture and Garvan have been validated in general populations. We now understand that a significant predictor of imminent fracture is a recent fracture. However, these studies did not include patients with a recent fracture, so these tools significantly underestimated the increased fracture risk in the two years after an index fracture, a period of imminent risk. Epidemiological studies have now described the imminent fracture risk in terms of age, sex, and fracture site in a growing number of countries. However, these calculations are beyond routine clinical practice. While we wait for fracture risk assessment tools to incorporate these calculations, several interim methods have been proposed, each with its strengths and challenges.

Using FRAX, a new category within the treatment area has been defined using multiples of the interventions threshold. Analyses using artificial intelligence have been used to identify those at high risk of a subsequent fracture. Finally, expert consensus has been used to define very high risk using combinations of age, fracture site, number and recency, bone mineral density and FRAX score. Key challenges remain in determining the specific fracture sites that should be included and whether a DXA, FRAX fixed, or age-adjusted threshold should be used and if the risk of another fracture may vary by country.

## ESCEO4

### HOW TO MANAGE PATIENTS AT VERY HIGH RISK OF PRESENTING AN OSTEOPOROTIC FRACTURE

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The aim of osteoporosis therapy is to reduce the increased fracture risk associated with osteoporosis-related bone fragility. Long-term prevention of fragility fracture relies on the triad -balanced nutrition, including calcium, protein and vitamin D, -weight-bearing or balance improving physical exercises and -pharmacological therapies. Among the latter, the anti-resorptives are the most widely used. Alendronate, basedoxifene, denosumab, ibandronate, raloxifene, risedronate, menopausal hormone therapy (MHT) and zoledronate decrease vertebral fracture risk. The relative risk reduction is as high as 60 to 70% by one year of therapy only, indicating an early marked efficacy. For hip fracture, alendronate, denosumab, risedronate, and zoledronate reduce the risk in women with osteoporosis, MHT in postmenopausal women, and calcium and vitamin D in institutionalized patients. Fracture risk reduction is observed from approximately 18 months of therapy on. Regarding combination therapies, the added costs and risks of side effects must be considered. Until now we have no clear evidence that using drugs together provides greater fracture risk reduction than monotherapy. In terms of sequential therapies, reasons to switch an anti-resorptive drug to another one in-

clude intolerance to current treatment, concern about adherence to treatment, inadequate clinical response, such as bone loss or occurrence of fracture on therapy, or failure to achieve turnover markers reduction. To prevent rapid bone loss and increased vertebral fracture risk after discontinuing denosumab, a bisphosphonate treatment may be envisaged. When clinical response to bisphosphonate therapy is inadequate, a switch to teriparatide, romosozumab or to denosumab could be recommended. However, switching denosumab to teriparatide is not recommended. An anabolic treatment like the amino-terminal fragment of PTH, teriparatide, an analog of parathyroid hormone related protein, abaloparatide, or the monoclonal antibody against sclerostin, romosozumab (the latter when tested against alendronate), decreases vertebral and non-vertebral fracture risk by one year of treatment too. In sequential therapies, teriparatide, abaloparatide or romosozumab therapy should be followed with denosumab or a bisphosphonate to maintain the early antifracture efficacy. Because of a high magnitude and early antifracture efficacy, such a sequential regimen should become the standard of care for patients at high, very high or at imminent risk of fracture.

## ESCEO5

### MANAGEMENT OF HAND OSTEOARTHRITIS: WHAT REALLY MATTERS FOR THE PATIENT

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Hand osteoarthritis is a highly prevalent disease which is associated with substantial morbidity and mortality. A patient-centered approach to hand osteoarthritis care has the potential to facilitate true, shared, decision making, improve patient investment in management and adherence to therapy. This talk, informed by an expert ESCEO working group, will highlight the elements of clinical care and therapeutics which are particularly important to patients as well as advocating for an increasing role for patients in personal healthcare decisions, formulating policy recommendations and in mapping the future direction of hand osteoarthritis research.

## ESCEO6

**MANAGEMENT OF HAND OSTEOARTHRITIS: HOW CAN THE ACR GUIDELINES BE APPLIED TO AN EUROPEAN POPULATION IN A PATIENT-CENTRIC APPROACH**J.-Y. Reginster<sup>1,2</sup>

<sup>1</sup>On behalf of the ESCEO Working Group on Hand Osteoarthritis (HOA), Belgium, <sup>2</sup>Director, World Health Organization Collaborating Center for Public Health Aspects of Musculoskeletal Health and Aging, University of Liege, Liège, Belgium

Hand Osteoarthritis (HOA) is a disease and not a normal process of ageing. HOA deserves a multimodal treatment, including non-pharmacological and pharmacological approaches. The *American College of Rheumatology* (ACR) guidelines were written in a predominantly US-centric approach but, due to their robust methodology, they can globally be endorsed by ESCEO for the management of European patients. ESCEO agrees that within the SYSADOAs family, Chondroitin Sulfate (CS) is the only one which has successfully demonstrated efficacy on pain and function in this particular indication. This proof of efficacy being complemented by a very good tolerance justifies the positive recommendation from the ACR to be applied to the European population. It would nevertheless be interesting to see another trial confirming the Gabay's study despite the fact that this study has been conducted with the most robust methodology and an independent statistical analysis of the outcomes. After having carefully listened to the patients, it is clear that patients want to have pharmacological approaches which combine an efficacy on pain and function with a high safety profile. They mentioned that they are prepared to pay a reasonable price premium to use a pharmacological approach which provides a high risk/benefit ratio. The aesthetic component of HOA should not be neglected. Hyaluronic Acid (HA) and Corticosteroids (CS) injections appear to be promising approaches in some acute phases, i.e. flares, but they need further demonstration of efficacy/safety. Patients expressed their preference for injectable preparations which contain a low volume, a small needle and a limited number of injections. Patients' preferences and derived health economic analyses support the use of a pharmacological management of HOA.

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## **EUGMS-ESCEO-IOF Symposium Abstracts**



## EUGMS-ESCEO-IOF1

**ASSESSING FRAILITY IN PATIENTS WITH MUSCULOSKELETAL CONDITIONS**A. J. Cruz-Jentoft<sup>1</sup><sup>1</sup>Hospital Universitario Ramón y Cajal (IRYCIS), Madrid, Spain

The concept of frailty has evolved significantly in recent years. First used to describe persons with advanced physical and mental disability who were close to death, it has gradually moved to describe a state of increased vulnerability to stressors, even when disability is absent or only mild. Frailty is associated with age-related declines reserves across multiple physiological systems.

Frailty status is strongly associated with relevant health outcomes (death, disability, delayed recovery from disease, surgical complications, use of medical and social care resources, patient reported outcomes) in multiple care settings (community, hospital, nursing homes) and across multiple medical and surgical specialties. Assessment of frailty status adds to usual predictive tools in complex care settings and improves decision making. In consequence, assessment of frailty in older patients is becoming standard practice across the health care spectrum.

Assessment of frailty is compounded by the lack of consensus on a single instruments. There are two major approaches to measure frailty: summing an accumulation of deficits found in different domains (leading to what is usually defined as a Frailty Index) or using a phenotype that describes some aspects of frailty (the most widely used is the CHS Physical Frailty Phenotype). Each approach has pros and cons, but both need some time and expertise, both at the time of assessment and in the interpretation and further action taken as a result. Specific approaches to simplify assessment in some specialties and setting are being developed (most started in the field of oncology, but now expanding to many other fields and disciplines). Advances in the musculoskeletal field have been slow, but it is now clear that assessing frailty in patients with musculoskeletal conditions will rapidly expand and become an additional tool to improve outcomes and to reduce variability in decision making.

## EUGMS-ESCEO-IOF2

**USING FRAILITY TO TAILOR COMPLEX DECISIONS TO PATIENT NEEDS**J. M. Bauer<sup>1</sup><sup>1</sup>Center for Geriatric Medicine and Network Aging Research, Heidelberg University, Heidelberg, Germany

Aging beyond age 70 is associated with an increasing individual heterogeneity of organic capacities and comorbidities. This development results in extremely different risk profiles for functional and health outcomes like disability, loss of independence and death. The frailty concept reflects this heterogeneity as it categorizes older persons based on an integrated assessment of functionality and organic deficits. Medical decisions in the context of diagnostic approaches and therapeutic interventions have to reflect the heterogeneity and the different risk profiles of the older population. The implementation of the frailty assessment in clinical routine is a prerequisite for the successful tailoring of responsible decisions to the needs of vulnerable patients. Different methods to assess frailty are currently considered in different patient populations and for different purposes. In this regard the approach of a GP will differ from that of an oncologist for example. While the former will have to rely on very practical and easily applicable tools to identify older patients at risk, the latter will be able to invest more resources before the decision on a potentially harmful therapy is made in cooperation with the patient and his caregivers. In a relevant number of cases the frailty assessment may trigger a comprehensive geriatric assessment as only a multidimensional analysis may allow to decide on the best approach to improve an older patient's overall condition. At the moment it still has to be defined which tools for the assessment of frailty should be regarded as a standard for different clinical scenarios. Facing the accelerated aging of many Western societies respective knowledge gaps should be addressed and medical guidelines should be adapted accordingly.

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## **SICOT-ESCEO-IOF Symposium Abstracts**

## SICOT-ESCEO-IOF1

## THE RESULTS OF DIFFERENT SURGICAL TREATMENT MODALITIES FOR FRAGILITY COMMINUTED FRACTURES OF THE PROXIMAL HUMERUS

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**Introduction:** Management of displaced fragility comminuted fractures of the proximal humerus is still controversial. We present our experience with such fractures treated by closed or open “minimal invasive osteosynthesis” or by open reduction and using of fixed plates or by hemiarthroplasty or shoulder replacement (TSR).

**Patients & Methods:** It consists of 219 Pts. (63 M, 156 F, 55–89-year-old- mean 72.5Y) followed for 4-10 years (mean 5.5Y). Based on Neer’s classification 10 had 2 parts fractures, 129 had 3 parts fractures and 80 had 4 parts fractures. 109 Pts. were treated by minimal invasive techniques (89 by closed reduction and minimal osteosynthesis by transcutaneous KW pinning, 15 by IMN (PHN) and 5 by LCP); 59 Pts were treated by ORIF through delto-pectoral approach (32 by minimal osteosynthesis, 22 by rigid AO plates and 5 by AO LCP). 51 Pts were treated by hemiarthroplasty or by total shoulder arthroplasty (TSR). Patients were evaluated by the Rockwood’s and by the Constant’s shoulder grading scores, and by radiographs.

**Results:** Overall results were excellent and good in 85% of patients with 2, and 3 parts fractures of the proximal humerus. treated by closed or open minimal osteosynthesis techniques, with some better results in less comminuted fractures. 21 young patients with 4-part fractures were treated surgically. Of them, 9/13 (69%) treated by minimal invasive techniques and 5/8 (62.5%) treated by ORIF with rigid plates had good functional results. 7/21 other patients had poor results and most of them developed AVN of the humeral head. 75% of the patients treated by hemiarthroplasty / TSR had satisfactory results. They were almost free of pain, but most of them had only a moderate improvement in shoulder motion.

**Conclusions:** Based on this study it seems that “minimal osteosynthesis” by K.W. techniques and or plates and lag screws, by closed or open reduction, remains as the first optional treatment of complex fragility fractures of the shoulder, even also in young patients with a 4-part fracture. ORIF by conventional plates may be used in young patients and by LCP (locked compression plates) in osteoporotic comminuted fractures of older patients. In the elderly, hemiarthroplasty or total shoulder arthroplasty should be also considered in such pathology as the treatment of choice.

## SICOT-ESCEO-IOF2

## SURGICAL TREATMENT OF FRAGILITY FRACTURES OF THE SPINE

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Osteoporotic vertebral spine fractures (OVSF) present an increasing major worldwide health problem. They are a leading cause of pain, disability, impaired quality of life, and morbidity in the elderly.

The best treatment is prevention, aiming to identify treatable causes, correcting calcium and vitamin D, and appropriate design exercise program.

Medical treatment includes hormonal replacement (estrogen preparation), bisphosphonates, calcitonin, raloxifene...

Nonsurgical treatment includes bedrest, cast/brace, analgesia...

Surgical treatment starts after conservative treatment fails, as a less invasive technique (vertebroplasty or kyphoplasty) or maximally invasive treatment which includes an open approach to the spine (posterior, anterior or combined).

Vertebroplasty was done through a needle that is inserted percutaneously via a transpedicular approach into the vertebral body. Liquid polymethylmethacrylate (PMMA) directly into a fractured vertebral body was instilled under pressure to fill the collapsed vertebral body.

Kyphoplasty attempts to reduce the wedge-shaped vertebra by using an inflatable balloon. The most common indication for cement augmentation are patients with painful OVFS that fail to improve within 2-3 week of nonsurgical treatment.

MRI is the best option for the evaluation of acuity of fracture. The most appropriate time for surgery ranges from 3 weeks to 3 months. Indication for open surgical treatment includes OVFS with neurological deficit secondary to progressive collapse, instability or spinal stenosis. Patients with painful fractures not amenable to vertebroplasty (vertebra plana) or patients in whom vertebroplasty has failed and has deformity are candidates for open spine procedures.

Recently, posterior surgical fixation procedures we combine with intraoperative vertebroplasty to restore alignment and reconstruction of the anterior column in aim to diminish biomechanical forces on posterior instrumentation without added morbidity of separate anterior exposure.

Patients with osteoporosis and spinal deformity have an increased risk of topping off and bottoming off syndrome. To prevent that, we use the augmentation screws, long enough posterior fixation construction, and preventive vertebroplasty on the proximal and distal vertebral body of the fixation construct.

**Conclusion**

- Vertebroplasty and kyphoplasty have resulted in significant advances in the surgical treatment of osteoporotic vertebral spine fractures.
- Patients who have a neurological deficit, spinal deformity and intractable pain require open surgical reconstruction.

**SICOT-ESCEO-IOF3****FRAGILITY FRACTURES OF PELVIS: STANDARDS IN THE THERAPY OF INSUFFICIENCY FRACTURES OF THE PELVIS**R. Pfeifer<sup>1</sup><sup>1</sup>Department of Traumatology, University Hospital Zurich, Zürich, Switzerland

Fragility fractures in pelvis are commonly seen in aging population. Similarly to other osteoporotic lesions, these fractures are associated with prolonged immobilization of the patient and systemic complications, such as pneumonia and thromboembolic events. Adequate treatment of fragility fractures requires early diagnostics, sufficient pain treatment and, depending of the fracture type, surgical stabilization. This talk gives an overview on the relevant classifications and summarizes current treatment options and their outcome.

**SICOT-ESCEO-IOF4****OSTEOPOROTIC HIP FRACTURES**I. Hasani<sup>1</sup>, A. Saveski<sup>2</sup>, V. Gershon<sup>3</sup>

<sup>1</sup>University Traumatology Clinic - Skopje, Skopje, North Macedonia, <sup>2</sup>Univeristy Clinic for Orthopaedic Diseases, Skopje, North Macedonia, <sup>3</sup>Zefat Medical Faculty, Bar-Ilan University, Ramat Gan; The Center for Rehabilitation Research, University of Haifa, Israel, Haifa, Israel

Although very important fractures Osteoporotic Hip Fractures, because for some of our geriatric patients are “the beginning of the end”, they are the most condemned fractures in our everyday praxis and most neglected one, often operated by the youngest surgeons or residents. Geriatric hip fractures are often in the shadow of other young injured patients on the wards. Literature shows an interesting fact that they are often subject to nonstandard treatment also in the same centers, and not to mention the differences in different centers, in different countries, from different surgeons.

A lot of scientific work has been done on bringing up new light on the modernization of osteosynthesis in weakened bones.

Impacting the osteoporotic bone with blades vs. reaming has been shown superior in neck stabilization, with or without augmentation of the blade. Intramedullary fixation has been shown superior to compression lateral plate, medializing the loading center. Locking diaphyseal screws on the plate has also been shown superior on fixation failure, compared to non-locking screws. A lot of controversies still exist in comparing blading with double screwing of the femoral neck; on augmenting the blade, due to the thermal effect on the cancellous bone. New modern implants of simultaneous divergent blading and screwing of the femoral neck, with compression possibilities, rotation, and angle stable construct, have brought a new era on femoral neck fracture treatment.

Hemiarthroplasties are still very successfully implemented in everyday practice, with their big advantage on early weight-bearing and rapid rehabilitation of the injured. But still, the controversy of the orthopaedists and traumatologists on arthroplasty vs. osteosynthesis exists, being relativized with the last technological osteosynthesis advancement.

Insisting on separate orthogeriatric departments, with standardized treatment and fast-line strategy, use of the most adequate osteosynthesis and not always the most expensive, serious preoperative preparation, devoted and fast surgery delivered from an experienced surgeon, with serious immediate rehabilitation are the mainstream strategies for a good result on treating this modern orthopedic epidemy. Reasonable use of new expensive implants, will help elderly patients for a better and faster return to pre-injured state and also save a lot from the state health budget. Prevention of failure and revisions should be every surgeon's target to decrease the mortality, morbidity, and overall expenses on treatment of OHF.

Even though these fractures are the “beginning of the end” for almost 1/3 in the first year, of the injured frail and elderly injured; decreasing the excess mortality should be every surgeon's target for enabling our beloved oldies to live beside us as much as possible.

**SICOT-ESCEO-IOF5****PERIPROSTHETIC FEMORAL FRACTURES**G. Osterhoff<sup>1</sup><sup>1</sup>Department of Orthopaedics, Trauma and Plastic Surgery, University Hospital Leipzig, Leipzig, Germany

Periprosthetic fractures of the femur (PPF) are challenging injuries in patients with previous total hip replacement or total knee replacement. They can occur early as a complication of the initial intervention itself or later as a consequence of aseptic loosening and/or a trauma. In most cases, the patients are old, have many comorbidities and the surgeon has to deal with impaired bone quality.

This talk gives an overview on the relevant classifications and summarizes current treatment options and their outcome.

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## **OARSI-ESCEO Symposium Abstracts**



## OARSI-ESCEO 1

**OSTEOARTHRITIS AND OSTEOPOROSIS: DOES THE EPIDEMIOLOGY SUGGEST AN INVERSE OR COLLINEAR RELATIONSHIP?**E. Dennison<sup>1</sup><sup>1</sup>MRC Lifecourse Epidemiology Centre, Southampton, United Kingdom

It has been suggested for many years that there is an inverse relationship between osteoporosis (OP) and osteoarthritis (OA), with the concept of 'bone formers' and 'bone losers' often proposed. However, the relationship is complex and debate continues regarding how the two conditions are linked. In recent years one therapy for OP has even been trialled in OA patients. This overview will focus on the epidemiological studies that have considered the relationship between these two conditions over the last 30 years and will briefly discuss the possible pathophysiological relationships existing between them. Studies have highlighted differential levels of bone remodelling markers, such as leptin and OPG between the two conditions while in other work genome-wide methylation profiling of bone samples has revealed differentially methylated regions in OP and OA. Most recently researchers have considered subchondral bone microarchitecture and mineral properties in OP and OA in relation to stages of cartilage degeneration, demonstrating regional differences, and builds on previous work demonstrating different rates of bone turnover in different regions. This work has suggested that both regional and compartmental differences at structural, material, and cellular levels need to be studied to understand the transition of OA subchondral bone from being osteoporotic to sclerotic. This may help provide further management strategies for OA, the commonest joint condition, and for which the 'holy grail' of therapy remains elusive.

## OARSI-ESCEO 2

**CAN WE REACH A UNIFYING PATHOPHYSIOLOGIC FRAMEWORK FOR THESE TWO COMMON MUSCULOSKELETAL DISORDERS?**R. Chapurlat<sup>1</sup><sup>1</sup>INSERM UMR 1033, Université Claude Bernard-Lyon 1, Hôpital E Herriot, Lyon, France

Osteoporosis (OP) and osteoarthritis (OA) are two common conditions associated with aging, and also more frequent in women. They have some risk factors in common, including sex, age, inflammation and genetics. Other risk factors seem to have opposite effects in the two conditions, such as BMI, BMD and mechanical loading. Reasoning based on the role of these risk factors,

however, may be a superficial approach in some cases because the different phenotypes of OA involve various biological pathways.

Specifically, the changes in subchondral bone during the evolution of OA suggest common pathophysiologic mechanisms. Both OP and OA have a strong genetic polygenic background, but without evidence of common genetic heritability. Local and systemic inflammation are risk factors for both OP and OA. High BMI is a risk factor for OA, but the relationship between BMI and OA differs across joints. Similarly, higher BMI is somewhat protective for hip fracture, but increases the risk of humerus and ankle fracture. Lower BMI is a risk factor for hip fracture but may be protective for OA.

The link between bone mineral density (BMD) and OA is controversial, because of the confounding effect of osteophytes and of the interaction between BMI and BMD. Strong relationships have been observed for osteophytes, enthesophytes and high bone mass phenotypes, suggesting subsets of OA patients with increased bone formation. Despite generally higher BMD in OA, the risk of fracture is increased in OA patients, perhaps mediated by a greater propensity to fall and impaired mobility of vertebral bodies.

Women are more commonly affected by OP and OA. Estrogen deficiency has been involved in both increased bone resorption and cartilage degradation. Estrogen replacement tends to protect from both phenomena.

Common mechanisms involved in aging have been described in OA and OP. For example, the sirtuin (Srt) family promotes longevity and counteracts age-related conditions. Sirt-1 has been associated with protective effects on bone loss and chondrocytes.

In summary, OP and OA may share common biological mechanisms. The link between BMD, BMI and fracture risk in OA is dependent on the stage, definition and location of OA and the way BMD is measured. Parallel biologic phenomena, however, do not necessarily imply a unified mechanistic framework.

## OARSI-ESCEO 3

**OBESITY, OSTEOARTHRITIS, AND OSTEOPOROSIS: ANY EVIDENCE FOR SHARED PATHOGENESIS?**N. E. Lane<sup>1</sup><sup>1</sup>University of California at Davis School of Medicine, Sacramento, United States

Over the past decade, the prevalence of obesity has increased worldwide, and this has then led to increased incidence of cardiovascular, diabetes and musculoskeletal diseases. While the association of obesity with osteoarthritis (OA) is well described. Recently epidemiologic studies have found obesity is also associated with osteoporosis (OP) and related fractures.

The association of obesity with OA is strong. Meta-analyses have shown overweight and obesity were significantly associated with higher knee OA risks of 2.45 (95% CI 1.88 to 3.20,  $p < 0.001$ ) and 4.55 (95% CI 2.90 to 7.13,  $p < 0.001$ ), respectively. The risk of knee OA increased by 35% (95% CI 1.18 to 1.53,  $p < 0.001$ ) with a 5 kg/m<sup>2</sup> increase in BMI. While the association of obesity with osteoporosis is not nearly as strong, surprisingly when 44,534 women in the GLOW study were followed prospectively for 2 years, fractures in obese women accounted for 23% and 22% of all previous fractures and incident fractures and the risk of ankle and upper leg fractures were higher in obese than in the non-obese women, while the risk of wrist fractures was significantly lower. Obese women with fractures were more likely to have experienced early menopause and more falls in the past year.

Obesity is characterized by adipose tissue expansion and chronic low-grade inflammation. Bone marrow derived adipocytes (BMAs) are derived from the same mesenchymal stem cell precursors as osteoblasts and chondrocytes and the percentage of BMAs appears to be inversely related to BMD. Obesity is associated with activation of inflammatory pathways, increased bone resorption, reduced bone formation and muscle atrophy. The inflammatory pathways that are activated with obesity can also impact the development and progression of OA. While the association between obesity, OA, and OP is complex, weight loss may affect fatty tissue mass, secretion of inflammatory mediators and may overtime, influence other musculoskeletal tissues such as bone and articular cartilage. A more thorough understanding of the role of obesity in these two common musculoskeletal diseases of aging is needed, as this may allow for development of more effective treatments.

18-month period results in a dose response, with greater weight loss resulting in less total body fat, less lean body mass, less total hip bone mineral density (BMD), and less femoral neck BMD. The changes in BMD, while significant with higher weight loss, remained above the osteopenia threshold levels for all weight loss categories.

Aerobic exercise and dietary weight loss, separately and in combination, reduce inflammation and knee joint compressive forces over an 18-month intervention period. However, changes in lean body mass and fat mass are not significantly different from an attention control group. High intensity strength training also does not exacerbate disease progression measured by x-ray and MRI; changes in disease progression are consistent with national history progression.

Long-term exercise and dietary weight loss have positive effects on clinical and mechanistic outcomes and do not exacerbate disease progression. Eighteen months of high- and low-intensity strength training significantly increase muscle strength in older adults with knee osteoarthritis, but this does not translate into significant improvements in pain and function relative to an attention control. While aerobic and strengthening exercises have positive effects on pain, function, and mobility in older adults with knee osteoarthritis and obesity and cause no harm to knee joint structure, the greatest effect occurs with a weight loss of at least 10% over an 18-month period.

## OARSI-ESCEO4

### PHYSICAL ACTIVITY AND DIETARY WEIGHT LOSS: ARE THEY PROTECTIVE OR RISKY FOR KNEE OSTEOARTHRITIS AND OSTEOPOROSIS

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The purpose of this presentation is to present randomized clinical trial (RCT) data on physical activity and dietary weight loss in older adults with knee osteoarthritis, overweight, and obesity and the effect these non-pharmacologic therapies have on clinical, mechanistic, and structural outcomes. Over 30 years of RCT data on a combination of walking and low intensity strength exercise and dietary weight loss will show that these non-pharmacologic, non-surgical interventions reduce pain, and improve function and mobility. Body composition changes with exercise are minimal in this population with 18 months of exercise resulting in a 2% weight loss, a 5% reduction in lean mass, and less than a 1% reduction in fat mass. However, dietary weight loss over an

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## ESCEO-ESPRM Symposium Abstracts

## ESCEO-ESPRM I

## UPDATE IN NON PHARMACOLOGICAL AND NON SURGICAL APPROACHES IN HAND OSTEOARTHRITIS

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<sup>2</sup>ESPRM Chair Musculoskeletal Disorders Committee, Ankara, Turkey, <sup>3</sup>President Turkish Society of Rehabilitation Medicine, Ankara, Turkey

**Introduction:** In this article our aim is to synthesize Systematic Literature Review about Update in Non pharmacological and Non surgical approaches in Hand Osteoarthritis (HOA)

**Material and Method:** New information from Guidelines, SRs and RCT published in last 5 years, which made recommendations or evaluated rehabilitation (Non pharmacological and Non surgical intervention) of persons with Hand OA.

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.

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 hand OA 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.

Hand ex. recommendations for the Hand OA management

a) 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

b) Hand strengthening exercises should be considered for hand OA management due to their clinically beneficial effect on hand pain and grip force

c) Ex. in combination with orthosis improves hand pain and functionality in both short and long term

d) Education regarding an ex. regimen including muscle strengthening and ROM exercises in combination with joint protection techniques should be recommended for all patients with hand OA

e) 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

**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 & Pharmacological treatment modalities and must be individualised to the patient's requirements

Exercises to improve function and muscle strength, as well as to reduce pain, should be considered for every patient.

Education and training in ergonomic principles, pacing of activity and use of assistive devices should be offered to every patient.

Orthosis, use of assistive devices should be offered to every patient is strongly recommended for patients with hand OA. Orthoses should be considered for symptom relief in patients with thumb base OA. Long-term use is advocated. (3months). Cognitive behavioral therapy (CBT). Thermal interventions (locally applied heat or cold). Paraffin, an additional method of heat therapy for the hands. Kinesiotaping for patients with first CMC joint OA. Acupuncture, is conditionally recommended for patients with hand OA.

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## ESCEO-ESPRM2

### UPDATE IN NON PHARMACOLOGICAL AND NON SURGICAL APPROACHES IN KNEE OSTEOARTHRITIS

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**Objective:** Knee osteoarthritis (OA) is a heterogeneous disease associated with important effects on function as well as quality of life, and the clinical management is difficult. Update in non pharmacological & non surgical approaches in knee osteoarthritis is of great importance to physicians, patients and public.

**Material and Methods:** Various treatment guidelines were constructed in order to offer comprehensive treatment profiles for individuals with knee OA, using recommended treatments as input for each decision. Among them the updated algorithm for the management of knee OA from the ESCEO is highly recommended.

**Results:** Non-pharmacologic treatments for knee OA are underutilized. They have efficacy for pain relief and improved function. Nonpharmacological treatment in the 2019 ESCEO algorithm: Core interventions are information/education of the patient, weight loss in case of overweight or obesity and exercises.

**Exercises:** Evaluation of function and prescribing the right combination of exercises for the individual patient is recommended. Exercises combining aerobic and strengthening exercises have a relevant role and a high level of evidence according to the GRADE (Grading of Recommendations Assessment, Development and Evaluation). In all patients exercises are recommended, irrespective of age, radiographic severity, pain intensity, functional levels, or comorbidity. There is moderate-to high-quality evidence for land-based exercise improving knee pain and function with moder-

ate effect size immediately after treatment, comparable to oral NSAIDs. Strategies to improve adherence by patient education about OA and benefits of exercise and long-term monitoring are important.

A combination of low-impact aerobic fitness training (walking, cycling, deep-water walking) and lower-limb strengthening exercises is preferred. Exercise choice should be based on patient's mobility, specific impairments (strength, ROM, aerobic fitness, and balance), and preferences. Exercises involving high impact on joints, running-jumping are discouraged. For patients who run or jog with mild symptoms of OA, a load management approach with attention to rest days, distance, speed, footwear, and building up muscle strength is important. Stretching or flexibility exercises, particularly of hamstrings are part of exercise program to increase knee ROM. Aquatic exercises have clinically relevant effects on knee pain, function, and are particularly useful for patients with severe pain due to its better tolerance.

**Weight loss:** There is substantial load placed on the knees during weightbearing activities, and in addition to the mechanical consequences of overweight, adipokines released by adipose tissue (leptin and adiponectin) are directly involved in inflammation and cartilage damage. Overweight patients should be offered optimal support to lose weight. Diet plus exercise have the best results for weight loss and improvement in pain, with scores of approximately 50%, when 10% reduction in body weight is attained. An initial target is a 5-10% weight reduction within 6-months. A combination of a calorie-restricted diet & physical activity is supported.

Mild knee osteoarthritis patients are recommended core non-pharmacologic therapies alone, focusing on education, exercise, and weight management or in combination with topical therapies or analgesics on an as-needed basis for adequate control of symptoms.

For moderate/severe knee osteoarthritis patients non-pharmacologic interventions are the first-line therapy combined with pharmacotherapy. Aquatic exercises are usually better tolerated in patients with severe pain.

**Adjunctive therapies:** These are lacking sufficient evidence and are of limited clinical benefit for patients who do not respond to first-line approach: Insoles and other specialized footwear, to reduce stress on knee compartments, nutritional supplements, transcutaneous electrical nerve stimulation (TENS), acupuncture and local heat. An assistive device, such as a cane or walker, can unload an affected knee and diminish pain with walking. Neoprene sleeves reduce pain for patients with varus deformity. Tai-Chi is a treatment option for the rehabilitation of knee OA and has been shown to be as effective as a standard exercise program after 12 weeks in terms of knee pain, physical function, and reduction in analgesic use, in addition to greater improvement in depression. Moreover, Tai Chi improves balance and is associated with a reduced falls risk in older patients with knee OA.

**Conclusion:** Nonpharmacologic interventions are the backbone of knee OA management and lifelong treatment with nonpharmacologic therapies is recommended to relieve symptoms and prevent further joint damage. For all patients, ongoing exercise



for pain relief and joint protection are recommended (Grade 2B). There is no strong evidence on the best prescription of exercise modalities and dosage (intensity, duration, frequency). A combination of low-impact aerobic fitness training (walking, cycling, deep-water walking) and lower-limb strengthening exercises is preferred. For overweight patients, a calorie-restricted diet and exercise program recommended (Grade 2B) with optimal support to lose weight.

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## ESCEO-ESPRM3

### UPDATE IN NON PHARMACOLOGICAL AND NON SURGICAL APPROACHES IN HIP OSTEOARTHRITIS

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**Objectives:** Osteoarthritis (OA) is one of the leading musculoskeletal causes of global disability, mainly affecting the knees and the hips with increasing prevalence worldwide.<sup>1-6</sup> This Update shows an actual overview to the important non pharmacological and non surgical approaches in Hip Osteoarthritis.

**Material and Methods:** Reviews, metaanalysis, guidelines with the keywords hip osteoarthritis and non pharmacological and non surgical approaches or management were reviewed by PubMed-listed publications until February 14<sup>th</sup> 2022.

**Results:** Non-pharmacological and non-surgical approaches should be used as first step and in the course of hip OA and can usually be actively used by patients themselves at low risk. Since education, motivation and/or initiative are often lacking, these procedures have been used not regularly in clinical practice. Core Treatments for Hip OA included arthritis education and structured land-based exercise program<sup>7</sup> with the aims improving pain, flexibility and function, disability, participation and quality of life.

Higher comorbidity count and lower vitality should be stabilized and/or improved because of their prediction of deterioration of physical functioning.<sup>8</sup> Activation by exercise therapy (eg. aquatic exercise, physiotherapy with instruction to selfmanagement, manual therapy) is recommended<sup>6,7,9</sup>. There is no evidence

which kind of exercise is best for outcome in hip OA<sup>6</sup>. An approach combining exercises to increase strength, flexibility, and aerobic capacity is likely to be most effective in the management of lower limb and hip OA<sup>10</sup>, but this evidence is largely from trials in patients with knee osteoarthritis. For weight loss a combination of exercise and diet is recommended with low evidence for hip OA<sup>6,11</sup>

Additionally to activating exercise physical therapy modalities, walking aids or complementary can be considered.<sup>6, 11-13</sup>

**Conclusion:** Core Treatments for Hip OA included arthritis education and structured land-based exercise programs. The combination of different exercises to increase strength, flexibility, and aerobic capacity is likely to be most effective.

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## **ISGE-ESCEO-IOF Symposium Abstracts**

## ISGE-ESCEO-IOF1

**CONNECTIVE TISSUE CHANGES AND OSTEOPOROSIS AFTER THE MENOPAUSE. SIMILARLY IN RESPONSE TO THE MENOPAUSE AND VARIOUS TREATMENTS**M. P. Brincat<sup>1</sup><sup>1</sup>Department of Obstetrics & Gynaecology, University of Malta, -, Malta

Allbright (1941) had established that osteoporotic fractures are far more common in older women than in men. The effects of the menopause have been well established, with some 30 to 40% of bone mass being lost in the first five to ten years post menopause.

The exact same losses in skin collagen were noted in our studies (Brincat et al 1981,1982) and these results were confirmed over the years. It has been shown that it is possible to arrest postmenopausal bone loss and even reverse it using a range of pharmaceutical agents, but the appropriate use of hormone replacement therapy (HRT) continues to enjoy its place. In view of the current rereading and re-evaluation of the WHI trials, a better understanding of the use of HRT has been established and has made this mode of treatment much more readily available and safe to use, within the usual cautions. All other preparations that are shown to be efficacious, also need cautions since none of these are free from certain risk. However, HRT enjoys the benefit of being able to target not just connective tissue in bone but also that of skin and other organs. HRT also has a multisystemic benefit in that the woman's discs and the carotid artery in postmenopausal women have also been shown as opposed to postmenopausal losses in untreated women. These mimic those in bone and skin. SERMS have also shown great promise in this area.

In view of the above a reassessment of the role of HRT in treating osteoporosis is necessary since it is efficacious, physiological and readily available.

## ISGE-ESCEO-IOF2

**HORMONE REPLACEMENT THERAPY IN POST-MENOPAUSE FOR BONE LOSS PREVENTION: WHEN, HOW AND FOR HOW LONG**A. R. Genazzani<sup>1</sup><sup>1</sup>Department of Clinical and Experimental Medicine, University of Pisa, Pisa, Italy

The effect of menopausal hormone therapy (MHT) for the maintenance of skeletal health and prevention of future fractures in menopausal women is now well demonstrated. Despite controversy over associated side effects, which has limited its use in recent decades, the potential role for MHT soon after menopause in the management of postmenopausal osteoporosis is increasingly recognized. This presentation is a report on the benefits versus risks of using MHT in the management of postmenopausal osteoporosis. Current literature suggests robust anti-fracture efficacy of MHT in patients unselected for low BMD, regardless of concomitant use with progestogens, but with limited evidence of persisting skeletal benefits following cessation of therapy. Side effects include cardiovascular events, thromboembolic disease, stroke and breast cancer, but the benefit-risk profile differs according to the use of opposed versus unopposed oestrogens, type of oestrogen/ progestogen, dose and route of delivery and, for cardiovascular events, timing of MHT use. Overall, the benefit-risk profile supports MHT treatment in women who have recently (< 10 years) become menopausal, who have menopausal symptoms and who are less than 60 years old, with a low baseline risk for adverse events. MHT should be considered as an option for the maintenance of skeletal health in women, specifically as an additional benefit in the context of treatment of menopausal symptoms, when commenced at the menopause, or shortly thereafter, in the context of a personalized benefit-risk evaluation.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
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## **Meet-the-Experts Abstracts**



## MTE1

## ROLE OF BIOCHEMICAL ASSESSMENTS IN THE MANAGEMENT OF OSTEOPOROSIS

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Bone Turnover Markers (BTMs) concentration in blood or urine are thought to reflect bone remodelling rate. They have been used to research metabolic bone diseases including Paget's disease of bone, osteoporosis and osteomalacia as well as metabolic bone disease of chronic kidney disease (CKD-MBD) in the last several decades. BTMs are also used in clinical practice, in conjunction with other diagnostic modalities, especially imaging studies, for the diagnosis and or monitoring of metabolic bone diseases. BTMs are not useful for diagnosis of osteoporosis and are currently not included in fracture risk assessment, but are still useful in initial assessment of patients with osteoporosis to identify presence of secondary causes for osteoporosis and are largely used for monitoring of therapy. Yet, a very high BTM value may indicate the presence of a secondary cause for the osteoporosis and a baseline BTM may be useful to compare post treatment values with baseline ones to confirm efficacy of treatment and adherence. Indeedw hilst parenteral therapy almost always elicits a significant response in BTMs, effectiveness of oral therapy is dependent on adherence to and persistence with therapy by the patient and absorption of the medication in the gut, neither of which can always be reliable. In fact, adherence and persistence with long-term medication is notoriously unreliable. Hence, monitoring with the BTMs has been promoted as a useful tool to confirm adherence and effectiveness of long-term oral therapies for osteoporosis. A change in BTM values is considered significant if it exceeds the reference change value (RCV) defined as the smallest difference between sequential laboratory results which is associated with a true change. RCV is calculated as  $= 1.65 \times [CV_1^2 + CV_A^2]^{1/2}$  for a unidirectional change. Hence, we recently showed RCV for  $\beta$ -CTX and PINP in blood of -19.9% and -30.8% for PINP and  $\beta$ -CTX respectively. In addition to detecting a significant change in BTMs following initiation of treatment, optimum treatment effect is reflected by the BTM attaining treatment targets. The mean or median of the premenopausal reference interval is commonly used as treatment target for antiresorptive therapy in osteoporosis. These values are method dependent due to the inter-method assay differences described above both for PINP and for  $\beta$ -CTX, and ideally should be determined for the population of interest and the method assay used. Finally, BTMs are sometimes used in practice to determine if bisphosphonate effect is persisting after a period of cessation of therapy (drug holiday) in order to help decide to restart therapy when BTMs rise above the treatment target.

## MTE2

## GERMAN GUIDELINES FOR THE MANAGEMENT OF POST-MENOPAUSAL OSTEOPOROSIS

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The German Guidelines for the Diagnosis and Therapy of Osteoporosis in Postmenopausal Women and Men exist since 2006 and have changed over the past 15 years from an indication threshold system based purely on the T-score of a DXA measurement to one that assesses individual fracture risk taking into account a variety of fracture risk factors. Based on the ten-year absolute risk of vertebral and hip fractures, thresholds are defined above which osteoporosis diagnosis is indicated and specific therapy should be recommended to reduce fracture risk. These thresholds are 20% absolute ten-year risk for vertebral and hip fractures for diagnosis and 30% for therapy. The following risk factors are included in the risk assessment:

Low-trauma vertebral and nonvertebral fractures (excluding finger, toe, skull, and ankle fractures), Cushing's syndrome and sub-clinical hypercortisolism, Primary hyperparathyroidism, Growth hormone deficiency in pituitary insufficiency, Male hypogonadism, Subclinical and manifest hyperthyroidism, Diabetes mellitus type 1 and 2, Hyperthyreosis factitia, if persistent, Rheumatoid arthritis, Ankylosing spondylitis, Systemic lupus erythematosus, Celiac disease, B-II gastric resection or gastrectomy, Epilepsy and anticonvulsants, Schizophrenia, Apoplectic insult, Alzheimer's disease, Parkinson's disease, Depression, Heart failure, Monoclonal gammopathy of unknown significance, Alcohol and alcoholic liver disease, Anorexia nervosa, Smoking and chronic obstructive pulmonary disease (COPD), Hormone ablative therapy, male hypogonadism of other cause, Aromatase inhibitors, Existing or planned therapy with glucocorticoids  $\geq 2.5$  mg/d prednisolone equivalent for more than 3 months, High-dose glucocorticoids by inhalation, Therapy with Glitazones, Antidepressants, Opioids, Proton pump inhibitors when taken chronically, Proximal femur fracture in father or mother, Multiple intrinsic falls or high risk of fall, Immobility.

Because of the unknown interaction of risk factors, no more than two risk factors should be considered per patient in addition to age, sex, and bone densitometry results. Risk factors should be considered in order of priority based on the strength of the risk factor.

The guideline will be discussed in detail.

## MTE3

## WHICH DRUGS DO IMPACT FRACTURE HEALING?

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The main complication of osteoporosis is a fragility fracture. Once a fragility fracture occurs, it is critical that treatment is promptly initiated to prevent the next fracture, as the risk for a fracture is highest in the subsequent 1-2 years. It is important to review effects of anti-osteoporosis drugs on fracture healing to reassure both orthopaedic surgeons and patients on the absence of adverse effects or any beneficial effects of these drugs. Evidence will be reviewed for antiresorptive drugs, and for remodelling- and modelling-based anabolic drugs.

**Fracture healing:** Fracture healing involves an initial anabolic phase secondary to recruitment of stem cells that differentiate into skeletal and vascular tissues. A cartilaginous callus then forms adjacent to the fracture line, while primary bone formation is initiated at the periosteal surface. The surrounding increased vascular bed then grows into the callus and as chondrocyte differentiation progresses, the cartilage extracellular matrix undergoes mineralization, ending this anabolic phase. The next phase is predominantly catabolic during which time the callus volume is reduced, and the continuing coupled bone remodeling of the callus results in restoration of the original cortical structure and marrow space.

**Bisphosphonates:** Bisphosphonates inhibit bone resorption and preclinical studies show larger callus, delayed callus remodeling, but stronger mechanical strength. Few clinical data exist on accelerated fracture healing with bisphosphonates, however, timing of dosing may be important. When zoledronic acid was given 2-12 weeks after a hip fracture, it reduced subsequent fracture risk and improved mortality, despite no differences in the time to heal and no evidence of delayed healing, based on serial clinical and radiographic assessment. A recent 2021 meta-analysis also concluded that bisphosphonates had no effect on fracture healing time.

**Denosumab:** A smaller number of preclinical studies also show larger callus and delayed callus remodeling, but with stronger mechanical strength with denosumab. Data from the FREEDOM double-blind, randomised, controlled trial with denosumab vs. placebo showed no evidence of impaired or delayed healing in the 199 postmenopausal women with non-vertebral fractures treated with denosumab.

**Parathyroid hormone (PTH):** Many preclinical studies uniformly show increased callus volume, mineralization, and mechanical strength with PTH(1-34) (teriparatide) treatment. A meta-analysis

of 5 studies was consistent and showed PTH peptides shortened healing time. In two randomized controlled trials, PTH(1-34) was administered to postmenopausal women with radius fractures, and PTH(1-84) was given to older postmenopausal women with pelvic fractures. Both treatments significantly shortened healing times compared with controls: 7.4 vs 9.1 weeks with PTH(1-34), but only at a dose of 20 mcg/d, or 7.8 vs. 12.6 weeks with PTH(1-84) 100 mcg/d. No randomized controlled trials of PTH peptides exist for atypical femur fractures, while fracture healing data from case reports or series are conflicting.

**Abaloparatide (PTHrP analogue):** Preclinical studies also support a role for abaloparatide in accelerating fracture healing, but no clinical studies have been performed.

**Sclerostin inhibition:** Preclinical studies show faster healing time and increased BMD at fracture sites in animals treated with sclerostin antibody. Data from two multicenter trials of the sclerostin antibody, romosozumab, in the healing of acute tibial shaft fractures following intramedullary nailing and of acute unilateral hip fracture post-surgical fixation are awaited.

In conclusion, while there is no evidence that antiresorptive drugs impair fracture healing, current evidence supports a role for PTH in shortening fracture healing times for radius and pelvic fractures. No studies have examined vertebral fracture healing times.

## MTE4

## TREATMENT OF DISORDERS OF PHOSPHATE HOMEOSTASIS

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Serum phosphate levels range from 2.5 and 4.5 mg/dl in adults, with higher levels in childhood, adolescence, and pregnancy.

Circulating phosphate levels are maintained within a narrow range though intestinal absorption, kidney tubular reabsorption, and cellular redistribution. Increased or decreased levels of phosphate in plasma are common conditions, mostly asymptomatic.

Acute and severe situations that require specific treatments may occur.

In this presentation management of hypophosphatemia and hyperphosphatemia will be discussed.

## MTE5

**ASSESSMENT OF QUALITY OF LIFE IN SARCOPENIA: AN URGENT ISSUE**C. Beaudart<sup>1</sup>, O. Bruyère<sup>1</sup>

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Sarcopenia is recognized as a major health problem among older adults. Indeed, this disease is associated with some adverse clinical outcomes such as physical impairment, limitation of mobility, increased risk of falls, hospitalisation and mortality. Health-related QoL is defined by the World Health Organization (WHO) as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. Quality of life is measured via generic or specific questionnaires. Current research, mainly using generic questionnaires, shows a reduced quality of life in patients with sarcopenia, mainly in areas related to functional status and physical performance. Specific quality of life questionnaires could, in combination with generic questionnaires, provide more precise data on the impact that sarcopenia has on the quality of life of patients. The objective of the current MTE is to discuss the PRO and CONS as well as the clinimetric properties of available generic and specific instruments to assess quality of life of patient with sarcopenia.

## MTE6

**ROLE OF REGISTRIES IN MUSCULOSKELETAL MANAGEMENT**C. Ojeda Thies<sup>1</sup>

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Registries have been around in musculoskeletal surgery for over 40 years, beginning with arthroplasty registers in Sweden. Arthroplasty registers serve as clinical quality assurance, and have allowed to detect design issues and problems with surgical indication over several decades of follow-up. The low cost, sheer number of patients included and length of follow-up are its main advantages over clinical trials, but the predefined variables and their noninterventional quality limit testing research hypotheses. Clinical trials can work together with registries to ease recruitment and to assess external validity of cohorts. Clinical audits in musculoskeletal disease such as hip fracture, polytrauma and other fracture registries have proven essential to measure and analyze healthcare system performance, assess clinical variability, detect areas of improvement and evaluate the effect of im-

provement measures. International networking and integration of registries offers exciting prospects in data analysis and artificial intelligence, and has been instrumental in efficiently responding to new challenges such as the global coronavirus pandemic. Finally multidisciplinary registries facilitate collaborative research that can further advance the quality and cost-effectiveness of care, with benefits for providers of care, health departments and ultimately governments.

## MTE7

**MANAGEMENT OF TUMORAL BONE DISEASE: FOCUS ON MONOCLONAL GAMMOPATHY OF UNDETERMINED SIGNIFICANCE (MGUS) FRACTURE RISK**C. B. Confavreux<sup>1,2,3</sup>

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Multiple myeloma recent guidelines have updated recommendations to treat bone and optimize long term bone health. These recommendations do not cover monoclonal gammopathy of undetermined significance (MGUS). Nevertheless, it has been reported in the MGUS patient population a significant increase of fracture risk. This is particularly the case for vertebral fracture prevalence in comparison to standard population.

In this session, we will first review the clinical and imagery data obtained by DXA (density), TBS (bone quality) and HR-pQCT (bone microarchitecture). Then we will consider specific physiopathological bone microenvironment points suggesting that MGUS may induce bone fragility independently of patient osteoporotic status. Finally, strategy to prevent fracture risk in MGUS patients will be discussed.

Conflict of interests. MSD avenir research grant, AMGEN, BMS, DREAMER Novartis

## MTE8

## ASSESSMENT AND MANAGEMENT OF PRIMARY HYPERPARATHYROIDISM

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Primary hyperparathyroidism (PHP) is a common endocrinological disease, with a broad spectrum of clinical presentations, ranging from mild, asymptomatic forms to very severe, life-threatening conditions. Its diagnosis is basically biochemical, characterized by elevated or inappropriately unsuppressed concentrations of PTH in the presence of hypercalcemia. Clinically, together with symptoms of hypercalcemia (psychological dysfunction, nausea, vomiting, weight loss, dehydration, acute renal insufficiency, coma), they can present osteoporosis, nephrolithiasis, nephrocalcinosis, and fractures. Severe forms are rare, and the first option of treatment for them is the removal of the parathyroid tumor. Much more frequent and more challenging are the mild and asymptomatic presentations. In the last 5 decades, the diagnosis of PHP increased largely, especially attributed to the routine measurements of calcium levels. This measure uncovered many individuals with PHP in its milder forms or even, asymptomatics. Which brought us questions about the best procedure to take, since most of these individuals will never develop an aggressive disease and, therefore, have low morbidity. Surgery is the first line of treatment and can normalize the calcemia, improving bone mass and, probably, neuropsychological manifestations. Nevertheless, some medical therapies, like bisphosphonates, denosumab, and calcimimetics can control the major consequences of PHP and can be used in mild or asymptomatic forms, or for those who will not undergo surgery. However, other challenges in the diagnosis and treatment of this disease can still be mentioned, such as the monogenic PHP conditions, in addition to normocalcemic forms of hyperparathyroidism.

## MTE9

## CARDIOVASCULAR EFFECTS OF BISPSPHONATES

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**Objective:** To discuss the evidence from clinical trials and observational studies suggesting that bisphosphonates for osteoporosis can cause or prevent cardiovascular events. How should we interpret the current evidence and incorporate it in managing patients with osteoporosis?

**Background:** In a manner not unlike that of HRT/MHT, users of bisphosphonate for osteoporosis have been found to be either at increased or decreased risk of cardiovascular events. Most RCT data indicate either no significant effect, or in the case of atrial fibrillation, a modest increase in some but not all settings. In comparison with romosozumab, however, alendronate was associated with a lower cardiovascular event rate within the high imminent fracture risk population. Observational studies have shown conflicting directions of effect and it should be borne in mind that patients with osteoporosis generally share risk factors for cardiovascular disease and will be at increased risk of MI or stroke compared with the general population, hence the difficulty is identifying a suitable control group with a similarly elevated base risk. Three approaches are commonly used here, namely a) untreated patients with a diagnosis code for osteoporosis b) propensity score matching and c) active comparator designs. A fourth approach is the self controlled case series, which has been used to study atrial fibrillation in users of oral bisphosphonates.

**Learning points:** At the end of the session, participants will know a) the main findings from pivotal bisphosphonate RCTs as regards cardiovascular safety b) the concerns posed by unmeasured confounders in observational studies of cardiovascular outcomes with bisphosphonates c) the strengths and limitations of the approaches commonly used to address confounding d) the directions for future study.

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## MTE10

## DEVELOPMENT OF FRACTURE PREVENTION SERVICES IN LOW- AND MIDDLE-INCOME COUNTRIES

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**Objective:** The number of older adults (aged  $\geq 60$  years) is rising exponentially across the globe, particularly in low- and middle-income countries (LMICs). As LMICs undergo an epidemiological transition because of rapid urbanisation, the burden of non-communicable diseases, including osteoporosis, is increasing yet osteoporosis is often undiagnosed until a fragility fracture occurs<sup>1</sup>. Understanding better the availability and growing evidence re-



garding fragility fractures in LMICs may start to define what fracture prevention services in resource-limited settings would look like.

**Methods:** Narrative review of published epidemiology studies in LMIC's with a view to understanding current provision and possibilities regarding fragility fracture prevention.

**Findings & conclusion:** There is limited evidence from across the regions, particularly in the most resource poor countries. To deliver effective fracture prevention services we need robust epidemiological data on prevalence and incidence of osteoporotic fractures across the continent, and context specific challenges regarding provision of services. Furthermore data are required on the risk factors for fragility fractures to present opportunities for secondary and primary fracture prevention.

## MTE11

### MANAGEMENT OF OSTEOARTHRITIS IN 2022: HOW TO RECONCILE DIVERGENT GUIDELINES

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Osteoarthritis (OA) is the commonest joint condition in later life and is managed by many different groups of clinicians. A number of guidelines have been established by groups internationally and this meet the expert session will focus on four main elements (1) a review of the main guidelines currently in use (2) a review of the similarities that exist (3) a review of the differences (4) a discussion of why these differences might exist, before discussing pragmatic approaches regarding management. A similar exercise was recently published specifically for hip OA [1] and this work will be presented.

The group will be invited to consider the importance of site of OA; the date when guidelines were published or updated; the geographic location of the recommending panel, and the impact that local healthcare systems may have; and the different weighting applied to research findings, expert opinion and patient view in guidelines.

In closing, we will reflect on the considerable literature that states that OA guidelines are often poorly adhered to, whatever their content, and discuss strategies to consider how this might be improved in delegates' local clinical environments. This has been the topic of previous editorials and reviews, and these data will be presented if time allows.

[1] Christian-Hubert Roux. Hip osteoarthritis guidelines: Differences, applicability and application? Joint Bone Spine, Volume 87, Issue 2, 2020, Pages 111-114,

## MTE12

### PHARMACOLOGICAL AND NON-PHARMACOLOGICAL MANAGEMENT OF PATIENTS WITH OSTEOPOROSIS FOLLOWING HIP FRACTURES

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The aim of management of patients following hip fractures in the elderly is to retain ambulatory activity and independent ADLs and to prevent the recurrent fractures.

Patients finishing the acute stage treatments for the fractures are usually moved to the "the Convalescent Rehabilitation Hospital" to receive physio- and occupational therapy for 2-3 hours daily for a period of up to 90 days in Japan. At the end of the period, approximately one third of the patients retain independent mobility for ambulation and ADLs. In a year after sustaining hip fractures, approximately 50% of patients are independent in their ADLs and 18% required minimal help. Thus, many patients can be expected to improve ambulatory activity with the help of ongoing physiotherapy and self-training under the management of family physicians for at least a year. For non-pharmacological management, it is important to keep three activities of "Exercise and walking", "Adequate meals", and "Maintaining the circadian rhythm". I recommend moderate gymnastics and walking for at least 30 minutes every day. Daily exercise and regular partaking of meals contribute to the maintenance of a good sleeping routine at night, and help to support patients' daytime activities.

The very high incidences of new recurrent fractures have been reported after initial spine and hip fractures. Recently, it has been also confirmed that fractures at other sites such as the humerus and wrist may also cause recurrent fractures. For pharmacological management, it is important to note that the fractures involving large amounts of bone destruction cause an acute increase in bone turnover. In fact, early intervention with ZOL administered within 90 days after surgery, significantly decreases the risk of recurrent fractures for patients following an initial hip fracture. Agents for increasing bone formation and reducing bone resorption such as teriparatide at a weekly dose of 56.5mcg, could be used for a limited period to stimulate the accumulation of bone mass in the spine, before switching to potent anti-resorptive agents.



## MTE13

## THE USE OF BISPHOSPHONATES TO MANAGE MUSCLE WASTING (MEET THE EXPERT)

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Bone resorption caused by inflammation results in release of transforming growth factor-beta (TGF- $\beta$ ) from bone matrix, resulting in paracrine catabolic effects on skeletal muscle in two distinct conditions: cancer metastatic to bone and pediatric burn injury. In bone metastases the damage appears to be caused by oxidative stress that damages the ryanodine receptor in muscle leading to calcium leakage and ensuing muscle weakness. In pediatric burns, TGF- $\beta$  release from bone appears to depress the phosphorylation of the Akt/mTor anabolic pathway and increase activity of the ubiquitin ligase catabolic pathway. While similar analyses were not performed in these two clinical settings, muscle wasting in both was prevented by the use of bisphosphonates, implicating the bone as the source of catabolic activity in muscle. Inasmuch as these two conditions involve distinct patient groups, it is possible that bone release of TGF- $\beta$  is a universal means by which bone may control muscle mass. Thus in these two conditions bisphosphonates can successfully prevent muscle wasting. An open question remains as to whether this mechanism is active in other conditions involving immobilization/bed rest, hyperparathyroidism, genetic diseases such as Paget's, and other hyper-resorptive conditions. We know that in some conditions, such as critical illness myopathy, loss of muscle and bone appear linked. Studies on a rat model of pharmacologic immobilization and mechanical ventilation show a direct correlation between time and magnitude of trabecular bone and muscle loss as well as trabecular bone and myosin loss (Gugala et al J Orthop Res 2021) although bisphosphonates have not been used to try to ameliorate this condition in this model. Other general questions that will be discussed include whether there is a threshold effect for bone resorption release of TGF- $\beta$  such that resorptive rates beneath the threshold result in a clinically insignificant release of TGF- $\beta$ , whether factors released by bone are always in the same proportion or quantity or whether these are modulated by metabolic conditions and/or other tissues. For example, bone releases at least one muscle catabolic factor, TGF- $\beta$ , but also one anabolic factor, undercarboxylated osteocalcin. How does bone know which to release and in what quantity? What signals bone to release these proteins? We will discuss also what kinds of studies in what kinds of conditions are needed to evaluate the role of TGF- $\beta$  in other clinical conditions included in this topic: sarcopenia, non-cancer cachexia, and genetic conditions. Answers to these questions may broaden the use of bisphosphonates and other anti-resorptive agents.

## MTE14

## FALL PREVENTION STRATEGIES

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**Objectives.** The problem of falls in the elderly population is the subject of our attention, both from a medical point of view, for the causes and consequences associated with them, and from a psychosocial point of view, for the negative impact on the quality of life of the older individuals. Falls, in fact, can have devastating psychological consequences; the fear of falling and post-fall anxiety syndrome can lead to a progressive limitation of walking, with heavy effects on the risk of incidence or progression of disability.

**Material and Methods.** A narrative literature review to describe the magnitude of the problem and the proposed strategies for successful interventions.

**Results.** The incidence of falls in people over 65, resident at home, is reported to be around 35-40% each year and in institutionalized individuals the frequency is 3 times higher. Falls are a major cause of traumatic fractures and 65% of fall-related deaths occur in patients over the age of 75. The most debilitating fractures are undoubtedly those of the hip, which have very serious consequences, both in terms of morbidity and socio-economic impact. Mortality is 15-25% and motor disability affects more than half of patients in the year following the event. Furthermore, in about 20% the ability to walk independently is completely lost and only 30-40% regain full autonomy in daily activities. Fall prevention interventions have been successfully implemented in various care settings and the need to increase sensitivity to this problem, both by the general population and by social and health workers, must be a priority in the geriatric setting. Environmental, behavioural, biological and socio-economic risk factors could all be successfully addressed by improving physical mobility, awareness of drug use, community infrastructure and housing, appropriate policies and legislation.

**Conclusions.** The most successful interventions are usually based on multicomponent programmes, including exercise-based, behavioural, cultural, educational, clinical, environmental and/or technological components. This approach acknowledges that the risk of falling is different among older individuals, and encourages a personalized assessment and prescription of appropriate interventions.

**Reference.** Step safely: strategies for preventing and managing falls across the life-course. Geneva: World Health Organization; 2021.

## MTE15

## HORMONAL CONTRACEPTION AND BONE HEALTH

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Insufficient bone acquisition during development and/or accelerated bone loss after attainment of peak bone mass (PBM) are 2 processes that may predispose to fragility fractures in later life. The relative importance of bone acquisition during growth vs. bone loss during adulthood for fracture risk has been explored by examining the variability of bone mineral density (BMD) in relation to age. Bone mass acquired at the end of the growth period appears to be more important than bone loss occurring during adult life.

The major physiological effect of estrogen is the inhibition of bone resorption. When estrogen transcriptionally possesses binds to the receptors, various genes are activated, and a variety modified. Interleukin 6 (IL-6) stimulates bone resorption, and estrogen blocks osteoblast synthesis of IL-6. Estrogen may also antagonize the IL 6 receptors. Additionally, estrogen inhibit bone resorption by inducing small but cumulative changes in multiple estrogen dependent regulatory factors including TNF- $\alpha$  and the OPG/RANKL/RANK system.

Hormonal contraceptives are commonly used in premenopausal women with a variety of methods, in different age groups including women with or without risk factors for bone loss such as DM I, glucocorticoids etc. This meet the expert session will include various methods of hormonal contraception (including ethynyl estradiol, 17- $\beta$  estradiol, POP, LNG-IUD, DMPA) at various doses and its effect on bone health implicating women's age as well as prevalent risk factor for fracture.

## MTE16

## UCB-SPONSORED MEET-THE-EXPERT SESSION - STRENGTH IN SHARING: INSIGHTS ON OPTIMISING OUTCOMES WITH BONE-FORMING THERAPY

UCB<sup>1</sup>

<sup>1</sup>UCB, Brussels, Belgium

In this highly interactive session, Dr Friederike Thomasius (Frankfurt Hormone and Osteoporosis Centre, Germany) and Dr Margareta Rödén (Sundsvall Hospital, Sweden) will discuss their expert perspectives on the optimal use of bone-forming therapy in postmenopausal women with severe osteoporosis in clinical practice.

Through the presentation of real-world clinical case studies, Dr Thomasius and Dr Rödén will describe their approaches to fracture risk evaluation, treatment decisions featuring bone-forming therapy (including benefit-risk considerations) and analysis of associated clinical outcomes.

This session offers an engaging discussion-style format, with the audience invited to submit questions and comments throughout.

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## MTE17

## IBSA-SPONSORED MEET-THE-EXPERT SESSION - SYSADOAS AND VISCOSUPPLEMENTATION: FROM GUIDELINES TO THE EXPERTS' PERSPECTIVES

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**Objectives:** Osteoarthritis (OA) is the most common disabling arthropathy that impairs quality of life with a heavy burden on healthcare systems. Hand, knee, hip and spinal facets are the most affected joints, with an increasing prevalence with aging<sup>1</sup>.

Different pharmacological treatments are currently recommended by international guidelines and among them SySADOAs (i.e. chondroitin sulfate/CS) used chronically and viscosupplementation with i.a. HA are consolidated approaches.

**Material and Methods:** MEDLINE/PubMed databases have been utilized as search for the most relevant publications on OA.

**Results:** Acetaminophen is currently disappeared from all the guidelines. On the opposite, the recent ESCEO Algorithm affords a recommendation to the use of prescription CS as Step 1 for long-term background therapy in patients with knee OA, highlighting that the drug should be distinguished from non pharmaceutical products<sup>2</sup>. Oral highly purified, pharma grade CS (800-1200mg/day) is effective and safe in the treatment of knee, hand and hip OA, with a positive effect on symptoms. OA patients have also shown beneficial effects when treated with viscosupplementation. HA intra-articularly administered offers the best pharmacological benefit/risk ratio, as measured by improvements in OA health outcomes and a possible substantial delay to TKR<sup>3</sup>. In patients with hand OA, the combined treatment with CS and i.a. HA showed a higher and significant reduction of VAS pain vs patients treated with i.a. HA only ( $p < 0.01$  and  $p < 0.02$  at 3 and 6 months, respectively), underlining a synergistic action<sup>1</sup>.

**Conclusions:** Among OA treatments, pharmaceutical-grade CS and i.a. HA have a well-established efficacy. Viscosupplementation performed concomitantly with a chronic background therapy with SySADOAs (i.e. CS) may provide a more marked reduction of symptoms, a delay in the progression of the pathological conditions and a consequent improvement of the quality of life of patients under safe conditions.

#### References

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**Disclosures:** Consultancy fees from IBSA, Genevrier, Pfizer, Bone Therapeutics, Grunenthal, Sanofi, Pierre Fabre, Expanscience. Grants from SFR, Arthritis Foundation. Stock options from Peptinov, Scarcell, Skindermic.

## MTE18

### VIATRIS-SPONSORED MEET-THE-EXPERT SESSION - EROSIVE AND NON-EROSIVE OSTEOARTHRITIS OF THE HAND: FOCUS ON CLINICAL ASPECTS AND MULTIMODAL DISEASE MANAGEMENT

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My presentation will focus on erosive hand osteoarthritis, a peculiar subset of hand osteoarthritis, featured by prominent signs of inflammation, high severity progression and typical radiographic changes. In particular, I will discuss its main clinical aspects which often determine an important clinical burden and I will present the actual scientific evidence about its risk factors with a particular attention to metabolic risk factors. Furthermore, my presentation will cover the topic of the multidisciplinary pharmacological and non pharmacological management of hand osteoarthritis with reference to the 2018 update of EULAR recommendations for the management of hand osteoarthritis. The final part will be devoted to a brief presentation of our recent experience about the efficacy of prescription-grade crystalline glucosamine sulfate as an add-on therapy to conventional treatments in patients with erosive hand osteoarthritis.

## MTE19

### VIATRIS-SPONSORED MEET-THE-EXPERT SESSION - AN UPDATE ON OSTEOARTHRITIS; A SERIOUS DISEASE, WITH CONSIDERATION OF THE LATEST PHENOTYPIC RESEARCH

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For a long time, osteoarthritis (OA) was considered to be a simple marker of aging, responsible for some pain that sometimes hinders joint function. Today, we know that OA is a chronic disease responsible for disabilities even in young adults, sometimes heavy ones, limiting walking and leading to a sedentary lifestyle which, as a consequence, can lead to an increase in cardiovascular mortality and morbidity. This is why the FDA now considers this disease to be a serious one, which justifies the acceleration of research in this field in order to find solutions for these hundreds of millions of patients worldwide. Research is now moving towards the identification of different clinical and molecular phenotypes. This should help for optimizing clinical trials in the field, which have so far failed to bring a disease-modifying treatment (DMOAD) to market. Recent advances in the field should undoubtedly pave the way for new prognostic and therapeutic avenues.

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## Committee of National Societies Abstracts

## OCs1

**LOW BIOAVAILABLE IGF-1 IS THE SINGLE BIOMARKER ASSOCIATED WITH OSTEOSARCOPENIA IN POST-MENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS**

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**Objective:** Osteosarcopenia is referred to as the co-incidence of osteoporosis/osteopenia and sarcopenia that increases morbidity and mortality in patients with rheumatoid arthritis (RA). This study aimed to determine serum levels of bioavailable IGF-1 in post-menopausal women with RA and to relate them with the existence of osteosarcopenia.

**Material and Methods:** An observational study including 69 post-menopausal RA patients under treatment. They were divided in two groups according to the existence or the absence of osteosarcopenia. Sarcopenia was defined according to European Working Group on Sarcopenia in Older People (EWGSOP) recommendations as low muscle mass (expressed as appendicular skeletal muscle mass index [ASMI] calculated by dual-energy x-ray absorptiometry [DXA]) and low muscle strength (handgrip) or low physical performance (Short Physical Performance Battery [SPPB]). Osteoporosis was defined as a T-score  $\leq$  -2.5 in femoral neck bone mineral density. Serum levels of bioavailable IGF-1 were determined using an electrochemiluminescent assay. Serum levels of bone alkaline phosphatase (BALP), serum cross-linked C-telopeptide of type I collagen (CTX), osteocalcin (OCN), 25-hydroxycalciferol (25-OH-D3) were determined, as well. The ratio CTX/OCN was calculated as indicative of bone turnover levels. RA disease activity was calculated using the DAS28 (ESR) score and inflammatory markers (ESR, CRP), functionality was calculated using the HAQ-DI score and seropositivity was determined according to RF and CCP antibodies.

**Results:** The prevalence of osteosarcopenia was 13% in this RA cohort. Mean IGF-1 levels were significantly lower in RA patients with osteosarcopenia ( $75 \pm 16$   $\mu$ g/L vs.  $106 \pm 43$   $\mu$ g/L,  $p < 0.0001$ ). No other significant associations were observed regarding disease activity, functionality, seropositivity for RF / anti-CCP, inflammatory markers or markers of bone turnover.

**Conclusion:** Post-menopausal RA patients with osteosarcopenia have lower bioavailable IGF-1 when compared to those without osteosarcopenia. Low bioavailable IGF-1 can predict the development of osteosarcopenia in RA patients.

**Acknowledgments:** Supported by grants from the Greek Rheumatology Society and Professional Association of Rheumatologists.

**Disclosures:** The authors have no conflict of interest to declare.

## OCs3

**GRIP STRENGTH, BONE MINERAL DENSITY AND MORTALITY: LESSONS FROM THE PAST AND HOPE FOR THE FUTURE?**

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**Objectives:** Several studies have reported associations between either low bone mineral density (BMD) or low grip strength (GS) and mortality risk. However, advances in the management of osteoporosis (OP) and low GS, a marker of sarcopenia, have occurred at different rates, with many more therapeutic modalities available for OP. We examined relationships between BMD, GS and all-cause and cause-specific mortality in the UK Hertfordshire Cohort Study (HCS).

**Methods:** Data on GS, measured by dynamometry, and mortality were available for 2987 HCS participants (47% women); femoral neck BMD measurements, measured by DXA, were available on 992 participants. Deaths were recorded from baseline (1998-2004) until 31st December 2018. Associations between GS and BMD in relation to mortality (all-cause, cardiovascular-related, cancer-related, and other) were examined using sex-specific Cox regression models with adjustment for age. Current use of bisphosphonates (BP) was part of the exclusion criteria for baseline DXA (though 41 participants of the whole sample were taking BPs); hormone replacement therapy was permitted.

**Results:** Mean (SD) baseline age of participants was 65.7 (2.9) years in men and 66.6 (2.7) years in women. Lower GS at baseline was associated with higher all-cause mortality in men (hazard ratio per SD lower grip strength: 1.22 (1.12,1.33),  $p < 0.001$ ) and in women (1.29 (1.17,1.43),  $p < 0.001$ ). Lower GS was associated with increased risk of cardiovascular (1.30 (1.11,1.52),  $p = 0.001$  in men; 1.61 (1.30,1.99),  $p < 0.001$  in women) and other mortality (1.33 (1.14,1.55),  $p < 0.001$  in men; 1.39 (1.18,1.63),  $p < 0.001$  in women) in both sexes, but no association was found with cancer mortality ( $p > 0.25$ ). However, lower BMD was not associated with increased risk of all-cause or cause-specific mortality ( $p > 0.09$  for



all associations). At 2011-2012 and 2017 follow up sub-studies, 10 % of participants (45 of 443 respondents and 22 of 221 respondents respectively) reported taking BP.

**Conclusions:** We report strong relationships between GS and mortality in both sexes after adjustment for age in comparison with BMD. We hypothesize this may reflect better recognition and management of people with low BMD, suggesting better measurement and interventions for low muscle strength is needed in routine clinical practice.

OCs4

**ASSOCIATION BETWEEN EXPOSURE TO FINE PARTICULATE MATTER AND OSTEOPOROSIS: A POPULATION-BASED COHORT STUDY**

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**Background:** Environmental air pollution has been associated with the disruption of bone health at a molecular level. Particulate matter (PM) exposure can simultaneously stimulate bone resorption and halt bone formation.

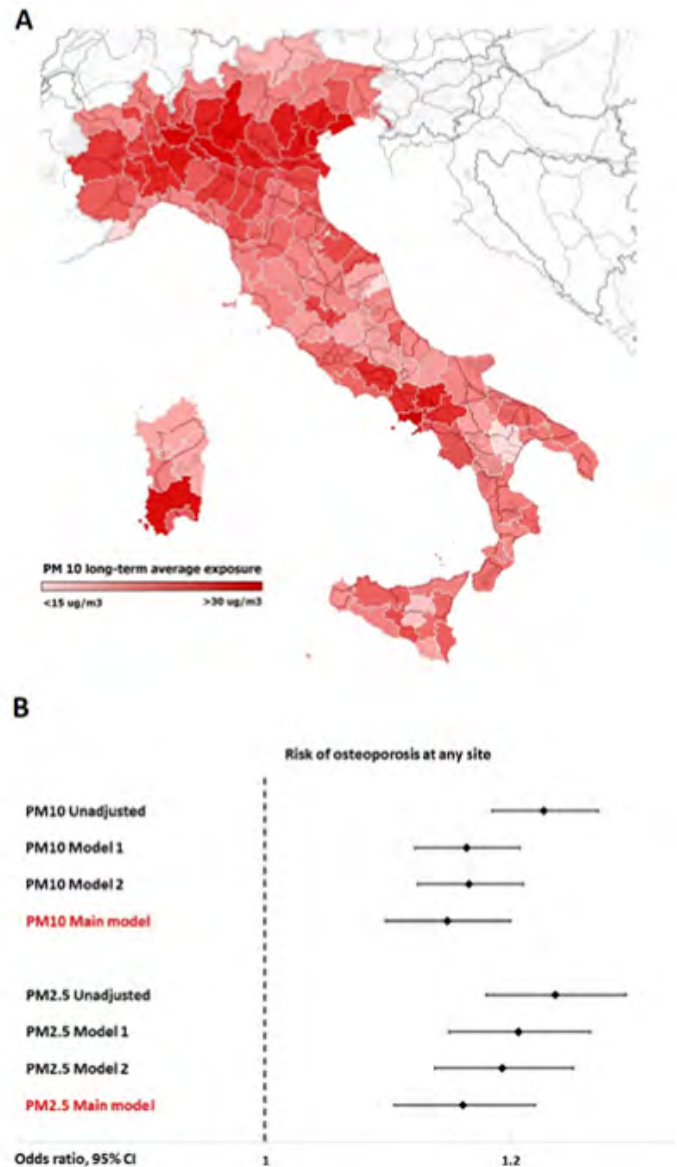
**Purpose:** The primary aim of the present study is to describe the association between long-term exposure to PM and osteoporosis in a large cohort of women at high risk of fracture.

**Methods:** Clinical, demographic and densitometric data were extracted from the DeFRACalc79 dataset, which gathers data on women at risk for osteoporosis. Data on the monitoring of PM10 and PM2.5 concentrations were retrieved from the Italian institute of environment protection and research. Generalized linear models with robust estimators were employed to determine the relationship between BMD and PM long-term exposure. We sequentially adjusted for confounders. Fully adjusted model included age, body mass index (BMI), presence of prevalent fragility fractures, family history of vertebral or hip fractures, menopause, glucocorticoid treatment, comorbidities and the macro-area of residency.

**Results:** 59,950 women from 110 Italian provinces were included in the study. We obtained air quality data from 617 air quality stations across 110 Italian provinces. PM 2,5 exposure was negatively associated with T-score levels at the femoral neck (Beta -0.005, 95 CI -0.007 to -0.003) and lumbar spine (Beta -0.003, 95 CI -0.006 to -0.001). Chronic exposure to PM2.5 above 25 ug/m<sup>3</sup> was associated with a 16% higher risk of having osteoporotic T-score at any site (aOR 1.161, 95% CI 1.105 to 1.220), exposure to PM10 above 30 ug/m<sup>3</sup> was associated with a 15% higher risk of having osteoporotic T-score at any site (aOR 1.148, 95% CI 1.098 to 1.200), Figure 1B.

**Conclusion:** Long-term exposure to air pollution was associated with a higher risk of osteoporosis. Femoral neck site seemed to be more susceptible to the detrimental effect of PM exposure

Figure 1. A. Long-term exposure to PM in Italy (2013-2019 average concentration). B. Risk of osteoporosis at any site in patients chronically exposed to particulate matter (PM) 10 >30 ug/m<sup>3</sup> and PM2.5 >25 ug/m<sup>3</sup>. Model 3 (main model) adjusted for age, body mass index (BMI), presence of prevalent fragility fractures, family history of osteoporosis, menopause, glucocorticoid treatment, comorbidities and macro-area of residency (categorized as: northern Italy, central Italy and southern Italy).



## OCs5

## CAROTID ATHEROSCLEROSIS IS ASSOCIATED WITH A HIGHER RISK OF FALL-RELATED HOSPITALIZATION IN OLDER AUSTRALIAN WOMEN

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**Objectives:** Previously, an association between clinical cardiovascular disease and falls has been reported. However, the relationship between measures of carotid atherosclerosis and injurious falls are unclear. We sought to investigate the association between measures of carotid atherosclerosis including carotid plaque and common carotid intima media thickness (CCA-IMT) with long-term fall-related hospitalizations.

**Materials and Methods:** Community-dwelling older Western Australian women (N = 1116, age = 75.1 ± 2.7 y) were included. B-mode carotid ultrasound was used to assess the presence of focal carotid plaque, and CCA-IMT at baseline. Six images of the left and right common carotid arteries (3 on either side) were used to obtain a mean and maximum CCA-IMT. Focal carotid plaque was defined as a focal increased thickness ≥1 mm of the intima-media layer. Fall-related hospitalizations were identified from linked health record over 11.5 years.

**Results:** 428 (38.4%) women experienced a fall-related hospitalization. In a multivariable adjusted model, presence of carotid plaque was associated with 44% greater relative hazard for a fall-related hospitalization (HR 1.44 95%CI, 1.18-1.76). Such association persisted after adjustment for measures of muscle function including hand grip strength and timed-up-and-go performance. Each SD increase in the mean (SD 0.13) (HR 1.10 95%CI, 1.00-1.21) or maximum (SD 0.15) CCA-IMTs (HR 1.11 95%CI, 1.01-1.22) were also associated with greater risk of falls (Table 1).

**Conclusion:** Measures of carotid atherosclerosis are associated with a higher long-term risk of injurious falls independent of measures of muscle function. Further investigations into the importance of clinical and subclinical vascular disease for assessing falls risk are warranted.

Table 1: Hazard ratios (HR) for injurious fall-related hospitalizations.

Outcome	Carotid Plaque (HR 95%CI)		CCA-IMT (HR 95%CI)	
	Absent (n=563)	Present (n=553)	Per SD of the mean (n=1100)	Per SD of the maximum (n=1100)
Injurious falls, n (%)	189 (33.6)	239 (43.2)	428 (38.9)	428 (38.9)
Unadjusted	Referent	1.51 (1.25-1.83)	1.13 (1.04-1.23)	1.14 (1.04-1.24)
Minimally-adjusted	Referent	1.48 (1.22-1.79)	1.11 (1.01-1.21)	1.12 (1.02-1.22)
Multivariable-adjusted	Referent	1.44 (1.18-1.76)	1.10 (1.00-1.21)	1.11 (1.01-1.22)

Bolded number indicate p ≤ 0.05; Minimally-adjusted: age, BMI and treatment; Multivariable-adjusted: minimally-adjusted plus prevalent diabetes, atherosclerotic vascular disease and falls, statin and antihypertensive medication use, and physical activity; CCA-IMT: Common Carotid Artery Intima-Media Thickness.

**Conflict of interest:** None

## OCs6

## DIABETES HAS A GREATER IMPACT ON SUBSEQUENT FRACTURE INCIDENCE IN TIME, THAN PREVIOUS FRACTURES, SEX AND AGE: A SURVIVAL ANALYSIS

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**Background:** Diabetes may induce osteometabolic disorders that lead to increased fracture risk, relation with subsequent fractures remains unclear.

**Objective:** To establish the impact in time of fragility fractures, age, sex and diabetes on subsequent fractures after an index hip fracture.

**Methods:** Retrospective, observational and descriptive study. From database of 670 records of patients aged ≥50 years with an index hip fracture between 2014-2017. Follow-up at least 2 months. Retrieved information: previous fracture, age, sex, diabetes and subsequent fracture. Statistical analysis: Central tendency, dispersion, frequency and percentages. T-Student, Chi square test. Kaplan-Meier method, logrank test. Cox regression model.

**Results:** We included 570 patients, mean age 80.09 years (SD=±9.45), 79.8% women. Mean follow-up time 24.8 months (SD=±20.8). Subsequent fractures on 96 cases, mean time to subsequent fracture 25.9 months (SD=±19.5); of these 56.2% occurred within 2 years after incident fracture. No associations were found between previous fracture (p=0.3), sex (p=0.265), and diabetes (p=0.54) for subsequent fractures. Survival analysis only found association for subsequent fractures with diabetes (p=0.01) and biological sex (p=0.03). Cox regression analysis model showed an increased risk only for diabetes (HR=3.8; p=0.017; 95% CI 1.275-11.484).

**Conclusion:** Patients with diabetes had an increased risk of developing subsequent fractures. Men patients develop subsequent fractures earlier.

**Keywords:** Subsequent fracture, fragility fracture, diabetes mellitus, survival analysis.

## OCs7

### TRABECULAR BONE SCORE BY DUAL-ENERGY X-RAY ABSORPTIOMETRY: A CROSS-SECTIONAL AND LONGITUDINAL ANALYSIS IN HEALTHY ADULT MALES

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**Objective:** This study is aimed to identify whether bone turnover markers and sex steroids are associated with Trabecular Bone Score (TBS) and longitudinal change in TBS.

**Material and Methods:** A longitudinal, population-based sibling pair study was conducted. The cross-sectional and longitudinal data of 465 healthy men, aged 25 to 45 years at baseline, were used. Mean follow-up time was 12.5 years. Lumbar spine TBS (L1-L4) was calculated using the TBS iNsight® software. SHBG, CTX and P1NP were measured using immunoassays. Total testosterone and estradiol were determined by liquid chromatography-tandem mass spectrometry, while free testosterone and free estradiol were calculated. Linear mixed-effects modelling was used to perform the cross-sectional and longitudinal analyses.

**Results:** At baseline, total and free estradiol showed a positive association with TBS while BMI showed a negative association. Lumbar spine BMD and TBS were moderately and positively correlated at baseline. No associations were found between baseline TBS and total and free testosterone nor between baseline TBS and bone turnover markers.

The longitudinal study observed a decline in TBS. Further, a higher BMI at baseline was associated with a more pronounced decline in TBS over time. Greater increases in BMI over time were associated with more pronounced decreases in TBS. Total and free estradiol showed no associations with changes in TBS. In contrast, lower levels of total testosterone at baseline were associated with more pronounced decreases in TBS during follow-up. Moreover, an association was found between greater decreases in total testosterone and more pronounced decreases in TBS. Lastly, more pronounced decreases in bone turnover markers, CTX and P1NP, were associated with greater decreases in TBS over time.

**Conclusions:** In conclusion, these findings suggest that total testosterone could be seen as a determinant for changes in TBS, while estradiol could not. These divergent results for the individual sex steroids suggest that testosterone and estradiol have an effect on different properties of bone, namely bone microarchitecture and bone mass. Further, as changes in bone turnover markers are associated with changes in TBS, it could be suggested that change in bone turnover rate has an impact on bone microarchitecture.

## OCs8

### GENETIC MODEL FOR PREDICTION OF OSTEOPOROTIC VERTEBRAL FRACTURE RISK IN WOMEN

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Early identification of individuals with high risk of osteoporotic vertebral fractures is very important for their prevention. Genetic predisposition is one of the strongest determinants of fracture risk. The purpose of present research was to develop genetic model for predicting risk of vertebral fractures in women with postmenopausal OP.

**Material and Methods.** In total, 620 Belarusian women met inclusion criteria, of them 456 with OP and 164 controls. Using PCR, 57 variants located in 28 osteoporosis susceptibility genes were genotyped as previously described [1]. Genetic risk score (GRS) was calculated using multiple logistic regression analysis.

**Results.** We revealed statistically significant associations of *COL1A1* rs1800012, *COL1A2* rs42517, *VDR* rs7975232, rs1544410 and rs731236, *ESR1* rs9340799 and rs2234693, *MTHFR* rs1801133 gene variants with vertebral fracture ( $p < 0.05$ ). The negative GRS was allotted to the protective genotypes and positive – to the risk. The lowest value of the logistic regression coefficient was assigned to 1 point (rs2234693); rs1800012 and rs7975232 had the greatest impact on fracture risk (3 points); other variants were equivalent to 2 points. The only protective was rs9340799 (-1 point). In GRS of 5-7 points, individuals with fractures exceeds those without (OR = 8.3,  $p < 0.0001$ ), and at 8 points and higher, there were only 5% of study participants without fractures. Therefore, GRS of 4 points and less was taken as an ordinary, 5 to 7 points – increased, 8 and more – high fracture risk. To determine the prognostic value of the developed model, ROC-curve was analyzed (Figure).

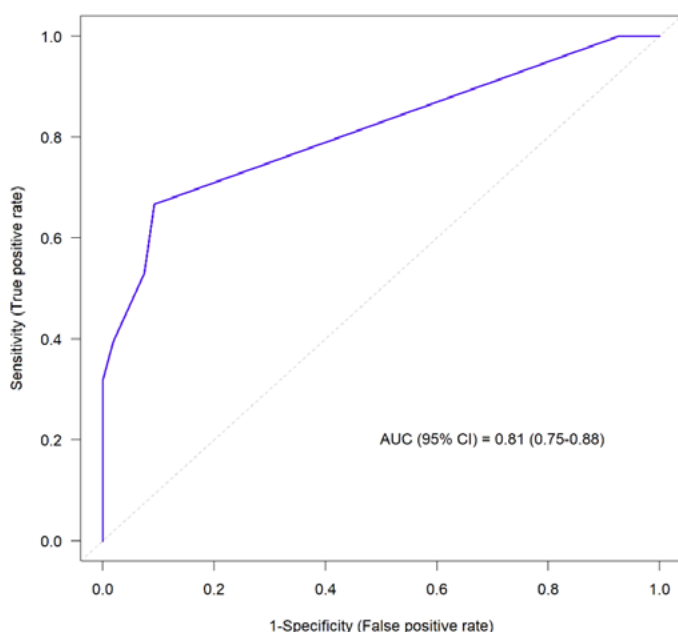


Figure – ROC-curve for a model of vertebral fracture risk

The AUC of 0.81 indicates very good diagnostic level. The model is characterized by high sensitivity (83%), average specificity (67%), good accuracy (78%).

**Conclusion.** The developed model has very good predictive value and may help to identify individuals with increased fracture risk to perform preventive measures. Average specificity suggests that the model may be improved with additional genetic and/or clinical factors.

**Reference.** Marozik, P., et al. Vitamin D Status, Bone Mineral Density, and VDR Gene Polymorphism in a Cohort of Belarusian Postmenopausal Women. *Nutrients* 2021, 13, 837. doi:10.3390/nu13030837

## OCs9

### ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN THE FRACTURE LIAISON SERVICE

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**Objective:** Significant care gap exists for those suffering from fragility fracture and osteoporosis. We reported the effect of our protocol and risk factors on 2-years mortality, falls, and recurrent fractures of a fracture liaison service (FLS) program.

**Material and Methods:** Our FLS program enrolled patients with incident hip fracture (HF) and untreated vertebral fracture (VF) from both inpatient and outpatients services from 2 hospitals (N=600).

Different from the traditional statistical analysis, the advanced machine learner XGBoost (eXtreme Gradient Boosting), which integrates multiple tree models and stronger interpretability, was used to identify significant determinants of 2-year mortality, falls, and recurrent fractures.

**Results:** The mean age for this cohort was 77.5±10.5 years with 72% female. Two years mortality was 14.2%, fall rate 33.2%, and recurrent fracture rate 6%. The top 5 risk factors of mortality are "To do regular exercise or not", "Have ever hip fracture", "Self-pay for osteoporosis drugs", "Self-care of EQ-5D-5L", "Use steroid or not". The accuracy, precision and recall of the mortality model are 85%, 0.88 and 0.95. The top 5 risk factors of falls are "Parkinson's disease or not", "Osteoarthritis or not", "Self-care of EQ-5D-5L", "Use osteoporosis drugs or not", "T-score". The accuracy, precision and recall of the fall model are 70%, 0.76 and 0.85. The top 5 risk factors of recurrent fractures are "Have ever used osteoporosis drugs in previous 3 months", "Self-pay for osteoporosis drugs", "Have ever hip fracture", "The 10-year probability of a major osteoporotic fracture", "The 10-year probability of hip fracture". The accuracy, precision and recall of the recurrent fractures model are 97.5%, 0.97 and 1.0.

**Conclusion:** This study used XGBoost model to discuss risk factors for mortality, falls, and recurrent fracture among these patients. In the further, we want to cross-validation results on osteoporosis datasets of bone radiographs. We hope the artificial intelligence and machine learning can be a contribution in developing new methods as diagnostic tools in clinical settings.

## OCs10

### CHRONIC IRON DEFICIENCY ANAEMIA (IDA) IS AN INDEPENDENT RISK FACTOR TO BE CONSIDERED IN THE MANAGEMENT OF FALLS DISEASE (FD), FEAR OF FALL (FOF) AND FRAGILITY FRACTURES OF OLDER ADULTS.

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**Introduction:** Various factors are considered in the prevention of Falls Disease (FD), Fear of Fall (FOF) and Fragility Fractures. The significance of Calcium, Vitamins D3 and B12 is well established. The serum iron is an important but ignored constituent that leads to Iron Deficiency Anemia (IDA). Anemia is a global health prob-



lem especially in children of low-income areas, women of child-bearing age, and the elderly. It is estimated that anemia affects more than two billion people worldwide, which accounts for more than one third of total world population.

**Methods:** The principal investigator is Consultant Orthogeriatrician. While registering any new beneficiary in our Falls Institute of India (FII), it is mandatory to do Comprehensive Geriatric Assessment (CGA). The CGA includes Blood Works, DEXA Scan, HGS, SPPB and ECG etc. Blood works include estimations of CBC, PS, ESR, Fasting and Post Meal Sugar, KFT, LFT, LIPID PROFILE, Vitamins D3, B12, Calcium, Iron etc.

The retrospective data of last 3 years between 2019 to 2022 is considered here. The age group chosen is between 50 years to 93 years. Out of total 100 beneficiaries, 85 females and 15 males are chosen on the basis of their Sr. Iron readings and responses to Intravenous Iron Therapy. The reference range of Sr. Iron is 50-170 ug/dl in female and 65-175 ug/dl in males. The lowest value was 2 ug/dl and highest was 65 ug/dl. By looking at the adversities of Oral Iron Therapy, initially all the beneficiaries were given IV Iron Therapy by trained nursing staff under supervision of Principal Investigator [PI].

Initially, 100 mg, 5ml of Iron Sucrose, with 100 ml normal saline over 30 minutes with all prophylactic precautions to attend any kind of anaphylactic adverse events was given. Such 10 doses, 1 dose/day were given. After 10 doses, with the gap of 48 hours, serum iron was re-estimated. The response to IV Iron Therapy was significant. On an average, 10 doses increases the value of Sr Iron by 50 -70 ug/dl. Depending upon the deficiency another set of 5-10 doses were given, that took the value to 120-130 ug/dl. The iron doses to be given were calculated by all given traditional formulas.

**RESULTS:** The IV Iron Therapy improved the symptoms of fatigue or tiredness, loss of appetite, chest pain, shortness of breath, strength in lower limbs, ability to walk few more steps etc significantly. After acceptable improvements in the Sr. Iron values, oral iron therapy was advocated with detailed dietary advice.

**CONCLUSIONS:** Chronic iron deficiency anemia (IDA), is an independent risk factor to be considered while managing the treatment to prevent Falls Disease (FD), Fear of Fall (FOF) and Fragility Fractures in older adults.

**REFERENCE:** "Organizational Strategies for the Management of Intravenous Iron Therapy in Non-Hospitalized Settings": A Safe Opportunity to Implement Patient Blood Management in Italy.

Matteo Bolcato, Ivo Beverina, Daniele Rodriguez, Anna Aprile, Macro Trabucco Aurilio

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## Committee of Scientific Advisors Abstracts

## CSA-OC1

**ASSESSING METASTATIC AND NON-METASTATIC FRACTURE RISK IN PATIENTS WITH CANCER: IOF CSA BONE AND CANCER WORKING GROUP**C. B. Confavreux<sup>1,2,3</sup>

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In the last 10 years, fantastic progress has been achieved in oncology transforming patient prognosis in many cases toward healing and prolonged remission. This change of paradigm raised new issues and particularly “life after cancer” and its quality. Locomotion and the resumption of physical activity is an essential part of this “life after cancer”. This implies resistant bones and paying attention to fracture risk. Clinicians will encounter two situations. The first one will be adjuvant setting in patients without bone metastasis but facing cancer treatment induced bone loss (CTIBL). It is typically the case in postmenopausal women receiving hormonal deprivation treatment for breast cancer or men with hormonosensitive prostate cancer. In this setting, physicians deal with global bone fragility assessment. Recent guidelines will be presented. The second situation will be to assess local fracture risk in a bone metastasis. Reference scores such as Mirels are outdated since they were developed with old imagery tools and before the cancer revolution of personalized medicine and new treatments. qCT and numerical simulation offer new evaluation tools that can be developed in daily practice to help physicians in their evaluation of bone metastatic fracture risk. MEKANOS project will be presented as an illustration.

Conflict of interests. MSD avenir research grant, AMGEN, BMS, DREAMER Novartis

## CSA-OC2

**THE ROLE OF BONE MICROSTRUCTURE IN DIABETES-RELATED BONE FRAGILITY**S. Ferrari<sup>1</sup>

<sup>1</sup>Geneva University Hospital, Geneva, Switzerland

on behalf of the IOF-CSA Working group on Bone and Diabetes

Diabetes is associated with a 2-5x increase in fracture risk, the highest risk seen in type 1 diabetes. Part of this increased risk is carried by the propensity to falls, itself related to the risk of hypoglycemia with certain diabetes drugs. The determinants of bone fragility in diabetes markedly differ from post-menopausal osteoporosis, including low bone turnover, normal-high bone min-

eral density in type 2 diabetes, non-covalent collagen cross-linking (by end-glycation products – AGEs), and a higher degree of matrix mineralization, to name a few. Whether diabetes is also characterized by alterations in bone microstructure is yet uncertain. Numerous cross-sectional cohort studies using high-resolution micro-CT at distal radius and tibia have examined this question, but their results may differ according to the diabetes profile of the subjects included, namely the type of diabetes, duration and severity of disease, use of oral medications or insulin, level of glycemic control (HbA1c), etc.... What appears from these studies though, is that trabecular bone volume and structure do not seem to be altered, - again contrarily to post-menopausal osteoporosis-, whereas cortical bone alterations, mostly cortical porosity, has been reported in some, but not all studies. In this case, cortical porosity seems more to be prominent when microvascular complications and/or fractures are present. However, because of the low bone turnover state observed in diabetes, it remains unclear how and when cortical porosity develops. On another side, some studies looking at bone material properties by in vivo micro-indentation suggest a lower resistance of the bone tissue itself. Clearly, longitudinal studies in diabetics cohorts are needed to better understand the determinants of bone fragility in this disease.

## CSA-OC3

**CAN WE IMPROVE COMMUNICATION OF RISK TO PATIENTS? A PROJECT FROM THE IOF CSA EPIDEMIOLOGY AND QUALITY OF LIFE WORKING GROUP**M. Hiligsmann<sup>1</sup>

<sup>1</sup>Department of Health Services Research, CAPHRI Care & Public Health Research Institute, Maastricht University, Maastricht, Netherlands

Effective communication between healthcare professionals and patients is an important aspect of patient-centered care and shared decision-making. Nowadays, several tools (e.g. FRAX®) are available to evaluate fracture risk of patients. Communicating fracture risk and benefits associated with taking a medication in a clear and intuitive way to patients is essential, but remains difficult. Many patients do not understand the words used by clinicians when describing medical information. There is a need for improvement in healthcare professionals' communication to patients regarding risk of fracture, aiming to increase patients' understanding of the risks and consequences of fractures and potentially treatment intake.

The RICO (Risk Communication in Osteoporosis) international project, endorsed by the IOF CSA Epidemiology and Quality of Life working group, has been created to understand patients' preferences for framing fractures risk. This session will present the first learnings of the RICO project on how to improve communication

of risk of patients. First, results from two scoping reviews (Beaudart et al. Osteoporosis International, 2021) that were conducted to review recommendations and guidelines for communication regarding general health risk, and to investigate communication strategies regarding risk of fracture will be presented. Healthcare professionals will be invited to apply these recommendations to optimize a patient-centered approach to reducing risk of fracture. Second, results from interviews with 26 patients at risk for fractures will be shared. Through these interviews, patients were asked to critically reflect on preliminary fracture framing presentations and they underlined the importance of visual aids in support to oral communication between patients and healthcare professionals. Next steps and expected outcomes of the RICO project will then be discussed including the ongoing collection of semi-structured interviews with 30 patients in 20 osteoporosis centers around the world. Finally, some considerations for the future of risk communication in osteoporosis will be shared.

Disclosure: the RICO project has received funding from Amgen US.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



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Abstract Book

## **Non-Sponsored Symposia Abstracts**

## NSS1

**CAPTURE THE FRACTURE CELEBRATING 10 YEARS – LEARNINGS AND SUCCESSES**K. Åkesson<sup>1</sup>

<sup>1</sup>Professor, MD, PhD, senior consultant, Dean Faculty of Medicine, Lund University, Lund, Sweden

Capture the Fracture was launched during 2012, over these years there has been vast progress in availability and development of fracture liaison services across the globe but the gap in service is still larger than those patients covered.

Capture the Fracture has been a great success and a learning experience. The Best Practice Framework is the backbone and applicable with local adaptation in all settings around the world. After initiation and providing the building blocks, monitoring and systematic follow-up and sustainability as key issues.

The best practice frame work is based on 13 standards following the care pathway from identifying patients with fracture, evaluation, initiation of therapy or other preventive measures to follow-up and monitoring. The next step is to evaluate progress, successes and room for improvement, in order to do so key performance indicators aligned with the standard have been developed. This allows for continuously evaluating both patients and the service.

To encourage a world-wide implementation of fracture liaison services for secondary prevention of future fractures, an extensive digital tool box has been developed on the Capture the Fracture website. It allows for "Getting mapped" by applying for have each service evaluated against the standards and as of today, 704 sites are on the map as either bronze, silver or gold services and representing 50 countries around the globe.

The success is obvious, but there are still large gaps in post-fracture care and prevention. The vision for the next decade will be improved personalized patient management, fracture liaison service extending into covering many more health and hospital services with complete systems integration and easily accessible tools for monitoring through comparative registries.

This symposium will highlight the most important steps to success, the currently available tools, how to get mapped and the future.

## NSS2

**IMPLEMENTING PHYSICAL ACTIVITY AS A CARE FOR OLDER ADULTS FOLLOWING IN GERIATRIC OUTPATIENT CLINICS**M. Aubertin-Leheudre<sup>1</sup>

<sup>1</sup>Département des Sciences de l'Activité Physique, Groupe de Recherche en Activité Physique Adapté, Université du Québec à Montréal (UQAM), Montréal, Canada

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.



## NSS3

**IMPLEMENTING PHYSICAL ACTIVITY FOR COMMUNITY-DWELLING PRE-DISABLED SENIORS DURING ISOLATION PERIODS (E.G. COVID 19 PANDEMIC)**F. Buckinx<sup>1</sup>

<sup>1</sup>Département des Sciences de l'Activité Physique, Groupe de Recherche en Activité Physique Adapté, Université du Québec à Montréal (UQAM), Montréal, Canada

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.

## NSS4

**IMPLEMENTING PHYSICAL ACTIVITY FOR OLDER ADULTS IN NURSING HOMES**O. Bruyère<sup>1</sup>

<sup>1</sup>World Health Organization (WHO) Collaborating Center for Public Health Aspects of Musculoskeletal Health and Aging, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium

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.

## NSS5

**DEVELOPMENT OF THE BUILD BETTER BONES WEBSITE TO SUPPORT REHABILITATION FOR PEOPLE WITH OSTEOPOROSIS**D. Pinto<sup>1</sup>

<sup>1</sup>Department of Physical Therapy, Marquette University, Milwaukee, Milwaukee, United States

Evidence suggests that the best outcomes after a fragility fracture are achieved through "patient-centered multidisciplinary care" which includes both pharmacologic and nonpharmacologic care extending beyond the initial visit for the fracture. Recently, a literature review conducted by the International Osteoporosis Foundation's Rehabilitation Working Group, published in Osteoporosis International, discussed the rehabilitation interventions used in the management of fragility fractures including exercise, balance, fall prevention, nutrition, and other therapies. The literature review considered primary to tertiary prevention of fracture. The Rehabilitation Working Group decided to develop a website to increase awareness of osteoporosis rehabilitation strategies to patients, caregivers and physicians. The purpose of this talk is to present the new website developed by this working group, [www.BuildBetterBones.org](http://www.BuildBetterBones.org). We will present the development process including patient, provider, and researcher stakeholder feedback about the website using interviews, surveys and listening sessions. We will present website features along with plans for future development and dissemination. This will be an interactive session in which we seek to engage with the audience to apply feedback to our web-development process.

## NSS6

**REHABILITATION INTERVENTIONS IN PATIENTS WITH OSTEOPOROSIS AND FRAGILITY FRACTURE**O. Bruyère<sup>1</sup>

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

Recently, the Rehabilitation Working Group of the International Osteoporosis Foundation conducted a review of the current state of the evidence for rehabilitation strategies post fragility fracture. It was shown that multi-modal exercise post fragility fracture to the spine and hip is strongly recommended to reduce pain, improve physical function, and improve quality of life. Outpatient physiotherapy post hip fracture has a stronger evidence base than outpatient physiotherapy post-vertebral fracture. Appropriate nutritional care after fragility fracture provides a large range of improvement in morbidity and mortality. Education increases understanding of osteoporosis which in turn increases utilization of other rehabilitation services. Education may improve other health outcomes such as pain and increase a patient's ability for self-advocacy. The Working Group concluded that rehabilitation interventions are inter-reliant and research investigating the interaction of exercise, nutrition and other multi-modal therapies may increase the relevance of rehabilitation research to clinical care.

## NSS7

**SEQUENTIAL AND COMBINED TREATMENT: CONCEPTS, RATIONALE AND GUIDELINES**L. F. Vidal Neira<sup>1</sup>, L. F. Vidal Neira<sup>2,3</sup>

<sup>1</sup>Specialist in Rheumatology. Head of the Rheumatology Department at Hospital María Auxiliadora, Lima, Peru, <sup>2</sup>Medical Director at Centro Diagnóstico de la Osteoporosis y Enfermedades Reumáticas – CEDOR, Lima, Peru, <sup>3</sup>IOF Latin America Regional Advisory Council - Chair, Lima, Peru

Data from pivotal studies of currently available antiresorptive and anabolic medications used to treat osteoporosis have demonstrated safety and effectiveness once used as single interventions. The expected effect demonstrated on various single-drug pivotal studies is fracture risk reduction that can be translated through incremental bone mineral density and bone remodeling markers modifications.

Bone mineral density, measured at total femur, has proven to be an excellent surrogate marker of subsequent fracture risk in individual patients on or after osteoporosis treatment. While CTX

and P1NP have shown their usefulness for monitoring biochemical changes under antiresorptive and anabolic treatment circumstances, respectively.

For those patients remaining at a persistently very high risk of fracture after five to ten-year treatment period, a customized approach is necessary. This approach demands the association of drugs in pre-planned sequential treatment or in a simultaneously combination. But, only recently, the combined and/or sequential administration of two agents has gained a more substantial support provided by larger trials.

There are several reasons why a two-drug approach should be considered:

- As a chronic disease, osteoporosis requires long-term management and none of the currently available antiresorptive agents has proven safety and efficacy beyond 10 years of treatment. Anabolic agents also have limited evidence for intervals that range from 12 to 48 months, at most.
- Some patients may experience therapeutic failure, demanding a change or an additional drug administration.
- A therapeutic approach that offers, at the same time, inhibition of bone resorption and induction of bone formation, might conceptually be superior once it offers a double-sided rather than single-sided drug effect.

A considerable number of sequential and combination options is available, and some clinical studies have investigated their effect. However, the evidence is still scarce. An algorithm for the management of patients at low, high and very high risk of osteoporotic fractures has showed that, for patients at very high risk of fracture, starting treatment with an anabolic agent seems most appropriate approach. But, in the vast majority of cases, osteoporotic patients usually are exposed to antiresorptive drugs for longer periods before they are changed into anabolic treatment. Therefore, it is needed to discuss what to expect while transitioning from these two classes of drugs as well what to expect when a combination is mandatory for some reason. In this session, the recommendations of different guidelines on sequential and combined treatment will be reviewed, addressing those to be preferred or avoided in clinical practice.

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## NSS8

### COMBINATIONS AND SEQUENCES TO BE AVOIDED

J. J. Carey<sup>1</sup>

<sup>1</sup>Professor in Medicine National University of Ireland, Galway, Ireland

Osteoporosis medication regimens remain unusual in that all individuals are given the same dose or the same treatment in many jurisdictions, and the same response is expected. Such practice is rarely engaged in other illnesses where doses are often based on age, weight, disease severity and co-morbidities. Osteoporosis medications have important limitations including:

- The sub-optimal effect on vertebral fractures
- The often poor effect on non-vertebral fractures as well
- The widespread concerns about toxicity despite a dearth of evidence
- The period of time needed to present any clinical benefit, and
- Complex dosing regimens that might interfere with adherence.

While it is enticing to consider lower or higher doses, or different combinations or sequences of medications, large clinical studies with validated fracture outcomes are few, and often the evidence lags behind, or contradicts the practice. Changes to a “substitute” or “better” medications may require a primary “failure” of a certain option in order to be considered for approval, while in other cases combinations and sequences are employed. A number of clinical trials comparing different medications, dosing regimens, combinations and sequences have been completed in the last two decades.

One situation that requires attention is the transition from denosumab to teriparatide. It has been demonstrated that, in the first six months of switching from denosumab to teriparatide, there is a rapid decline in spine BMD, with concomitant extensive and progressive bone loss at the hip and distal radius. It represents a potentially dangerous situation where bone remodeling accelerates with increases in biomarkers of skeletal turnover to levels highly above baseline. Although the pathophysiology of this phenomenon is not clear, considering the detrimental effects of denosumab discontinuation without sequential antiresorptive therapy *per se* urges clinicians to continue treatment with denosumab or to shift to another antiresorptive agent while treating with teriparatide after denosumab withdrawal. Another potentially ominous situation is the combination of two antiresorptive

agents like bisphosphonates and denosumab that might lead to extremely low bone turnover atypical fractures or predispose the patient towards osteonecrosis.

In this session these data will be addressed focusing what combinations and sequences are probably best avoided in clinical practice.

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## NSS9

### SUCCESSFUL ASSOCIATIONS, TIMMING AND ENDPOINTS

B. Muzzi Camargos<sup>1,2,3</sup>

<sup>1</sup>Bone Densitometry Unit Coordinator at Rede Mater Dei de Saúde - Brazil. Vice President for Densitometry at Radiology Society of Minas Gerais, Belo Horizonte, Brazil, <sup>2</sup>Member of the IOF Committee of Scientific Advisors, Belo Horizonte, Brazil, <sup>3</sup>Member of the National Osteoporosis Commission at the Brazilian Federation of Associations for Gynecology and Obstetrics, Belo Horizonte, Brazil

Previously fractured patients at very high risk of subsequent fractures and patients with bone mineral density T-scores below -3.0 require therapeutic interventions able to provide a rapid fracture risk reduction. In this scenario, the body of evidence comparing anabolic and antiresorptive medications in randomized trials has pointed out in favor of the superiority of anabolic agents (i.e. Abaloparatide and Teriparatide) over the ones that represent the antiresorptive therapy (i.e. Bisphosphonates and Denosumab). It also has shown that the previously administration of antiresorptives may, at least, partially blunt or mitigate the anabolic drug efficacy and should be avoided; specially when bisphosphonates are the antiresorptives in question. Nevertheless, not all antire-

sorptives interact negatively with Teriparatide. The Denosumab and Teriparatide Administration (DATA) trial showed that a combination of Teriparatide and Denosumab, when administered simultaneously, increased bone mineral density, improved skeletal microarchitecture and elevated bone strength to a greater extent than either drug when administered alone. This is one example of a desirable combination where both drugs, despite of representing opposite mechanisms of action, interact positively with each other, providing a superior effect as measured by the surrogate markers described before. As well as the specificity of the agents used as a combination matters; the different timing and sequence of drug administration also makes a huge difference. Potent antiresorptive agents, like Zoledronic Acid and Denosumab, reduce vertebral fracture incidence by 65% compared with placebo over the first year of treatment. However, only 20-25% of nonvertebral fracture risk reductions are demonstrated after three years of therapy. Although there are very impressive numbers on both classes of drugs, anabolic agents performed better than antiresorptives on incident vertebral and non-vertebral fracture risk reduction for higher risk populations. A head-to-head study of two anabolic agents - Abaloparatide and Teriparatide - has demonstrated that new vertebral fracture incidence was reduced by 86% for Abaloparatide and by 80% for Teriparatide compared to placebo, at 18 months of therapeutic intervention. Abaloparatide and Teriparatide showed a reduction of 43% and 28%, respectively, on the incidence of non-vertebral fractures versus placebo, within eighteen months of treatment. Considering the non head-to-head data obtained from the pivotal trials above-mentioned, anabolic agents can produce rapid reductions in fracture risk, at twelve to eighteen months for vertebral and nonvertebral sites when compared to antiresorptive medications. As the vertebral and non-vertebral fracture risk reduction is significantly greater for anabolic rather than antiresorptive agents; it is reasonable to prioritize, whenever possible, a sequential use of anabolics before antiresorptives on very high risk patients.

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## NSS10

### INTRODUCTION AND DEMOGRAPHIC REGIONAL OVERVIEW

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<sup>1</sup>University of Costa Rica, Department of Endocrinology, Hospital Cima San José, Costa Rica, President of the Costa Rican Menopause and osteoporosis Society, San José, Costa Rica

Ten years after the publication of the Latin America Audit in 2012, the AUDIT LATAM 2021 Steering Committee, following IOF guidance, invited the countries of the Latin American region to collaborate in this second, revised edition of the regional audit. The research project included two phases. Phase 1 main objectives were to update the population demographic data, to describe the existing infrastructure related to the management of fragility fractures and to learn about the health policies for osteoporosis implemented in the Latin American region. An adequate response to phase 1 enabled countries to pass onto phase 2. The objectives of Phase 2 were to characterize the epidemiology, cost, and burden of fragility fractures in our region, describing the frequency of main fragility fractures (proximal humerus, hip, distal forearm, vertebral and others), in men and women over 50 years old between 2015 and 2019; to estimate the cost of fragility fractures and the prevalence of osteoporosis in the Latin-American countries where such data is available.

Phase 1 gathered information from 19 countries, representing a 35% increase in the number of countries that participated from the Latam Audit in 2012. Forty percent of the Latin American population is in the range of +50 years, and in the last five years, life expectancy has increased one year throughout the region, reaching an average of 75.8 years old. There are 0.68 average DXA equipment in the region per 100,000 inhabitants. FRAX calculator is currently available in seven countries (+75% vs 2012). Bisphosphonates are the first treatment option for osteoporosis patients. A larger number of countries have frequently carried out surveys on calcium and Vitamin D intake, and currently, there are 68 active societies (scientific and / or patient) related to osteoporosis. In conclusion, Phase 1 has been extremely important and provided updated demographic data and available resources in each participating country while enabling us to meet and encourage many collaborators in the field of osteoporosis throughout our region.

A smaller number of countries completed Phase 2, highlighting the need to generate quality epidemiological data in the region. Significant gaps exist in osteoporosis care in several countries in Latin America. There is a great inequity in the distribution of diagnostic and therapeutic resources between urban and rural regions. Potential solutions to these limitations are to promote osteoporosis as a public health priority, increase education, research, and awareness about the disease, optimize the availability of diagnostic and therapeutic resources, and improve second-



ary fracture prevention through models like the Fracture Liaison Services. More results about our research will be presented during this symposium.

## NSS11

### EPIDEMIOLOGY AND COSTS OF FRAGILITY FRACTURES IN LATIN AMERICA

P. Clark<sup>1</sup>

<sup>1</sup>Clinical Epidemiology Research Unit, Children's Hospital of Mexico Federico Gomez UNAM, Mexico City, Mexico Faculty of Medicine, National Autonomous University of Mexico UNAM, Mexico City, Mexico

We gather information regarding mayor fragility fractures (FF) in the population > 50 years old from five countries in the region: Brazil, Colombia, Chile, Mexico and Perú from 2015 to 2019.

Regarding hip fractures, we observed that except for Mexico, rates increased over the five years period observing the highest in Chile: 115.4/100,000 in 2015 to 144/100 000 in 2019, and the lowest in Peru: 116/100 000 in 2015 and 142.5 in 2019. Such numbers place Latin America as an intermediate rate of fracture region compared to other regions in the world. Mexico showed a consistent decrease in the number of fractures in 2018 and 2019 based on data provided by the largest health system in the country. The rates for proximal humerus, vertebra and wrist fractures did not have the same consistency as hip fractures. In Brazil, the most reported fracture was wrist, in Chile, vertebral and in Colombia, proximal humerus. Direct costs for the 4 FF were gathered from the IMSS in Mexico being hip fracture the costliest at \$7,971.44 DIs, while wrist fracture with a direct cost of \$2,022.46 DIs was the least expensive.

## NSS12

### COMPARATIVE SITUATION AND CHALLENGES FOR OSTEOPOROSIS DIAGNOSIS AMONG THE PARTICIPANT LATIN AMERICA COUNTRIES

B. Muzzi Camargos<sup>1</sup>

<sup>1</sup>Rede Materdei – Brazil Sociedade de Radiologia de Minas Gerais, Belo Horizonte, Brazil

The availability of DXA equipment varies markedly around the world and there is little information on the minimum number of devices per population.

A study by Kanis et al<sup>1</sup> estimated the requirements for DXA in Europe. On average, each DXA center care for 3,000 patients annually. On an estimated scenario (A) of all women over 65 years of age, 4.42 DXA units per million of the total population would

be needed. Assuming this same proportion, adjusted per 100,000 inhabitants, the proportion is 0.442 DXA devices per 100,000 inhabitants. A second scenario (B) was determined considering by the clinical risk factors at the age of 65 years and an intervention threshold established at 10 years of 4% for hip fracture. To evaluate all women older than 65 years, 1.05 scans per million population would be needed, resulting in a ratio of 0.105 explorations per 100,000 inhabitants.

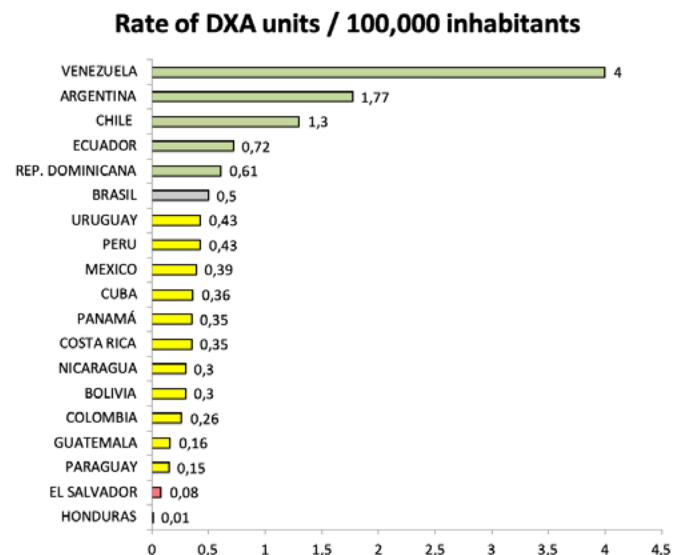
Assuming the two scenarios above as maximum and minimum thresholds respectively and then, adjust the proportion to 100,000 people, we can establish the following ranking for the countries participating in the LATAM Audit 2021<sup>2</sup>

- Argentina, Chile, Brazil, Ecuador, Venezuela, and Dominican Republic are above the highest limit of 4.42

- Honduras and El Salvador are below the lowest threshold, with less than 0.105 devices per 100,000 inhabitants

- Uruguay, Paraguay, Mexico, and Peru are in-between thresholds (in yellow).

**Conclusion:** The assumption of limits can lead to misinterpretations. However, the purpose of this analysis was to compare the availability of DXA devices among Latin American countries and to identify which countries bear an insufficient number of DXA devices for their population.



<sup>1</sup>JKanis JA, Johnell O. Requirements for DXA for the management of osteoporosis in Europe. Position Paper. Osteoporos Int 2005; 16: 229–238



## NSS13

## ACCESS TO PHARMACOLOGICAL AND NON-PHARMACOLOGICAL TREATMENT IN LATIN AMERICA

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Calcium and vitamin D supplementation should always be considered in patients with osteoporosis so, many of the countries in the region have conducted surveys of calcium consumption in the general population or in higher risk target groups such as children or elderly population. There are also local studies of vitamin D levels. The results, in almost all of them, showed deficiency in both parameters. Despite this, there are not universal food fortification policies (only few countries have them) although supplemented products are available. All countries in the region have different calcium salts and vitamin D preparations. However, health systems provision and/or reimbursement is only available in a few countries.

Bisphosphonates are available in every audited country. Access to other osteoporosis medications such as denosumab or anabolic therapies is variable. Other medication that can be used in osteoporosis such as SERMs and menopausal replacement therapy, are also available, in general, with an easy access. For all this drugs, except denosumab, there is biosimilar medications in some countries.

In conclusion, all the countries included in this audit have effective treatments for osteoporosis but the availability of more sophisticated or higher cost medicines is limited to some countries.

There is considerable variability in reimbursement policies in public and private health systems and that represent one of the main barriers for treatments of osteoporotic patients.

## NSS14

## APPROACH TO SECONDARY FRACTURE PREVENTION. THE LATAM EXPERIENCE

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Since 2012, the Capture the Fracture® (CtF®) initiative of the International Osteoporosis Foundation (IOF) has promoted strategies with the aim of preventing secondary fractures, through Fracture Liaison services (FLS). In Latin America (LA), there has been

a rapid growth of FLSs both in numbers and performance in 2021, with 34 new FLS, corresponding to an increase of 94% since 2013. One of its most recent strategies is the Mentorship Programme which trains mentors in different countries to facilitate the transfer FLS knowledge and tools to support the implementation and management of post fracture care programmes locally. LA currently has four mentors in Brazil, four in Mexico, three in Colombia and five in Argentina

To date, there are 101 FLSs in LA: 46 in Brazil, 22 in Mexico, 16 in Colombia, 15 in Argentina and 2 in Chile.

Recently, Brazil group of mentors published Brazilian FLS data at the WCO-IOF-ESCEO congress in Barcelona / 2021 in a poster about the mentorship-process in Brazil, which resulted in eight new FLS and 12 that improved their category. The Mexican mentors has recently published data about the implementation of CtF® in both the public and private sectors, and how common barriers should be identified. Additionally, Colombia, published in 2021 data of 1699 fractured patients from 10 FLS, in one year of follow-up, finding a treatment gap of 7 to 43%, shortened time to surgery, a decrease in mortality from 20 to 9% and a higher detection of vertebral fractures (19%).

FLSs are the most effective tool, adaptable to LA countries to prevent fractures, achieving higher quality of life, lower mortality, and lower cost to the health system. They also allow to obtain valuable epidemiological data of osteoporosis and are a bridge with government entities to achieve public health policies.

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## NSS15

**OSTEOPOROSIS IN THE ASIA PACIFIC.  
CHALLENGES AND SOLUTIONS**M. Chandran<sup>1</sup>

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The Asia Pacific which is home to 4.5 billion people is a vast and heterogenous region with diverse cultures, ethnicities, and health care systems. The population aged over 65 years in Asia alone is projected to more than quadruple by 2050. Osteoporotic fractures impose a huge health economic burden in this region in which health care systems vary widely. Though age adjusted incidence rates of hip fractures are declining in some countries such as Singapore, reflecting increased awareness and prioritization of osteoporosis as a health care priority, the average age standardized hip fracture incidence across the AP region remains very high. Treating a single hip fracture represents approximately 19% of Asia Pacific's regional per-head gross domestic product each year currently. An important issue in most Asia Pacific countries is the different disease status in rural areas compared with cities. An increased incidence in hip fractures in urban regions over that in rural areas is reported. This may reflect the lack of hospitalised hip fractures in rural areas but may also reflect lower population health status and treatment rates. Significant gaps exist in osteoporosis care in several countries in the Asia Pacific region. Accessibility issues to DXA scanning and medications is a significant problem that hampers optimal care. Some countries such as Republic of Korea, Japan, Hong Kong, Australia, Singapore, and New Zealand have about 12–24 DXA machines per million population. In contrast, China, India, Indonesia, Pakistan, Philippines, Sri Lanka, and Vietnam are severely under-resourced with less than 1 machine per million population. Few Governments in the AP region recognize osteoporosis as a public health care priority. A lack of understanding that fragility fractures are linked to osteoporosis exists even amongst health care professionals. The variation in the scope and recommendations provided in clinical practice guidelines on osteoporosis in the region contributes to the uncertainty amongst clinicians as to how to manage osteoporosis appropriately. However, the work of several organizations in the area such as that of the International Osteoporosis Foundation, the Asia Pacific Consortium on Osteoporosis etc are beginning to bear fruit in recent years. Fracture Liaison Services have been set up in several countries in the Asia Pacific region, an attempt at standardization of clinical practice guidelines is being made and clinical and epidemiological research in the field of osteoporosis is advancing at a rapid rate. This presentation will highlight some of the epidemiological data regarding osteoporosis, the unique

challenges faced by health care providers while managing the disease, and some of the innovative solutions that have sprung up in recent years in the Asia Pacific region.

## NSS16

**FRAGILITY FRACTURES IN EUROPE: DIAGNOSIS  
AND TREATMENT IN DAILY PRACTICE**W. F. Lems<sup>1</sup>

<sup>1</sup>Full Professor, Amsterdam Rheumatology and Immunology Centre (ARC), VU University Medical Center, Department of Rheumatology, Steering Committee Member, Capture the Fracture®, International Osteoporosis Foundation, Amsterdam, Netherlands

Osteoporosis is a common metabolic bone disorder, characterized by low bone mass and a deteriorated microarchitecture, and an increased risk for vertebral and nonvertebral fragility fractures. The low bone mass and increased fracture risk can be easily and reliably diagnosed with DXA and VFA (1), and effective, relatively safe, and inexpensive drugs are available. However, are diagnostic methods and treatment options used optimal in Europe? There is a remarkable disparity between the availability of DXA machines, varying from 3.6 per million to 51.4 per million (2). Reimbursement for initiating treatments differs also between countries. The total number of fragility fractures in the EU6 (the 5 largest countries and Sweden) are estimated to increase from 2.7 million in 2017 to 3.3 million in 2020, a 23% increase (3). The percentage of eligible individuals not receiving treatment with anti-osteoporotic drugs, the so-called "treatment-gap", is estimated to be 73% for women and 63% for men (an increase of 17% since 2010). (3) In the coming decades, fracture rates are expected to rise substantially in Europe. Given the suboptimal availability of diagnostic machines and the large treatment gap, there is a need for urgent action: starting with diagnosis and treatment in individuals with high fracture risk should be the first step. Initiating of new Fracture Liaison Services (FLS) services and optimisation of existing FLS services should be on top of the agenda.

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## NSS17

**OSTEOPOROSIS IN LATIN AMERICA. CHALLENGES AND SOLUTIONS**S. Cerdas Pérez<sup>1</sup>

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Ten years after Audit 2010, the Executive Committee AUDIT LA 2021, under the guidelines of the IOF, invited the countries of the Latin American Region to participate in a new regional audit. The main objectives were to update the population epidemiological data, to describe the existing infrastructure related to the management of fragility fractures, to evaluate the fractures costs and to know the health politics implemented to manage osteoporosis in the Latin American Region. We obtained information from 19 countries, forty percent of the population of Latin America is in the range of +50 years and in the last 5 years, life expectancy increased 1 year throughout the region, reaching an average of 75.8 years. Significant gaps exist in osteoporosis care in several countries in Latin America. There is great inequity in the distribution of diagnostic and therapeutic resources between urban and rural regions. There are for diagnosis only 0.68 average DXA teams in LA x per 100,000 inhabitants, and only seven countries have a FRAX calculator. Bisphosphonates are the first treatment option, but the availability of bone-forming drugs is limited in some countries. Potential solutions to these limitations are to promote osteoporosis as a public health priority, increase education and awareness about the disease and its consequences for politicians, medical teams and the general population, optimize the availability of diagnostic and therapeutic resources, and improve secondary prevention of fracture, through systems like Fracture Liaison Services.

## NSS18

**OSTEOPOROSIS IN THE CONTEXT OF ULCERATIVE COLITIS**Y. Dionyssiotis<sup>1</sup>

<sup>1</sup>A/Prof. PM&R, Spinal Cord Injury Rehabilitation Clinic, University of Patras, Rio Patras, Greece

Ulcerative colitis is an autoimmune inflammatory disease which affects the bowel. The disease may be associated with spondylarthritis and may affect the vertebral column. Ulcerative colitis is characterized by systemic inflammation. Systemic inflammation is accompanied by the circulation of inflammatory cytokines which induce the development of osteoporosis. The disease is also characterized by malabsorption. Vitamin D deficiency is a major contributor to the development of osteoporosis in ulcerative colitis.

## NSS19

**PATHOGENESIS OF OSTEOPOROSIS IN THE CONTEXT OF ULCERATIVE COLITIS**I. Kostoglou-Athanassiou<sup>1</sup>

<sup>1</sup>Department of Endocrinology, Asclepeion Hospital, Voula, Athens, Greece

Osteoporosis is a major comorbidity characterizing ulcerative colitis. The disease is a chronic systemic autoimmune disease. Inflammatory cytokines are released which act systemically and induce systemic osteoporosis. The disease may be associated with spondylarthritis. Inflammatory cytokines act in the nearby bone tissue, invade it and induce osteoporosis. Chronic malabsorption leads to micronutrient malabsorption as well as severe vitamin D deficiency. In conclusion, osteoporosis in the context of ulcerative colitis presents a common comorbidity. Its pathogenesis is related to the effects of systemic and periarticular inflammation, malabsorption and severe vitamin D deficiency.

## NSS20

**ULCERATIVE COLITIS AND ANKYLOSING SPONDYLITIS**L. Athanassiou<sup>1</sup>

<sup>1</sup>Department of Rheumatology, Asclepeion Hospital, Voula, Athens, Greece

Ulcerative colitis is one of the two major types of inflammatory bowel disease, along with Crohn's disease. Unlike Crohn's disease, which can affect any part of the gastrointestinal tract, ulcerative colitis characteristically involves the large bowel. Ulcerative colitis is a chronic illness that has a profound emotional and social impact on the affected patients. Patients with ulcerative colitis commonly present with rectal bleeding, frequent stools, mucous discharge from the rectum, lower abdominal pain and severe dehydration in severe cases. In some patients the disease may run a fulminant course with severe diarrhea, fever, leucocytosis and abdominal distention. The disease is associated with uveitis, pyoderma gangrenosum, erythema nodosum and ankylosing spondylitis. The relationship of ulcerative colitis with ankylosing spondylitis leads to its classification as a spondylarthropathy.

## NSS21

**TREATMENT OF OSTEOPOROSIS IN THE CONTEXT OF ULCERATIVE COLITIS**P. Athanassiou<sup>1</sup><sup>1</sup>Department of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

Treatment of osteoporosis in the context of ulcerative colitis involves the administration of vitamin D, calcium and systemic antiosteoporotic agents. The administration of vitamin D is necessary, should be chronic and should lead to adequate blood vitamin D levels. Denosumab may be used for the management of osteoporosis in the context of ulcerative colitis. Bisphosphonates may lead to osteoporosis prevention or treatment. Alendronate may be used and may lead to bone mineral density improvement. Risedronate may also be used. Zoledronate may also be used as it is administered intravenously once annually and may lead to bone mineral density improvement. Teriparatide may also be applied in the case of severe osteoporosis.

## NSS22

**OSTEOSARCOPENIA SCHOOL**Y. Dionyssiotis<sup>1</sup><sup>1</sup>A/Prof. PM&R, Spinal Cord Injury Rehabilitation Clinic, University of Patras, Rio Patras, Greece

The combination of osteopenia / osteoporosis and sarcopenia - known as osteosarcopenia - has been proposed as a subset of frailer individuals at higher risk of institutionalization, falls, and fractures. Osteosarcopenic patients have very particular clinical, biochemical, diagnostic, and functional characteristics that could be identified in clinical practice. In this workshop we will go over the translational aspects of sarcopenia and osteoporosis research and highlight expected outcomes from different interventions. The new holistic concept called Osteosarcopenia School will be presented. Preventive measures and therapeutic interventions that can benefit both muscle and bone simultaneously will be analyzed. This new concept is based on counseling and education of patients as part of a rehabilitation program. It includes a specific pathway to stop the vicious cycle, not only of social isolation, but also of falls and fractures in this population, which are all leading to disability. According to the concept, the focus is mainly shifted on muscle strengthening, balance improvement and reducing all causes of instability (i.e. neurogenic, iatrogenic etc.). To this end, specific exercise programmes combined with a review of drugs, is essential in these patients. Re - education

includes interventions targeting to increase functionality of the subjects through social reintegration and improvement in activities of daily living.

## NSS23

**PHYSICAL ACTIVITY FOR TREATMENT AND REHABILITATION IN OSTEOPOROSIS AND SARCOPENIA**M. A. Lissens<sup>1</sup><sup>1</sup>M.D., Ph.D., Thomas More University College, Geel, University Association K.U. Leuven, Leuven, Belgium

Physical activity is an important factor influencing peak bone mass and muscle volume. A lack of physical activity is a major risk factor to develop osteoporosis and sarcopenia. Several studies showed significant associations between physical activity level, bone mass and muscle mass measures. This has its implications in rehabilitation medicine. In primary rehabilitation the aim is prevention of osteoporosis and sarcopenia, whereas in secondary rehabilitation treatment is the main goal. In tertiary rehabilitation emphasis is put on treatment of fractures and complications. The goal of an osteoporosis and sarcopenia rehabilitation program is to help the patient to return to the highest level of function and independence possible, while improving the overall quality of life, physically, emotionally, and socially. The focus of rehabilitation is to decrease pain, help prevent fractures, and minimize further bone and muscle loss. Therefore, rehabilitation programs may include the following: exercise programs and conditioning to increase weight bearing and physical fitness, pain management techniques, nutritional counseling, use of assistive devices to improve safety at home, patient and family education, especially prevention of falls (90% of hip and wrist fractures are the result of a fall). Many skilled professionals are part of the multidisciplinary rehabilitation team, including the specialist in physical medicine and rehabilitation or physiatrist as coordinator. Physical activity can help osteoporosis and sarcopenia patients gain improvement in muscle strength and cardiovascular endurance, can prevent falls and can reduce functional decline. Benefits from regular exercise include improved bone health, both psychological and cognitive benefits, and enhanced quality of life.



## NSS24

**OSTEOPOROSIS, FRACTURE PREVENTION AND FALLS RISK ASSESSMENT – CLOSING THE GAP BETWEEN TREATMENT GUIDELINES AND CLINICAL PRACTICE**N. Gadallah<sup>1</sup><sup>1</sup>Rheumatology and Rehabilitation, Ain Shams University, Cairo, Egypt

Osteoporosis, falls and fractures represent the 3 major bone health challenges particularly for older adults. Whilst absolute fracture risk assessment has sorted the problem for fracture prediction, people with high falls risk are always missed in day to day practice. Integrated falls and bone health service aiming at reduction of the rate and risk of falls as well as fragility fractures, and to improve the health and mobility of older people and sustain their independence could be a possible solution to fill this gap. However, remains the challenge of identifying those subjects at high risk of falling. Using simplified, patient friendly, self-reported falls risk assessment in addition to the Fracture risk assessment (FRAX) to be completed by the patients over 50-years old attending the fracture clinic, can help to screen all the patients in very short time and identify their fracture as well as falls risk. Such approach involves all parties focussing on a common agenda of reducing falls and fractures and their impacts by bringing together & integrating primary prevention, secondary prevention and rehabilitation as well as measuring outcomes collectively. This presentation will discuss a model of an integrated falls and fracture prevention system which incorporates the following elements: 1. Promotion of falls prevention activities particularly amongst older adults, e.g. exercise programs that address balance and strength; 2. Building capacity for identifying and responding to those people within or moving into the at-risk group for falls; 3. Development of an integrated clinical care pathway for assessment and treatment of those who have fallen; and 4. Lifelong optimization of bone health "Bone Boost" and fracture liaison services for secondary fracture prevention

A targeted patient management program should be developed tailored to the individual's subject needs, risk factors as well as associated comorbidities.

## NSS25

**SARCOPENIA ASSESSMENT IN STANDARD CLINICAL PRACTICE: WHO, HOW AND WHEN?**M. Hassan<sup>1</sup><sup>1</sup>Ass. Prof. Rheumatology and Rehabilitation, Tanta University, Tanta, Egypt

Diagnosis of sarcopenia requires quantitative and qualitative measurement of muscle mass as well as assessment for underlying aetiology. Optimal care for people with sarcopenia is essential because the condition has high personal, social and economic burdens when untreated. In terms of human health, sarcopenia increases risk of falls and fractures; impairs ability to perform activities of daily living; is associated with cardiac disease, respiratory disease and cognitive impairment; leads to mobility disorders; and contributes to lowered quality of life, loss of independence or need for long-term care placement, and death. In financial terms, sarcopenia is costly to healthcare systems. The presence of sarcopenia increases risk for hospitalisation and increases cost of care during hospitalisation.

Early detection of sarcopenia can prevent downstream adverse health outcomes. Since sarcopenia is asymptomatic, particularly in its early stage, the development of an effective screening tool is vital to identify those patients at risk and in the meantime can be used to refer this cohort, suspected to have sarcopenia, for body composition valuation. Currently, the gold standard in measurement is highly debatable. It is unlikely that a single test which examines only 1 parameter will be adopted as the standard tool to assess for sarcopenia. Furthermore, the tool should be cheap, easy to use and has high predictive value.

This presentation will try to fill the gaps for sarcopenia awareness, care and research design. It will discuss the main parameters that can be used as predictors for sarcopenia and present a validated screening tool that can be used to identify older adults who are at risk of developing sarcopenia in standard practice.

## NSS26

**USING SOCIAL MEDIA AS A PATIENT EDUCATION TOOL: IS THERE A ROOM FOR BONE HEALTH EDUCATIONAL HUB?**Y. El Miedany<sup>1</sup><sup>1</sup>Prof. Canterbury Christ Church University, England Consultant Rheumatologist H. Senior Clinical Lecturer, King's College London Fellow of the Academy of Medical Educators, Kent, United Kingdom



Social media not only has applications for teaching and learning, but also has the potential to allow the patients to communicate, collaborate and share information. Over the past year, and as a consequence to the COVID-19 pandemic, social media has become an integral communication method for the majority of our digitally connected society. These offer tips, strategies and health services benefits for people concerned about or living with variable medical conditions. The information can also be of value for people who are caring for others or just looking into symptoms.

The Egyptian Academy of bone health and metabolic bone disease launched a social hub for bone health and fracture prevention patient education through online patient communication. This included different forms: video presentations, Wikis (online public forum featuring text and multimedia content that can be edited by users), microblogs (format which allows users to post a large number of brief messages or updates over a short period).

It is important to leverage social healthcare marketing platforms to educate the people, answer their queries and update them on matters related to their health conditions. People communities are likely using one or more social media tools to share information and discuss their health. Asserting the society's expertise has helped to protect people from faulty information. Interactive digital communication has a role in optimizing patients' health.

This presentation will share with the audience the outcomes of the people perception toward the use of social media in bone health patient education as well as analyses of the people interaction and their responses which reflect their attitude toward its benefits and risks involved.

## NSS27

### OSTEOPOROSIS: A MAJOR CHALLENGE IN AFRICA

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The ageing population around the world is increasing, and the same could be said about Africa. One of the important consequences of the improved longevity is bone loss, bone fragility and fractures. Africa is a vast continent with low income and limited resources. While major advances in early diagnosis, assessment of risk factors, screening, prevention, and treatment have been made in western populations, lack of resources and income limit the value of many of these advances on the African continent. Dual x-ray absorptiometry (DXA), the gold standard for diagnosis of osteoporosis by measurement of bone mineral density (BMD), is found in only a few countries in Africa. As a result, many subjects are diagnosed late in the disease, usually after developing fractures. A few studies have been done in Africa, but they vary in their reporting with respect to BMD data, or fracture incidence. The results of DXA studies show that age and menopause are important factors driving osteoporosis in Africa, as is the case

elsewhere in the world. The pattern of bone loss at different sites differs from Caucasian studies, but the prevalence of osteoporosis is higher in subjects over 50 years of age and increases steadily as they get older. Hip fracture incidence rate (IR) is on the increase, and there are significant ethnic differences in IR of hip fractures across the continent. In South Africa, hip fractures are more common among white and Indian females and least common among African black females. The result has been the development of a FRAX score for South Africa distinct for each ethnic group, which is likely to improve detection, prevention, and treatment among high-risk categories. Despite the challenges, recent consensus treatment guidelines for osteoporosis have been developed for Africa.

## NSS28

### OSTEOPOROSIS AND HIV: AN AFRICAN PERSPECTIVE

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Of the approximately 37 million persons living with HIV (PLWHIV) globally, ~69% reside in sub-Saharan Africa. The introduction of anti-retroviral treatment (ART) has resulted in increased longevity, and osteoporosis is emerging as a significant comorbidity. Recent studies from Africa, have shown increased rates of hip and vertebral fractures. Apart from the traditional risk factors, HIV and ART increase fracture risk. HIV infection is associated with up to 6.4-fold decrease in bone mineral density (BMD) and 3.7-fold increase in osteoporosis. The initiation of certain ART is associated with a 2-6% decrease in BMD.

The limited studies from Africa in PLWHIV show the adverse risk of HIV and ART on bone health. Studies from Botswana in persons using pre-exposure prophylaxis and in healthy Malawian men on ART for at least one-year found a lower BMD in men than women. In Nigeria, the prevalence of osteoporosis was 31.9% in PLWHIV compared to 9.3% in HIV negative persons.

In Kenya, a higher prevalence of osteoporosis, was observed in PLWHIV on ART (56.5%) compared to ART naïve PLWHIV (32.6%). In pre-menopausal South African women with HIV, significant bone loss (2 - 3% annually), exceeding post-menopausal losses, has been reported. A recent study in a rural South African community, confirmed HIV infection was strongly associated with osteoporosis with 19.4% of women and 8.4% of men aged over 50 years having osteoporosis.

Given that the vast proportion of women living with HIV, who will be transitioning through menopause live in Africa, one needs to consider the additional burden that low oestrogen levels will place on an already compromised bone. Health care policy makers need to urgently implement cost-effective screening pro-

grams for osteoporosis for aging PLWHIV, and further research on bone health in PLWHIV in Africa is needed to fully understand the disease burden.

## NSS29

### FRACTURE RISK CENTRIC APPROACH FOR THE MANAGEMENT OF OSTEOPOROSIS

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**Background:** Osteoporosis is a condition associated with fragility fractures of the hip, vertebrae, forearm and humerus. Fractures caused by osteoporosis affects about one in two women and one in five men aged over 50 in western countries, resulting in increased morbidity, mortality and a high annual cost in health services. In Africa, especially in sub saharan Africa, the burden of osteoporosis and its related consequences is predicted to increase. Globally, clinical osteoporosis risk and fracture risk include modifiable and non-modifiable factors, depending or not on bone mineral density. Fracture risk assessment is a high priority for the management of osteoporosis.

**Aim:** To highlight the fracture risk centric approach for the management of osteoporosis.

**Methods:** Literature review, considering pubmed, google scholar search of articles focus on osteoporosis, fracture risk and management.

**Result:** Fracture risk include clinical risk factors (age, body mass index, previous fragility fracture, premature menopause, family history of hip fracture, current smoking, rheumatoid arthritis, glucocorticoids treatment, secondary osteoporosis and heavy alcohol consumption) and bone mineral density. The FRAX tool recommended by WHO calculates the absolute 10-year risk of major fractures. In elderly, fractures risk is multifactorial including risk factors for falling. A distinction between osteoporosis risk factors and those for falling should be made in identifying elderly with fracture risk.

**Conclusion:** Fracture risk centric approach for the management of osteoporosis especially in the elderly should be promoted.

## NSS30

### DXA SCANNING IN CLINICAL PRACTICE

A. El Maghraoui<sup>1</sup>

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Dual-energy x-ray absorptiometry (DXA) is recognized as the reference method to measure bone mineral density (BMD) with acceptable accuracy errors and good precision and reproducibility. The World Health Organization (WHO) has established DXA as the best densitometric technique for assessing BMD in post-menopausal women and based the definition of osteoporosis on its results. DXA allows accurate diagnosis of osteoporosis, estimation of fracture risk, and monitoring of patients undergoing treatment. However, when DXA studies are performed or analyzed incorrectly, it can lead to major mistakes in diagnosis and therapy. We will review the fundamentals of positioning, scan analysis, and interpretation of DXA in clinical practice.

## NSS31

### PHYSICAL ACTIVITY IN THE MANAGEMENT OF OSTEOPOROSIS: CAN WE PREVENT FRACTURES?

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**Background:** Better physical activity (PA) in the elderly lowers the possibility of falls and fractures and programs of physical exercise is important in the treatment of osteoporosis and its complications. However, data about the effect of different types and combinations of PA in osteoporotic fractures prevention are controversial.

**Objective:** The aim was to evaluate the current evidence about the effectiveness of different types and regimes of PA for osteoporotic fractures prevention in the older age subjects based on literature review and own clinical data.

**Material and Methods:** The systematic literature search was conducted using the PubMed, Scopus, Web of Science, and Google Scholar databases from 2011 to December 2021 with the search words "physical activity", "fracture", "osteoporosis", "exercise", "fall". The results included data from systematic reviews and meta-analyses, randomized and non-randomized clinical studies. It was found 43 scientific references focused on the studied topic.

**Results:** The current evidence demonstrates insufficient data about the PA influence on fracture risk reduction. Cochrane reviews devoted to the role of exercise for fractures (2011) and falls prevention in older people (2019) demonstrated unclear or high risk of bias for one or more items for most trials.

On the one hand, it was not demonstrated a significant effect of different PAs for fracture prevention in postmenopausal women despite the more reliable effect of some of them on hip and spine BMDs. On the other hand, it was shown that effective exercise programs for fall prevention primarily involved balance and functional exercises significantly reduce fall-related fractures and less evidence there is about the effect of multiple exercise programs that additionally include resistance exercises. Also, it was confirmed the reliable effect of Tai Chi in fall prevention and less information about dance, or walking on the rate of falls and fall-related fractures.

**Conclusion:** Multi-modal exercise training is preferred for fracture prevention, as data about the effect of various types of PAs on BMD and fracture or fall risk is not the same. Any exercise prescription designed for fractures prevention must be tailored with a combination of weight-bearing, progressive resistance training to each individual's needs and preferences to optimize adherence.

## NSS32

### PHYSICAL EXERCISES IN PATIENTS WITH VERTEBRAL FRACTURES

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Different types of physical exercises (PE) are widely used in the rehabilitation of patients with osteoporosis (OP) and its complications. PE demonstrates sufficient efficiency and compliance; however, data on its benefits in patients with vertebral fractures (VF) are insufficient. Many authors recommend the dozens of combinations with differing types of exercises (like weight-bearing, balancing, and others) and various duration of the physical rehabilitation programs, however, there is no clear recommendation about the PE depending on the intensity of vertebral pain, quantity, and localization of VF.

Based on our previous research, we created programs of PE for postmenopausal women of different ages with OP and VF in different post-fracture periods.

The development of the PE program consisted of 3 stages: I – gentle range of motion (approximately 1 month), II – complex of gentle and training range of motion (2-4 months), III – training range of motion (5-7 months). Before starting therapy, in general, 1.5-2 months after VF, due to baseline status assessment and monitoring the effectiveness of therapy, we recommend conducting functional testing (SPPB and tests that characterize the mobility of the spine (Tomayer, Schober, Otto tests), assessment of the severity of pain, age of the patient, the presence of comorbidities and the number and localization of VF.

The programs include a combination of strength and weight-bearing exercises, PE for improving coordination, different by the quantity, number of exercises, and number of repetitions, strength, and intensity. The duration of exercise is at least 30-40 minutes per day, 5-7 days a week, and their intensity depends on the stage of mode, age, and severity of pain. We recommend to conduct the first (1-3) classes under the supervision of a physical therapist. In the future, the patient can perform a set of PE at home with the help of previously recorded videos of this complex or use printed material.

The advantages of the program of PE are the simplicity of training with possible online support of physical therapists, without any need of using special equipment at home. Performed in our center 7 months clinical study aimed at the effectiveness and safety of a PE program showed a reduction in pain, increased functional activity, and improved quality of life in patients with VF.

## NSS33

### DEVICES IN THE MANAGEMENT OF PATIENTS WITH VERTEBRAL FRACTURES

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Osteoporotic vertebral fractures are associated with back pain, reduction of patient mobility, and deterioration of life quality. Current strategies of conservative management for osteoporotic vertebral fractures include pharmacological treatment for prevention of future fractures and nonpharmacological measures, in particular, multifarious orthoses to immobilize the fracture site and diminish pain and different devices to improve mobility like canes, walkers, etc. However, data about devices in these patients is controversial.

The **aim** is to evaluate the effectiveness, safety, and compliance of devices in the management of patients with vertebral fractures based on literature review and clinical cases data.

**Methods:** We conducted a systematic literature search using the databases of PubMed, Google Scholar, World cat from 2010 to December 2021.

**Results:** Most studies had shown the benefits of using orthosis to reduce pain and kyphosis as well as decrease the bed rest periods. However, the debate over the type of braces for these patients continues. Currently, there are 3 options: rigid brace, soft brace, and brace with hyperextension functional. Each of them has some advantages and disadvantages. A rigid orthosis provides good fixation, prevents the progression of kyphosis, but the compliance may be poor. A soft orthosis is better tolerated by patients, and its impact on the progression of kyphosis is not worse

than a rigid one and is therefore preferred. Orthosis with hyperextension may improve trunk muscle strength, so they are preferred for the elderly with multiple vertebral deformities.

Patients with osteoporotic fractures have an increased risk of falls. The use of additional support devices, such as canes or walkers, may be helpful for patients with a high risk of falls, due to improving the balance of patients, preventing falls, lowering the pressure from the back, and reducing the pain. In general, canes can support up to 25% of the patient's weight, at the same time some kinds of walkers can support up to 50%.

**Conclusion:** Orthopedics devices are important in the management of acute osteoporotic vertebral fractures. As a result, it is improved biomechanical vertebral stability, reduced kyphotic deformity of the spine, enhanced postural stability, enlarged muscular strength, and increased functional outcomes.

## NSS34

### ASSESSMENT OF OLDER ACUTE HIP FRACTURE PATIENTS: FROM THE VIEW OF GERIATRICIANS

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**Objectives:** Hip fractures are important causes of disability and mortality in older adults. The orthogeriatric assessment proved beneficial while it is limited in many developing countries. Herein, we aimed to report the results derived from the first two orthogeriatric assessment centers in Turkey.

**Material and Methods:** 103 older adults underwent geriatric assessment in the study period (November 2018-September 2020). We noted demographics, geriatric syndromes identified by a comprehensive geriatric assessment, laboratory parameters on admission, and mortality in the hospital. Descriptive statistics were generated for all study variables. Numerical variables were given as mean±standard deviation, and relative frequencies were given for categorical (qualitative) variables. Also, continuous data were given as a median, interquartile range (IQR) as appropriate.

**Results:** Mean age was 81.2±7.8 (range: 63-95), and 65% were female. While 58.3% of the patients were widowed, 4.9% were single. 22.3% were living alone. 35% were uneducated. 8.7% were smokers, 3.9% had reported using alcohol regularly. The mean time to preoperative evaluation of hip fracture patients by the geriatrician was 3.99±3.80 [median=3; interquartile range (IQR)=3] days. 79.7% were either frail or prefrail (58.3%, frail; 21.4%, prefrail) before admission to the hospital. Before the hospitalization, 50.5% were undernourished [10.7%, malnutrition (MN); 39.8%, malnutrition risk (MNR)]. This rate became 73.8% during the ear-

ly days of hospitalization (median=3 days, IQR=3) (28.2%, MN; 45.6%, MNR, respectively). 54.4% of the patients had a previous complaint of urinary incontinence before admission to the hospital; the most common (46.4%) incontinence type was urge incontinence. 44.7% of the patients reported having difficulty in falling asleep and/or maintaining sleep. 23.3% of the patients had positive screening test (Patient Health Questionnaire, PHQ-2) for depression. Delirium was screened positive in 28.2% of the patients on admission. 25.2% had reported severe pain before operation. 90% had at least one chronic disease, and 53.4% had polypharmacy. 37.9% of the patients had orthostatism symptoms before admission to the hospital. Most of the patients had some degree of dependency before admission. The scores of activities of daily living and instrumental activities of daily living were as follows: median=6, IQR=2, and median=3, IQR=8, respectively. 50.5% of the patients had a fear of falling, and the prevalence of falls in the last year was 36.9%. Among them, 21.4% had recurrent falls, and 15.5% had a history of one fall before the fall that caused the hip fracture. Hip fractures occurred due to falling at home in 77.7% of the patients, falling outside in 16.5%, and falling in a nursing home in 1.9%. 22.3% of the patients reported a previous fragility fracture, and 17.3% of the patients who reported a previous fragility fracture had recurrent fractures. Only 21.7% of the patients with fragility fractures had received treatment for osteoporosis. 36% of the patients used vitamin D, and 20.4% used calcium before the hip fracture. The values of c-reactive protein, hemoglobin, albumin, creatinine, and CKD-EPI at admission were as follows: median=40.5 mg/L, IQR=95.3; 11.2±1.96 g/dL; 3.5±0.5 g/dL; median=0.84 mg/dL, IQR=0.54; and median=68.8, IQR=38.5. Spinal anesthesia was applied in 76% of the patients. 7.1% of the patients died before surgery, and 4.3% died after operation during hospitalization.

**Conclusion:** Our patients were older, mostly female, frail, and malnourished. Most of them were previously osteoporotic, but there was a lack of treatment for osteoporosis. In order to prevent fractures in the future, awareness of osteoporosis should be increased. A comprehensive orthogeriatric approach should be incorporated into these risky hip fracture patients to handle harmful consequences.

## NSS35

### THE ANALYSIS OF COSTS DERIVED FROM HIP FRACTURE HOSPITAL ATTENTION

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The hospital admission due to hip fracture is associated in older adults with a higher risk of perioperative adverse events, poorer functional recovery, and higher mortality rate. These worse outcomes are linked to comorbidity, frailty, and other geriatric syndromes. Likewise, these complications are potentially pre-



ventable, and their presence increases the costs of attention. Analyzing the costs of each complication can help to design efficient approaches to these situations.

Studies have reported that type 2 diabetes mellitus, dementia, delirium, and anemia are some of the most frequent comorbidities and perioperative complications associated with older adults with hip fractures. As well as these mentioned comorbidities and other ones such as heart failure, chronic obstructive pulmonary disease, and kidney disease increase the hospitalization cost. In the same way, delirium, cardiac events, anemia, urinary tract infection, and digestive events increased costs during hospital admission, too. Most previous comorbidities increase the risk of in-hospital adverse events, which ultimately influence the hospitalization cost.

The analysis of the main clinical characteristics and the indirect estimation of the complexity of the patients are and useful measurement to know the cost of the process. A simple calculation of the average cost of the attention and its adverse events can be designed in patients who are admitted due to hip fracture. Additionally, this tool can fit the welfare quality indicators by severity and cost.

Our studies showed that comorbidities and preventable adverse events increase the costs of attention and emphasize the need to create closer monitoring strategies for these patients in order to improve hospital care and reduce costs at the same time.

### NSS36

#### ORTHOGERIATRIC CARE IN TURKEY: FROM ORTHOPAEDIANS' VIEW

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In the Department of Orthopedics and Traumatology of the Istanbul Faculty of Medicine, approximately 20% of the weekly operations are geriatric hip fractures. These patients are followed up with a very careful protocol both preoperatively and postoperatively. After the diagnosis of hip fracture is made in the emergency orthopedic outpatient clinic, the patient is admitted to our ward to relieve pain as soon as possible and put her/him in a more stable position. First, we pay close attention to using air mattresses to prevent decubitus wounds, wearing a urinary catheter to control fluid intake and output, and wearing anti-thromboembolic stockings for mechanical prophylaxis. Afterward, considering the additional comorbidities of the patient, we begin to prepare for the surgery by asking the relevant polyclinics for consultation. If we thought that the patient had nutritional problems and was in delirium, we would definitely ask for consultation from the geriatrics outpatient clinic. However, after the exchange of ideas between geriatrics and orthopedics, care is taken to request a geriatric consultation from every hospitalized patient. When anesthesia

finds the patient suitable for surgery, we perform the necessary surgery in about 2-4 days. After that, the patient who stays in the intensive care unit for about a day is taken to the bed in the service. Then, the patient is mobilized with a walker by the surgical team performing the surgery according to the weight-bearing protocol appropriate for the fracture and operation types. In this way, the patient, who remains in the service for about four more days after the operation, is discharged if there is no wound problem and her general condition is good.

Our patients are called for outpatient follow-ups in the 1st, 3rd, and 6th weeks. In these polyclinic controls, union and mobilization of the patient are checked with the necessary x-rays. It is recommended to go to the geriatrics outpatient clinic for bone density measurement and necessary treatment, especially at the 3rd-week control. We pay particular attention to mobilization for patients who we think will have adequate union after the 6th week. For this, we also ask for consultation from the physical therapy and rehabilitation unit.

### NSS37

#### WHAT THE ORTHOPAEDIC SURGEON CAN DO TO AVOID MORBIDITY AND MORTALITY FOLLOWING AN OSTEOPOROTIC FRACTURE ?

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Older people with fragility fractures have the dual problem of FRAILITY and FRAGILITY. Thus, they require a special skill set that can be ensured through orthogeriatric co-management. The orthogeriatric team comprises many members, all of them important, but the orthopaedic surgeon is key for establishing the precise indication of management, for technically executing the surgery in a flawless manner, adapting the surgical technique to the particular characteristics of the osteoporotic bone and the increased demand on prompt rehabilitation of the frail patient in order to avoid the downward spiral of further deconditioning and dependence.

### NSS38

#### PRACTICAL ASPECTS IN THE RADIOGRAPHIC EVALUATION OF INFLAMMATORY AND DEGENERATIVE ARTHROPATHIES

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Conventional radiography is the most readily available imaging method for defining bone destruction, the extent of disease, and adjacent soft-tissue lesions of inflammatory and degenerative arthropathies. Furthermore, conventional radiography is an inexpensive, widely available and reproducible tool for assessing and monitoring structural damage and progression in osteoarthritis and inflammatory arthritis, with all its limitations regarding early disease. Conventional radiography remains the gold standard for the demonstration of erosive damage in patients with inflammatory arthritis, despite its poor sensitivity for the detection of active arthritis and generally late changes detection in the disease course.

Among the advantages of using the radiographic method it is worth to mention the coverage of a large area, with several joints possible to evaluate, in a single radiographic exposure. There are multiple advantages of digital conventional radiography: spatial resolution is higher and images can be recorded electronically, which allows teleradiology and picture archiving applications.

The presentation discusses the continuing advantages of conventional radiography in many clinical circumstances (osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis, gout) and acknowledges the circumstances in which computer tomography, magnetic resonance and ultrasound imaging are more useful modalities. The predilection for certain joints in the appearance of the first erosive lesions in inflammatory arthritis, the existence of destructions in clinically asymptomatic joint areas, similarities and discordances of structural damage, types of structural progression, destructive lesions of multiple causes, are some of the practical aspects that will be discussed.

There are several imitations of using conventional radiology for evaluation of inflammatory and degenerative arthropathies: projectional superimposition, inability to visualize cartilage and soft tissue inflammation, poor reliability for early diagnosis of arthritis, late detection of erosions, exposure to ionizing radiations. Other imaging tests may have advantages, such as providing better detail or being safer or faster.

### NSS39

#### ULTRASONOGRAPHY IN RHEUMATOLOGY: TRICKS AND TIPS

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Musculoskeletal ultrasound (US), a non-invasive imaging technique, has become increasingly used in recent years, in the evaluation of inflammatory, posttraumatic, and degenerative joint involving diseases, such as rheumatoid arthritis, spondyloarthropathies

but also osteoarthritis, or posttraumatic lesions, through the possibility of real-time evaluation of articular and periarticular structures, at relatively low costs compared to other imaging methods. More than this, the possibility to evaluate those structures in dynamics, during movements, significantly improves the results. Being a real-time technique, it also yields an excellent opportunity for patient education and to allows the possibility to explain the rationale for the therapy. However, besides those advantages, it also has some drawbacks, such as being highly dependent on the operator, or that there are no standardized diagnostic criteria for all diseases. The frequent artifacts that form when ultrasound passes through various interferences between two tissues can mislead an inexperienced examiner.

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### NSS40

#### MAGNETIC RESONANCE IMAGING (MRI) IN MUSCULOSKELETAL PATHOLOGY

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Magnetic resonance imaging (MRI) is a technique based on the application of a strong external magnetic field that will align all the protons of the examined structure. The alignment is disturbed by radiofrequency (RF) pulses and then the protons will align again with the magnetic field. This relaxation will produce the emission of MR signal that is influenced by the tissue properties and by the modulation of RF signal and it is used to generate MRI contrast and to construct an image. MRI provide excellent anatomical and functional details of various tissues including bone, cartilage, muscle, tendon, ligaments, fat and detect some early pathologic aspects long before other imaging techniques as conventional radiology. MRI is contraindicated in patients with pacemaker, metallic implants (ferromagnetic) or metallic foreign bodies, claustrophobia but has no ionizing radiation or malignancy risk and it is considered a very safe technique. In the last decades MRI was widely used in the musculoskeletal pathology from spinal and discal problems, internal derangement of the knee, rotator cuff problems, avascular necrosis, osteomyelitis, tumors, osteoarthritis, synovitis, tenosynovitis, sacroiliitis and it is and

gold standard or at least an established modality of choice for the assessment of the musculoskeletal system. This presentation will highlight some useful information for the clinicians for using MRI and understanding its results.

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### NSS41

#### MOLECULAR IMAGING IN RHEUMATOLOGY: THE "NEW KID ON THE BLOCK"

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Molecular imaging techniques are non-invasive imaging techniques that have high sensitivity and can be very specific for the tissue they examine. This specificity is due to the use of substances called tracers that can be very target (read "tissue") specific. Some of them can also provide *in vivo* assessment of molecular interactions. Due to all their characteristics, molecular imaging techniques can be used in Rheumatology both for early diagnosis and monitoring response to therapy. And, since being early in diagnosing disease as well as being able to promptly change treatment as quick as necessary, are probably the most important requirements in inflammatory rheumatic diseases, molecular imaging techniques can prove to be particularly useful in Rheumatology. This talk will focus on what are their functioning principles and their most important uses in this field.

### NSS42

#### TRAINING EDUCATION TO IMPROVE HEALTHCARE PROFESSIONALS KNOWLEDGE AND SKILLS FOR PREVENTION AND QUALITY MANAGEMENT OF OSTEOPOROSIS - AN EXPERIMENTAL STUDY

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An experienced, dedicated healthcare professional with competency in caring for people with osteoporosis and other chronic musculoskeletal diseases is imperative to ensure the highest quality of care for patients. The training education of healthcare professionals in low-resource settings aims at the creation of a workforce equipped with management and prevention skills that support a culture of ongoing education, training, practice, and professional development. An experimental study was conducted to assess the role of education training among healthcare professionals in fostering knowledge and skills for the prevention and quality management of osteoporosis. The study sample, composed of 42 participants, was intentional as it involved all health care professionals (nurses, midwives, and primary healthcare nurses) registered for participation in educational sessions. An assessment of knowledge and skills was performed at the beginning and after the training. A questionnaire based on the training education curriculum material was used to measure impact. The training session lasted 6 hours. After the training, the participants' knowledge of osteoporosis was significantly improved in terms of defining the disease and its types of prevention. Participants also had a significant improvement in knowledge about foods and types of physical activity recommended for prevention and good disease management. The major impact of education was on the importance that health professionals have in preventing and managing osteoporosis and the recognition of screening instruments. In the initial assessment before the start of the training, 30 participants reported that they had no knowledge of any instrument, versus 38 after the training who knew more than 2 instruments,  $p \leq 0.05$ . Lifelong learning and training education are essential elements of practice and service for health professionals in the prevention, early recognition, continuum care, and proper referral of osteoporosis.

**Keywords:** Training education, healthcare professionals, osteoporosis, knowledge, skills, prevention, management.

### NSS43

#### ENCOURAGING THE PROMOTION OF MUSCULOSKELETAL TRAINING AMONG HEALTHCARE PROFESSIONALS AS A COST-EFFECTIVE METHOD FOR THE PREVENTION AND MANAGEMENT OF MUSCULOSKELETAL DISEASES

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Osteoporosis is a skeletal disease that causes a weakening of the bones, resulting in an increased risk of fractures of the spine, femur, and wrist even with simple falls. It particularly affects women, especially after menopause.

It has long been proven that regular physical activity and proper nutrition (education for the prevention of osteoporosis) are essential both for improving muscle mass and for preventing and combating bone fragility. Numerous studies have shown that those who carry out correct and constant physical activity increase the values of bone mineral density to a greater extent than sedentary people. This is due to the fact that muscle contractions and the stresses of the tendons on the bones stimulate bone remodeling in a positive way. In light of the epidemiological data reported and the results of many randomized studies, it appears evident to strengthen the programs aimed at its prevention among health professionals, especially women, who represent the group most at risk and most sensitive to the problem. The prevention of skeletal fragility, typical osteoporosis, and related fractures can be done at three levels:

- Primary includes all measures taken at the level of the general population without which the risk of the individual subject is analyzed. Typical recommendations concern a balanced diet, regular physical activity, smoking cessation, and abstention from alcohol;
- Secondary goals include early disease detection through the use of equipment or algorithms capable of estimating the risk of fracture.
- Tertiary care is aimed at patients who have already suffered a fracture and have therefore manifested clinically the signs of skeletal fragility.

**Keywords:** musculoskeletal training, cost-effective method, prevention, management, musculoskeletal diseases.

## NSS44

### EVALUATION OF CONTINUING EDUCATION FOR HEALTH CARE PROFESSIONALS RELATED TO MUSCULOSKELETAL DISEASES AND OSTEOPOROSIS DURING THE COVID-19 PANDEMIC PERIOD

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Ongoing education for health care professionals is essential to the continued delivery of care to communities, facilitating expanded access to the right to health. Evaluation of continuing education for healthcare professionals related to osteoporosis and musculoskeletal diseases during the COVID-19 pandemic period. This is a descriptive study, conducted during the period January 8–10, 2021, on the nursing staff of the city of Vlore, through an online questionnaire which was distributed through social networks. The study involved 60 nurses, of whom 83% were female and 17% male, 42% of the age group 31–40 years and 35% aged 23–30 years, 43% with a masters degree, and 22% of them worked

in centers of health in the city, 13% in surgery, 10% in emergency, 8% in ORL, and 8% in obstetrics. The study found that 86.7% of healthcare professionals did not participate in any training related to osteoporosis during 2019–2020. Also, 90% of professionals have not participated in any training related to musculoskeletal diseases during the years 2019–2020. The study showed that 53.3% of professionals did not suffer from osteoporosis or musculoskeletal diseases, 18.3% of professionals suffered from osteoporosis and musculoskeletal diseases, and 8.3% of professionals had not had any examination or control for osteoporosis and musculoskeletal diseases. From the results of the study, it was noticed that 61.7% of professionals perceive that community health education related to musculoskeletal diseases is not part of their work, compared to 38.3% who have community health education as part of their work. Some of the advice that health professionals provide to the community about musculoskeletal disorders is: a) a healthy diet, physical activity, and regular check-ups, particularly after the age of 40; b) increased consumption of calcium and vitamin D; c) early disease detection and treatment without reaching lesions that may require intervention; d) perform examinations as needed, and consult a specialist as soon as the first symptoms appear.

**Keywords:** evaluation, continuing education, healthcare professionals, musculoskeletal diseases, osteoporosis, COVID-19, pandemic period.

## NSS45

### ASSESSING THE NEEDS OF NURSING STAFF FOR TRAINING RELATED TO OSTEOPOROSIS AND MUSCULOSKELETAL DISEASES

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Continuing education is very important for increasing knowledge and improving the skills of nursing staff in order to increase the quality of service delivery and maintain their accreditation as professionals. The purpose was to assess the needs of nursing staff for training related to osteoporosis and musculoskeletal diseases. This is an analytical exploratory study, conducted in January 2021, on the nursing staff of the city of Vlore, through an online questionnaire that was distributed through social media. 60 nurses participated in the study, of which 83% were female and 17% were male. 42% were in the age group 31–40 years and 35% in the age group 23–30 years. 43% had a masters degree. 22% of them worked in healthcare centers in the city; 13% in surgery service, 10% in emergency service, and 8% in obstetrics. 77% and 78% did not attend any training related to osteoporosis and musculoskeletal diseases during the years 2018–2019. 98% of nursing staff are interested in attending any training related to osteoporosis and musculoskeletal diseases. Concerning age and participation

in training, there is greater participation in the training of young nurses in the 23–30 age group. For self-care, a negative asymmetry is noted (skewness = -0.8) with a central value and dispersion of  $71.4 \pm 18.4$ . Regarding nursing gender and self-care, we observed an average and high level of self-care for both genders, and also regarding the participation of nursing staff in training and self-care, we observed an average and high level of self-care for both trained and untrained nurses.

**Keywords:** nurse, continuing education, training, osteoporosis, musculoskeletal diseases, self-care.

## NSS46

### LIMITATION OF HUMAN MOBILITY DUE TO PANDEMICS. FROM ANCIENT TIMES TO THE SARS-COV-2 VIRUS ERA

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From the first historically known pandemic, which appeared in Athens in 430 BC and has been described by Thucydides in his second book of "Histories", until the appearance of the COVID-19 pandemic in December 2019, pandemics appear in the route of history as multifaceted crises which destabilize the social and political status quo. The relaxation of social and political bonds brought about by the collective threat, which is made apparent in the massive number of deaths and the suspension of social and financial activities, has multiple effects. The pandemics since ancient years affected human mobility. Hippocrates suggested to the ancient Athenians to limit their mobility so as to contain the effects of the Athenian pandemic. The modern COVID-19 pandemic has deeply affected human mobility. It affected mobility at the level of the individual, at the level of the city, at national level as well as international level. The effects on human mobility have multiple health consequences. Limitation of human mobility affects musculoskeletal and cardiovascular health and has psychological and, in some cases, psychiatric effects. People need counseling and support at all levels to overcome these multiple adverse effects of limited mobility.

## NSS47

### COVID-19 AND POST-COVID. THE ROLE OF INFLAMMATION AND MUSCULOSKELETAL MANIFESTATIONS

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The clinical presentation of COVID-19 infection ranges from absence or minimal symptoms to severe pneumonia. Fever, dry cough and fatigue are the commonest symptoms. Myalgia and arthralgia are also present. COVID-19 infection induces immune activation and a hyperinflammatory reaction. Musculoskeletal symptoms are related to increased inflammatory indices and increased inflammatory cytokines. Patients with severe COVID-19 disease who survive and are discharged from the acute care unit may present with severe sarcopenia. Sarcopenia following severe COVID-19 infection necessitates rehabilitation. Rehabilitation following severe COVID-19 infection may improve sarcopenia and other musculoskeletal manifestations. Some of the COVID-19 patients following recovery develop long-term symptoms, which are collectively called post-COVID syndrome. Musculoskeletal manifestations are a main clinical finding of the post-COVID syndrome. Such manifestations include arthralgias, myalgias along with sarcopenia. The SARS-CoV-2 virus is known to be associated with autoimmunity. The development of systemic autoimmune inflammatory disease may be related to the SARS-CoV-2 infection and in this context musculoskeletal manifestations such as arthritis, arthralgias and myalgias. In conclusion, musculoskeletal manifestations may be observed in acute COVID-19 infection, following discharge from the acute care unit and in post-COVID syndrome.

## NSS48

### COVID-19, POST-COVID. MOBILITY PROBLEMS

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The pandemic which was caused by the SARS-CoV-2 virus has spread all over the world and has dramatically changed the behavior of the individuals. Consequently, the mobility of the population has changed at individual, social, national and international level. Mobility limitations have affected the health of the population. Musculoskeletal and cardiovascular are the main health problems related to mobility limitations caused by the pandemic. Arthralgias, myalgias, arthritis and sarcopenia are the main findings encountered. In patients discharged from the intensive



care unit sarcopenia may be a major problem. Many patients are deeply affected and may need to learn to walk again. These patients are in need of long-term rehabilitation in order to recover full functionality. Musculoskeletal manifestations require physical rehabilitation treatment. In particular, sarcopenia, arthralgias, myalgias and arthritis may be treated successfully by rehabilitation and physical therapy.

## NSS49

### COVID-19, POST-COVID. ANTI-INFLAMMATORY THERAPEUTIC INTERVENTIONS

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The SARS-CoV-2 infection runs a variable course. It may run as an asymptomatic or oligosymptomatic disease or may cause severe pneumonia. In cases of severe disease a hyperinflammatory reaction which causes release of cytokines, known as cytokine storm may take place, which may lead to death. The cytokine storm may be responsible for fatal outcome and should be prevented or managed therapeutically. For this purpose various anti-inflammatory agents have been applied therapeutically. Dexamethasone is used for the treatment of severe COVID-19 infection and improves outcome. Anakinra, a recombinant interleukin-1 receptor antagonist, a biologic agent which was initially introduced for the management of rheumatoid arthritis is also applied in the treatment of severe COVID-19 infection. Anakinra has been approved and has been applied successfully in the treatment of severe COVID-19 infection and has been shown to improve outcome. Tocilizumab, an antibody against IL-6 receptor, has also been used for the treatment of severe COVID-19 infection and has favorable effects. Tocilizumab has been approved by WHO for the treatment of severe SARS-CoV-2 infection. Baricitinib, a Janus kinase inhibitor is also used for the treatment of severe COVID-19 infection. In conclusion, the cytokine storm observed during severe COVID-19 infection may be responsible for adverse outcome. The hyperinflammatory reaction during severe SARS-CoV-2 infection should be managed therapeutically by various agents, such as dexamethasone, anakinra, tocilizumab and baricitinib. The therapeutic application of these agents improves outcome in severe SARS-CoV-2 infection.

## NSS50

### WHAT ARE THE EFFECTS OF COVID-19 ON SKELETAL MUSCLE ?

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**Introduction:** Myalgia is one of the common early symptoms of COVID-19 infection with a prevalence of 35.8% (range 11 to 50%). There are also reports of myositis and rhabdomyolysis secondary to COVID-19 disease. It has been reported that COVID-19 patients with more severe infection had a higher prevalence of skeletal muscle injury with myalgia and elevated serum creatine kinase levels compared with those with non-severe infection. The duration of myalgia also depends primarily on disease severity. Imaging data from hospitalized patients showed that myalgia on admission is associated with abnormal imaging of the lung, and it predicts poor prognosis, especially in elderly.

The long-term health consequences of COVID-19 remain largely unclear. According to a cohort study looking for the 6-month consequences of COVID-19 in patients discharged from hospital, fatigue / muscle weakness (63%) and sleep difficulties (26%) were the most common symptoms. Therefore, muscle involvement is very important both during the acute and the chronic phase of the disease.

**Possible mechanism of muscle damage:** The mechanism of myositis in COVID-19 infection is not fully understood. Skeletal muscles and other cells in the muscles like satellite cells, leukocytes, fibroblasts, and endothelial cells express ACE-2. Therefore, it is postulated that skeletal muscles are susceptible to direct muscle invasion by SARSCoV-2. Animal studies suggest that children are more likely to get affected due to their immature muscle cells. Other possible mechanisms suggested are immune complex deposition in muscles, release of myotoxic cytokines, damage due to homology between viral antigens and human muscle cells, and adsorption of viral protein on muscle membranes leading to expression of viral antigens on myocyte surface. Whether these postulated mechanisms for COVID-19-related myositis are also responsible for myalgia is also not known. Given the limited evidence, further investigation is required to elucidate whether skeletal muscle injury in COVID-19 is attributed to direct virus invasion through ACE2 or just secondary to systemic inflammation.

**Options against muscle damage:** Malnutrition is a possible cause of immunological and muscular dysfunction in COVID-19. Hence, muscle damage in vulnerable COVID-19 patients may be minimized by suitable nutritional support: oral intake of protein-rich food/dietary supplements or volume-controlled higherprotein enteral formula according to patients' status. Also, clinical evidence shows that COVID-19 patients receiving L-Glutamine exhibited shorter hospital stay, fewer ICU admissions, and lower mortality than non-supplemented patients. Therefore, the effect of protein and amino acid supplementation on myopathy in COVID-19 may be very important, albeit further investigations are necessary to



test this hypothesis. Vitamin D intake promotes immunity and muscle protein synthesis. Neuromuscular electrical stimulation—inducing muscle contraction by applying small electrical impulses—is suggested to be used to maintain muscular blood flow, reduce muscle atrophy, and improve muscle strength in ICU-admitted COVID-19 patients.

As a **conclusion**, muscle injury is common in Covid-19 patients. Muscle injury is likely to be attributed to the cytokine storm, disease severity, malnutrition, prolonged physical inactivity and myotoxic drugs. Considerable attention to longer-term consequences of muscle injury in recovering Covid-19 patients is necessary.

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## NSS51

### DOES COVID-19 HAVE AN IMPACT ON BONE AND JOINT?

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**Introduction:** Patients with SARS infections have indicated a significant musculoskeletal burden of this disease, such as skeletal muscle, neurological, bone, and joint disorders. It is stated that, in addition to directly infecting cells outside the respiratory tract, the inflammatory response in the airway can also lead to systemic inflammation, which can affect almost any organ system, including the musculoskeletal system. Unfortunately less is known about bone and joint in COVID-19 patients than about skeletal muscle disorders.

**Bone involvement:** Decreased bone mineral density has been reported in SARS patients. Of the cytokines known to be induced as a result of COVID-19, CXCL10, IL-17, and TNF- $\alpha$  have been implicated in inducing osteoclastogenesis and reducing osteoblast proliferation and differentiation and this leads to a decrease in bone mineral density. SARS-CoV-2 enters cells using ACE 2, a receptor found in many tissue types, including synovial tissue and cartilage, and provides viral replication. As is known, ACE2 has many functions, in particular, anti-inflammatory properties and

prevention of bone resorption. It is believed that when SARS-CoV-2 uses the ACE2 receptor to enter cells and blocks receptor function, it leads to a decrease in bone mass and inflammation of the joints. It can lead to apoptosis of virally infected cells and further local inflammation. If the ventilator duration is prolonged in ventilator-treated COVID-19 patients, this may cause pro-inflammatory signals, decrease in bone mineral density, and cause bone fragility. Patients who had higher or longer doses of corticosteroids can also have an elevated risk of developing osteonecrosis. The combination of hypercoagulability, leukocyte aggregation and vascular inflammation can disrupt the microvascular blood flow in the bone and may play a role in the development of osteonecrosis. Osteonecrosis has been frequently reported in patients with severe SARS and most of these cases were related to the femoral head, humeral head, talus, calcaneus, and other anatomical sites.

**Joint involvement:** Arthralgias are usually reported in patients with COVID-19, but are often combined with myalgias, which makes it difficult to specifically identify the prevalence of arthralgia. It is reported that, IL-1 $\beta$ , IL-6 and TNF- $\alpha$  can lead to chondrolysis, which in some patients can lead to arthralgia or progression of osteoarthritis. In general, arthralgia is more common in coronavirus cases than clinical arthritis. Only a few cases of acute clinical arthritis secondary to COVID-19 have been reported, some of which show characteristics suggestive of reactive arthritis or crystal arthritis rather than viral arthritis. Clinically, virus-induced arthritis can be difficult to confirm and this situation emphasizes the importance of detailed evaluation of patients in order to exclude other causes of arthropathy. Signs suggestive of viral arthritis include the onset of arthralgia within a few weeks of viral infection, a self-limiting course, and a good response to NSAIDs. For the differential diagnosis it is recommended to perform serological tests and/or synovial analysis to exclude other potential etiologies and other secondary arthropathies. In the literature, systemic lupus erythematosus, dermatomyositis, Graves' disease, rheumatoid arthritis and psoriatic spondylarthritis, including SARS-CoV-2-induced chronic rheumatologic diseases have been reported. Inflammatory arthropathies can be triggered by SARSCoV-2 even in patients with mild or no respiratory symptoms with acute viral infection. Correlation with the COVID-19 test is required to establish this relationship in clinical practice.

## NSS52

### MANAGEMENT OF MUSCULOSKELETAL CONSEQUENCES IN PERSONS WITH POST-COVID-19 SYNDROME

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Musculoskeletal system symptoms and signs are reported to be common (over 15%) among patients with post-acute/long COVID-19 syndrome. Common signs and symptoms include fatigue,

muscle weakness, arthralgia, myalgia, back pain and discomfort, numbness, sarcopenia, and walking difficulty. Although the exact mechanisms underlying the effects of COVID-19 on musculoskeletal system are not fully understood, it is thought that various factors such as systemic inflammation, neuromuscular involvement due to post-intensive care syndrome (PICS), and musculoskeletal sequelae of COVID treatment might have a role. Rehabilitation programs can be beneficial for patients with persistent musculoskeletal complaints recovering from COVID-19 infection. Post COVID-19 medical sequelae should be considered in all patients and relevant evaluation should be performed in post-COVID clinics. This evaluation is suggested to be performed at least 4 weeks after initial recovery to determine an individualized care plan. Rehabilitation needs of patients should be identified following a detailed functional assessment preferably by a rehabilitation physician.

Patients with PICS may present with muscle weakness, deconditioning, myopathies and neuropathies which are the physical domains of this syndrome. In order to prevent PICS, it is recommended that appropriate rehabilitation interventions including early passive and active mobilization, posture and breathing management, and swallowing exercises should be started in the intensive care unit as soon as clinical stability is reached and inclusion criteria are met. Patients sedated or with cognitive impairment should undergo passive mobilization with manual techniques and neuromuscular electrical stimulation to prevent muscle mass loss and joint deformity.

In the post-acute period, patients presenting with PICS or severe COVID-19 should have a multidisciplinary team approach for rehabilitation and receive rehabilitation interventions focusing on not only physical but psychological and cognitive domains also. Integrated and customized rehabilitation programmes encompassing musculoskeletal and pulmonary training as well as psychosocial support will be helpful for patients to return to pre-COVID-19 functioning levels. Non-hospitalised or mild COVID-19 patients with long COVID-19 may also require physical rehabilitation for the management of common symptoms such as fatigue or dyspnea, and improvement of activities of daily living including work participation. A multi-component, structured exercise programme including progressive aerobic training combined with resistance and balance training is recommended in post-acute stage. Rehabilitation treatment for post-acute COVID-19 patients can be provided as inpatient, outpatient, home-based or telerehabilitation services. Individualised self-management strategies and telerehabilitation could be valuable in the long-term. As the prevalence of malnutrition is reported to be common among COVID-19 patients, nutritional optimisation and counselling may also lead to more rapid improvement in functional performance.

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## NSS53

### PAIN, BRAIN AND BIOMECHANICS

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The perception of pain is a conscious process, and therapy is impossible without a comprehensive assessment of the activity of the body and brain. However, despite its high prevalence the nature chronic musculoskeletal pain is not yet well understanding. Its mechanism remains complex included biological, psychological and social factors. Some anatomical structures and their biomechanical characters are all suspects of forming the causes of the non-specific chronic pain. Researches are constantly attempting to search new approaches for understanding mechanism of chronic pain. Obviously, we need to exam the human biomechanical status deeply for create modern methods of treatment.

## NSS54

**PATIENT WITH THE PAIN. WHY SOMETIMES WE FAIL?**O. Kurushina<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

Pain is a complex experience that cannot be unambiguously perceived by the patient and easily diagnosed by the doctor. It is one of the most striking examples of the role of psycho-emotional disorders in the formation of chronic pathological syndromes. The report will present the main pathogenetic mechanisms of acute and chronic pain syndromes, the role of social status and models of doctor-patient interaction. Approaches to the treatment and prevention of chronic back pain will be demonstrated using cognitive-behavioral psychotherapy. The proposed diagnostic and therapeutic algorithms may be useful to doctors of various specialties in the management of patients with pain.

## NSS55

**BIOKINEMATIC — A NEW APPROACH TO BACK PAIN RELIEF**B. Kalinchenko<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

The purpose of the report is to present the modern methods for diagnosing disorders of the biomechanics of the musculoskeletal system in patients with myofascial pain. The effectiveness and possibility of using the developed methods of visual diagnostics in neurological patients with myofascial pain syndrome will be presented. The report will present the possibilities of using the biofeedback technique for myofascial pain.

## NSS56

**PAIN MANAGEMENT: NON-PHARMACOLOGICAL APPROACHES**A. Drushlyakova<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

Currently, pain is the most common symptom faced by doctors of various specialties. At the same time, there are many risk factors including incorrectly selected medications that can lead to chronic pain. In the treatment of pain, it is advisable to use not only medication, but also non-pharmacological treatment to re-

duce and prevent the pain syndrome. It is especially important to choose methods of non-pharmacological treatment of musculoskeletal pain.

## NSS57

**ADHERENCE TO TREATMENT: WHY MONITORING MATTERS**W. F. Lems<sup>1</sup><sup>1</sup>Full Professor, Amsterdam Rheumatology and Immunology Centre (ARC), VU University Medical Center, Department of Rheumatology, Steering Committee Member, Capture the Fracture @, International Osteoporosis Foundation, Amsterdam, Netherlands

Osteoporosis is a common metabolic bone disorder, characterized by low bone mass and a deteriorated microarchitecture, leading to an increased risk for vertebral- and nonvertebral fragility fractures. The low bone mass and increased fracture risk can be easily and reliably diagnosed with DXA and VFA (1), and effective, relatively safe and inexpensive drugs are available. According to international guidelines, oral alendronate and risedronate are first choice, and for those who not tolerate it or with contra-indications, second line drugs are available, such as zoledronic acid, denosumab (all anti-resorptive drugs) and the anabolic drugs teriparatide, and, recently romosozumab.

Antiresorptive drugs are usually intentionally described for 5 years (zoledronic acid 3 years), based on RCTs in which fracture reductions were found of 50-70% for vertebral fractures and 20-40% for nonvertebral fractures.

A substantial decrease in the fracture risk reduction may result from not taking in the anti-osteoporotic medication adequately. For oral bisphosphonates, it has been found that around 50% of the patients have stopped their anti-osteoporotic drug treatment in the first year of an intentionally 5 years treatment period (2,3). For parenteral drugs (teriparatide, zoledronic acid and denosumab) it is somewhat better, but still far from optimal: around 40-55% of patients continued their anti-osteoporotic drug treatment for two years (4). Side effects, particularly upper gastro-intestinal side effects for oral bisphosphonates, and lack of awareness of the risk for future fractures are among the most important reasons for low adherence. This large-scale non-adherence may result in ineffective use of medication and fractures that could have been avoided: it has been suggested that the clinical benefits of oral bisphosphonates are 40-70% lower than expected and that the incremental cost-effectiveness ratio of anti-osteoporotic medication double. (5)

Interestingly, there are some recent data showing that the adherence to therapy 1 year after an index fracture was much higher, around 80-90% (6,7): this could be related to the pain and limitations of the recent fracture, and because of the selection that FLS

services are visited by recent fracture patients that are motivated to have a DXA/VFA and to start anti-osteoporotic drug treatment in case of a high fracture risk.

In the other lectures we will a) discuss the IOF-project "Capture the Fracture", and b) analyse and discuss the data on adherence to therapy at the FLS in the IOF "Capture the Fracture" project.

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6). Optimizing fracture prevention: the fracture liaison service, an observational study. Eekman D, et al *Osteoporos Int* 2014;25:701-9

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## NSS58

### FLS PATHWAY AND HOW THE BEST PRACTICE FRAMEWORK AND KEY PERFORMANCE INDICATORS ASSESS MONITORING

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There is a critical role for monitoring to ensure patients' recommended anti-osteoporosis medication (AOM), start treatment early and adhere to treatment to deliver the expected benefit of reducing fractures. However, patients are often transitioning between hospitals to the community or primary care-based settings. This represents a potential challenge to ensuring continuity of care. In the ideal scenario, patients would be monitored early after treatment recommendation to ensure early initiation of the AOM and then later to ensure adequate adherence. A series of criteria and performance indicators have been developed at the organisational and patient-level to facilitate local service improvement. At the organisational level, the International Osteoporosis Foundation Best Practice Framework includes, under standard 12, ques-

tions around long-term management. This includes the content, timings, method, and responsibility for re-evaluations for patients with hip fractures and other non-hip inpatients, outpatient and vertebral fracture patients (clinical and radiological). The results of these assessments are then combined with the other criteria to assign gold, silver, bronze or blue stars to an individual FLS.

At the patient level, key performance indicators (KPI) have been developed to measure critical aspects of the FLS pathway and compare them with agreed achievement levels. This permit data-driven approaches for service improvement to improve FLS effectiveness and efficiency. KPI 7 relates to the proportion of all patients recommended AOM who have a recorded monitoring visit within 16 weeks of the index fracture. KPI 8 relates to the proportion of all patients recommended AOM who have initiated an evidence-based strength and balance class within 16 weeks of the index fracture. KPI 9 relates to the proportion of all patients recommended AOM who have initiated an AOM within 16 weeks of the index fracture. KPI 10 relates to the proportion of all patients recommended AOM who are still on AOM 1 year after the index fracture. Methods for measuring adherence in the real-world setting are challenging, including patient self-report, prescription data, and clinical review.

## NSS59

### ANALYSIS OF MONITORING PRACTICES USING THE IOF BEST PRACTICE FRAMEWORK

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Despite robust evidence for the effectiveness of secondary fracture prevention, translation in the real-world setting remains disappointing. One key aspect is improving adherence through monitoring. There is little guidance for the optimal methods for monitoring. Our objective is to describe the current delivery of monitoring FLSs as a first step to inform a clinical best practice guide for monitoring patients in the FLS setting.

We used the International Osteoporosis Foundation (IOF) Capture the Fracture Best Practice Framework questionnaires from 460 FLSs across 48 countries. The questionnaire includes how FLSs were undertaking patient monitoring in their setting. The reported monitoring components were reported globally and by comparing concordance within a country.

Of the 461 FLSs surveyed, 88% reported a plan for evaluating adherence to treatment recommendations. Approximately 63% of FLSs used more than one method of monitoring. Just under 50% of FLSs deliver monitoring as part of their service, 10% used both the FLSs and specialty doctors, 21% by a specialty doctor alone, 8% by the GP and 8% by both the GP and specialty doctor. Fifty-nine per cent of FLSs monitored patients within six months of treatment recommendation, but FLSs also variably included monitoring at more than one time point, including 7-12 (38%) months, 13-24 (16%) months and a few also followed patients after more



than two years (10%). 272 (59%) FLSs monitored both before six months and 176 (38%), at 7-12 months in line with the international KPIs.

FLSs used different modalities to follow patients, including clinic review (69%), DEXA (43%), telephone interview (43%), prescription review (41%) and novel methods, for example, use of social media (WhatsApp or Facebook) or postal questionnaires (16%). In 24 countries, there were more than five or more responses within a country. When analysed within the country, we observed marked variability across all aspects of monitoring within some countries and similarities within other countries.

The variation in monitoring practices by FLSs globally highlights the need for best practice guidelines that can be applied globally.

## NSS60

### BALKAN PENINSULA -REGIONAL INITIATIVE

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The Balkan peninsula has the one of the oldest population in Europe. This translates into considerably higher osteoporosis (OP) rates and fractures and substantial economic burden for health systems. In this symposium, our objective would be to outline OP's current situation in older adults of the region and identify areas of improvement, set possible KPIs to achieve that and set clear call for actions to policy makers and our colleagues. We would identified the drivers to improve secondary fracture prevention like: (1) national osteoporotic fracture registry, even regional one, (2) regular dual-energy x-ray absorptiometry (DXA) staff education through accredited IOF courses organised in region, (3) setting standard to include vertebral fracture assessment for every patient sent for DXA exam, (4) fracture risk assessment tool (FRAX) algorithm specific to every country in the region and their introduction to the general practitioners routine and finally (5) including more "Fracture Liaison Services" in all levels of medical institutions, from primary to tertiary level with aim to include as much as possible patient with osteoporotic fractures. We believe that the joint call for action would have more influence on policy makers and our suggestions would have beneficial outcome in treatment of osteoporotic patients in all countries of Balkan peninsula.

## NSS61

### ARTIFICIAL INTELLIGENCE SOLUTIONS FOR OSTEOPOROSIS MANAGEMENT AND PERCEPTION OF ARTIFICIAL INTELLIGENCE

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Osteoporosis is a global health problem for ageing populations characterized by diminished bone mineralization and subsequent increased bone fragility. Concepts of machine learning (ML) and artificial intelligence (AI) so far offered promising tools for individualized approach for both osteoporosis diagnostics and management. Osteoporosis is treatable disease but could be easily overlooked due to lack of symptoms before major fracture occurs. To increase the early detection of osteoporosis several screening tools are used. ML was recently shown to have potential to outperform the classic screening tools. Such ML powered tools could be useful for patients when incorporated in clinical practice. Additionally, ML based algorithm capable of predicting bone mineral density status after osteoporosis treatment with particular drug was recently introduced, therefore offering physicians support in selection of best treatment option.

Knowledge and trustworthiness in AI among responsible stakeholders are fundamentals for its implementation in everyday practice. Currently published studies on this topic were mainly focused on general awareness about AI and expectations for the future of medical profession. Therefore, we conducted a national survey with an aim to reveal basic knowledge about AI and perception of AI in the aspect of trust and independence. Despite the fact radiologists in Croatia have limited access to both AI tools and education, level of their trust in accuracy of AI is very high. Accordingly, there is a need to develop and implement educational programs dedicated to AI in medical school curriculum.

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## NSS62

### THE CURRENT SITUATION IN THE APPROACH TO OSTEOPOROSIS IN OLDER ADULTS IN TURKEY: AREAS IN NEED OF IMPROVEMENT WITH A MODEL FOR OTHER POPULATIONS

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**Objectives:** The total number of older adults in Turkey is striking, amounting to around 8 million, and this translates into considerably higher numbers of cases of osteoporosis (OP) and fractures in older adults. We aimed to outline the current situation of OP in older adults in Turkey and investigate the differences between Turkey and a representative developed European country (Belgium), in terms of the screening, diagnosis, and treatment of OP. Our intention in this regard was to identify areas in need of improvement and subsequently to make a clear call for action to address these issues.

**Material and Methods:** Herein, considering the steps related to the OP approach, we made a complete review of the studies conducted in Turkey and compared with the literature recommendations.

**Results:** There is a need for a national osteoporotic fracture registry; measures should be taken to improve the screening and treatment of OP in older males, such as educational activities; technicians involved in dual-energy X-ray absorptiometry (DXA) scanning should undergo routine periodic training; all DXA centers should identify center-specific least significant change values; all older adults should be considered for routine lateral dorsolumbar X-ray imaging for the screening of vertebral fractures while ordering DXA scans; the inclusion of vertebral fracture assessment (VFA) software in DXA assessments should be considered; screening using a fracture risk assessment tool (FRAX) algorithm that is specific to Turkey should be integrated; the fortification of foods with vitamin D is required; the high fracture risk by country-specific FRAX algorithm and the presence of falls/high fall risk should be integrated in reimbursement terms; and finally, more "fracture liaison services" should be established.

**Conclusion:** We suggest that the practical consideration of our suggestions will provide considerable support to the efforts for combating with the adverse consequences of OP in society. This approach can be subsequently modeled for other populations to improve the management of OP globally.

## NSS63

### VITAMIN D AND FIBROMYALGIA

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Fibromyalgia is a chronic disorder of unknown etiology, characterized by widespread musculoskeletal pain, which is associated with a range of other symptoms such as fatigue, sleep disturbance, and somatic and cognitive symptoms. In contrast, signs on physical examination are scarce and are limited to the well-localized tender points on palpation.

Vitamin D has been suggested to be involved in pain processing and modulate cytokine production, and it is possible that the modulation of painful stimulus transmission may be altered by reduced levels of vitamin D.

The association of vitamin D deficiency with musculoskeletal pain has been highlighted by different authors; and at the present time, the serum measurement of 25 (OH) D is part of the initial study of all patients with an initial diagnosis of fibromyalgia.

Different studies reported lower vitamin D levels in FM patients when compared with healthy controls, however, there is conflicting evidence regarding vitamin D supplementation in these patients. However, the exact role of vitamin D supplementation in fibromyalgia remains to be defined.

## NSS64

### VITAMIN D IN RHEUMATIC DISEASES

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Vitamin D levels are instrumental in several rheumatic diseases including fibromyalgia (FM), rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE).

Vit D has been suggested to be involved in pain processing and modulate inflammation and cytokines production in patients with RA and was associated with SLE activity levels.

Assurance of Vit D levels above 30 ng / ml is crucial in patients with chronic rheumatic disorders. This is particularly important in patients receiving long term glucocorticoid therapy more than 5 mg of prednisone or equivalent for more than 3 months. Moderate

to severe Vit D deficiency correlates with chronic musculoskeletal pain that may worsen chronic pain and inflammation parameters. Das 28 and other RA clinical parameters are linked to Vit D levels. The same occurs in patients with SLE.

## NSS65

### THE CROSSTALK BETWEEN BONE, KIDNEY AND VASCULATURE: NEW INSIGHTS

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Investigation into the chronic kidney disease-mineral bone disorder (CKD-MBD) has elucidated the disruption of a multiorgan systems biology produced by renal injury in early stages of kidney diseases. The disordered systems biology causes the CKD-MBD and contributes major components of increased cardiovascular risk for CKD patients. The outcome of the syndrome, in addition to previously recognized complications of renal osteodystrophy, is increased cardiovascular mortality in CKD. The inception of the CKD-MBD is due to early effects of kidney disease. Its pathophysiology involves circulating factors produced by renal repair attempts such as sclerostin and activin A, and newly discovered hormones, FGF23 and soluble klotho. Progressing from its inception, the disruption of the multiorgan system leads to the pathophysiology previously recognized as secondary hyperparathyroidism, hyperphosphatemia, calcitriol deficiency, and renal osteodystrophy that are now incorporated into the CKD-MBD syndrome along with vascular disease (especially calcification) and cardiac disease (especially hypertrophy and heart failure). The new pathophysiology brings attention to the extreme need for advances in treatment of the CKD-MBD. Current therapy, focused on the late components of the syndrome, has not affected the mortality associated with CKD in clinical trials.

## NSS66

### NEW PLAYERS IN THE CHRONIC KIDNEY DISEASE-MINERAL AND BONE DISORDER

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Many factors are at play in the pathogenesis of Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD), such as parathyroid hormone, calcium, fibroblast growth factor 23 (FGF23),

klotho, vitamin D, and phosphate, a well-known uremic toxin, all resulting in bone abnormalities, parathyroid hyperplasia, and vascular calcifications. Hyperphosphatemia is one of the factors related to vascular calcifications, which impacts on the high CKD cardiovascular mortality also on its own right. Its reduction is protective at least experimentally in Klotho deficient mice; however, in general, up to now trials have failed to definitively show that phosphate reduction improves clinically meaningful parameters. Tenapanor, ferric citrate, nicotinamide, are among the novel drugs useful to manage hyperphosphatemia in the CKD-MBD condition.

Vascular calcification (VC) is related to the high cardiovascular mortality of CKD, but a more detailed understanding of the biochemical processes related to VC is critically needed. It can be argued in fact that vascular calcification may be present from the initial stages of CKD when mineral metabolism compensation mechanisms are still preserved; therefore, other factors may be at play.

For example, the FGF23-a-Klotho axis is altered in CKD, and it may be involved in the pathogenesis of VC, and also interestingly in osteoporosis (Oxidative Medicine and Cellular Longevity, 2021).

We have shown that lanthionine, a non-proteinogenic amino acid, generated as a side-product of the activities of transsulfuration enzymes in hydrogen sulfide biosynthesis, which is severely elevated in CKD, is able to increase intracellular Ca<sup>2+</sup> levels in endothelial cells (Int J Mol Sci, 2019). In addition, we demonstrated a correlation between lanthionine levels and the Total Calcium Score, based on the Agatston score, and inflammation, in CKD patients (Int J Mol Sci, 2021) Furthermore, lanthionine changes the gene expression of proteins involved in the earliest phase of the mineralizing process, in pro-calcific cell culture conditions, such as Bone morphogenetic protein 2 (BMP2), Runt-related transcription factor 2 (RUNX2), tissue-nonspecific alkaline phosphatase (ALPL) and Inorganic Pyrophosphate Transport Regulator (ANKH), Dickkopf WNT Signaling Pathway Inhibitor 1 (DKK1), Extracellular signal-regulated kinases 1/2 (ERK1/2). Therefore, lanthionine is able to modify the endothelial homeostasis with the expression of specific markers involved in the mineralization process, setting the basis for a better understanding of the link between uremic toxins and CKD-MBD. In addition, these results support the role of the endothelium in VC development.

## NSS67

**PHOSPHATE AND VASCULAR CALCIFICATION: IMPLICATIONS FOR TREATMENT**J. Voelkl<sup>1</sup>, J. Voelkl<sup>2</sup>

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Inorganic phosphate is required for various metabolic and cellular processes, but elevated phosphate levels have been associated with detrimental effects on the cardiovascular system. Higher circulating phosphate levels have been linked to mortality in chronic kidney disease patients, but also the general population. Circulating phosphate levels are controlled by an endocrine triangle of PTH, Vitamin D and FGF23. Ectopic precipitation of phosphate and calcium is prevented by local and systemic calcification inhibitors, such as pyrophosphate, fetuin-A and matrix GLA protein. Spontaneously formed calcium-phosphate clusters may be bound by Fetuin-A monomers, which can transform into calciprotein particles. Insufficient clearance and maturation of primary calciprotein particles leads to formation of cytotoxic secondary calciprotein particles. This anti-calcific system can be determined in individual patients by the serum calcification propensity test. A key target susceptible to mineral stress induced by calcium-phosphate crystals are vascular smooth muscle cells. These cells exhibit remarkable plasticity and can alter their phenotype towards cells with pro-calcific properties. This phosphate-induced reprogramming involves activation of inflammatory pathways and cytokine production, induction of senescence, expression of osteogenic enzymes and vesicle release. Ultimately, these alterations may entail medial vascular calcification, which are closely associated to cardiovascular survival. Currently, no broadly applicable treatments are available to prevent the sequelae of mineral stress, but new therapeutic concepts are emerging. These may open up new avenues to mitigate vascular calcification and the burden of cardiovascular disease.

## NSS68

**PANDEMICS. HISTORY, POSTTRAUMATIC STRESS AND SOCIAL EFFECTS**Y. Athanassiou<sup>1</sup>

<sup>1</sup>Department of Philosophy of Law, Law School, University of Athens, Athens, Greece

Humanity has seen a long history of pandemics. Major breakthroughs in the treatment of infectious diseases as well as the development of effective vaccines has given false hopes that humanity had put an end to pandemics due to infectious diseases. However, it appears that nature has the way to trouble and humiliate humanity. Thus, coronaviruses have caused pandemics during the 20<sup>th</sup> century. The pandemic caused by SARS-CoV-2 is recent and has been caused by a coronavirus. Despite successful efforts to develop effective vaccines the death toll of the pandemic was severe. The infectious disease ravaged across many countries all over the planet, as in modern times communication is quick and relatively easy. Consequently, efforts were made to contain the disease and different methods of social isolation and mobility limitations have been applied all over the world. All these measures have caused posttraumatic stress to individuals, especially vulnerable individuals and have affected somatic and psychic health.

## NSS69

**COVID-19, AUTOIMMUNITY AND MUSCULOSKELETAL DISEASES**L. Athanassiou<sup>1</sup>

<sup>1</sup>Department of Rheumatology, Asclepeion Hospital, Voula, Athens, Greece

The SARS-CoV-2 virus is a virus related to autoimmunity. The virus may be related to the development of autoimmune diseases. Various mechanisms may lead to autoimmunity in the case of infection with the COVID-19 virus. These mechanisms include hyperinflammation and hyperstimulation of the immune system, molecular mimicry and extracellular neutrophil traps. In this context infection with the SARS-CoV-2 virus has been related to the development of systemic inflammatory autoimmune diseases, which may have musculoskeletal manifestations.

## NSS70

## COVID-19, POST-COVID AND FRAILITY

Y. Dionyssiotis<sup>1</sup>

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The SARS-CoV-2 virus has been the cause of the recent pandemic. The virus causes an infection which may be asymptomatic, mild or severe leading to the development of severe pneumonia. Severe infection by the SARS-CoV-2 virus may have a fatal outcome. Various risk factors for severe disease have been identified. These include old age, male sex, the presence of various comorbidities, diabetes mellitus, arterial hypertension and obesity. Frail elderly individuals are at an increased risk for fatal outcome, if infected by the SARS-CoV-2 virus. If a patient survives a severe infection severe sarcopenia may be observed. Thus, the SARS-CoV-2 infection may be related to the development of different manifestations of frailty, such as sarcopenia. In addition, the post-COVID syndrome has been observed in people who survive the infection. The post-COVID syndrome may have various manifestations and make a susceptible individual frail. In conclusion, frailty and various conditions which lead to frailty may be a risk factor for the development of severe SARS-CoV-2 infection. Additionally, if a person survives severe infection he may develop various characteristics, such as sarcopenia which characterize frailty. Additionally, frailty may develop in the context of post-COVID syndrome. For the management of various factors which lead to frailty in the context of COVID-19 or post-COVID syndrome rehabilitation and physiotherapy may be used effectively.

## NSS71

## COVID-19 AND POST-COVID. AUTOIMMUNITY AND ENDOCRINE DISEASES

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SARS-CoV-2 has caused the recent pandemic, which in some parts of the world has regressed to an endemic situation, however, in other parts it remains a pandemic. The disease causes severe pneumonia which maybe lethal, albeit it may also run as a mild disease. The SARS-CoV-2 disease is a factor leading to autoimmunity. It affects all organ systems. Thyroid disease is a rare manifestation of SARS-CoV-2 infection. Cases of subacute thyroiditis in patients with the Covid-19 infection, have been described all over the world. Cases of thyroiditis and hypothyroidism have been observed following a SARS-CoV-2 infection. Cases of Graves' disease in patients with the Covid-19 infection have

also been described. The scientific community developed forms of vaccination to combat the SARS-CoV-2 pandemic. Vaccination against the SARS-CoV-2 virus has helped to limit the pandemic and is characterized by very few side effects. Amongst those cases of subacute thyroiditis and cases of Graves' disease have been found after vaccination against the SARS-CoV-2 virus. In conclusion, SARS-CoV-2 is a coronavirus which has been related to the development of autoimmunity. Autoimmune thyroid disease, in the form of either subacute thyroiditis, autoimmune thyroiditis and Graves' disease have been described in patients with the Covid-19 disease.

## NSS72

## LOW ENERGY AVAILABILITY IN SPORTS SYNDROME (LEA-S) AND STRESS FRACTURES

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Low Energy Availability in combination with Functional Hypothalamic Amenorrhea can occur from severe energy restriction, or increased energy expenditure. In females of reproductive age engaging in excessive exercise the result may be menstrual cycle disorders when there is relative caloric deficiency due to inadequate nutritional intake for the amount of energy expended.

The "female athlete triad" (Triad), consists of 1. Low energy availability, 2. Menstrual dysfunction, and 3. Low bone mineral density (BMD). There is marked interpatient variability in the degree of weight loss or exercise required to induce the triad. Risk for low BMD is increased four times if body weight is below 85% of ideal body weight. BMD ranges from normal to low or osteoporosis in spite of the bone-building effect of weightbearing exercise. Microarchitectural changes with regard to bone quality are demonstrated by HR-CT especially in trabecular bone.

Bone health is compromised and can lead to stress fractures and early osteoporosis. Estrogen deficiency is responsible for low BMD. Low peak bone mass&fractures are a result of impaired bone accrual during adolescence which has a life long effect on bone health and susceptibility to fractures. Amenorrheic athletes have lower BMD than eumenorrheic athletes, particularly at the lumbar spine. Stress fractures, occur at a much higher frequency in patients with exercise-induced amenorrhea. Repeated stress fractures occur in up to 30% of ballet dancers and 32% of runners. They are more common in athletes with distorted eating patterns. This is caused by low bone mass and the low-energy state, which leads to low bone turnover and/or favors a resorptive state. Alterations in bone turnover with suppression of bone formation and decreases or increases in resorption reflect estrogen deficiency but also nutritional deprivation. Assessment with regard to low



BMD, osteoporosis, stress reaction of bone or fracture is of great importance since long term effects on bone health are hard to reverse and certainly take a long time so we aim at prevention.

## NSS73

### HOW TO ASSESS BONE IN SPORTS MEDICINE?

J. J. Carey<sup>1</sup>

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Understanding and addressing bone health in sports encompasses a blend of science, art and medicine. Healthy bones are essential for healthy athletes, and in younger elite athletes are often put under considerable stresses and strains which normal bones would not be able to withstand, whose needs may vary substantially within the same team or between sports. On the other hand, occasional and past athletes wish to have healthy bones to enable pleasurable participation and maintenance of a healthy lifestyle. Assessment and management thus requires an understanding of the persons activities, objectives and their bone quality and quantity, and a more considered approach to what is considered 'normal', and whether fractures or part of a disease or a failure to withstand excessive force. A thorough history and physical examination, coupled with quality anthropometry, DXA or other imaging techniques aid comprehensive assessment of baseline risk, and a set of characteristics to which changes can be assessed. The changes in BMD may be unevenly distributed, normal or increased at weightbearing sites and decreased at non-weightbearing sites. There are also some microarchitectural changes especially in trabecular bone indicating poor bone quality in some degrees, and these changes are demonstrated by HR-CT.

## NSS74

### HOW TO OPTIMIZE BONE HEALTH IN SPORTS MEDICINE?

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Bone loss is one of the most challenging issue in the management of low energy availability since reverse of it takes a longer than other symptoms like lack of energy and menstrual dysfunction. Although some recovery is possible, it is not clear if complete restoration is possible to return bone health equal to that of menstruating exercising women. Development of an alternative tool to help protect bone health would be beneficial. When approaching the female athlete triad, it is important to recognize this may be a sensitive topic for the female athletes. That is why treatment

requires a team work, which includes a physician, dietitian, mental health practitioner, physiotherapist, exercise physiologist, and coach.

While interventions can have both pharmacological and non-pharmacological components, non-pharmacological treatment methods are to be the initial course of action. Pharmacological interventions should be considered if there is no improvement after a year of non-pharmacological intervention and/or the athlete has a relevant history of fractures. Depending on the cause of low EA, the athlete should be referred to a sports dietitian for nutritional education and counselling. If there is suspicion of a clinical eating disorder, the athlete should be referred to a mental health professional for psychological treatment. Energy expenditure may also need to be altered by reducing or ceasing exercise. Addressing low EA, increasing body weight, having a regular menstrual cycle, and ensuring adequate calcium and vitamin D are recommended to optimize bone health in female athlete triad. High-impact exercise are important in particular if the restoration of energy availability is difficult. High-impact exercise can be highly osteogenic, but it can also be challenging because of the high risk of stress fractures. Screening athletes is even more important than the treatment process in the management of female athlete triad. Physiotherapists can play a role in assessing, modifying and monitoring an athlete's activity, such that they can help place less focus on cardiovascular training. Resistance exercises, including weight-training, should also be incorporated 2-3 days a week. A multidisciplinary treatment approach is necessary, including medical, dietary, and mental health support with special consideration for bone health.

## NSS75

### MUSCULOSKELETAL PROBLEMS IN POST-COVID-19 PERIOD

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Coronavirus disease-2019 (COVID-19) is a disease caused by severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2). This disease has been declared a pandemic by the World Health Organization. Although the majority of patients infected with SARS-CoV-2 have asymptomatic or mild symptoms, some patients develop serious sequelae that can permanently impair their quality of life. ACE2 receptors, which are the target receptors for SARS-CoV-2, are also found in the intestine, kidney, small vessel wall, smooth muscle, skeletal muscle and intra-articular synovial tissues besides the lung. Therefore, besides lung involvement, it can be involved in many organs and systems, including the musculoskeletal system. Studies have reported that musculoskeletal problems include myalgia, arthralgia, muscle weakness, cerebrovascular events, cranial nerve involvement, Guillain-Barre syn-



drome, polyneuropathy, osteoporosis and osteonecrosis, etc. Early and proper individualized rehabilitation programs are needed to enhance functionality and increase quality of life. Treatments based on specific exercises for different conditions related with COVID-19 are essential to increase range of motion and decrease muscle weakness. The prevention of osteoporosis and osteonecrosis are important especially in patients with high dose and long duration steroid history.

## NSS76

### PAIN MANAGEMENT IN COVID-19

B. Duyur Çakıt<sup>1</sup>

<sup>1</sup>MD Professor of PMR University of Health Science Ankara Training and Research Hospital, Department of Physical Medicine and Rehabilitation, Ankara, Turkey

Since coronavirus disease-2019 (COVID-19) is a neurotropic virus, it can be a source of neurogenic-neuropathic pain, as well as cause nociceptive, nociplastic pain as a result of tissue damage and the release of various mediators. Apart from these, it can also be a source of central and functional pain. It is claimed that, central nervous system symptoms (headache, epilepsy, delirium, cerebrovascular accident, encephalitis) may be related to inflammatory processes, peripheral nervous system symptoms (anosmia, agnosia, acute myelitis, Guillain Barré syndrome, polyneuritis) may be related to immune-mediated mechanisms, musculoskeletal system symptoms (atonia, paresis, myalgia) may be related to direct damage. General rules are still valid in pain management and a individualized, multidisciplinary approach continues to be recommended. Although there is no clear data that can limit the use of analgesics in pain treatment, pain management in accordance with the minimum dose, minimum duration rule, with caution against side effects for all treatment applications, is valid for COVID-19 patients.

## NSS77

### SARCOPENIA: POSTACUTE SEQUELE OF COVID 19

B. Karaođlan<sup>1</sup>, A. Utkan Karasu<sup>2</sup>

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Skeletal muscle-related symptoms are common in post-acute period of Covid-19. Sarcopenia is a common sequele of immobilization especially in elderly patients, leading to physical disability and impaired quality of life. Early recognition and proper intervention with rehabilitation approaches are essential to prevent the progression of disease and complications. Rehabilitation

during the immobilization period helps to reduce the incidence of sarcopenia. There is not a consensus on optimal management strategies to improve fatigue and exercise tolerance in sarcopenic patients with acute Covid-19. Detailed recommendations for exercise therapy are still suboptimal. Rehabilitation, in the form of regular physical exercise, has proven to be effective in avoiding and improving the debilitating effects of myopathy and sarcopenia. In addition to physical activity, proper nutrition and Vit D supplementation can be effective in the management of these patients.

## NSS78

### SYSTEMATIC REVIEW ON OUTCOMES OF HIP FRACTURES IN ASIA PACIFIC

J. Close<sup>1</sup>, L. Harvey<sup>1</sup>

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Hip fracture is a devastating injury suffered by millions of people around the world annually. Death from hip fracture is a recognised complication but data from studies in different countries varies significantly. This presentation highlights a systematic review being undertaken to study mortality following hip fracture in countries in the Asia Pacific region.

Over 12,000 studies were screened, covering 14 Asia Pacific countries/regions and 604 studies were included. Preliminary results of the systematic review of mortality rates showed significant variation in in-hospital mortality (1.0% – 5.5%), 30-day (1.0% – 7.7%) and 1-year mortality (9.0% – 24.5%) across countries/regions in Asia Pacific. Understanding the reasons underpinning the observed variation is important and consistent collection of data via registries is just one way that we can use to achieve this goal.

## NSS79

### BRIDGING THE GAP: BONE HEALTH EDUCATION FOR SPECIALISTS

R. Blank<sup>1</sup>, D.-C. Chan<sup>2</sup>, Y. Choi<sup>3</sup>, J. Close<sup>4</sup>, P. J. Mitchell<sup>5</sup>, L. Mercado-Asis<sup>6</sup>, J. K. Lee<sup>7</sup>

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Our recent scoping review of the perceptions about the importance of treating fractures and osteoporosis among key stakeholders showed the literature on the perceptions of specialist physicians is very limited. Existing literature suggests that recognition of fragility fractures as a sign of underlying bone disease is still low, even among physicians.

We report on a series of educational modules directed at the specialists who would typically treat patients with an increased risk of osteoporosis and fragility fracture due to glucocorticoid use, a plethora of medical conditions or immobility.

We are looking to present these materials across the Asia Pacific region in 2022 and beyond. The modules will be available free of charge through the Asia Pacific Fragility Fracture Alliance website (<https://apfracturealliance.org>) and we encourage leaders of all specialities to help raise awareness and increase the rates of osteoporosis identification, diagnosis and management in at-risk populations.

## NSS80

### ASIA PACIFIC FRAGILITY FRACTURE ALLIANCE – ASIA PACIFIC OSTEOPOROSIS AND FRAGILITY FRACTURE SOCIETY COLLABORATION

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In the orthopaedic community, osteoporosis is often under-diagnosed and undertreated in patients being treated for fragility fractures. A need for a specific section that focuses on osteoporosis and fragility fractures was identified at the Asia Pacific Orthopaedic Association (APOA) 2021 Congress. In response, a new section of the APOA, the Asia Pacific Osteoporosis & Fragility Fracture Society (APOFFS) was formed.

APOFFS has several objectives including to increase awareness, knowledge and promote best practice in osteoporosis and fragility fracture care. With the close alignment of APOFFS's objectives with the mission and vision of the Asia Pacific Fragility Fracture Alliance (APFFA), fruitful collaboration is anticipated. This presentation highlights key features of a survey on the awareness and attitudes to the management of fragility fractures among the APOA membership, which will be undertaken in collaboration with the Evidence Generation Working Group of APFFA.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



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Abstract Book

## **Sponsored Satellite Symposia Abstracts**

SY1

## UCB-SPONSORED SATELLITE SYMPOSIUM - EMBRACING MULTIDISCIPLINARY TEAMS FOR STRONGER SECONDARY FRACTURE PREVENTION

UCB<sup>1</sup><sup>1</sup>UCB, Brussels, Belgium

We invite you to join this interactive symposium, chaired by Professor Eric Hesse (Hospital of the Ludwig-Maximilians-University Munich, Germany), to explore the importance of a multidisciplinary approach towards optimising secondary fracture prevention, with a key focus on the utilisation of bone-forming therapy.

### Identifying those postmenopausal patients at higher risk of fracture: When, who and how?

*Professor Mattias Lorentzon (University of Gothenburg and Sahlgrenska University Hospital, Sweden)*

To begin the symposium, Professor Mattias Lorentzon will provide an overview of the crucial points within the post-fracture care pathway for identifying patients at higher risk of fracture. In particular, Professor Lorentzon will focus on key risk factors – such as fracture recency – that have a major influence on fracture risk,<sup>1</sup> whilst also discussing the latest concepts in fracture risk stratification, as reflected in recent guideline updates.<sup>2</sup> As a geriatrician, Professor Lorentzon will provide his expert insights from the perspective of his role within the multidisciplinary team (MDT).

### Clinical decision-making with bone-forming therapy: Where do we begin?

*Professor Bente Langdahl (Aarhus University, Denmark)*

Some recent guideline updates<sup>2</sup> and publications<sup>3</sup> recommend the use of bone-forming therapy first, followed by an antiresorptive in patients at higher risk of fracture. From her perspective as an endocrinologist, Professor Bente Langdahl will revisit the post-fracture care pathway to focus on the points of treatment consideration, initiation and monitoring, and the key MDT members involved. Professor Langdahl will present the scientific rationale for a sequential treatment approach for patients at higher risk of fracture<sup>4-7</sup> and the advantages of initiation with first-line bone-forming therapy.<sup>8</sup> To conclude her presentation, Professor Langdahl will present a clinical case study – touching upon the crucial stages of clinical decision-making (up to the point of therapy initiation) in real-world clinical practice.

### Optimising management through a co-ordinated approach to care

*Mr Sherwin Criseno (University Hospitals Birmingham NHS Foundation Trust, United Kingdom)*

Finally, Mr Sherwin Criseno will look to provide a synthesis of the concepts presented previously – focusing on the post-fracture care pathway from a holistic standpoint. Offering an alternative perspective from his role as a consultant nurse in endocrinology,

Mr Criseno will describe how effective and efficient connections between key MDT stakeholders, as well as patients, can help to optimise secondary fracture prevention. Through his own experiences in the clinic, Mr Criseno will discuss ways in which the goals of post-fracture care may be more readily achieved by embracing a multidisciplinary approach, as well as resources that are currently available to guide the facilitation of improved post-fracture care.<sup>9</sup>

This satellite symposium is sponsored by UCB and a UCB medicine will be discussed.

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SY2

## AGNOVOS HEALTHCARE BREAKFAST SPONSORED SYMPOSIUM: REDEFINING POSSIBLE: PROCEDURAL TREATMENT FOR BONE LOSS IN HIPS OF VERY HIGH-RISK PATIENTS

*S. Ferrari<sup>1</sup>, C. Gluer<sup>2</sup>, A. Kurth<sup>3</sup>, M. L. Brandi<sup>4</sup>, J. De Schep- per<sup>5</sup>*

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This symposium is guided by a multi-disciplinary group of expert clinician researchers who are interested in the question of how procedural treatments for local bone loss can help patients by strengthening bone in patients at high-risk of fracture.

The prevalence of osteoporosis-related bone loss and associated fragility fractures in the aging population continues to challenge health care professionals, caregivers and healthcare systems. De-

spite the availability of several clinically proven pharmacological therapies, unmet needs in care persist. Unmet needs are especially pronounced for patients at imminent and very high-risk of hip fragility fracture<sup>1</sup>. The significant impact on mortality, mobility and future fracture risk associated with an index hip fractures has led to the development, study and commercial introduction of procedural treatments<sup>2</sup> as a novel means to address local loss of bone mass, quality and strength. Current treatment guidance suggests consideration of one type of procedural treatment, LOEP, for patients at very high risk of fracture<sup>3</sup>. To explain how this type of procedural treatment may help clinicians improve care, the panel of experts will discuss key topics related to local osteoporotic bone loss and LOEP, including:

1. Osteoporotic bone loss impact on proximal femur bone morphology and biomechanics
2. The importance of alternative strategies in addressing bone loss in very high-risk patients
3. Multi-model, pre-clinical evidence of bone formation with LOEP
4. Clinician and patient experience after first 100 LOEP cases

1. Ferrari et al., Archives of Osteoporosis 2016 11:37; 2. Howe et al. Osteoporos Int 31, 921–929 (2020); 3. Kanis et al., Osteoporos Int 31, 209 (2020).

### SY3

#### THE IMPORTANCE OF REAL-WORLD DATA: GATHERING EVIDENCE TO GUIDE OSTEOPOROSIS CARE

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

<sup>1</sup>Pharmaco and Device Epidemiology Unit, University of Oxford, Oxford, United Kingdom

**Objectives:** We will review sources of real-world data, study types, and common study designs in the field of osteoporosis and metabolic bone disease.

**Materials and methods:** Various data sources will be presented including electronic medical records, registries, and health claims, along with how they are used to answer characterisation, prediction, and causal inference questions. Nested casecontrol, cohort, and self-controlled designs will also be presented with examples of how they have been used to answer clinical questions in the field.

**Results:** Multiple countries provide local and international researchers with access to routinely collected health data from primary care, outpatient records, inpatient records, and health claims. In some cases, these are linked and enriched to improve the granularity of the information available for research. Several international initiatives have facilitated pooled analyses of mul-

tiples databases and been used to inform relevant research questions on the key features associated with fracture risk. These analyses allow the creation of algorithms to identify subjects at high risk of imminent fracture and to study the comparative safety and effectiveness of anti-osteoporosis medicines.

**Conclusions:** Real-world evidence is a growing area of research in osteoporosis and metabolic bone research. It is vital that researchers and clinicians understand the pros and cons of the information generated using these data, and the methods used to process it.

**Conflict of Interest Statement:** Prof Prieto-Alhambra's research group has received grant support from Amgen, Chesi-Taylor, Novartis, and UCB Biopharma. His department has received advisory or consultancy fees from Amgen, Astellas, AstraZeneca, Johnson and Johnson, and UCB Biopharma, and fees for speaker services from Amgen and UCB Biopharma. Janssen, on behalf of IMI-funded EHDEN and EMIF consortiums, and Synapse Management Partners have supported training programmes organised by Prof Prieto-Alhambra's department and open for external participants organized by his department outside submitted work.

### SY4

#### TRENDS IN HIP FRACTURE INCIDENCE & TREATMENT – LATEST GLOBAL DATA USING POPULATION-BASED DATABASES

C. Cooper<sup>1</sup>

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

**Objectives:** Osteoporotic hip fractures are associated with high morbidity and mortality<sup>1</sup> and remain a significant public health issue worldwide. Despite this, many of the currently available reports on hip fracture incidence are based on outdated studies with heterogeneity in methods and study periods, making it a challenge to examine and compare data between geographical regions<sup>2</sup>. During his presentation, Professor Cooper will share contemporary real-world data on hip fractures from 19 countries and regions, highlighting trends in incidence and treatment approaches worldwide<sup>3,4</sup>.

**Materials and methods:** This study is a retrospective analysis of patients aged  $\geq 50$  years who were admitted to hospital due to hip fracture between 2005–2018<sup>3,4</sup>. A common analysis protocol and an analytical common data model (ACDM) were applied across all sites to provide comparable data. Annual incidence of hip fracture, mortality, and pharmacological treatment rates within 12 months are described as key outcomes. Trends in hip fracture counts were projected to 2050.

**Results:** Over the study period, the average change in standardised hip fracture incidence varied from -2.8% to +2.1% per year (Hong Kong, -2.4%; UK, -1.4%; Australia [AU], +0.2%; US Medicare,



-1.2%; US Optum [USO], -0.3%; Netherlands [NL], +2.1%). Standardised mortality rates within 12 months of hip fracture ranged from 14.4–28.3%, whilst mortality trends varied from -5.3% to -0.4% per year, with the largest changes in AU (-5.3%), NL (-4.6%) and USO (-3.4%). Frequency of anti-osteoporosis medication use prior to hip fracture was  $\leq 20\%$  across all regions with available data. Use of pharmacological treatment within 12 months of hip fracture ranged from 11.5–50.3% across regions, with trends varying from -4.2% to +12.7% per year. Total estimated hip fracture counts were projected to increase over time in 16 out of 17 countries.

**Conclusions:** Although hip fracture incidence has stabilized or reduced in many countries in recent years, this reduction is insufficient to offset the increase of hip fractures as the global population ages. There remains an urgency to treat hip fractures to improve patient outcomes.

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**Disclosures:** Prof Cooper has received lecture fees and honoraria from Amgen

## SY5

### COMPARING THE EFFECTIVENESS OF ANTIRESORPTIVES FOR FRACTURE RISK REDUCTION USING REAL-WORLD DATA

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Clinical trials suggest that denosumab is more effective in increasing bone mass than bisphosphonates (BPs), but clinical studies designed to compare the fracture efficacy of denosumab with BPs are lacking<sup>1</sup>. Results from comparative effectiveness studies using real-world data are inconsistent and limited due to small sample sizes, potential for unmeasured/residual confounding, and the use of indirect comparisons<sup>2–4</sup>. Data on the comparative effectiveness of osteoporosis treatments would provide important information for prescribers, payers and patients. However, there are methodological challenges given the selection of treatment is affected by various factors such as disease severity. In addition, real-world databases often lack data on important risk factors, such as bone mineral density (BMD), that may confound comparisons of effectiveness between treatment groups.

Professor Jeff Curtis' presentation will focus on the rigorous, staged approach required to evaluate the comparability of osteoporosis treatment groups and minimize unmeasured confounding in comparative studies. Professor Curtis will present data to show how comparability of patients on various osteoporosis therapies differed depending on prior treatment experience, fracture history, and type of health insurance. He will also provide his perspective on ways to objectively evaluate the comparability of treatment groups using negative control outcomes. Professor Curtis will then discuss results from a recent comparative effectiveness study evaluating fragility fracture outcomes among a commercially insured population. He will also provide an overview of the unique design of comparative effectiveness and safety studies in osteoporosis, using data from a population of postmenopausal Medicare beneficiaries in the United States, with links to external data (eg PCORnet) to augment information not typically found in administrative claims data sources.

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**Disclosures:** Prof Curtis has received lecture fees and honoraria from Amgen

## SY6

### A RESEARCH FRAMEWORK ON OSTEOARTHRITIS FOR THE UN DECADE ON HEALTHY AGING

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The Decade of Healthy Aging aims to build a world able to foster healthy aging, by promoting several actions, including the delivering of integrated care and primary health services that are responsive to the needs of older people.

When we consider the needs due to the burden of diseases, few disorders in medicine can match the impact of musculoskeletal conditions, in particular of Osteoarthritis (OA). Moreover, OA has a significant economic effect not only on health care budgets, but also on patients, their employers, and their caregivers. OA is the most common articular disease of the developed world and a leading cause of pain and chronic disability, mostly as a consequence of lower limb OA involving knee and/or hip districts. The prevalence of OA increases with age and is higher in women than in men. It has been estimated that more than half of people aged 65 years or older living in high-income countries have radiographic evidence of OA, while the prevalence of symptomatic OA involves up to one out of three individuals. As the world's

population continues to have longer lifespan, it is estimated that degenerative joint diseases such as OA will impact at least 130 million individuals around the globe by year 2050. However, OA prevalence rates and their projections could even be underestimated due to the different joint sites considered and to the lack of a unanimous definition of the disease. This latter issue is a potential consequence of the large heterogeneity in OA pathogenesis and clinical presentation, which has been summed up in four different phenotypes, namely the biomechanical, osteoporotic, metabolic and inflammatory ones. Although such phenotypes often overlap, each of them encapsulates a predominant feature of OA pathogenetic process, which can concern mechanical stress due to previous traumatic injuries, uncontrolled physical activity or excess weight conditions, subchondral bone osteoporosis, metabolic factors or local and chronic inflammation. These aspects have to be taken into account when dealing with OA patients, since the clinical presentation, as well as the coexistence of chronic conditions could influence the course of the disease and the response to the therapies. For all these reasons, OA appears as an optimal candidate for personalized medicine, including both pharmacological and non-pharmacological interventions.

## SY7

### NON-PHARMACOLOGICAL APPROACH: DIET AND ITS IMPACT ON OSTEOARTHRITIS

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Nutrition plays a pivotal role in almost all chronic diseases. In osteoarthritis, we observe that obesity and weight gain are strongly associated with knee and hip osteoarthritis and with more severe forms of these conditions. The Mediterranean type diet (abundant in vegetables, fruits, beans, whole grains, olive oil and fish, and less red meat than typical Western diets) has been associated with reduction in joint inflammation in patients with rheumatoid arthritis, another common rheumatological disease. Some recent epidemiological studies reported that higher adherence to Mediterranean diet is associated with a lower presence of osteoarthritis, probably for the antiinflammatory of this healthy dietary pattern. In this presentation, I would like to report the current evidence regarding health diet, in particular Mediterranean diet, and osteoarthritis from an epidemiological and molecular point of view.

## SY8

### MULTIMODAL PHARMACOLOGICAL APPROACH: FROM EVIDENCE-BASED TO DAILY PRACTICE

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ESCEO published an algorithm for the management of knee osteoarthritis which recommended the combination of non-pharmacological and pharmacological treatments and, for drug treatment, a stepwise approach from background first-line treatment until a surgical solution in case the patient remains severely affected after all previous steps. Nevertheless, after discussing with patients partners, it seems that, in many cases, single interventions do not provide sufficient relief of symptoms in a large subset of the population. Multimodal treatments, combining the different pharmacological approaches recommended by ESCEO appear to be an appropriate solution, particularly for patients with moderate to severe knee osteoarthritis, patients who need an immediate relief before the prescription of crystalline Glucosamine Sulfate allows for an optimal symptomatic management or for patients who are receiving non-steroidal inflammatory drugs but who need also to be prescribed a background treatment to reduce the progression of the disease.

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## Posters Abstracts

P101

### FACTORS RELATED TO PATIENTS' SATISFACTION AND CLINICAL OUTCOME AFTER 5 YEARS TOTAL KNEE REPLACEMENT

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**Objective:** The effects of the clinical outcome on the patients' satisfaction after short-term uncomplicated total knee arthroplasty have been described in several studies. This study was performed to examine the influence of pain score, knee score, and function score related to the satisfaction in doing activity daily living and meet patients' expectations during a 5-y follow-up.

**Methods:** 135 patients were enrolled in this prospective study. The following pain score, knee score, and function score, patients meeting expectation and satisfaction in doing activity daily living were assessed in all patients. The primary outcome measure was postoperative pain on a numerical rating scale (0-10 cm.). The secondary outcome measures were satisfaction in doing activity daily living and meet patients' expectations. Repeated measures ANOVA were analyzed, and the differences between data were analyzed by the least significant different method. Kappa coefficient analysis was used to analyze the consistency between satisfaction and treatment outcomes.

**Results:** The pain score after 1-3 months of surgery was significantly reduced after the surgery. The function score after surgery 1-3 months has clearly increased. The pain score and function score are different from the knee score 1-3 months after surgery. Knee score increased and came back down during 6 months, 9 months, and 1 y after surgery. It remained stable for 2, 3 and 4 y after surgery. Sitting in a chair and entering or exiting the vehicle was significant increases over 9 months, 1 y, 3 y and 4 y. Walking on flat ground, and going up and down stairs were less satisfied at 1 month.

**Conclusion:** The doctor should explain to the patient that the pain will decrease 1 month after surgery. The daily activities can start 3-6 months after surgery but will still not be able to do sports activities or exercise.

P102

### SKELETAL HEALTH DETERMINANTS AND OUTCOMES AMONG CANADIANS: COMPARISON OF THE CANADIAN MULTICENTER OSTEOPOROSIS STUDY AND THE CANADIAN LONGITUDINAL STUDY ON AGING COHORTS

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**Objective:** To compare age- and sex-specific BMD, prevalent fracture patterns, osteoporosis (OP) treatment, and population characteristics in Canada over time.

**Methods:** We explored sex-specific differences in femoral neck BMD (FN-BMD), prevalent major osteoporotic fractures (MOF) in men and women 50-85 y from Canadian Multicenter Osteoporosis Study (CaMos, N=6479; 1995-1997) and Canadian Longitudinal Study on Aging (CLSA, N=19,534; 2012-2015). We created linear and logistic regression models to compare femoral neck and fracture risk between cohorts, adjusting for age and other important covariates. Among participants with prevalent MOF, we compared the use of calcium and vitamin D supplements (SUP), hormone therapy (HT), and bisphosphonates (BP).

**Results:** Mean (SD) age in CaMos (women 65.5 [8.5]; men 65.1 [8.7]) was higher than in CLSA (women 63.3 [9.0]; men 64.2 [9.1]). CaMos participants had lower mean height and BMI, and a higher prevalence of smoking than those of CLSA. Adjusted linear regression models (estimates; 95%CI) demonstrated lower FN-BMD (g/cm<sup>2</sup>) in CaMos women (-0.017; -0.021 to -0.014) and men (-0.006; -0.011 to 0.000), while adjusted odds ratios (95%CI) for prevalent MOF were higher in CaMos women (1.99; 1.71 to 2.30) and men (2.33; 1.82 to 3.00) compared to CLSA. In women with prevalent MOF, HT use was not different in CaMos vs. CLSA (43.3% vs.37.9%), but SUP use (32.0% vs. 48.3%) and BP use (5.8% vs. 17.3%) were lower in CaMos participants. In men, comparisons yielded inconclusive results.

**Conclusion:** Higher BMD, lower risk of fractures, and improvement in antiosteoporosis treatment were noted in the CLSA participants as compared to CaMos participants, even after adjusting for multiple covariates. The etiology of these differences is likely multifactorial and includes changes in lifestyle, BMI, OP treatment, and the environment.



P103

**PRIMARY HYPERPARATHYROIDISM PRESENTED WITH BROWN TUMORS**K. Groti Antonic<sup>1</sup><sup>1</sup>University Medical Center Ljubljana, Ljubljana, Slovenia

**Objective:** Report a case of primary hyperparathyroidism with parathyroid adenoma that causes brown tumors. In spite of having benign characteristics brown tumors can be confused with malign processes.

**Methods:** 58-year-old lady admitted to the endocrinology department with 2 y bone pain in legs, arms and jaw, difficulties swallowing and talking. Maxillofacial surgeon suspected jaw osteomyelitis, pathohistology showed giant cell granuloma without osteitis. CT of facial bones showed osteolytic lesions, enhanced mass and cortical destruction of jaw and cystic deformation along with bone resorption. Plain radiography of right tibia showed slowly growing tumor with osteolytic lesions of diaphysis, destruction of cortical bone reminiscent of multiple myeloma. MRI of right tibia showed additional osteolytic lesions and cystic formations. Biopsy of the mass located in the right tibia was performed, and pathohistology confirmed giant cell bone tumor. Laboratory tests showed high level of calcium so the patient was referred to endocrinology department. Patient's medical history did not reveal any nephrolithiasis or bone fractures, but the patient had a history of thyroid disease; she underwent radioactive iodine therapy two times and has been receiving thyroid hormone replacement therapy for 30 y. During the physical examination patient had body weight of 50 kg, height of 160 cm, bilateral periorbital edema, pain in the jaw (palpated mass), pain in right tibia with 1 x 2 cm palpable tumor and perimaleolar edema on both sides. Vital signs were in normal range. Arterial hypertension was confirmed. Biochemical examinations confirmed primary hyperparathyroidism with high serum PTH, high serum calcium, low serum phosphorous and low vitamin D levels. A parathyroid adenoma with 14-mm diameter, hypoechoic in appearance, located inferior of right thyroid gland was suspected on neck ultrasound. Abdominal ultrasound showed no nephrocalcinosis or nephrolithiasis. PET/CT choline confirmed multiple cystic lesions on the ribs, tibia, humerus, shoulders, hips, pelvis, ankles, right infraorbital, jaw and fingers. PET/CT choline also showed diffuse osteolytic lesions and large right parathyroid adenoma (14 mm). Plain radiography showed subperiosteal resorption of phalanges (2<sup>nd</sup>, 3<sup>rd</sup>, 5<sup>th</sup>) and osteolysis of 2<sup>nd</sup> and 4<sup>th</sup> phalanges of fingers of both hands – brown tumors. DXA showed osteoporosis with high risk for hip fracture. Patient was treated with calcimimetic Cinacalcet and has received bisphosphonate infusion (zoledronic acid). Following parathyroid adenectomy, calcium replacement was started to thwart hungry bone disease. Pathology reported 2-cm parathyroid adenoma.

**Results:** Osteitis fibrosa cystica (brown bone tumor) is a major problem in patients with secondary hyperparathyroidism, especially in cases of chronic renal failure. Long lasting parathyroid adenomas, like our case, can result in multiple brown tumors.

**Conclusion:** Brown tumors can cause pathologic fractures which can mimic malign processes. Main treatment for primary hyperparathyroidism is parathyroid adenectomy, which regresses brown tumor.

P104

**OSTEOPOROSIS IN CUSHING SYNDROME**M. Mcbride<sup>1</sup><sup>1</sup>Lancaster University, Lancaster, UK

**Objective:** The main aim of a 2020 Cushing syndrome (CS) Doctor of Philosophy study was to measure health-related quality of life (HRQoL) in members of the Pituitary Foundation UK who had been diagnosed with CS and the comorbidities which are induced by this medical condition. According to Saag et al (2021), "Glucocorticoid-induced osteoporosis (GIOP), in CS remains the most common form of drug-induced osteoporosis."<sup>1</sup> GIOP creates weaknesses in bones which are easily fractured and similar to CS, is more prevalent in women than men. One of the objectives of this recent study was to establish if any of the members had GIOP.

**Methods:** A disease specific questionnaire was circulated to 86 members and one question asked if they had been diagnosed with osteoporosis and if they had been referred for a DXA. The members HRQoL was measured using a Likert scale and thematic analysis was applied to the question related to how this condition had impacted on their HRQoL.

**Results:** The ages of the members were between 35-68 years old. The questionnaire results showed poor HRQoL scores. 36% of the female members and 2% of the men had been diagnosed with osteoporosis. 43% had a DXA scan to confirm their diagnosis and 23.8% described how that they had found an improvement in their condition after being prescribed medical therapy. Mobility disabilities were reported, and this reduced their ability to socialise and work. Health professionals' awareness in recognising the signs and symptoms of CS and early osteoporotic changes were also reported in the members statements.

**Conclusion:** This study highlighted the prevalence of osteoporosis in CS patients. Health professionals' awareness and early diagnosis would reduce the sustained burden of hypercortisolism which is a major cause of GIOP. Referral for DXA scans and using new technology such as artificial intelligence to identify early changes in bone density was recommended.

**Reference:** <sup>1</sup>Saag K et al, 2021. Marcus and Feldman's Osteoporosis, Chapter 45, Ed.5. Glucocorticoid-induced osteoporosis in Cushing syndrome: Vol. 2, pp. 1103-1138.

**Acknowledgement:** The Pituitary Foundation UK for giving permission for this study.



P105

### FUNCTIONAL OUTCOME AND QUALITY OF LIFE OF CONSERVATIVE VS. SURGICAL MANAGEMENT OF ADULT POTT'S DISEASE WITH INCOMPLETE SPINAL CORD INJURY: A PROSPECTIVE COHORT STUDY

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**Objective:** To determine the differences in functional outcome and quality of life of adult patients with Pott's disease with incomplete spinal cord injury who have undergone surgical vs. non-surgical management.

**Methods:** In this prospective cohort study, 45 patients were followed up for 1 y after undergoing pharmacologic treatment alone vs. a combination of anti-Kochs and surgery for Pott's disease. Oswestry Disability Index (ODI) and Short Form-36 (SF-36) were obtained on initiation of treatment, after 3 months, 3 months and 1 y.

**Results:** ASIA scores from onset of treatment and after 1 y significantly improved ( $p < 0.001$ ) for both nonsurgical and surgical patients. ODI scores showed significant improvement ( $p = 0.004$ ) after 6 months of treatment for both surgical (ODI  $40.56 \pm 8.31$ ) and nonsurgical (ODI  $50.81 \pm 12.43$ ) patients. At the end of 1 y for both groups, their disability classification improved from "crippled" to "moderate disability". For SF-36, patients who underwent surgery had significantly improved scores on the 3<sup>rd</sup> month of treatment in the following domains: physical function ( $p = 0.002$ ), physical role limitation ( $p < 0.001$ ), emotional role limitation ( $p < 0.001$ ), social functioning ( $p = 0.003$ ) and health change ( $p < 0.001$ ). After 1 y of treatment, patients in both groups ( $p < 0.001$ ) were noted to have significant improvement

**Conclusion:** Significant improvement with regards to functional outcome and quality of life was noted from both surgical and non-surgical patients after 1 y of treatment, with earlier improvements and better final scores in SF-36 and ODI in patients who underwent surgery.

P106

### BIFIDOBACTERIUM LONGUM ALLEVIATES BONE LOSS AND MAINTAINS BONE HEALTH BY MODULATING THE BREGS-TREGS-TH17 CELL AXIS IN OVX MICE

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**Objective:** Probiotics are known to be involved in the management of various inflammatory diseases including osteoporosis. Several studies along with ours reported that probiotics mediate their health promoting effects by regulating Treg- $Th17$  immune cell balance in the host. Furthermore, various studies demonstrated that Tregs- $Th17$  immune cell balance can be further regulated by regulatory B cells (Bregs) in the host. But no study to date had delineated the Bregs-Tregs- $Th17$  cell axis in case of osteoporosis, i.e., "immunoporosis". Moreover, no study investigated the immunomodulatory potential of *Bifidobacterium longum* (BL) in regulating bone health. The present study aimed to examine the effect of probiotic BL on bone health via modulation of host Bregs-Tregs- $Th17$  cell axis in Ovx mice.

**Methods:** To investigate the direct role of BL in regulating bone health, we firstly assessed the ability of BL to modulate osteoclastogenesis and functional activity of bone marrow-derived osteoclasts at different ratios of BL-cell free conditioned media (BL-CM) at 1:100, 1:10, and 1:5 ratios. Then we performed TRAP and F-actin ring polymerization assays. Also, we evaluated the potential of BL to directly modulate differentiation of naïve T cells into Tregs and  $Th17$  and naïve B cells into Bregs. Furthermore, we assessed the ability of BL-induced Bregs in modulating osteoclastogenesis along with inducing Tregs and  $Th17$  cell differentiation under in vitro conditions. Moving ahead, we also monitored the osteoprotective effect of BL on bone health in ovariectomy induced osteoporotic mice model under in vivo conditions. For the same, 18 female C57BL/6 mice of 8-10 weeks were divided equally into three groups as sham/control group, Ovx group, and Ovx+BL group (received  $10^9$  cfu/ml/d BL orally) for a period of 45 d. At the end of the experiment, mice were sacrificed and tissues analyzed for various parameters to access the role of BL administration on bone health by using several cutting edge technologies such as SEM, AFM,  $\mu$ CT, FACS, and ELISA.

**Results:** Our in vitro results indicated that BL-CM inhibits osteoclastogenesis in a dose-dependent manner by reducing the development of multinucleated TRAP-positive osteoclasts. It also reduced the functional activity of osteoclasts. Excitingly, our flow cytometric data revealed that BL enhanced the differentiation of naïve T cells into  $CD4^+Foxp3^+$  Tregs with simultaneous reduction of  $CD4^+Roryt^+$   $Th17$  cells differentiation. Moreover, BL also enhanced the differentiation of naïve B cells into Bregs. Interestingly, our coculture experimental data suggested that BL enhances the antiosteoclastogenic and suppressive ability of Bregs. Moreover, our in vivo data suggested that administration of BL attenuated bone loss in Ovx mice. Both the cortical and trabecular bone content of the Ovx+BL treated group was significantly higher than Ovx group. Remarkably, the percentage of osteoclastogenic  $CD4^+Roryt^+$   $Th17$  cells at distinct immunological sites such as bone marrow, mesenteric lymph nodes (MLN), and Peyer's patches were significantly reduced ( $p < 0.01$ ), whereas the percentage of antiosteoclastogenic  $CD4^+Foxp3^+$  regulatory T cells (Tregs); was significantly enhanced ( $p < 0.01$ ) in BL treated group, thus resulting in inhibition of bone loss. Moreover, BL administration also significantly ( $p < 0.01$ ) enhanced population of  $CD19^+CD1d^{hi}CD5^+$  Bregs in Ovx+BL group. The immunomodulatory role of BL was further supported by serum cytokine data with a significant reduction

in proinflammatory cytokines (IL-6, IL-17, and TNF $\alpha$ ) along with enhancement of anti-inflammatory cytokines (IL-10, IFN $\gamma$ ) in BL treated group.

**Conclusion:** We propose for the first time that the osteoprotective role of BL on bone health is mediated via its effects on the immunoporotic Bregs-Treg-Th17 cell axis which further regulates osteoclastogenesis. The present study thus highlights the potential of probiotic BL as a novel osteoprotective agent in the treatment and management of bone-related diseases including osteoporosis.

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## P107

### POSTOPERATORY SUPPRESSIVE THERAPY WITH LEVOTHYROXINE FOR PAPILLARY THYROID CARCINOMA: LONG TERM BONE ISSUES

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**Objective:** Bone mass loss and osteoporosis can be associated with suppressive therapy with levothyroxine (LT4) and thyrotoxic states, which induce accelerated bone turnover, causing a negative bone formation and resorption balance. Loss of bone mass in postmenopausal women further contributes to high fracture risk. Moreover, postoperative hypocalcemia might have a negative impact on mineral metabolism. (1-5) We aim to introduce a female patient with high risk papillary thyroid carcinoma (TC) receiving suppressive therapy with LT4 and subsequent osteopenia.

**Methods:** Case report.

**Results:** A 72-y female known with postoperative hypothyroidism and hypocalcemia for TC (also treated with radioiodine therapy I<sup>131</sup>-75 mCi) has a history atrial fibrillation, dyspepsia, dyslipidemia, hypovitaminosis D, kidney stones; she is under suppressive LT4 regime (125  $\mu$ g/d) since last 4 decades. 4 y ago DXA showed: lumbar L1-4:BMD=0.077g/cm<sup>2</sup>, T-score=-0.9SD, Z-score=0.4SD; femoral neck BMD=0.925g/cm<sup>2</sup>, T-score=-0.8SD, Z-score=0.5SD; total hip BMD=0.981g/cm<sup>2</sup>, T-score=-0.2SD, Z-score=0.8SD. Bone turnover markers (BTM) revealed osteocalcin=23.52 ng/mL (N:5-46), CrossLaps=0.31 ng/mL (N:0.33-0.782), P1NP=47.45 ng/mL (N:20.25-76.31). Additional effects of LT4 are confirmed by TSH=0.47  $\mu$ UI/mL (normal:0.5-4.5), FT4=13.47 pmol/L (N:9-19) with negative thyroglobulin. 25-hydroxyvitamin D is 33.5 ng/mL (N>30) under cholecalciferol 1000U/d. Recently she suffered a single lumbar (low trauma) fracture with stationary BMD-DXA: L1-4 BMD=1.104 g/cm<sup>2</sup>, T-score=-0.6SD, Z-score=0.6SD; femoral

neck BMD=0.941g/cm<sup>2</sup>, T-score=-0.7SD, Z-score=0.7SD; total hip BMD=0.979g/cm<sup>2</sup>, T-score=-0.2SD, Z-score=0.9SD. BTM showed P1NP=39 ng/mL (N:20.25-76.31). PTH was normal 48.43 pg/mL (N:15-65). She had low DXA-TBS of 1.077. Thyroid panel confirmed suppressive therapy TSH=0.5  $\mu$ UI/mL (N:0.5-4.5). Weekly alendronate was recommended plus vitamin D supplements.

**Conclusion:** Whether TBS is a stronger predictor of osteoporotic fractures than DXA-BMD in iatrogenic thyrotoxicosis is an open issue. The risk of osteoporosis and fragility fractures in a postmenopausal patient with long term LT4 suppressive therapy for TC is increased, making periodical assessment of bone status an essential aspect. Other medication against potential LT4-related cardiovascular issues like anticoagulants might also have a negative impact on fracture risk.

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## P108

### WHEN SHOULD HANDGRIP STRENGTH BE MEASURED TO PREDICT FUNCTIONAL OUTCOME IN HIP FRACTURES?

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**Objective:** To investigate the relationship between handgrip strength (HGS) and functional outcomes in patients with hip fracture and to determine the best timing to measure HGS.

**Methods:** This was an observational study at a single institution with 79 such patients analyzed prospectively. HGS was measured at admission (preoperative) and at 1 wk postfracture (postoperative). We evaluated walking ability using Koval scores and quality of life with the European Quality of Life Five Dimension (EQ-5D) scale at pre-injury and 3, 6, and 12 mo postoperatively. We analyzed the relationship between pre/postoperative HGS and functional outcomes and compared the functional outcomes between the "Low strength" and "Normal" groups, based on pre/postoperative HGS.

**Results:** Both preoperative and postoperative HGS had significant correlations with the postoperative 6- and 12-mo HGS and Koval scores (P<0.05). Postoperative HGS was more strongly correlated than preoperative HGS. Postoperative HGS was correlated with the EQ-5D score at postoperative 3-mo and with the EQ-5D and Koval scores at postoperative 6- and 12-mo. The incidence of low strength was 78.5% and 70.9%, respectively, based on preoperative and postoperative HGS. The "Low strength" group based on

preoperative and postoperative HGS showed poor Koval scores and EQ-5D at postoperative 12 mo and poor functional outcomes earlier in the follow-up (postoperative 6- and 12-mo Koval scores and postoperative 3-, 6-, and 12-mo EQ-5D), respectively.

**Conclusion:** Both preoperative and postoperative HGS reflected functional outcomes of patients with hip fracture during the 12-mo follow-up. Postoperative HGS had a higher prognostic value than did preoperative HGS.

## P109

### QUANTITATIVE DIAGNOSIS & SCREENING OF OSTEOPOROSIS USING ABDOMINAL COMPUTED TOMOGRAPHY SCANS OBTAINED FOR OTHER INDICATIONS

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**Objective:** Osteoporosis is a prevalent condition in current developing era but undiagnosed or underdiagnosed condition in especially developing countries like India. The study aim was to evaluate CT-derived BMD assessment compared with DXA measures for identifying osteoporosis by using CT scans performed for other clinical indications.

**Methods:** It was a cross-sectional study. A Total of 1867 adults undergoing CT and DXA (n=2067 pairs) within a period over 5 y. CT-attenuation values (in Hounsfield units [HU]) of trabecular bone between the T12 and L5 vertebral levels, with an emphasis on L1 measures (study test); DXA BMD measures (reference standard). Sagittal CT images assessed for moderate-to-severe vertebral fractures.

**Results:** CT-attenuation values were significantly lower at all vertebral levels for patients with DXA-defined osteoporosis (P<0.001). An L1 CT-attenuation threshold of 160 HU or less was 90% sensitive and a threshold of 110 HU was more than 90% specific for distinguishing osteoporosis from osteopenia and normal BMD. Positive predictive values for osteoporosis were 68% or greater at L1 CT-attenuation thresholds less than 100 HU; negative predictive values were 99% at thresholds greater than 200 HU. Among 119 patients with at least 1 moderate-to-severe vertebral fracture, 62 (52.1%) had nonosteoporotic T-scores (DXA false-negative results), and most (97%) had L1 or mean T12 to L5 vertebral attenuation of 145 HU or less. Similar performance was seen at all vertebral levels. Intravenous contrast did not affect CT performance.

**Conclusion:** Abdominal CT images obtained for other reasons that include the lumbar spine can be used to identify patients with osteoporosis or normal BMD without additional radiation exposure or cost. The potential benefits and costs of using the various CT-attenuation thresholds identified were not formally assessed.

## P110

### SUBLAMINAR MERSILENE TAPE AUGMENTED PEDICLE SCREWS FIXATION FOR OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURE: NOVEL & LOW-COST MODALITY

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**Objective:** The study purpose was to assess the safety and efficacy of sublaminar mersilene tape augmented pedicle screws fixation as a novel and low-cost modality for osteoporotic vertebral compression fractures (OVCFs) instrumentation fixation.

**Methods:** A retrospective study of 40 consecutive patients of the OVCFs. All patients were operated with open decompression, pedicle screw fixation, and sublaminar mersilene tape augmentation. Preoperative and postoperative clinical (VAS, modified Oswestry disability index [M-ODI], neurologic deficit, revision surgeries, and infection) and radiological (axial collapse, fracture union, implant failure/back out,) parameters were compared to describe the utility of sublaminar mersilene tape augmented pedicle screws for OVCFs treatment.

**Results:** Compete neurological improvement was noted in 38 patients and two patients had Frankel Garde D neurology. The mean VAS was significantly improved from preoperative 8.98±0.60 to 2.76±0.54, final follow-up and M-ODI from 80.10±6.90 to 15.30±6.90. The mean local kyphosis angle was improved from 23.20°±5.90° preoperative to 5.30°±3.9° postoperatively and 3.30°±2.50° loss of correction at final follow-up. There was no pseudoarthrosis and implant failure noted. No iatrogenic dural or nerve injury.

**Conclusion:** Sublaminar mersilene tape augmentation relies on the lamina for its hold, which is the strongest part of an osteoporotic vertebra. Sublaminar mersilene tape augmented pedicle screws fixation is a novel and low-cost modality for OVCFs. It provides significant improvement in clinical and radiological outcomes. This technique is an easy learning curve, user friendly and safe, which makes this a viable alternative option for OVCFs fixation.

P111

### EPIDEMIOLOGY OF OSTEOPOROSIS IN WESTERN PART OF INDIA AND INFLUENCE OF ENVIRONMENTAL FACTOR ON OSTEOPOROSIS

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**Objective:** Osteoporosis is a one of the leading challenge and its burden is increasing very fast in developing country like India. The study aim was to study the prevalence of osteoporosis and vitamin D deficiency in western Indian women and to explore the influence of various life style factors on BMD.

**Methods:** It is an observational study conducted on 3287 women with age above 45 y. These patients were selected from Mumbai-western region of India. The assessment of bone density was done by using quantitative ultrasound technique at heel. The physical activity, risk factors in the FRAX tool, vitamin D, and PTH were assessed.

**Results:** Overall prevalence of osteoporosis in women above 45 y of age was 43.33%. The prevalence was highest among executive job group (55.2%) and least among tribal women (31.08%). 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.

**Conclusion:** A significantly large proportion of western Indian population had osteoporosis and vitamin D deficiency. The prevalence of osteoporosis is rising very fast with increase in sedentary life style and nutritional hazards. Environmental factors clearly impact the occurrence of osteoporosis in different subset of population. Further interventional studies are needed to look at reduction in end points like fractures in these subjects.

P112

### IL-17A AND IL-23 CYTOKINES AND THEIR RELATION TO ESTROGEN IN POSTMENOPAUSAL OSTEOPOROSIS

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**Objective:** Estrogen deficiency is now considered a postinflammatory state as it has been associated with the elevation of various cytokines like IL-1, IL-6 and TNF $\alpha$ , responsible for osteoclastogenesis. The role of IL-17 has been established in various

inflammatory and autoimmune disorders associated with bone loss, we evaluated the levels of IL-17 with respect to estrogen in postmenopausal women with and without osteoporosis.

**Methods:** Total 150 postmenopausal females with mean age (58.17 $\pm$ 5.94), between the age group 45-75 y, were recruited. Females with a history of natural menopause at least one year after the onset of menopause were enrolled. All patients underwent BMD measurement through DXA scan and were divided into two groups, Group A patients with osteoporosis and Group B without osteoporosis. Serum levels of IL-17, IL-23 levels, and estrogen levels were measured by standard quantitative sandwich ELISA kits.

**Results:** Group A patients level of IL-17 (48.49 $\pm$ 8.34 pg/ml) and IL-23 (91.28 $\pm$ 9.89 pg/ml) was significantly higher than in group B patients with a level of IL-17 (19.55 $\pm$ 7.11 pg/ml), IL-23 (44.56 $\pm$ 11.36 pg/ml), while that of estrogen was significantly low in group A (31.80 $\pm$ 12.57 pg/ml) in comparison to group B (40.39 $\pm$ 20.88 pg/ml).

**Conclusion:** We observed lower level of estrogen is associated with higher levels of inflammatory cytokines IL-17 and IL-23, thus further strengthening the concept that postmenopausal osteoporosis is an inflammatory disorder as estrogen deficiency results in elevation of inflammatory cytokines.

P113

### FOUR-YEAR RESULTS OF KNEE OSTEOARTHRITIS SELF-MANAGEMENT PROGRAM (PARQVE)

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**Objective:** To evaluate the long-term effects of the self-management program PARQVE in patients with knee osteoarthritis (KOA).

**Methods:** A prospective 4-y cohort with 95 grades II and III Kellgren & Lawrence (K&L) KOA patients who participated in two Saturdays of OA self-management program taking home written and visual material. Standing X-rays were obtained at inclusion and Ahlback's classification were registered. WOMAC, weight and BMI were obtained at inclusion, 6, 12, 24, 36 and 48 months. Timed Up and Go (TUG) and five-times-sit to stand test (FTSST) were obtained up to 36 months.

**Results:** WOMAC pain, function and total improved from baseline to all other moments (p<0.001). WOMAC function and total lost some of the results between 2 and 3 y, improving again at year 4. WOMAC stiffness results were only significant between baseline and 6 (p=0.001) and 12 months (p=0.01). On average, WOMAC total and subsets scores reached minimally clinically important difference in all moments. Nonsignificant improvements were observed without changes in body composition (P>0.05).



**Conclusion:** The OA self-management program (PARQVE) offers consistent improvement in pain, function and quality of life.

## P114

### EFFECTS OF KNEE OSTEOARTHRITIS SELF-MANAGEMENT PROGRAM (PARQVE) AFTER TWO YEARS OF USUAL CARE

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**Objective:** To evaluate the effects of the self-management program PARQVE in patients with knee osteoarthritis (KOA) already receiving standard care.

**Methods:** A prospective 4-y cohort with 96 grades II and III Kellgren & Lawrence (K&L) KOA patients submitted to usual care for 2 y and then invited to participate in 2 d, 2 months apart of OA self-management program and followed once yearly for 2 y. WOMAC, weight, BMI, Timed Up and Go (TUG) and five-times-sit to stand test (FTSST) were obtained at inclusion, 6, 12, and 24 months.

**Results:** WOMAC pain, function and total improved from baseline to all other moments ( $p < 0.001$ ). In respect to baseline, after two years of standard care patients had reached minimally clinically important difference (MCID) in WOMAC pain, stiffness and total (not function). One year after intervention all WOMAC total and subsets results reached MCID losing partial gains at 2 y ( $p < 0.001$ ). Similar significant improvements in body composition, TUG and FTSST were observed ( $p > 0.001$ ).

**Conclusion:** The adding of a classroom interactive OA self-management program (PARQVE) offers relevant improvement in pain, function and quality of life to patients already in standard care to KOA.

## P115

### COMPARING CLINICAL AND ECONOMIC OUTCOMES OF DENOSUMAB AND TERIPARATIDE MEDICATIONS IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS 10 YEARS EXPERIENCE

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**Objective:** Although therapeutic options for osteoporosis have expanded greatly over the past few decades, no single agent is able to restore skeletal integrity in most patients with advanced disease. Biologics are substantially more expensive than their conventional counterparts, but it is unclear whether extra costs deliver better health outcomes. We compare clinical and economic outcomes between teriparatide daily subcutaneous administration (monthly costs 505 \$) and denosumab six monthly subcutaneous administration (monthly costs 43 \$) among postmenopausal women with osteoporosis for 10 y.

**Methods:** From a 50% random sample of patients followed in osteoporosis clinic at Alnoor Specialist Hospital, we selected women newly diagnosed with osteoporosis, 9154 cases between 1 January 2010 till 1 July 2021 and who initiated teriparatide or denosumab after the diagnosis. We followed them up until one of these events: switching osteoporosis treatment, death, or the end of study period – end of October 2021. Clinical outcomes included hip fracture, vertebral fracture, fracture of radius, ulna or carpal bones, other upper limb fractures, other lower limb fractures and any fracture. Economic outcomes included medical costs, pharmacy costs, and total costs associated with osteoporosis. Using conventional propensity score, high-dimensional propensity score and instrumental variable analysis, we constructed Cox proportional hazards models to evaluate the risk of fracture and two-part models to compare costs.

**Results:** Teriparatide users had higher risk of fracture and higher costs, compared with similar denosumab users. The hazard ratios of fracture for teriparatide relative to denosumab ranged from (1.21-3.12), depending on methods. There was no difference in the risk of hip fracture between treatment groups. Total annual costs related to osteoporosis were higher for teriparatide users.

**Conclusions:** Teriparatide is more expensive yet less effective than treatment with denosumab in postmenopausal osteoporosis with no difference of hip fracture prevention between treatment groups.

## P116

### FIRST YEAR OF FRACTURE LIAISON SERVICE AT ALNOOR SPECIALIST HOSPITAL, HOLLY MAKKAH, SAUDI ARABIA

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**Objective:** We presented the first-year experience of the recently established fracture liaison service at Alnoor Specialist Hospital. Our main aim, according to Capture the Fracture Project, was to create a multidisciplinary approach, between Orthopedics and other departments specifically the rehabilitation center, for secondary fracture prevention.



**Methods:** Since February 2020 to January 2021 we evaluated 200 patients admitted to Traumatology Unit for fragility fractures (80 males, 120 females). Median age was 80 y (IQ range 71-85, minimum 60 and maximum 95 y).

**Results:** Bone localization of fractures were as follows: 100 (50%) proximal femoral fractures, 40 (20%) diaphyseal femoral fractures and 40 proximal humerus fractures (20%). The remaining 10 patients suffered from distal radial fractures requiring surgery. The common mayor fractures risk factors were frequently detected: smoking habits (actually or in the past) was reported by 50% of patients, fragility fracture familiarity was stated in 21% of patients, diabetes mellitus was present in 17% of patients, nephrolithiasis in 8%, and 7% of patients were actually or previously treated with corticosteroids (>5 mg/d for >3 months). Moreover, overt malabsorption was reported in 3%; early menopause (before 45 y of age) occurred in 5% of women. Half of the patients had comorbidities and were on multidrug treatment with >3 medications. An anamnestic previous fragility fracture was reported in 50 patients (25%), and among these, only 25 patients (12%) received any antiosteoporosis treatment for secondary fracture prevention. Anatomical site of previous fragility fractures was distal radial (32%), proximal femur (29%), vertebra (24%) and humerus (15%). Among all evaluated patients, only 51 patients (26%) were supplemented with vitamin D. Moreover, 27 patients (14%) experienced fragility fractures during osteoporosis treatment (mainly denosumab) and one patients presented atypical diaphyseal fractures associated with long-term (10 y) treatment with alendronate. We finally compared fractured patients younger than 70 y (n=46) and older than 70 y (n=144). Localization of fractures and main clinical characteristics were similar in the two groups.

**Conclusion:** These preliminary data from real-life clinical experience in a single center traumatology unit suggested that about half of hospitalized patients were experiencing a further fragility fracture, and among these only one third received any antiosteoporosis treatment for secondary fracture prevention. Sensitivity towards refractured risk is low and the fracture liaison model should be promoted in orthopedic division among the trauma center nationally.

## P117

### GYNECOLOGICAL DISORDERS IN PATIENTS WITH OSTEOPOROSIS

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**Objective:** Osteoporosis is a disease of low BMD which can result in a greater risk for fragility fractures and musculoskeletal deformities. It is especially prevalent in postmenopausal women and thus it can be associated with gynecological disorders. The

aim of our study was to evaluate gynecological disorders and history in osteoporotic women presented at two rheumatology outpatient centers.

**Methods:** This was a retrospective study that included 251 female patients older than 35 years old, with osteoporosis (T-score < 2.5). They were asked about their life history, a number of past abortions, parity number, age of first birth, age of menopause setting, and history of hysterectomy.

**Results:** After evaluating all data, it was found that the average number of abortions was 2 and the average parity number was 3. It was found that the higher the number of births, the lower the T-score (eventually, the higher the fracture risk) (p=0.001). Patients that had given birth to an advanced age (>30 years old), had a lower T-score, thus a higher fracture risk (p<0.05). Women with a premature menopause setting (<45 years old) had a higher fracture risk with a lower T-score (p=0.001). Of 251 women included in this study, 39 (15.5%) had a history of hysterectomy.

**Conclusion:** In this study it was observed a strong relationship of osteoporosis with various gynecological disorders and some specificities like parity or first birth age. It was found that the more births, the older at first birth, the younger during menopause setting, the higher fracture risk. It was found also a considerable percentage of women with osteoporosis and past hysterectomy history.

## P118

### MOTION CHARACTERISTICS OF VERTEBRAL SEGMENTS WITH LUMBAR DEGENERATIVE SPONDYLOLISTHESIS IN ELDERLY PATIENTS VS. ADULT PATIENTS

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**Objective:** Spondylolisthesis refers to the forward displacement of one vertebra relative to another. Degenerative spondylolisthesis typically occurs at the level of L4-L5. It is then most likely at L3-L4, followed by L5-S1. Older people are most commonly affected. It is four times more likely to occur in women than men. This research is to study the in vivo motion characteristics of the lumbar vertebral segments with lumbar degenerative spondylolisthesis during weight-bearing activities in elderly patients vs. adult patients.

**Methods:** In this prospective study, 60 patients with lumbar degenerative spondylolisthesis were included. Thirty patients were elderly with mean age 72.2 y, while the other 30 patients were adults with mean age 45.4 y. Vertebral kinematics was obtained using a combined MRI/CT and dual fluoroscopic imaging technique. During functional postures (supine, standing upright, flexion, and extension), disc heights, vertebral motion patterns and

instability were studied. The cases were randomly chosen without privilege to sex, or weight, but all share the fact that they suffer from midline low back pain that has been proven to be attributed to spondylolithesis.

**Results:** Posterior disc heights were significantly smaller in elderly patients group than in adult group under all postures. Anterior disc heights were smaller in elderly group than in adult group; however, the differences were only significant at standing upright. The ranges of different vertebral motion patterns of both groups were much less than the reported criteria of lumbar spine instability. However, the range of motions were also much less in elderly group than in adult group.

**Conclusion:** Our study showed that the lumbar vertebrae with degenerative spondylolithesis in elderly patients has disordered motion patterns more than in adult patients. This may be resulted in vertebral instability, and surgical reinstabilization should be planned accordingly.

## P119

### EVALUATION OF SPINAL FIXATION CLINICAL TRAINING COURSE FOR YOUNG NEUROSURGEONS AND ITS IMPACT ON SURGICAL OUTCOME

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**Objective:** Surgical skills are a cornerstone in improvement of surgical outcome. This study was conducted to evaluate a clinical training course of spinal fixation for young neurosurgeons and its impact on their surgical outcome.

**Methods:** The study included 14 of young neurosurgeons at Benha Faculty of Medicine (7 lecturers and, 7 assistants lecturers). The evaluation items included surgical duration, incidence of complications, and patients improvement and satisfaction. We compared these items during 6 months pre- and post-implementation of the clinical training course. The course was implemented in 7 d (2 d of lecturers and 5 d of clinical training).

**Results:** The study results revealed that the implementation of this training course resulted in improvement of young neurosurgeons clinical skills which reflected on statistically significant improvement of all items of their surgical outcome, and significant decrease in surgical duration.

**Conclusion:** The introducing of this spinal fixation clinical training course can improve clinical skills and surgical outcome of young neurosurgeons.

## P120

### PROGNOSTIC FACTORS OF SURGERY FOR CERVICAL CORD TUMORS

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**Objective:** Spinal cord tumors represent 10-15% of central nervous system neoplasms. In adults, two-thirds of these tumors are extramedullary and the remaining third are intramedullary. Approximately 36% of tumors were located in the cervical cord. We aim to outline the prognostic factors that affect the final outcome of cervical cord tumor surgeries.

**Methods:** 61 patients with cervical spinal cord tumors underwent surgery between March 2019 and March 2021, 38 men and 23 women, ages are 2-76) y with a mean age of 41 y. The neurological status before surgery, 1 month after the operation and at the most recent examination were assessed based on the grading system of McCormick outcome of the neurological status in the long term follow-up period, estimated comparing the preoperative neurological status and the most recent status, was classified into "improved", "unchanged", "deteriorated" and "death". The 61 patients were divided according to the histopathological diagnosis.

**Results:** There were 22 ependymoma (36.1%), 13 schwannoma (21.3%), 12 meningioma (19.7%), 6 neurofibroma (9.8%), 3 astrocytoma (4.9%) and 5 other pathologies collectively (8.2%). We have 75% of patients with total resection, 11.4% subtotal and 13.1 partial resection or biopsy. We had 37 patients improved (60.7%), 13 patients with no change (21.3%). 10 patients deteriorated (16.4%) and 1 died (1.6%). By statistical analysis we found significant correlation between postoperative outcome and the tumor grade ( $P=0.015$ ) as overall results for all grades from 1- 4, the less the grade the better outcome. We found a significant correlation between the preoperative state and the final functional outcome, that, the better the preoperative state the better outcome. There is statistically relevant correlation between the recurrence and the degree of resection.

**Conclusion:** The spinal cord tumors can be treated safely and effectively by surgery. Total resection must be the essential aim before surgery and must be tried whenever possible. Preoperative neurological state, pathological type, pathological grades, and degree of resection are the most important factors that affected the final outcome.

P121

### MOTION CHARACTERISTICS OF THE VERTEBRAL SEGMENTS WITH LUMBER DEGENERATIVE SPONDYLOLISTHESIS IN ELDERLY PATIENTS

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**Objective:** Spondylolisthesis refers to the forward displacement of one vertebra relative to another. This study compared the clinical results of lumbar decompression vs. lumbar decompression with bilateral pedicle screw fixation and posterolateral fusion in elderly patients with lumbar degenerative spondylolisthesis (DS).

**Methods:** 30 patients (age>55 y) with lumbar DS with failed conservative measures for at least 3 months before surgical treatment were included. Vertebral kinematics obtained using plain X-ray; also MRI and/or CT scan of lumbosacral spine were done. During functional postures, vertebral instability was studied. All cases operated upon from May 2018 to December 2018 in neurosurgery department of Benha University Hospital and followed up 6 months at least. Patients grouped into 2 groups according to vertebral instability: group A (15 cases) and group B (15 cases), cases chosen without privilege to sex, or weight, but suffering from midline low back pain and/or claudication that were proven to be attributed to spondylolisthesis.

**Results:** Adequate lumbar decompression alone in cases of group A (with no evident range of motion) showed good outcome with less complications when compared with cases of group B (showing instability) treated with decompression with posterolateral instrumented fusion using bilateral pedicle screw fixation.

**Conclusion:** Lumbar DS is a degenerative disease of lumbar spine results in neural compression but does not result necessarily in vertebral instability, some cases of lumbar DS may need only neural decompression as restabilization process may have occurred but other cases show instability which required decompression with instrumented fusion.

P122

### EVALUATION OF A COMPUTER-BASED TRAINING COURSE FOR DEVELOPING THE ADMINISTRATIVE KNOWLEDGE AND SKILLS OF NEUROSURGICAL RESIDENCES

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**Objective:** Computer-based training (CBT) has become widely accepted in medical education as a useful means of acquiring knowledge and skills. This study evaluated the effectiveness of teaching clinical course by using CBT in developing administrative knowledge and skills of neurosurgical residents-interns at two centers of neurosurgery.

**Methods:** This prospective study included 30 neurosurgical residents in 4 neurosurgical centers. Clinical administrative course using CBT was designed and implemented by the researcher. Then we evaluate and assess the effect of the course on interns' administrative knowledge and skills, interns' attitude towards CBT, and interns' preference for CBT or traditional classroom training (TCT). The interns were divided into 2 groups; a control group (15) and a study group (15). Tools used for data collection were administrative knowledge test, administrative skill scale, attitude toward CBT questionnaire, and preference for TCT or CBT questionnaire.

**Results:** The study group had statistically significant higher mean scores regarding their immediate and follow-up administration knowledge and skills than the control group. The interns had positive attitude towards CBT; however, their slightly higher preference for CBT over TCT is statistically insignificant.

**Conclusion:** Change the educational programs for young neurosurgeons into electronic courses can be useful for improving their administrative knowledge and skills. Also it can encourage young neurosurgeons to be self-learners as well as lifelong learners.

P123

### ROLE OF ANTERIOR APPROACH IN MANAGEMENT OF POST-TRAUMATIC CERVICAL FACET DISLOCATION: SHORT TERM FOLLOW-UP

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**Objective:** Facet dislocation constituted an important subgroup of cervical spine injuries that result from flexion-rotation or flexion-distraction injury. Management of cervical spine dislocations represents an area of substantial controversy regarding the appropriate diagnostic work-up and the available treatment options either conservative or surgical. Anterior cervical approach is an option for treatment of cervical spine facet dislocations. This study evaluated the efficacy and safety of anterior cervical stabilization in treatment of cervical facet dislocation and to review the specific areas of controversy generated by this issue.

**Methods:** Ten patients with single level cervical facet dislocation were admitted in the Dept. of Neurosurgery, Benha University in the period between January 2019 and December 2020. Seven male and 3 female patients who ranged in age from 18-50 y (average 32.1 y). Six patients presented with unilateral cervical facet

dislocation and 4 patients with bilateral cervical facet dislocation. The level of facet dislocation was C5–6 in four, C6–7 in two, C3–4 in two and C4–5 in two patients. Three patients presented with a complete spinal cord injury (SCI), 2 patients with an incomplete SCI, 4 with radicular symptoms, and 1 patient was neurologically intact. All patients underwent CT evaluation of the cervical spine. Plain radiography and preoperative MRI cervical spine were not routinely done but tailored according to patient's condition. Decompression, reduction, and stabilization of the cervical spine via the ventral approach was accomplished in all cases.

**Results:** Adequate decompression of neural tissue by satisfactory reduction of deformity and meticulous discectomy was achieved in all patients, followed by fixation using anterior plate. Postoperative neurological status was unchanged in 3 patients and improved in 4 patients, 1 patient died due to respiratory compromise caused by diaphragmatic paralysis that was present preoperatively. There was no deterioration of preoperative neurological function. The only complication related to the approach was transient recurrent laryngeal nerve palsy encountered in one case.

**Conclusion:** Anterior only cervical approach is effective and reliable alternative for decompression, reduction, and stabilization of the dislocated cervical spine facets in selected patients.

## P124

### SARCOPENIA IN PATIENTS WITH HEART FAILURE

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**Objective:** Sarcopenia has been recently identified as a comorbidity in patients with heart failure (HF). Whether sarcopenia affects prognosis in noncachectic HF patients is unknown. This study assessed the determinants of sarcopenia and its prognostic value in elderly males with HF.

**Methods:** A total 146 non diabetic, noncachectic, male patients with HF left ventricular ejection fraction 29±8%) were included. Sarcopenia was evaluated in accordance with revised definition of European working group on sarcopenia in older people 2 from 2018.

**Results:** 28 (19%) and 26 (18%) patients were diagnosed with presarcopenia and sarcopenia, respectively. They were older compared to nonsarcopenia patients (142±6 and 146±6 vs. 65±7, p<0.0001), with inferior physical performance expressed by 6-min walking distance (367±73 and 360±95 vs. 430±74 m, p=0.003). Patients with sarcopenia presented with lower BMI (25/3 vs. 29/6 kg/m<sup>2</sup>, p=0.014) along with more prominent wasting of bone compartment expressed by reduced total bone mineral content (p=0.002). Creatinine clearance was significantly reduced, while NT-proBNP (log-transformed) was higher in patients with presarcopenia/sarcopenia compared to nonsarcopenia subgroup (p=0.001 and p=0.039, respectively). A total of 82 (56%) pa-

tients died within 6 s of follow-up. Kaplan-Meier survival analysis showed impaired survival in patients with presarcopenia/sarcopenia (p=0.001). In univariate Cox regression analysis determinants of all-cause mortality were: age, NT-proBNP (log-transformed), left ventricular ejection fraction, creatinine clearance and presence of sarcopenia (all p<0.05). In multivariate Cox regression analysis, NT-proBNP (HR 3.000 (95%CI 1.589-5.665), p=0.001), and presence of sarcopenia (HR 0.500 (95%CI 0.241-1.038), p=0.063) were independent determinants of all-cause mortality after 6 y of follow-up.

**Conclusion:** The rate of presarcopenia and sarcopenia was high in noncachectic, elderly men with HF, and these patients have impaired survival compared to the patients with normal skeletal muscle status.

## P125

### EXPERIMENTAL SUBSTANTIATION OF THE EMERGENCE OF EARLY ONSET OSTEOARTHRITIS IN INDIVIDUALS WITH JOINT HYPERMOBILITY

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**Objective:** The urgency of the problem of joint hypermobility is determined, in particular, by the high risk of early onset osteoarthritis. We studied joint morphology using hip joints of Wistar rats in norm and after antigenic stimulation. The last one was modeled through the transuterine intrafetal interscapular subcutaneous injection of antigen (0.05 ml of human normal immunoglobulin) for the rat fetus on the 18th day of its antenatal life under general anesthesia and sterile conditions via laparotomy for the pregnant female (Voloshyn's method 1981). The control group of rats was injected with 0.05 ml of physiological saline in the same manner.

**Methods:** Joints were fixed, decalcified and dehydrated. Paraffin embedded tissue specimens were stained by Mallory's trichrome and Hart's elastin stains. Components of the joint capsule were analyzed by light microscopy (x100) using the intersection point counting method. The obtained data were statistically processed. The parameters of intact and control rats did not differ significantly from each other.

**Results:** In the joint capsule of antigen-suppressed rats, we found a decreased total quantity of collagen fibers through the arranged collagen fibers (till the 60<sup>th</sup> day) together with an increased number of elastic fibers, disarranged collagen fibers (till the 45<sup>th</sup> day) and ground substance (till the 14<sup>th</sup> day). These phenomena could be regarded as the morphological substrate for the joint capsule hypermobility. Our previous studies have also revealed an increased quantity of fucose conjugates (30-45<sup>th</sup> day) in the antigen-suppressed articular cartilage, which is typical for immature tissues. Together with a decreased number of collagen fibers, it could create preconditions for strength reduction and functional



weakness of the joint, thereby contributing to the increased joint wear and early onset osteoarthritis. Along with that, we detected a decreased elasticity of the joint capsule (decreased number of elastic fibers from the 60<sup>th</sup> day) in antigen-suppressed rats, what might be perceived as an important link in the development of age-related joint degeneration.

**Conclusion:** We would suggest the intrafetal antigen injection for Wistar rats as an experimental model for an in-depth study of the morphology of hypermobility-dependent conditions in the joint.

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### THE RELATIONSHIP BETWEEN TYPE 2 DIABETES MELLITUS AND OSTEOPOROSIS IN ELDERLY PATIENTS: A RETROSPECTIVE STUDY

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**Objective:** The effects of type 2 diabetes mellitus (T2DM) on bone are complex and the relationship of T2DM with BMD remains inconsistent across studies. The objective of this study was to determine the relationship between osteoporosis and T2DM in elderly patients.

**Methods:** Study design and setting: retrospective study was conducted in osteoporosis clinic in the primary health care center in Dubai health authority. Target population: elderly aged 60 y and above attended the osteoporosis clinic for screening in the primary health care centre in Dubai health authority.

**Results:** The prevalence of osteoporosis in this study was 39.5%. The results showed that nondiabetic elderly had higher prevalence of osteoporosis in comparison to diabetic elderly (44.0% and 33.1%, respectively). This difference was statistically significant ( $P=0.007$ ). It was observed that males had higher femur and lumbar spine BMD in comparison with females.

**Conclusion:** The investigations of the clinical relevance of osteoporosis in T2DM appear conflicting and to date no clear findings have been reached due to the inconsistent findings among researchers. Our data showed that nondiabetics were at a higher risk of developing osteoporosis than T2DM elderly. This finding is consistent with previous studies in Kuwait, Jordan and Iran which showed that T2DM is a promoter for bone health. Furthermore, studies have reported that magnesium deficiency is linked to osteoporosis, insulin resistance and Alzheimer's disease. This could explain that magnesium deficiency in nondiabetics increased the risk for osteoporosis compared to diabetic who consume appropriate magnesium through diet to prevent insulin resistance and therefore prevent osteoporosis. The prevalence of osteoporosis in this study was 39.5%. Our data showed that nondiabetics were at a higher risk of developing osteoporosis than T2DM elderly.

BMD in femur was slightly lower than at lumbar spine. The study findings revealed that vitamin D and HBA1C were significantly higher in diabetic elderly.

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### VERTEBRAL FRACTURES AMONG PATIENTS REFERRED FOR BONE DENSITOMETRY SCREENING IN DUBAI PRIMARY HEALTH CARE FACILITIES

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**Objective:** Vertebral fractures are one of the most common fractures associated with low BMD. However two-thirds to three-fourths of patients with vertebral fractures are not clinically recognized. The aim of this study was to determine the prevalence of vertebral fractures in patients referred for bone densitometry and the most common site of fracture.

**Methods:** The study was carried out in the osteoporosis clinic in Dubai primary health care center. A total of 120 patients were examined using DXA. Of all the patients, 48.3% were osteoporotic and 40.9% were osteopenic. The overall prevalence of vertebral fracture was 14.2%.

**Results:** The prevalence of vertebral fracture was higher in females compared to males (15.7% and 9.7%, respectively). It was found that patients aged 80 and above had the highest prevalence of vertebral fracture (54.5%). Undiagnosed vertebral fractures were common. **Conclusion:** It is crucial to prevent vertebral fracture through early diagnosis and appropriate treatment of osteoporosis.



P128

### PRONOUNCED VITAMIN D DEFICIENCY AND REDUCED BONE MINERAL DENSITY IN WOMEN SUFFERING FROM SACRAL INSUFFICIENCY FRACTURES

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**Objective:** Insufficiency fractures of the sacrum have been detected with increasing frequency in recent times, whereby their incidence will increase further as a result of the increase in life expectancy. The objective of the present retrospective investigation on women suffering from sacral insufficiency fractures was to determine the extent of a possible vitamin D deficiency and existing osteoporosis.

**Methods:** In 276 female patients aged from 58-99 (Ø 81.3) y with sacral insufficiency fractures, the fractures were classified according to Denis et al. and the Classification of Fragility Fractures of the Pelvis (FFP) according to Rommens & Hofmann on the basis of CT (axial layer through the pelvis and coronal oblique reformation of the sacrum with a slice thickness of 2 mm) and MRI images (axial and sagittal T1- and T2-weighted 4-mm slices through the pelvis and a coronal oblique STIR sequence of the sacrum with a slice thickness of 2.8 mm). In all of the women, osteodensitometry was performed by QCT in the area of the lumbar spine, and vitamin D levels were determined.

**Results:** Among all patients, there were 90 unilateral and 186 bilateral sacral fractures, 462 fracture zones in total, with a distribution of 42.4% Denis 1, 4.2% Denis 2, 43.3% Denis 1 and 2, and 10.1% Denis 1, 2 and 3. A FFP type II was found in 84.7 %, FFP type III in 4.8% and FFP type IV in 10.5% of the cases. The BMD the lumbar spine was 12-74 (Ø 44.3) mg/ml in the unilateral fractures and 2-54 (Ø 30.3) mg/ml in the bilateral fractures. The vitamin D value was 8-28 (Ø 13.1) nmol/l in the unilateral fractures and 0-18 (Ø 6.8) nmol/l in the bilateral fractures, the difference being significant ( $p < 0.001$ ).

**Conclusion:** Fracture risk factors for the occurrence of sacral insufficiency fractures are the female sex, advanced age, the presence of osteoporosis, and a severe vitamin D deficiency. A sacral insufficiency fracture is a strong indicator for the presence of manifest osteoporosis.

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### VITAMIN D DEFICIENCY AND TURNER SYNDROME

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**Objective:** Turner Syndrome (TS) is a condition that may involve digestive system anomalies, including celiac disease, Crohn's disease, and ulcerative colitis resulting in malabsorption, therefore, severe vitamin D (VD) deficiency. Also, a higher risk of diabetes mellitus might damage bone microarchitecture in addition to hypoenestrogenism-related bone loss. We aim to introduce a female patient with TS and severe VD and iron deficiency.

**Methods:** Case report.

**Results:** Case data: a 25-y, menstruated female with TS (Mosaicism: 45X0/46XX) and dwarfism (no therapy with growth hormone) with closes growth cartilages (height=1.43 cm/genetic predicted height=1.58 cm) is admitted for asthenia, nonspecific mild bone pain. The personal medical history includes partial hearing loss, mild autoimmune hepatitis, autoimmune hypothyroidism (controlled without levothyroxine), bicuspid aortic valve. Six years prior she was admitted to the hematology department with metrorrhagia complicated with anemia (a coagulopathy was excluded). The endocrine panel showed TSH=3.32 µUI/mL (N:0.5-4.5), ATPO (anti-thyroperoxidase antibodies)=10 µUI/mL (N:0-35), ATG (anti-thyroglobulin antibodies)=20 UI/L (N:30-70). Hypoechoic thyroid ultrasound pattern consistent with thyroiditis. She had closed growth cartilages according to X-ray. Bone turnover markers (BTM) revealed osteocalcin=22.11 ng/mL (N:11-43), alkaline phosphatase=134 U/L (N:<105), P1NP=60.41 ng/mL (N:15.13-58.59), CrossLaps=0.48 ng/mL (N:0.162-0.436). She also had severe VD deficiency, 25-hydroxyvitamin D (25OHD)=4 ng/mL (N>30). The patient had antitransglutaminase IgA and IgG antibodies assessed; the results were negative. However, she did not undergo an endoscopic examination to exclude celiac disease. She was intermittently under VD, and refused iron therapy despite persistent anemia. Two years later, 25OHD remained still low of 9.25 ng/mL. Currently, she was readmitted: severe anemia (hemoglobin of 8 g/dL) with low iron content, persistent mild liver cytolysis ALT=35.3 U/L (N:0-31), AST=33.6 U/L (N:0-32) was confirmed in addition to normal serum total calcium=9.51 mg/dL (N: 8.4-10.3), ionized calcium=4.1 mg/dL (N:3.9-4.9) phosphorus=3.6 mg/dL (N:2.5-4.5); TSH=2.64 µUI/mL (N:0.5-4.5), and BTM: osteocalcin=14.7 ng/mL (N:11-43), alkaline phosphatase=97 U/L (N:<105), CrossLaps=0.5 ng/mL (N:0.162-0.436), P1NP=45.93 ng/mL (N:15.13-58.59), respective PTH=41.15 pg/mL (N:15-65),

adequate FSH/LH ratio=6.67/6.16 mIU/mL (consistent with her menses). However, 25OHD was still low=4 ng/mL. She received VD 4000 UI/d, 6 weeks, followed by 2000 UI/d.

**Conclusion:** In TS digestive related VD deficiency should be expected; the present of iron deficient anemia is a hallmark of gastrointestinal conditions that might interfere with other nutrients absorption, but also with oral VD replacement. Despite normal estrogen status due to 45X0/46XX, bone and mineral metabolism might be affected.

## P130

### DXA ASSESMENT AFTER COVID-19 INFECTION

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**Objective:** Recent studies regarding COVID-19 infection have shown possible impact on bone metabolism and structure, but it is an interesting perspective to follow. During the COVID-19 pandemic, many patients with bone loss suffered from lack of physical activity and had difficult access to healthcare facilities, leading to worsening of preexistent conditions; patients under antiosteoporotic medication stopped their drugs due to deficiencies of health care systems/addressability issues; chronic stress/depression might also aggravate cortisol/glycaemia status thus bone health. (1-5) We aim to introduce a female patient with osteoporosis who was hospitalized for SARS-CoV2 infection and her subsequent bone evaluation.

**Methods:** Case report.

**Results:** This is a 67-year lady admitted for bone evaluation. Personal medical history: nonsecretor pituitary microadenoma, post-operative hypothyroidism treated with daily 100 µg levothyroxine, bilateral hearing loss, knee surgery. She entered menopause by the age of 42 after total hysterectomy without adnexectomy for benign condition. Her medical records include normal thyroid function, a central DXA scan with osteopenia: lumbar (L1-4) BMD=1.012 g/cm<sup>2</sup>, T-score=-1.6(SD), Z-score=-0.7(SD); femoral neck BMD=0.850 g/cm<sup>2</sup>, T-score=-0.9SD, Z-score=-0.2SD; total hip BMD=0.899g/cm<sup>2</sup>, T-score=-0.9SD, Z-score=-0.2SD. She was intermittent vitamin D replacement. The patient was tested positive for COVID-19 in September 2021 and she was hospitalized for 2 weeks with a moderate form of infection. 3 months she came to our attention for mild persistent bone pain. On admission, 25-hydroxyvitamin D=30.2 ng/mL (N:30-100) – under daily 1000UI cholecalciferol, bone turnover markers with normal osteocalcin=43.55 ng/mL (N:15-46), and high CrossLaps=1.14 ng/mL (N:0.33-0.782), P1NP=108.1 ng/mL (N:20.25-76.31). Central DXA confirmed BMD loss: L1-4 BMD=0.909 g/cm<sup>2</sup>, T-score=-2.4SD,

Z-score=-1.3SD; femoral neck: BMD=0.795 g/cm<sup>2</sup>, T-score=-1.8SD, Z-score=-0.6SD; total hip BMD=0.847g/cm<sup>2</sup>, T-score=-1.3SD, Z-score=-0.4SD, and DXA-TBS=1.375. Profile X-ray showed osteocondensation of the vertebral plates. 25OHD and PTH were normal. She continued with 1000 UI/d of cholecalciferol. Despite reduced BMD, the values were consistent with osteopenia, no decision of specific medication was done for the moment.

**Conclusion:** Whether the COVID-19 infection or the social pandemic circumstances or just physiological aging amid pandemic is reflected by DXA-BMD changes is a still an open issue.

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## P131

### PREVALENCE OF OSTEOPOROSIS IN ALBANIAN POSTMENOPAUSAL WOMEN AND THE ROLE OF INDEPENDENT FACTORS SUCH AS BREASTFEEDING AND NUMBER OF CHILDREN BORN IN OSTEOPOROSIS

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**Objective:** To assess the prevalence of osteoporosis in Albanian postmenopausal women, and the possible relationship between osteoporosis with the number of children born, and the duration of the breastfeeding period in the study population.

**Methods:** It was a cross-sectional study, realized in Tirana city, with an enrollment of 4789 Caucasian postmenopausal women. A validated questionnaire was used to collect information about the menopausal status and other risk factors for osteoporosis, such as the number of children born and the duration of breastfeeding. Assessment of BMD was performed by using peripheral system ultrasound device, calcaneus measurement evaluation. Low BMD was evaluated by T-score (osteoporosis for T-score<-2.5). Binary logistic regression was used to determine the relationship between osteoporosis and independent factors.

**Results:** The mean age of the study group was 55.65±9.1 with a median age of 55.0. The prevalence of osteoporosis was 6.2% (N=286). In logistic regression models was seen that postmenopausal women had 69% more chances to have osteoporosis than no menopausal women (OR=1.69, 95%CI=1.45-1.77, P<0.001). It was not found any relationship between osteoporosis and duration of breastfeeding (P>0.05 in all cases). A significant association was seen between postmenopausal osteoporosis and multiparity. Postmenopausal women with multiple births (3 or more) had an increased chance to have osteoporosis than others. The above association progressively was increased, as the number of births was higher, as it is shown in the Table.

No. of children born	Osteoporosis	No osteoporosis	Total	OR	95%CI	P-values
0	16 (5.61%)	315 (7.31%)	331 (7.20%)	References		
1-2	117 (41.05%)	2629 (60.98%)	2746 (59.75%)	1.14	0.67-1.95	0.628
3-4	104 (36.49%)	1094 (25.38%)	1198 (26.07%)	1.87	1.31-1.92	0.023
5-6	21 (7.37%)	171 (3.97%)	192 (4.18%)	2.41	2.21-4.81	0.011
>6	27 (9.47%)	102 (2.37%)	129 (2.81%)	5.21	3.1-6.37	<0.001

**Conclusion:** Sex hormones cease to play a key role in osteoporosis in Caucasian postmenopausal women. Multiparous women, especially those with 3 or more children born, should be aware to check their BMD status during the postmenopausal period due to the higher risk for osteoporosis vs. others.

## P132

### OSTEOPOROSIS IN A PATIENT WITH BILATERAL ADRENAL HYPERPLASIA AND AUTONOMOUS CORTISOL SECRETION, PRIMARY HYPERPARATHYROIDISM AND PAPILLARY THYROID CARCINOMA

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**Objective:** Osteoporosis is a disease that can be caused by a wide range of factors hence requiring a multilateral approach for diagnosis and treatment of bone loss. Conditions such as Cushing syndrome, primary hyperparathyroidism (PHPT), levothyroxine (LT4) suppression therapy after surgery for thyroid carcino-

ma (TC), and a postmenopausal state are risk factors for bone loss. We aim to introduce a female patient with multiple conditions linked to osteoporosis concerning thyroid, parathyroid, and adrenals pathological status.

**Methods:** Case report.

**Results:** This is a 56-y female admitted for evaluation of a recently detected adrenal mass. Her personal medical history includes total thyroidectomy and radioiodine therapy (100mCi) for papillary TC, currently under suppressive treatment with LT4 125 µg/d, a history of PHPT (PT-ectomy 7 y prior, kidney stones surgery 2 y prior), osteopenia since last 8 y, osteoporosis since last 5 y (alendronate 70 mg/week since last year), also arterial hypertension, abdominal wall eventration. Physical examination was normal (physiological menopause by the age of 49). The endocrine panel confirmed thyroid suppression: TSH=0.43 µUI/mL (N:0.5-4.5), FT4=11.69 pmol/L (N:9-19), negative thyroglobulin. A possible autonomous cortisol secretion is confirmed by low baseline ACTH=6.21 pg/mL (N:3-66) plus morning plasma after dexamethasone 2 d x 2 mg=2.21 µg/dL (N<1.8), starting from baseline=15.97 µg/dL (N:4.82-19.5). CT showed adrenal hyperplasia, two nodules (right-1.57/2.19 cm, left-1.4/1.6/1 cm). Bone assays are within normal limits: 25-hydroxyvitamin D=26.3 ng/mL (N<30), bone turnover markers of resorption CrossLaps=0.43 ng/mL (N:0.33-0.782), respective of formation osteocalcin=24.98 ng/mL (N:15-46), P1NP=65.52 ng/mL (N:20.25-76.31), alkaline phosphatase=69 U/L (N:38-105), and PTH=46.07 pg/mL (N:15-65). DXA confirmed osteoporosis based on lumbar (L1-4) BMD=0.820 g/cm<sup>2</sup>, T-score=-3SD, Z-score=-2SD; total hip BMD=0.888g/cm<sup>2</sup>, T-score=-0.9SD, Z-score=-0.2SD; femoral neck BMD=0.836 g/cm<sup>2</sup>, T-score=-1.5SD, Z-score=-0.3SD in addition to low TBS of 1.210. Alendronate was switched to zoledronic acid 5 mg/y in addition to cholecalciferol supplements.

**Conclusion:** Macronodular adrenal hyperplasia, possible on a currently unidentified genetic link with TC and PHPT, causes long term bone loss; however, bilateral adrenalectomy comes with high risk situation of lifelong primary adrenal insufficiency, thus the decision if surgery should not take into consideration the bone damage. However, in this case, osteoporosis was correlated with multiple factors like TC, PHPT.

## P133

### INTERACTIVE CASE-BASED EDUCATION SIGNIFICANTLY IMPROVES CLINICIAN COMPETENCE IN DIAGNOSING FIBRODYSPLASIA OSSIFICANS PROGRESSIVA (FOP)

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**Objective:** To determine whether online interactive case-based independent medical education could improve clinicians' competence in recognizing symptoms suggestive of, and differentially diagnosing fibrodysplasia ossificans progressiva (FOP), and knowledge regarding the consequences of an FOP misdiagnosis.

**Methods:** Pediatricians and orthopedists/orthopedic surgeons participated in an interactive case-based activity.<sup>1</sup> Educational design included a "test, then teach" approach to elicit cognitive dissonance, with evidence-based feedback provided following each learner response. The effects of the education on knowledge and competence were assessed using a 3-question, repeated pairs, pre-assessment/post-assessment study design. For all questions combined, the McNemar's test assessed differences from pre- to post-assessment. P values < 0.05 are statistically significant. The activity launched on June 11, 2021, and data were collected through September 1, 2021.

**Results:** Overall significant improvements were seen after participation for pediatricians (36% average correct response rate at pre-assessment vs. 82% at post-assessment; P < 0.001, N = 117), and orthopedists/orthopedic surgeons (33% average correct response rate at pre-assessment vs. 79% at post-assessment; P < 0.001, N = 165). The most significant improvements related to clinicians' competence in recognizing characteristics indicative of FOP and differentiating FOP from other confounding diagnoses. A significant improvement was also achieved regarding improved knowledge of the potential consequences of a misdiagnosis of FOP. After participating, 37% of pediatricians and 33% of orthopedists/orthopedic surgeons had measurable improved confidence related to diagnosing FOP.

**Conclusion:** This study demonstrates the success of online, interactive case-based education in improving clinicians' knowledge and competence in diagnosing FOP. This could lead to improved overall outcomes for these patients.

**Reference:** <sup>1</sup>Pignolo RJ. Soft-tissue Swellings and Malformed Great Toes: What's the Diagnosis? Launched: 6/11/2021. Data as of 9/1/2021. Available at [www.medscape.org/viewarticle/952682](http://www.medscape.org/viewarticle/952682)

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### LOW BIOAVAILABLE IGF-1 IS THE SINGLE BIOMARKER ASSOCIATED WITH OSTEOSARCOPENIA IN POSTMENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS

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**Objective:** Osteosarcopenia is referred to as the co-occurrence of osteoporosis/osteopenia and sarcopenia that increases morbidity and mortality in patients with rheumatoid arthritis (RA). This study aimed to determine serum levels of bioavailable IGF-1 in postmenopausal women with RA and to relate them with the existence of osteosarcopenia.

**Methods:** An observational study including 69 postmenopausal RA patients under treatment. They were divided in two groups according to the existence or the absence of osteosarcopenia. Sarcopenia was defined according to EWGSOP recommendations as low muscle mass (expressed as appendicular skeletal muscle mass index [ASMI] calculated by DXA) and low muscle strength (handgrip) or low physical performance (Short Physical Performance Battery [SPPB]). Osteoporosis was defined as a T-score  $\leq$  -2.5 in femoral neck BMD. Serum levels of bioavailable IGF-1 were determined using an electrochemiluminescent assay. Serum levels of bone alkaline phosphatase (BALP), serum crosslinked C-telopeptide of type I collagen (CTX), osteocalcin (OCN), 25-hydroxycalciferol (25-OH-D3) were determined, as well. The ratio CTX/OCN was calculated as indicative of bone turnover levels. RA disease activity was calculated using the DAS28 (ESR) score and inflammatory markers (ESR, CRP), functionality was calculated using the HAQ-DI score and seropositivity was determined according to RF and CCP antibodies.

**Results:** The prevalence of osteosarcopenia was 13% in this RA cohort. Mean IGF-1 levels were significantly lower in RA patients with osteosarcopenia ( $75 \pm 16$   $\mu$ g/L vs.  $106 \pm 43$   $\mu$ g/L,  $p < 0.0001$ ). No other significant associations were observed regarding disease activity, functionality, seropositivity for RF/anti-CCP, inflammatory markers or markers of bone turnover.

**Conclusion:** Postmenopausal RA patients with osteosarcopenia have lower bioavailable IGF-1 when compared to those without osteosarcopenia. Low bioavailable IGF-1 can predict the development of osteosarcopenia in RA patients.

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P135

### SARCOPENIA CONTRIBUTES TO DECREASED FUNCTIONALITY IN POSTMENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS

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**Objective:** Sarcopenia decreased functionality and mortality in patients with rheumatoid arthritis (RA). This study aimed to determine the functionality of RA patients and to relate it with the existence of sarcopenia.

**Methods:** An observational study including 69 postmenopausal RA patients under treatment. They were divided in two groups according to the existence or the absence of sarcopenia. Sarcopenia was defined according to EWGSOP recommendations as low muscle mass (expressed as appendicular skeletal muscle mass index [ASMI] calculated by DXA) and low muscle strength (handgrip) or low physical performance (Short Physical Performance Battery [SPPB]). Functionality of RA patients was calculated using the HAQ-DI score.

**Results:** Sarcopenia and its parameters were associated with decreased functionality in postmenopausal women with RA. Mean HAQ-DI value was increased in patients with sarcopenia ( $1.0 \pm 0.6$  vs.  $0.7 \pm 0.5$ ,  $p=0.05$ ). HAQ-DI values were inversely associated with ASMI ( $p=0.09$ , Pearson= $-0.21$ ), total SPPB score ( $P<0.0001$ , Pearson= $-0.49$ ) and handgrip strength ( $p=0.02$ , Pearson= $-0.29$ ).

**Conclusion:** Postmenopausal RA patients with sarcopenia present decreased functionality when compared to those without sarcopenia.

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### TRUNNIONOSIS LEADING TO MODULAR FEMORAL HEAD DISSOCIATION: CASE REPORT AND LITERATURE REVIEW

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Component dissociation secondary to trunnionosis is rare, and its causes are multifactorial. It is a major complication of total hip replacement, in most cases requiring revision arthroplasty. We present a case of taper/head modular interface dissociation in a metal-on-metal total hip replacement. We review the literature of both trunnionosis, as well as a systematic review of modular dissociation of the femoral component in total hip arthroplasty, identifying commonalities with our own case.

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### BONE MINERAL DENSITY IS THE BEST PREDICTORS OF FRACTURES IN PATIENTS WITH CHRONIC RENAL DISEASE STAGE 5D

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**Objective:** Chronic kidney disease (CKD) leads to increased bone fragility and fractures. The aim of this study was to evaluate the ability of DXA and BMD scores to predict risk of fractures in patients with stage 5 CKD treated with hemodialysis.

**Methods:** The study included 604 patients (men: 312, women: 292) with CKD hemodialysis therapy. The average age of patients was  $45.2 \pm 11.8$  y, the duration of renal replacement therapy (RRT)  $70.3 \pm 48.5$  months. BMD was assessed by DXA.

**Results:** Of the 604 CKD patients on hemodialysis, 149 (24.7%) had fractures at the end of the study. Of the 312 male patients, fractures were registered in 23.1% (72 patients), and of the 292 female patients, fractures were detected in 26.4% (77 patients). All patients were divided into two groups: with fractures and without fractures. The CKD patients with fractures had significantly longer term RRT, higher iPTH, alkaline phosphatase levels. The BMI and duration of menopause/amenorrhoea, the level of 25(OH) D in blood plasma did not differ significantly in the groups of patients. All BMD scores in hemodialysis patients with fractures were significantly lower than in patients without fractures. The lowest BMD values were found in the forearm bones. Univariate regression analysis showed a statistically significant contribution of densitometric scores of all the studied skeletal zones to the assessment of risk of fractures. At the same time, the T-score showed a closer relationship to the risk of fractures in comparison with the Z-score of the same zones. Stepwise multivariate regression analysis showed that the combination of T-scores of the lumbar vertebrae, distal forearm, Ward's area of hip is the best



predictor of the overall risk of fractures. Adding other indicators to the analysis did not significantly increase the predictive value of the indicators.

**Conclusion:** The risk of fracture in patients with stage 5D CKD increases as BMD decreases and the duration of renal replacement therapy increases. The assessment of BMD in patients with chronic kidney disease is an acceptable method for predicting fragility fractures.

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### ASSOCIATION BETWEEN ANTIPSYCHOTIC MEDICATION USE AND BONE MINERAL DENSITY: A POPULATION-BASED STUDY

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**Objective:** It has been reported patients with schizophrenia have reduced BMD and increased fracture risk. However, less is known regarding the direct effects of antipsychotic treatment. Hence, We aim to investigate the association between antipsychotic medication use and BMD in a population-based sample of men and women.

**Methods:** Women (n=793) and men (n=587) were drawn from the Geelong Osteoporosis Study. BMD was measured at the spine and hip using DXA. Anthropometry and socioeconomic status were determined and information on medication use, and lifestyle was obtained via questionnaire. Linear regression analyses were used to test cross-sectional associations between BMD and antipsychotics use, after adjusting for potential confounders.

**Results:** Thirty-three (4.2%) women and 16 men (2.7%) were identified as users of antipsychotics. In women, age was an effect modifier in the relationship between antipsychotic use and BMD. Among younger women (<60 y), adjusted mean BMD was 9.1% lower at the spine [1.166 (1.085-1.246) vs. 1.282 (1.244-1.320) g/cm<sup>2</sup>, p=0.003] and 9.9% lower at the hip [0.896 (0.836-0.956) vs. 0.994 (0.966-1.023) g/cm<sup>2</sup>, p=0.001] for antipsychotic users compared to nonusers. Associations persisted following further adjustments. There was no relationship observed between antipsychotic use and BMD for older women (aged ≥60 y) or men (all p>0.05).

**Conclusion:** These population-based data suggest antipsychotic use is associated with lower BMD in younger but not older women or men. Further research is required to investigate the underlying mechanisms involved.

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### RA POST COVID-19

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**Objective:** Is there an effect of COVID-19 on the body in relationship to rheuma related diseases?

**Methods:** Evidence based research.

**Results:** Female pt aged 76 known for years to be suffering from TBC since she was 5, Pott's disease, spinal TBC and Charcot foot as a result. Has been treated with antiflogisticae, analgisticae and tuberculostaticae; uses appropriate footwear. The combination of COVID+19 and the related fear of contact resulted in the pt staying home more often and taking significantly less exercise. After more than a year following symptoms were noticed: painful and swollen knee, with oedema; painful shoulder, restriction of movement and oedema. The classic treatment gives temporary relief. This improvement lasts for max 3 days. Male pt aged 79 been treated years for rheumatoid pain, had back surgeries twice. Was until now in good health with standard antiflogisticae and analgisticae. Before COVID-19 did a lot of gardening, rode his bicycle, and went to Turkey for several months a year. Post COVID he needs to be treated monthly instead of 4 times a year, can't ride his bicycle and can't travel abroad without help since he has problems walking and driving. He now is totally dependent on his partner for his getting about. We know that COVID-19 doesn't only impact the lungs, but the impact can be found throughout the entire body. It also has an impact on the reaction of the body to treatment. In my private practice I have noticed that the patients I normally treat for pains related to chronic pains, RA or generally speaking autoimmune disorders and who also lived through a COVID-19 infection are likely to suffer more pain and less benefit from the medication.

**Conclusion:** Chronic rheumatoid pain evolves in acute synovial synovitis because of COVID-19, unlike rheumatic inflammation, the pain and inflammation disappears after a needle puncture to remove the synovial fluid.

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**RHEUMATOLOGICAL ASPECTS OF FORMS AND VARIANTS OF PANNICULITIS**O. Egorova<sup>1</sup>, G. Tarasova<sup>1</sup>, S. Radenka-Lopovok<sup>2</sup><sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, <sup>2</sup>FSBEIHE I.M. Sechenov Moscow State Medical University, Moscow, Russia

Panniculitis (Pn) is a set of heterogeneous inflammatory diseases characterized by lesions of subcutaneous fat (SCF) and often accompanied with the defeat of the musculoskeletal system and internal organs. Depending on the etiology and histomorphological picture, Pn is divided into two forms: septal (SPn) and lobular panniculitis (LPn) with and without signs of vasculitis, which is reflected in the clinical picture of the disease. Often Pn is one of the symptoms of rheumatic diseases (Rd), it can lead to late diagnosis of the underlying disease.

**Objective:** to study the frequency of occurrence of forms and variants of Pn in rheumatological practice on the basis of long-term prospective observation

**Materials and methods:** We examined 687 patients with Pn (613 women and 74 men, mean age 39.7±11.31 and 41.2±12.57 years, respectively) with the referral diagnosis of «Erythema Nodosum» (EN) or «Panniculitis», who were observed in the rheumatologic clinic in 2010-2020. In addition to general clinical examination, we determined serum concentrations of  $\alpha$ -1 antitrypsin, amylase, lipase, ferritin, creatine phosphokinase, conducted a CT scan of the chest organs, immunological, TB tests and pathological study of skin biopsy from the node.

**Results:** As a result of application of the developed diagnostic algorithm, 430 patients (62.6%) were diagnosed with SPn and 249 patients (36.2%) - with LPn. In 9 cases (1%) (3 patients with SPn and 6 - with LPn), it was not possible to confirm the variant of Pn, despite the comprehensive examination. In 8 patients (1.1%) no Pn data were revealed, the following diagnoses were verified: 2 patients (25%) – discoid lupus and lipodystrophy, 1 (12.5%) – erysipelas, lichen, fixed erythema and keratoacanthoma. SPn in 94% of cases (400 patients) was presented by EN, in 4% (18) – by superficial migrating thrombophlebitis, in single cases (1-0%) – by eosinophilic fasciitis, skin nodular polyarteritis and scleroderma-Pn (2, 6 and 1 patients, respectively). In 28% of cases LPn was associated with systemic connective tissue lesions, in 27% with idiopathic lobular Pn (Weber – Christian panniculitis) ( $p < 0.002$ ), in 32.92% with lipodermatosclerosis and in 14.28% with subcutaneous sarcoid. In a few cases LPn was caused by lymphoproliferative (2,88%) and cancer (2,49%) diseases, calciphylaxis (2,05%), erythema Bazin (1.64%), cold Pn (0.82%) and alpha 1-antitrypsine failure (0.41%)

**Conclusion:** the results confirm that patients with SPn were found twice as often as with LPn. Prenosological Pn was mainly associated with sarcoidosis, EN and Rd, which confirms the relevance of further research of Pn.

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**PANNICULITIS AS A MANIFESTATION OF AN AUTOIMMUNE/AUTOINFLAMMATORY DISEASE**O. Egorova<sup>1</sup>, G. Tarasova<sup>1</sup><sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** ASIA syndrome or Schonfeld syndrome is an autoimmune/inflammatory condition induced by adjuvants in genetically susceptible individuals with the development of rheumatic diseases (RD), multiple sclerosis, sarcoidosis, and others. This study aimed to characterize the symptoms of panniculitis (Pn) associated with ASIA syndrome.

**Methods:** Within 7 y, ASIA syndrome was diagnosed in 12 women, average age 37.2±7.4, with a referral diagnosis of “erythema nodosum” or “panniculitis”. The duration of the disease was 16.7±3.9 months. In addition to general clinical study, the serum concentration of  $\alpha$ -1 antitrypsin, amylase, lipase, ferritin, creatine phosphokinase (CPK), immunological parameters (ANP-Hep2, dsDNA, C3 and C4, CRP, ANCA, Scl-70, antibodies to cardiolipins G and M), CT of the chest organs, pathomorphological and immunohistochemical examination of a biopsy specimen of skin with subcutaneous fat tissue (SFA) from the affected areas.

**Results:** The development of ASIA syndrome was preceded by gluteoplasty using propantriol-1,2,3 (in 4 patients), liposuction (2), biorevitalization with hyaluronic acid (2) and endoprosthesis with breast implants (2), bone metal construction (1) and mesh hernioplasty (1). The clinical picture of Pn was characterized by generalized red-purple painful (VAS pain 55.8±17.3 mm) subcutaneous indurations on the upper limbs and trunk (in 100% of cases), face (16.6%) and lower limbs (33.3%), with ulceration and oily fluid leakage (58.6%). The saucer symptom was recorded in 83.3% of the observed patients. In 66.6% of cases, fever and articular syndrome were observed, in 41.6% myasthenic syndrome and lymphadenopathy, in 8.3% xerophthalmia, keratoconjunctivitis dry, xerostomia and recurrent parotitis. In blood tests, leukopenia (up to  $2.0 \times 10^9/l$ ) was identified in 33.3% of patients, a significant increase in the level of creatinine phosphokinase in 16.6%, a two or more times increase in ESR and CRP in 100%. All patients demonstrated immunological changes. The morphological picture of the skin and SFA in 75% of cases resembled lobular Pn, in 8.3% tumor lymphocytes with the immunophenotype of cytotoxic T-lymphocytes: CD3+, CD8+ were detected. The results obtained allowed confirming RD in 8 patients: systemic lupus erythematosus and idiopathic lobular panniculitis in 2 patients and 1 in dermatomyositis, systemic scleroderma of Sjogren's disease, mixed connective tissue disease. One case was diagnosed with sarcoidosis and T-cell lymphoma. In 2 patients after the liposuction procedure the course of Pn was reversible.

**Conclusion:** Diagnosis of Pn associated with ASIA syndrome is a complex task that requires a multidisciplinary approach to verify the diagnosis and treatment tactics.

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### BILATERAL ADRENAL TUMORS, MENINGIOMA AND BENIGN THYROID TUMOR: BONE STATUS

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**Objective:** A patient may present with multiple complex endocrine pathologies that require a multilateral approach and identification of possible connections. Endogenous glucocorticoid secretion leads to increased bone resorption, decreased bone formation, decreased calcium intestinal absorption, making Cushing syndrome (CS) a risk factor for bone mass loss, even in mild endogenous forms which are found in patients with bilateral adrenal hyperplasia (BAT). We aim to introduce a female patient with left adrenal adenoma after right adrenalectomy, hypothyroidism following subtotal thyroidectomy for benign multinodular goiter, meningioma, and osteopenia.

**Methods:** Case report.

**Results:** This is a 54-year patient with persistent mild adrenal CS. The patient's personal medical history includes right adrenalectomy in 2018 for adrenocortical adenoma, osteopenia since 2017, treated hypothyroidism after subtotal thyroidectomy since 2015 for benign multinodular goiter, surgically removed thymus tumor in 2018, treated arterial hypertension, meningioma (gamma knife surgery in 2021). On admission, clinical exam is irrelevant for CS. Assessments showed normal thyroid function (TSH=1.13 µUI/mL (N:0.5-4.5)), mild vitamin D deficiency (25OHD=23 ng/mL), and normal osteocalcin=24 ng/mL (15-46), alkaline phosphatase=81 U/L (38-105), CrossLaps=0.64 ng/mL (0.33-0.782), P1NP=85 ng/mL (20.25-76.31), PTH=33 pg/mL (15-65). DXA showed no bone loss: lumbar BMD(g/cm<sup>2</sup>)=1.066, T-score(SD)=-0.9, Z-score(SD)=-0.5; total hip BMD(g/cm<sup>2</sup>)=0.835, T-score(SD)=-1.4, Z-score(SD)=-0.9; femoral neck BMD(g/cm<sup>2</sup>)=0.843, T-score(SD)=-1.4, Z-score(SD)=-0.6. Left adrenal tumor of 2 cm was consistent with autonomous cortisol secretion based on blood assays: baseline ACTH=4.38 pg/mL (3-66), morning plasma cortisol=8.57 µg/dL (4.82-19.5), plasma cortisol after dexamethasone 2 mg x 2 days=11.32 µg/dL (adequate suppression of less than 1.8 µg/dL). The patient was offered vitamin D supplements and further evaluations are needed in order to decide left adrenalectomy.

**Conclusion:** Despite the adrenal CS, considering that the risks associated with postadrenalectomy permanent adrenal insufficiency requiring permanent cortisol substitution was higher than the benefit for bone mass status, surgery was postponed. BAT-related cortisol anomalies might increase the osteoporotic fracture risk during long time exposure; however, the clinical manifestations might not be very suggestive for CS, as seen here.

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### INCIDENCE AND PATTERNS OF FRACTURES IN PATIENTS WITH CHRONIC RENAL DISEASE ON MAINTENANCE HEMODIALYSIS AND AFTER KIDNEY TRANSPLANTATION

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**Objective:** The risk of fractures increases in patients with chronic kidney disease (CKD) stage 5 on hemodialysis and after kidney transplantation. We found that the low BMD is the main risk factor for fractures in patients with CKD stage 5 [1,2]. The aim of this study was to compare the frequency and nature of fractures in patients on maintenance hemodialysis and after kidney transplantation.

**Methods:** The study involved 359 hemodialysis patients and 131 kidney transplant recipients. The duration of renal replacement therapy (RRT) of the dialysis patients was 72.7 (36.0-112.0) months. The duration of RRT in kidney transplant recipients was 84 (48-142) months, including 40 (18-72) months of a functioning transplant. All fractures in the studied patients were registered.

**Results:** The characteristic of fractures is presented in Table 1. Of 166 dialysis male patients, fractures were found in 44 patients (26.5%), of 193 observed women, fractures were detected in 51 (26.4%). Of 55 male transplant recipients, fractures were registered in 15 cases (27.3%), of 76 female patients in 32 cases (42%).

**Table 1.** Characteristic of patients and fractures

	Dialysis		Transplant	
	Male	Female	Male	Female
Number of patients	359		131	
Sex	Male 166	Female 193	Male 55	Female 76
Age (y)	45.2±11.8		39.7±11.7	
Patients with fractures (%)	26.5		35.9	
Axial fractures (%)	9.6		27.7	
Hip fractures (%)	9		8.5	
Fractures at peripheral sites (%)	42.8		63.8	
Repeated fractures (%)	9.2		25.5	

**Conclusion.** The kidney transplant recipients have a higher risk of fractures than patients on dialysis. Most of the fractures in both groups affected the peripheral sites of skeleton. Kidney transplant recipients have a higher risk of axial fractures. Hip fractures occurred equally in both groups. Female patients with kidney transplant are at higher risk than man. Fractures in the dialysis group affect both men and women equally.

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**P144****BILATERAL ADRENAL TUMORS IN MENOPAUSAL FEMALE: BMD-DXA RESULTS**

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**Objective:** There is a complex approach to a patient with multiple endocrine pathologies. Adrenal tumors are a common finding on abdominal imaging, and even though the majority is nonfunctional adenomas (incidentaloma), it is important to evaluate a potential impact on bone metabolism if cortisol is excessively

secreted. Osteopenia could also occur from multiple causes like overtreatment with levothyroxine for iatrogenic post-operative hyperthyroidism or early menopause. (1-5) We aim to introduce a female patient with osteopenia, bilateral nonfunctional adrenal adenomas, postprocedural hypothyroidism for follicular adenoma, and breast adenoma.

**Methods:** This is a case report. The patient agreed for anonymous use of her medical records.

**Results:** This is a 62-year patient (menopause by the age of 51) with total thyroidectomy in 2015 (histopathological exam: follicular adenoma) in chronic substitutive treatment with levothyroxine, bilateral nonfunctional adrenal adenomas (right-0.78/1.04 cm, left-0.93/0.99 cm), and breast adenomas. 8 y ago a medullary thyroid cancer was suspected based on 4 times upper limit of calcitonin and not confirmed after thyroidectomy. During endocrine investigations bilateral AT were detected in addition to adequate suppression after DXM 2X2: ACTH=11.5 pg/mL (3-66), morning plasma cortisol=9.6 µg/dL (4.82-19.5), cortisol after DXM 2x2=0.74 µg/dL (<1.8). Normal DXA was followed until present time when BMD decreased: lumbar(L1-4) BMD(g/cm<sup>2</sup>)=0.911, T-score(SD)=-2.2, Z-score(SD)=-1.5; total hip BMD(g/cm<sup>2</sup>)=0.776, T-score(SD)=1.8, Z-score(SD)=-1.3; femoral neck BMD(g/cm<sup>2</sup>)=0.805, T-score(SD)=-1.7, Z-score(SD)=-0.8. Vitamin D levels were adequate under daily 1000 UI cholecalciferol per day: 25OHD=30.3 ng/mL (N>30), with normal bone turnover markers like osteocalcin=26.97 ng/mL (15-46), CrossLaps=0.87 ng/mL (0.33-0.782) and PTH=20.07 pg/mL (15-65). DXM suppression test showed a mild lack of cortisol inhibition.

**Conclusion:** In patients with adrenal adenomas, especially bilateral there should be a constant follow on hormonal status, on potential cardiometabolic implications and potential impact on bone mass.

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**P145****LOW Z-SCORE AND CONN SYNDROME IN ADULT MALE**

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**Objective:** Osteoporosis in a young male patient is most probably of secondary cause. Conn syndrome (CS) involves increased renal excretion of calcium, leading to secondary hyperparathyroidism thus inducing a bone mass reduction. Moreover, mineralocorticoids receptors were found in the osteoblasts and osteocytes proving a direct effect of mineralocorticoids on bone metabolism. We aim to introduce a male patient with CS and unexpected low Z-score at central DXA. (1-5)

**Methods:** Case report. The patient agreed for anonymously use of his medical records.

**Results:** This is a 44-y patient with a history of stage III ESC/ESH arterial hypertension (AH) since last 4 y, partially controlled by four antihypertensive drugs (telmisartan, spironolactone, calcium blocker, rilmenidin) in addition to history of hypokalemia. His family medical history includes paternal stage I ESC/ESH hypertension by the age of 60. Recently, spironolactone was switched to eplerenone because of gynecomastia. On admission for secondary AH: thyroid function was normal: TSH=1.33  $\mu$ UI/mL (0.5-4.5), so was IGF1=171.8 ng/mL (78-233) and total plasma testosterone, plasma catecholamines with plasma cortisol suppression after DXM test but high aldosterone/renin ratio (107.18): plasma aldosterone(ortho)=258 pg/mL (24.4-403)/renin=3.34 pg/mL (2.64-27.66), respective aldosterone(clino)=24 7pg/mL (18.8-256.7)/renin=3.44 pg/mL (1.68-23.94) was consistent for CS. CT confirmed a right adrenal tumor(14.4/11.2 mm). Central DXA was performed and identified low BMD and TBS (1.227): lumbar(L1-4) BMD( $g/cm^2$ )=1.027, T-score(SD)=-1.6, Z-score(SD)=-2.2; total hip BMD( $g/cm^2$ )=1.334, T-score (SD)=-1.6, Z-score(SD)=-1.5; femoral neck BMD ( $g/cm^2$ )=1.265, T-score (SD)=1.5, Z-score (SD)=1.5. Low 25-hydroxyvitamin D=26.8 ng/mL (N>30), mild suppression of bone formation maker: osteocalcin=8.76 ng/mL (15-46) and resorption CrossLaps=0.17 ng/mL (0.33-0.782), but normal: alkaline phosphatase=77 U/L (38-105), P1NP=25.77 ng/mL (20.25-76.31), and PTH=19.78 pg/mL (15-65) were identified. Unilateral adrenalectomy is planned and further re-assessment of DXA status.

**Conclusion:** In CS, a low DXA Z-score is rarely found due to the effects of mineralocorticoids on calcium metabolism and their direct effects on bone cells. Endocrine and neuroendocrine tumors are among causes of low bone mass in adult males. The importance of low TBS under these circumstances is yet to be explored, as in this case. The right choice of therapy for CS-related low BMD varies between adrenalectomy for underlying cause and starting a specific medication against osteoporosis.

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## P146

### ACROMEGALY: LOW BONE MINERAL DENSITY IN ADULT MALE

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**Objective:** Acromegaly via GH/IGF1 (growth hormone/insulin-like growth factor) excess induces a disruption in normal bone microarchitecture, however BMD-DXA may be normal. Hypogonadotropic hypogonadism, secondary diabetes mellitus, and even associated primary hyperparathyroidism in multiple endocrine neoplasia type 1 are additional risk factors for impaired bone status. We aim to introduce a male patient with acromegaly and osteoporosis. (1-5)

**Methods:** case report.

**Results:** a 65-y male with acromegaly since last 6 y due to a macroadenoma (of 1.2 cm) with initial nadir GH of 2.2 ng/mL during OGTT, and IGF1 of 67 9ng/mL (48-235) was treated with trans-sphenoidal hypophysectomy and gamma knife. Pre-operative hypogonadism was corrected after neurosurgery. He remained on monthly octreotide LAR 30 mg and 2 mg weekly cabergoline. Due to persistent back pain X-ray was done and identified vertebral fractures (VF). Initial DXA also confirmed osteoporosis: lumbar (L1-4) BMD( $g/cm^2$ )=0.834, T-score(SD)=-3.2, Z-score(SD)=-3.3; total hip BMD( $g/cm^2$ )=0.953, T-score(SD)=-1.4, Z-score(SD)=-0.7; femoral neck BMD( $g/cm^2$ )=0.893, T-score(SD)=-1.4, Z-score(SD)=-0.7. Low 25OHD=10 ng/mL was confirmed. He had no diabetes, neither need for glucocorticoid replacement. He started zoledronate (5 mg/y) followed by monthly risedronate for 5 y. Currently, acromegaly is controlled under low dose of cabergoline: IGF1=176 ng/mL (51-209), prolactin=0.2 ng/mL (<23), while BMD-DXA increased: lumbar (L1-4) BMD( $g/cm^2$ )=0.962, T-score(SD)=-2.1, Z-score(SD)=-2.3; total hip BMD ( $g/cm^2$ )=0.98, T-score(SD)=-0.8, Z-score (SD)=-0.7; femoral neck BMD( $g/cm^2$ )=0.892, T-score(SD)=-1.4, Z-score(SD)=-0.7. Bone turnover markers are suppressed: CrossLaps=0.16 ng/mL (N: 0.33-0.782), osteocalcin=4 ng/mL (N:15-46) with mild reduction of 25OHD at the level of 24 ng/mL and normal PTH of 50 pg/mL (15-65). Because of prevalent VF he continued with antiresorptive drugs.

**Conclusion:** This is a rare case of male severe acromegaly related osteoporosis with low BMD which is not typical for patients with GH/IGF1 excess, especially in males. Debatable issues are the following: how long we should treat the patient if GH/IGF1 normalizes and which is the best treatment selection against osteoporosis under these specific circumstances.

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## P147

### CHANGES IN QUALITY OF LIFE AND DEPRESSIVE STATUS OF CAREGIVERS DURING ONE YEAR AFTER FRAGILITY HIP FRACTURE

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**Objective:** Burdensome or stress of caregivers can negatively affect the functional recovery of hip fracture patients. This study, therefore, aims to evaluate the quality of life and depressive status of caregivers during one year after hip fracture.

**Results:** We prospectively enrolled primary caregivers of hip fracture patients between April 2019 and January 2020 at the Siriraj Hospital (Bangkok, Thailand). The quality of life of all caregivers was evaluated using the 36-Item Short Form Survey (SF-36), the EuroQol 5D-5L (EQ-5D-5L), and the EuroQol visual analog scale (EQ-VAS). The depressive status was assessed using the Hamilton Rating Scale for Depression (HRSD). A total of 50 caregivers were included in the final analysis.

**Results:** Both mean SF-36 physical and mental component scores decreased significantly during the first 3 months post-hip fracture treatment. Similar to SF-36 MCS, the mean EQ-5D-5L and EQ-VAS scores declined significantly at 3 months and returned to their baseline values within 12 months. As for HRSD, there were 6%, 56%, 36%, and 6% of caregivers who expressed mild depressive symptoms at baseline and 3-, 6-, and 12-month post-hip fracture treatment, consecutively.

**Conclusion:** These caregivers should be considered as hidden patients and incorporated in a part of the hip fracture treatment pathway.

## P148

### ASSOCIATION OF CALCITONIN RECEPTOR GENE POLYMORPHISM WITH BONE MINERAL DENSITY AND FRACTURES IN PATIENTS WITH CHRONIC KIDNEY DISEASE STAGE 5D

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**Objective:** We have studied before the vitamin D receptor and collagen type I polymorphism on BMD and fractures in patients with CKD stage 5D [1,2]. Calcitonin receptors (CTR) are also involved in maintaining calcium homeostasis. The aim of this study was to analyze susceptibility of CTR gene polymorphism to BMD and fractures.

**Methods:** The study included 107 patients with CKD stage 5D. The description of CTR genotype groups is given in Table 1. BMD by Z-score and fractures were analyzed. Duration of dialysis did not differ significantly in the groups.

**Table 1.** Description of CTR genotype groups

Characteristics	Genotype			
	TT	TC	CC	p
Number of patients	57/53.3%	40/37.4%	10/9.4%	-
Sex (male/female)	26/31	15/25	6/4	-
Age (y)	38.4±10.5	40.2±1.11	41.7±12.7	>0.05

**Results:** In each subgroup, the number of patients with normal BMD scores according to the criterion Z ( $Z > -1.0$ ) and with low BMD indicators ( $Z \leq -1.0$ ) was calculated, which was expressed as a percentage. In the forearm bones and vertebrae, low Z-score was more often detected in patients with TT genotype. In the femur, BMD deficiency occurred with approximately the same frequency in patients with genotypes TT, TC and CC. However, a dispersion analysis of BMD in the groups did not reveal significant difference. There was no significant difference in the frequency of fractures in studied patients.

**Conclusion.** We did not find association of CTR polymorphism with BMD and fractures in patients with CKD 5D.

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P149

**PREMATURE OVARIAN FAILURE AND OSTEOPOROSIS**O. A. Diaconu<sup>1</sup>, D. E. Rentea<sup>2</sup>, A. M. Gheorghe<sup>2</sup>, G. Voicu<sup>2</sup>, N. M. Bugălă<sup>3</sup>, S. Zugravu<sup>2</sup>, M. J. Tuculina<sup>3</sup>

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**Objective:** Premature ovarian failure (POF), of different causes like genetic anomalies or iatrogenic, is one of the conditions that lead to bone mass loss in females, due to estrogen deficiency. Thus to prevent osteoporosis and bone fractures, early management plays an important role. We aim to introduce a female patient with POF and bone mass loss. (1-5)

**Methods:** This is a case report.

**Results:** This is an 81-year patient with a history of POF and hypothyroidism. On admission, the patient complained of lumbago, polyarthralgia, and knee pain leading to walking difficulties. The patient's medical history includes POF since the age of 34, hypothyroidism due to multinodular goiter, diagnosed by the age of 28 (controlled under levothyroxine substitution), chronic venous insufficiency, and treated arterial hypertension. Her family health history includes a son with congenital hypothyroidism. The endocrine panel showed: TSH of 2.59  $\mu$ UI/mL (N:0.5-4.5), FT4 of 13.79 pmol/L (N:9-19), ATPO (anti-thyroperoxidase antibodies) of 0.28 UI/mL(N:0-5.61). Relatively high 25-hydroxyvitamin D of 43.8 ng/mL(normal levels above 30 ng/mL) under daily 2000 UI cholecalciferol (selftreatment for the last months) was identified in addition with normal bone turnover markers: osteocalcin of 24.83 ng/mL (N:15-46), alkaline phosphatase of 104 U/L (N:38-105), CrossLaps of 0.721 ng/mL (N:0.33-0.782), P1NP of 72.30 ng/mL(N:20.25-76.31), as well as PTH of 43.92 pg/mL (N:15-65). Thoracic spine X-ray showed: dorsal hyper kyphosis in the sagittal plane, osteocondensation of vertebral plates, anterior layered osteophytes, anterior syndesmophytes T5-T6, T6-T7, T7-T8, T8-T9, reduced disc spaces mid-spine. Lumbar spine X-ray showed: lumbar hyper lordosis in the sagittal plane, L5 retrolisthesis (of 7 mm), demineralization, and small anterior osteophytes, low positioned L5, reduced discal spaces L4-L5, L5-S1, and arthrosis posteriorly. Central DXA showed reduced lumbar BMD with an associated T-score of -2.9 SD. A reduction of vitamin D daily dose was recommended in addition to oral weekly alendronate. TBS was normal=1.377.

**Conclusion:** Taking into consideration that premature ovarian failure is a significant cause of osteoporosis, serial follow-up is recommended. Additional arthrosis at spine level might mask a low BMD according to central DXA.

**References:**

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P150

**YOUNG PATIENT WITH ACROMEGALY: IS DXA MANDATORY?**O. A. Diaconu<sup>1</sup>, D. E. Rentea<sup>2</sup>, S. Zugravu<sup>2</sup>, A. M. Gheorghe<sup>2</sup>, A. Dumitrascu<sup>2</sup>, N. M. Bugălă<sup>3</sup>, M. J. Tuculina<sup>1</sup>

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**Objective:** GH (growth hormone) excess in acromegaly may induce a variety of abnormalities in skeletal metabolism in addition to joint alterations and bone deformities. There is no linear relationship between lack of GH/IGF1 control and the degree of BMD reduction since this is a multifactorial equation. We aim to introduce a young male patient with acromegaly admitted for back pain. (1-5)

**Methods:** Case report.

**Results:** This is a 35-year male with a history of severe acromegaly admitted for persistent back pain. 8 years ago he had neurosurgery for a compressive pituitary macroadenoma and then acromegaly was confirmed. Due to invasion at the cavernous sinus, only partial resection was feasible (postoperative pituitary remnant of 2.1 cm). The first IGF1 value was obtained after surgery: IGF1=936.34 ng/mL (90-262), thus active post-surgery status required gamma knife therapy and octreotide LAR 40 mg/month in addition to cabergoline 3 mg/week and pegvisomant 80 mg/week. Screening for acromegaly related cancers showed at colonoscopy a polyp 2-3 mm in the terminal ileum (histopathological exam: hyperplastic ileal mucosa, with nonspecific, minimal inflammatory changes). He had no pituitary insufficiency, neither anomalies of glucose profile. During the last years, he continued to have low values of 25-hydroxyvitamin D (25OHD) between 10-15 ng/mL despite intermittent supplementation. On current admission, endocrine panel showed low 25OHD=16.8 ng/mL and high bone formation markers osteocalcin=53.5 ng/mL (N:15-46) and P1NP=114.7 ng/mL (N:20.25-76.31), and bone resorption marker CrossLaps=1.04 ng/mL (N: 0.33-0.782), normal alkaline phosphatase=78 U/L (N:38-105), and PTH=23.3 pg/mL (N: 15-65). Suppressed prolactin=0.119 ng/mL (N:4.79-23.3) was consistent with cabergoline exposure and IGF1=410.6 ng/mL (N:<242) showed yet uncontrolled disease. DXA was within normal limits, so was TBS: lumbar L1-4: BMD(g/cm<sup>2</sup>)=1.102, Z-score(SD)=-0.7, TBS=1.345; total hip BMD(g/cm<sup>2</sup>)=0.981, Z-score(SD)=-0.5; femo-

ral neck BMD(g/cm<sup>2</sup>)=0.945, Z-score(SD)=-0.6. Profile X-ray of the spine, and later MRI showed no vertebral fractures. Consequent vitamin D supplements and higher cabergoline doses were recommended.

**Conclusion:** Bone damage is a rare condition in young adult acromegalic males, the differential diagnostic of back pain should include vertebral fractures despite normal Z-score. Which is the best case-finding strategy of osteoporosis in acromegaly is a complex issue.

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## P151

### TUMOR-INDUCED OSTEOMALACIA: DIFFICULTIES IN DIAGNOSIS AND TREATMENT

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**Objective:** Tumor-induced osteomalacia (TIO) is a rare paraneoplastic syndrome that develops due to excessive secretion of fibroblast growth factor 23 (FGF23) in mesenchymal tumors. The main manifestations are bone pain, pathological fractures and generalized muscle weakness. Nonspecific symptoms may delay the diagnosis, that leads to severe complications and disability of patients.

**Methods:** We present a case of step-by-step diagnosis and treatment of a patient with TIO.

**Results:** A 54-year-old patient with a long history of chronic pain in the back, left foot, a decrease in height by 12 cm for life, the presence of multiple vertebral fractures, low traumatic fractures of the leg and pelvic bones, received bisphosphonates for 3 y, despite no improvement in his condition. On admission, the preliminary diagnosis was secondary hyperparathyroidism associated with vitamin D deficiency (PTH 224.3 pg/ml, calcium 2.02 mmol/l, phosphorus 0.27 mmol/l). Despite adequate vitamin D and calcium supplementation, the normalization of PTH the severe hypophosphatemia persisted (PTH 46.46 pg/ml, phosphorus 0.41 mmol/l). The index of tubular phosphate reabsorption has been decreased up to 70% which suggested the FGF23-producing tumor. According to somatostatin receptor scintigraphy of the whole body with pentetraotide, MSCT and MRI, the lesion was located in the left calcaneus. Before surgery the patient received therapy with phosphorus up to 1260 mg/d, calcium carbonate 1500 mg/d, alfacalcidol 4 µg/d, cholecalciferol 7000 U/d and noted some improvement in well-being. The amputation of the lower limb was performed. The histological analysis showed the signs of cavernous hemangioma that do not exclude phosphaturic

mesenchymal tumor. Unfortunately, the follow-up examination revealed persistent hypophosphatemia despite of normocalcemia (phosphorus 0.5-0.68 mmol/l), so surgical treatment was unsuccessful. The late diagnosis contributed to the development of severe complications including secondary sites of these tumors.

**Conclusion:** The present case demonstrated the need for a comprehensive examination of patients with hypophosphatemia and generalized bone pain. The timely diagnosis of TIO determines the clinical outcomes and prognosis.

## P152

### THREE-YEAR TREATMENT WITH ASFOTASE ALFA DURING TRANSITION FROM ADOLESCENCE TO ADULTHOOD IN A PATIENT WITH CHILDHOOD ONSET HYPOPHOSPHATASIA

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**Objective:** Hypophosphatasia (HPP) is a rare inherited disease characterized by low alkaline phosphatase (ALP) activity and impaired bone mineralization. Asfotase alfa is a human recombinant enzyme replacement therapy approved in many countries for the treatment of patients with HPP. We describe a 3-y follow-up of the patient with late diagnosis childhood onset HPP successfully treated with asfotase alfa over the transition from adolescence to adulthood.

**Methods:** Case report.

**Results:** A male patient was admitted to our clinic at the age of 17, complaining of muscle weakness, limited physical activity and inability to move independently without crutches. He was only able to walk independently at 2.5 years old. His ability to walk gradually deteriorated and at the time of hospitalization the patient was restricted to a wheelchair with a minimum ability to walk up to 3 m with crutches. The weakness of his muscles was so profound that all activities were associated with a tremor. Laboratory evaluation at the age of 15 and 17 revealed low ALP levels – 20 U/L (40-390 U/L). Clinical examination revealed significant growth retardation (-3.24 SD), chest, spine and leg deformities. Genetic analysis revealed compound heterozygous *ALPL* gene mutations c.302A>G/c.571G>A. He received a first injection of asfotase alfa at the age of 17 years 9 months. Six months later, he reported a significant improvement in walking tolerance up to distances of 86 meters according to the results of a 6-min walking test, and his tremor had completely disappeared. At every follow-up he continued to show increasing in walking speed and grip strength. The asfotase alfa therapy has been continued >3 y without interruption. He is now receiving 2 mg/kg asfotase alfa subcutaneously 3 times

per week. His walking distance improved to 480 m over 6 min. We also recorded a gradual improvement in BMD from -4.3 SD to -3.2 SD Z-score. The only adverse event was a postinjection skin reaction, which was minimized after the injection regime was changed to three times a week in a different parts of body.

**Conclusion:** This case report supports the evidence that asfotase alfa treatment is effective during the transition from adolescence to adulthood in childhood onset HPP. Long-term treatment with asfotase alfa is associated with increased ALP levels, improved functional abilities and patient quality of life.

## P153

### THE RELATIONSHIP BETWEEN VITAMIN D DEFICIENCY, BODY COMPOSITION AND PHYSICAL/COGNITIVE FUNCTIONS

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**Objective:** Vitamin D (VitD) is a fat soluble vitamin that has important effects on many systems, especially the musculoskeletal system. Although the relationship between VitD levels with body composition and physical/cognitive functions have been investigated in various studies, however, there is no study evaluating all these parameters together. In accordance with, We aim to discover the relationship between VitD deficiency with body composition (i.e., skin, subcutaneous fat and muscle thicknesses) and physical/cognitive functions.

**Methods:** A total of 203 healthy adults (78 M, 125 F, aged 19-91 y) who had recent 25-OH-VitD measurements were included. Demographic/anthropometric data and ultrasonographic (US) measurements (skin, subcutaneous fat and muscle thicknesses) were recorded. Handgrip strength, gait speed, timed up and go test and chair stand test were evaluated. Additionally, cognitive status was also evaluated with mini-mental state exam.

**Results:** Subjects were classified as VitD deficient group (<20 ng/ml, N=125) and normal/control group (≥20 ng/ml, N=78). The groups were similar regarding age, gender and anthropometric measurements (all p>0.05). Subcutaneous fat tissues were thicker in the VitD deficient group (all p<0.05). All the other US measurements and functional/cognitive tests were similar between the groups (all p>0.05). According to linear regression analyses; BMI were independently related with all subcutaneous fat thicknesses in both genders, and VitD deficiency were related with all subcutaneous fat thicknesses in females, and anterior forearm subcutaneous fat thickness in males (all p<0.05).

**Conclusion:** We imply that together with BMI, VitD deficiency is independently related with increased regional subcutaneous fat tissue. We also underscore the role of US measurements for evaluation of body composition in related clinical scenarios.

## P154

### SHARED GENETIC ARCHITECTURE BETWEEN RHEUMATOID ARTHRITIS AND VARYING OSTEOPOROTIC PHENOTYPES

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**Objective:** Rheumatoid arthritis (RA) and low BMD, an indicator of osteoporosis (OP), appear epidemiologically associated. Shared genetic factors may explain this association. This study aimed to investigate the presence of pleiotropy to clarify the potential genetic association between RA and OP.

**Methods:** We examined BMDs at varying skeletal sites reported in UK Biobank as well as OP fracture acquired from the Genetic Factors for Osteoporosis (GEFOS) Consortium and the Twins UK study. PRSice-2 was used to assess the potential shared genetic overlap between RA and OP. The presence of pleiotropy was examined using colocalization analysis.

**Results:** PRSice-2 revealed that RA was significantly associated with OP fracture ( $\beta=351.6\pm 83.9$ , p-value=2.76E-05), total BMD ( $\beta=-1763.5\pm 612.8$ , p=4.00E-03), spine BMD ( $\beta=-919.8\pm 264.6$ , p-value=5.09E-04) and forearm BMD ( $\beta=-66.09\pm 31.40$ , p-value=3.53E-02). Through colocalization analysis the same causal genetic variants, associated with both RA and OP, were apparent in 12 genes: *PLCL1*, *BOLL*, *AC011997.1*, *TNFAIP3*, *RP11-15819.1*, *CDK6*, *CHCHD4P2*, *RP11-505C13.1*, *PHF19*, *TRAF1*, *C5* and *C11orf49* with moderate posterior probabilities (>50%).

**Conclusion:** Pleiotropy is involved in the association between RA and OP phenotypes. These findings contribute to the understanding of disease mechanisms and provide insight into possible therapeutic advancements and enhanced screening measures.

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This research has been conducted in using the UK Biobank Resource under application #18219.



P155

### MECHANICAL FORCES CONTROL LATE POSTNATAL BONE GROWTH VIA INHIBITION OF ANGIOGENESIS

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**Objective:** Growth and maturation of juvenile long bones, as well as fracture healing, require a specialised highly angiogenic blood vessel subtype, called type H vessels (Kusumbe et al., 2014; Ramasamy et al., 2014; Xu et al., 2018). At the end of adolescence, type H endothelial cells mature into quiescent type L endothelium, which lacks the capacity to promote bone growth. Until now, the mechanism inducing this switch in vasculature and thus the signals that terminate bone growth have remained unknown.

**Methods:** We performed laser microdissection of single capillary and surrounding cells from the ossification front at different ages followed by transcriptome analysis (NGS). Osteoblast-specific inducible *Dmp1* knockout mice and *Dmp1*-specific *Piezo1* and *Piezo2* knockout mice, as well as mechanical limb unloading through sciatic and femoral neurectomy were used to study the molecular mechanism. The mouse bones were mainly analysed using fluorescent immunohistochemistry combined with high-resolution 3D confocal microscopy as well as multiplex RNAScope technology.

**Results:** Here we find that extracellular dentin matrix protein 1 (DMP1) transforms highly angiogenic type H into quiescent type L vessels and inhibits vascular endothelial growth factor (VEGF) signaling. We show that mechanical forces, associated with increased body weight at the end of adolescence, trigger the mechanoreceptor PIEZO1 to enhance the production of FAM20C kinase in osteoblasts, a major kinase of the secreted phosphoproteome (Tagliabracci et al., 2012, 2015). FAM20C phosphorylates DMP1, previously identified as a key factor in bone mineralization (Feng et al., 2006; Ling et al., 2005), and thereby mediates its release into extracellular matrix (Liu et al., 2017) leading to the switch from rapid bone growth to accelerated strengthening. Large amounts of extracellular DMP1 inhibit VEGF signaling in endothelial cells by preventing VEGFR2 phosphorylation and VEGFR3 expression on the tip cells limiting further growth activity.

**Conclusion:** These findings demonstrate a key molecular mechanism that couples mechanical forces and bone maturation via an extracellular matrix protein and its regulation of vascular sub-

types. It may suggest new therapeutic options to treat fractures and bone pathologies such as osteoarthritis, osteoporosis and osteosarcoma.

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### PARATHORMONE AND VITAMIN D LEVELS ACCORDING TO PRESENCE OF URIC ACID LOWERING THERAPY IN PATIENTS WITH CHRONIC KIDNEY DISEASE AND DIABETES MELLITUS

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**Objective:** Patients with diabetes mellitus and chronic kidney disease (CKD) often develop disturbances related to calcium metabolism, such as secondary hyperparathyroidism due to vitamin D deficiency. Uric acid is often elevated in diabetes mellitus because insulin resistance increases uric acid reabsorption at the kidney level. The aim of this study was to explore the association between PTH values, Vitamin D values and uric acid lowering therapy presence or absence in this category of patients.

**Methods:** 120 diabetes mellitus with chronic kidney disease patients from the Gavril Curteanu Municipal Hospital were evaluated during 01.01.2019-31.12.2019. 50% of them were in stage II CKD and 41.66% were in CKD stage III, 57.5% were female and 42.5% were male, average age was 68.78±8.5 y, average diabetes mellitus duration was 11.8±7.2 y.

**Results:** Uric acid lowering therapy was present in 50% of patients while PTH-lowering therapy was present in 54.16% of patients. Vitamin D deficiency (<20 µg/L) was recorded in 32 patients of 60 (53.33%) in the group with uric acid lowering therapy and 40 patients out of 60 (66.67%) in the group without uric acid lowering therapy (p=0.138), and the mean values were almost equal (20.76 µg/L vs. 20.78 µg/L, p=0.994). Average PTH values were 116.35±95.12 pg/mL in the group with uric acid lowering therapy and 119.21±80.33 mg/dL in the group without uric acid lowering therapy (p=0,859). Increased PTH (>65 pg/mL) values were reported in 36 patients in the group with uric acid lowering therapy and in 39 patients in the group without uric acid lowering therapy (60.00 vs. 65.00%, p=0.581). There was detected a direct correlation between serum uric acid values (r=0.196, p=0.032) and PTH values. Thus high uric acid values were associated with high PTH values.



**Conclusion:** Deficiency of vitamin D and increased PTH values are highly prevalent in diabetes mellitus patients with CKD stage II or III. The presence of uric acid lowering therapy appears to be associated with slightly better parameters of these calcium metabolism related markers.

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### PELOID THERAPY IN THE TREATMENT OF OSTEOARTHRITIS

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**Objective:** Mud therapy plays a paramount role in the treatment and prevention of osteoarthritis (OA). This fact has been recognized since ancient times. OA is one of the most widespread diseases of the joints, in general, affects knee and hip joints. Clinical manifestations of osteoarthritis include pain, stiffness and dysfunction of the affected joints [1]. Peloid therapy has a pathogenic orientation: it contributes to pain relief and reduction of joint stiffness as well as activation of regeneration of damaged joint structures [2]. We aim to study the pelotherapy efficacy in patients with osteoarthritis of the knee joints at radiological stage II.

**Methods:** The object of the study - the patients of the JSC "Sanatorium "Chuvashiyakurort". The uniqueness of the sanatorium is the use of therapeutic sapropelic therapeutic muds from the Kogoyar Lake. During the year, 140 patients from 55-65 years old were under observation. Gender composition was 89 (69.4%) women and 61 (30.6%) men. Patients were divided into two groups: The 1st group (70 people) received basic therapy with chondroprotective agents (Teraflex) and nonsteroidal anti-inflammatory drugs (NSAIDs) on demand; the 2nd group (70 patients) - basic therapy, with the addition of peloid application at 50°C, treatment time 30 min. The procedures were carried out on 3 consecutive days, followed by a one-day break. The course of treatment was 15 applications. Before and after the treatment the following self-reporting was conducted: VAS pain level, morning stiffness, evaluation of performance capacity, dependence on NSAID use.

**Results:** The patients in the second group had a 36% reduction in the VAS pain level and a 30% reduction in morning stiffness relative to the group that received only basic therapy; the number of patients who indicated a 38% reduction in dependence on NSAIDs was reduced.

**Conclusion:** Peloid therapy reduced VAS pain and reduced the frequency of NSAID use, demonstrating positive clinical dynamics. We recommend the use of pelotherapy in patients with knee OA of radiological stage II in addition to basic therapy.

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P158

### VITAMIN D LEVEL IN WOMEN DURING THE MENOPAUSE LIVING IN THE TERRITORY OF THE CHUVASH REPUBLIC

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**Objective:** Vitamin D is a fat soluble vitamin that stimulates intestinal calcium absorption and plays an important role in maintaining phosphate levels for bone mineralization, bone growth and remodeling. Vitamin D deficiency increases the likelihood of developing osteoporosis. We aim to study the level of vitamin D in the blood of women during menopause living in the territory of the Republic of Chuvashia.

**Methods:** The study included 125 women aged 55-60 y. Studies of 25(OH)D levels were carried out by the method of indirect ELISA. Anthropometric study included the calculation of BMI. Diagnostic criteria for vitamin D deficiency: the level of 25 (OH) 100 nmol/l and more was regarded as the norm, 50-100 nmol/l - hypovitaminosis, 25-50 nmol/l - mild deficiency; 12.5-25 nmol/L - moderate deficiency, <12.5 nmol/L - severe deficiency.

**Results:** The average level of 25 (OH) D in women was 56.3±2.1 nmol / L). Among urban women, this indicator is 54.7±2.6), for rural women - 59.1±4.3). It was found that in 16.8% of women the level of 25(OH)D was >75 nmol/l, 37.5% had a deficiency and 45.7% had a deficiency of vitamin D. The lowest level of 25(OH)D blood in women with excess body weight.

**Conclusion:** These results indicate the problem of vitamin D deficiency in women during menopause. It is necessary to carry out treatment programs in this direction in order to reduce the likelihood of developing osteoporosis.

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**EFFICACY OF LOW-ENERGY LASERTHERAPY IN TREATMENT OF RHEUMATOID ARTHRITIS**N. Zhuravleva<sup>1</sup>, V. Diomidova<sup>1</sup>, E. Guryanova<sup>1</sup>, A. Arkhipova<sup>2</sup><sup>1</sup>Chuvash state University by I. N. Ulyanov, <sup>2</sup>Chuvash State University, Cheboksary, Russia

**Objective:** There is still no consensus on the effectiveness of laser therapy in rheumatoid arthritis (RA). Aim of this study was to evaluate the effectiveness of laser therapy in RA patients with against the background of basic therapy.

**Methods:** The study included 86 patients with RA, significant according to the 2010 EULAR/ACR criteria, aged 30-64 y, 79 women and 7 men, with a disease duration from 2 months to 15 y. The patients were divided into 2 groups: 1 - receiving laser therapy against the background of basic treatment; and 2 - receiving only basic therapy with drug therapy. Low-energy laser therapy (LLLT) was carried out using the BTL-5110 Laser in a pulsed mode of the red spectrum (635 nm), a power density of 4-5 W/cm<sup>2</sup>, with a pulse duration of 100-150 ns, a frequency of 80-10000 Hz, on the metacarpal phalangeal and proximal interphalangeal joints 5 points for 2 min 10 procedures. The subjective state of patients was assessed using a visual analogue scale of pain (VAS). All patients underwent a study of a general blood test and CRP. The studies were performed before and after the end of the course of treatment.

**Results:** An open comparative study of the effectiveness of LLLT against the background of basic drug therapy in patients with RA was carried out. Before treatment, the average subjective pain score on the VAS scale in patients with RA in the main group was 74±5 mm, and in the control group - 72±5 mm. After the course of treatment, the pain index in the main group significantly decreased to 50±5 mm, and in the control group to 63±5 mm and did not achieve a significant difference. In the main group of patients with RA, ESR was 32±6 mm and significantly decreased to 21±4 mm, and in the control group - 33±5 mm and significantly decreased to 24±4 mm. And although there was no significant difference between the groups, there was a tendency for a more pronounced decrease in ESR in the group of patients receiving laser therapy. CRP in the main group was 6.4±1.0 mg/L and significantly decreased to 3.7±0.5 mg/L, and in the control group - 6.3±1.0 mg/L and significantly decreased to 3, 9±0.5 mg/l. In all groups, male patients assessed improvement in their condition more often than women: 84.09% to 76.04%.

**Conclusion:** The use of LLLT against the background of basic RA therapy is effective, which is confirmed by a significant decrease in: VAS, ESR and CRP indicators in patients with RA. This proves a decrease in the activity of the disease.

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**INTRAOSSEOUS INJECTION OF HYDROGEL TO LOCALLY INCREASE BONE DENSITY: OSTEOPOROTIC HIP FRACTURE PREVENTION AS POTENTIAL APPLICATION**U. Kettenberger<sup>1</sup>, D. Pioletti<sup>2</sup><sup>1</sup>Flowbone SA, <sup>2</sup>EPFL/Laboratory of Biomechanical Orthopedics, Lausanne, Switzerland

Fracture prevention is done today with anti-osteoporotic drugs. Those are slow-acting and have a limited efficiency for the hips. Especially for patients with very high fracture risk, the at least 12-18 months needed for a drug to effectively increase bone density and consequently decrease fracture risk, are a clear limitation of this prevention strategy. To reinforce fragilized hips rapidly, local injections of bone cement have been proposed, a technique called femoroplasty. This treatment presents serious drawbacks, such as introducing an important mismatch in mechanical properties between the injected cement and the surrounding bone. This mismatch can result in a general weakening of the proximal femur. Furthermore, the rather invasive injection technique requires a general anesthesia which is hard to justify for a preventive treatment. The cement in the bone, especially if it is a polymeric one, can also seriously hamper a consecutive surgery in case of a fracture or when replacing an osteoarthritic hip.

To overcome these limitations of the femoroplasty, we developed an innovative hyaluronic acid-based gel with integrated hydroxyapatite nanoparticles. This nonsetting gel is highly flowable and can be injected easily into trabecular bone. The incorporated nanoparticles initiate a biomineralization of the matrix and guided bone formation. New bone rapidly substitutes the material in a controlled manner, limited to volume initially taken by the gel. This astonishing effect has already been shown in small (rats) and large animals (sheep). When injected in bone defects at the femoral condyles of rats (normal and OVX),  $\mu$ CT and histology showed a turnover of the material into woven bone in as little as two weeks. In sheep, the material was injected into the distal femoral and proximal tibial epiphysis without prior defect creation. The sheep were terminated 4 weeks after injection. The harvested bone samples were scanned in a  $\mu$ CT and a histopathological analysis was performed. The results confirmed the findings in the rats: 4 weeks after injection, the material was almost entirely substituted by woven bone which perfectly integrated into the existing sheep bone structure. Intra-gelatinous bone formation was even detected in remote locations at the end of the diaphyses. Those striking results make this new class of injectable biomaterial a promising candidate for a local, highly efficient and physiological strengthening of osteoporotic hips for fracture prevention.

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**PSOAS MUSCLE ATROPHY DUE TO LUMBAR OSTEOPOROTIC FRACTURE**K. Alpantaki<sup>1</sup>, K. Raptis<sup>2</sup>, C. Chaniotakis<sup>3</sup>, S. Naoum<sup>2</sup>, D. Kotzias<sup>2</sup>, K. Dretakis<sup>4</sup>, A. Mari<sup>5</sup>, C. Koutserimpas<sup>2</sup>

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**Objective:** Most osteoporotic vertebral fractures (OVFs) are treated conservatively, with relatively good results. Nevertheless, up to 30% of these cases is complicated with neurologic deficits. An extremely rare case of major hip flexor weakness due to significant atrophy of the psoas muscle, one year following an osteoporotic fracture of the L2 vertebral body is presented.

**Methods:** The clinical, radiologic and laboratory findings, as well as the clinical course of the patient are presented.

**Results:** A 76-year-old female suffered an osteoporotic burst fracture of the 3rd lumbar vertebra. Upon presentation, the patient did not have any neurologic deficits. Thus, she was treated conservatively. Twelve months after initial presentation the patient had gait disturbance. Significant weakness of the left hip flexors was found, while no changes were noted in the plain x-rays. MR imaging of the lumbar spine was performed, revealing that the lower end plate of the L2 vertebral body was collapsed and retro-pulsed and along with the L2-L3 disc bulge was causing central spinal canal stenosis as well as considerable stenosis of the L2-L3 foramina bilaterally. Additionally, notable atrophy of the left psoas muscle was recorded. Spinal stenosis at the L2-L3 level was assumed to be the main reason of psoas denervation and the subsequent atrophy.

**Conclusion:** Osteoporosis and subsequent OVF may have many and severe complications. OVF may cause late neurological sequelae with significant disabilities and serious deterioration of the patient's quality of life. Diagnosis, as well as management of this clinical entity may be challenging.

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**ROBOTIC ARM-ASSISTED TOTAL KNEE RECONSTRUCTION SURGERY: MIDTERM OUTCOMES**K. Dretakis<sup>1</sup>, V. Igoumenou<sup>2</sup>, K. Raptis<sup>3</sup>, S. Naoum<sup>3</sup>, C. Koutserimpas<sup>3</sup>

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**Objective:** Robotic arm-assisted total knee arthroplasty (RATKA) consists of a haptic assistive robotic arm used for bone preparation associated with a software system with the patient's fine-cut CT images. The aim of this study is to present implant survivorship and complications rates, as well as to evaluate patients' satisfaction, clinical and functional outcomes of RATKA, from the initial series in Greece.

**Methods:** The present is a prospective study. Oxford Knee score was recorded preoperatively and one year postoperatively. Patients' satisfaction rates, as well as complications and reoperation incidents were investigated. Valgus and varus deformities as well as flexion and extension were studied pre-and postoperatively.

**Results:** A total of 120 patients (78; 65% females and 42; 35% males) with mean age=71.9 y were included in the study. The mean follow-up was 23.7 months, while one revision was performed. Statistically significant improvement of the Oxford Knee score, as well as of the knee alignment deformities were recorded. Furthermore, regarding patients' satisfaction rates, 99.4% of patients reported to be "very satisfied" or "satisfied" with the procedure.

**Conclusion:** RATKA appears to be a safe and reproducible procedure, while the accurate implant positioning may lead to favorable long-term outcomes. The present study demonstrated that excellent overall satisfaction rates, clinical outcomes and implant survivorship may be expected, with minimal surgery-related morbidity.

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### OUTCOMES OF SURGICAL TREATMENT OF ATHLETIC PUBALGIA IN PROFESSIONAL ATHLETES

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**Objective:** Athletic pubalgia or sportsman hernia is an obscure sport injury. Patients most commonly present with groin pain during repetitive, high-speed twisting and cutting motions. The present 11-y study aims to evaluate the clinical outcomes, intraoperative findings as well as complications of the endoscopic surgical treatment in competitive athletes.

**Methods:** The present is a retrospective observational study of a prospectively maintained electronic database. All competitive athletes, from 2010-2020, suffering from athletic pubalgia, treated with laparoscopic Total Extra-Peritoneal technique, at the Dept. of General, Laparoscopic, Oncologic and Robotic Surgery of the "Athens Medical Center" were enrolled in this retrospective cohort. Postoperative pain, complications, return to previous training routine and patients' satisfaction were recorded.

**Results:** A total of 100 patients (88; 88% males and 12; 12% females) with a mean age of 26.7±7.5 y were included. Preoperatively, mean numeric scale pain was found to be 7.7±1.7. Three days following operation, the mean score of the pain scale was 3.4±1.5, showing a decrease of 55.8%. The mean time for return-to-sport-activity was found to be 6.27±3.02 weeks. Furthermore, 5 patients (5%) referred slight numbness at the groin area during the first 6 months after the operation as well as one patient (1%) suffered from a postoperative hematoma. No recurrence was observed. At the final follow-up period (mean 36.58±16.5 months), 97 (97%) patients mentioned to be very satisfied, 31 (31%) satisfied and 2 (2%) not satisfied with the outcome of the procedure.

**Conclusion:** Endoscopic operative management in competitive athletes diagnosed with athletic pubalgia seems to be quite satisfactory, offering quick recovery rates, rapid return-to-sport activity, very low rates regarding complications as well as no recurrence.

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### MODIFIED ANTEROLATERAL MINIMALLY INVASIVE TOTAL HIP ARTHROPLASTY (ALMIS): WHAT TO EXPECT DURING THE LEARNING CURVE AND HOW TO STAY AWAY FROM PITFALLS

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**Objective:** To report the clinical outcomes as well as the complications from the modified anterolateral minimal invasive surgery (ALMIS) approach for total hip arthroplasty (THA).

**Methods:** This study is a 7-y retrospective analysis, evaluating all patients who underwent THA through modified ALMIS approach at the Orthopaedics & Traumatology Dept. of "251" Hellenic Air Force General Hospital of Athens, Greece, from January 2013 until December 2019. Through this technique after explosion of the interval between tensor fascia latae, gluteus medius and vastus lateralis, a few anterior gluteus medius fibers, as well as gluteus minimus are elevated.

**Results:** 154 patients with a mean follow-up period of 4.6 y were enrolled in the study. Mean postoperative Harris hip score was 91.1. Moreover, the mean satisfaction rate (1-10) was 9.1 (SD 0.7), while no revision surgeries have been performed so far. Regarding complications, one case (0.6%) of intraoperative femur fracture, two cases (1.3%) of greater trochanter avulsion fractures, 12 cases (7.8%) of heterotopic ossification and 12 cases (7.8%) of positive Trendelenburg sign were recorded.

**Conclusion:** This modified surgical technique offers good visibility during acetabulum and femur preparation, with excellent clinical results during midterm follow-up, without significant percentages of complications.

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### FUNGAL SEPTIC ARTHRITIS FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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**Objective:** Postoperative infections following arthroscopic anterior cruciate ligament (ACL) reconstruction (ACLR) consist of a relatively rare but severe complication, while fungal infections are considered extremely rare. We describe a rare case of fungal septic arthritis caused by *Aspergillus fumigatus* in a young healthy patient undergoing arthroscopic ACLR.

**Methods:** The clinical, radiologic and laboratory findings, as well as the clinical course of the patient are presented.

**Results:** A 27-year-old male underwent arthroscopic ACLR with hamstring tendon autograft. Fourteen days after surgery, the patient presented with fever, while the surgically treated knee was swollen and warm. Laboratory and imaging findings revealed signs of septic arthritis. Patient underwent arthroscopic debridement, while cultures of the synovial fluid obtained were negative and he was discharged on oral empirical antimicrobial treatment. Twenty days later, he represented with deteriorating symptoms. An additional arthroscopic debridement was performed. Autograft was removed and sent for microscopy, cultures, multiplex PCR and histological examination. Microscopy revealed *A. fumigatus* and the patient was discharged 14 d following last arthroscopy on oral voriconazole and linezolid. At a 16-month follow-up, he did not have any signs or symptoms of infection, while per os voriconazole treatment continued for 6 months after the fungus isolation.

**Conclusion:** Fungal arthritis following ACLR may be catastrophic as most cases lead to bone loss and complex reconstructive surgeries or even arthrodesis in relatively young patients. High index of suspicion is of utmost importance in order such cases be detected. It is of note that histological examination and/or detection of *Aspergillus* DNA by PCR methods may be quite useful tools for the definite diagnosis.

## P166

### IS THERE A DIFFERENCE IN ENDOTHELIAL DAMAGE IN PATIENTS WITH RHEUMATOID ARTHRITIS AND OSTEOARTHRITIS?

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**Objective:** Damage to the vascular endothelium is recorded in both rheumatoid arthritis (RA) and osteoarthritis (OA), however, we have not found comparative studies of the degree of impairment in these diseases in the literature data. The aim of this study was to determine endothelial damage by the number of circulating endothelial cells and the content of stable nitric oxide metabolites.

**Methods:** 35 women with RA were examined with a low degree of activity and experience diseases at least 3 years old, at the age 58.2±4.1 y and 40 women with a combined form of OA of the knee and small joints of the hands, at the age of 60.4±2.7 y who

were treated in the rheumatology department of the 25th hospital in Volgograd. The control group was almost 30 healthy persons, comparable in sex and age, donors of the regional blood transfusion station.

**Results:** The content of stable nitric oxide metabolites was determined by the polymerase reaction with the Griss reagent. The content of stable nitric oxide metabolites in blood plasma was in the RA 16.7±2.2 and to the patients with OA 15.4±2.5 µg/L, respectively, which is much more than in control (4.2±1.2 µg/L, p<0.05). There were no significant differences in the content of circulating endothelial cells between the groups RA and OA.

**Conclusion:** Data presented indicate the similarity of quantitative changes in vascular endothelial damage in RA and OA. This fact can be explained by the fact that there is degradation of cartilage (regardless of etiology), as well as concomitant arterial hypertension and the presence of concomitant obesity, which also negatively affects the quality of cartilage tissue.

## P167

### ROLE OF FIBRONECTIN AND ANTIBODIES TO HIM IN THE PATHOGENESIS OF RHEUMATIC DISEASES

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**Objective:** The participation of fibronectin (FN) in the pathogenesis of rheumatic diseases (RD) is not controversial today. Most of the clinical manifestations of this group of diseases are based on vascular insufficiency. Among the possible reasons for her occurrence a certain role is assigned functional inferiority of FN, namely decrease in its opsonizing and antithrombotic ability. It is assumed that along with oversaturation of active domains of the FN molecule products of tissue degradation as one of the factors of its functional insufficiency in RD there may be the formation of antibodies (AT). The aim of the study was to improve the immunological diagnosis of systemic lupus erythematosus (SLE), systemic scleroderma (SSD), and rheumatoid arthritis (RA) using immobilized granular antigenic drugs with magnetic properties based on FN.

**Methods:** We examined the patients of the rheumatology department of the 25th hospital in Volgograd.

**Results:** Increased levels of AT to FN were found in 49 (41.9%) patients with RA, 22 (41.6%) patients with SLE and 11 (32.4%) patients with SSD. In all cases, the studied indicator correlated with the degree of disease activity (p<0.05), which makes it possible to use it as an additional indicator. the severity of the pathological process. High levels of antibodies to FN in RA were associated with lesions of peripheral vessels and RES, in SS - with involvement in the pathological process of the nervous and cardiovascular systems, and with SLE - the heart, vessels and kidneys. An increase in the contractile ability of blood vessels and a decrease in rheological blood properties underlying this pathology, prob-



ably due to deposition in the vascular the wall of FN-containing immune complexes and increased expression of adhesion molecules.

**Conclusion:** Thus the revealed patterns make it possible to predict the clinical variant diseases and carry out timely correction of incipient disorders.

## P168

### REFRACTORY LOW BACK PAIN AND LUMBAR CT-GUIDED STEROID INFILTRATION. STUDY OF 582 PROCEDURES FROM THE SAME CENTER

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**Objective:** Mechanical low back pain which is refractory to analgesic and rehabilitative treatment is an important cause of disability. The primary objective of corticosteroid (CS) lumbar infiltration is to accelerate the recovery process and to avoid surgery. However, its use is not without controversy.

**Methods:** Retrospective study of lumbar CT-guided CS injections performed in a single center.

**Results:** 582 procedures were performed in 445 patients (1 infiltration in 445 patients, 2 in 106, 3 in 23, 4 in 7 and 5 in 1). The mean age±SD was 58.6±14.8 y with a male/female ratio of 224/221. The indications, access and used CS appear in the Table. In 86% of patients the oral analgesic treatment had been ineffective. Improvement was observed in 68% of patients at the first month (Table) regardless of the indication, approach of injection and CS used and in 63.2% at 3 months. Only 21.3% of patients (n=124) required a subsequent surgery due to the persistence of pain, mostly within the first year after infiltration (66.9%). Clinical efficacy showed no statistically significant differences regarding to the indication of the procedure. On the other hand, we observed a significantly higher improvement of the pain through the foraminal and lateral recess than through the epidural at 3 months (p=0.002). Regarding the CS used, the improvement was significantly greater with triamcinolone compared to dexamethasone in the first and third months (p≤0.001). Concerning safety, there were 16 cases (2.7%) of local complications (5 punctures of the thecal sac, 4 extravasations of the contrast and 7 transient pain in lower extremities) and 5 (0.9%) systemic complications

(3 allergic reactions and 2 syncope due to low blood pressure), without clinical relevance and they were not associated with the indication, approach of injection and CS used.

TABLE. Clinical evolution of pain at the first month according to indication, approach of injection and used steroid.

	Total response, n (%)	Partial response, n (%)	No response, n (%)	Worsening, n (%)	TOTAL, n (%)
<b>INDICATION</b>					
-Disc herniation	12 (4.8%)	167 (66.5%)	66 (26.3%)	6 (2.4%)	251 (43.1%)
-Lumbar spinal stenosis	5 (2.3%)	131 (61.8%)	75 (35.4%)	1 (0.5%)	212 (36.4%)
-Postoperative fibrosis	1 (1.2%)	56 (65.1%)	29 (33.7%)	0 (0%)	86 (14.8%)
-Spondyloarthrosis	1 (6.2%)	11 (68.8%)	4 (25%)	0 (0%)	16 (2.8%)
-Other (lithesis, synovial cyst and facet joint syndrome)	1 (5.9%)	11 (64.7%)	5 (29.4%)	0 (0%)	17 (2.9%)
<b>APPROACH</b>					
-Lateral recess	14 (4.4%)	207 (64.7%)	94 (29.4%)	5 (1.5%)	320 (55%)
-Epidural	3 (1.9%)	94 (59.5%)	60 (38%)	1 (0.6%)	158 (27.1%)
-Foraminal	3 (2.9%)	75 (72.1%)	25 (24%)	1 (1%)	104 (17.9%)
<b>STERIOD</b>					
-Dexamethasone	8 (2.1%)	234 (60.6%)	140 (36.3%)	4 (1%)	386 (66.3%)
-Triamcinolone	12 (6.1%)	142 (72.5%)	39 (19.9%)	3 (1.5%)	196 (33.7%)
<b>TOTAL n=582</b>	<b>20 (3.4%)</b>	<b>376 (64.6%)</b>	<b>179 (30.8%)</b>	<b>7 (1.2%)</b>	<b>582 (100%)</b>

**Conclusion:** In our series disc herniation, lumbar stenosis and postoperative fibrosis were the most common indications. Improvement was observed in 68% and in 63.2% of the patients in the first and third months, respectively. Triamcinolone, foraminal infiltration and lateral recess proved to be more effective for pain control. In our study, lumbar CT-guided CS infiltration in patients with refractory low back pain is an accessible, minimally invasive, safe and effective procedure.

## P169

### MINIMAL IMPORTANT CHANGE/ DIFFERENCE (MIC) FOR HAND GRIP STRENGTH

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**Objective:** Muscle strength is important to assess sarcopenia in clinical practice. Interpretability of hand grip strength measures depends on availability of «normative reference values» and “indicators of real change” [(minimal important change) (MIC)]. Deter-

mination of MIC for handgrip strength (HGS) is utmost important because clinicians and researchers would thereby be able to follow the clinical course of the patients. This is especially important to determine whether a suggested therapeutic agent against sarcopenia really succeed to treat sarcopenia. The aim of this study is to identify MIC for HGS to be used in geriatrics setting.

**Methods:** A prospective, multicenter, international observational and longitudinal study will be conducted. The study is designed to identify MIC for HGS in postacute older adults. Patients admitted between the November 2021 and March 2022 will be eligible for inclusion. The baseline measurement will be taken as early as possible within 48 h after admission at the latest. The second measurement will be performed within 48 h before being discharged. At each time, we will measure grip strength and in the second measurement subjects and physicians will be also ask to provide a global rating of perceived changes in their upper extremity following 7-point Likert scale and subjects will get other anchors like ADL, IADL, EQ-5D, FRAIL scale, MNA-SF, Simpler Modified Fried Frailty Scale and SARC-F.

**Conclusion:** Our purpose is to begin to examine how much change constitutes a clinically meaningful difference on upper extremity assessments after hospitalization for an acute problem. A hospitalization poses an extra risk factor for older adults in terms of physical decline. In our study we will use more than one anchor to validate MIC. In conclusion, the literature doesn't show us a clear MIC for grip strength. This protocol has been designed to identify MIC for grip strength in geriatric patients.

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### CENTRAL HYPOPIUITARISM: BONE EFFECTS

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**Objective:** Central hypopituitarism, by lack of gonadotropins/estrogen/testosterone, growth hormone deficiency disturbs bone metabolism. (1-5) We aim to introduce a young female patient with central hypopituitarism (including long term untreated hypogonadism) and associated bone status.

**Methods:** Case report. The patient agreed for the anonymous use of her medical records.

**Results:** This is a 40-year female patient admitted for bone assessment. She is known with pituitary dwarfism (without GH treatment), hypogonadotropic hypogonadism (estrogens priming for pubertal menses induction was applied then she decided to stop etinilestradiol/levonorgestrel therapy since last decade), hypercholesterolemia, multinodular goiter. The medical family history is irrelevant. She accuses diffuse bone pain. Physical ex-

aminational reveals: height=139 cm. The endocrine panel showed normal thyroid function: TSH=1.16 µU/mL (N:0.5-4.5), FT4=14.85 pmol/L (N:9-19), low IGF1=63.9 ng/mL (78-274); low estradiol=5 pg/mL, intact glucocorticoid axes cholesterol 3 time upper normal limit. Pituitary CT showed an incidentaloma of 0.54/0.28 cm(this is a nontumor related, probably genetic hypopituitarism). Blood bone assays: 25-hydroxyvitamin D=30.8 ng/mL (N>30) under daily 1000 UI cholecalciferol, normal bone turnover markers: of formation osteocalcin=25.04 ng/mL (N:15-46), and alkaline phosphatase=90U/L(normal:38-105), respective of resorption CrossLaps=0.56 ng/mL (N:0.33-0.782) as well as PTH=45.17 pg/mL (N:15-65). Central DXA showed low Z-score=-2.1SD (lumbar L1-BMD=0.8 g/cm<sup>2</sup>); total hip BMD=0.554 g/cm<sup>2</sup>, Z-score=-2.4SD; femoral neck BMD=0.740 g/cm<sup>2</sup>, Z-score=-1.5SD. Profile X-ray excluded vertebral fractures. Estroprogestative therapy was reinitiated. She continued with 1000 UI/d cholecalciferol. Statins were added for cholesterol values control.

**Conclusion:** This case highlights the importance of DXA assessment even in young females because of untreated central hypogonadism. The lack of GH therapy during pubertal years might be a secondary contributor to impair peak bone mass. Treatment for low Z-score should start with estrogen substitution unless fragility fractures are prevalent.

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## P171

### FROM COVID-19 VACCINE AGGRAVATED GRAVES' DISEASE TO TRABECULAR BONE SCORE

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**Objective:** Graves' disease is an autoimmune thyroid condition causing an increase in thyroid hormones levels as well as ophthalmopathy and dermopathy. Thyrotoxic states accelerate bone resorption resulting in bone mass loss and secondary osteoporosis. Glucocorticoid therapy for controlling eye complications and even thyroid function in selected cases is a secondary contributor to bone damage. (1-5) We aim to introduce a male patient with

Graves' ophthalmopathy which was aggravated after COVID-19 vaccine requiring glucocorticoid therapy with consequent bone anomalies.

**Methods:** This is a case report. The patient agreed for anonymously use of his medical records.

**Results:** This is a 68-year nonsmoking male patient admitted for eye evaluation. He has a history of hypercholesterolemia, arterial hypertension, but also Basedow-Graves' disease that was diagnosed for more than 15 y; he had no eye involvement, thus after thyroid function control with methimazole, he received radioiodine iodine treatment 11 y ago; currently with subclinical hypothyroidism under substitutive levothyroxine 25 µg/d. While generally in good health, he described progressive eye deterioration since last 2 months (he received the first 2 doses of vaccine against COVID-19 four months prior). He has severe proptosis, photophobia, and palpebral edemas. The patient was treated with pulse therapy methylprednisolone 6x250 mg which was repeated up to a maximum total dose of 4.5 g. On current admission, the endocrine panel showed hypothyroidism: TSH=5.04 µUI/mL (N:0.5-4.5), FT4=10.65 pmol/L (N:9-19) with negative thyroid blocking antibodies ATG (anti-thyroglobulin antibodies)=13.12 UI/mL (N:0-115), ATPO (anti-thyroperoxidase antibodies)=0.39 UI/mL (N:0-5.61), and positive TRAb (antiTSH-receptor antibodies)=2.86 UI/L(N:0-1.75). Thyroid ultrasound reveals post radioiodine therapy status, right lobe=1.24/1.1/3.16 cm, left lobe=1.2/1.5/3 cm, hypoechoic structure, intensely inhomogeneous. Orbital CT identified bilateral, asymmetric bilateral exophthalmia without other cases of proptosis. Bone status showed vitamin D deficiency (25-hydroxyvitaminD=18 ng/mL), and normal bone turnover markers osteocalcin=15.42 ng/mL(N:15-46), alkaline phosphatase=61 U/L (N:38-105), CrossLaps=0.22 ng/mL (N:0.33-0.782), P1NP=35.42 ng/mL (N:20.25-76.31), and PTH=33.12 pg/mL (N:15-65). Due to nonspecific bone pain by the end of the methylprednisolone therapy, we evaluated a central DXA showing osteopenia: lumbar BMD=1.14g/cm<sup>2</sup>, T-score=-1.4SD, Z-score=-0.6SD, TBS=1.325; total hip BMD=1.173, T-score=0.5SD, Z-score=0.7SD; femoral neck BMD=1.013 g/cm<sup>2</sup>, T-score=-0.4SD, Z-score=0.3SD. Spine X-ray scan showed no vertebral fractures. He had low TBS of 1,100. No other causes of bone loss were identified. The patient received adequate levothyroxine substitution, 2000 UI cholecalciferol, 6 weeks followed by 1000 UI/d.

**Conclusion:** Short term glucocorticoid exposure might protect bone. In this case, we had a low TBS with osteopenia based on BMD-DXA. It is difficult to appreciate the impact of methylprednisolone and even the effects of lockdown and limited physical exercise amid pandemic on bone status. Whether vaccine against COVID-19 infection might trigger an autoimmune condition that further requires corticotherapy is still debatable.

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## P172

### THE IMPACT OF FRAILITY AND ITS ASSOCIATIONS AMONG A SAMPLE OF COMMUNITY-DWELLING OLDER ADULTS

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**Objective:** Frailty, sarcopenia and fragility fractures are powerful correlated and all of them are predictors of clinical adverse outcomes. Elderly individuals with have a fragility fracture should be assessed for frailty and sarcopenia to better develop a care plan. For these reason interventions are necessary to determine and treat frailty. The present study investigates the prevalence of frailty and associated factors among the older adults who were assessed within the scope of a geriatric study in the Fatih District of the Istanbul Province.

**Methods:** Retrospective cross-sectional study. The study included community-dwelling older adults aged 61-101 y who were living in the Fatih District of the Istanbul Province between November 2014 and May 2015. The number of drugs regularly used by the participants and the number of diseases were recorded. It was evaluated whether the participants experienced falling/risk of falling/fear of falling in the last 1 y. VAS was used in the assessment of chronic pain. The other instruments used for assessment included the FRAIL scale for frailty screening; the 6-item KATZ Activities of Daily Living (ADL) scale; the 8-item Lawton-Brody Instrumental Activities of Daily Living Scale (IADL) for the measurement of functional capacity; the European Quality 5 Dimensions (EQ-5D) questionnaire for the assessment of quality of life; the Mini-Cog test for cognitive screening; the Geriatric Depression Scale-Short Form (GDS-SF) for depression screening; the Mini Malnutrition Assessment-Short Form (MNA-SF) for malnutrition screening; and the Romberg test and postural instability test for walking. Hand grip strength (HGS) was measured using a Jamar hydraulic hand dynamometer and the thresholds for hand grip strength were evaluated <27 kg<16 kg in men and women, respectively, based on the EWGSOP2 definition. Muscle mass was measured through a bioimpedence analysis (TANITA-BC532). Low muscle mass (young adult mean-2SD) and the thresholds for muscle mass were evaluated as <9.2 kg/m<sup>2</sup> vs. 7.4 kg/m<sup>2</sup> in men and women, respectively, based on national data. Sarcopenia was defined as a reduction in muscle mass and muscle function [usual gait speed (UGS) or muscle strength] based on the EWGSOP2 definition.



**Results:** The study included 204 older adults (94 men and 110 women), with a mean age of 75.4±7.3 y. Of the cases, 30.4% were robust, 42.6% were prefrail and 27% were frail. Significant differences were recorded in number of diseases ( $p=0.006$ ), frail score ( $p=0.002$ ), malnutrition ( $p=0.004$ ) and the results of a clock-drawing test ( $p=0.040$ ), number of drugs, chronic pain ( $p=0.001$ ), as well as in the fear of falling, IADL, GDS-SF, -EQ-5D scores, BIA fat, BIA muscle and hand grip strength ( $p<0.001$ ) between the groups. The frailty groups differed significantly in terms of the presence of malnutrition, fear of falling, urinary incontinence, chronic pain, Romberg sign, postural instability, level of ambulation, presence of depression, dementia, falls within the last one year ( $p<0.001$ ) and gender ( $p=0.004$ ). A regression analysis evaluating independent frailty-associated factors [dependent variable: frailty (robust vs. prefrail +frail)], revealed an association with the number of drugs (OR=1.24,  $p=0.036$ ), cognitive disorder (OR=0.30,  $p=0.016$ ) and EQ-5D (OR=1.53,  $p=0.017$ ).

**Conclusion:** The present study established the prevalence of frailty in the Fatih district community, in which the most prominent associated factors were cognitive dysfunction, low quality of life, and multiple drug usage. Nationwide population studies involving multiple centers are required.

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### THE DISCOURSE OF PREGNANCY-RELATED OSTEOPOROSIS: SENTIMENT ANALYSIS OF THE LITERATURE FROM 2011 TO 2021

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**Objective:** Pregnancy-related osteoporosis is rare; its etiology and pathogenesis are uncertain, while its management and natural history are still poorly defined. Sentiment analysis (SA) is the automated process by which we can extract information about the emotion that prevails and identifies a body of text. In particular, SA can provide a measure of the "sentiment polarity" (positive or negative) of a text. Since SA of medical texts can be implemented (Artif Intell Med 2015;64:17-27) we sought to use SA regarding this clinical issue.

**Methods:** We collected the English language abstracts of review articles or articles with a review of the literature in PubMed from 2011 to November 2021, implementing the search strategy (with Medical Subject Headings [MeSH] terms): "osteoporosis OR (low AND bone AND density) AND human AND pregnancy" and performed SA with an online artificial intelligence tool (courtesy of Prof. Daniel Soper, California State University, Fullerton, CA, USA; <https://www.danielsoper.com/sentimentanalysis/default.aspx>). The results were evaluated by year with the Kruskal-Wallis and chi-square tests.

**Results:** From 2011 to 2021 a slight trend from negative to positive sentiment was noted in the literature stud-

ied, but did not attain statistical significance ( $p=0.18$ ). **Conclusion:** Regarding pregnancy-related osteoporosis uncertainties remain vis-à-vis diagnosis and management, bearing also in mind the need to optimize perinatal outcomes. Research has yet to provide causes or an optimal treatment for this entity, which can differ between nonpregnant or pregnant states. This situation is reflected in the sentiment of the published literature, especially in review articles - usually by experts in the field worldwide - that try to provide a critical evaluation of the data that is available from existing studies.

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### ANTIRESORPTIVE DRUGS IN BONE HEALTH OF POSTMENOPAUSAL WOMEN RECEIVING AROMATASE INHIBITORS FOR EARLY BREAST CANCER: A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS

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**Objective:** This systematic review aimed at summarizing the evidence on the effects of antiresorptive drugs in patients receiving aromatase inhibitors (AIs) for early breast cancer (BC).

**Methods:** A systematic search was performed on PubMed, Scopus, and Web of Science up to April 30, 2021, in order to identify RCTs published in English language. The studies were assessed by the following PICO model: P) Participants: postmenopausal women with early BC receiving adjuvant AI. I) Intervention: bisphosphonates and/or denosumab treatment; C) Comparator: any comparator; O) Outcome: BMD modifications. Jadad scale was used to perform the quality assessment.

**Results:** Out of the 2415 records identified, 21 papers (15 studies) were included in the data synthesis. The quality assessment through the Jadad scale revealed 6 studies with scores of 5, 1 study with a score of 4, 13 studies with scores of 3, and 1 study with a score of 1. Although both bisphosphonates and denosumab showed to increase BMD, only denosumab has been related to a significant reduction in fractures.

**Conclusion:** Cancer treatment-induced bone loss is a growing issue in the current literature; however, optimal management in women with early BC is still a challenge. Further evidence is needed to characterize the optimal antiresorptive drug and treatment duration in women with CTIBL, targeting the specific patients' characteristics.



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### MACHINE LEARNING APPROACH TO ASSESS THE ROLE VITAMIN D DEFICIENCY IN OSTEOPOROSIS OF BREAST CANCER WOMEN: AN OBSERVATIONAL CROSS-SECTIONAL STUDY

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**Objective:** To assess the role of vitamin D deficiency in women with breast cancer (BC) and its correlation with osteoporosis through a machine learning approach.

**Methods:** The patients included in this observational cross-sectional study were women in post-menopausal status receiving hormone therapy due to estrogen receptor-positive BC. The outcomes assessed were the following: osteoporosis and osteopenia diagnosis; lumbar spine and femoral neck BMD, serum levels of 25-hydroxyvitamin D, calcium, and PTH.

**Results:** The study included 54 BC women, mean age of 67.3±8.16 y. Data showed a significantly low correlation with the LS BMD value; therefore, multiple factor analyses have been used to assess the role of vitamin D in osteoporosis, reporting that the BMD determined the orientation of vector individuals, and vitamin D arranged cluster analysis with the same trajectories. Thus, we found a low prevalence of patients with adequate bone health and vitamin D serum levels in a cohort of BC women.

**Conclusion:** The machine learning model highlighted a close relationship between bone health and vitamin D serum level. Therefore, adequate screening and supplementation of vitamin D should be performed in order to reduce the risk of fragility fractures in BC women.

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### PATELLA TOOTH SIGN IN A PATIENT WITH LONGSTANDING RHEUMATOID ARTHRITIS

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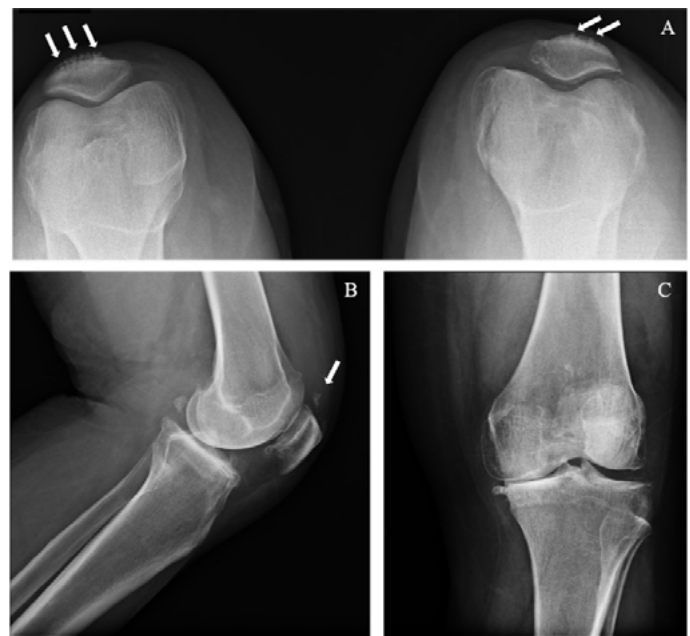
**Objective:** Patella enthesophyte resembling a teeth structure in skyline view of knee radiograph has first been described in 1977 by Greenspan et al. It may be an incidental finding in middle-aged and elderly people, but it has also been described in association

with quadriceps tendon rupture. Up to our knowledge, there has been no previous report of this uncommon radiographical sign in a patient with rheumatoid arthritis (RA).

**Methods:** Medical records review. Informed consent was obtained from the patient.

**Results:** A 65-year-old female Brazilian patient with RF-positive and ACPA-positive RA since 33 years old complained of persistent mechanical left knee pain. On physical examination, limited range of motion of left knee due to pain, more intense on palpation of the quadriceps insertion, was evidenced. There was no synovitis. She had been previously treated with infliximab and adalimumab, both of which had to be interrupted because of mild allergic reaction, and with rituximab, which is on its fourth biannual infusion, in monotherapy, with satisfactory response. X-rays of the knees were ordered to evaluate for possible secondary osteoarthritis (OA) given the long course of RA. On skyline view, multiple indentations on the superior pole of the patellae, more prominent at the left side, were noticed. According to Greenspan classification, grade 3 and grade 2 tooth sign on the left and right patella were detected, respectively. In face of the non-inflammatory character of the joint complaint, with degenerative alterations clearly seen on x-ray, therapy for RA remained unchanged, and conservative therapy for secondary OA was started.

**Conclusion:** Patella tooth sign represents vertical ridging on the superior aspect of the patella due to quadriceps enthesopathy (QE), with no clear reported correlation between knee symptoms and the radiographical finding. We described a case of RA that manifested knee pain related to QE and secondary OA.



(A) Skyline view of knees. (B) Lateral view of left knee. (C) AP view of left knee.

Arrows point to enthesophytes forming the patella tooth sign.

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### COMPARISON BETWEEN VERTEBROPLASTY WITH HIGH OR LOW VISCOSITY CEMENT AUGMENTATION OR KYPHOPLASTY IN CEMENT LEAKAGE RATE FOR PATIENTS WITH VERTEBRAL COMPRESSION FRACTURE: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

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**Objective:** To determine whether outcomes following vertebroplasty with high viscosity cement are superior to low viscosity cement and noninferior to kyphoplasty in the setting of vertebral compression fractures.

**Methods:** We searched for randomized controlled trials and cohort studies assessing cement leakage rate in adult patients with VCFs who underwent vertebroplasty with high (HVCV) or low viscosity cement (LVCV) augmentation, or kyphoplasty (KP) in PubMed, Embase, Ovid, The Cochrane Library, and Web of Science from inception up to December 2019. Two authors extracted data and appraised risk of bias. We performed pairwise meta-analyses in R to compare differences between three treatments and network meta-analysis using frequentist random-effects models for indirect comparison. We used P-score to rate the overall certainty of evidence. The primary outcome was cement leakage rate.

**Results:** Five RCTs and eight cohort studies with 840 patients and a total of 1280 vertebral bodies were included in the systematic review and network meta-analysis. Compared to LVCV, the relative risk for cement leakage following HVCV and KP was 0.42 (95%CI 0.28–0.61) and 0.83 (95%CI 0.40–1.68), respectively. Our pooled results suggested that HVCV (P-score=0.99) was better than KP (P-score=0.36) in cement leakage rate.

**Conclusion:** The present network meta-analysis demonstrated that HVCV may be associated with lower risk of cement leakage among patients with VCFs as compared to other augmentation techniques. Future prospective studies will validate the findings of this analysis and further elucidate the risk of symptomatic cement leakage.

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### TERIPARATIDE AND BISPHOSPHONATE USE IN OSTEOPOROTIC SPINAL FUSION PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** Osteoporosis is one of the most common conditions among adults worldwide. It also presents a challenge among patients undergoing spinal surgery. Use of teriparatide and bisphosphonates in such patients has been shown to improve outcomes after fusion surgery, including successful fusion, decreased risk of instrumentation failure, and patient-reported outcomes. Herein, we performed a systematic review and indirect meta-analysis of available literature on outcomes of fusion surgery after use of bisphosphonates or teriparatide.

**Methods:** We conducted a comprehensive search of all databases (Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid Embase, Ovid Cochrane Central Register of Controlled Trials, Ovid Cochrane Database of Systematic Reviews, and Scopus) to identify studies assessing outcomes of spinal fusion among osteoporotic patients after use of teriparatide or bisphosphonate. Four authors independently screened electronic search results, and all four authors independently performed study selection. Two authors performed independent data extraction and assessed the studies' risk of bias assessment using standardized forms of Revised Cochrane risk-of-bias tool for randomized trials (RoB 2) and Risk Of Bias In Nonrandomized Studies of Interventions (ROBINS-I).

**Results:** Nineteen studies were included in the final analysis. A total of 13 studies evaluated the difference in fusion rate between bisphosphonates and teriparatide or control group. Fusion rate was higher for bisphosphonates (effect size (ES) 83%, 95%CI 77–89%) compared with teriparatide (ES 71%, 95%CI 57–85%), with the p-value for heterogeneity between groups without statistical significance (p=0.123). Five studies assessed the impact of using bisphosphonate or teriparatide on screw loosening. The rate of screw loosening was higher for bisphosphonates (ES 19%, 95%CI 13–25%) compared with teriparatide (ES 13%, 95%CI 9–16%) without statistical significance (p=0.52).

**Conclusion:** Our results indicate that while both agents may be associated with positive outcomes, bisphosphonates may be associated with a higher fusion rate, while teriparatide may be associated with lower screw loosening. The decision to treat with either agent should be tailored individually for each patient keeping in consideration the adverse effect and pharmacokinetic profiles.

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### THE INFLUENCE OF MENOPAUSE ON BONE MINERAL DENSITY IN PATIENTS WITH CHRONIC KIDNEY DISEASE STAGE 5

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**Objective:** BMD is the main determinant of fracture risk in patients with chronic kidney disease (CKD) [1]. Menopause, age, female sex and white race are determinants of fractures risk in general population [2]. The aim of the study was to analyze the effect of menopause on BMD in white female patients with CKD stage 5.

**Methods:** The study involved 251 women with stage 5 CKD, 82 women (aged 44.8±12.9 y; 44 in menopausal, 5 of them with surgical menopause) before the start of dialysis and 169 women (aged 45.0±13.8 y; 93 in menopausal, 14 of them with surgical menopause) on hemodialysis. To assess BMD, DXA of the lumbar spine, hip and forearm was used.

**Results:** The analysis of BMD estimated by T-score in postmenopausal and premenopausal patients showed that postmenopausal women in both groups had lower BMD of the lumbar vertebrae, and in predialysis patients, also of the distal forearm. However, according to the Z-score, which smooth out the influence of age on the assessment of BMD, no significant differences were obtained between menopausal and premenopausal women ( $p>0.05$ ). The predialysis patients with surgical menopause had lower Z-scores of the lumbar spine and forearm than women after natural menopause ( $p<0.05$ ). In dialysis patients, there was not revealed significant difference in BMD assessed by the Z-score between women with surgical and natural menopause ( $p>0.05$ ).

**Conclusion:** The inconstancy in the influence of menopause on BMD scores in female patents with CKD stage 5 can be explained by the common hormonal disorders observed in most women with the end stage renal disease and also too many other factors that affect bone metabolism in CKD.

#### References:

1. Mazurenko SO, et al. Biomed Eng 2017;51:20
2. Kelsey JL. Public Health Rep 1989;104(Suppl):14

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### FREQUENCY OF CARDIOVASCULAR DISEASE AT DIFFERENT LEVELS OF VITAMIN D

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**Objective:** In 2012, a national cross-sectional multicenter population-based survey was conducted, which included 2032 people with a mean age of 49.3±14.7 y (20-80 y), men 956 (47.1%), women 1076 (52.9%) from 12 districts of the country. The aim was to assess the frequency of cardiovascular events in the study population and their relationship to vitamin D levels.

**Methods:** The level of 25-hydroxyvitamin D [25(OH)D] is determined according to the FDA validated LCMS/MS method. The values of this parameter should be presented in nmol/l. Based on our previous study for a normal level of vitamin D in our country, a value above 50 nmol/l ( $>20$  ng/ml) is assumed, below which value begins to increase in the level of PTH [1]. Statistical processing was performed with SPSS 13.0.

**Results:** Concomitant cardiovascular disease (CVD) was reported by 8.8% of subjects (179/2032) in the study population. Winter screening of vitamin D in Bulgaria showed that 75.8% (1528/2016) of the population has a level of 25(OH)D<50 nmol/l - 21.3% (430/2016) of the population is deficient in vitamin D (cutoff<25 nmol/l) and 54.5% (1098/2016) of the population is with insufficiency in vitamin D (cutoff 25-50 nmol/l). At a threshold level of 25(OH)D 50 nmol/l, there is no statistically significant difference in the frequency of CVD in the two groups [ $>50$  nmol/l - 7.8% (38/484) vs.  $<50$  nmol/l - 9.2% (139/1510),  $p=NS$ ]. There was also no significant increase in the risk of CVD at levels of 25(OH)D<50 nmol/l compared to levels of 25(OH)D>50 nmol/l (OR=0.840, 95%CI 0.578-1.222, NS). At a threshold level of 25(OH)D 25 nmol/l there is a significant increase in the frequency of CVD in persons with levels below this limit [ $>25$  nmol/l - 7.6% (120/1579) against  $<25$  nmol/l - 13.57% (57/420),  $p<0.0001$ ]. There was a reduction in the risk of CVD at the level of 25(OH)D>25 nmol/l (OR=0.526, 95%CI 0.376-0.735), compared to the risk in individuals with a level of 25(OH)D<25 nmol/l,  $p<0.0001$ .

**Conclusion:** A threshold level of vitamin D below which a change in the risk of CVD is observed is 25 nmol/l, with levels above this value having a protective effect (OR=0.526, 95%CI: 0.376-0.735,  $p<0.0001$ ). Vitamin D deficiency is among the risk factors for cardiovascular disease along with diabetes, arterial hypertension, obesity, CKD, hyperparathyroidism and should not be missed research and evidence.

**Reference:** 1. Borissova A-M, et al. Osteoporosis 2013;8:133

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### ROLE OF ALENDRONATE/TERIPARATIDE IN STEROID-INDUCED OSTEOPOROSIS IN DEVELOPING COUNTRIES

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**Objective:** In this study, the comparison of alendronate with teriparatide was done in 214 patients with osteoporosis (ages 22-65 y) who had received glucocorticoids for at least 3 months. A total of 107 patients received 20 µg of teriparatide, and 107 received 10 mg of alendronate once daily.

**Methods:** Study design and patients in this randomized, double-blind clinical trial, the primary outcome was the change from baseline to 24 months in BMD at the lumbar spine associated with the administration of daily teriparatide (at a dose of 20 µg), as compared with that of daily alendronate (at a dose of 10 mg), in patients with established glucocorticoid-induced osteoporosis.

**Results:** A total of 214 patients (148 women and 66 men) were screened. Of these patients, 129 underwent randomization and 28 began treatment (25 women and 3 men). There were no significant differences between study groups in baseline characteristics. In both study groups combined, 115 patients had radiologic evidence of previous vertebral fractures and 182 patients had radiologic evidence of previous no vertebral fractures. Similar patterns of response to the treatments were observed in analyses of absolute and relative changes in BMD; only relative changes are presented here lumbar spine patients in the teriparatide group had an increase in the baseline value for BMD at the lumbar spine that was significantly greater than the increase in the alendronate group. At the last measurement, patients in the teriparatide group had an increase in mean (±SE) BMD at the lumbar spine from baseline that was significantly greater than that of patients in the alendronate group (7.2±0.7% vs. 3.4±0.7%, P<0.001).

**Conclusion:** 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. The occurrence of sporadic hypercalcemia was more frequent in the teriparatide group than in the alendronate group. On the basis of the known pathophysiology of glucocorticoid-induced osteoporosis, teriparatide might be considered as a therapeutic strategy for patients at high risk for fracture.

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### ADDRESSING THE BURDEN OF ORTHOPEDIC TRAUMA AND CATEGORICALLY IDENTIFYING THE PATTERN OF INJURIES PRESENTING AT TRAUMA CENTER CIVIL HOSPITAL KARACHI-PAKISTAN

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**Objective:** To address the burden of orthopaedic trauma presenting in Trauma Centre Civil Hospital, Karachi Pakistan. 500 bedded Trauma Centre is serving all kinds of trauma 24 h a day with all state of the art facilities and is fully equipped with latest machinery. It is the largest emergency institute of Sindh till date. This study also presents the pattern of injuries categorically, that we are encountering in daily emergency

**Methods:** This descriptive study was conducted from Sept 2017 to Dec 2017. An informed verbal consent was taken and preformed questionnaire was filled. Patient brought dead and those who were having injuries other than the orthopaedic injury were excluded. Data was analysed using SPSS 21 for statistical significance.

**Results:** The study was conducted on 2850 patients of all age group, which makes an average of 30 patients per day, including 1957 males (68.7%) and 893 females (31.3%). Among the total, the number of patients of paediatric age group (1-12 y) were 942 (33.05%). Mean age was 35 in adults. SD 28.69 Maximum injuries occurred in age group of 10-30 y. By occupation most were found to be students and children 659 (23.1%). Most traumas occurred due to road traffic accidents 2193(76.9%) and other occurred at home 657 (23.05%). Road traffic accidents are found to be major cause of injuries and rest was due to other causes. Majority of patients were brought by ambulance service with any first aid given. By addressing the categorical arrangement of patients with their pattern of injuries, the cases with mild type of injury like foreign body, soft tissue trauma and muscular pain of sudden onset were 446 (15.6%). The patients with single bone closed fractures including clavicle fracture 180 (6.31%), humerus neck and shaft fracture 83 (2.91%), supracondylar humerus fractures 355 (12.4%), radius/ulna shaft fracture 90 (3.1%), Colles' fracture 389 (13.6%), neck of femur fracture 56 (1.96%), intertrochanteric fracture 62 (2.1%), femur shaft fracture 186 (6.5%), fracture of tibia/fibula 133 (4.6%) and bimalleolar fracture 45 (1.57%). The patients which suffered from joint dislocations like shoulder 48 (1.68%), elbow dislocation 17 (0.59%), hip dislocation 22 (0.77%) were also addressed. Some patients were having severe injuries including multiple fractures, major contaminated open wounds, traumatic amputations, crushed limbs or with head injury 43 (3.06%). Very few cases were cold 42 (5.6%) and some patients were included which are unknown and those whose data were lost 695 (24.3%).



**Conclusion:** This study concludes many objectives. First and the major point to address is the burden of orthopaedic trauma not only from the city but also for interior of Sindh Province presenting in Trauma Centre Civil Hospital Karachi. Road traffic accidents were the leading cause of trauma esp. motorbike accidents, is the second thing to address. This study is also categorizing the pattern of injuries selectively with all parameters. For the betterment and decrease of burden, traffic violation should be taken under consideration. People should be acknowledged about how to provide first aid and the mode of transport should be improved.

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**PERSPECTIVES OF FUNCTIONAL RECOVERY ACCORDING TO BODY MASS INDEX AFTER HIP FRACTURE SURGERY AT DISCHARGE OF A DEDICATED ORTHOGERIATRIC REHABILITATION UNIT: ORTHOGERONTOLREHAB COHORT – OGRIC PART 1**

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**Objective:** Osteoporotic hip fracture (HF) is a major public health concern. HF has a negative impact on functional status with many patients who do not return to their pre-fall function after HF in everyday life and that leads to a substantial loss of healthy life-years in elderly people. Among HF patients, half requires hospitalization in rehabilitation unit (RU). Among the multidisciplinary interventions, intensive nutritional intervention after HF improves nutritional intake and status, and a greater functional recovery. Concerning BMI and recovery of activities of daily living (ADL) after HF fracture surgery, studies are rare and their results differ. The aim of this study was to evaluate according to BMI in older people the functional recovery in activities of daily living at discharge of a dedicated orthogeriatric rehabilitation unit after HF.

**Methods:** The data source used in this cohort study was the OrthoGerontolRehab (OGR) database. This database contains data for inpatients in the dedicated RU of Charles Foix hospital - APHP Sorbonne University, from July 2012 to September 2018. The unit is situated at Ivry-sur-Seine, in the Val de Marne region of France. BMI measurement: the malnutrition was evaluated in RU by BMI measured at admission. We classified patients according to the WHO BMI categories measured at admission in the rehabilitation unit into four groups: underweight (BMI < 18.5 kg/m<sup>2</sup>), normal weight (BMI 18.5 to < 25 kg/m<sup>2</sup>), overweight (BMI 25 to < 30 kg/m<sup>2</sup>) and obese (BMI ≥ 30 kg/m<sup>2</sup>). Functional outcomes: The primary functional outcome measure was the ATIH (Agence Technique de l'Information et de l'Hospitalisation): the summa-

tion of items dressing/bathing, physical ambulation, feeding and toileting corresponds to ATIH motor score ranged 4 to 16. Subjects are considered as little or no dependent if score from 4 to 8, moderately dependent if score from 9 to 12, and very dependent if score ≥ 13. The secondary functional outcomes were: 1- the Autonomie Gérologie Groupes Iso-Ressources (AGGIR) score evaluated by geriatrician to define the older adults' level of personal independence in ADL at admission and at discharge of RU. The AGGIR scale includes 10 items that assess global patient abilities: dressing, bathing, physical ambulation inside and outside, transferring, feeding, toileting, orientation, consistency and remote communication (phone, doorbell, etc.). Three levels of disabilities are defined as GIR 1-2 considered very dependent, GIR 3-4 moderately dependent and GIR 5-6 little or no dependent. 2- discharge setting including community (home, assisted living) and institution (long-term care, nursing home); and 3- length of stay (in days) in rehabilitation unit.

**Results:** After exclusion of 81 individuals with BMI at admission in rehabilitation missing data, 295 HF patients aged of 86.9±5.8 y (range 71-104) were studied. Their mean weight at admission in RU was 57.82±12.51 kg (range 24.4-99.1) and their BMI was 22.81±4.28 kg/m<sup>2</sup> (range 10.7-37.3). Among HF patients, 56.6% were considered as normal weight, 15.2% as underweight, 22.4% as overweight and 5.8% as obese. At admission in RU after HF surgery, the vast majority of inpatients were considered as moderately or very dependent according to ATIH motor score and GIR scale, with 90.2% and 94.2% respectively. Among inpatients, 10.5% were classified GIR 1, 41% GIR 2, 25.8% GIR 3, 16.9% GIR 4, 3.4% GIR 5 and 2.4% GIR 6. Level of autonomy at admission evaluated by ATIH instrument or by GIR scale did not differ significantly according to BMI groups. At discharge of RU, the vast majority of inpatients remained considered as moderately or very dependent according to ATIH motor score and GIR scale, with 66.4% and 87.1% respectively. No difference of functional recovery at discharge and discharge setting was significantly observed according to BMI groups.

**Conclusion:** We hypothesized that overweight and obese older subjects had a worst functional recovery after hip fracture because they were actually malnourished, but our results did not show it. We did not study albumin serum as malnutrition marker because in hospitalized patients this is not considered as a good marker of nutritional status with inflammatory state influencing factors of hypoalbuminemia, even if serum albumin independently nutritional status, is also prognostic factor and has impact on the functional recovery. To evaluate sarcopenia would have been probably the right choice. Indeed it exists a negative impact of obese people with sarcopenia on the recovery of daily living after hip fracture. Unfortunately, tools measuring sarcopenia such as handgrip dynamometry, DXA, remain in the field of research and are not used or available in routine, particularly in RU, contrary to BMI or albumin serum.

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### PERSPECTIVES OF FUNCTIONAL RECOVERY ACCORDING TO SERUM ALBUMIN AFTER HIP FRACTURE SURGERY IN A DEDICATED ORTHOGERIATRIC REHABILITATION UNIT: ORTHOGERONTOLREHAB COHORT – OGRC PART 2

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**Objective:** Hip fracture (HF) has a negative impact on functional performances generating transfer to rehabilitation unit. Nutritional status is usually assessed with serum albumin despite limitations. Regardless of being nutritional marker, serum albumin is prognostic factor. The aim of this study was to evaluate the functional recovery at discharge of rehabilitation unit after HF according to serum albumin.

**Methods:** We retrospectively analyzed data of OrthoGerontolRehab database from May 2012 to July 2018 of patients in a dedicated orthogeriatric rehabilitation unit. Patients were classified into two groups based on serum albumin at admission in rehabilitation unit:  $\geq 30$  g/dl considered as well nourished or moderate malnourished and  $< 30$  g/dl as severe malnourished. Functional recovery was assessed using 1- Agence Technique de l'Information et de l'Hospitalisation (ATIH) motor autonomy instrument: the summation of items dressing/bathing, physical ambulation, feeding and toileting corresponds to ATIH motor score ranged 4 to 16; subjects are considered as little or no dependent if score from 4 to 8, moderately dependent if score from 9 to 12, and very dependent if score  $\geq 13$ ; and 2- the Autonomie Gérontologie Groupes Iso-Ressources (AGGIR) score evaluated by geriatrician to define the older adults' level of personal independence in ADL at admission and at discharge of RU. The AGGIR scale includes 10 items that assess global patient abilities: dressing, bathing, physical ambulation inside and outside, transferring, feeding, toileting, orientation, consistency and remote communication (phone, doorbell, etc.). Three levels of disabilities are defined as GIR 1-2 considered very dependent, GIR 3-4 moderately dependent and GIR 5-6 little or no dependent.

**Results:** In the 295 HF patients aged  $86.9 \pm 5.8$  y, median serum albumin at admission in rehabilitation unit was  $28.5 \pm 3.7$ , and 59% (n=174) were considered as severe malnourished, 39% (n=116) as moderate malnourished and 5 patients as well nourished. At admission in RU after hip fracture surgery, autonomy in activities of daily living was poor with 68.5% of patients very dependent in ATIH motor score and 51.5% classified GIR 1 or 2 groups. At discharge of RU, 66.4% of patients were still considered as moderately or very dependent according to ATIH motor score and 87.1%

were still dependent with GIR group 1 to 4. Patients with serum albumin  $< 3$  g/dl had worse autonomy at admission and were more dependent at discharge with worst ATIH score ( $p=0.0006$ ) and GIR groups ( $p=0.0508$ ), and returned home less ( $p=0.037$ ) than patients with serum albumin  $\geq 30$  g/dl.

**Conclusion:** In a sample of hip-fractured patients of a dedicated orthogeriatric rehabilitation unit, functional recovery at discharge improved but less in subjects with severe malnutrition who were more dependent at admission in rehabilitation unit.

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### IMPACT OF VITAMIN D DEFICIENCY ON FUNCTIONAL RECOVERY AFTER HIP FRACTURE IN ELDERLY PATIENTS HOSPITALIZED IN ORTHOGERIATRIC REHABILITATION UNIT

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**Objective:** Hip fracture in older people is a severe complication of osteoporosis due to high mortality, morbidity, poor functional prognosis and socioeconomic costs. The aim of this study was to assess the impact of vitamin D deficiency on functional recovery after hip fracture upon discharge from a dedicated orthogeriatric rehabilitation unit (RU).

**Methods:** We retrospectively analyzed data collected in the OrthoGerontolRehab database from July 2012 to September 2018 on hip fracture patients having undergone multidisciplinary rehabilitation in a dedicated orthogeriatric RU. In the first analyze, patients were classified into four groups based on vitamin D postoperative measurement: 0-10 ng/mL considered as vitamin D deficient, 11-20 ng/mL as moderate insufficiency, 21-30 ng/mL as slight insufficiency and  $> 30$  ng/mL as nondeficiency. In the second analysis, patients were classified into two groups based on median postoperative vitamin D level of the study population. Functional recovery at discharge of RU was assessed using: 1- walking distance (in meters: 0-10; 11-50; 51-100;  $> 100$ ); 2- use of walking aid as rollator, cane and human aid; 3- autonomy in the activities of daily living by the Groupe Iso Resource (GIR) scale (GIR 1-2 considered very dependent, GIR 3-4 moderately dependent and GIR 5-6 little or no dependent); 4- the Agence Technique de l'Information et de l'Hospitalisation (ATIH) motor score (dressing, feeding, physical ambulation and toilet) corresponds to a score ranged 4 to 16; subjects are considered as little or no dependent if score from 4 to 8, moderately dependent if score from 9 to 12, and very dependent if score  $\geq 13$ ; 5- discharge setting (returning home or entering a nursing home) and 6- length of stay in RU.

**Results:** Among 248 hip fracture patients aged of 86.9 y, median postoperative vitamin D levels was  $22 \pm 12.6$  ng/mL and 58 (n=23%) had a vitamin D between 0-10 ng/mL; 56 (23%) between 11-20 ng/mL, 69 (28%) between 21-30 ng/mL and 65 (26%)  $> 30$  ng/mL. 119 (48%) patients had a vitamin D measurement between 0-21 ng/mL et 129 (52%) upper than 21 ng/mL. In the two analyses, no significant difference was found concerning walking distance (respectively,  $p=0.813$  and  $p=0.551$ ), use of walking aid ( $p=0.485$ ;  $p=0.17$ ), GIR score ( $p=0.571$ ;  $p=0.841$ ), ATIH motor score ( $p=0.25$ ;  $p=0.394$ ), discharge setting ( $p=0.533$ ;  $p=0.495$ ) and length of stay ( $p=0.344$ ;  $p=0.31$ ).

**Conclusion:** Vitamin D deficiency in older subjects was not associated with less good functional recovery after hip fracture surgery at discharge of an orthogeriatric RU.

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### CHARACTERIZATION OF NEUROPATHIC COMPONENT OF BACK PAIN IN PATIENTS WITH VERTEBRAL FRAGILITY FRACTURES

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**Objective:** Vertebral fractures are the most common osteoporotic fractures. These lesions can be associated with chronic back pain. In addition to nociceptive mechanisms, a neuropathic component may be involved in the genesis of spine pain associated with vertebral fragility fractures. However, literature on this topic is lacking. The objective of this study is to assess the type of vertebral pain in patients with vertebral fragility fractures.

**Methods:** Patients with at least one vertebral fracture that occurred at least 3 months before the enrollment were included. Vertebral fractures were detected by morphometric examination and classified according to Genant's semiquantitative method to characterize the type and the severity of vertebral deformities. Pain severity and its impact on daily living activities were evaluated through the Brief Pain Inventory (BPI). Neuropathic pain was investigated through the Leeds Assessment of Neuropathic Symptoms and Signs pain scale (LANSS) and the painDETECT questionnaire.

**Results:** 72 patients were included. Our population consisted mainly of women (88.8%). The mean age was 69.2 y; 70.8% of patients have multiple vertebral fractures, of which 47% are localized at the thoracic spine, 43.1% at the thoracolumbar level, 9.8% at the lumbar spine. The BPI showed moderate spinal pain (score 5-6) in 23.6% of cases and severe (score 7-10) in 8.3% of cases, with high interference (score 5-10) with daily living activities in 38.8% of cases. The painDETECT questionnaire revealed the pres-

ence of a neuropathic component of back pain in 5.5% of cases, while the LANSS scale showed that the presence of a neuropathic mechanism was probable in 23.6% of cases.

**Conclusion:** In our study, we demonstrated that if we use the pain-DETECT questionnaire for evaluating the neuropathic component of back pain, only 5.5% of patients reported clinical complaints associated with neuropathic mechanisms, almost in line with available data about this topic in patients with vertebral fragility fractures, whereas LANSS scale seems to demonstrate an incidence 4-fold higher of neuropathic component of back pain in the same population. Considering that our population is affected by chronic back pain, presumably, a large proportion of people with vertebral fragility fractures show neuropathic signs and symptoms that are better identified by the LANSS.

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### POSTPARTUM BACK PAIN: A WARNING SIGN FOR VERTEBRAL FRAGILITY FRACTURES

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**Objective:** Pregnancy and lactation-associated osteoporosis (PLO) is a rare form of osteoporosis. Back pain and height loss related to vertebral fragility fractures are the most common symptoms. Due to its rarity, no guidelines on the management of this condition are available. In this work, we described the management of a case of PLO.

**Methods:** A 33-year-old woman (BMI=25.64 kg/m<sup>2</sup>) was referred to our outpatient service for the onset of acute back pain that occurred 2 months after childbirth and the beginning of lactation. A medical history of Hashimoto's thyroiditis treated with levothyroxine was reported. Physical examination showed mobility limitation of the thoracic and lumbar spine, tenderness of the thoracic and lumbar spinous processes, and paraspinal muscles. MRI showed seven vertebral fractures. Blood chemistry was normal. After exclusion of other secondary causes of osteoporosis, PLO was diagnosed.

**Results:** According to the National regulatory reimbursement criteria, the patient was treated with teriparatide and vitamin D supplementation, also including the prescription of a semirigid thoracolumbar orthosis. Discontinuation of lactation and a calcium-rich diet were also recommended. At a 6-month follow-up, the patient showed pain reduction (Brief Pain Inventory Severity Index from 7.1 to 1.5; Interference Index from 7.2 to 3.2) and absence of new vertebral fractures at the MRI.

**Conclusion:** Osteoporotic vertebral fractures associated with pregnancy and lactation are an important cause of disabling back pain, with loss of function and severe limitation to the quality of

life. Multimodal approaches, including discontinuation of breast-feeding, supplementation with calcium and vitamin D, antiosteoporotic drug therapy, spinal orthosis, and regular follow-up are useful strategies to reduce the risk of new fractures and improve the quality of life of patients with PLO.

## P188

### ASSOCIATIONS OF BODY MASS INDEX, BODY FAT PERCENTAGE AND SARCOPENIA COMPONENTS WITH BONE HEALTH ESTIMATED BY SECOND GENERATION HR-PQCT IN OLDER ADULTS WITH OBESITY

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**Objective:** Sarcopenia and obesity have both been associated with increased fracture risk in older adults, however, there are limited data on relationships between sarcopenia, obesity, and bone microarchitecture. We aim to investigate associations of BMI, body fat percentage, and components of sarcopenia (lean mass and physical function), with bone microarchitecture indices measured by HR-pQCT in older adults with obesity.

**Methods:** 77 adults aged  $\geq 50$  y with body fat percentage 30% (men) or 40% (women) were included. Body fat percentage, appendicular lean mass (ALM) and total hip and lumbar spine areal BMD (aBMD) were assessed using DXA. Participants completed functional assessments including stair climb power test and BMI was calculated. Distal tibial bone microarchitecture was measured by second generation HR-pQCT. Linear regression analyses were adjusted for age, sex, smoking status, vitamin D and self-reported moderate-to-vigorous physical activity.

**Results:** BMI was negatively associated with trabecular separation but positively associated with total hip aBMD, trabecular number, trabecular thickness, and trabecular volumetric BMD (vBMD) (all  $p < 0.05$ ). ALM was positively associated with total hip and lumbar spine aBMD, trabecular area and trabecular vBMD (all  $p < 0.05$ ). Conversely, body fat percentage was negatively associated with cortical area ( $\beta$ -coefficient:  $-1.509\text{mm}^2$ ; 95%CI:  $-2.978, -0.039$ ). Higher stair climb power test time (indicating poorer physical function) was associated with poorer trabecular vBMD, trabecular thickness and cortical area (all  $p < 0.05$ ).

**Conclusion:** Higher BMI, ALM and muscle power were associated with favourable bone microarchitecture indices, but a higher body fat percentage was negatively associated with cortical bone area, among older adults with obesity. These findings suggest that the

protective effect of high BMI for fractures is attributable to higher muscle mass and/or forces and high fat mass may not be beneficial for bone health.

## P189

### THE STATE OF OSTEOPOROSIS TREATMENT IN FINLAND: PATIENT'S PERSPECTIVE ON THE IMPLEMENTATION OF THE TREATMENT RECOMMENDATION

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**Objective:** To find out how the different parts of the treatment recommendations for osteoporosis (updated 2020) are implemented in practice in Finland from the patient's point of view.

**Methods:** The survey was conducted for members of Finnish Osteoporosis Association electronically and on a paper form and was also disseminated on social media. There were 992 respondents. 86% of the responders were over 65 years of age.

**Results:** In Finland, official local treatment chains for osteoporosis operate in a few areas and there are big differences between the different hospital districts in the country. According to the patients, many doctors do not know osteoporosis and the attitude of many doctors was reported to be dismissive. Screening for fracture patients is performed in only a few hospital districts.

- 63% of diagnosed patients were told what a word osteoporosis meant
- 42% found out the causes behind osteoporosis (for example, laboratory tests)
- 37% received guidance for selfcare
- For 25%, the risk of personal fracture was determined
- 32% of those who started treatment were referred for an oral health checkup
- 29% of those who started taking the medicine heard about the possible side effects of the medicine
- 55% heard about the duration of medication
- 28% had a treatment plan

**Conclusion:** Self-medication of osteoporosis is challenging for the patient. The effectiveness of treatment is slow and usually requires lifestyle changes. If a patient does not have information about self-medication, the benefits of medication, or the duration or the follow-up of medication, it is very likely that the patient will stop treatment. As the Finnish population ages, osteoporosis and fractures will be a greater challenge to society due to increasing acute, long-term, and nursing home care. In the ongoing reform of social and health care in Finland, it is important to consider the complete treatment chain according to the osteoporosis treatment recommendations when planning services.



P190

### A SHORT-TERM EFFICACY OF CHONDROITIN-SULPHATE, GLUCOSAMINE-SULPHATE AND S-ADENOSYLMETHIONINE ON CARTILAGE THICKNESS, INFLAMMATION, SYMPTOMS AND FUNCTIONALITY IN PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** To evaluate the effect of oral supplementation on cartilage thickness, inflammation, and clinical outcomes in patients with knee osteoarthritis.

**Methods:** A total of 120 patients (mean age 66.44±7.88 y) with symptomatic, radiographic knee osteoarthritis and Kellgren-Lawrence grade 1-3 were included in the study. They were randomized in a 1:1:1 ratio to receive a placebo, 50% (1st experimental group) or 100% of active substances (2nd experimental group). Laboratory (ESR, CRP, TNF $\alpha$ , IL-1, IL-6, and IL-17), imaging (XR and MSUS), and clinical assessments (VAS, SF-36, WOMAC, LY-SHOLM) were performed at Baseline, Visit 1 (after 1 month), Visit 2 (after 3 months) and Visit 3 (after 6 months), except XR which was performed at Baseline and Visit 3. The joint space width (JSW) at lateral and medial condyle was estimated by one radiologist. One experienced ultrasonographer assessed cartilage thickness at the lateral condyle, medial condyle, and intercondylar notch, as well as the presence of osteophytes, effusion, synovial hypertrophy, and popliteal cyst in a semi-quantitative manner. Regarding COVID-19 related restrictions, 30 patients dropped out and only data for 90 patients were evaluated and presented. Statistical analysis was performed using SPSS 25.

**Results:** Patients show improvements in all clinical outcomes favoring the placebo group ( $p > 0.05$ ). SE, CRP, IL-1, and IL-17 were slightly decreased in the 2nd experimental group compared to placebo after 6 months ( $p > 0.05$ ). MSUS showed a slight increase or no changes (0.08 to 0.24 mm regarding knee/condyle,  $p < 0.01$  or  $p < 0.05$  respectively) in cartilage thickness favoring 2nd group, but those findings didn't correlate with XR (no changes after 6 months). There weren't any changes in presence of other OA-related MSUS characteristics.

**Conclusions:** We can't underestimate the huge effect of a placebo on patients' symptoms, their functionality, and quality of life. Possible anti-inflammatory effects need to be evaluated in further studies. However, according to MSUS assessment, there was a small but significant increase in cartilage thickness in the experimental group, while remained stable or slightly decreased in the placebo and 1st group, which means that oral supplementation

may slow down OA progression, especially in a lower stadium of disease. Future studies evaluating the effect of supplementation in patients with knee osteoarthritis need to include more objective assessments (sensitive and reliable imaging and laboratory markers) to support data obtained by clinical assessment questionnaires.

**Disclosure:** The study was sponsored by Abela Pharm.

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### MANAGEMENT OF PATIENTS WITH VERTEBRAL FRACTURES IDENTIFIED AS INCIDENTAL FINDINGS ON CT IMAGING

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**Objective:** Vertebral fractures are increasingly identified on routine radiology imaging but are often untreated, even though they are associated with high risk of future fractures and increased mortality<sup>1</sup>. The aim of this study was to analyse the clinical management and follow-up of patients with vertebral fractures incidentally identified on CT imaging in order to identify areas where the fracture liaison service (FLS) can supplement existing services to improve patient care.

**Methods:** This retrospective study included all CT scans positive for vertebral fractures performed in a tertiary hospital in June 2021, identified via newly implemented three-letter codes in the CT report: VXP=vertebral fracture(s) positive, VXS=chronic, stable vertebral fracture(s). The management of patients was analysed in terms of 1) recommended investigations (vitamin D, bone profile, PTH and myeloma screen), 2) treatment (antiresorptive treatment with bisphosphonates or denosumab, or referral for DXA scan), and 3) follow-up (referral to the FLS).

**Results:** 88 CT scans positive for vertebral fractures were identified, corresponding to 84 patients (average age 74.75 y, range 51-95). Only 1 case (1.1%) had all four recommended investigations, whereas 60 cases (68%) did not have any investigations. Only 1 case was newly started on antiresorptive treatment, and 2 cases (2%) were referred for DXA scan for further osteoporosis assessment. 66 cases (75%) did not have any osteoporosis treatment. Only 2 cases (2.3%) were referred to FLS for follow-up.

**Conclusion:** The majority of patients were not appropriately investigated or treated for their osteoporotic fracture. These are clear opportunities to improve patient management, reducing the risk of future fractures. The FLS can play a vital role in improving the management of vertebral fractures.

**Reference:** 1. Royal Osteoporosis Society. State of the Nation report: Vertebral Fracture Identification in 2021. Accessed 10/11/2021.

P192

**VITAMIN D AND CHRONIC URTICARIA**A. M. Rîcă<sup>1</sup>, A. M. Gheorghe<sup>2</sup>, D. E. Rentea<sup>2</sup>, N. M. Bugălă<sup>3</sup>, M. J. Tuculina<sup>1</sup>

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**Objective:** Besides its role in the calcium-phosphorus balance, vitamin D (VD) plays a role in immunity and its deficit is associated with several autoimmune diseases. Polyglandular autoimmune syndromes include a large variety of diseases characterized by several glandular failures; while the component of thyroid autoimmunity is mostly related with other autoimmune skin conditions including urticarial and vitiligo. (1-5) We aim to introduce a female patient with hypovitaminosis D and chronic urticarial of unknown other cause than autoimmune context.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 49-year nonsmoking female patient who is admitted for endocrine checkup, knowing she has been recently diagnosed with urticarial. She has a history of autoimmune hypothyroidism, premature ovarian failure by the age of 38 for which she received estro-progestative treatment that was soon stopped due to liver cytolysis of possible autoimmune cause (positive LMK1 and ASMA antibodies, probably an autoimmune hepatitis). After 8 months of amenorrhea, the patient's menstrual cycle became regular, and LMK1 and ASMA antibodies turned negative. The patient presented intermittent pruritus with unspecified trigger and a tendency to weight loss. In the meantime, the skin and menses status was normal. On current admission, the endocrine panel showed normal thyroid function: TSH=3.41 µUI/mL (N:0.5-4.5), FT4=10.09 pmol/L (N:9-19), and positive antithyroid antibodies, as well as intact glucocorticoid axes based on baseline blood assessments of ACTH=19 pg/mL (N:3-66), morning plasma cortisol=12.3 µg/dL (M:4.82-19.5). Anterior cervical ultrasound: right thyroid lobe:1.57/0.92/3.7 cm, left lobe:1.47/0.9/3.5 cm, hypoechoic structure. She had VD deficiency of 25-hydroxyvitaminD=8 ng/mL (N:30-100) and negative tests for celiac disease with normal parathormone and bone turnover markers as well as serum calcium levels. Vitamin D supplements 2000 UI/d was added to symptomatic medication for urticaria.

**Conclusion:** There is a bidirectional link between immunity and VD. VD deficit may accompany autoimmune diseases due to chronic malabsorption and chronic inflammation. Moreover, hypovitaminosis D leads to abnormal immune responses. In patients with autoimmune disorders affecting multiple glands and nonendocrine organs as seen here for liver, gonads and thyroid, VD status might be the clue for associated skin conditions.

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P193

**PITUITARY ADENOMA: HOW ABOUT THE BONE?**A. I. Trandafir<sup>1</sup>, N. M. Bugălă<sup>2</sup>, D. E. Rentea<sup>1</sup>, M. J. Tuculina<sup>3</sup>

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**Objective:** Endocrine tumors, like pituitary adenomas might impair bone status because of hypogonadism (including due to hyperprolactinemia), growth hormone anomalies, associated secondary diabetes mellitus, and need for glucocorticoid therapy. (1-5) We aim to introduce a female patient with pituitary adenoma and osteopenia.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 62-year female patient who is admitted for bone evaluation. She had menopause by the age of 40. She also associates chronic autoimmune thyroiditis with hypothyroidism in treatment with levothyroxine, kidney stones, and mammary dysplasia. 11 years ago she had an episode of persistent headache, thus a CT was performed and a microadenoma of 0.4 cm was identified. She came to an endocrinologist and the tumor was considered an incidentaloma due to negative hormonal profile. Under these circumstances, she had a bone evaluation done and found with osteopenia. She continued with intermittent vitamin D supplements. On current admission, the endocrine panel showed normal thyroid function under daily levothyroxine TSH=1.2 µUI/mL (N:0.5-4.5) and positive antithyroperoxidase antibodies of 95 UI/mL (N<5), as well as normal bone turnover markers: osteocalcin=16 ng/mL (N:15-46), CrossLaps=0.26 ng/mL (N:0.33-0.782), P1NP=40 ng/mL (N: 20.25-76.31), and PTH=46 pg/mL (N: 15-65). She initially had vitamin D deficiency but, under 1000 UI/d of cholecalciferol, 25-hydroxyvitamin D is 29.6 ng/mL (N>30). Central DXA confirmed osteopenia: lumbar L1-4: BMD=1.02 g/cm<sup>2</sup>, T-score=-1.3SD, Z-score=-1.4SD with TBS=1.366; total hip BMD=1.056 g/cm<sup>2</sup>, T-score=0.4SD, Z-score=0.4SD; femoral neck BMD=0.928 g/cm<sup>2</sup>, T-score=-0.8SD, Z-score=-0.3SD. Anterior cervical ultrasound confirmed hypoechoic patterns, suggestive for an autoimmune condition of the thyroid.

**Conclusion:** In patients with pituitary incidentalomas, the bone evaluation is usually done when the patient seeks medical attention due to need for endocrine tests concerning pituitary gland, as seen here. Osteopenia might be caused by a tumor at pituitary level or might be incidental, as in this case.

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## P194

### BONE TURNOVER MARKERS POST VACCINE AGAINST COVID-19

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**Objective:** Widespread vaccination against COVID-19 has raised hypotheses related to potential interactions with underlying chronic afflictions and treatments among people expecting vaccination. There is clear data to prove a relationship between bone turnover markers and the vaccine, but it is an interesting perspective to follow. (1-5) We aim to introduce a female patient recently vaccinated against COVID-19 and bone evaluation. **Methods:** This is a case report. The patient agreed for anonymous use of her medical records.

**Results:** This is a 51-year female patient who is admitted for bone evaluation due to nonspecific bone pain. She was recently vaccinated against COVID-19 (2 doses). Her medical history includes postoperative hypothyroidism two decades ago, pituitary microadenoma (incidentaloma), dyslipidemia, and hyperuricemia. She had surgical menopause by the age of 45 for benign conditions. Currently, the endocrine panel showed normal thyroid function: TSH=1.57 µU/mL (N:0.5-4.5), FT4=13.18 pmol/L (N:9-19) under daily levothyroxine 125 µg. Anterior cervical ultrasound revealed total post-thyroidectomy status, with right thyroid remnant of 0.25/0.26 cm, respective left of 0.23/0.32 cm, and hypoechoic, inhomogeneous pattern. Bone assessments revealed low vitamin D levels on terms of 25-hydroxyvitamin D=20.6 ng/mL (N>30), and high bone turnover markers, of formation osteocalcin=47 ng/mL (N:15-46), P1NP=85 ng/mL (N:20.25-76.31), with normal total alkaline phosphatase=69 U/L (N:38-105), and mildly elevated CrossLaps=0.79 ng/mL (N:0.33-0.782) as bone resorption marker as well as normal PTH=14 pg/mL (N:15-65). Central showed nor-

mal BMD according to her age. Antibodies anti-Sars-CoV-2 (IgG) were high 152 AU/mL. She was not known with a 6-month history of COVID-19 infection. The patient was recommended cholecalciferol 1000 UI/d.

**Conclusion:** Whether vaccine against COVID-19 infection might change the bone turnover markers is controversial. In this patient, there was the only new event in the patient medical history which may potentially contribute to this type of anomaly.

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## P195

### COST-EFFECTIVENESS OF BISPHOSPHONATES IN THE PREVENTION OF FRACTURES IN OSTEOPENIC POSTMENOPAUSAL WOMEN IN COLOMBIA

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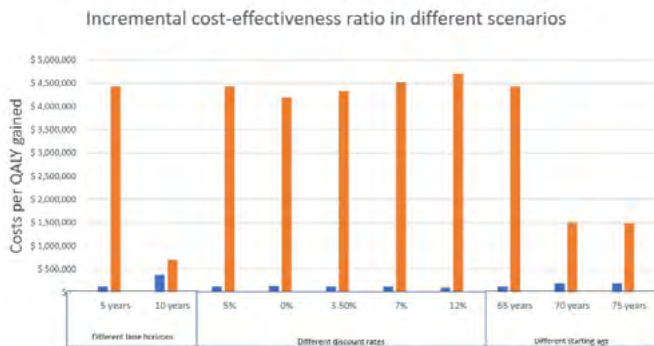
**Objective:** To estimate the costs and health benefits of adding bisphosphonates to vitamin D and calcium to prevent fractures in postmenopausal women with osteopenia in Colombia.

**Methods:** A Markov model was used with the following health states: osteopenia, hip fracture, vertebral fracture, other fracture, osteoporosis and death in a target population of postmenopausal women aged 65-75 y with osteopenia and densitometric low bone mass in a time horizon for the base case of 5 y, and a 10-y set-time scenario was also analyzed. Using the health care perspective, we analyzed the cost-effectiveness of vitamin D and calcium vs. alendronate or zoledronate with vitamin D and calcium. A base case was established from which costs and outcomes were estimated. The fracture probability was obtained from the literature review. Costs related to fragility fractures were calculated considering usual care. The outcome was an incremental cost-effectiveness ratio (ICER) measured as the cost divided by fractures prevented and the cost per quality of adjusted life years (QALYs) gained. We also carried out a probabilistic sensitivity analysis using 1000 iterations of a second-order Monte Carlo simulation for the base-case scenario.

**Results:** In the base-case analysis of women whose treatment was started when they were 65 years old, alendronate was cost saving and resulted in 10 fewer fractures per 1000 women compared to treatment with only vitamin D and calcium. As for zoledronate, the cost per QALY was \$6,129,847 pesos (US 1,876 dollars) there was a decrease in all fractures (50 fewer fractures per



1000 women), with a cost of \$11,980,780 (US 3,667 dollars) per fracture avoided, which was below the threshold of willingness to pay. In the Figure, we summarize the ICER for the different scenarios that were modeled. In the sensitivity analyses, the results were sensitive to changes in the cost of alendronate upkeep and the alendronate cost.



**Conclusion:** Assuming Colombia's current costs of alendronate and zoledronate, these therapies are cost saving and cost effective, respectively, in postmenopausal women with low bone mass.

## P196

### RISK FACTORS FOR LOW-ENERGY FRACTURES AND THEIR IMPACT ON THE SHORT-TERM PROGNOSIS OF PATIENTS WITH COVID-19 PNEUMONIA

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**Objective:** COVID-19 is associated with different complications that worsen the prognosis for affected patients. Low-energy fractures caused by osteoporosis are associated with increased length of hospital stay and the critical care unit, as well as an increase in mortality rates. The aim of this study was to evaluate characteristics of low-energy fractures and their influence on prognosis in patients infected with COVID-19.

**Methods:** A single center observational study included 128 COVID-19-positive patients (women 91, men 37; age 78.16±27.5 y) and viral pneumonia complicated with low-energy fractures of various locations. They were followed until they were discharged from the hospital or died.

**Results:** 100 (78%) patients had hip fractures, 14 patients (11%) distal forearm, 9 patients (7%) shoulder, and 5 patients (4%) vertebral fractures. The risk factors for fractures were old age, female

gender, smoking, alcohol abuse and a history of low energy fractures. 102 (79.7%) patients were discharged from the hospital, 26 (20.3%) died. 55 patients with hip fractures were operated, 45 were treated conservatively due to severe general state or respiratory failure. In patients receiving conservative treatment, mortality rate was higher (19 patients - 42.2%) compared to patients who were operated on (3 patients - 5.5%). 10 patients with forearm fractures were operated, 4 patients were treated conservatively. One patient from this group who received conservative treatment died. Only one patient with shoulder fractures was operated on (5.3%), 2 patients who received conservative treatment died. All patients with vertebral fractures underwent conservative treatment, and 1 patient died.

**Conclusion:** Risk factors for low-energy fractures in patients infected with COVID-19 are common in the general population. COVID-19 pneumonia has had a significant impact on the care of patients with fractures. Almost half of the patients were unable to receive surgical treatment due to severe general state, which worsened the prognosis.

## P197

### PREVALENCE OF SEVERE HYPOVITAMINOSIS D IN YOUNG FEMALE PATIENTS AND RISK FACTORS PRESENTED WITH PERSISTENT AND NONSPECIFIC BACKACHE AND KNEE PAIN IN TWO TERTIARY CARE HOSPITAL KARACHI PAKISTAN

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**Objective:** To assess the prevalence of hypovitaminosis D in young female patient in outpatients department of two tertiary care hospital of Karachi Pakistan with persistent, nonspecific backache and knee pain syndromes refractory to initial medical management.

**Methods:** This cross-sectional study includes 200 young female patient age range between 14-35 y presented consecutively between June 2018 and Dec 2018 with persistent, nonspecific backache and knee pain to the OPD of two tertiary care hospital of Karachi Pakistan. A questionnaire was designed and filled after taking consent includes details regarding age, gender, occupation, area of skin and sun exposure duration, dietary habits, type of clothing and residence used. Patient BMI and plain x-ray lumbosacral spine and knee were taken to exclude other pathologies. Serum vitamin D3 levels were determined and compared with serum calcium levels, serum phosphorus and alkaline phosphatase levels. Serum vitamin D level <20 µg/ml defined as deficiency.

**Results:** Among 200 patients, 100 from each hospital ranging from 13-35 y, mean 24±7.21SD. Patients were predominantly married 136(68%). Exposure of face and hands while outdoor by most of them was 96(48%). Sun exposure duration in majority of participant was 1-2 h/d 116(58%). Mostly are resident of apartments



152(76%). Variable coloured clothes used by majority participant 128(64%) and variable fabric 164(82%). 178(89%) patients had deficiency of vitamin D and correlated with duration of sunlight exposure significantly, also with exposure of large skin area, dietary consumption of vitamin D rich food and worn variable clothing colours. Serum phosphorus level and serum alkaline phosphatase level were negatively correlated with vitamin D significantly whereas positively correlated with serum calcium.

**Conclusion:** All patients with persistent, nonspecific backache and knee pain are at high risk for the consequences of unrecognized and untreated severe hypovitaminosis D. female of child-bearing age with such pain appear to be at greatest risk for misdiagnosis or delayed diagnosis. Because osteomalacia is a known cause of persistent, nonspecific musculoskeletal pain, screening all outpatients with such pain for hypovitaminosis D should be standard practice in clinical care.

## P198

### A STUDY ON LEVEL OF KNOWLEDGE AND SELF-EFFICACY TOWARDS THE BONE HEALTH AMONG OLDER PEOPLE IN KUANTAN

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**Objective:** Osteoporosis is a silent disease with increasing prevalence due to the global aging population. decreased bone strength and bone quality is the hallmark of osteoporosis leads to an increased risk of fragility fractures in older people. The rising morbidity and mortality from bone disease cause major human, family, and society healthcare burdens. Adequate knowledge and a positive attitude towards the disease and osteoprotective activities may prevent osteoporosis, but comprehensive studies to verify this hypothesis are limited in Malaysia. We aim to determine the level of knowledge and self-efficacy towards bone health among older people and the associated factors in maintaining bone health.

**Methods:** A cross-sectional survey was conducted on older people living in Kuantan, Pahang. Convenience sampling was applied to recruit the respondents of the study. The interviewer-based was employed by using OPAAT and Self-efficacy Questionnaire for the purpose of data collection.

**Results:** The final sample size was 207 respondents with the response rate being 99%. The level of knowledge is adequate (57.5%) and poor self-efficacy (66.2%) was reported among older people in Kuantan. A significant association was found between age ( $p=0.036$ ), gender ( $p=0.043$ ), level of education ( $p=0.042$ ) and self-efficacy.

**Conclusion:** Osteoporosis was common in the community of older people living in Kuantan. There is adequate knowledge and poor self-efficacy in maintaining bone health among the older people in Kuantan. Being a man, a widow, having low education levels were associated with poor self-efficacy towards bone health which needs further attention from the healthcare provider. The awareness that osteoporosis is preventable may be used as a strategy to stimulate older people to accept and comply with the health education messages regarding the prevention of osteoporosis.

## P199

### REASONS FOR DISCONTINUATION OF TOFACITINIB IN REAL CLINICAL PRACTICE

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**Objective:** To evaluate the strategy of prescribing and the reasons for discontinuation of tofacitinib (TC) in real clinical practice.

**Methods:** The retrospective study included 30 adults with a reliable diagnosis of rheumatoid arthritis (RA), who were prescribed TC. TC was prescribed both for bio-naive patients (first line of therapy) and after a history of bDMARDs (second, etc. lines of therapy). Patients remained under follow-up for 3 y or until TC treatment was discontinued, whichever comes first.

**Results:** The group was represented mainly by women (27, 90%) receiving DMARDs (25, 83.3%) and GC (21, 70%) with insufficient efficacy (DAS28  $5.87 \pm 0.68$ ). The average age of the patients was  $43.06 \pm 13.68$  y, the average duration of the disease was  $13.04 \pm 9.22$  y. As the first line of therapy, TC was prescribed to 3 patients, as the second - 11, third - 9, fourth - 6 and fifth - 1 patient. The reasons for discontinuation of TC in the 1st line of therapy were: LE in one patient, AR in one patient (herpes zoster) and ADR in one patient. In the 2nd line, TC was canceled due to LE in 4 patients, due to AR - in 3 patients and for ADR - in 1 patient. 3 patients (27.3%) in this group continued treatment for more than 3 years with a satisfactory effect. In the 3rd line, the reasons for discontinuation were LE in 2 patients, AR - in 3. One patient canceled TC due to a planned pregnancy. 3 patients (33.3%) continued treatment during the entire observation period. In the 4th line, 5 patients (83.3%) continued taking TC for >3 y. In one patient, the drug was canceled one month after the appointment due to AR.

As a 5th line, TC was prescribed to one patient and canceled due to AR. Statistical assessment of correlations between the incidence of AR or LE and clinical and demographic parameters (gender, age, duration of RA, the presence of concomitant DMARDs and/or GC) was not revealed. The cumulative discontinuation rate of TC did not show a significant dependence on the sequence of the line of therapy.

**Conclusion:** In real clinical practice, TC is prescribed primarily as the second and subsequent lines of therapy after bDMARDs. There was no correlation between the incidence of AR or LE and clinical and demographic indicators, as well as the frequency of withdrawal and the sequence of the line of therapy. Research in larger cohorts is needed.

## P200

### OUR EXPERIENCE AND ANALYSIS OF QUALITY OF LIFE AND CHANGES IN BMD IN PATIENTS TREATED WITH TERIPARATIDE

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**Objective:** To assess the change in BMD and quality of life in patients treated with teriparatide at 0-12-18 and 24 months of treatment using the SF-36 questionnaire. Patients with vertebral fractures, in addition to physical pain, have a deteriorating quality of life with relevant economic, social, emotional and global aspects. Teriparatide is a recombinant human PTH containing 1-34 amino acid sequences of the natural PTH molecule.

**Methods:** 15 patients aged 65-83 y were studied, of which 9 patients with 2-4 vertebral fractures - primary initiation of therapy with teriparatide (group 1) and 6 patients with severe osteoporosis with insufficient response to current treatment - worse indicators - secondary start of treatment with teriparatide - (group 2). Mean baseline of BMD T-score in group 1 BMD T-score - 3.98 SD, and in group 2 - BMD T-score - 3.92 SD. The evaluation intervals with SF-36 questionnaire and BMD are 0-12-18-24 months. Control group of 20 patients (group 3) - homogeneous in terms of demographic data, but heterogeneous in terms of therapy - BMD T-score - 2.98 SD.

**Results:** The observed improvement in BMD is still at 12 months in both groups of patients, and this improvement continues at 24 months / 6 months after stopping therapy /. BMD at 12 months improved on average by 0.42 SD /  $p < 0.001$  / and by 0.21 SD /  $p < 0.001$  / at 24 months in the group with vertebral fractures and by 0.39 SD /  $p (0.001)$  and 0.19 SD /  $p < 0.001$  (in the second group without teriparatide treatment fractures). In the control group, an improvement in BMD was reported only at 24 months, with 0.18 SD. At the 18th month, no statistically significant difference in BMD was reported in any of the groups. Regarding SF-36 questionnaire - the highest level of improvement is reported in groups 1 and 2 in the level of pain - average improvement in group 1 at 18 and 24 months by 40 and 30% /  $p < 0.001$  / and 35 and 28% /  $p < 0.001$  / in group 2, physical function in group 1 with 23% and 22% /  $p < 0.001$  / and in group 2 with 20% at 18 and 15% /  $p < 0.001$

/ at 24 months, emotional wellbeing at 18 months by 40% in group 1 /  $p < 0.001$  / and by 20% /  $p < 0.001$  / in group 2. Control group of patients reported significantly less improvement - by 15 and 20% /  $p$ , respectively. / 0.001 / at the level of pain and by 10 and 5% /  $p < 0.001$  / in terms of emotions. The quality of life at 18 and 24 months changes as follows: in group 1 by 42% and 30% respectively ( $p < 0.001$ ), in group 2- 37 and 39% /  $p < 0.001$  / and group 3- 27 and 22% ( $p < 0.001$ ).

**Conclusion:** Teriparatide treatment improves not only BMD levels but also quality of life, especially in patients with vertebral fractures. In addition, the improvement continues after it is stopped.

## P201

### COMPARATIVE ANALYSIS OF SERUM OPG LEVELS IN PATIENTS WITH ACUTE CORONARY SYNDROME AND RHEUMATOID ARTHRITIS

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**Objective:** Study of serum osteoprotegerin (OPG) levels in patients with acute coronary syndrome (ACS) and rheumatoid arthritis (RA).

**Methods:** The groups for analysis are 3, of which the first group of ACS patients consists of 2 subgroups, divided into 46 patients with RA, 49 without RA, the second group is without ACS and clinically healthy, consisting of 40 patients. OPG is tested 24 and 48 h after the start of ACS. The kits used are TNFRSF19 Human Sandwich ELISA. Detection level - 50 pg/mL - 400 ng/mL, minimum detection level 50 pg/ml, by RayBiotech. Blood is taken at 24 and 48 hours. Serums of patients after centrifugation were stored in a refrigerator at  $t -20 -80 ^\circ \text{C}$ . The condition to avoid repeated cycles of freezing and thawing is met.

**Results:** Intergroup analyzes of serum OPG levels at 24 and 48 h were performed using the Kruskal-Wallis test. Between the three groups: with RA, without RA and the control, there was a statistically significant difference in the levels of OPG at 24 h,  $p < 0.001$ , and OPG at 48-  $p < 0.001$ . The pairwise comparative analysis shows two significant results regarding the level of OPG at 24 h. The highest value is in the group with RA (207.71 ng/ml) and the difference between this and the group without RA (99.30 ng/ml) is significant,  $p < 0.001$ . The second significant difference was between RA and healthy controls (111.91 ng/ml),  $p = 0.020$ . There was no significant difference between patients without RA and healthy controls,  $p = 0.829$ . The serum level of OPG at 48 h showed the highest value in patients with RA (143.36 ng/ml) with a significant difference from those without RA (69.38 ng/ml),  $p = 0.002$ . On the other hand, no significant difference was observed between the RA group and the control group (109.53 ng/ml),  $p = 0.513$ .

The lowest value is for ACS without RA (69.38 ng/ml), but the difference with the control group does not reach statistical significance,  $p=0.060$ . The only significant difference is between the groups with and without the RA group with the control group. **Conclusion:** OPG levels increase significantly in patients with ACS with RA, most markedly increasing at 24 and 48 h. This may make it a likely biomarker, but there is still no standardized methodology for this.

## P202

### MESENCHYMAL STROMAL CELLS AND THEIR SECRETOME IMPROVE RECOVERY FOLLOWING OSTEOCHONDRAL INJURY IN A MURINE MODEL

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**Objective:** Osteochondral injuries are a recognised factor in the development of osteoarthritis (OA). Mesenchymal stromal cells (MSCs) represent a promising biological therapeutic option as an OA-modifying treatment, and they also secrete factors that may have an anticatabolic effect and/or encourage endogenous repair. We aim to study the effects of (i) intra-articular injection of human bone-marrow-derived MSCs and (ii) their secretome on recovery in a murine knee osteochondral injury model.

**Methods:** The MSC secretome was generated by stimulating human bone-marrow-derived MSCs with TNF $\alpha$ . Mice ( $n=48$ ) were injected with i) MSC secretome, ii) MSCs or iii) cell culture medium (control). Pain was assessed by activity monitoring, and cartilage repair, subchondral bone volume and synovial inflammation were evaluated using histology and microCT.

**Results:** Both MSC- and MSC-secretome-injected mice showed significant pain reduction at day 7 when compared to control mice, but only the MSC-injected mice maintained a significant improvement over the controls at day 28. Cartilage repair was significantly improved in MSC-injected mice. No significant effects were observed with regards to synovial inflammation or subchondral bone volume.

**Conclusion:** The MSC secretome demonstrates regenerative effects but this does not appear to be as sustained as a MSC cell therapy. Further studies are required to investigate if this can be overcome using different dosing regimens for injection of the MSC secretome. As we further understand the regenerative properties of the MSC secretome, we may be able to enhance the clinical translatability of these therapies. Direct intra-articular injection of MSCs for the treatment of OA also appears promising as a potential future strategy for OA management.

**Acknowledgement:** MS is supported by a grant from the Wellcome Trust (PhD Programme for Clinicians).

## P203

### A NOVEL DUAL-MODALITY GENE REPORTER FOR TRACKING OF MUSCULOSKELETAL CELL THERAPIES

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**Objective:** The ability to track cell therapies in animal models can increase our understanding of their localisation and function, in particular, mesenchymal stromal cells (MSCs) as a cell therapy in osteoarthritis research. However, traditional cell-tracking techniques are mainly histological which do not allow dynamic evaluation of the cell therapy, and requires large numbers of experimental animals. Here we describe a novel dual-modality gene reporter, based on the organic anion transporting protein Oatp1a1, which can be used in a musculoskeletal context.

**Methods:** Oatp1a1 mediates uptake of the clinically approved, Gd<sup>3+</sup>-based MRI contrast agent, as well as the radionuclide <sup>111</sup>In. Following transfection with a lentiviral vector, cells which express Oatp1a1 can be tracked with both magnetic resonance imaging (MRI) and radionuclide imaging, combining the spatial resolution of MRI with the sensitivity of radionuclide imaging. Several assays, including cell migration and differentiation potential assays, were used to investigate the effect of lentiviral transfection on MSCs.

**Results:** We optimised the transfection of human bone marrow derived MSCs and show that their phenotype is similar to that of non-transfected cells under particular conditions, allowing us to track the Oatp1a1-expressing MSCs in vivo. These cells showed reversible and positive contrast (>7-fold signal enhancement) in  $T_1$ -weighted MRI. Following injection of <sup>111</sup>In in the same experimental animals, the cells are also successfully longitudinally imaged using single photon emission computed tomography (SPECT).

**Conclusion:** This reporter construct can be used for tracking implanted stromal cells, because the expression of the Oatp1a1 reporter is unaffected by cell division. The incorporation of tissue- or phenotype-specific promoters to the construct will also provide information about the differentiation state of the cells, allowing us to gain insights into their function along with their localisation. The combination of MRI and radionuclide imaging may allow whole-body screening for detection of labelled cells, followed by high-resolution and targeted imaging with MRI. We have used contrast agents licensed for human clinical use, and this technology could potentially be used in clinical research settings in the longer term.

**Acknowledgement:** MS is funded by a grant from the Wellcome Trust (PhD Programme for Clinicians).

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**UNDERSTANDING GNL3 AND ITS ROLE IN THE PATHOGENESIS OF KNEE OSTEOARTHRITIS**M. Seah<sup>1</sup>, M. Birch<sup>1</sup>, A. Mccaskie<sup>1</sup><sup>1</sup>Division of Trauma & Orthopaedic Surgery, University of Cambridge, Cambridge, UK

**Objective:** Genomewide association studies have implicated several genes in the development of knee osteoarthritis (OA). Among these candidate genes is *GNL3*, which encodes the protein nucleostemin which is found in stem cells. It functions to regulate cell cycle progression and tissue regeneration but its role in the joint is unknown. We aim to characterise the effects of *GNL3* deletion in a mouse model, and corroborate the findings with knockdown experiments in human mesenchymal stromal cells (MSCs) and human articular chondrocytes to study the role *GNL3* has in the pathogenesis of OA.

**Methods:** The effect of *GNL3* deletion in a mouse model was studied using histology (to assess cartilage thickness), microCT for bone morphometry, and scanning electron microscopy to further characterise the subchondral structure and perform elemental analysis. These were compared to age-matched controls. siRNA-mediated knockdown of *GNL3* in human MSCs and chondrocytes was performed to examine the effects on chondrogenesis-related genes using RT-PCR.

**Results:** *GNL3* heterozygote mouse knees had thinner layers of articular cartilage compared to aged-matched controls. They also had thicker trabeculae, and greater spacing between the trabeculae. They showed significantly reduced alkaline phosphatase staining, suggesting reduced osteogenic activity from osteoblasts. Knockdown of *GNL3* using siRNA in MSCs and articular chondrocytes did not significantly alter the mRNA expression of chondrogenic genes such as *COL2A1*, but there was significant upregulation of the metalloproteinase *ADAMTS4*.

**Conclusion:** The increase in *ADAMTS4* expression might be implicated in the pathogenesis of OA, and *GNL3* may represent a local target in disease-modifying therapies. However, as *GNL3* is expressed widely by other cell types, further work should be done to investigate the role of *GNL3* deletion in other cell types which may have a role in the endogenous repair of damaged cartilage.

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**THE EFFICACY OF JOINT DISTRACTION IN THE MANAGEMENT OF ANKLE OSTEOARTHRITIS**W. Smith<sup>1</sup>, K. Joshi<sup>1</sup>, M. Patel<sup>1</sup>, C. Carslaw<sup>1</sup>, M. Seah<sup>1</sup><sup>1</sup>Division of Trauma & Orthopaedic Surgery, University of Cambridge, Cambridge, UK

**Objective:** We aim to evaluate the evidence for joint distraction for ankle osteoarthritis compared to the pre-distraction state, and patients receiving ankle debridement.

**Methods:** A literature search of MEDLINE, Ovid EMBASE, Scopus and Cochrane Library was performed. Clinical trials of adult populations with a diagnosis of osteoarthritis were included, with the main outcomes being AOFAS, AOS, VAS scores and joint space width. Studies featuring participants with inflammatory arthritides or haemophilic arthritis were excluded. Risk of bias was assessed using the Jadad Scale (RCTs) and the Newcastle-Ottawa Methodology Score (Cohort studies).

**Results:** 11 studies were included representing a total of 354 patients with a diagnosis of ankle osteoarthritis. Ankle joint distraction was associated with a significant improvement in all American Orthopedic Foot and Ankle Society Score (AOFAS) indices when compared to baseline (SMD=-1.69, 95%CI -1.98 to -1.39, P<0.00001; I<sup>2</sup>=70%). There were also statistically significant improvement in Ankle Osteoarthritis Scale (AOS) pain scores after treatment (SMD=1.99, 95%CI 1.61 to 2.38, P<0.00001; I<sup>2</sup>=97%), and in AOS disability scores after treatment (SMD=2.17, 95%CI 1.78 to 2.55, P<0.00001; I<sup>2</sup>=97%). This was not associated with an increased incidence of serious adverse events or side effects.

**Conclusion:** The existing literature suggests that ankle distraction appears to be effective in the management of osteoarthritis. Future randomized clinical trials are needed to characterize its efficacy relative to other surgical techniques employed in advanced ankle osteoarthritis.

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**EVALUATION OF A RELATIONSHIP BETWEEN BLOOD VALUES IL-6, C-REACTIVE PROTEIN (HS-CRP) AND A SKELETAL MUSCLE INDEX (ALM/HT2) IN A REHABILITATION PROGRAM CARE FOR MUSCULOSKELETAL SYSTEM: A KEY TO LONGEVITY (PRELIMINARY RESULTS)**P. Novosad<sup>1</sup>, P. Hrdý<sup>1</sup>, P. Fojtík<sup>2</sup>, M. Zemánek<sup>3</sup><sup>1</sup>Mediekos Ambulance s.r.o, Zlín, Osteology Academy o.p.s Zlín, Zlín, <sup>2</sup>Agel Hospital Ostrava Vítkovice a.s, Dept. GIT, Ostrava-Vítkovice, <sup>3</sup>Vaše Laboratoře Zlín s.r.o, Zlín, Czech Republic



**Objective:** Today it is clear that physical development of individuals with sedentary lifestyle is different from the one of the physically active individuals. Only after the year 2000, with the first discovery of causality of IL-6 and muscular movement, an intensive study of this problematics has begun. Currently, there are about 600 known operations (myokines) that are interrelated with muscle functions. Muscular tissue interrelates with others mechanistically, but it also forms humoral harmony in which the muscular tissue has a dominant and determining role. This phenomenon is relevant for pathophysiology of chronic low-grade inflammation (LGI), muscle loss, origin and development of non-communicable diseases.

There are, so far, no known suitable medicaments which would be used for solving problematics of muscular loss. This is a reason why more attention needs to be paid to the recommended physical regime (150 min a week, according to WHO) and a dietary regime (basic diet + proteins). We have built a complex diagnostic and therapeutic program for our patients. (Our program: Care for Musculoskeletal System: A Key to Longevity). Definition of pathological values follows EWGSOP and WHO. We have reported about this problematics during the last two IOF congresses. In this research we focused on problematics of how to follow the state of muscle mass, its quality, its loss or gain and a presence of LGI. We use a determination of IL-6 and hs-CRP (high-sensitivity).

**Methods:** This is a case of female probands. Group A – patients of osteology outpatient department n=46, average age 73.2, average T sc – 1.2. They keep a physical load regime and also a dietetic program with a regular supervision. These are a part of one rehabilitation group. Group B – a control group n=38, average age 71.1, average T sc – 1.8, with no regular and dietetic regime. Next, we have evaluated two groups after a one year check-up: Group C (n=13) with a yearly decrease of ALM/ Ht<sup>2</sup> by 6.5% and Group D (n=9) with a growth by 3.0%. Determination of BMI, according to WHO, the border figure is 25 or 30 kg/m<sup>2</sup>

DXA method determination of selective muscle index as a measure for muscle mass. ALM/Ht<sup>2</sup> for age above 60 y, border value for sarcopenia is  $\leq 5.45$  kg/m<sup>2</sup> (GE-Prodigy, LSC-1.5%). From laboratory examinations We aim at IL-6 and hs-CRP. Before the laboratory examination we recommended to our patients to leave out, at least for one day, any exhausting physical load and diet with a high percentage of red meat. For a determination of hs-CRP we used immune-turbidimetric determination on an analyser Abbott Alinity. A range of measuring method CRP Vario High Sensitivity is from 0.40 to 160,00 mg/l. For an in vitro determination of IL-6 we used ECLIA on an analyser cobas e 801. IL-6 is stated by a manufacturer Roche Diagnostics GmbH.

**Results:** We looked for mutual correlation between individual laboratory and physiological values, i.e., between IL-6, hs-CRP, ALM/Ht<sup>2</sup>, BMI and age, mathematical relation for the correlation according to Spearman. Significantly relevant was only a mutual relation between IL-6 and hs-CRP. (0.90). When we calculated average values of individual groups, their relations were as follows:

Parameter	Age	ALM/Ht <sup>2</sup>	hs-CRP mg/l	IL-6 ng/l
Group				
A	73.2	6.46	0.89	4.95
B	71.1	5.88	2.15	6.00
Stat. significance		<0.05	<0.01	<0.05
C	69.2 year decrease	-6.5%	3.35	7.26
D	73.4 year increase	+3.0%	1.22	5.11
Stat. significance			<0.01	<0.01

**Conclusion:** IL-6 is a cytokine (myokine) which can be interpreted, in different circumstances, as inflammatory in physically inactive individuals. Criteria for inactivity according to WHO is physical load that is shorter than 150 min/week and its level is lower than light<1.5 MET (MET=metabolic equivalent of task, 1 MET=3.5 ml/kg/min; [VO<sub>2max</sub>]).

As an optimal physical load for rehabilitation in our program we recommend a load at 3-5.9 MET, where IL-6 has an anti-inflammatory reaction. This is why we decided for a determination of IL-6 also a next marker for inflammation, hs-CRP (sufficiently sensitive for this level of inflammation), which does not show these characterisations of cytokine. Considering the fact that we carried out the laboratory examination after a preparation and in a calm state, it can be assumed that both parameters should be lowered in higher levels of muscle mass, characterised here as ALM/Ht<sup>2</sup>. Due to the fact that we did not find mutual correlation between quantitative value of muscle and parameters of inflammation, we recommend carrying our laboratory examinations in a context with parameters of our monitoring BMI, measurement of hand-grip (muscle strength), ALM/Ht<sup>2</sup> and, of course, a similar anamnestic evaluation of the last decade of a rehabilitation programme (Dietary and physical regime). In this context a laboratory monitoring hs-CRP (which proves to be relevantly sensitive in this case) and IL-6 both have a strong evidence value when monitored in the rehabilitation part of our programme. This statement proves that when keeping a rehabilitation and dietary program, it is possible to keep the muscle mass level or increase the level, and thus improve laboratory parameters LGI. It will be necessary to evaluate this deliberation and maybe to simplify when we have a higher number of cohorts for a more detailed analysis.

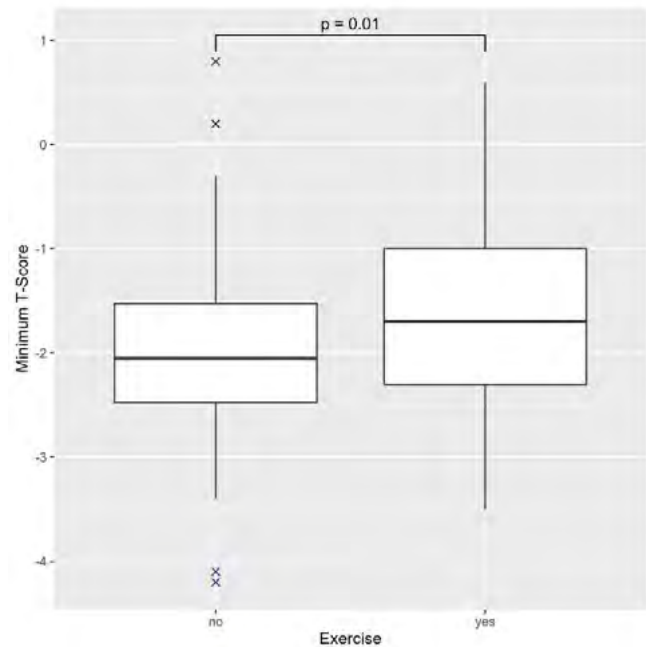
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**BONE MINERAL DENSITY AND EXERCISE IN PATIENTS WITH VASCULITIS**A. Palmowski<sup>1</sup>, E. Wiebe<sup>1</sup>, S. Hermann<sup>1</sup>, B. Mucbe<sup>1</sup>, F. Buttgerit<sup>1</sup><sup>1</sup>Charité - Universitätsmedizin Berlin, Dept. of Rheumatology and Clinical Immunology, Berlin, Germany

**Objective:** Exercise is an effective intervention to improve bone health. Associations between BMD and exercise have not yet been explicitly assessed in patients suffering from vasculitis. This study aimed to evaluate if exercise is associated with BMD in patients suffering from vasculitis (including polymyalgia rheumatica (PMR)).

**Methods:** We used baseline data from patients with any kind of vasculitis (including PMR) enrolled in the prospective "Rh-GIOP" cohort (<https://clinicaltrials.gov/ct2/show/NCT02719314>). Simple and multiple linear regression models with minimum T-score at any site (both hips and lumbar spine were measured) as the dependent variable were run. Dose-response analyses (frequency of exercise per week) was performed in patients with any type of exercise. In multiple regression, we adjusted for potential confounders associated with minimum T-scores in an analysis of the overall cohort (manuscript in preparation): age, sex, menopause, BMI, bisphosphonate use, denosumab use, current glucocorticoid dose, proton-pump inhibitor use, history of vertebral fractures, health assessment questionnaire scores, alkaline phosphatase levels, and  $\gamma$ -glutamyltransferase levels. Missing data was handled by multiple imputation by chained equations.

**Results:** 198 patients with a mean age of  $68 \pm 11$  y were included. 68% were females, and the most common diseases were PMR (36%), giant cell arteritis (26%), and granulomatosis with polyangiitis (17%). The mean minimum T-score was  $-1.74 \pm 0.9$ . Only five patients had a disease duration of less than three months. Exercise was positively associated with minimum T-scores in both unadjusted (Figure) and adjusted analysis (unadjusted:  $\beta=0.36$ ; 97.5% CI 0.09 to 0.63;  $p=0.01$ ; adjusted:  $\beta=0.30$ ; 0.04 to 0.56;  $p=0.02$ ). In exercising patients, there was no association between the frequency of exercise and minimum T-scores ( $p(\text{ANOVA})=0.66$ ).



**Conclusion:** Exercise is positively associated with BMD in patients with PMR and vasculitis. It is unlikely that the association between exercise and BMD is only caused because generally healthier patients have a higher likelihood of exercising because we adjusted for several covariates, including health assessment questionnaire scores. We found no dose-response relationship. Most likely, this is due to confounding caused by different kinds of exercises: Some exercises are thought to be more effective in elevating BMD, e.g., weight-bearing exercise. Besides, the analysis could have been underpowered to assess differences within the group of exercising patients. To sum up, our findings corroborate the advice given to most patients suffering from low bone mass or OP irrespective of their underlying disease: To start or continue exercising within the scope of personal possibilities. A limitation of this study is its cross-sectional design. Residual confounding cannot be fully ruled out. We plan to conduct longitudinal analyses in the future.

**Acknowledgements:** Rh-GIOP is supported by a joint funding from Amgen, Biogen, BMS, Chugai, Generic Assays, GSK, Hexal, Horizon Therapeutics, Lilly, Medac, Mundipharma, Novartis, Pfizer, Roche and Sanofi.

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## THE RELATIONSHIP BETWEEN GLUCOCORTICOIDS AND BONE DENSITY IN VASCULITIDES: A CROSS-SECTIONAL ANALYSIS

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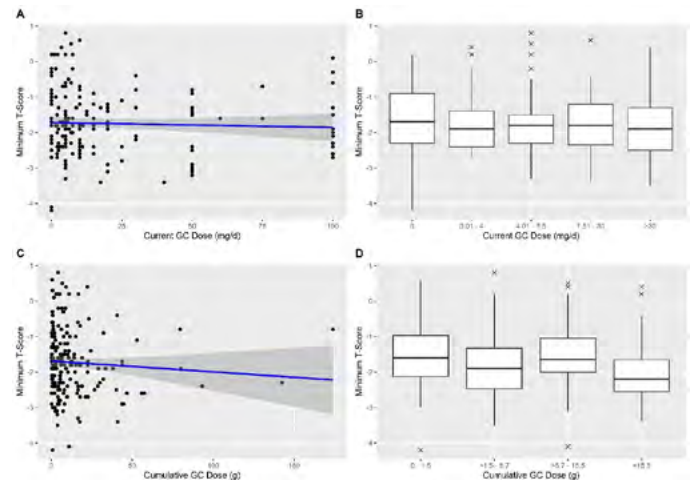
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**Objective:** Prior research on the effects of glucocorticoids (GCs) in polymyalgia rheumatica (PMR) and other vasculitides is scarce and inconclusive. This study aimed to determine whether there is an association between GCs and bone density in patients with PMR and other vasculitides.

**Methods:** We used data from the Rh-GIOP cohort study (<https://clinicaltrials.gov/ct2/show/NCT02719314>), which started in 2015. In this analysis, we assessed baseline visits of patients with PMR and different types of vasculitis. Multiple regression modelled the effect of current and cumulative GC intake on the minimum T-score (mTs; lumbar spine or hip). The models included adjustment for confounders such as age, sex, BMI, or inflammation (measured by c-reactive protein (CRP)). GCs were modelled both as continuous and as categorical predictors in separate models. Patients with early disease (duration of less than months) and patients with very high GC dosages (>100mg/d prednisolone equivalent) were excluded from inferential analyses. We performed multiple imputation by chained equations for missing data (~ 5%).

**Results:** 198 patients with a mean age of 68±11 y, 68% females, and a mean disease duration of 5.3±6.3 y were included. Most patients suffered from PMR (36%), giant cell arteritis (26%), and granulomatosis with polyangiitis (17%). The majority (87%) was currently taking GCs, 88% received vitamin D supplements. DXA T-scores of ≤ -2.5 (indicating osteoporosis (OP)) were present in 20% of patients. Mean CRP was 13.2±26.1 mg/l. Scatter- and boxplots depicting mTs and GC exposition are presented in Figure. Current GC dose was not associated with mTs in any model (current intake:  $\beta$ (continuous model)=-0.01, 97.5% CI -0.02 to 0.01;  $p$ (all models) ≥ 0.49; cumulative intake:  $\beta$ (continuous model)=0.01, 97.5% CI -0.04 to 0.07;  $p$ (all models) ≥ 0.35). CRP as a surrogate for inflammation was also not associated with mTs ( $p$ (all models) ≥ 0.56). There was no significant interaction between CRP and GC intake ( $p$  for interaction(all models) ≥ 0.32). Lower BMI ( $p$ (all models) ≤ 0.01), history of vertebral fractures ( $p$ (all models) ≤ 0.02), and proton-pump inhibitors ( $p$ (all models) ≤ 0.04) were associated with impaired bone density in all models.

Similar results were found with femoral neck and lumbar spine T-scores as dependent variables, and after excluding patients with PMR.



**Conclusion:** In the Rh-GIOP cohort, the prevalence of OP was similar in patients with PMR and vasculitides to the overall elderly German population.<sup>1</sup> Vitamin D supplementation was very common; deficiencies surprisingly rare. In the general population, about 32% of Germans are estimated to have a vitamin D deficit.<sup>2</sup> There was no association between current or cumulative GC intake, inflammation, and bone density. Proton-pump inhibitors and BMI as modifiable risk factors were linked with bone density. Our findings require confirmation from longitudinal analyses of the Rh-GIOP and other cohorts.

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## FG-4592 IMPROVES ESTROGEN DEFICIENCY INDUCED BONE LOSS

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**Objective:** To investigate the effects of FG-4592 on bone remodeling in an ovariectomized (OVX) rat model.

**Methods:** Twenty-four 12-week-old female Sprague Dawley rats were divided into three groups (n=8 per group): sham-operated group (Sham), OVX group, and OVX rats intragastrically receiving FG-4592 (10 mg/kg, every other day for 12 weeks) group. Then left femurs were subjected to microCT to evaluate BMD, bone volume/total volume (BV/TV), trabecular number (Tb.N), trabecular thickness (Tb.Th) and trabecular separation (Tb.Sp). Left tibiae were collected to calculate osteoclast surface/bone surface (Oc.S/BS), osteoclast number/bone surface (N.Oc/BS), osteoblast surface/bone surface (Ob.S/BS) and osteoblast number/bone surface (N.Ob/BS). One-way analysis of variance followed by Tukey HSD post hoc test was used for comparisons.  $P < 0.05$  was statistically significant.

**Results:** OVX induced remarkably decreased BMD, BV/TV, Tb.N, Tb.Th and dramatically increased Tb.Sp compared with the sham group. However, FG-4592 treatment improved these changes in OVX rats. OVX rats had increased Oc.S/BS, N.Oc/BS, Ob.S/BS and N.Ob/BS compared with the sham group. FG-4592 decreased Oc.S/BS, N.Oc/BS but further increased Ob.S/BS and N.Ob/BS in OVX rats.

Table. Bone histomorphometric parameters.

Parameters	Sham	OVX	OVX+FG-4592
BMD(g/cm <sup>3</sup> )	1.70±0.05	1.42±0.03**	1.48±0.03***
BV/TV(%)	75.88±7.21	37.51±4.93**	44.80±3.61***
Tb.N(1/mm)	6.79±0.46	4.07±0.33**	4.75±0.49***
Tb.Th(mm)	0.112±0.005	0.092±0.008**	0.095±0.003**
Tb.Sp(mm)	0.045±0.004	0.157±0.009**	0.146±0.006***
Oc.S/BS(%)	4.22±1.30	11.93±2.55**	8.63±2.27***
N.Oc/BS(/mm)	1.65±0.48	5.92±1.39**	4.16±0.73***
Ob.S/BS(%)	5.95±1.31	13.11±3.97**	18.12±5.06***
N.Ob/BS(/mm)	6.40±1.86	10.26±2.60*	14.19±3.19***

\* $P < 0.05$ , \*\* $P < 0.01$ , compared with the sham group;

# $P < 0.05$ , ## $P < 0.01$ , compared with the OVX group.

**Conclusion:** FG-4592 alleviated bone loss and improved bone microstructure of OVX rats.

**Acknowledgment:** This work was supported by National Natural Science Foundation of China (No. 81870524).

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### EFFECT OF ROMOSUZUMAB ON BONE MINERAL DENSITY AND FRACTURES: RESULTS FROM TWO UNIVARIATE META-ANALYSES

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**Objective:** This study evaluated the effect of romosozumab on BMD and fracture occurrence in postmenopausal women with osteoporosis using the classical and Bayesian univariate meta-analysis approaches. Romosozumab, a monoclonal antibody that binds with and inhibits sclerostin, has been approved for the treatment of postmenopausal women with osteoporosis and high fracture risk.

**Methods:** A systematic search was done following the PRISMA Statement in PubMed using the terms "Clinical trials" or "treatment" and "romosozumab". Original studies published in English language were reviewed with the agreement of authors. The year of publication, duration, study population and outcomes (BMDs at the lumbar spine (LS), total hip (TH) and femoral neck (FN) and the occurrence of fractures) were extracted. Narrative reviews, meta-analyses, indication other than postmenopausal osteoporosis were excluded.

**Results:** In univariate classical meta-analysis, the summary estimates (%BMD increase and credible intervals) found were; 12.3 (11.4, 13.2) in LS, 4.4 (3.5,5.3) in TH and 4.6 (3.4,5.8) in FN at 12 months. Using the Bayesian meta-analysis, the summary estimates found were; 12.3 (8.9, 15.7) in LS, 4.4 (2.5,6.3) in TH and 4.6 (2.5, 6.8) in FN at 12 months. Over 12 months, the occurrence of all fractures using classical meta-analysis was significantly lower in the romosozumab group than in the placebo group (OR=0.5, CI (0.4,0.7)). Using Bayesian meta-analysis, the occurrence of all fractures was significantly lower in the romosozumab group than in the placebo group (OR=0.5, CI (0.4, 0.8)).

**Conclusion:** The summary estimates for BMD and all fractures were similar in both classical and Bayesian meta-analysis, although the credible intervals were different. Romosozumab treatment for 12 months was associated with a significantly lower fracture occurrence compared to placebo.



P211

### CURRENT PREVALENCE AND PATTERNS OF ANTIOSTEOPOROTIC DRUG USE BASED ON REAL-WORLD NATIONWIDE DATA ON 8,641,341 INDIVIDUALS

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**Objective:** Based on the 2019 European scorecard, osteoporosis is diagnosed in an estimated number of 683,679 individuals in Greece with the direct cost of incident fractures reaching €694.7 million, but relevant real-world data are scarce.

**Methods:** The e-Government Centre for Social Security Services prescription-database, which covers 99.9% of the Greek population, was used to capture all individuals on antiosteoporotic treatment during 2019.

**Results:** A total of 288,983 among 8,641,341 people, corresponding to the 3.3% of the total adult Greek population, had filled at least one antiosteoporotic prescription (6.0% and 0.36% for females and males, respectively). Prevalence of antiosteoporotic treatment increased with age, from 0.15% in those younger than 50 to 8.6% in those older than 70 years. Oral bisphosphonates were more frequently prescribed (58.8%), followed by denosumab (39.4%). Alendronate was more frequently prescribed in males and in people younger than 60 years. Denosumab was more frequently prescribed in females and in people older than 60 years. Selective estrogen-receptor modulators, teriparatide and parenteral bisphosphonates accounted for 1.1%, 1.0% and 0.02% of all prescriptions, respectively. Orthopedic surgeons (39.6%), endocrinologists (19.6%), general practitioners (19%), and rheumatologists (9.3%), prescribed the vast majority of antiosteoporotic regimens, with significant differences in prescription patterns. The annual cost of treatment per patient increased significantly with age, being on average €323.33.

**Conclusion:** About 42% of the estimated number of individuals with osteoporosis in 2019 in Greece received treatment with the total annual cost being about €93 million. The impact of this undertreatment on fracture incidence and related healthcare costs deserves further investigation.

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### CORRELATION BETWEEN NOTTINGHAM HIP FRACTURE SCORE AND 10-YEAR PROBABILITY OF SUSTAINING FRAGILITY FRACTURE IN OLDER ACUTE HIP FRACTURE PATIENTS

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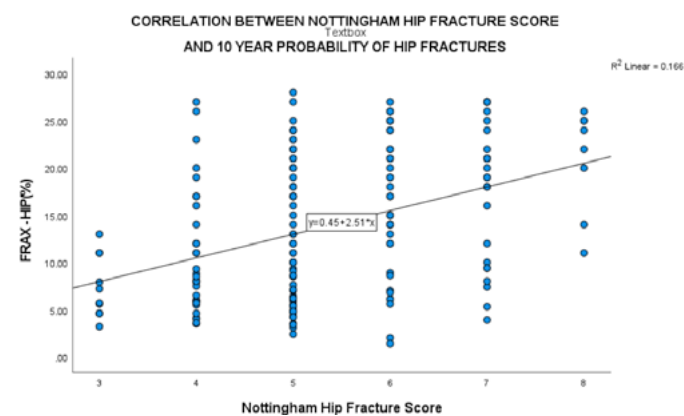
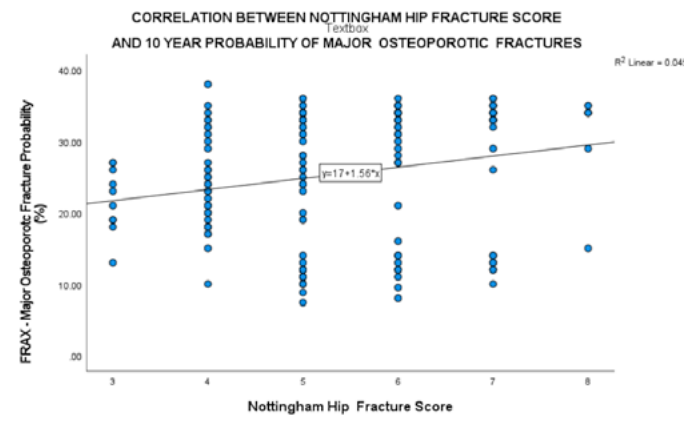
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**Objective:** The Nottingham Hip Fracture Score (NHFS) is a well validated scoring system that has been shown to predict the 30-d mortality, 1-y mortality and functional outcome after surgical repair of hip fracture. The aim of this study is to determine the relationship between the NHFS and the 10-y probability of osteoporotic fracture in older patients with acute hip fracture and to assess the role of gender.

**Methods:** We carried a cross-sectional, retrospective analysis of consecutive older patients, aged 60 y and over, admitted with hip fracture to a single trauma unit in the UK between January and December 2019. Data were extracted from the electronic health records. Patients with incomplete data were excluded. The FRAX UK, without BMD, was used to calculate the 10-y probability of sustaining a major osteoporotic fracture and the 10-y probability of sustaining a hip fracture. IBM SPSS 27 software was used for statistical analysis. Descriptive statistics was used to define baseline characteristics. Pearson's correlation coefficient and linear regression coefficient were used to analyse correlation.

**Results:** A total of 175 patients were included; 40 male patients and 135 females. Average age was 83 y (SD 8). NHFS was positively correlated with the 10-y probability of sustaining a major osteoporotic fracture in all patients, male patients and female patients ( $r=0.212$ ;  $p=0.005$ ,  $r=0.452$ ;  $p=0.003$ , and  $r=0.589$ ;  $p<0.001$ , respectively). NHFS was also positively correlated with the 10-y probability of sustaining hip fracture in all patients, male and female patients ( $r=0.408$ ;  $p<0.001$ ,  $r=0.477$ ;  $p=0.002$ , and  $r=0.602$ ;  $p<0.001$ , respectively).

**Conclusion:** The NHFS is positively correlated with the 10-y probability of sustaining major osteoporotic fracture, as well as hip fracture, in older patients with acute hip fracture. This association persisted even when broken down by gender although the strength of correlation was stronger in female patients.



P213

**WALKING ON UNTREATED HIP FRACTURE**A. Michael<sup>1</sup>, N. Obiechina<sup>2</sup>, S. Querishi<sup>1</sup>, E. Laugharne<sup>1</sup><sup>1</sup>Russells Hall Hospital, Dudley, <sup>2</sup>Queen's Hospital, Burton on Trent, UK

Case report: A 79-year-old female was admitted following a fall, she had right hip pain and was unable to weight bear. 32 months earlier she had a fall, attended ED, XR showed no fracture (Fig. 1) and was discharged home. However she continued to have severe left hip pain for 3 months that gradually partially eased over the subsequent 3 months and was able to mobilize with a frame, which she never used previously. XR on index admission (Fig. 2) showed acute right neck of femur (NoF) IC fracture and an old left NoF IC fracture; which we think happened due to the fall 32 months earlier and was not obvious on XR. The acute fracture was repaired with hemiarthroplasty. The old left NoF fracture was treated conservatively. She had physiotherapy, gradually improved and was discharged.

Discussion: Plain radiographs may miss nondisplaced fractures and fractures in markedly osteoporotic patients. The incidence of radiographically missed fractures varies between 2-14%. Missing diagnosis of occult hip fracture is more likely in patients with cognitive dysfunction, higher ASA grade, poor mobility and dependence for activities of daily living. If a fracture is not detected on X-rays, but the patient is symptomatic, another imaging modality should be used. MRI is the gold standard however is expensive and time consuming. CT scan is cheaper and quicker. A meta-analysis of patients with suspected hip fracture but no fracture on initial x-rays showed that 39% had hip fracture identified on MRI. With MRI as the reference standard for hip fracture, the sensitivity and specificity of CT were 79% and 91%, respectively (NEJM). Most missed hip fracture patients have subcapital NoF fracture and are likely to return to the hospital with a displaced fracture within a short period. The great majority of hip fracture patients are unable to walk, however some may be able to walk; but with hip or groin pain. Surgical repair remains the preferred choice of management for hip fracture patients. Some cases of impacted hip fracture are treated conservatively. If operative treatment is not possible/feasible, the duration of non-weight bearing (NWB) depends on

fracture type, configuration, patient factors and surgeon preference. If the fracture is stable (valgus impacted) immediate weight bearing may be recommended. Many patients with extracapsular fracture are advised to have bed rest (on traction) for about 6 weeks to allow bone healing. However patients with intra-capsular fracture are encouraged to mobilise as soon as they can; and whilst patients are NWB they are encouraged to stand and walk with crutches if they can and it is safe to do so. They would need analgesia, even intra-articular local anesthetic (pseudo Girdlestone). Intracapsular fractures usually induce less pain compared to extracapsular fractures, however if not surgically repaired they do not heal and patients develop avascular necrosis of head of femur. There is increased risk of mortality and morbidity if the hip fracture is treated nonoperatively. In a study of 340 patients, the risk of mortality was four times higher at one year and three times higher at two years in the conservatively treated patients compared to the operative group. On discharge all of the conservatively treated were unable to ambulate even with assistance and needed help with transfers. Our patient's left hip fracture was likely missed, she did not return to the ED, during the COVID-19 pandemic, and conservatively managed herself. Subsequently her mobility deteriorated, fell and fractured her right hip. This time she was treated surgically with better outcome.

## P214

### FIRST PUBLIC OSTEOPOROSIS CONGRESS OF TURKEY BY THE TURKISH OSTEOPOROSIS SOCIETY

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The Public Congress of Osteoporosis was organized online by Turkish Osteoporosis Society. Date: April 1 – 2, 2021 via social media accounts. The participation in our congress was free of charge, Since COVID-19 was the most discussed issue of public health in the last year osteoporosis follow up and treatment was not possible due to restrictions or postponed by many of the elderly patients. To raise awareness on osteoporosis, risk of osteoporosis and fracture, the importance of prevention and continuing treatment, the scientific board members of the Turkish Osteoporosis Society shared their knowledge and experience for two days with the public as well as osteoporosis patients.

Topics of the congress: Has the COVID-19 pandemic affected osteoporosis and its treatment? What can be done? Basic information on the etiopathogenesis of osteoporosis? What are the risk factors for osteoporosis? Which risk factors can we change?

How is it possible to prevent osteoporosis? What are the clinical signs and symptoms of osteoporosis? Major osteoporotic fractures and the results. Is osteoporosis also a disease of men? Which diseases and medications cause secondary osteoporosis? The importance of screening for osteoporosis in many secondary diseases. Awareness about medications including glucocorticoids. Can inflammatory rheumatic diseases affect the bone? How does osteoporosis affect the quality of life? Nutrition: What minerals should we take for osteoporosis, how? How can we get the necessary protein and vitamins in osteoporosis? What are the regulations that should be made at home to prevent falls The importance of risk of falling and fracture, also muscle strength was emphasized.

Interactive participation during the public congress made it possible to discuss the topics with patients, relatives and attendees. Contributions and questions also were addressed. The message about the importance of osteoporosis, osteoporotic fractures and how to continue treatment under pandemic conditions was emphasized. Attention to and awareness of osteoporosis was raised, which was the mission of the 1st Public Congress of Osteoporosis of Turkey.

## P215

### OSTEOPROTEGERIN GENETIC POLYMORPHISMS AND THEIR INFLUENCE ON THERAPEUTIC RESPONSE TO IBANDRONATE IN POSTMENOPAUSAL OSTEOPOROTIC FEMALES

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**Objective:** To explore osteoprotegerin genetic polymorphisms and their influence on the therapeutic response to ibandronate in postmenopausal osteoporotic females.

**Methods:** A total of 135 postmenopausal females were recruited for this case-control study from Madina Teaching Hospital (MTH), Faisalabad, Pakistan. A total of 135 patients were divided into an osteoporotic group (89 females) and a nonosteoporotic group (46 females). One tablet/month of ibandronate 150 mg was given to each osteoporotic patient for 6 months, and blood samples were collected before and after treatment. The BMD was measured by DXA Scan. The serum OPG was measured using ELISA kits. Three SNPs (A163G, T245G, and G1181C) of the OPG gene were selected for analysis.

**Results:** Serum OPG was significantly lower in osteoporotic subjects than in the control group. The mean serum OPG level after 6 months of ibandronate treatment was improved considerably (be-

fore treatment  $11.3 \pm 2.8$  ng/ml vs. after treatment  $13.6 \pm 5.2$  ng/ml,  $p < 0.001$ ). After 6 months of therapy with ibandronate, the percentage changes in OPG levels with AA, TT, TC, GC, and GG genotypes were significant. BMI and GC polymorphism (rs2073618 (G/C) G1181C) were inversely associated with low BMD. **Conclusion:** A significant decrease in the levels of OPG was found in the AA genotype of the rs3134069 SNP, TT, TC genotype of rs3102735 and GG, and GC genotype of the rs2073618 SNP after 6 months of treatment with ibandronate. Furthermore, the inverse association of rs2073618 with low BMD indicates the protective role of this SNP in our population.

## P216

### ASSOCIATION OF SERUM CHEMERIN WITH CALCIUM, ALKALINE PHOSPHATASE AND BONE MINERAL DENSITY IN POSTMENOPAUSAL FEMALES

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**Objective:** To investigate the association of serum chemerin with calcium, alkaline phosphatase and BMD in postmenopausal non-osteoporotic and osteoporotic females.

**Methods:** This cross-section analysis was carried out at the orthopedic department of Madina Teaching Hospital, Faisalabad, Pakistan, in the year 2017-2019. Postmenopausal females were divided into two groups according to their BMD. All osteoporotic females had a T-score of -2.5 or less. Data were analyzed on SPSS-24.

**Results:** A total of 140 women were included in our study (80 osteoporotic and 60 nonosteoporotic). Nonsignificant difference in age and BMI was observed between osteoporotic and nonosteoporotic subjects ( $p=0.152$ ) and ( $p=0.291$ ) respectively. There was a significant difference found in total BMD, serum chemerin levels between osteoporotic and non-osteoporotic subjects  $p < 0.001$  in both parameters. No significant correlation of serum chemerin was found with serum calcium, serum alkaline phosphatase and BMD in postmenopausal osteoporotic females ( $p=0.907$ ), ( $p=0.318$ ), ( $p=0.664$ ), respectively. A significant negative correlation was found between serum alkaline phosphatase levels and total BMD in postmenopausal osteoporotic females ( $p=0.039$ ). Linear regression analysis of serum alkaline phosphatase levels with total BMD showed no association between BMD and serum alkaline phosphatase levels ( $p=0.869$ ).

**Conclusion:** There is no association of serum chemerin with calcium, ALP and BMD in non-osteoporotic and osteoporotic postmenopausal females.

## P217

### A CASE OF OSTEITIS FIBROSA CYSTICA

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**Objective:** Hyperparathyroidism can lead to osteitis fibrosa cystica (OFC), in which bone is replaced by fibrous tissue (peritrabecular), accompanied by the formation of brown tumors, resulting in loss of bone mass. Excessive PTH accelerates osteoclastic bone resorption, releasing calcium into the bloodstream, and causing structural changes in bone architecture. (1-5) We aim to introduce a female patient with primary hyperparathyroidism (PHPT) in a possible context of jaw - HPTP syndrome.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 39-year patient admitted for bone evaluation. She has a history of familial polycystic kidney disease and surgery for kidney stones (during pregnancy) and for a right cystic jaw tumor. Current admission confirms PHPT with normal kidney function: total serum calcium= $10.8$  mg/dL (N:8.5-10.2), phosphorus= $1.9$  mg/dL (2.3-4.7), high PTH= $1.123$  pg/mL (N:15-65), low 25OHD= $12.6$  ng/mL (N:30-100), high bone turnover markers: osteocalcin= $185.6$  ng/mL (N:15-46), alkaline phosphatase= $142$  U/L (N:38-105), CrossLaps= $0.1$  ng/mL (N:0.33-0.782), P1NP= $79.23$  ng/mL (N: 20.25-76.31). Ultrasound and then CT and Tc99m scintigraphy confirmed a right parathyroid adenoma of 2.53 cm. X-ray of long bones was irrelevant while multiple brown tumors are identified at the level of ribs and disorganized structure of the ischium. Central DXA confirmed osteoporosis on terms of low Z-score= $-2.3SD$ , BMD= $1.006$  g/cm<sup>2</sup> at lumbar level. Parathyroid adenoma was removed, she experienced postoperative hungry bone syndrome. The histopathological exam showed: giant parathyroid adenoma (8.6 g) with oxyphilic cellularity, thin capsule without aspects of vascular invasion, but with present discontinuities - the existence of an intact capsule cannot be stated. Immunohistochemistry report did not reveal additional elements to sustain the diagnostic of parathyroid carcinoma. CDC73 testing is under evaluation. The patient continued with vitamin D supplementation.

**Conclusion:** Jaw-PHPT syndrome is an unusual cause of hypercalcemia, as seen here. Interestingly, in patient's family, the mother and maternal grandfather had polycystic kidney conditions without any anomaly of calcium metabolism.

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## P218

### SOMATOTROPINOMA- RELATED BONE STATUS: CASE REPORT

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**Objective:** There is a connection between excessive GH (growth hormone) in patients with acromegaly and bone loss. Acromegaly is a cause of secondary osteoporosis, together with menopausal states and vitamin D deficiency. Excessive GH and IGF1 modify the normal bone structure, predisposing to fragility fracture. (1-5) We aim to introduce acromegaly related bone status on a menopausal female.

**Methods:** This is a case report.

**Results:** This is a 71-year patient who is admitted for endocrine assessments due to acromegaly; she accuses nonspecific bone pain. She is known with acromegaly since last 5 y: hypophysectomy was done as initial therapy with postoperative persistence and treatment with octreotide LAR for 3 y. She also has multinodular goiter with euthyroidism, arterial hypertension, and arrhythmias, left arm branch, repetitive urinary tract infection, kidney stones, arthrosis, and type 2 diabetes mellitus controlled under diet. The patient had surgical menopause at 42 y due to benign conditions. Bone assessments showed persistent vitamin D since preoperative levels of 10 ng/mL, controlled of initial high IGF1 values from 357 ng/mL to 241.3/mL (N:26-226), control thyroid function, normal prolactin and glycated hemoglobin A1c. Anomalies of bone turnover markers are detected: osteocalcin=59.81 ng/mL (N:15-46), CrossLaps=1.16 ng/mL (N: 0.33-0.782) and normal PTH=53.84 pg/mL (N:15-65). Osteopenia is confirmed at central DXA: lumbar L1-4 BMD=0.956 g/cm<sup>2</sup>, T-score=-1.7SD, Z-score=-1.3SD; total hip BMD=0.982 g/cm<sup>2</sup>, T-score=-0.2SD, Z-score=0.4SD; femoral neck BMD=0.874 g/cm<sup>2</sup>, T-score=-1.2SD, Z-score=-0.3SD. Profile X-ray of the spine did not identify vertebral fractures. She continued with octreotide and 1000 UI cholecalciferol/d.

**Conclusion:** In this case, the menopausal female had a bone status connected with early menopause, diabetes mellitus and somatotropinoma. However, bone turnover markers are expected to be blunt due to diabetes, not high as here. GH excess related arthrosis might falsely increase BMD at DXA.

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## P219

### FOLLOWING BONE MINERAL DENSITY ON A MENOPAUSAL FEMALE AFTER SURGERY FOR PRIMARY HYPERPARATHYROIDISM

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**Objective:** The high levels of PTH associated with primary hyperparathyroidism (HPTH) lead to increased resorption of calcium, thus secondary osteoporosis. Whether surgical removal of underlying tumor is enough to resettle bone status depends on PTH excess history, menopausal and age status, other comorbidities. (1-5) We aim to introduce a female patient with surgically treated PHPT in order to follow DXA results and associated therapy.

**Methods:** Case report.

**Results:** This is a 71-year female who is admitted for bone assessment. Menopause by the age of 49 was associated with mild high blood pressure as medical history. She has a history of PHPT who was treated with PT-ectomy 9 y ago. Before the diagnostic of PHPT she had 5 fragility fractures and she was treated for 4 y with alendronate. After surgery, PTH normalized and she was treated with zoledronate 5 mg/y starting from T-score=-2.8SD at lumbar spine DXA, lumbar L1-4: BMD=0.850, T-score(SD)=-2.8, Z-score(SD)=-1.9; total hip BMD(g/cm<sup>2</sup>)=0.865, T-score(SD)=-1.1, Z-score(SD)=-0.4; femoral neck BMD(g/cm<sup>2</sup>)=0.711, T-score(SD)=-2.4, Z-score(SD)=-1.3; 1/3 distal radius BMD(g/cm<sup>2</sup>)=0.523, T-score (SD)=-2.7, Z-score (SD)=-1.6. The therapy continued until 2 y ago when at lumbar T-score of -2.2SD, BMD=0.918g/cm<sup>2</sup>, a decision of drug holiday was taken (despite preoperative fractures and no incidental postoperative fractures). Currently, she had suppressed bone turnover markers, BMD increased after 2 y of drug holiday to lumbar BMD(g/cm<sup>2</sup>)=0.992, T-score(SD)=-1.6, Z-score(SD)=-0.4; total hip BMD (g/cm<sup>2</sup>)=0.919, T-score (SD)=-0.7, Z-score (SD)=0.4; femoral neck BMD(g/cm<sup>2</sup>)=0.802, T-score(SD)=-1.7, Z-score(SD)=-0.3; 1/3 distal radi-

us BMD(g/cm<sup>2</sup>)=0.567, T-score(SD)=-2.1, Z-score(SD)=-0.2. TBS remained low, but with a small increase of 1,187. The decision of continuing only with vitamin D supplements was taken.

**Conclusion:** On this case, the good effect on BMD during drug holiday is due to PTH controlled levels. The decision of drug holiday on a patient with prevalent fractures but probably related to a secondary cause which was removed is delicate, but it should be taken into consideration in patients with long history of bisphosphonates exposure.

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## P220

### HYPERPROLACTINEMIA-RELATED BONE TURNOVER MARKERS

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**Objective:** Patients with prolactinoma might experience osteoporosis, hypogonadism and prolactin's direct negative effect on bones, as suggested by the presence of prolactin receptors in osteoblasts, could lead to loss of bone mass or abnormal bone turnover markers.(1-5) We aim to introduce a female patient case with abnormal bone profile due to uncontrolled prolactinoma.

**Methods:** This is a case report.

**Results:** This is a 48-year, nonsmoking, menstruated female who is admitted for endocrine evaluation of a prolactinoma. She had a 10-y history of meso-prolactinoma in addition to chronic thyroiditis with euthyroidism and two mammary fibroadenomas. Since diagnostic, she started therapy with dopamine agonist cabergoline which was recommended in various doses, up to a maximum 3 mg/week. She also associates macroprolactinemia 20%. During last decade, the levels of prolactin never normalized despite normal menses and no galactorrhea and that the fact that initial tumor of 0.99 cm decreased to 0.5 cm. When it came to escalating the dose of 3 mg/week, the patient accuses nausea and insomnia and refuse to increase the dose so she continued with a persistent mild increase of prolactin (after PEG exclusion of macroprolactinemia). On current admission, she complains of nonspecific bone pain. Blood assays show normal thyroid function: TSH=1.5 µU/mL (N:0.5-4.5), FT4=9.96 pmol/L (N:9-19), high

ATPO (antithyroperoxidase antibodies)=421.15 UI/mL (N:0-5.61) consistent with the diagnostic of Hashimoto's thyroiditis, normal 25-hydroxyvitamin D=34 ng/mL (N:30-100) under daily 1000 UI of cholecalciferol and high bone turnover markers, respective of formation osteocalcin=47.34 ng/mL (N:15-46), P1NP=86.14 ng/mL (N:20.25-76.31), and of resorption CrossLaps=0.86 ng/mL (N:0.33-0.782) with normal PTH=53 pg/mL (N:15-65) and total alkaline phosphatase=46 U/L (N:38-105), increased prolactin(post-PEG)=61.22 ng/mL (N:4.79-23.3), and normal IGF1=164.2 ng/mL (48-235). She continued with similar cabergoline and cholecalciferol doses. For the moment, DXA was not indicated

**Conclusion:** To avoid bone mass loss in hyperprolactinemic patients, prompt diagnosis and treatment are essential. The effect of long standing mild hyperprolactinemia might be reflected on mild changes of bone turnover markers when without hypo-estrogenic state, as seen here. Close follow-up is useful since bone turnover markers might be influenced by daily habits and potentially by primary hypothyroidism which was not confirmed in this case despite high antithyroid antibodies.

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## P221

### MULTIPLE COMORBIDITIES: WHAT ABOUT THE BONE?

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**Objective:** In a patient with multiple endocrine diseases, impairment of bone status represents the hallmark of different pathways. (1-5) We aim to introduce a female case with multiple co-morbidities and anomalies at central DXA.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** There is a 67-year patient known with complicated osteoporosis (forearm fracture) who is admitted for bone evaluation. The personal medical history includes adrenal incidentaloma, multinodular goiter with euthyroidism under levothyroxine therapy, controlled arterial hypertension, dyslipidemia, episodes of kidney stones, arrhythmias. She had surgical menopause at 47 y. On current admission, thyroid function is normal: TSH=2.92

$\mu\text{UI/mL}$  (N:0.5-4.5), no cortisol over-secretion was identified concerning adrenal incidentaloma (baseline ACTH=9.73 pg/mL (N:3-66), morning plasma cortisol=9.29  $\mu\text{g/dL}$  (N:4.82-19.5); mild vitamin D deficiency (25-hydroxyvitaminD=22.6 ng/mL (N:30-100), normal bone turnover markers: alkaline phosphatase=74 U/L (N:38-105), P1NP=72.71 ng/mL (N: 20.25-76.31), except for CrossLaps=0.321 ng/mL (N:0.33-0.782). She has a 8-y history of specific medication against osteoporosis: at start she had the fracture and lowest T-score=-1.3SD, BMD=0.855g/cm<sup>2</sup> for femoral neck; after 1 y of risedronate she switched to oral ibandronate due to digestive complains; after 3 more years T-score remained -1.4SD at the same region, and recently (under same therapy), DXA showed stationary aspects: lumbar BMD(g/cm<sup>2</sup>)=1.069, T-score(SD)=-0.9, Z-score(SD)=0.5; femoral neck BMD(g/cm<sup>2</sup>)=0.835, T-score (SD)=-1.5, Z-score (SD)=-0.1; total hip BMD(g/cm<sup>2</sup>)=0.887, T-score(SD)=-1, Z-score(SD)=0.1. For the moment, a decision of drug holiday was taken.

**Conclusion:** In this case, a part for age and menopausal status, adrenal tumor and levothyroxine long term substitution might contribute to bone loss. The decision of adrenalectomy should take into consideration incident fragility fractures and BMD decrease. However, here the patient had a good response to medication thus drug holiday was taken into consideration despite a previous fracture. In order to increase patients' compliance to medication, this decision should be taken into account at some point (as most probably a transitory decision).

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## P222

### GRIP STRENGTH, BONE MINERAL DENSITY AND MORTALITY: LESSONS FROM THE PAST AND HOPE FOR THE FUTURE?

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**Objective:** Several studies have reported associations between either low BMD or low grip strength (GS) and mortality risk. However, advances in the management of osteoporosis (OP) and low GS, a marker of sarcopenia, have occurred at different rates, with many more therapeutic modalities available for OP. We examined relationships between BMD, GS and all-cause and cause-specific mortality in the UK Hertfordshire Cohort Study (HCS).

**Methods:** Data on GS, measured by dynamometry, and mortality were available for 2987 HCS participants (47% women); femoral neck BMD measurements, measured by DXA, were available on 992 participants. Deaths were recorded from baseline (1998-2004) until 31 December 2018. Associations between GS and BMD in relation to mortality (all-cause, cardiovascular-related, cancer-related, and other) were examined using sex-specific Cox regression models with adjustment for age. Current use of bisphosphonates (BP) was part of the exclusion criteria for baseline DXA (though 41 participants of the whole sample were taking BPs); hormone replacement therapy was permitted.

**Results:** Mean (SD) baseline age of participants was 65.7 (2.9) y in men and 66.6 (2.7) y in women. Lower GS at baseline was associated with higher all-cause mortality in men (hazard ratio per SD lower grip strength: 1.22 (1.12,1.33),  $p<0.001$ ) and in women (1.29 (1.17,1.43),  $p<0.001$ ). Lower GS was associated with increased risk of cardiovascular (1.30 (1.11,1.52),  $p=0.001$  in men; 1.61 (1.30,1.99),  $p<0.001$  in women) and other mortality (1.33 (1.14,1.55),  $p<0.001$  in men; 1.39 (1.18,1.63),  $p<0.001$  in women) in both sexes, but no association was found with cancer mortality ( $p>0.25$ ). However, lower BMD was not associated with increased risk of all-cause or cause-specific mortality ( $p>0.09$  for all associations). At 2011-2012 and 2017 follow up sub-studies, 10% of participants (45 of 443 respondents and 22 of 221 respondents respectively) reported taking BP.

**Conclusion:** We report strong relationships between GS and mortality in both sexes after adjustment for age in comparison with BMD. We hypothesize this may reflect better recognition and management of people with low BMD, suggesting better measurement and interventions for low muscle strength is needed in routine clinical practice.

## P223

### HOW DOES PERIPHERAL QCT ASSESSED MUSCLE DENSITY RELATE TO FALLS AND FRACTURES IN LATE ADULTHOOD? FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY (HCS)

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**Objective:** Having previously considered the determinants of muscle density (MD) in late adulthood in the HCS, here we report relationships between forearm MD (FMD) and calf MD (CMD), assessed by pQCT, with falls and fractures in the same cohort.

**Methods:** 183 men and 167 women recalled falls and fractures since the age of 45 y, and over the previous year, on a nurse administered questionnaire; fractures were also ascertained through vertebral fracture assessment. pQCT of the radius and tibia was performed; MD was measured at the 66% site using standard

methodology. Total hip BMD (thBMD) was assessed using DXA. Pearson correlations were used to examine relationships between MD measures and thBMD. CMD and FMD relationships with prior fracture and falls were examined using logistic regression.

**Results:** Mean (SD) age was 76.1 (2.5) y in men and 76.4 (2.6) y in women; mean (SD) FMD and CMD values ( $\text{mg}/\text{cm}^3$ ) were: men 79.8 (3.2), women 77.3 (3.3) and men 80.7 (2.6), women 78.5 (2.6), respectively. 46 (25.7%) men and 51 (30.9%) women self-reported fracture since the age of 45 y or had documented vertebral fracture. 103 (56.6%) men and 119 (72.1%) women self-reported falls since the age of 45 y. FMD and CMD were weakly correlated with thBMD (men:  $r=0.11$  and  $r=0.19$ , women:  $r=0.21$  and  $r=0.30$  respectively). Lower CMD was related to increased risk of previous fracture among women (odds ratio per SD lower CMD: 1.43 (95%CI: 1.01, 2.02),  $p=0.046$ ). In the pooled sample after adjustment for sex, lower FMD was also related to increased risk of previous fracture (OR 1.41 (1.05, 1.90),  $p=0.021$ ). These two associations were attenuated after adjustment for age and thBMD ( $p>0.09$ ). By contrast, no significant relationships were seen between CMD or FMD and falls since aged 45, or in the previous year.

**Conclusion:** MD in upper and lower limbs was associated with previous fracture rather than falls history in this cohort of community-dwelling older adults, highlighting the close relationship between muscle and bone health in later life. Further prospective studies in larger cohorts are needed.

al. Our objective was to describe the changes of bone microarchitecture and aBMD in a group of patients with TIO after 12 months of surgical cure.

**Methods:** We analyzed the data of 11 patients with TIO who had been referred to our institution between May 2018 and December 2020. Out of these patients, two achieved surgical cure and had at least 12 months follow-up. In these two patients we evaluated bone microarchitecture and aBMD before surgical removal and at final follow-up. Bone microarchitecture of non-dominant distal tibia and distal radius were evaluated by HR-pQCT and bone strength by finite element analysis.

**Results:** Two patients (male, 52 years old; female, 64 years old) with longstanding TIO (9 and 10 y from first symptoms to surgery) were assessed at first visit to our institution (preoperatively) and 15 and 26 months after surgical cure. There was a considerable improvement in all cortical parameters in tibia (up to 63%) but modest changes in the cortical parameters at radius. Trabecular parameters tended to slightly worsen after surgical cure. Bone strength demonstrated a substantial increase predominantly at tibia (Table). Both patients showed an increase in aBMD at LS (35 and 125%), FN (31 and 124%) and TH (15 and 161%).

## P224

### SPECTACULAR CORTICAL BONE RECUPERATION AFTER CURE OF TUMOR INDUCED OSTEOMALACIA

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**Objective:** Bone microarchitecture by HR-pQCT and BMD by DXA (aBMD) are severely affected in patients with tumor-induced osteomalacia (TIO). However, there is no prospective data reporting changes of these parameters following successful tumor remov-



	Patient 1			Patient 2		
	Pre-op	Post-op	% Difference	Pre-op	Post-op	% Difference
Distal radius						
Ct.Ar (mm <sup>2</sup> )	67.7	69.4	2.5%	48.9	40.7	-16.8%
Tb.Ar (mm <sup>2</sup> )	350.3	347.2	-0.9%	164.4	173.0	5.2%
Tt.BMD (mg HA/cm <sup>3</sup> )	294.2	283.8	-3.5%	264.6	227.7	-13.9%
Ct.BMD (mg HA/cm <sup>3</sup> )	865.1	864.7	0.0%	881.8	840.9	-4.6%
Ct.Th (mm)	0.77	0.78	1.3%	0.76	0.63	-17.1%
Tb.BMN (mg HA/cm <sup>3</sup> )	170.5	151.6	-11.1%	61.4	66.3	8.0%
Tb.BV/TV (%)	14.2	12.6	-11.3%	5.1	5.5	7.8%
Tb.N (1/mm)	1.75	1.66	-5.1%	1.01	0.95	-5.9%
Tb.Th (mm)	0.081	0.076	-6.2%	0.051	0.058	13.7%
Stiffness (N/mm)	115	112	-2.6%	47	50	6.4%
Estimated failure load (N)	5926	5743	-18.3%	2258	2543	12.6%
Distal tibia						
Ct.Ar (mm <sup>2</sup> )	103.0	118.4	15.0%	41.8	67	60.3%
Tb.Ar (mm <sup>2</sup> )	1006	990	-1.6%	479	462	-3.5%
Tt.BMD (mg HA/cm <sup>3</sup> )	160	180	12.8%	81	113	39.7%
Ct.BMD (mg HA/cm <sup>3</sup> )	841	850	1.1%	799	876.2	9.7%
Ct.Th (mm)	0.78	0.90	15.4%	0.46	0.75	63.0%
Tb.BMD (mg HA/cm <sup>3</sup> )	84	93.5	11.0%	0.1	-4	
Tb.BV/TV (%)	7	7.8	11.4%	0.1	-0.3	
Tb.N (1/mm)	1.21	1.30	7.4%	0.38	0.25	-34.2%
Tb.Th (mm)	0.058	0.060	3.4%	0.1	-0.014	
Stiffness (N/mm)	164	186	13.4%	52	80	53.8%
Estimated failure load (N)	8558	9657	12.8%	2496	4010	60.6%

**Conclusion:** In these two cases of longstanding TIO that achieved surgical cure, there was an impressive improvement in cortical parameters. We hypothesize that during the disease, the cortical

bone had become "trabecularized" and the inner cortical surface had been falsely measured as trabecular bone. After cure, there was a "corticalization" of the false trabeculae so the trabecular parameters decreased and cortical parameters increased. The extent of the above phenomena would be better shown in mechanical loaded and richer in cortical compartment bones, as the tibia. More research is needed to prove this hypothesis in the future.

## P225

### IMPORTANCE OF MICROARCHITECTURE MEASUREMENT IN FRACTURE RISK ASSESSMENT IN POSTMENOPAUSAL SERBIAN WOMEN

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**Objective:** Osteoporosis is a disease characterized by low BMD and impaired microarchitecture of bone tissue, leading to increased bone fragility and a consequent increase in fracture risk. Conceptual description of the disease puts into focus two important characteristics of bone: BMD and quality, especially bone microarchitecture. We aim to investigate discriminative value of TBS in detecting postmenopausal women with osteoporotic fractures.

**Methods:** Cross-sectional study was conducted in Railway Healthcare Institute, Belgrade, in period Jan 1 - Oct. 31, 2020. 220 postmenopausal women aged 46-83 y were included. Study included only those who were first time on BMD testing and never had treatment therapy for osteoporosis before. BMD was measured on Hologic Discovery C device, on lumbar spine and hip region. The vertebral fracture assessment was performed, and Th4- L4 region was analyzed in aim to detect vertebral fractures on the same device. The lumbar spine scans were reanalyzed in TBS iNsite<sup>®</sup> software (V1.9.2, Med-Imaps, France) and TBS was calculated. All the participants were previously tested using an epidemiological questionnaire.

**Results:** In relation to the existence of a small trauma fracture, the subjects are divided into two groups: with no previous fracture- 106 (48.4%) and group with fracture-114 (51.6%). Postmenopausal women with fractures have a higher percentage of osteoporosis measured on lumbar spine or hip (56.8% vs. 47.6%;  $\chi^2=14.02$ ,  $df=2$ ,  $p=0.001$ ) according to DXA findings and totally degraded microarchitecture than women without fractures (65.7% vs. 44.7%;  $\chi^2=45.07$ ,  $df=2$ ,  $p=0.00$ ). The highest number of fractures was found in subjects who had osteoporosis on DXA and completely degraded bone microarchitecture - 55/114 (48.25%), while the lowest number of fractures was found in subjects who had a normal BMD and preserved bone microarchitecture 2 (1.75%). A higher number of fractures was found in subjects with completely impaired bone microarchitecture and osteopenia

22/114 (19.3%) than in subjects with osteoporosis and partially degraded bone microarchitecture 7/114 (6.14%) and in subjects with normal BMD and TBS values 9/114 (7.89%).

**Conclusion:** TBS is a useful adjunct in the evaluation of fracture risk. Combining the normal and osteopenia BMD values with the lowest range of TBS and clinical risk factors can help in defining a significant subset of non-osteoporotic women at higher risk of fracture which is useful in clinical practice and patient management.

## P226

### REAL-LIFE SHORT-TERM EFFECTIVENESS OF ANTI-OSTEOPOROTIC TREATMENTS: A LONGITUDINAL COHORT STUDY

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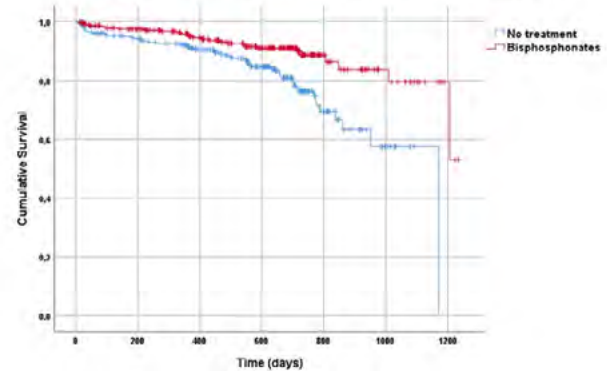
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**Objective:** Data from randomized clinical trials showed that anti-osteoporotic treatments increase BMD and reduce the risk of fragility fractures. However, data on the real-life effectiveness of such medications is still scarce. The primary objective of the present study is to assess the real-life effectiveness of anti-osteoporotic treatment in a representative cohort of Italian women.

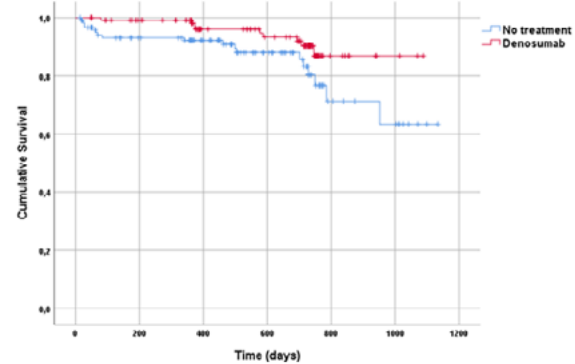
**Methods:** We retrieved clinical and densitometric data from the DeFRA database. Multivariable Cox regression models were employed to analyze the effectiveness of different anti-osteoporotic drugs. In sensitivity analyses, we generated 1:1 matched cohorts of patients with prescription of anti-osteoporotic patients and non-treated individuals and patients with increasing BMD vs. stable or decreasing BMD (propensity score matching with nearest neighbor matching algorithm).

**Results:** Data from 50,862 women were available. Among these, 3574 individuals had at least 2 consecutive visits. The crude fracture rate was 91.9/1000 person-year for nontreated patients. The crude fracture rate in bisphosphonate users was 72.1/1000 person-year, in denosumab users was 58.2/1000 person-year and in teriparatide users was 19.3/1000 person-year. Overall, we found that bisphosphonates were associated with a 30% lower risk of fracture compared to no treatment (aHR 0.70, 95%CI 0.50-0.98), denosumab and teriparatide were associated with 60% and 90% lower risk of fracture, respectively (aHR 0.43, 95%CI 0.24-0.75 and aHR 0.09, 95%CI 0.01-0.70). Bisphosphonate use was associated with a lower risk of fracture only after one year of treatment. Figures 1,2 and 3 show the Kaplan Meier curve for bisphosphonates, denosumab vs. no treatment, and patients with increasing BMD vs. stable or decreasing BMD at FU.

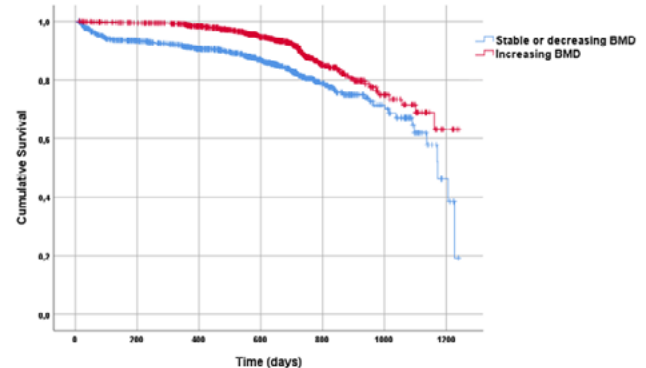
**Figure 1.** Kaplan-Meier curves displaying the fracture (vertebral and non-vertebral fractures) probability for 1:1 matched groups of bisphosphonate users and individuals without treatment. (log-rank  $p < 0.0001$ )



**Figure 2.** Kaplan-Meier curves displaying the fracture (vertebral and non-vertebral fractures) probability for 1:1 matched groups of denosumab users and individuals without treatment. (log-rank  $p 0.037$ )



**Figure 3.** Kaplan-Meier curves displaying the fracture (vertebral and non-vertebral fractures) probability for 1:1 matched groups of patients with increasing BMD and stable or decreasing BMD. (log-rank  $p < 0.0001$ )



**Conclusion:** We found that all antiosteoporotic medications effectively reduced the risk of fracture in the real-life. Bisphosphonate's effect on fracture risk was apparent only after the first year of treatment. Our findings do not support the use of bisphosphonates in patients at imminent risk of fracture

P227

## HANDGRIP STRENGTH IN OLDER INPATIENTS AND THE 10-YEAR PROBABILITY OF SUSTAINING HIP FRACTURE

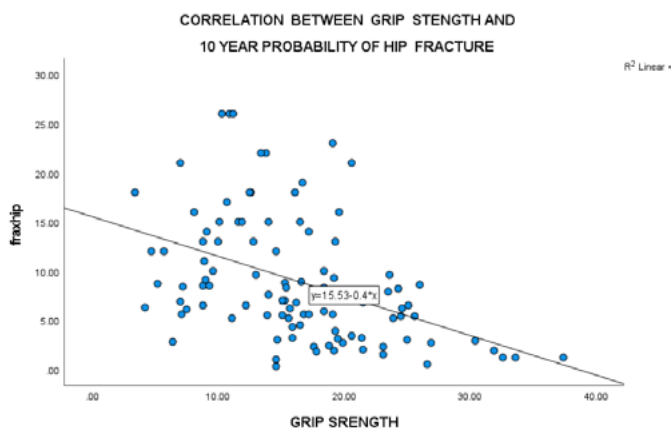
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**Objective:** Weak handgrip is one of the five diagnostic criteria for frailty phenotype, and can predict disability, morbidity and all-cause mortality. Handgrip strength has been shown to be inversely associated with BMD and weak handgrip is a recognised risk factor for falls and fracture in older patients. We aim to explore the relationship between handgrip strength and 10-year probability of sustaining hip fracture in older inpatients and to determine the influence of gender on this relationship.

**Methods:** A cross-sectional prospective analysis was carried out on inpatients aged 60 and above in a district general hospital over a 2-month period. Grip strength was measured in these patients as part of screening for frailty. The Jamar hydraulic hand held dynamometer was used for measurement of handgrip strength three times in each hand. The Southampton protocol was applied. The FRAX UK, without BMD, was used to calculate the 10-y probability of sustaining a hip fracture. Patients with incomplete data were excluded. IBM SPSS 27 software was used for statistical analysis. Baseline characteristics were calculated using summary descriptive statistics and Pearson's correlation coefficient and linear regression were used to compute correlation.

**Results:** 104 patients were included in the analysis; 41 males and 63 females. Mean age was 83 y (SD 8.2). There was inverse correlation between handgrip strength and the 10-y probability of sustaining a hip fracture in all patients, male patients and female patients ( $r=-0.442$ ;  $p<0.001$ ,  $r=-0.451$ ;  $p=0.003$ ,  $r=-0.309$ ;  $p=0.01$ , respectively).



**Conclusion:** Handgrip strength is inversely correlated with the 10-yr probability of sustaining a hip fractures in older inpatients aged 60 and above. This correlation persists when broken down by gender.

P228

## A NEW REHABILITATION COMPLEX FOR CORRECTION MOVEMENT DISORDERS AND MUSCLE STRENGTH DEFICIT IN OBESE PEOPLE

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**Objective:** To evaluate effectiveness a new complex included aerobic and physical training, kinesiohydrotherapy, balance therapy on changes in muscle strength and movement disorders in patients with obesity.

**Methods:** The study group included 40 patients aged 58 [53;66] y.o. with a BMI  $\geq 30$  kg/m<sup>2</sup>. The control group included of 40 people aged 57 [54;63] y.o. with BMI  $\geq 30$  kg/m<sup>2</sup>. Study methods included anthropometry, functional tests, and dynamometry.

**Results:** In research it was a significant decrease in body weight (from 106.03 [83;145] to 102.8 [80;141] kg), BMI (from 39.2 [30.12;49.1] to 38.1 [29.4;46.7] kg/m<sup>2</sup>), decreased WC (from 109 [105;125.8] to 107 [98.8 12] cm), HC (from 127 [112.3;139.8] to 121 [109.5;133.5] cm), decreased pain syndrome (from 5 [3;7] to 2.5 [1;4.75] points), increased arm strength (in right arm from 20 [14.25;34] to 30 [19;42], in left arm from 19.5 [14.25;29.5] to 22 [18;30.75] daN). Conditioning and coordination abilities improved significantly in the main group according to the functional tests: "Up and go test" (from 7.9 [7.1;8.9] to 7.4 [6.5;8.3] s), back muscle strength (from 5[5;5] to 5[5;5]), static and dynamic abdominal muscle endurance (from 12.04 [9.47;17.13] to 16.07[10.69;27.7] s and from 31[21;37.25] to 39 [29.5;46.5] s, and back and (from 14.94[5.8775;22.205] to 18.41[9.745;31.335] times and from 8[5;14] to 10 [8;23], times, respectively); Fukuda test scores (from 65[56;76.75] to 72[61;82] reps), One leg standing test (from 13.9[5.38;32.15] to 18.61[8.6125;38.1575] s for the left) and closed eyes (from 3.45[2.16;6.38] to 3.975[2.715;5.82] s for the right and from 4.12[1.3;8.61] to 4.31[2.16;8.13] s for the left).

**Conclusion:** A new complex including aerobic and strength training, kinesiohydrotherapy, and balance therapy showed significant effects on body weight reduction, body volume reduction, and muscle strength improvement in obese patients. A new integrated method results in a longer maintenance of the achieved effect when controlling the long-term results after 3 months and 1 year compared with the group that received only the 2-component program.

P229

### BODY COMPOSITION ASSESSMENT METHODS COMPARISON FOR SARCOPENIC OBESITY SYMPTOM VERIFICATION

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**Objective:** To compare the effectiveness of three methods of body composition assessment such as bioimpedans analysis (BIA), air-replacement bodyplatismography (BodPod) and DXA total body program (DXA Total Body) in the verification of reducing of skeletal muscle mass as sign of sarcopenic obesity.

**Methods.** The study group included 95 patients aged 21-69 y.o. (average age 53.9±11.05 years) with BMI ≥30.0 kg/m<sup>2</sup>. The control group included 37 patients aged 37-69 y.o (average age 50.73±10.6 y) of the same age without obesity with BMI 20.0-29.9 kg/m<sup>2</sup>. Body composition was tested using BIA, BodPod and DXA with calculating fat, lean and skeletal muscles mass (kg) and % in all the patients.

**Results:** According to BIA the groups differ only in fat mass (FM) 42.75 (4.8;6.3) vs. 33.15 (28.4;35.5) kg; p=0.036 and did not differ (p>0.05) in lean (LM), skeletal muscle mass (SMM) and in% of FM and SMM. According to BodPod analyses groups differed in the FM 3.4 [36.81;69.94] vs. 31.02 [23.22;38] kg, p=0.007, % FM 45.4 [42.1;53.8] vs. 37.7 [28.6;41.1], p=0.003 and % LM - 54.6 [46.2;57.9] vs. 62.3 [58.9;71.4], p=0.003, but had statistically equivalent values of LM 55 [49.48;67.77] vs. 40.36 [33.12;49.06] kg, p=0.19. According to DXA Total Body analyses statistically significant differences (p<0.05) have been identified between the groups in FM and % FM of the hands, feet, trunk, total body (p>0.05), but not in LM and % LM (p>0.05).

**Conclusion:** From methods of body composition assessment, air-replacement bodyplatismography (BodPod) is the most sensitive in the verification of skeletal muscle mass reduction in obese patients. This method shows that patients with obesity have a significantly reduced muscle mass compared with normal weight or overweight subjects.

P230

### DEVELOPMENT OF A FULLY AUTOMATIC TECHNIQUE FOR SEGMENTATION AND QUANTIFICATION OF MASSETER AND TONGUE MUSCLES: A CROSSROAD OF SARCOPENIA AND DEMENTIA

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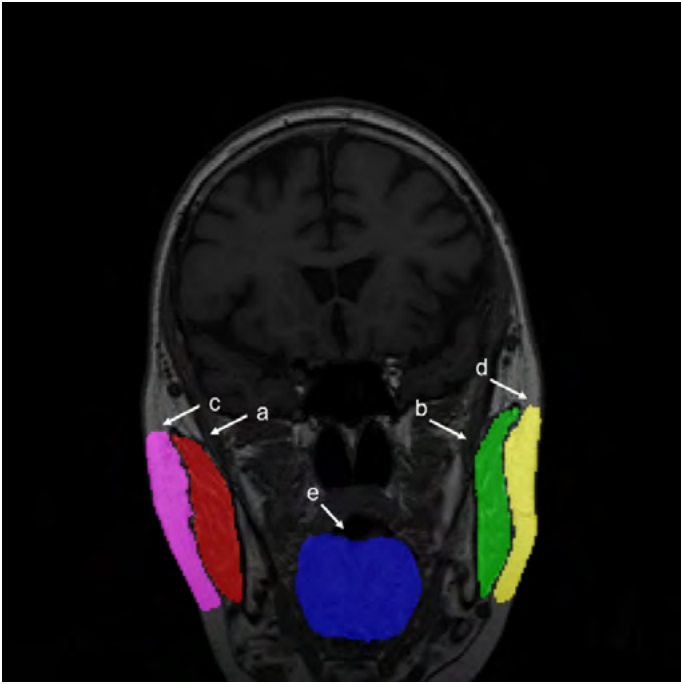
<sup>1</sup>Australian Institute for Musculoskeletal Science (AIMSS), The University of Melbourne and Western Health, Melbourne, Australia, <sup>2</sup>Centre for Age-Related Medicine (SESAM), Stavanger University Hospital and Faculty of Health Sciences, University of Stavanger, Stavanger, Norway, <sup>3</sup>Dept. of Medicine-Western Health, The University of Melbourne, Melbourne, Australia, <sup>4</sup>Centre for Age-Related Medicine (SESAM), Stavanger University Hospital, Stavanger, Norway, <sup>5</sup>Australian Institute for Musculoskeletal Science (AIMSS), The University of Melbourne and Western Health, Melbourne, Australia

**Objective:** Sarcopenia and dementia are the major drivers of frailty and disability in older adults. Current evidence suggests an association between sarcopenia, brain atrophy and cognitive impairment. Therefore, measuring the severity of muscle wasting is not only essential to detect sarcopenia but could also have the potential to be used as a predictive biomarker for dementia. We have previously validated a fully automatic technique to segment and quantify masseter muscles, tongue muscle, and subcutaneous fat. Whether artificial intelligence could be used to optimise the validity and usefulness of this technique remains unknown.

**Methods:** Using 417 MRI slices, several artificial intelligence (AI) models (U-Net deep learning) were developed. Masseter muscles and subcutaneous fat on both sides and tongue muscle were manually segmented using commercially available software (SliceOmatic by TomoVision) and then used to train, validate, and test the AI models. Dice coefficient has been used to measure the similarity of the results between the manual and automatic techniques.

**Results:** The novel fully automatic technique can segment and quantify masseter muscles and subcutaneous fat at their level on the left and right sides of the head and tongue muscle (Figure 1). This technique provides a fast and accurate tool to analyse a large number of MRI scans. The agreement between manual segmentation and the fully automatic technique for all areas is above 90%, indicating a high accuracy (92% for R masseter, 92% for L masseter, 90% for R subcutaneous fat, 91% for L subcutaneous fat, 92% for tongue).





**Figure 1.** 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.

**Conclusion:** Using the presented AI model, masseter and tongue muscle volume, as well as subcutaneous fat, can be opportunistically measured in CT scans and MRI images and used as a surrogate measure of the general body muscle volume and an indicator of prognosis and a predictor of adverse outcomes in people with dementia. This study could contribute to easier clinical practice implementation of sarcopenia detection using facial muscles.

## P231

### SHORT-TERM EXPOSURE TO FINE PARTICULATE MATTER AND RISK OF FRAGILITY HIP FRACTURES: A CASE-CROSSOVER STUDY ON 1042 HIP FRACTURES

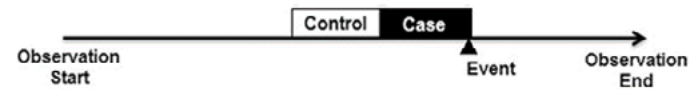
G. Adami<sup>1</sup>, M. Pontalti<sup>1</sup>, A. Fassio<sup>1</sup>, D. Gatti<sup>1</sup>, S. Negri<sup>1</sup>, V. Braga<sup>1</sup>, P. Olivi<sup>1</sup>, M. Rossini<sup>1</sup>

<sup>1</sup>University of Verona, Verona, Italy

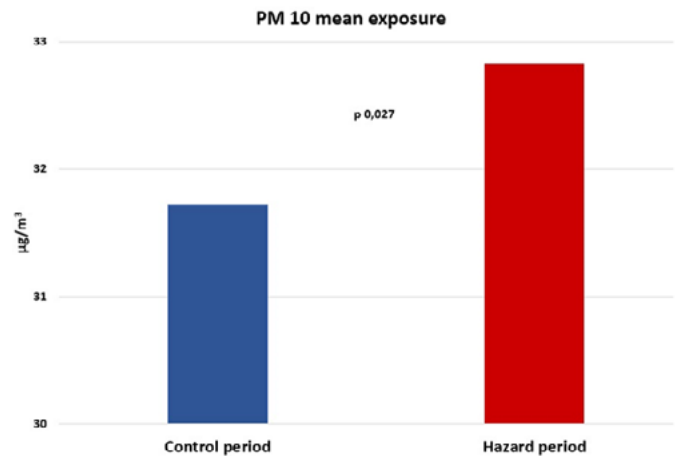
**Objective:** Fragility femoral fracture is a common, world-spread, medical condition, that has a relevant impact both clinically and economically. Chronic exposure to environmental air pollution has been linked with a higher risk of developing osteoporosis. However, little is known regarding the relationship between short-term exposure to air pollution and bone fractures. Our study aims to investigate the link between short-term exposure to fine particulate matters and fragility hip fractures.

**Methods:** We retrieved data of patients suffering from hip frac-

tures admitted and data on the monitoring of PM<sub>10</sub> concentrations from the Italian institute of environment protection and research (ISPRA). We designed a case-crossover study to compare the exposure to particulate matters (PM<sub>10</sub>) in the 30-day period immediately before the fracture (hazard period) referent to a 30-day control period (from day -30 to -60 from the fracture). Exposure to PM<sub>10</sub> was evaluated as mean value and AUC. Case-crossover controls for within-person time-invariant and between-patient confounders (Figure 1).



**Results:** 1042 patients (73.7% female n=768), with a hip fracture admitted to the hospital, were included in the study. Mean age of the cohort was 82.6 y ( $\pm 9.55$ ). Average exposure to PM<sub>10</sub> in the control period was 33.84  $\mu\text{g}/\text{mm}^3$ , cumulative exposure (AUC) was 952,42  $\mu\text{g}/\text{mm}^3$  compared 31.72  $\mu\text{g}/\text{mm}^3$  and AUC of 920.24  $\mu\text{g}/\text{mm}^3$  in the hazard period (Figure 2) The differences between levels of PM<sub>10</sub> in the two periods was statistically significant as levels of PM<sub>10</sub> was higher in the hazard period compared to control period, with a p-value=0.027 ( $\alpha < 0.05$ ) when comparing mean values in the two groups and a p-value=0.024 ( $\alpha < 0.05$ ), when comparing AUCs.



**Conclusion:** Our study suggests that short-term exposure to environmental air pollution might increase the risk of femoral fragility fractures. Further studies should be taken to further investigate the biological mechanisms underlining this finding

P232

## ASSOCIATION BETWEEN EXPOSURE TO FINE PARTICULATE MATTER AND OSTEOPOROSIS: A POPULATION-BASED COHORT STUDY

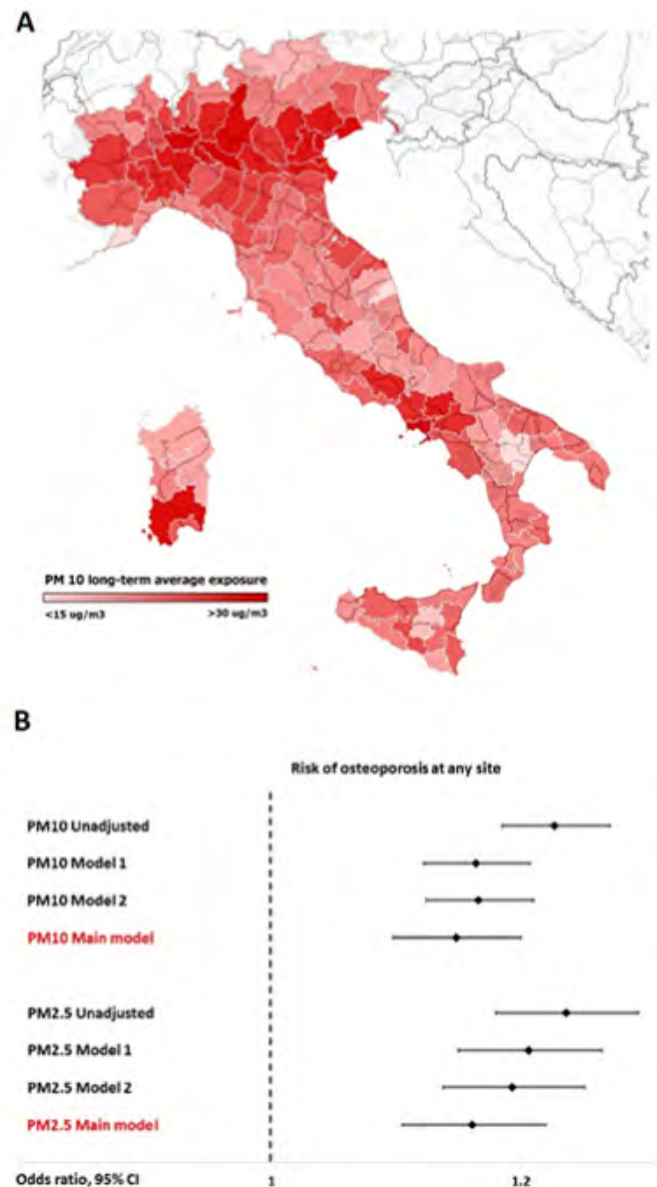
G. Adami<sup>1</sup>, A. Fassio<sup>1</sup>, O. Viapiana<sup>1</sup>, D. Gatti<sup>1</sup>, M. Rossini<sup>1</sup><sup>1</sup>University of Verona, Verona, Italy

**Objective:** Environmental air pollution has been associated with the disruption of bone health at a molecular level. Particulate matter (PM) exposure can simultaneously stimulate bone resorption and halt bone formation. The primary aim of the present study is to describe the association between long-term exposure to PM and osteoporosis in a large cohort of women at high risk of fracture.

**Methods:** Clinical, demographic and densitometric data were extracted from the DeFRACalc79 dataset, which gathers data on women at risk for osteoporosis. Data on the monitoring of PM10 and PM2.5 concentrations were retrieved from the Italian institute of environment protection and research. Generalized linear models with robust estimators were employed to determine the relationship between BMD and PM long-term exposure. We sequentially adjusted for confounders. Fully adjusted model included age, BMI, presence of prevalent fragility fractures, family history of vertebral or hip fractures, menopause, glucocorticoid treatment, comorbidities and the macro-area of residency.

**Results:** 59,950 women from 110 Italian provinces were included in the study. We obtained air quality data from 617 air quality stations across 110 Italian provinces. PM 2,5 exposure was negatively associated with T-score levels at the femoral neck ( $\beta$ -0.005, 95 CI -0.007 to -0.003) and lumbar spine ( $\beta$ -0.003, 95%CI -0.006 to -0.001). Chronic exposure to PM2.5 above 25  $\mu\text{g}/\text{m}^3$  was associated with a 16% higher risk of having osteoporotic T-score at any site (aOR 1.161, 95%CI 1.105 to 1.220), exposure to PM10 above 30  $\mu\text{g}/\text{m}^3$  was associated with a 15% higher risk of having osteoporotic T-score at any site (aOR 1.148, 95%CI 1.098 to 1.200), Figure 1B.

**Figure 1. A.** Long-term exposure to PM in Italy (2013-2019 average concentration). **B.** Risk of osteoporosis at any site in patients chronically exposed to particulate matter (PM) 10 >30  $\mu\text{g}/\text{m}^3$  and PM2.5 >25  $\mu\text{g}/\text{m}^3$ , Model 3 (main model) adjusted for age, body mass index (BMI), presence of prevalent fragility fractures, family history of osteoporosis, menopause, glucocorticoid treatment, comorbidities and macro-area of residency (categorized as: northern Italy, central Italy and southern Italy).



**Conclusion:** Long-term exposure to air pollution was associated with a higher risk of osteoporosis. Femoral neck site seemed to be more susceptible to the detrimental effect of PM exposure.

## P233

## ASSOCIATION BETWEEN SHORT-TERM EXPOSURE TO ENVIRONMENTAL AIR POLLUTION AND PSORIASIS FLARE

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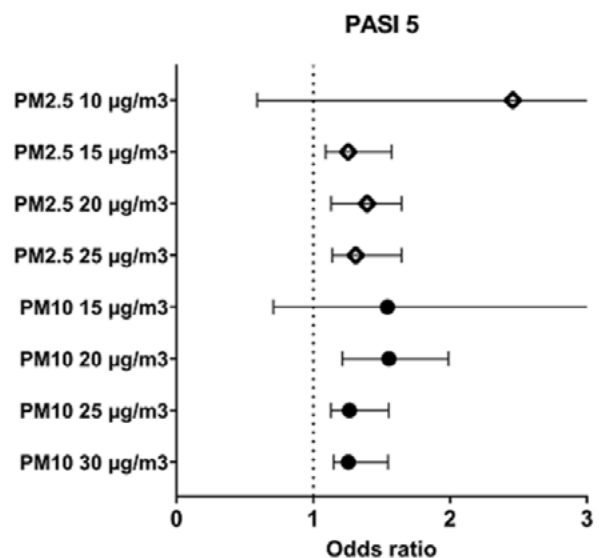
<sup>1</sup>University of Verona, Verona, Italy

**Objective:** Psoriasis is a chronic inflammatory disease with a relapsing-remitting course. Selected environmental factors such as infections, stressful life events or drugs may trigger disease flares. Whether the air pollution could trigger psoriasis flares is still unknown. We aim to investigate whether the short-term exposure to environmental air pollution is associated to psoriasis flares.

**Methods:** Observational study with both case-crossover and cross-sectional design. We analyzed longitudinal data from 2013 to 2020 of patients with psoriasis attending the outpatient dermatologic clinic of the University Hospital of Verona. For the case-crossover analysis patients with at least one disease flare, defined as PASI increase  $\geq 5$  between 2 consecutive assessments) were considered. For the cross-sectional analysis, patients receiving any systemic treatment for  $\geq 6$  months, with  $\geq 2$  consecutive PASI assessment were included. We compared the mean and cumulative concentrations of several air pollutants (CO, NO<sub>2</sub>, NO<sub>x</sub>, C<sub>6</sub>H<sub>6</sub>, PM10 and PM2.5) in the 60 days preceding the psoriasis flare and the control visits.



**Results:** A total of 957 patients with psoriasis with 4398 follow-up visits were included in the study. Among the overall cohort, 369 (38.6%) patients with psoriasis flare were included in the case-crossover study. We found that concentrations of all pollutants were significantly higher in the 60 days before psoriasis flare (median PASI at the flare 12, IQR 9-18), compared to the control median PASI 1, IQR 1-3,  $p < 0.0001$ ). In the cross-sectional analysis, exposure to mean PM10 over  $20 \mu\text{g}/\text{m}^3$  and mean PM2.5 over  $15 \mu\text{g}/\text{m}^3$  in the 60 days before assessment were associated with a higher risk of PASI  $\geq 5$  point worsening, aOR 1.55, 95%CI 1.21-1.99 and aOR 1.25, 95%CI 1.0-1.57, respectively. Sensitivity analyses that stratified for trimester of evaluation, with various lag of exposure and adjusting for type of treatment yielded similar results.



**Conclusion:** Air pollution may be a trigger factor for psoriasis flare.

## P234

## ASSOCIATION BETWEEN LONG-TERM EXPOSURE TO AIR POLLUTION AND IMMUNE-MEDIATED DISEASES: A POPULATION-BASED COHORT STUDY

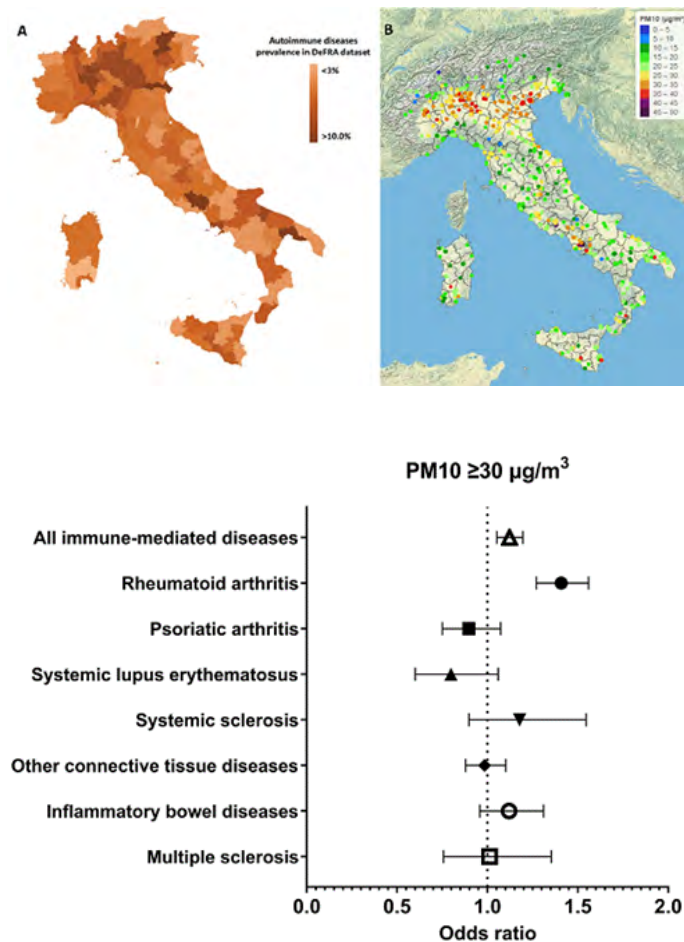
G. Adami<sup>1</sup>, M. Pontalti<sup>1</sup>, A. Fassio<sup>1</sup>, O. Viapiana<sup>1</sup>, D. Gatti<sup>1</sup>, M. Rossini<sup>1</sup>

<sup>1</sup>University of Verona, Verona, Italy

**Objective:** Environmental air pollution has been associated with disruption of the immune system at a molecular level. The primary aim of the present study is to describe the association between long-term exposure to air pollution and the risk of developing immune-mediated conditions.

**Methods:** We conducted a retrospective observational study on a nationwide dataset of women and men. Diagnoses of various immune-mediated diseases were retrieved. Data on the monitoring of PM10 and PM2.5 concentrations were retrieved from the Italian institute of environment protection and research (ISPRA). Generalized linear models were employed to determine the relationship between autoimmune diseases prevalence and PM. **Results:** 81,363 subjects were included in the study. We found a positive association between PM10 and the risk of autoimmune diseases ( $p = 0.007$ ,  $p = 0.014$ ). Every  $10 \mu\text{g}/\text{m}^3$  increase in PM10 concentration was associated with an incremental 7% risk of having an autoimmune disease. Exposure to PM10 above  $30 \mu\text{g}/\text{m}^3$  and PM2.5 above  $20 \mu\text{g}/\text{m}^3$  was associated with a 12% and 13% higher risk of autoimmune disease, respectively (aOR 1.12, 95%CI 1.05-1.20 and aOR 1.13, 95%CI 1.06-1.20). Exposure to PM10 was associated with an increased risk of rheumatoid arthritis, expo-

sure to PM<sub>2.5</sub> was associated with an increased risk of rheumatoid arthritis, CTDs and IBD. Figure 1. A. Prevalence of auto-immune diseases across Italy in the DeFRA database; B. Long-term exposure to particulate matter (PM) of <math><10\ \mu\text{m}</math> in Italy (2013-2019 average concentration  $\mu\text{g}/\text{m}^3$ ). Figure 2. Risk of immune-mediated conditions at chronic exposure to PM<sub>10</sub>  $\geq 30\ \mu\text{g}/\text{m}^3$ .



**Conclusion:** Long-term exposure to air pollution was associated with a higher risk of developing autoimmune diseases, in particular rheumatoid arthritis, CTDs, and IBD. Chronic exposure to levels above the threshold for human protection was associated with a 10% higher risk of developing immune-mediated diseases.

## P235

### DIETARY ACRYLAMIDE AND PHYSICAL PERFORMANCE TESTS: A CROSS-SECTIONAL ANALYSIS

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**Objective:** Dietary acrylamide is found in certain foods, such as deep frying, baking and roasting, and is associated with higher inflammatory and oxidative stress parameters. The association between dietary acrylamide and physical performance has not yet been explored. The aim of the study was to investigate the relationship between dietary acrylamide intake and physical performance tests in a large cohort of North American individuals affected by knee osteoarthritis or at high risk for this condition.

**Methods:** Dietary acrylamide intake was obtained through a food frequency questionnaire and reported in quartiles and as an increase in deciles. Physical performance was explored using the 20-m usual pace test, the 400-m walking distance, and the chair stands time. The association between dietary acrylamide and physical performance tests was explored using linear regression analysis, adjusted for potential confounders.

**Results:** 4436 participants (2578 women, mean age: 61.3) were enrolled. People in the highest quartile of dietary acrylamide reported significantly longer 20-m walking ( $15.53 \pm 3.32$  vs.  $15.15 \pm 2.91$  s), 400-m walking ( $312 \pm 54$  vs.  $305 \pm 58$  s) and chair stands ( $11.36 \pm 4.08$  vs.  $10.67 \pm 3.50$  s) times than their counterparts in Q1. In adjusted linear regression analyses, each increase in one decile in dietary acrylamide was associated with a longer time in walking for 20 m ( $\beta=0.032$ ; 95%CI: 0.016-0.048;  $p=0.04$ ), 400 m ( $\beta=0.048$ ; 95%CI: 0.033-0.063;  $p=0.002$ ) and chair stands ( $\beta=0.016$ ; 95%CI: 0.005-0.037;  $p=0.04$ ) times.

**Conclusion:** Higher dietary acrylamide intake was significantly associated with poor physical performance, also after accounting for potential confounders, suggesting a role for this food contaminant as a possible risk factor for sarcopenia.



P236

## LONG-TERM EFFECT OF DENOSUMAB ON BONE MICROARCHITECTURE AS ASSESSED BY TISSUE THICKNESS-ADJUSTED TRABECULAR BONE SCORE (TBS) IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS: RESULTS FROM THE FREEDOM AND OPEN-LABEL EXTENSION (OLE)

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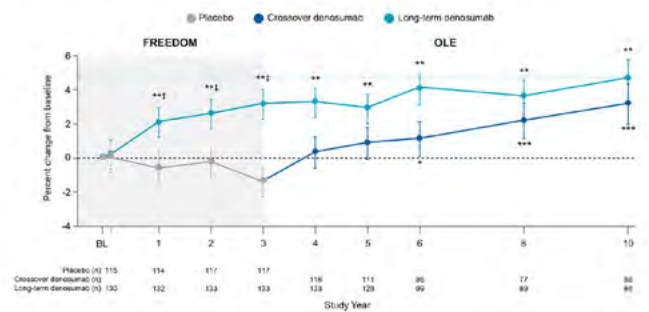
**Objective:** TBS is an indirect measure of bone microarchitecture assessed on lumbar spine (LS) DXA scans and provides information beyond BMD. TBS algorithm has been updated to account for regional soft tissue noise in DXA images. This retrospective analysis applied updated built-in tissue thickness-adjusted TBS algorithm to investigate the long-term effect of denosumab on bone microarchitecture in FREEDOM and OLE.

**Methods:** This analysis included 279 postmenopausal women with LS or total hip BMD T-score < -2.5 and ≥ -4.0 who completed the FREEDOM DXA substudy and continued in the OLE study: 150 women received denosumab 60 mg subcutaneously every 6 months for 3 y and same-dose open-label denosumab for 7 y (long-term denosumab group); 129 women received placebo for 3 y and open-label denosumab for 7 y (crossover denosumab group). BMD and TBS were assessed on LS DXA scans, blinded from treatment allocation, at FREEDOM: baseline, Month 1, and Years 1, 2, and 3; and at OLE: baseline, Years 1, 2, 3, 5, and 7.

**Results:** Baseline characteristics were similar between groups. Long-term denosumab led to significant and progressive increases in TBS over 10 y of treatment (Figure). A similar trend was observed in the crossover group during 7 y of denosumab therapy. In the long-term denosumab group, % of patients with normal microarchitecture (TBS > 1.074) increased from 26.1% at baseline to 53.2% up to Year 10, and % of patients with degraded (TBS ≤ 1.027) or partially degraded (1.027 < TBS ≤ 1.074) microarchitecture decreased from 48.6% to 29.1% and from 25.4% to 17.7%, respectively (P < 0.0001; TBS thresholds equivalent to 1.230 and 1.310 for the classical TBS algorithm corrected for BMI). A similar improvement in bone microarchitecture was observed in the crossover group from OLE baseline up to OLE Year 7 (P < 0.0001). Over the course of long-term denosumab treatment, TBS changes were largely unrelated to LS BMD changes:  $r^2$  was 0.05 from baseline to Year 10 in the long-term group and 0.28 from OLE baseline to OLE Year 7 in the crossover group.

Figure. Percentage change from baseline by visit and treatment group for tissue thickness-adjusted trabecular bone score.

Data are presented as least-squares mean and 95% CI. n = number of subjects with observed data. \*P < 0.05 compared with OLE baseline; \*\*P < 0.0001 compared with baseline; \*\*\*P < 0.0001 compared with OLE baseline; †P < 0.0001 compared with placebo. BL, baseline; OLE, open label extension.



**Conclusion:** Up to 10 y of denosumab treatment significantly and progressively improved TBS assessment of bone microarchitecture independently of BMD in postmenopausal women with osteoporosis.

**Disclosures:** Amgen Inc. sponsored this study and provided medical writing assistance for this abstract. D. Hans: Co-owner of the TBS patent and has corresponding ownership shares and position at Medimaps group. M. McClung: Honorarium and consulting fees from Amgen. M. McDermott, S. Huang, M. Kim: Employees and stockholders of Amgen.

P237

## VITAMIN D STATUS AND ITS RELATIONSHIP WITH HYPOTHYROIDISM AMONG POSTMENOPAUSAL WOMEN

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**Objective:** Vitamin D has multiplicity of actions including hypothyroidism by its antiinflammatory and immunomodulatory responses. With the lack of the respecting data in Ukraine, the aim of this study was to estimate the interrelation between hypovitaminosis D and hypothyroidism among the postmenopausal women.

**Methods:** An observational study was organized from 1 June to 3 August, 2021 in Ukraine. 312 acceptable allegedly healthy postmenopausal women above 51 y without having any chronic sickness and medications interrupting cholecalciferol metabolism were involved in the study. Reports were obtained by interviewing with self-completed questionnaires. In order to assess variations between various groups independent t-test, ANOVA were accepted to obtain P value. The diagnosis of hypothyroidism was made on the basis of definition of TSH, free thyroxine (fT<sub>4</sub>) and free triiodothyronine (fT<sub>3</sub>) fasting blood level according to the American Association of Clinical Endocrinologists and the American Thyroid Association guidelines.

**Results:** Among 312 research subjects, the prevalence of overt and subclinical hypothyroidism was 4.81% and 17.95%, correspondingly. The investigation exposed 171 (54.81%) deficient, 127 (40.71%) insufficient, and only 14 (4.48%) sufficient cholecalciferol level. Urban residents had more in deficiency level of cholecalciferol than villagers. At the same time, rural residents had more vitamin D insufficiency. Obese subjects deteriorated more in hypovitaminosis D than women with normal body mass. There was statistically significant interrelation found between TSH and cholecalciferol level in this investigation. **Conclusion:** There is high prevalence of hypothyroidism and hypovitaminosis D among the postmenopausal women. We found statistically significant relationship found between hypothyroidism and hypovitaminosis D.

## P238

### VITAMIN D STATUS AND ITS IMPACT ON THYROID RELATED PARAMETERS IN GRAVES' DISEASE

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**Objective:** To compare serum vitamin D level in Graves' disease vs. age and sex matched controls and to assess the correlation of vitamin D with hormonal parameters and thyrotropin receptor antibody (TRAb) titers in Graves' disease.

**Methods:** In total, 64 patients with Graves' disease and 32 age and sex matched healthy individuals were recruited. Biochemical and hormonal investigations that included serum TSH, free triiodothyronine (fT<sub>3</sub>), free thyroxine (fT<sub>4</sub>), calcium, phosphorous, 25-hydroxyvitamin D (25(OH)D), and PTH were done for all subjects.

**Results:** The patients with Graves' disease had significantly lower 25(OH)D levels (18.1±6.4 ng/ml) as compared to control subjects (21.7±9.4 ng/ml) ( $P=0.017$ ). Thyroid hormone levels, thyroid volume, and TRAb titers did not differ significantly between vitamin D deficient Graves' disease group (25(OH)D<20 ng/ml) and vitamin D non deficient Graves' disease group (25(OH)D ≥20 ng/ml). Furthermore, serum vitamin D level correlated significantly with thyroid hormones, thyroid volume and TRAb titers among Graves' disease. The odds ratio (OR) for association of vitamin D deficiency (VDD) state and Graves' disease was 1.93 (95%CI 0.79–3.72). Vitamin D sufficiency state was associated significantly with lower risk of Graves' disease (OR=0.39, 95%CI 0.14–0.97).

**Conclusion:** Serum vitamin D levels are significantly lower in patients with Graves' disease. Significant correlation between vitamin D and thyroid hormones, thyroid volume and TRAb titers was found in these patients. Vitamin D state is associated with Graves' disease.

## P239

### SERUM RESISTIN LEVELS AND ITS GENETIC VARIANTS (RS3931020, RS13144478) ARE ASSOCIATED WITH BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN

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**Objective:** Osteoporosis is a multifactorial disorder and a number of genetic variants or loci responsible for BMD has been identified. Resistin, a novel adipokine has diverse role in human body including its function in bone remodeling. The objective of this study was to see the association of serum resistin levels and its genetic variants (rs3931020, rs13144478) with BMD in postmenopausal females.

**Methods:** This comparative analytical study was conducted on postmenopausal osteoporotic (n=101), osteopenic (n=77) and non-osteoporotic (n=74) females. For comparison and correlational analysis, Kruskal-Wallis test and Spearman's rho correlation were used respectively. Hardy-Weinberg equilibrium was determined and genotype frequencies were compared by chi-square test ( $\chi^2$ ).

**Results:** There was significant difference in the serum levels of resistin ( $p<0.001$ ), among the three groups. Significant negative correlation of resistin was observed with BMD at various sites. Serum resistin levels were significantly low in the rs3931020 AA homozygous genotype ( $p=0.010$ ), and significantly high in the rs13144478 AT heterozygous genotype ( $p=0.020$ ), BMD at all sites except left femoral neck was significantly high in rs3931020 AA genotype, while BMD at lumbar spine, left hip and total BMD were significantly low in the rs13144478 TT homozygotes.

**Conclusion:** High serum resistin levels are associated with low BMD and single nucleotide variation in rs3931020 and rs13144478 may lead to high serum resistin levels and low BMD. Resistin can serve as a new genetic marker, potential therapeutic target and predictor of osteoporosis.

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### OSTEOPOROSIS IN SICKLE CELL DISEASE: PREVALENCE OF LOW BONE MINERAL DENSITY AND RELATION WITH BONE FRAGILITY

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**Objective:** Osteoporosis in sickle cell disease (SCD) has been previously reported, but the clinical consequences and specific management remain unclear. The objective of this study was to assess the prevalence of osteoporosis in sickle cell patients and to evaluate the potential risk factors and associated complications.

**Methods:** We conducted a single-center cross-sectional study. During an outpatient follow-up visit, BMD at the lumbar spine and the right hip and biological measurements were performed in sickle cell patients aged between 20 and 40 years. A vertebral fracture assessment (VFA) was also made to assess prevalence of vertebral deformities. Clinical data were collected from the standardized electronic medical records and patients were also contacted to complete a standardized questionnaire to obtain potential fracture history.

**Results:** 138 patients with sickle cell disease (74 women/64 men) were included between June 2020 and December 2021. The mean age of the patients was 29±6 y. Ninety-nine patients (71.7%) were homozygous S/S, the mean hemoglobin level was 9.6±1.6 g/dL. The mean T-Score was measured at -1.3±1.7 at the lumbar spine, -0.5±1.2 at the total hip and -0.5±1.2 at the femoral neck. A T-score ≤ -2.5 at the lumbar spine was found in 33 patients (23.9 %), with 4 of them (3%) having also a T-score ≤ -2.5 at the total hip, and 3 (2.2%) at the femoral neck. 59 patients (46.8%) had vertebral deformities and no patient presented vertebral fracture on VFA. Fragility fractures were found in 9 patients (10.8%). Patients with T-score ≤ -2.5 had lower BMI (20.9±2.9 vs. 24.2±4.7 kg/m<sup>2</sup>, p<0.001), and lower hemoglobin levels (8.9±1.7 g/dL vs. 9.8±1.6, p=0.007). Lower hemoglobin levels were positively correlated with lower lumbar spine (r=0.24, p<0.005), total hip (r=0.32, p<0.001), and femoral neck BMD (r=0.31, (p<0.001). Osteoporotic patients had fewer history of avascular osteonecrosis (9% vs. 23%, p=0.1) than nonosteoporotic patients. No association was found between vertebral deformities, history of fracture, vitamin D, and osteoporosis.

**Conclusion:** Young patients with SCD commonly have low BMD at the lumbar spine, but the prevalence of fracture was low and low BMD specifically at the spine might stem from morphological abnormalities.

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### PTH SECRETION IS SUPPRESSED IN ACROMEGALY

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**Objective:** To assess PTH levels in acromegaly compared to healthy controls.

**Methods:** We included 34 adults with active acromegaly, 14 males and 20 females, median age 39.2 [33.3; 48.7] y, BMI 27.5 [24.8; 29.5] kg/m<sup>2</sup>, and 30 apparently healthy adults with similar age, sex and BMI to the control group. Laboratory assessments included serum vitamin D metabolites (25(OH)D<sub>3</sub>, 25(OH)D<sub>2</sub>, 1,25(OH)<sub>2</sub>D<sub>3</sub>, 3-epi-25(OH)D<sub>3</sub> and 24,25(OH)<sub>2</sub>D<sub>3</sub>, DEQAS certified), PTH by electrochemiluminescence immunoassay and serum biochemical parameters (total calcium, albumin, phosphorus, creatinine and magnesium). The relationship between PTH and 25(OH)D<sub>3</sub> levels was studied by nonlinear least squares regression analysis using Levenberg-Marquardt algorithm.

**Results:** Patients with acromegaly had higher baseline levels of serum calcium (both total and albumin-adjusted) and phosphorus (p<0.05). Acromegaly group also showed tendency to lower baseline levels of 25(OH)D<sub>3</sub> (p=0.05) with concomitant lower free 25(OH)D, 3-epi-25(OH)D<sub>3</sub> and 24,25(OH)<sub>2</sub>D<sub>3</sub> levels, while 1,25(OH)<sub>2</sub>D<sub>3</sub> levels were higher than in the control group (p<0.05). However, despite tendency to lower 25(OH)D<sub>3</sub>, baseline levels of PTH were lower in the acromegaly group (p<0.05) and none of the patients with acromegaly had secondary hyperparathyroidism vs. 5 patients (17%) in the control group (p<0.05). Patients with acromegaly had a lower PTH plateau value (27.4 vs. 38.2 pg/mL), which was reached at higher calculated levels of 25(OH)D<sub>3</sub> (35.1 vs. 28.6 ng/mL).

**Conclusion:** The suppression of PTH secretion observed in acromegaly might be associated with the combined effect of serum calcium, phosphorus and 1,25(OH)<sub>2</sub>D<sub>3</sub> elevation.

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### CUTOFF POINT FOR PTH SUPPRESSION USING DIFFERENT METHOD FOR 25(OH)D ASSESSMENT

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**Objective:** To compare cutoff point for PTH suppression depending on method for 25(OH)D assessment (UPLC-MS/MS or immunochemiluminescence analysis).

**Methods:** We included 130 apparently healthy patients, 32 males and 98 females, median age 25.5 [24.6; 28.8] y, BMI 21.7 [19.6; 24.7] kg/m<sup>2</sup>. All participants were tested for 25(OH)D<sub>3</sub> and 25(OH)D<sub>2</sub> by UPLC-MS/MS (DEQAS certified), 25(OH)D total (25(OH)D<sub>3</sub> + 25(OH)D<sub>2</sub>) by immunochemiluminescence analysis (Liaison, DiaSorin, Italy) and PTH by electrochemiluminescence immunoassay, as well as serum biochemical parameters (total calcium, albumin, phosphorus, creatinine and magnesium). The cutoff point of PTH suppression was defined as the value of vitamin D at which the difference between the two parts of the group in terms of PTH levels became significant when compared by t-test (p<0.05).

**Results:** Median 25(OH)D total determined by immunochemiluminescence analysis was equal 19.2 [13.3; 25.6] ng/mL and median 25(OH)D<sub>3</sub> was equal 20.3 [12.5; 26.9] ng/mL (r=0.9, p<0.05). Median Δ25(OH)D between the methods was equal 2.0 [0.9; 3.6] ng/mL (10.8 [5.9; 17.9] %). The 25(OH)D<sub>2</sub> levels did not exceed 0.5 ng/mL in any of the patients. Median PTH was equal 36.0 [27.4; 44.2] pg/mL, 12 patients (9%) were diagnosed with secondary hyperparathyroidism. Cutoff vitamin D value for PTH suppression was equal 25.2 ng/mL using UPLC-MS/MS and 23.7 ng/mL using DiaSorin.

**Conclusion:** Cutoff point for PTH suppression was comparable when using UPLC-MS/MS or immunochemiluminescence analysis for 25(OH)D assessment and generally concordant with the current recommendations for vitamin D deficiency diagnosis.

## P243

### DELAYED EFFECTS OF CHOLECALCIFEROL BOLUS TREATMENT ON VITAMIN D METABOLISM

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**Objective:** To evaluate changes in vitamin D metabolism in healthy adults after receiving cholecalciferol bolus dose treatment.

**Methods:** The study included 43 apparently healthy patients, 8 males and 25 females, median age 25.2 [24.1; 27.7] y, BMI 20.6 [19.4; 23.4] kg/m<sup>2</sup>. All participants did not take any vitamin D containing supplements or drugs that interfere with vitamin D metabolism within 3 months prior to the participation in the study and were tested for serum vitamin D metabolites (25(OH)D<sub>3</sub>, 25(OH)D<sub>2</sub>, 1,25(OH)<sub>2</sub>D<sub>3</sub>, 3-epi-25(OH)D<sub>3</sub> and 24,25(OH)<sub>2</sub>D<sub>3</sub>) by UPLC-MS/MS, PTH by electrochemiluminescence immunoassay, free 25(OH)D and vitamin D-binding protein (DBP) by ELISA and routine serum biochemical parameters (calcium, phosphorus, creatinine, albu-

min, magnesium) three times: before intake of 150 000 IU of an aqueous solution of cholecalciferol per os (n=43), 7 d after the intake (n=43), as well as 2 weeks (Group 1, n=12), 4 weeks (Group 2, n=15) and 6 weeks (Group 3, n=16) after the intake.

**Results:** The evaluated laboratory parameters did not differ between the groups at baseline and on Day 7 after cholecalciferol intake (p>0.05). Biochemical parameters, PTH, DBP, free 25(OH)D, 24,25(OH)<sub>2</sub>D<sub>3</sub> and 1,25(OH)<sub>2</sub>D<sub>3</sub>, as well as 25(OH)D<sub>3</sub>/24,25(OH)<sub>2</sub>D<sub>3</sub> and 25(OH)D<sub>3</sub>/1,25(OH)<sub>2</sub>D<sub>3</sub> ratios also did not differ between groups when evaluated at 2, 4 and 6 weeks after taking cholecalciferol (p>0.05), while 25(OH)D<sub>3</sub> and 3-epi-25(OH)D<sub>3</sub> levels were significantly lower when assessed at 6 weeks than at 2 weeks (27.9 [22.7; 33.3] vs. 35.6 [31.4; 39.3] ng/mL and 1.7 [1.4; 2.1] vs. 2.5 [2.4; 2.7] ng/mL respectively, p<0.05). 25(OH)D<sub>3</sub> and 3-epi-25(OH)D<sub>3</sub> increased by Day 7 and then decreased in all groups at the third observation point and were higher than the initial values (p<0.01), 1,25(OH)<sub>2</sub>D<sub>3</sub> remained stable throughout the observation period in all groups (p>0.05), 24,25(OH)<sub>2</sub>D<sub>3</sub> continued to increase by 2 weeks (p<0.01), while at 4 and 6 weeks was comparable to the values on Day 7 (p>0.05) and at the same time significantly higher than the baseline values (p<0.01). 25(OH)D<sub>3</sub>/24,25(OH)<sub>2</sub>D<sub>3</sub> ratios were lower, and 25(OH)D<sub>3</sub>/1,25(OH)<sub>2</sub>D<sub>3</sub> ratios were higher than at the baseline when evaluated at 2, 4 and 6 weeks (p<0.01).

**Conclusion:** Although peak serum concentrations of the main circulating vitamin D metabolite (25(OH)D<sub>3</sub>) appear to be reached earlier than 2 weeks after cholecalciferol bolus dose intake which is followed by a gradual decrease, significantly altered production of the main active (1,25(OH)<sub>2</sub>D<sub>3</sub>) and inactive (24,25(OH)<sub>2</sub>D<sub>3</sub>) metabolites (assessed as serum concentration and/or corresponding ratios) observed in the early period (first week), lasts at least up to 6 weeks after the intake.

## P244

### DIAGNOSIS OF OSTEOPOROSIS USING LUMBAR SPINE QUANTITATIVE CT IN INDIAN PATIENTS

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**Objective:** Osteoporosis is a metabolic bone disease that increases the risk for fragility fractures. Screening and diagnosis can be achieved by measuring BMD using QCT in the lumbar spine. QCT-derived BMD measurements can be used to diagnose osteopenia or osteoporosis based on American College of Radiology (ACR) thresholds. Many reports exist regarding the disease prevalence in asymptomatic and disease-specific populations; however, osteoporosis/osteopenia prevalence rates in lumbar spine fusion patients without fracture have not been reported. The purpose of this study was to define osteoporosis and osteopenia prevalence in lumbar fusion patients using QCT.



**Methods:** A retrospective review of prospective data was performed on Indian patients. All patients undergoing lumbar fusion surgery who had preoperative fine-cut CT scans were eligible. QCT-derived BMD measurements were performed at L1 and L2. The L1–2 average BMD was used to classify patients as having normal findings, osteopenia, or osteoporosis based on ACR criteria. Disease prevalence was calculated. Subgroup analyses based on age, sex, ethnicity, and history of abnormal BMD were performed. Differences between categorical groups were calculated with Fisher's exact test.

**Results:** 592 consecutive patients (55.4% female) were included in the study. The mean age was 62 y (range 21–89 y). There were 496 (83.8%) patients with ages  $\geq 50$  y. No previous clinical history of abnormal BMD was seen in 71.6% of patients. Osteopenia was present in 43.6% of patients and osteoporosis in 14.9%. There were no prevalence differences between sex or race. Patients  $\geq 50$  y of age had a significantly higher frequency of osteopenia/osteoporosis than those who were  $< 50$  y of age.

**Conclusion:** The prevalence of osteoporosis was 14.9% and that for osteopenia was 43.6% diagnosed by QCT. In the Indian population, this is the first report of osteoporosis disease prevalence in lumbar fusion patients without vertebral fragility fractures diagnosed by QCT.

## P245

### COMPARING THE EFFICACY OF DUAL PLATELET-RICH PLASMA (PRP) AND HYALURONIC ACID (HA) THERAPY WITH PRP-ALONE THERAPY IN THE TREATMENT OF KNEE OSTEOARTHRITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** This study aims to compare the efficacy of a dual therapy of PRP and HA compared with PRP-alone therapy in the treatment of knee osteoarthritis (KOA).

**Methods:** PubMed, Embase, CINAHL, SCOPUS, Cochrane Library, grey literature and bibliographic references were searched from inception to January 2021. Only randomized controlled trials (RCTs) and retrospective cohort studies comparing the effect of PRP and HA vs. PRP-alone therapy for KOA were included. Literature retrieval and data extraction were conducted by three independent reviewers. Pooled analysis of VAS, WOMAC, International Knee Documentation Committee (IKDC) scores, and adverse events were conducted.

**Results:** Ten studies (7 RCTs, 3 cohort studies) involving 983 patients were covered. Dual PRP and HA therapy resulted in a significant reduction in VAS compared to PRP-alone therapy at 4–6 weeks ( $P < 0.00001$ ) and 12 months ( $P < 0.00001$ ). Dual therapy resulted in

better WOMAC score improvement at 3 ( $P = 0.02$ ), 6 ( $P = 0.05$ ) and 12 months ( $P < 0.0001$ ) compared to PRP-alone therapy. The IKDC score for dual therapy was also higher at 6 months compared to PRP-alone therapy ( $P = 0.007$ ). Regarding adverse events, dual therapy was generally safer than PRP-alone therapy ( $P = 0.02$ ).

**Conclusion:** While there is a paucity of large and high-quality Level I studies, the current best evidence suggests that dual therapy with PRP and HA for KOA may be effective at providing pain relief and improvement in function up to 1 year following administration.

## P246

### CHARACTERISTICS OF COVID-19 IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To characterize the features of the course of COVID-19 in patients with RA.

**Methods:** We studied the material of questionnaires filled out by patients with RA who underwent COVID-19, verified by RT-PCR to SARS-CoV-2 RNA. The information was supplemented with data from discharge reports after inpatient treatment of COVID-19.

**Results:** The study included 32 adult patients (29 women, 90%) with a reliable diagnosis of RA (ACR/EULAR). The average age of patients is  $50.75 \pm 16.48$  y. 29 (90.6%) patients never smoked. The duration of RA (median) was 8 [4; 14.5] y. The most common comorbidities were diseases of the cardiovascular system (in 20 patients), diseases of the gastrointestinal tract (in 7 patients), obesity (in 5 patients) and diabetes (in 4 patients). At the time of the development of COVID-19, the severity of RA symptoms, assessed by the VAS, was  $4.78 \pm 3.06$ . 10 (31.25%) patients took glucocorticoids at an average dose of  $5 \pm 3.9$  mg/d. (prednisolone equivalent), 22 (68.75%) - DMARDs. 19 patients received bDMARDs, incl. 12 - rituximab (37.5%, of which 7 received the last infusion within 6 months or less before the first symptoms of COVID-19 appeared). The most often clinical manifestations of COVID-19 were: weakness and fatigue - in 29 (90.6%), fever - in 23 (71.9%), anosmia - in 20 (62.5%), increased arthralgia - in 17 (53.1%), shortness of breath - in 16 (50%), cough - in 15 (46.9%). There was a significant positive correlation between increased arthralgia during COVID-19 and RA activity. On average (median), each patient reported 13.5 [9.75; 19.25] symptoms associated with COVID-19. There was no significant correlation between the number of COVID-19 symptoms and RA activity. 12 patients (37.5%) were hospitalized, of which 8 needed oxygen support. Complications were reported in 4 cases (12.5%): venous thrombosis in 2 patients and acute respiratory failure in 2 more patients.

**Conclusion:** 37.5% of COVID-19 patients in the study group required inpatient treatment. In 12.5% - COVID-19 proceeded with complications. The number of symptoms associated with COVID-19 did not correlate with RA activity. However, patients with higher RA activity more often noted increased arthralgia.

## P247

### ANALYSIS OF LUNG DAMAGE IN COVID-19 IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To analyze the severity of changes in the lungs obtained with CT in patients with COVID-19 and rheumatoid arthritis (RA).

**Methods:** We studied the data of discharge reports after inpatient treatment of COVID-19, verified by RT-PCR to SARS-CoV-2 RNA, in patients with RA. Statistica software (version 12) was used for statistical processing. The results of the correlation analysis were considered reliable at  $p < 0.05$ .

**Results:** The study included 32 adult (over 18 years old) patients (29 women, 90%) with a reliable diagnosis of RA (ACR/EULAR). The average age of the patients was  $50.75 \pm 16.48$  y. In the study group, 29 (90.6%) patients never smoked, 2 smoked in the past and 1 was an active smoker. In 6 patients, RA proceeded with extraarticular manifestations in the form of Sjogren's syndrome. High RA activity at the time of COVID-19 disease was in 8 patients (25%), moderate - in 14 (43.75%), low - in 9 (28.12%), remission - in 1 (3.13%). During the period of COVID-19, CT scan was performed in 19 patients. When evaluated according to the "empirical visual scale", stage 0 of lung damage was noted in 1 patient (5.3%), 1 - in 9 (47.4%), 2 - in 5 (26.3%), 3 - in 3 (15.7%), 4 - 1 (5.3%). No statistically significant correlations were found between the severity of changes in the lungs and RA activity, as well as the presence of extraarticular manifestations. 20 patients (62.5%) underwent COVID-19 on an outpatient basis. For the treatment of COVID-19 in 19 cases, antibacterial drugs were prescribed, in 11 cases - injectable and in 15 - oral anticoagulants, in 17 cases - GC, in 15 - antiviral drugs, 4 patients required IL-6 inhibitors and 2 - janus kinase inhibitors. Two of the patients required no therapy other than standard care.

**Conclusion:** In the study group, COVID-19 proceeded predominantly with moderate lung involvement. No statistically significant correlations were found between the severity of changes in the lungs and RA activity, as well as the presence of extraarticular manifestations.

## P248

### FIRST TWO YEARS OF ORTHOGERIATRICS UNIT IN A HIGHLY COMPLEX HOSPITAL IN SOUTHWESTERN COLOMBIA

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**Objective:** Describe the elderly population with hip fracture treated in an Orthogeriatric Unit during the first and second year of implementation.

**Methods:** Retrospective descriptive observational study of a database with patients aged 60 y and over, admitted for fragility hip fracture.

**Results:** 609 patients, average 82 y, mostly women. Data collection was greater in the second year. In this year, the patients presented more comorbidities and geriatric syndromes: frailty, sarcopenia and malnutrition. Surgical intervention in the first 48 hours after the fracture is an ortho-geriatric principle, 10% of the patients underwent surgery at this time in year 1 and 6.5% in year 2. The time between admission to surgery was 4.3 ( $\pm 3.8$ ) days for year 1 and 4.8 ( $\pm 4.1$ ) days for year 2. Hospitalization days were 9.97 ( $\pm 23.5$ ) for year 1 and 9 ( $\pm 7.8$ ) days for year 2. The main in-hospital complications were anemia, constipation, and delirium. Postoperative complications occurred in 10% and 20.2% in year 1 and 2. Overall mortality was 11.5% and 10.9% during year 1 and 2. Of the patients undergoing surgery, 8.6% died in year 1 and 5% in year 2. Cardiorespiratory failure, myocardial infarction and sepsis were the most frequent causes of death.

**Conclusion:** This unit is the first in a hospital in southwestern Colombia. Our population is more adult, more comorbidities and geriatric syndromes than previous years in our hospital<sup>1</sup>, country<sup>2</sup> and Latin America<sup>3</sup>. The length of hospital stay, time to surgery and mortality were reduced compared to previous years in conventional orthopedic care<sup>1</sup>. Despite this, we have more perioperative complications, possibly associated with delayed surgery in older adults with high comorbidity and geriatric syndromes.

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P249

**DENSITOMETRIC IMPACT OF HYPOVITAMINOSIS D IN PATIENTS FOLLOWED FOR OSTEOPOROSIS**A. R. Halidou Idrissa<sup>1</sup>, N. K. Nassar<sup>1</sup>, S. J. Saadia<sup>1</sup><sup>1</sup>CHU Ibn Rochd, Service de Rhumatologie, Casablanca, Morocco

**Objective:** Vitamin D facilitates the intestinal absorption of calcium and phosphorus. It is also necessary for the fixation of calcium on the bones. Osteoporosis is characterized by a decrease in bone mass and an alteration in bone microarchitecture, which results in the weakening of bone tissue. The maintenance of a satisfactory level of vitamin D is of paramount importance during the follow-up of the patients.

**Methods:** Retrospective study conducted in the rheumatology department between June 2015 and June 2021. Inclusion criteria: patients followed and treated for osteoporosis of any age and both sexes. Exclusion criteria: patients with normal bone densitometry, osteopenic and osteomalacia patients.

**Results:** 513 patients were included in our study. The average age was 6.89 y (21-92), and the majority were female (92.79%). The average duration of follow-up was 3.11 y. At the beginning of their antiosteoporotic treatment, they had normal vitamin D levels. (61.79% of the patients had hypovitaminosis D with 17.67% of the patients in vitamin D deficiency. After 2 y on antiosteoporotic drugs, the mean BMD, coupled with the T-score considered in hypovitaminized patients [T-score(BMD)] was -2.9(0.775) at the lumbar spine and -1.9(0.831) at the femoral neck; lower than the average of the entire osteoporotic population studied, which was -2.6(0.812) at the lumbar spine and -1.6(0.879) at the femoral neck.

**Conclusion:** Maintenance of adequate vitamin D levels is necessary for good therapeutic prognosis of osteoporotic patients. Our study showed that after two years of treatment, osteoporosis was more marked at BMD in patients with hypovitaminosis D compared with the normovitamin group.

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**DENSITOMETRIC SEVERITY OF MULTIFACTORIAL OSTEOPOROSIS: ABOUT 128 CASES OF OSTEOPOROSIS**A. R. Halidou Idrissa<sup>1</sup>, N. K. Nassar<sup>1</sup>, S. J. Saadia<sup>1</sup><sup>1</sup>CHU Ibn Rochd, Service de Rhumatologie, Casablanca, Morocco

**Objective:** Osteoporosis is a diffuse rarefying osteopathy of the skeleton characterized by a decrease in bone strength. Osteoporosis has multiple risk factors such as (endocrinopathies, drugs, ethylism, inflammatory rheumatism, etc.). Study aim was determination of the densitometric severity of multifactorial osteoporosis.

**Methods:** Prospective study conducted in the rheumatology department, between March 2019 to March 2021. Inclusion criteria: patients diagnosed with osteoporosis on the basis of osteodensitometry (ODM) at the lumbar spine (LS) and femoral neck (FC). Exclusion criteria: osteopenic patients and patients with normal ODM.

**Results:** 128 patients were included. The mean age was 62.75 (28-90) y, with a female predominance of 93.75%. 67.19% of the patients had several risk factors for osteoporosis at diagnosis (Table). Their mean BMD, coupled with the T-score considered in all patients [T-score(BMD)] was -3.62(0.619) at LR and -2.93(0.782) at FC, compared with -3(0.752) at LR and -2.4 (0.808) at FC for unifactorial patients.

**Table.** Risk factors for osteoporosis at diagnosis.

Risk Factors	No. of Patients	Percentages (%)
Endocrinopathies (diabetes=25, hyperparathyroidism=12, hyperthyroidism=3)	40	31.25
Drugs (corticosteroids=24, proton pump inhibitors=14, anticoagulants=5, antiaromatases=19)	52	40.63
Chronic inflammatory rheumatism (rheumatoid arthritis=11, psoriatic arthritis=7)	18	14.06
Ethylism	2	1.56
Hypovitaminosis D	83	64.84

Other (intestinal malabsorption syndrome=4, sedentary lifestyle=37, BMI<19 kg/m <sup>2</sup> =11)	52	40.63
Menopause + Other Factors (at diagnosis)	81	63.28

**Conclusion:** Strict and closer control of these risk factors may both prevent the onset of osteoporosis and provide a better prognosis for already diagnosed patients. Multifactorial patients have more profound densitometric osteoporosis.

## P251

### DENSITOMETRIC STATUS IN DIABETIC PATIENTS

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**Objective:** “Diabetoporosis” is a complication developed during diabetes. It exposes to bone fragility which is similar to osteoporosis. Diabetes causes changes in bone mass, altering bone quality and/or quantity and exposes patients to increased fracture risk. Nowadays, there is no specific recommendation for osteoporosis screening in diabetics. We aim to determine the frequency of diabetic patients in a population of patients followed for osteoporosis.

**Methods:** Prospective study conducted in the rheumatology department of CHU Ibn Rochd, from March 2019 to March 2021. Inclusion criteria: patients diagnosed as osteoporotic on the basis of osteodensitometry (ODM) T-score <-2.5 at the lumbar spine (LS) and/or femoral neck (FC), of any age and both sexes. Exclusion criteria: osteogenic patients, patients with normal ODM and patients diagnosed with diabetes during their follow-up for osteoporosis.

**Results:** 128 patients were included, mean age was 62, 75 (28-90) y, with a female predominance of 93.75%. 25 patients or 19.53% were diabetic, all female and postmenopausal; with a mean age below the average of the study population, 59.81 y. The mean BMD, coupled with the T-score considered in diabetic patients [T-score(BMD)] was -3.2(0.721) at LR and -2.2(0.802) at FC while it was -3.01(0.692) at LR and -2.5 (0.749) at FC in the study population.

**Conclusion:** We believe that early detection of diabetic patients will lead to better preservation of their bone capital. About 1/5 patients were diabetic in our series, which is a worrying number as there is no consensus on systematic screening for osteoporosis in diabetic patients.

## P252

### OSTEOPROM PART II: TREATMENT AND MANAGEMENT OF OSTEOPOROTIC FRACTURES IN MEN – A 7-YEAR STUDY OF REAL-WORLD CLINICAL PRACTICE IN A SINGLE-CENTRE

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**Objective:** Despite increased attention on osteoporosis in men, clinicians still have less concern about osteoporosis. The growing data on the pathophysiology of bone and epidemiological data of fracture in men are becoming available. We studied the BMD gain and antifracture effectiveness of osteoporosis treatment with denosumab (Dmab) in men cohorts (OsteoProM).

**Methods:** We provided a retrospective observational real-world single-centre study from August 2014 to December 2021. We collected data and then manually analysed it from pts medical records at RECUH Outpatient Clinic. Data were used to study for effectiveness of Dmab in men using total mean hip and spine BMD changes; incidences of fracture during treatment. We analysed fractures risk factors, fractures incidences, BMD changes, laboratory data (serum Ca, vitamin D, iPTH levels), co-morbidities and concomitant medications. DXA scans were performed at the study’s initial diagnosis and the end: the analysis of BMD of the lumbar vertebrae L1/L4 and the total mean hip. Statistical analysis was performed using IBM SPSS Statistics v23.

**Results:** We analysed 40 men (914 pts with OP for 7 y, women 822 pts (89.9%), men 92 pts (10.1%)). The mean age was 62.2±12.5SD y. Men with idiopathic OP were 70.0%, GIO 17.5%, secondary OP 12.5%. Dmab increased BMD at lumbar spine L1/L4 in 71.4%; total mean hip in 69.2% pts. Before the study started pts with at least one fracture were 47.5%, mainly in the spine (63.2%). After the study ended, pts with at least one fracture were 2 pts. BMD by DXA was analysed in each injection (inj.) group (grp). Men were divided into six groups according to the number of Dmab inj.: grp 1 (12–13 inj.), 2 pts; grp 2 (9–11 inj.), 4 pts; grp 3 (8 inj.), 3 pts; grp 4 (6–7 inj.), 4 pts; grp 5 (4–5 inj.), 5 pts; grp 6 (1–3 inj.), 22 pts.

**Conclusion:** In our OsteoProM study, Dmab effectively increases BMD and significantly increases BMD in DXA scans at the lumbar spine and the total mean hip in men with and without fractures. Dmab is an effective antifracture medication and safe agent. Dmab is an appropriate clinical option in men with intolerance or contra-indications to bisphosphonates. Dmab is also an appropriate firstline option for men with osteoporosis.



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### IMBALANCE OF XANTHINE OXIDASE AND XANTHINE DEHYDROGENASE ACTIVITIES IN RED BLOOD CELLS OF SYSTEMIC CONNECTIVE TISSUE DISEASE PATIENTS

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**Objective:** Systemic lupus erythematosus (SLE) and systemic scleroderma (SSc) are prominent representatives of systemic connective tissue diseases. According to modern concepts, systemic manifestations are formed under the influence of both immunopathological mechanisms and metabolic disorders developing at the cellular and subcellular levels. We aim to evaluate the changes in xanthin oxidoreductase (XOR) interconvertible forms (xanthine oxidase and xanthine dehydrogenase) activities in lysed red blood cells (RBC) of SLE and SSc patients.

**Methods:** Diagnosis of SLE was verified using the SLICC criteria (2012), SSc – ACR/EULAR criteria (2013). Activities of xanthine oxidase (XO), EC 1.17.3.2 and xanthine dehydrogenase (XDG), EC 1.17.1.4 were measured in lysed RBC by spectrophotometric method [1]. The enzymatic activities were expressed as nmol/min/ml and normalized to  $1 \times 10^9$  cells/ml. Statistical comparison tests were selected in according to common guidelines. Differences were considered significant when  $p < 0.05$ .

**Results:** 56 adult SLE patients, 51 adult SSc patients and 35 healthy individuals were enrolled in the study. Both diseases accompanied by changes in XO and XDG activities of lysed RBC. In SLE, there was a significant decrease in XDG activity compared to healthy controls ( $p < 0.001$ ). In contrast to the control, lysed RBC from patients with SSc were characterized by an increase in the activity of XO against the background of a decrease in the activity of XDH ( $p < 0.001$  for both enzymes). The XO/XDG coefficient with SSc was higher than with SLE ( $p < 0.001$ ).

**Conclusion:** Significant changes of XOR activity were observed in lysed RBC of SLE and SSc patients. The changes were more expressed with the scleroderma process. According to the literature, it can be assumed that RBC XOR exhibits nitrite reductase activity in systemic connective tissue diseases [2]. Wherein reactive oxygen and nitrogen species are formed, which can have a damaging effect on RBC.

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P254

### ASSOCIATION BETWEEN XANTHIN OXIDOREDUCTASE ACTIVITY AND X-RAY STAGE IN RHEUMATOID ARTHRITIS

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**Objective:** The X-ray stage in rheumatoid arthritis (RA) indicates the severity of destructive processes in the joint structures. Bone erosions are formed most actively at II and III stages. In contrast to them, stage IV, in which multiple erosions are also detected, is characterized by the predominance of sclerotic processes with the formation of fibrous and bone ankylosis. We aim to study the activity of xanthin oxidoreductase (XOR) in plasma and lysed red blood cells (RBC) depending on the X-ray stage of RA.

**Methods:** Diagnosis of RA was verified using the ACR/EULAR criteria (2010). Activities of XOR interconvertible forms (xanthine oxidase (XO), EC 1.17.3.2 and xanthine dehydrogenase (XDG), EC 1.17.1.4) were measured in plasma and lysed RBC by spectrophotometric method [1]. The results were expressed as Me ( $Q_{25}; Q_{75}$ ). Spearman's correlation coefficient and Mann-Whitney U test were used. Differences were considered significant when  $p < 0.05$ .

**Results:** 77 adult RA patients (mean age 45 (37; 49) y; mean disease duration was 8 (6; 10) y) were enrolled in the study. 7 (9.1%) patients had I X-ray stage (by Steinbroker criteria), 39 (50.6%) – II stage, 24 (31.2%) – III stage, 7 (9.1%) – IV stage. Relationship with the stage of joint damage was revealed only for the XDG of lysed RBC ( $\rho = -0.33$ ,  $p = 0.003$ ). At the same time, some tendencies were traced. The XO activity of plasma was lower in I X-ray stage compared with stages II and III. The XDG activity was lower in I stage compared with stage II also. The activity of XO was lower and the activity of XDG was higher in lysed RBC at the I and II stage compared with stage III.

**Conclusion:** The highest oxidase activities of XOR were observed in X-ray stages II and III. The reactive oxygen and nitrogen species formed as a result of the increased enzyme activity, apparently, can take part in the processes of bone resorption and support the progression of the disease.

**Reference:** 1. Mozgovaya EE, et al. Siberian Journal of Life Sciences and Agriculture 2021;3:288

P255

**FRAILITY AND THE GROWING CHALLENGE OF MAJOR TRAUMA IN OLDER PATIENTS**M. Seah<sup>1</sup>, A. Carrothers<sup>1</sup><sup>1</sup>Division of Trauma and Orthopaedic Surgery, University of Cambridge, Cambridge, UK

**Objective:** NHS England is the first health system in the world to systematically identify people, aged 65 and over, who are living with moderate and severe frailty using a population-based stratification approach. The Frailty Index (FI) is a known predictor of adverse outcomes in geriatric patients and we aim to investigate its utility as an outcome measure in geriatric trauma patients.

**Methods:** We prospectively measured frailty in all geriatric trauma patients at a Major Trauma Centre over a 3-y period. Patients included in our study were above 65 years old and had an Injury Severity Score (ISS) above 15. The primary outcome measures were mortality and in-hospital complications. Secondary outcomes included length of stay, functional outcomes and discharge destinations. A multivariate logistic regression was used to assess the relationship between the FI and outcomes.

**Results:** 951 patients were included, with a mean age of 78.2±8.9 y. 47% (n=447) of the patients had intermediate or high frailty scores. Increased frailty was associated with increased mortality at discharge (15.2%, 16.8% and 28.1% for low, intermediate, and high frailty groups) and at one year (24.9%, 31.3% and 55.2%, respectively). An increased frailty score was also associated with an increased risk of complications (e.g., unplanned intubation, peri-operative infections) (OR, 2.6; 95%CI, 1.6-6.4; p=0.001), and discharge to a destination other than home disposition (OR, 1.4; 95%CI, 1.0-2.5; p=0.001). Other predictors of mortality included male sex, age >90 y and the occurrence of a serious peri-operative complication.

**Conclusion:** The FI is an independent predictor of mortality and complications in older patients who sustain major trauma. This provides a useful clinical tool for risk stratification, and future studies should focus on identifying in-hospital interventions that can counteract the impact of frailty on patient outcomes.

P256

**GOUTY ARTHRITIS**A. R. Halidou Idrissa<sup>1</sup>, N. K. Nassar<sup>1</sup>, S. J. Saadia<sup>1</sup><sup>1</sup>CHU Ibn Rochd, Service de Rhumatologie, Casablanca, Morocco

**Objective:** Gout is a metabolic rheumatism related to an abnormality of uric acid causing hyperuricemia. It is manifested by the occurrence of inflammatory joint flare-ups called "gout attacks", also known as podagra, this attack is most often monoarticular. However, it is also possible that gout presents in a polyarthritic form. This study aimed at determination of the frequency and clinical characteristics of gouty polyarthritis in a population having presented a podagra.

**Methods:** This is a prospective study conducted in the rheumatology department, carried out between June 2019 and June 2021. Inclusion criteria: patients with a gout attack (according to EULAR/ACR 2015 diagnostic criteria). Exclusion criteria: asymptomatic hyperuricemia.

**Results:** A total of 54 patients were included in our study, 2 patients or 3.70% presented with gouty arthritis, all of them male with a mean age of 38.5 (28-69) y. Presentation of the patients (Table).

**Table.** Presentation of gouty arthritis patients.

Patients	1st	2nd	54 patients
Age (y)	28	53	Mean=45.5
Sex (M, F)	H	H	H=49, F=5
RISK FACTORS	Skin psoriasis	-Skin psoriasis, -HTA	
uricemia (mg/l)	109.09	93.21	Mean=97.73
Attacks during the gout attack (joints)	-Proximal interphalangeal joints (IPP) -1st metatarsophalangeal joints (MTP)	- 1st right MTP, - 2 ankles and - 2 knees	- Monoarthritis (87.04%) - Oligoarthritis (9.26%) - Polyarthritis (3.70%)

**Conclusion:** Less than one in twenty patients developed gouty polyarthritis in our series, allowing to note that this condition is uncommon in a gouty attack population; and its occurrence seems to be associated with secondary forms of gout (skin psoriasis).

## P257

### OBESITY AND DIFFUSE IDIOPATHIC SKELETAL HYPEROSTOSIS (DISH)

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**Objective:** DISH or senile spinal ankylosing hyperostosis is a noninflammatory enthesopathy responsible for a musculoskeletal disorder. Two (according to Forestier) or three (according to Resnick) contiguous intervertebral bridges are required to confirm hyperostosis, as well as correct discs (unlike spinal osteoarthritis) and the absence of sacroiliac or posterior joint fusion (unlike spondyloarthritis). The diagnosis of DISH is radiological and presents as ossification of the entheses along the spine. No etiology has yet been determined; however, certain risk factors such as obesity seem to be associated with this condition. We aim to determine the frequency of obesity in a population of DISH.

**Methods:** Descriptive study conducted at the rheumatology department of the CHU IBN ROCHD of Casablanca, between February 2020 and March 2021. Inclusion criteria: all patients diagnosed with DISH according to Risnick's criteria. Exclusion criteria: patients not meeting Risnick's criteria and those followed for SpA.

**Results:** 57 patients were included in our study during this period. The mean age was 64.36 y (57-81 y), with a male predominance of 59.65%. 36.84% of patients were hypertensive and 50.88% had a mean BMI of 33.13 (30.49 to 41.26) kg/m<sup>2</sup>. The discovery of AVH was incidental, either as a result of routine checkup or other reasons in 75.44% of patients, while it was symptom-driven in the 24.66% of patients.

**Conclusion:** In our series, about one out of two patients with DISH has obesity. Similar to the data in the literature.

## P258

### PULMONARY INVOLVEMENT IN RHEUMATOID ARTHRITIS AND SECONDARY SJÖRGEN SYNDROME

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**Objective:** Rheumatoid arthritis (RA) is a severe inflammatory disease that affects the joints and other organs such as the lung. Gougerot-Sjögren's syndrome (GSS) is an autoimmune disease. Secondary GSS can be primary or secondary and is defined by (1) the presence of another connective tissue disease, (2) the existence of dry eyes or dry mouth, and (3) objective evidence of ocular or salivary involvement. The presence of anti-SSA or anti-SSB antibodies is not necessary for the diagnosis of secondary SMS (4). The association of the two pathologies (RA-SGS) is frequent, and apart from osteoarticular involvement, various organs can be affected, in this case the lungs, by one or the other pathology with similar pulmonary lesions. We aim to determine the incidence of pulmonary involvement in a population of RA-SGS patients.

**Methods:** Retrospective study, conducted from January 2019 to October 2021, at the rheumatology department of the CHU Ibn Rochd of Casablanca. Inclusion criteria: patients followed for RA according to the diagnostic criteria (EULAR/ACR 2010) associated or not with secondary GSS. Exclusion criteria: patients followed for primary GSS alone or other inflammatory rheumatic diseases with pneumopathy.

**Results:** 139 patients were included in our study, with a female predominance of 96.40%. The mean age was 56.31 y, the mean duration of RA was 9.89 y (4 months - 34 y). GSS was associated in about 1/3 of the patients, 33.81%. In the study population 24.46% of patients had pulmonary involvement which was present in the majority of RA-SGS patients (63.83%). Clinically, exertional dyspnea was found in all these patients and chronic dry cough in 66.67%. On standard radiography, an interstitial syndrome was found in all these patients and on the pulmonary CT scan, 2 patients were at the stage of pulmonary fibrosis, i.e., 6.67% (PR-SGS).

**Conclusion:** Secondary SGS is found in 30% of patients with rheumatoid arthritis (3). Pulmonary infiltrative disease is similar in both conditions. In RA these diseases are in the foreground after pleural involvement. They have the same clinical, radiological and functional characteristics, associated to varying degrees with exertional dyspnea, dry cough, crepitus rales, and digital hypocrasia (5,6). Pulmonary involvement is frequent in SSc, mainly represented by diffuse interstitial lung disease and bronchial and bronchiolar involvement (7). In SSc, the prognosis is rarely life threatening (8). In RA, the overall prognosis of rheumatoid lung disease remains poor with significant morbidity and mortality. A particular evolutionary mode characterized by acute exacerbation of interstitial lung disease associated with connective tissue diseases has been reported, particularly in RA (9,10). In our series,

the frequency of the association of secondary GSS with RA is similar to the data in the literature and lung involvement is particularly frequent in these patients. No study in the literature has specifically addressed the clinical and prognostic features of lung involvement in RA-SGS patients.

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## P259

### SERONEGATIVE RHEUMATOID ARTHRITIS: INCIDENCE AND CHARACTERISTICS

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**Objective:** Rheumatoid arthritis (RA) is the most common autoimmune chronic inflammatory rheumatism. Its prevalence is 1% worldwide (1,2). The diagnosis of RA is based on a combination of clinical and paraclinical findings. Rheumatoid factor (RF) and anticyclic citrullinated peptide antibodies (ACPA) are an important step in the diagnostic process. Their positivity is a strong argument for the diagnosis (3). However, in a proportion of patients these autoantibodies may be absent. We aim to determine the incidence of seronegativity (RF and ACPA) in an RA population.

**Methods:** Retrospective study, conducted from November 2019 to November 2021, at the rheumatology department of CHU Ibn Rochd of Casablanca. Inclusion criteria: adult patients followed up or diagnosed with RA according to the diagnostic criteria (EULAR/ACR 2010), with completion of the immunological assessment. Exclusion criteria: patients followed for other inflammatory rheumatic diseases.

**Results:** 153 patients were included in our study, with a female predominance of 95.16%. The mean age of the patients was 56.36 years, the mean duration of RA was 9.89 y, with a mean time to diagnosis of 1.83 y. At the time of diagnosis the mean activity of RA according to DAS28 vs. was 4.07 and 4.69 according to DAS28 CRP. 9 patients, or 5.88%, were serologically negative with a mean age of 41.66 y. The average duration of the disease was 4.17 y. The time to diagnosis was 1.26 y. The activity of RA was 3.93 according to the DAS28 vs. and 3.83 according to the DAS28 CRP, lower than the average of the study population.

**Conclusion:** Authentic RA with negative RF and negative ACPA is possible. These markers may be negative at the beginning of RA and then become positive during the course of the disease (4). RF is present in 80% of RA patients, but it is also found in many other diseases (liver cirrhosis, influenza, etc.). ACPAs are much more specific to the disease, but their presence is not systematic (5). Some experts believe that the prognosis of HIV-negative RA is better than that of HIV-positive RA. However, the course of the disease can be quite similar. Thus, patients with HIV-negative arthritis were more likely to improve clinically than HIV-positive patients, but there is generally little clinical difference (6). In patients with RF, progression to symmetry of arthritis is twice as frequent as in those without RF (7). Anti-CCP antibodies are associated with severe and active forms of RA (8, 9), which is also true for RF. Their presence has been correlated with clinical severity (10). Seronegative RA is a clinical form of RA, despite the importance of the immunological workup. This entity even though it has all the clinical features of seropositive RA seems less invasive, as confirmed by our results (DAS28). The prevalence of seronegative RA is less known in the literature. Further research with more patients will be needed.

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## P260

### SPINAL INVOLVEMENT IN RHEUMATOID ARTHRITIS

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**Objective:** Rheumatoid arthritis (RA) is a chronic inflammatory rheumatism affecting the entire connective tissue, predominantly synovial. It is characterized by distal, destructive, deforming and disabling involvement. Spinal involvement is frequent in RA, with a particular prognostic and functional impact on the evolution of the disease (1). Spinal involvement is particular in RA because of the pannus. Standard radiographs must be combined with specific images. MRI can be used to determine the bulbar and medullary impact and to show the synovial pannus between C1 and C2; CT scans with coronal reconstructions can be used to assess the bone condition (2). We aim to determine the incidence of spinal involvement in a population of patients followed for RA.

**Methods:** Retrospective study, conducted from January 2019 to October 2021, at the rheumatology department of the Ibn Rochd University Hospital of Casablanca. Inclusion criteria: patients followed for RA according to the diagnostic criteria (EULAR/ACR 2010) of any age and both sexes. Exclusion criteria: degenerative cervical spine disease or ankylosing spondylitis.

**Results:** Our study included 130 patients, with a female predominance of 95.16%. The mean age of the patients was 56.14 years (16-78 y). The mean duration of RA including the onset of symptoms was 9.89 y (4 months - 34 y). At the time of diagnosis, the mean RA activity by DAS28 vs. was 4.07 and 4.69 by DAS28 CRP. 11 patients or 8.46% had RA-related spinal involvement and the location was cervical in all of these patients. The period between spinal diagnosis and duration of RA was 12.17 y. In these patients the disease activity was higher than in the study population with a DAS28 vs. of 5.11 and 4.90 for the DAS28 CRP.

**Conclusion:** In RA, the frequency of spinal involvement has decreased with better disease management (2). In our study, less than one in ten patients had RA-related spinal involvement. This location reflects severe forms. Clinical signs are dominated by pain and signs of spinal cord injury, without any parallelism between their existence and radiological damage (3). Anterior atlantoaxial subluxation (AAS) and atlantoaxial impingement (AAI) are the most characteristic disorders (4,5). Atlantoaxial involvement can lead to neurological deficits that can be severe or even death due to brain compression (6,7). Cervical spine involvement is a common finding in advanced RA (4,8). In our study, cervical involvement was discovered on average after more than a decade of RA. Clinical evaluation of neurological complications is hampered by the presence of arthritis and deformities, objective diagnostic techniques are needed (9). Atlantoaxial subluxation

correlated with elevated DAS28, polyarthritis, elevated C-reactive protein (CRP), and advanced wrist and hand erosions (10). In our study, spinal involvement was less frequent than that reported in the literature. Nevertheless, this study confirms the correlation of the condition with older and active RA.

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## P261

### TOPOGRAPHY OF JOINT INVOLVEMENT IN GOUT ATTACK: ABOUT 54 CASES

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**Objective:** Gout is a metabolic disease resulting from an increase in the concentration of uric acid in the blood (hyperuricemia) beyond which there is a significant risk of a gout attack by the formation of monosodium urate crystals (MSU) in the joint. Gout attack (podagra) is most often monoarticular, typically involving the first metatarsophalangeal joint (56 to 78% of cases), however the other joints are less represented in the literature. We aim to determine the joint topography in gout attacks according to the frequency.

**Methods:** Prospective study conducted in the rheumatology department, carried out between June 2019 and June 2020. Inclusion criteria: patients with gout (according to EULAR/ACR 2015 criteria) of any age and both sexes. Exclusion criteria: all differential diagnoses of gout attack and asymptomatic hyperuricemia.

**Results:** A total of 54 patients were included. The mean age was 51.5 (SD 28- 69) y, with a male predominance of 90.74%. As risk factors, 64.28% of the patients were obese, 66.66% with a BMI >35 kg/m<sup>2</sup>, 42.86% were smokers, 24.07% were alcoholics, 14.28% were being followed up for skin psoriasis, 14.28% were undergoing hemodialysis for chronic renal failure. The clinical pres-

entations were monoarticular in 87.03% of cases. Involvement of the first metatarsal-phalangeal joint (1st MTP) was in the majority with 68.52% of the arthritis of the ankle 24.07%, knee 7.41%, metacarpal-phalangeal joints (MCP) 1.85% and proximal interphalangeal joints (IPP) 1.85%. Mean uricemia was 97.73 (86.37-109.09) mg/l, hyperuricemia was inaugural in 57.14% of cases.

**Conclusion:** Gout is the most common metabolic rheumatism in adult men, occurring in 1 to 2% of men in Western countries (5). Gout attacks preferentially affect the lower limb, and in particular the metatarsophalangeal joint of the big toe. This involvement, formerly known as "podagra", is the first clinical manifestation of gout in half of the patients (6). 3% to 14% of patients with gout initially have an oligoarticular attack. This percentage increases in subsequent attacks (7). Gout attacks can also occur in the tarsus, ankle and knee as well as in the upper extremity (8). Classically, gout affects the big toe (76%), the tarsus and ankle (50%), the knee (32%) and (25%) the fingers (9). The locations of the other joints apart from the 1st MTP are less described in the literature. Nevertheless, they occupy an important proportion in the clinical presentations of gout attack. Involvement of the first metatarsophalangeal joint (1st MTP) is the most frequent clinical presentation of gout attack. However, in significant proportions, the gout attack can occur in other joints (ankle, knee). Our data are quite similar to the data in the literature.

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## P262

### FREQUENCY OF DEVELOPMENT AND CLINICAL FEATURES OF PERIPHERAL ARTHRITIS IN RHEUMATIC POLYMYALGIA AND TEMPORAL ARTERITIS

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**Objective:** Rheumatic polymyalgia and temporal arteritis are often considered as different manifestations of the same disease. This point of view is based on a common genetic predisposition, as well as the fairly frequent coexistence of these syndromes. However, the presence of significant clinical differences between rheumatic polymyalgia and temporal arteritis may indicate their different etiopathogenesis. The aim of our study was to assess the frequency and characteristics of peripheral arthritis in rheumatic polymyalgia and temporal arteritis, as well as to identify the frequency of rheumatoid arthritis in these diseases.

**Methods:** The group of examined patients consisted of 62 patients of the rheumatology department of the hospital 25 of Volgograd, with newly diagnosed rheumatic polymyalgia or temporal arteritis or who were on routine treatment for these diseases.

**Results:** Both diseases were diagnosed in 7 patients. As a result, 37% of the examined patients were found to have peripheral arthritis at the time of the main diagnosis or during the development of the underlying disease. At the time of diagnosis of temporal arteritis, no cases of peripheral arthritis were detected, while in patients with rheumatic polymyalgia, this indicator was 21%. Arthritis that occurs during the development of the underlying disease was significantly more often represented by polyarthritis (46.1%) than arthritis detected at the diagnosis of the underlying disease (12.5%). Rheumatoid arthritis was detected in 4.8% of cases only in patients with rheumatic polymyalgia.

**Conclusion:** Based on the results of the study, differences in the etiopathogenesis of rheumatic polymyalgia and temporal arteritis can be assumed, since peripheral arthritis and the development of rheumatoid arthritis were observed only in the group of patients with rheumatic polymyalgia.

## P263

### DUAL-ENERGY X-RAY ABSORPTIOMETRY SCANNER MISMATCH IN FOLLOW-UP BONE MINERAL DENSITY TESTING

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**Objective:** Detecting significant changes in BMD with DXA scanners relies on the least significant change (LSC). Results from two different DXA scanners can only be compared, albeit with decreased sensitivity for change, if the LSC between the two scanners has been directly determined through cross-calibration. Performing follow-up DXA scans on non-cross-calibrated scanners (scanner mismatch) has safety and economic implications. This study aims to determine the proportion of scanner mismatch occurring at a population level.

**Methods:** All patients who completed at least two DXA scans between 1 April 2009 to 31 December 2018 in the province of Alberta, Canada were identified using population-based health services databases. Scanner mismatch was defined as a follow-up DXA scan completed on a DXA scanner that differed from and was not cross-calibrated to the previous DXA scanner. Multivariate logistic regression models were used to assess predictive factors that may contribute to scanner mismatch.

**Results:** 264,866 patients with 470,641 follow-up DXA scans were identified. Scanner mismatch occurred in 18.9% of follow-up DXA scans; 28.7% of patients experienced at least one scanner mismatch. Longer duration between scans (OR 1.25, 95%CI 1.24-1.26) and major osteoporotic fracture history before index scan (OR 1.06, 95%CI 1.03-1.08) increased risk of scanner mismatch. Osteoporosis medication use before index scan (OR 0.89; 95%CI 0.88-0.91), recency of follow-up scans (OR 0.98, 95%CI 0.73-0.98), female sex (OR 0.97, 95%CI 0.94-1.00), and age at last scan (OR 0.99, 95%CI 0.99-1.00) were associated with lower risk of scanner mismatch.

**Conclusion:** Scanner mismatch is a common problem, occurring in one-in-five follow-up DXA scans and affecting more than a quarter of patients. Interventions to reduce this large proportion of scanner mismatch are necessary.

## P264

### ASSOCIATION BETWEEN DIABETES MELLITUS AND OSTEOARTHRITIS

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**Objective:** A multicenter study to evaluate impact diabetes mellitus (DM) type 2 on clinical characteristics of knee osteoarthritis (OA).

**Methods:** The enrolled patients had knee OA based on ACR criteria with x-ray confirmation with stage I-III Kellgren-Lawrence (K&L). Mean disease duration was 5 (2-10) y. Patients were evaluated by report form, using the anthropometric parameters, questionnaires, disease history, clinical examination data, assessment of knee joints pain by VAS, WOMAC index, comorbidity data. All participants were signed an informed consent form.

**Results:** At prospective study were enrolled 253 women from 4 regions in Russia with mean age 58.3±9.5 y (40-75 y), with knee OA. Mean values of the BMI was 29.6±5.4 kg/m<sup>2</sup>. Compensated DM type 2 was diagnosed in 26 (10.3%) patients with knee OA. All patients with knee OA were divided into two groups: 1<sup>st</sup> group was with DM and 2<sup>nd</sup> group without DM (Table). Patients with DM were older, had higher weight and BMI, waist and hip size, higher duration of menopause. In patients with DM was harder course of OA: higher WOMAC score and all subscales of WOMAC; higher frequent of generalized OA (OR=3.07 (95%CI 1.34-7.02), p=0.009), higher frequent of synovitis at disease history (OR=3.13 (95%CI 1.04-9.45), p=0.04) and quadriceps hypotrophy (OR=5.1 (95%CI 2.1-12), p=0.0004).

In the Spearman correlation analysis are confirmed positive associations (p<0.05) between DM and more difficult and prolonged course of OA. Higher WOMAC score (r=0.16) and WOMAC pain (r=0.18), WOMAC function (r=0.16), higher PGA (r=0.21), more often generalized OA (r=0.17) and quadriceps hypotrophy (r=0.23), prevalence of synovitis in disease history (r=0.14) are associated with DM (p<0.05 for all parameters). Positive relationships also are indicated with BMI (r=0.21) and waist size (r=0.24).

**Table.** Comparative characteristics of patients with OA with or without DM

Parameters	1 group (n=26)	2 group (n=227)	p
Age, y, Me	65.5 (60-68)	59 (52-65)	0.002
BMI, kg/m <sup>2</sup> , Me	33.5 (29.4-35.8)	28.7 (25.6-32.3)	0.0006
Waist size, cm, Me	104 (92-106)	90 (84-96)	0.006
Hip size, cm, Me	112 (106-120)	106 (101-116)	0.03
OA duration, ys, Me	11 (7-18)	4 (2-10)	0.0032
Generalized OA, %	50	24.5	0.009
WOMAC pain, mm, Me	199 (158-230)	120 (45-190)	0.005
WOMAC function, mm, Me	675 (460-880)	390 (110-684.5)	0.01
WOMAC score, mm, Me	971 (620-1150)	553.5 (205-935)	0.01
PGA, VAS mm, Me	50 (42-60)	40 (25-50)	0.009
Synovitis (previous), %	80.8	61.8	0.04
Quadriceps hypotrophy, %	42.3	14.4	0.0004

**Conclusion:** In patients with DM type 2 are indicated significantly more difficult clinical course of OA. Our data are requiring a further study. The preventive measures, lead to decreased of traditional risk factors of DM development, and correct pharmacological therapy, probably, will promote favorable course of the OA.

## P265

### ELDCALCITOL PREVENTS BONE AND MUSCLE LOSS IN ORX MICE

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**Objective:** Androgen deficiency plays a crucial role in the pathogenesis of male osteoporosis and sarcopenia. Eldcalcitol (ELD) is vitamin D analogue used in the treatment of osteoporosis. The study was to examine the effects of ELD on muscle and bone loss in androgen-deficient male mice.

**Methods:** 6-week old C57BL/6 male mice were assigned into four group: (1) Sham; (2) ORX: orchidectomized; (3) 30 ng/kg ELD: ORX+ELD (30 ng/kg three times per week); (4) 50 ng/kg ELD: ORX+ELD (50ng/kg three times per week). Maximal limb muscle force of mice was measured by Grip-Strength-Meter every week. After treated for 12-week, mice were sacrificed and cross-sectional areas (CSAs) of muscle fibers were quantified, and expression levels of Murf-1, Atrogin-1, FoxO1, FoxO3 and FoxO4 in soleus were determined by qPCR. Biomechanical experiments were performed on femurs, and bone volume/tissue volume (BV/TV), trabecular thickness (Tb.Th), and trabecular separation (Tb.Sp) were detected by  $\mu$ CT.

**Results:** 30 ng/kg ELD completely rescues ORX induced muscle weakness, muscle strength increasing 24.53% compared with ORX (ORX: 0.0477 N/g vs. 30 ng/kg ELD: 0.05964 N/g,  $P < 0.01$ ). CSAs of soleus in 30 ng/kg ELD increased 31.3% compared with ORX (30 ng/kg ELD: 2254  $\mu\text{m}^2$  vs. ORX: 1547  $\mu\text{m}^2$ ,  $P < 0.001$ ), which decreased 49.6% compared with Sham (Sham: 3070  $\mu\text{m}^2$  vs. ORX: 1547  $\mu\text{m}^2$ ,  $P < 0.001$ ). Max-loads and elastic modulus of femurs were increased in 30 ng/kg ELD compared with those in ORX by 41.59% and 49.53% respectively ( $P < 0.05$ ). ELD administered significantly increased the BV/TV (ORX: 1.062% vs. 30 ng/kg ELD: 2.411%,  $P = 0.000$ ) and Tb.N (ORX: 0.1681 1/mm vs. 30 ng/kg ELD: 0.3344 1/mm,  $P < 0.001$ ) of trabecular bone compared with ORX. Compared with ORX, 30 ng/kg ELD significantly decrease expression of muscle degradation-related genes and FoxO transcription factors, of which Atrogin-1, MuRF1, FoxO1 and FoxO3 were dramatically downregulated of 50.99%, 65.31%, 78.59% and 59.85% respectively ( $P < 0.01 \sim P < 0.001$ ).

**Conclusion:** Our study suggests for the first time that ELD inhibited bone loss and muscle atrophy in ORX mice, and the effects of 30 ng/kg are better than those of 50 ng/kg, possibly by inhibiting FoxO-Atrogin-1 signaling pathway.

## P266

### PREVALENCE OF COEXISTING LUMBAR SPONDYLOSIS AND KNEE OSTEOARTHRITIS

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**Objective:** To qualitatively and quantitatively assess the prevalence of coexisting Lumbar Spondylosis (LS) and Knee Osteoarthritis (KOA). This has clinical implications on the screening, diagnosis, and management of orthopaedic patients. Furthermore, the number of affected patients is likely to increase substantially. However, there is no prior systematic review on the topic.

**Methods:** A systematic literature search was conducted in June 2021 in the PubMed, Embase, Scopus, Cinahl, and Cochrane CENTRAL databases. Clinical or epidemiological studies that reported quantitative data on the prevalence of coexisting LS and KOA were included. Studies which reported data on only one of LS or KOA were excluded. Odds ratios and 95% CIs for LS or KOA were retrieved or calculated for meta-analysis. Fixed-effects and random-effects models were used, and statistical significance was considered when  $p < 0.05$ . Heterogeneity was evaluated using Cochran's Q test and the  $I^2$  statistic. Risk of bias was assessed by the MINORs criteria.

**Results:** Nine studies (5758 patients) were included in this review. Four studies (4164 patients) defined KOA and LS by a KL grade of  $\geq 2$ , and were included in the meta-analysis. Two other studies defined KOA and LS by joint space narrowing (JSN) grade of  $\geq 2$ . A further three studies reported other outcomes. The combined OR of having KOA of KL grade  $\geq 2$  due to LS was 1.75 (95%CI 1.22-2.50,  $P = 0.002$ ), while the combined OR of having LS of KL grade  $\geq 2$  due to KOA was 1.84 (95%CI 1.23-2.77,  $P = 0.003$ ).

**Conclusion:** In patients with either KOA or LS, the odds of having a concurrent knee-spine presentation are significantly increased. This may have implications for clinical decision making and treatment regimes. However, further high-level studies with larger patient populations are required to establish the concordance of results in specific demographic groups.

## P267

### 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 1-1.5 y 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 ( $4.56 \pm 0.7$  units) after successful hormone therapy. No rehabilitation was required out afterwards. Group 2 included 41 patients (37.3%) with low MTA level ( $3.76 \pm 0.81$ ) 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 ( $MTA = 19.2 \pm 0.43$ ). The remaining 11 patients (group 4, 10.0%) with moderate rate of demyelination ( $16.4 \pm 0.52$ ) 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 to 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.

## P269

### TECHNICAL MEANS OF REHABILITATION FOR PATIENTS WITH LOW BACK PAIN

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**Objective:** 78 patients with myotonic (MT) syndrome.

**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:** 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 3-55 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 segmented 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, pain essentially decreased and increased tolerance of physical activity in 6 patients. It is estab-

lished, that katadolon shows not only analgesic and neuroprotective, but also myorelaxing action on muscles of pelvic girdle and feet in patients with acute and chronic pain syndrome.

## P271

### DIFFERENTIAL DIAGNOSIS AND TREATMENT OF MYOTONIC AND MYOFASCIAL SYNDROMES OF NECK PAIN

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**Methods:** The dynamic monitoring of 195 patients with myotonic and myofascial syndromes of neck pain was done against the control group of 45 people. An extended neurological examination was carried out which included roentgenometry of cervical and vertebrocranial areas of spinal column, electromyography of 7 to 9 relevant muscles, finding of the "key" muscle and the overall computer aided assessment of osteomuscular, cardiorespiratory and oxygen transport system disorders.

**Results:** Clinical and electromyographic criteria for diagnosis of myotonic and myofascial syndromes of neck pain were identified based on the occurrence rates. The role of major system disorders in pathogenesis of neurological manifests of neck pain was studied. New therapeutic approaches to stopping pain and myotonic syndromes were developed; the effectiveness of early rehabilitation measures was demonstrated. The prevailing myotonic syndromes were identified which were the musculus obliquus capitis inferior syndrome (in 68, or 39.4% patients); supescapular area syndrome (33% of patients); musculus scalenus anterior and musculus scalenus medius syndromes (18.9%); musculus pectoralis minor syndrome (9.7%). Hypodynamia caused system disorders were noted in 78.3% patients including excessive body mass and fat content; reduced blood circulation rate and heart-beat volume and the pronounced decrease of PWC170. The most informative spondylographic findings were reduced thickness of posterior areas of intervertebral disks from C1 to CVII (52.3 to 77.9% of patients), cervical lordosis impression (76.4%) and uncovertebral arthroses (58.2%).

**Conclusion:** The most seriously affected ("key") muscles in neck pain patients were found. Diagnosis and treatment strategies for neck pain patients were developed.

P272

**SOME ASPECTS OF REHABILITATION FOR PATIENTS WITH LOW BACK PAIN**A. Filipovich<sup>1</sup>

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**Objective:** Examination of 78 patients with myotonic (MT) syndrome of lumbar osteochondrosis.

**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 approved 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 segmented 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

P273

**REHABILITATION TECHNOLOGY OF PATIENTS WITH SYMPTOMATIC EPILEPSY**A. Filipovich<sup>1</sup>

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**Objective:** 220 patients with symptomatic epilepsy were examined.

**Methods:** Neurological examination, MRI, EEG.

**Results:** Prepared technology rehabilitation of patients with symptomatic epilepsy caused by organic diseases of the central nervous system. The technology is intended for use by inpatient and outpatient offices rehabilitation, medical and rehabilitation expert committees, clinics, health resorts organizations in order to improve the outcome of the disease, prevent the development of disability or reduced the severity of violations, Disability formed under disability. The technology includes: selection of the object and the subject of rehabilitation of rehabilitation; expert-rehabilitation diagnostics; evaluation of rehabilitation potential, rehabilitation prognosis; medical examination (with evaluation categories and the degree of disability, the risk of disability); formation and practical implementation of individual rehabilitation programs; evaluation of the effectiveness rehabilitation and formation of further rehabilitation of the route.

**Conclusion:** With the formation of medical rehabilitation measures provided by the integrated use therapy, medical physical training, medication correction, physical therapy, dietetics, the organization "School of the patient."

P274

**IMMUNOLOGICAL DISORDERS IN MULTIPLE SCLEROSIS PATIENTS WITH THE PRESENCE OF FOOD ALLERGY**A. Filipovich<sup>1</sup>

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**Objective:** 102 multiple sclerosis patients 19-33 years old were examined against the control group of 20 healthy people.

**Methods:** MRI and immunological studies

**Results:** All patients on the level of IgE in blood serum of 20 basic food products are divided into four groups: the first (13 pers, 12.7%) with the absence of IgE in serum, second (29 pers., 28.5%) with the presence of IgE (threshold 0.35-0.69 IU/ml); third (45 pers., 44.1%) with a moderate increase in IgE (0.70-3.49 IU/ml); 4 st (15 pers., 14.7%) with a significant increase in IgE (3.50-17.49 IU/ml) in serum. Patients first group without clinical signs of apparent exacerbation of MS were observed in blood eosinophilia, and the brain MRI revealed hyperintense foci in a single T-2W mode, indicating the absence of active demyelinating process. Patients with the second group with a slow chronic course of MS were determined by individual eosinophils (18.1%), indicating that they have a weak allergic reaction. Identification of individual hypo- and hyperintense lesions on brain MRI evidence of chronic course of demyelinating process in the presence of rare clinical exacerbations was seen by us as secondary progressive MS. In the third group investigated the apparent worsening of the process of clinical signs detected a moderate increase in serum IgE (45 pers., 44.1%) in the presence of explicit eosinophilia (11.8%).

**Conclusion:** Markers of exacerbation of MS is the simultaneous moderate increase in serum IgE eosinophilia, and the appearance of new lesions on MRI brain.

## P275

### 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 ( $5,12 \pm 0,15 \text{ mg/l}$ ;  $P < 0,01$ ), glycine ( $6,59 \pm 0,2 \text{ mg/l}$ ;  $P < 0,001$ ), histidine ( $5,11 \pm 0,12 \text{ mg/l}$ ;  $P < 0,05$ ), alanine ( $12,93 \pm 0,12 \text{ mg/l}$ ;  $P < 0,001$ ), arginine ( $5,62 \pm 0,09 \text{ mg/l}$ ;  $P < 0,001$ ), tyrosine ( $5,08 \pm 0,09 \text{ mg/l}$ ;  $P < 0,001$ ), metenonin ( $2,19 \pm 0,12 \text{ mg/l}$ ;  $P < 0,001$ ), phenylalanine ( $3,36 \pm 0,14 \text{ mg/l}$ ;  $P < 0,001$ ), lysine ( $6,94 \pm 0,17 \text{ mg/l}$ ;  $P < 0,001$ ), leucine ( $4,64 \pm 0,14 \text{ mg/l}$ ;  $P < 0,001$ ), threonine ( $6,2 \pm 0,14 \text{ mg/l}$ ;  $P < 0,001$ ), glutamic acids ( $2,99 \pm 0,16 \text{ mg/l}$ ;  $P < 0,001$ ) at simultaneous increase in concentration of tryptophan ( $7,36 \pm 0,12 \text{ mg/l}$ ;  $P < 0,001$ ). Among the connected amino acids in CMЖ the reliable increase, in comparison with control group healthy participants was observed, glycine ( $11,44 \pm 0,13 \text{ mg/l}$ ;  $P < 0,001$ ), histidine ( $6,12 \pm 0,11 \text{ mg/l}$ ;  $P < 0,001$ ), methionine ( $5,86 \pm 0,07 \text{ mg/l}$ ;  $P < 0,01$ ), lysine ( $19,42 \pm 0,16 \text{ mg/l}$ ;  $P < 0,001$ ), leucine ( $18,94 \pm 0,14 \text{ g/l}$ ;  $P < 0,01$ ), threonine ( $18,94 \pm 0,14 \text{ mg/l}$ ;  $P < 0,001$ ), glutamic acids ( $9,69 \pm 0,17 \text{ mg/l}$ ;  $P < 0,001$ ).

**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.

## P276

### RARE LYSOSOMAL DISEASES IN NEUROLOGICAL PRACTICE

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In the neurological department of the Minsk Regional Children's Clinical Hospital, we recently observed 2 cases of lysosomal diseases - glycolipidosis with a predominant lesion of the nervous system: GM2 gangliosidosis - Tay-Sachs disease, and cerebrosidosis - Krabbe's disease. At the heart of Tay-Sachs disease is a genetically determined disorder of the metabolism of gangliosides, accompanied by their increase in the gray matter of the brain, liver, spleen. The type of inheritance is autosomal recessive, the deficiency of the enzyme hexosaminidase A is determined. The frequency of infantile gangliosidosis is 1: 250,000. Vision decreases and is rapidly lost, a special feature is the "cherry spot", which is translucent vessels at the site of destruction of several layers of the retina. Here is a brief description of the case. Girl KD, 1 year 5 months, complaints of developmental delay - does not hold her head, does not turn over, does not sit, does not walk, does not talk. From 1 year 4 months, seizures appeared in the form of short-term tremors of the limbs. Twice, up to 1 year 5 months, she was treated in the neurological department due to delayed psychomotor development, was examined by geneticists in order to clarify the diagnosis. Objectively: the head is macrocephalic in shape, does not hold the head, the large fontanelle is closed, does not turn over, does not sit, does not walk. Exotropia. Muscle tone is sharply reduced in the limbs, there is no support. Tendon-periosteal reflexes are reduced. R-CT of the brain: The cortex and white matter of the brain are well developed. No foci of pathological density were found in the brain matter. The ventricular system is moderately dilated. The lateral ventricles are symmetrical. The subarachnoid space of the cerebral hemispheres and cerebellum is uniformly expanded to 7 mm. Conclusion: CT - signs of mixed hydrocephalus. O. ophthalmologist: does not fix the toy, the direct reaction of the pupils is sluggish. The fundus of the eye: the optic nerve disks are pale, the contour is clear, the vessels are 1: 2 (3), the course is normal. In the macular zone, there is a bright red rounded dystrophic focus, rounded with a whitish corolla. Visible periphery without pathology. Diagnosis: Tay-Sachs disease. Partial atrophy of the optic nerves in both eyes. Results of genetic testing: 1. At the Institute of Genetics and Cytology of the National Academy of Sciences of Belarus (laboratory of nonchromosomal pathology), mitochondrial DNA was analyzed for the presence of T8993 G mutations (maternal inherited Lee syndrome) and A3343 G (MELAS syndrome), as well as for the presence of large deletions of MT DNA. PCR analysis of DNA samples isolated from leu-

kocytes was carried out. According to the results of DNA analysis, these violations of the mitochondrial genome were not revealed. 2. Activity of lysosomal enzymes in leukocytes: decreased activity of  $\beta$ -hexosaminidase A: 10.7; 7.2 mmol/g per mg of protein (norm 180-470). Diagnosis: GM2 - gangliosidosis. Tay-Sachs disease. The risk of having a child with such diseases in the family is 25% - high. Material from a sick girl and her parents was sent for DNA research to the Medical Genetic Research Center of the Russian Academy of Medical Sciences, Moscow - a partial analysis of the HEXA gene (Tay-Sachs disease, H1H 272800). Treatment is symptomatic, specific enzyme replacement therapy has not been developed. The girl received anticonvulsants: depakin, carbamazepine, topamax, as well as diacarb, asparkam, emoxipin. 5 y ago, another girl with a diagnosis of globoid cell leukodystrophy - Krabbe's disease underwent inpatient treatment twice in the neurological department of the ultrasound department of the Moscow Regional Children's Clinical Hospital. The child was admitted at the age of three months with complaints of delayed psychomotor development, constant unmotivated cry, malnutrition, then myoclonic convulsions appeared. The objective status was spastic tetraparesis, increased tendon-periosteal reflexes, pseudobulbar disorders, muscle hypertension, which was later replaced by hypotension. The disease progressed, due to a violation of swallowing, the child suffered aspiration pneumonia. According to a decrease in the activity of the enzyme galactosylceramide- $\beta$ -galactosidase in the medical genetic center of Minsk, the diagnosis was made - Krabbe's disease. At the age of 1, the girl died. The type of inheritance of Krabbe's disease is autosomal recessive. To date, there are enzyme replacement drugs for the treatment of a number of extremely rare diseases: mucopolysaccharidosis - types 1,2,6, Gaucher disease, Fabry disease, Pompe syndrome, but in case of brain damage, there is no enzyme therapy, since the drugs do not penetrate the blood-brain barrier. Intensive clinical research is underway around the world to develop effective enzyme replacement therapy.

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**CYSTICERCOSIS OF THE BRAIN (CLINICAL CASE)**T. Zagorskaya<sup>1</sup>, A. Filipovich<sup>2</sup>

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A 6-year-old child came to the polyclinic of the Minsk Regional Children's Clinical Hospital with reduced vision in the right eye, converging squint. A decrease in vision was noticed within 0.5 y. Neurological status: active, answers questions correctly. From the side of the cranial nerves - convergent squint of the right eye, amblyopia on the right, dyslalia. Tendon-peristal reflexes D=S. Babinsky's symptom from 2 sides. In the Romberg position, he is stable, he performs the finger-nose test clearly. The

gait is steady. There are no changes in the general analysis of blood and urine, and in the biochemical analysis of blood. Examined by an ophthalmologist: the right eye is pale pink, the boundaries are clear, the vessels are not changed, the left eye is without pathology. Diagnosis: atrophy of the optic nerve of the right eye, strabismus converging with the parietic component (OD), vis OD - light perception, OS - 1.0. X-ray computed tomography of the brain: In both hemispheres of the brain, many calcifications are determined up to 0.5 cm in diameter. There is an asymmetric (D>S) expansion of the ventricular system (lateral ventricles), with a change in the configuration of the anterior horn of the right lateral ventricle (to spherical), 1.8 x 1.9 cm in transverse dimension. The transparent septum is displaced to the left by 0.5 cm. The rest of the ventricular system is moderately dilated. Conclusion: computed tomographic signs of cerebral cysticercosis in the calcification stage. Internal hydrocephalus. Severe deformation of the right lateral ventricle, probably due to the presence of a cysticercus bladder. Ultrasound examination of the abdominal organs - no pathology. In the study of feces - eggs of worms were not found. Was examined by a neurosurgeon. Diagnosis: Consequence of the transferred neuroinfection. According to CT data of the brain, there is an isolated expansion of the body of the right lateral ventricle without impairment of CSF circulation. Does not need neurosurgical treatment. Examination of an infectious disease specialist - antiparasitic therapy is recommended, albendazole for 10-14 d - 15 mg/kg per day in two doses. An ELISA test for antibodies to taenia solium was recommended - the antibodies were determined. Results and its discussion. More often, clinically, cysticercosis of the brain is manifested by a convulsive syndrome. Convulsions can be generalized (with loss of consciousness) and partial (twitching of the limbs without loss of consciousness). Convulsions are often persistent, difficult to stop, pharmacoresistant. Patients are forced to take anticonvulsants for a long time in mono or combination therapy: carbamazepine, depakin, lamictal, topamax. Depending on the leading cerebral disorders, there are 5 main syndromes of this disease: hypertensive, occlusive, epileptic (convulsive), meningoencephalitic and psychopathological. Depending on the localization of the parasite, cysticercosis is distinguished supratentorial (cortex and meninges of the brain, intraventricular and mixed form), subtentorial (IV ventricle, cisterns of the posterior cranial fossa and mixed form) and generalized, a special variant is distinguished - racematos or branched (usually localized in the soft cerebral membranes of the base of the brain and can go to the spinal cord). Conclusions. Children with a sharp decrease in vision should be examined by a neurologist to exclude brain pathology.



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## OSTEOPOROSIS-RELATED CHARACTERISTICS, OUTCOMES, AND PATTERNS OF CARE IN THE ENGLAND CARE HOME RESIDENCY POPULATION

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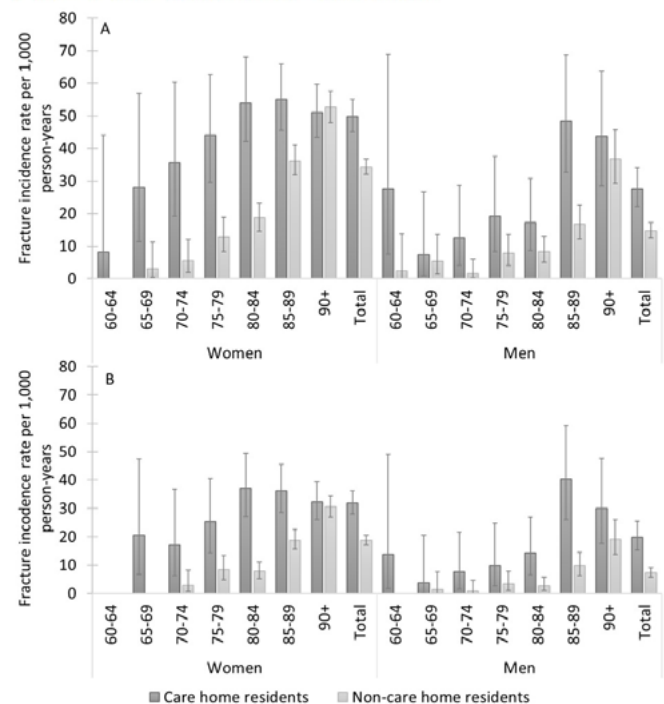
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**Objective:** To describe the English care home population in terms of osteoporosis (OP)-related characteristics, fracture incidence rates, and treatment patterns.

**Methods:** We identified care home residents (nursing and residential) aged  $\geq 60$  y from the Clinical Practice Research Datalink (CPRD) using morbidity codes (2012-2018). Participants were followed from first care home residency record (index date) to first of: residency outside the care home record, death, study end (end 2019), or their practice no longer contributing to CPRD. We identified a matched (age, sex, calendar period, practice) cohort of non-care home residents from CPRD. We assessed participant characteristics and places of residency during the 24 months prior to index date; comorbidities, history of falls, fractures, and OP treatments throughout all available medical history.

**Results:** We included 8366 care home residents and 16,143 matched individuals; median follow up, 328 d (IQR 133; 674) and 603 d (IQR 292; 1,184), respectively. In both cohorts, mean age was 84 (SD 8) y and 70% were women. At index, fracture risk factors were more common among care home residents, including BMI $<18.5$  (12% vs. 5%), history of falls (49% vs. 31%), prior fracture (27% vs. 11%) and hip fracture (17% vs. 6%). Care home residents were more likely to have previous OP diagnosis (21% vs. 16%) or OP medication use (25% vs. 21%). During follow up, care home residents experienced higher fracture rates than matched individuals (Figure). 21% (63/297) of care home residents had OP treatment following hip fracture. Overall, 2.4% (159/6,642) of care home residents without previous OP diagnosis were newly diagnosed and 40% of them (63/159) received treatment. OP treatment was initiated in 3.6% (225/6,265) of people during care home residency and 12-month persistence was 46%.

Figure: Crude fracture incidence rates (error bars represent 95% confidence intervals) per 1,000 person-years. (A) all fractures (B) hip fractures



**Conclusion:** Care home residents had more fracture risk factors and higher fracture rates than non-care home residents; however only 1 in 5 care home residents had an OP diagnosis. These data suggest there is an opportunity to improve OP management in this vulnerable population.

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**Disclosures:** V. Gerasimaviciute: Amgen employment; R. Mathur and K. Mansfield: consultancy fees from Amgen; J. O'Kelly: Amgen employment and stock ownership.

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### ARE DIETARY INTAKE AND NUTRITIONAL STATUS OF SPECIFIC POLYUNSATURATED FATTY ACIDS CORRELATED WITH SARCOPENIA OUTCOMES IN COMMUNITY-DWELLING OLDER ADULTS WITH SARCOPENIA?

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**Objective:** To assess dietary intake and status of polyunsaturated fatty acids (PUFAs) in sarcopenic older adults. Moreover, this study aimed to explore the relationship between dietary PUFAs' intake, nutritional PUFAs' status and sarcopenia outcomes in sarcopenic older adults.

**Methods:** The Exercise and Nutrition for Healthy Ageing (ENHANce) is an ongoing 5-armed triple blinded randomized controlled trial (NCT03649698) in sarcopenic older adults (>65 y) aiming to assess the effect of combined anabolic interventions (protein, omega-3 supplement and exercise) on physical performance in these adults, compared to single/placebo interventions. Baseline data of participants included until May 2021, were used for a secondary, exploratory, cross-sectional analysis. Dietary PUFAs intake was assessed with four-day food records and PUFAs' status with RBC membrane fatty acids profiles. Spearman's rho ( $\rho$ ) correlation coefficients were calculated to explore associations of PUFAs intake and status with sarcopenia-defining parameters (muscle strength, mass and physical performance), physical activity (step count) and quality of life (SF-36, SarQoL).

**Results:** In total, 29 subjects (9♂/20♀, mean age 76.3±5.4 y) were included. Total omega-3 intake of participants (1.99±0.99 g/d) was below the recommended intake (♂:2.8-5.6 g/d; ♀:2.2-4.4 g/d). Intake and status of PUFAs were not correlated. Regarding correlations with outcomes,  $\alpha$ -linolenic acid status was inversely associated with appendicular lean mass (aLM) ( $p=0.439$ ;  $p=0.017$ ), whereas docosahexaenoic acid status was positively associated with aLM ( $p=0.388$ ;  $p=0.038$ ). Some omega-3 PUFAs intake and status markers were positively associated with step count, SF-36 and SarQoL scores, whereas  $\gamma$ -linolenic acid status was inversely associated with SF-36 physical component summary score ( $p=-0.426$ ;  $p=0.024$ ).

**Conclusion:** Although intake of omega-3 and omega-6 was low, present exploratory study generated new hypotheses for potential correlations of PUFAs intake and status with several sarcopenia outcomes in older adults with sarcopenia.

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### FIRST INTERIM ANALYSIS OF THE INTERNATIONAL X-LINKED HYPOPHOSPHATAEMIA (XLH) REGISTRY: ADULT POPULATION BASELINE CHARACTERISTICS

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**Objective:** To report data from the first interim analysis of the X-linked hypophosphataemia (XLH) Registry, focusing on baseline characteristics of adults (aged  $\geq 18$  y).

**Methods:** The XLH Registry (NCT03193476) was initiated August 2017 to provide information on the natural history of XLH and will run for 10 years, aiming to recruit 1200 people with XLH. Subjects diagnosed with XLH were enrolled from 81 sites in 16 countries (last patient in: 30/11/2020; database lock: 29/03/2021). Parameters collected at baseline included demographics, medical/treatment history, and clinical presentation.

**Results:** Overall, 217 adults were eligible for inclusion in this analysis (18-<30 y, n=56; 30-<50 y, n=96;  $\geq 50$  y, n=65); 150 (69.1%) were female. Mean (SD) age was 41.9 y (15.5 y); median 41.1 y. Mean height, 155.8 cm (n=79); weight, 70.0 kg (n=96). Most subjects resided in the UK (50.7%, n=110) and France (18.9%, n=41). Treatment data were available for 118 subjects: conventional therapy (phosphate salts and active vitamin D), 83.9% (99/118); burosumab, 11.0% (13/118); no treatment recorded 5.1% (6/118). Of 163 subjects with available data, a genetic test result was recorded for 68 (41.7%), of whom 62 (91.2%) had confirmed *PHEX* mutations. Data on XLH family history were available for 187 subjects; 56/140 (40.0%) reported their biological mother affected; 22/141 (15.6%) reported their biological father affected. Mean time to diagnosis from first symptoms was longer in older vs. younger adults: 18-<30 y, 25 months (mo) (n=21); 30-<50 y, 21mo (n=21);  $\geq 50$  y, 112mo (n=13).

**Conclusion:** Adults in the XLH Registry align to expected profile. Shorter time to diagnosis in younger vs. older adults may indicate improved recognition and diagnosis of XLH in recent years.

**Acknowledgments:** Authors acknowledge the contribution of all members of the XLH Registry Steering Committee.

**Disclosure:** Kyowa Kirin International Plc is Sponsor of the XLH Registry and this abstract.

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**ADRENAL TUMOR-RELATED BONE ASSAYS**

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**Objective:** Adrenal tumors, even non-functional, could lead to an impaired bone mass due to subclinical hypercortisolism. Osteoporosis is also very common in postmenopausal women, due to lack of estrogens, so there should be a multilateral evaluation of an menopausal patient with adrenal incidentaloma. We aim to introduce a female case with nonsecreting adrenal tumor-related bone evaluation.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 62-year, nonsmoking patient with a non-secreting adrenal tumor who is admitted for the evaluation of the adrenal mass. The patient's medical history includes multinodular goiter with normal thyroid function, hiatal hernia, dyslipidemia, high blood pressure, mammary dysplasia, rectocele, type 2 diabetes under diet, and spondylosis. She is diagnosed with a unilateral adrenal mass of 0.8/2.3/2 cm 4 y ago and surgery was not recommended at that point due to nonsecretor profile. Suppression dexamethasone (DXM) test showed baseline morning ACTH=13 pg/mL (N:3-66), morning plasma cortisol=19 µg/dL (N:4.82-19.5) with inhibition after 1 mg DXM. She had vitamin D deficiency based on 25OHD=15 ng/mL In addition to cardiovascular medication, cholecalciferol 1000 UI/d was recommended. Initially, bone formation marker osteocalcin was reduced=11 ng/mL (N:15-46), so was CrossLaps=0.27 ng/mL (N:0.33-0.782) with normal P1NP=26 ng/mL(N: 20.25-76.31) as well as PTH=63 pg/mL (N: 15-65). Initial DXA was normal: lumbar(L1-2) BMD(g/cm<sup>2</sup>)=1.119, T-score(SD)=-0.4, Z-score(SD)=-0.1; total hip BMD(g/cm<sup>2</sup>)=1.088, T-score(SD)=0.6, Z-score(SD)=1; femoral neck BMD(g/cm<sup>2</sup>)=0.893, T-score(SD)=-1, Z-score(SD)=-0.3. Currently, thyroid function remained normal, vitamin D deficiency corrected under replacement: 25OHD=33.5 ng/mL (N:30-100) with low osteocalcin=11.44 ng/mL (N:15-46) and normal CrossLaps=0.34 ng/mL (N:0.33-0.782), and P1NP=32 ng/mL (N: 20.25-76.31). Plasma cortisol remained suppressed after 1 mg DXM test. DXA showed a small decrease of lumbar T-score to -1.1SD. She was offered further cholecalciferol therapy 1000 UI/d.

**Conclusion:** In this case the suppression of osteocalcin could be related to the presence of type 2 diabetes mellitus which was controlled under diet rather than adrenal incidentaloma. Cardio-metabolic and bone status are key elements in menopausal females with adrenal incidentalomas to decide adrenalectomy in addition to autonomous cortisol secretion which was not confirmed here and increase of tumour dimensions.

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**LUMBAR VERTEBRAL SINGLE FRACTURE AND OSTEOPENIA AT DXA IN A PATIENT WITH HASHIMOTO THYROIDITIS**

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**Objective:** Hashimoto thyroiditis is one of the most frequent endocrine disorders. Over excess treatment with levothyroxine for associated hypothyroidism could induce bone loss as an effect of iatrogenic hyperthyroidism. However, regardless thyroid status, discrepancies between DXA and prevalent osteoporotic fractures might be found in menopausal population, particularly. (1-5) We aim to introduce a female patient with Hashimoto disease and osteopenia but with osteoporotic fracture.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** There is a 68-year female who is admitted for recent diagnostic of a spontaneous lumbar L4 vertebral fracture that was detected starting from persistent low back pain. She associates multinodular goiter with a dominant node on right thyroid lobe, with a background of chronic Hashimoto thyroiditis, hypercholesterolemia. She had spontaneous menopause at age of 52. On admission, blood assays showed normal thyroid function under daily levothyroxine with a TSH=2.11 µUI/mL (N:0.5-4.5), FT4=9.72 pmol/L (N:9-19) and high antithyroid antibodies ATPO (antithyroperoxidase)=322.33 UI/mL (N:0-5.61). Vitamin D status shows a mild deficit, 25-hydroxyvitamin D=22 ng/mL (N:30-100), with normal bone formation markers in terms of osteocalcin=17 ng/mL (N:15-46), and P1NP=24 ng/mL (N:20.25-76.31), and a mild suppression of bone resorption marker CrossLaps=0.22 ng/mL (N: 0.33-0.782) plus normal PTH=38 pg/mL (N:15-65). Thyroid ultrasound was consistent with autoimmune elements based on hypoechoic, inhomogeneous pattern additional with multiple nodules (right lobe=2.6/3.3/4.3 cm, isthmus 0.27 cm, left lobe=1.7/.23/6 cm, the largest nodule is situated on right lobe of 4/2.4/2.6 cm. Central DXA showed osteopenia: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.953, T-score(SD)=-1.9, Z-score(SD)=-0.1; total hip

BMD ( $\text{g}/\text{cm}^2$ )=1.828, T-score(SD)=-1.4, Z-score (SD)=-0.1; femoral neck BMD( $\text{g}/\text{cm}^2$ )=0.795, T-score (SD)=-1.7, Z-score (SD)=-0.2. The decision of continuing levothyroxine with weekly alendronate and 1000 UI/d cholecalciferol was done.

**Conclusion:** This case highlights an aspect of real life medicine – osteopenia at DXA and osteoporotic fracture. Decision of antio-osteoporotic drugs should be done, yet, not all systems reimbursement is feasible if T-score is not consistent with the diagnostic of osteoporosis. Thyroid involvement in this case, due to consistent normal TSH levels, is probably minor.

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## P283

### INTEGRATED OSTEOPOROSIS CARE: HOW DOES THE IMPLEMENTATION OF INTEGRATED, PEOPLE-CENTRED HEALTH SERVICES (IPCHS) DELIVERY STRATEGIES RELATE TO OUTCOMES? A SYSTEMATIC LITERATURE REVIEW

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**Objective:** To provide an overview of Integrated, People-Centred Health Services (IPCHS) delivery strategies and substrategies applied in Integrated Osteoporosis Care (IOC) initiatives, and to relate their implementation to effectiveness on performance, clinical and behavioral outcomes.

**Methods:** A systematic literature research in six databases (PubMed, Embase, WoS, CINAHL, Scopus and CENTRAL) was conducted between Jan 1 2010 and Oct 20 2020 to identify IOC interventions applying at least two out of five IPCHS-strategies alongside collaborative practices within or between professionals or organizations. Quality assessment was performed using the Effective Public Health Practice Project checklist.

**Results:** Sixty-five publications describing 60 interventions and assessing 166 outcomes met inclusion criteria. Ninety percent of interventions were located in a secondary care setting. Only one intervention applied all five IPCHS-strategies, yet not all substrategies. Half of the interventions applied three out of five IPCHS-strategies. Three out of 20 substrategies were applied in over half of the interventions, leaving 17 substrategies underapplied. “Coordinating care for individuals” was the most applied substrategy (55/60), while no intervention focused on “defining

service priorities over the life course needs”. For some outcomes, a correlation with implemented substrategy(-combinations) could be identified. “Empowering and engaging individuals and families” has shown to be mandatory for reducing fracture incidence, “coordinating care for individuals and families” is imperative to safeguard the provision of appropriate and timely care, and “bolstering participatory governance” positively affects discharge destination after hospitalisation.

**Conclusion:** The implementation of particular IPCHS-substrategy combinations is associated with outcome effectiveness, but IOC in general has found limited entrance in primary care and community settings. The variety of formats and limited implementation of some of the substrategies reveals opportunities to optimize IOC in the future.

**Acknowledgements:** This work has been made possible through a value-based partnership between Ghent University and Amgen.

## P284

### EFFECTIVENESS OF NERIDRONATE ON BONE MINERAL DENSITY IN BOYS WITH DUCHENNE MUSCULAR DYSTROPHY

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**Objective:** In patients affected by Duchenne muscular dystrophy (DMD), a rare musculoskeletal disorder, low BMD is a major issue, particularly in those treated with glucocorticoids (GCs) (1). We aim to assess the effectiveness of neridronate in terms of BMD changes in this population.

**Methods:** We included patients affected by DMD in treatment with GCs referred to our outpatient from 2015 to 2020. All patients received an intramuscular injection of neridronate at the dose of 25 mg every month. A morphometric examination was performed to assess BMD at the lumbar spine (L1-L4) using DXA (GE Lunar), no more than 4 weeks before (T0) and after 1 y from neridronate treatment (T1). Data were analyzed using SPSS software (SPSS version 23.0, IBM Corp., Armonk, NY, USA). Normal distribution was ascertained by Shapiro–Wilk tests. Normally distributed data were presented as mean±SD and compared using the Student’s t-test. A p-value ≤0.05 was considered significant.

**Results:** Eight boys with DMD (mean age 18.87±6.81 y) were included with a mean age at diagnosis of 4.75±2.81 years. Six of them were nonambulant and two of them had low-trauma fractures (a distal femur fracture and a vertebral compression, respectively). All patients were receiving deflazacort [median duration of therapy 11.5 y (interquartile range 2-25)]. At the DXA evaluation (T0), the mean L1-L4 BMD value was 0.716±0.164  $\text{g}/\text{cm}^2$ . Six patients (75%) showed an L1-L4 Zs<-2, of which 5 (83%) with L1-L4 Zs<-3. The mean age of neridronate initiation was 18.87±6.81 y.



All patients were supplemented with calcium carbonate and vitamin D. After 12 months of treatment (T1), the mean L1-L4 BMD value was  $0.685 \pm 0.19$  g/cm<sup>2</sup>. Seven patients (87.5%) showed an L1-L4 Zs < -2, of which 4 (57%) with L1-L4 Zs < -3. Changes in lumbar spine BMD and Zs were not significant between T0 and T1 (D L1-L4 BMD  $0.007 \pm 0.05$ , CI 95% = -0.03 to 0.04; D L1-L4 Zs  $0.27 \pm 0.53$  CI 95% = -0.17 to 0.72).

**Conclusions:** In patients with DMD treated with deflazacort, a continuous and progressive BMD reduction of  $0.5 \pm 1$  g/cm<sup>2</sup> per year has been described (2). In this study, we reported for the first time that neridronate seems to slow the decline in BMD in boys with GC-treated DMD at 1-y follow-up.

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## P285

### SARCOPENIA DETERMINED BY HAND GRIP STRENGTH AND CALF CIRCUMFERENCE AS PREDICTOR OF MORTALITY IN OLDER INPATIENTS WITH HIP FRACTURE

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**Objective:** The incidence of fragility hip fractures is increasing due to the aging of the population, conditioning a significant increase in mortality and costs. Our objective is to evaluate the prevalence of sarcopenia in elder hospitalized patients with hip fracture and its association with mortality.

**Methods:** Prospective study, in hospitalized patients older than 65 y with diagnosis of hip fracture. The presence of sarcopenia was assessed using EWGSOP2 criteria. Low muscle strength was determined using the cutoff points for hand-grip strength (Dodds, 2014). We estimated appendicular skeletal muscle mass (ASM) using calf circumference (Pozza Santos, 2019) and low muscle quantity was determined using the cutoff points for ASM (Studenski, 2014).

**Results:** 259 patients were included, 20.7% were male and 79.3% female, mean age of 82.7 y. Mean BMI was  $25.7 \pm 5$  kg/m<sup>2</sup>. Hand grip strength showed a mean of  $20.2 \pm 9.6$  kg/m<sup>2</sup> for men and  $7.6 \pm 6.6$  kg/m<sup>2</sup> for women (84.9% below cutoff points). Calf circumference was  $32.5 \pm 2.9$  cm for men and  $30.8 \pm 3.9$  cm for women. Estimated ASM was  $19.7 \pm 2.4$  kg for men and  $10.8 \pm 3$  kg for women (83.3% below cutoff points). With this data, we found a prevalence of sarcopenia of 72.5%. Mortality was 9.4%, 15.3% and 29.7% at 3, 6 and 12 months, respectively. In sarcopenic patients, mortality risk was 8 times greater than in nonsarcopenic [95%CI 1.05–60.9; p=0.018] at 3 months, 5.99 times greater [95%CI 1.37–26.1; p=0.007] at 6 months and 6.18 times greater [95%CI 1.26–15.9; p=0.018] at 12 months.

**Conclusion:** The prevalence of sarcopenia in patients admitted for hip fracture is high and is closely associated to 3, 6 and 12-month mortality in these patients. Calf circumference measures may be used as a diagnostic proxy of sarcopenia for older adults in settings where no other muscle mass diagnostic methods are available.

## P286

### VALIDITY OF HAND GRIP STRENGTH, ANTHROPOMETRY AND BIOIMPEDANCIOMETRY AS DETERMINANTS OF REDUCED MUSCLE MASS IN APPLICATION OF GLIM CRITERIA IN OLDER INPATIENTS WITH HIP FRACTURE

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**Objective:** The incidence of fragility hip fractures is increasing due to the aging of the population. The estimated prevalence of malnutrition in patients with hip fracture is around 20-30%. Our objective is to evaluate the prevalence of malnutrition in elder hospitalized patients with hip fracture, as well as the clinical application of the GLIM criteria for the diagnosis of malnutrition, using anthropometry, bioelectrical impedance analysis (BIA) and hand grip strength as determinants of muscle mass.

**Methods:** Prospective study, in hospitalized patients older than 65 y with diagnosis of hip fracture, between September 2019 and February 2021. Nutritional assessment was performed using Mini Nutritional Assessment Short Form (MNA-sf) replacing calf circumference for the BMI item, Subjective Global Assessment (SGA) and GLIM criteria. For the definition of reduced muscle mass in application of the GLIM criteria, the population's 5th percentile of hand grip strength (Jamar) and the ESPEN cutoff points for low fat-free mass index (FFMI) were used, this being determined by anthropometry and by bioelectrical impedance analysis (BIA).

**Results:** 266 patients included, 20.7% were male and 79.3% female, mean age of 82.7 y. Mean estimated BMI was  $25.7 \pm 5$  kg/m<sup>2</sup>, with a FFMI by anthropometry of  $19.4 \pm 8.8$  kg/m<sup>2</sup> for men (25% below 17 kg/m<sup>2</sup>) and  $17.4 \pm 2.9$  kg/m<sup>2</sup> for women (20.1% below 15 kg/m<sup>2</sup>). FFMI by BIA was  $20.9 \pm 9.8$  kg/m<sup>2</sup> for men (8.7% below 17 kg/m<sup>2</sup>) and  $17.6 \pm 2.1$  kg/m<sup>2</sup> for women (8% below 15 kg/m<sup>2</sup>). Hand grip strength showed a mean of  $20.2 \pm 9.6$  kg for men (65.4% below population p5 percentile) and  $7.6 \pm 6.6$  kg for women (73.4% below population p5 percentile). MNA-sf found 19.9% of normonourished, 42% at risk of malnutrition and 38% of malnourished. SGA found 35.7% of normonourished, 41.7% with moderate malnutrition and 22.6% with severe malnutrition (kappa coefficient of 0.51 with MNA-sf; p<0.001). Using hand grip strength to apply GLIM criteria, we found 84.5% of malnourished patients; we being 47% when using anthropometry and 44.5% when using BIA (kappa coefficient of 0.39, 0.37 and 0.39 with SGA respectively;

$p < 0.001$ ). We found a strong agreement between using anthropometry and BIA when applying GLIM criteria (kappa coefficient of 0.95;  $p < 0.001$ ).

**Conclusion:** The prevalence of malnutrition in patients admitted for hip fracture is high. The use of hand grip strength as a determinant of fat-free mass reports a higher prevalence of malnutrition, which could be underestimated with the use of anthropometry and BIA.

## P287

### FRACTURE RATE INCREASES AFTER IMMUNE CHECKPOINT INHIBITOR TREATMENT: A POTENTIAL NEW IMMUNE-RELATED ADVERSE EVENT

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**Objective:** T cell activation can lead to osteoporosis and while there are several case reports of fractures occurring after immune checkpoint inhibitor (ICI) use, to date, there are no population level studies looking at fracture risk related to ICI use. Our objective was to compare fracture rates before and after ICI use.

**Methods:** Using Alberta Cancer Registry data, we identified all individuals treated with ICI for cancer between September 29, 2010 and March 31, 2019. Patients had to be at least 41 years of age at the time of ICI initiation to ensure at least one prior year of fracture data after the age of 40 y. Linked records from Alberta's healthcare administrative databases were assessed for the presence of fracture diagnostic codes in the year prior to and up to 2 y after ICI initiation. Fracture rate was stratified based on the time period before and after ICI initiation: the year prior to ICI initiation (-1 to 0), the year after ICI initiation (0 to +1) and the second year after ICI initiation (+1 to +2). Year -1 to 0 was considered the baseline fracture rate and fracture rates after ICI were compared to baseline using chi-squared tests of independence.

**Results:** The study cohort consisted of 1600 ICI users (mean age 65.7 y, 59% male). Most patients were treated with an anti-PD-1 agent (73.9%), followed by anti-CTLA-4 agent (9.8%), anti-PD-L1 agent (9.8%), and combination ICI (6.4%). ICIs were initiated on average 707.8 d after cancer diagnosis. 76 (4.8%) individuals had a remote history of a major fracture and 141 (8.8%) had been treated with an osteoporosis medication prior to ICI treatment. The fracture rate in the year prior to ICI initiation was 11.3 per 1000 patient years. The fracture rate in the year after ICI initiation was significantly higher at 27.3 per 1000 patient years ( $p < 0.01$ ), with a rate of 17.6 per 1000 patient years in the second year after ICI initiation ( $p = 0.28$ ). The relative risk of sustaining a major fracture in the year after compared to the year prior to ICI initiation was 2.39 (95%CI 1.34-4.27,  $p < 0.01$ ).

**Conclusion:** Fracture risk is increased in cancer patients early after initiation of ICI and this may represent a novel immune-related adverse event.

## P288

### PREVALENCE OF VITAMIN D INSUFFICIENCY IN A POPULATION OF HEALTHY ALBANIANS

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**Objective:** Vitamin D is a fat soluble vitamin that is naturally present in foods and available as a dietary supplement. It is also produced when ultraviolet rays from sunlight strike the skin and trigger vitamin D synthesis. Vitamin D promotes calcium absorption in the gut and maintains adequate serum calcium and phosphate concentrations to enable normal bone mineralization. Vitamin D levels are considered as deficient below  $< 12$  ng/ml and related with an elevated risk of mortality, infections and other diseases. Levels below  $< 20$  ng/ml are considered as insufficient and mostly related with unfavorable skeletal outcomes including fractures and bone loss. Levels 20-30 ng/ml are considered subnormal and those  $> 30$  ng/ml completely normal. We aim to assess the levels of vitamin D in a population of healthy Albanians.

**Methods:** We examined the level of vitamin D in 315 healthy patients. Quantification of their serum levels of 25(OH)D was performed using a commercial ELISA test.

**Results:** The mean age of the involved group was 46.29 ( $\pm 18.55$ ). Male-female ratio was 253 (80.3%) female and 62 (19.7%) male. Fortunately only 8 (2.5%) patients had severe vitamin D deficiency (all females), 109 (34.6%) had insufficiency, 155 (45.7%) subnormal levels and 54 (17.1%) had completely normal levels. Regarding the age, 62 (56.8%) patients with insufficiency were over 50 years old.

**Conclusion:** The prevalence of vitamin D insufficiency is relatively high, considered that Albania is a country with excellent sunlight exposure. Women after menopause should be cautious of their vitamin D levels to prevent fractures and bone loss.

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### ARE HIP FRACTURES A SECOND OPPORTUNITY TO DIAGNOSE PREVIOUS ASYMPTOMATIC VERTEBRAL FRAGILITY FRACTURES?

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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. We aim to determine the prevalence of previous VF in patients with fragility hip fracture and to characterize VF location, type and severity.

**Methods:** We retrospectively identified all fragility hip fractures admitted in our Fracture Liaison Service between 2019-2021. Those who had a thoracic and/or lumbar spine radiological imaging available in the previous 5 y were included. Demographic, lifestyle behaviours and FRAX data were collected. An independent, blinded rheumatologist and orthopaedist reviewed the images for VF and quantified severity using the Genant semiquantitative method. Data was analysed using SPSS version 25.

**Results:** A total of 154 hip fracture patients were screened for eligibility. 126 of these patients had radiological imaging available for analysis. The mean age was 80.5 (+10.5) years old and the majority of patients were women (83.7%). Radiological VF were present in 43 patients (34.1%), but only 7 (16.3%) were previously diagnosed. Thoracic spine (39.5%) was the most frequently affected location, followed by the lumbar spine (34.9%). Multiple thoracolumbar spine fractures were observed in more than a quarter of patients (25.6%). The most prevalent VF was wedge-type, followed by biconcave and crush, respectively. Most of the identified VF were classified as severe (>40% height loss) 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:** More than one third (34.1%) of hip fracture patients have osteoporotic vertebral fractures. Thoracic spine was the most frequently involved location and wedge fracture the most common fracture type. These findings highlight that VF are frequent asymptomatic and underrecognized.

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### FRAX-BASED OSTEOPOROTIC RISK FRACTURE CATEGORIZATION IN CHILEAN WOMEN

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**Objective:** The FRAX<sup>®</sup> tool has allowed a more accurate assessment of fracture risk. The recategorization of fracture risk into "high and very-high" with the application of FRAX-based intervention thresholds has not been investigated in Chile. We aim to estimate the proportion of individuals categorized at risk fracture high and very-high in Chilean women.

**Methods:** 1782 women aged 50-94 y were selected from the National Health Survey (ENS) 2016-2017, third version. We calculate the risk of major osteoporotic fractures with the FRAX model specific (without BMD) to the Chilean population. We use an age-specific intervention threshold and a fixed threshold from age 75 onwards. High risk was defined as those individuals whose probability of fracture is equal to or above the age-specific intervention threshold. Very-high risk is defined as a fracture probability that lies above the upper assessment threshold after a FRAX assessment, with or without the inclusion of BMD

**Results:** The proportion of women candidates for intervention nearly doubled (1.76-fold) with the use of the hybrid threshold. The proportion of women categorized as high risk with the hybrid threshold increased 1.74-fold compared to the age-specific threshold. And those categorized as very-high risk increased 1.86-fold. The number and proportion of women assigned according to categorization are presented in Table 1.

Table 1. Fracture risk categorization in Chilean women FRAX-based

Risk categorization	Age-specific threshold n (%)	Hybrid threshold n (%)
Candidates to intervention	65 (3.65)	115 (6.45)
High risk	50 (2.81)	87 (4.88)
Very high risk	15 (0.84)	28 (1.57)
Low risk	1717 (96.35)	1667 (93.55)

**Conclusion:** The use of a hybrid threshold increases the proportion of candidates for treatment and the assignment of women to the high and very high-risk category. Recategorization of fracture risk will allow us to refine the patient selection to optimize treatment in Chilean women.

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### FRAX-BASED TEN-YEAR PROBABILITIES OF OSTEOPOROTIC FRACTURES IN CHILEAN WOMEN

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**Objective:** Currently, osteoporosis treatment decisions are based on fracture risk assessment. The FRAX<sup>®</sup> tool allows a more accurate assessment of fracture risk with age-dependent and hybrid intervention thresholds, however, its application has not been investigated in Chile. We aim to estimate the FRAX-based 10-y probability of major osteoporotic fractures (MOF) and hip fractures (HF) in Chilean women.

**Methods:** 1782 women aged 50-94 y were selected from the National Health Survey (ENS) 2016-2017, third version. We calculate the risk of major osteoporotic and hip fractures with the FRAX model specific (without BMD) to the Chilean population. We use an age-specific intervention threshold and a fixed threshold from age 75 onwards. We calculated the 10-y probability of major osteoporotic and hip fractures in the total population and in the following scenarios: those with prior fractures, and those selected for treatment according to age-dependent and hybrid thresholds.

**Results:** Mean age (y) is 65.1(10.1), BMI (kg/m<sup>2</sup>) is 29.8(5.6). Overall, the 10-y fracture probabilities were higher for MOF than for HF. In women eligible for treatment according to hybrid thresholds the fracture probabilities are higher, with age-specific thresholds they are intermediate, and in those who had a previous fracture, they are lower. The 10-y fracture probabilities (%) in women eligible for treatment according to different scenarios are presented in Table.

Ten-year fracture probabilities (%) in women eligible for treatment according to different scenarios

	N	MOF		HF	
		Mean	SD	Mean	SD
Prior fracture	22	10	8.01	4.36	5.32
Age-specific	65	10.93	6.54	6.01	5.18
Hybrid	115	12.33	5.27	6.7	4.23
All women	1782	4.18	3.72	1.5	2.18

MOF major osteoporotic fractures, HF hip fractures

**Conclusion:** Fracture probabilities were highest in those eligible for treatment based on the hybrid thresholds, intermediate with the age-specific threshold, and lowest in those with a prior fracture. Hybrid thresholds improve the prediction of 10-y fracture probabilities compared with age-dependent thresholds.

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### HIP FRACTURE ADMISSIONS DURING COVID-19 PANDEMIC

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**Objective:** COVID-19 pandemic and the preventive measures adopted are likely to have direct and indirect effects on the admission of hip fracture patients to hospitals. This study assessed the admission of hip fracture patients during the COVID-19 pandemic when movement restrictions were in place.

**Methods:** A systematic search was done in PubMed and Embase using keywords "COVID-19" OR "SARS-CoV-2" AND "hip fracture incidence" OR "hip fracture admission" and the those fulfilling selection criteria were selected by the two authors, independently. The disagreements were resolved after a discussion between them. Primary studies comparing the admission of hip fracture during the pandemic with periods before the pandemic were included while systematic reviews and meta-analyses were excluded. Studies comparing COVID-19 positive and negative patients and those describing clinical outcomes were excluded. The country of origin of the study, authors, period of study and hip fracture data were extracted using a predesigned datasheet.

**Results:** Of the 110 publications, 28 fulfilled the selection criteria. They were from Europe (09), UK (07), Israel (04), USA (02), and Ireland (02). One study each from China, India, Peru and Canada. Majority of studies have been done in 2020, either during the first or second wave and comparisons have been made with data before the onset of pandemic. Most of the studies showed a reduction of admissions due to trauma and all fractures during the pandemic. While 19 studies reported that hip fracture admissions were not different or slightly increased during the study period compared to previous years, 09 studies reported a decrease in the number of hip fractures.

**Conclusion:** Most of the studies indicate no change in the number of hip fractures admitted during the period of movement restrictions compared to previous years. Differences in study methods and hospital admission practices during pandemic may have led to the inconsistency of results seen in this analysis.



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### A SYSTEMATIC REVIEW AND META-ANALYSIS OF THE EFFECTS OF IMPACT EXERCISE ON BONE STRUCTURE ACROSS THE LIFESPAN

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**Objective:** Moderate- to high-impact exercise improves BMD across the lifespan, but its effects on bone structure are unclear. This systematic review and meta-analysis investigated effects of impact exercise on bone structure from childhood to older age.

**Methods:** Four databases (PubMed, Embase, SportDiscus, Web of Science) were searched for randomised controlled trials (RCTs) investigating the effect of impact exercise with ground reaction forces equal to, or greater than, running, compared with sham or no exercise. Bone structure variables were measured by computed tomography or magnetic resonance imaging at the tibia, radius, lumbar spine and femur. Percentage changes in bone variables were compared between groups using mean differences (MD) and 95% CIs calculated via random effects meta-analyses. Subgroup analyses in children and adolescents, adults, postmenopausal women and older men were performed.

**Results:** 31 studies (n=3588) were included. Impact exercise significantly improved total volumetric BMD (vBMD) (MD=0.78%, 95%CI=0.33 to 1.23%, number of studies [k]=13), trabecular vBMD (0.78%, 0.36 to 1.21%, k=12) and trabecular area (1.53%, 0.37 to 2.69%, k=4) at the distal tibia. In subgroup analyses, impact exercise significantly improved total vBMD (1.19%, 0.40 to 1.98%, k=2) and trabecular vBMD (1.49%, 0.59 to 2.38%, k=2) in adults, and trabecular vBMD (0.78%, 0.39 to 1.18%, k=4) and trabecular bone volume fraction (0.72%, 0.18 to 1.26%, k=3) in postmenopausal women, at the distal tibia. In children and adolescents, impact exercise significantly decreased total area at the distal tibia (-1.34%, -2.39 to -0.30%, k=6), but increased cortical vBMD (1.58%, 0.81 to 2.34%, k=2) and cortical area (5.31%, 1.82 to 8.81%, k=2) at the radial shaft. Protocols which combined impact and resistance exercise improved cortical vBMD at the tibial shaft (0.66%, 0.09 to 1.24%, k=3) among children and adolescents. Impact exercise had no effect on bone structure or vBMD at the distal radius, lumbar spine or femur.

**Conclusion:** Impact exercise influences cortical and trabecular compartments differently across the lifespan. The relatively few trials utilising three-dimensional bone imaging techniques in distinct age groups emphasises the need for additional RCTs.

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### THE EFFECT OF CONCOMITANT THERAPY ON THE CONCENTRATION OF METHOTREXATE POLYGLUTAMATES IN BLOOD CELLS OF PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To study the effect of the most frequently prescribed "non-rheumatological" drugs - statins and omeprazole - on the level of methotrexate (MTX) metabolites in patients with rheumatoid arthritis (RA).

**Methods:** We studied samples of whole blood from 79 patients with RA, 14 men and 65 women, aged 53±11 y. All patients were followed up every 3 months for 9 months after the appointment of MTX as monotherapy. Eight patients were started statins, as prescribed by a cardiologist, more than 3 months before the start of MTX therapy. 12 patients were started omeprazole more than 1 month before the start of MT therapy. The MTX dose was comparable in all patients. The concentration of MTX monoglutamate (MTXMG) and polyglutamates with 2, 3, and 4 residues (MTXPGs<sub>2,3,4</sub>), as well as 7-hydroxymethotrexate (7-OH-MTX) separately in erythrocytes (ER) and mononuclear cells (MO) was performed using tandem chromatography-mass spectrometry, the result is presented in nmol/L. Statistical analysis was performed using the Statistica 10 package.

**Results:** Higher concentrations of the following MTX metabolites were determined in patients taking statins: on week 12: MTXMG(ER) 59 [25.3;104.6] vs. 13.2 [4.4;35.7], p=0.03; 7-OH-MTX(MO) 32.3 [27.9;380.8] vs. 2.4 [0.4;21.0], p=0.015; MTXMG(MO) 33.9 [12.2;35.2] vs. 0.2 [0.1;0.7], p=0.020; MTXPG<sub>2</sub>(MO) 11.6 [3.1;33.4] vs. 0.4 [0.1;1.2], p=0.007; MTXPG<sub>3</sub>(MO) 15.6 [3.5;27.4] vs. 0.7 [0.3;2.4], p=0.022; MTXPG<sub>4</sub>(MO) 8.9 [5.3;12.1] vs. 0.4 [0.2;1.5], p=0.0003; on week 36: MTXPG<sub>4</sub>(ER) 17.7 [7.8;44.8] vs. 4.9 [1.8;12.7], p=0.0044. The compared groups did not differ in the frequency of taking glucocorticoids (p=0.33). In the group of patients taking statins, good response to MTX therapy was demonstrated more often (p<0.05). In patients taking omeprazole, a statistically higher concentration of the following MTX metabolites was determined: on week 12: MTXPG<sub>2</sub>(MO) 2.18 [0.87;8.00] vs. 0.26 [0.06;1.18], p=0.0093; MTXPG<sub>3</sub>(MO) 3.48 [0.71;5.82] vs. 0.69 [0.29;2.26], p=0.0499. At other stages, no differences were found.

**Conclusion:** Taking statins promotes the detection of higher levels of MTX metabolites in MO after 12 weeks of treatment and MTXPG<sub>4</sub> after 36 weeks of treatment. It can be assumed that statins have an effect on the therapeutic effect of MTX by affecting the processes conversion of MTX metabolites.

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### 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, mov-

ing 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.

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### ASSOCIATION BETWEEN TYPE 2 DIABETES AND FRACTURE: A QUESTION OF BONE SIZE? A HR-pQCT CASE-CONTROL STUDY IN MEN AND WOMEN

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**Objective:** An increased risk of fracture in diabetics has been observed, although BMD is estimated to be 5-10% higher in patients with type 2 diabetes (T2DM) compared to healthy subjects. This higher BMD suggests that fracture risk in T2DM is underestimated. We used HR-pQCT in T2DM patients compared with control subjects, to characterize cortical and trabecular microarchitectural parameters to explain bone fragility in this population.

**Methods:** We conducted a nested case-control analysis in 507 men and women within three prospective cohorts. Each subject with T2DM was matched for age, sex and BMI with two controls. Thus, 169 cases with 338 controls were investigated in this study, among the 507 participants, there were 195 women (including 65 T2DM) and 312 men (including 104 T2DM)

**Results:** Mean duration of diabetes was 11.5 y. T2DM men had significantly higher areal bone density at the femoral neck ( $0.83 \pm 0.13$  vs.  $0.79 \pm 0.14$  g/cm<sup>2</sup>). We observed a significantly reduced bone area in type 2 diabetic patients, particularly at the tibia in women ( $624.84 \pm 94.66$  vs.  $656.34 \pm 107.39$  mm<sup>2</sup>) and the radius in men ( $389.45 \pm 64.86$  vs.  $407.13 \pm 63.81$  mm<sup>2</sup>). Among women, at the radius, the cortical area was higher in diabetics ( $44.35 \pm 9.26$  vs.  $41.17 \pm 10.05$  mm<sup>2</sup>) as well as the cortical density ( $826.6 \pm 70.21$  vs.  $804.37 \pm 72.72$  mgHA/cm<sup>3</sup>). After adjustment for median diabetes duration, total density at the tibia was significantly greater as well as cortical area in T2DM women. Among men, after adjustment for median diabetes duration, total density and cortical density at the radius were significantly higher in T2DM.

**Conclusion:** We observed that type 2 diabetic men and women had both cortical hypertrophy and a decrease in bone size at the distal radius and tibia. This reduction in bone size may be explained by

a defect of periosteal expansion in T2DM patients. This can be responsible for deterioration in bone strength and might participate to the increased risk of fracture in this population.

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### PREGNANCY VITAMIN D SUPPLEMENTATION INCREASES OFFSPRING BONE MINERAL DENSITY IN CHILDHOOD: A META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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**Objective:** Observational studies suggest an association between maternal serum 25-hydroxyvitamin D [25(OH)D] and offspring BMD. Several intervention studies assessing the effect of antenatal vitamin D supplementation on offspring BMD in childhood have now been published. We undertook a systematic review and meta-analysis of these studies.

**Methods:** A literature search was performed on Embase and Medline (OVID) using the combined terms "vitamin D" AND "pregnancy" (and related terms) up to 30/11/21. Two researchers independently screened for double blind randomized controlled trials (RCT) of antenatal vitamin D supplementation with offspring assessment of BMD/bone mineral content (BMC) by DXA in childhood. Previously presented data from the MAVIDOS RCT, which compared 1000 IU/d cholecalciferol to placebo from 14 weeks gestation until delivery with offspring DXA at age 4 years as the outcome measure, was also included. Fixed effects meta-analysis was performed using RevMan 5.4.1, yielding standardized mean difference (95%CI).

**Results:** Three published RCTs were identified, in addition to the data from MAVIDOS; one was excluded due to differing ages of the study groups at follow-up. All cholecalciferol supplementation regimes (1000-2800 IU/d or 4200-28000IU/week) increased maternal 25(OH)D compared to either placebo (two RCTs) or 400 IU/d (one RCT). The trials included a total of 1358 mother-offspring pairs from three countries (UK (n=494), Denmark (n=383) and Bangladesh (n=481)) and assessed offspring whole body less head BMD at age 4-6 years. BMD was higher in children born to mothers supplemented with vitamin D [0.16 (0.05, 0.27)] with a smaller effect on BMC [0.07 (-0.04, 0.19)] and lean mass [0.09 (-0.03, 0.22)].

**Conclusion:** This meta-analysis suggests moderate to high dose vitamin D supplementation in pregnancy leads to greater offspring BMD in early childhood.

P298

### ASSESSMENT OF NUTRITIONAL STATUS IN FEMALE PATIENTS WITH THYROID DYSFUNCTION AND OSTEOPOROSIS

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**Objective:** Osteoporosis and thyroid disorders are common diseases in the elderly. Any changes of normal thyroid function in euthyroid individuals are related to body weight variations. Maintaining normal thyroid function is important for achieving appropriate bone development and peak bone mass in young age, as well as for regulating the rate of bone turnover in adults. Aim of the study was to assess the nutritional status of women suffering from thyroid dysfunction and osteoporosis.

**Methods:** This study was carried out on 140 women (80 females with hyperthyroidism and 60 with hypothyroidism). They were 50-60 years old with mean age 52±4.8. Data were collected by interviewing patients. Anthropometric measurements were performed for all patients. Nutritional assessments were collected using questionnaire and 24-h recall method for 3 d as well as food frequency questionnaire.

**Results:** Patient's weight with hypothyroidism was higher than patients with hyperthyroidism. Although, the mean values of energy, macronutrients, minerals and vitamins for hyperthyroidism and hypothyroidism were not significantly different, except vitamin A which was significantly high. Our study also revealed that the mean values of energy and macronutrients intake were greater than the recommended dietary allowance (RDA) of the tested patients, hyperthyroidism (1472.3±407.7 kcal) was greater than the mean value for hypothyroidism (1361.2±454.3 kcal). Also, the mean value of energy intake for all patients (1424.7±428.7 kcal) was greater than the value of RDA level (1066.8 kcal). The mean value of protein intake for both hyperthyroidism and hypothyroidism were in the same average (57.2±15.8 vs. 56.2±16.4 g, respectively). The mean values of fat intake for both hyperthyroidism and hypothyroidism were very close (42.0±15.9 vs. 40.6±19.1 g, respectively). While the mean value of daily intake of fat for all patients (41.4±17.2 g) was greater than the RDA (29.6 g). The mean value of carbohydrate intake for hyperthyroidism (215.9±65.3 g) was greater than the mean value for hypothyroidism (191.7±68.3 g). The mean value of daily intake of carbohydrate for all patients was 205.6±67.2 g. It could be noticed that was greater than the RDA values (160 g) with about 39.8%. On the contrary, the minerals (copper, magnesium, and calcium) intake of all women under investigation showed low values compared with the RD. The intake of phosphorus and zinc was close to RDA. However, their intake of iron exceeded the RDA levels. Vitamins A, C, B1 and B2 were lower than the RDA levels. The mean values of thyroid hormones and calcium concentration in the blood were within the

normal range, although there were significant differences in the blood concentration of thyroid hormones between hyperthyroidism and hypothyroidism.

**Conclusion:** This study recommended nutrition education program for the women suffering from thyroid dysfunction and osteoporosis. Also, proper dietary habits should start early and continue through life.

## P299

### RELATIONSHIP BETWEEN SERUM LEVEL OF HOMOCYSTEINE, LEPTIN AND NEOPTERIN AND DISEASE ACTIVITY IN RHEUMATOID ARTHRITIS PATIENTS WITH OR WITHOUT EXTRAARTICULAR MANIFESTATIONS

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**Objective:** To determine serum homocysteine, leptin and neopterin levels in patients with RA and investigate the relationship between clinical and laboratory parameters of disease activity and presence or absence of extraarticular manifestations.

**Methods:** This study included 80 RA patients (16 males, 64 females; mean age 34.5±10.8 y; range 24.5-45.3) and age and sex-matched 80 healthy controls (16 males, 64 females, mean age 30.8±10.4 range 20-65). RA patients were divided into two groups (A&B) depending on presence or absence of extraarticular manifestations. Of the patients, there was 40 patients with no extraarticular while the other 40 with extraarticular (9 patients with cutaneous vasculitis, 7 with nodules, 6 with neuropathy, 5 with Reynaud's phenomenon, 7 with 2ry.Sjogren, 2 with Fealty's syndrome, 2 with interstitial nephritis, 2 with interstitial lung disease).

**Results:** In the RA group (A+B), mean serum Hcy, leptin and neopterin levels were (11.79±8.72 µmol/L), (22.43±7.37 ng/ml) and (3.83±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) and Hcy (<0.001). Also, In RA groups (A, B) there was statistically significant difference regarding serum neopterin (p<0.03) and DAS28 ESR (p<0.05). there was a positive significant correlation between serum (neopterin - Hcy) and ESR, TNFα, IL-6, and DAS28 (p<0.05) while no significant correlation was found between serum (neopterin- Hcy) and CRP (p>0.05).

**Conclusion:** Serum leptin cannot be considered of value as an inflammation marker in monitoring RA patients while Serum neopterin can be used as a sensitive marker for assaying background

inflammation and disease activity score in RA patients while serum homocysteine can be used as a marker for probability of extra articular complication of RA.

**Table 1.** Correlations between serum (neopterin - Hcy), inflammatory mediators and disease activity.

	Neopterin		Homocysteine	
	R	P	r	p
ESR	0.36	<0.001 <sup>a</sup>	0.36	<0.001 <sup>a</sup>
CRP	0.08	> 0.05	0.08	> 0.05
TNF-α	0.46	<0.001 <sup>a</sup>	0.46	<0.001 <sup>a</sup>
IL-6	0.24	<0.05 <sup>b</sup>	0.24	<0.05 <sup>b</sup>
DAS28	0.33	<0.001 <sup>a</sup>	0.33	<0.001 <sup>a</sup>

**Table 2.** Multiple linear regression analysis for neopterin and different independent variables

Variables	Neopterin (r <sup>2</sup> =0.458)		
	Standardized β coefficient	t	P
Age	0.065	0.710	> 0.05
Sex	-0.018	-0.203	> 0.05
ESR	0.517	4.934	<0.001 <sup>a</sup>
CRP	0.230	1.934	> 0.05
TNFα	0.164	1.842	> 0.05
IL-6	0.315	1.872	> 0.05
DAS28	0.534	4.862	<0.001 <sup>a</sup>

**Table 3.** Multiple linear regression analysis for homocysteine and different independent variables.

Variables	Homocysteine (r <sup>2</sup> =0.458)		
	Standardized β coefficient	t	P
Age	0.065	0.710	> 0.05
Sex	-0.018	-0.203	> 0.05
ESR	0.517	4.934	<0.001 <sup>a</sup>
CRP	0.230	1.934	> 0.05
TNFα	0.164	1.842	> 0.05
IL-6	0.315	1.872	> 0.05
DAS28	0.534	4.862	<0.001 <sup>a</sup>



P300

### VITAMIN D SUPPLEMENTATION DURING PREGNANCY INCREASES OFFSPRING BIRTH WEIGHT AND CALCIUM STATUS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** Observational studies have suggested an association between maternal 25-hydroxyvitamin D status and offspring birth size, and the effect of vitamin D supplementation has now been assessed in many intervention trials. We undertook a systematic review and meta-analysis of intervention trials of vitamin D supplementation in pregnancy and offspring birth size and calcium status.

**Methods:** A literature search was performed on Embase and Medline (OVID) using the combined terms "vitamin D" AND "pregnancy" until the end November 2021. Two researchers independently screened for intervention studies of antenatal vitamin D supplementation assessing offspring birth weight, length, head circumference and/or serum calcium level and undertook quality assessment and data extraction. Meta-analysis of trials comparing maternal supplementation with >400 IU/d vitamin D to either an unsupplemented control group, placebo or ≤400 IU/d vitamin D was performed using RevMan 5.4.1 software, yielding mean difference (95%CI). Fixed or random effects meta-analysis was chosen depending on heterogeneity of the included studies.

**Results:** 43 studies were identified. Marked variation in vitamin D supplementation regimes was noted but all regimes increased maternal 25(OH)D level. Vitamin D supplementation increased calcium concentration in umbilical cord blood [10 trials, n=1806, 0.08 mmol/l (95%CI 0.02, 0.14)] and on day 4-8 of life [3 trials, n=130, 0.07 mmol/l (0.01, 0.14)]. Birth weight [31 trials, n=5766, 45 g (2, 87)] was increased by vitamin D supplementation but length [19 trials, n=4344, 0.2 cm (-0.1, 0.5)] and head circumference [18 trials, n=4339, 0.1 cm (-0.1, 0.3)] were not. The odds of low birth weight (<2500 g) was not reduced by vitamin D supplementation [7 trials, n=1824, OR 0.82 (0.48, 1.39)].

**Conclusion:** Antenatal vitamin D supplementation at doses greater than 400 IU/d has a small positive effect on offspring birth weight and serum calcium concentration in the neonatal period.

P301

### NAILFOLD CAPILLAROSCOPY IN EARLY STAGES OF MIXED CONNECTIVE TISSUE DISEASE IN A SAMPLE OF EGYPTIAN PATIENTS

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**Objective:** Mixed connective tissue disease (MCTD) is a systemic autoimmune disease with high titer of anti-U1RNP and number of clinical pictures mainly Raynaud's phenomenon. Nailfold capillaroscopy (NFC) is a non-invasive diagnostic tool for patients with different connective tissue diseases (CTDs) that permit the detection of local microvascular changes that correlate with systemic vascular involvement. Aim of the study was to compare the results of NFC in patients with systemic sclerosis (SSc) to determine the chief characteristics of skin microangiopathy in early MCTD and trying to describe a characteristic MCTD pattern in Egyptian patients.

**Methods:** This cross-sectional study included 40 patients diagnosed with mixed connective tissue disease according to Alarcón-Segovia and Villareal criteria and 20 patients with confirmed systemic sclerosis according to the ACR and the EULAR classification criteria for Systemic Sclerosis. Nailfold examination for study subjects was done describing architectural, derangement, capillary density changes, mega capillary and enlarged loops, microhemorrhages and angiogenesis.

**Results:** Of the 60 patients studied, 49 (81.7%) patients were females and 11 were males with a mean age of 31 y with median 29.5 and range 16-52. Three of the 20 patients diagnosed with systemic sclerosis had arthritis. Out of 60 patients, 53.3% had thickened skin, 19 patients exhibited puffy fingers, 6 patients showed rash, and none had swollen joints. The skin was significantly thicker in systemic sclerosis patients (85%) compared to 37.5% in the MCTD population. Patients presented with various features, the most common of which was fatigue (26.7%) and myositis (23% of patients) (these are not classified as comorbidities – features would be more appropriate word). There is a significant negative correlation of -0.508 (P=0.022) between the enlargement scores and illness duration in systemic sclerosis patients. Those patients also exhibited a statistically significant positive correlation of 0.520 (P=0.019) between hemorrhage score and the number of tender joints. Alternatively, patients diagnosed with mixed connective tissue disease exhibited a significant positive correlation between the architectural changes scores of their joints and both; the duration of their illness (0.347; P=0.028) and the number of swollen joints (0.424 P=0.006). Mixed connective tissue disease patients also showed a significant correlation of 0.423 (P=0.007) between their hemorrhage scores and their age at the time of the study.

**Conclusion:** In this study, the results obtained were qualitatively satisfactory for clear delineation of the nailfold capillaries features in MCTD. Therefore, it aids in the recognition of alternations in nailfold capillaries making early prediction of course of illness in MCTD patients possible and thus preventing morbidities and sequelae of the disease.

**Table.** Capillaroscopy findings among the studied cases

Variables	Total (N=60)	SSc (N=20)	Mixed (N=40)	p-value
Architectural changes, Median (1st- 3rd IQ)	1.0 (1.0-2.0)	1.5 (1.0-2.0)	1.0 (1.0-1.0)	#0.042*
Density, Median (1st- 3rd IQ)	1.0 (0.3-2.0)	1.5 (1.0-2.0)	1.0 (0.0-2.0)	#0.223*
Enlargement, Median (1st- 3rd IQ)	1.0 (0.0-1.0)	1.0 (1.0-2.0)	0.5 (0.0-1.0)	#0.020*
Hemorrhage, Median (1st- 3rd IQ)	0.0 (0.0-1.0)	1.0 (0.0-1.0)	0.0 (0.0-0.8)	#0.015*
Neoangiogenesis, Median (1st- 3rd IQ)	0.0 (0.0-0.0)	0.0 (0.0-1.0)	0.0 (0.0-0.0)	#0.037*
Total, Median (1st- 3rd IQ)	4.0 (2.0-6.0)	5.5 (3.0-7.8)	3.5 (1.0-4.8)	#0.002*

\*Significant, #Mann Whitney test

## P302

### IMPACT OF FUNCTIONAL DISABILITY TO QUALITY OF LIFE IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** Rheumatoid arthritis (RA) is an autoimmune disease characterized by chronic symmetric polyarthritis causing progressive joint destruction and disability. We aim to investigate impact of functional disability to quality of life in patients with RA.

**Methods:** A perspective study included 148 patients with random sample method for patients treated in in Niška Banja Institute. The average age of patients was 56.53±9.23 and the average disease duration was 10.25±7.14 godine. Functional disability is represented with HAQ questionnaire filled in by patients themselves. Based on the obtained values they are classified in three

groups: I group with HAQ value score of 0.125-1.000 indicate modest disability, II group with HAQ value score of 1.125-2.000 indicate more severe disability and III group with HAQ value score of 2.125-3.000 indicate a complete functional disability. Quality of life was measured by questionnaires for quality of life evaluation: MOS SF-36 (Short form Medical Outcomes Instrument) with 2 scales: MCS (mental component scale) and PCS (physical component scale) and questionnaire EQ5D. Comparison of numerical variables classified according to the type of normality was performed by ANOVA test. Statistical significance was at the level of <0.05.

**Results:** Average value of PCS, in the group of patients with total functional disability was 12.36±8.19, that was statistically significantly worse than in the group of patients with more severe disease and 24.27±10.22, (p<0.001) and in the group with moderate functional disability 34.26±16.65, (p<0.001). QoL estimated by PCS was statistically significantly better with the patients with moderate functional disability compared to the patients with more severe and total functional disability (p<0.001). Average value of MCS, in the group of patients with total functional disability was 21.24±18.06, that was statistically significantly worse than in the group of patients with more severe disease and 36.25±18.12, (p<0.001) and in the group with moderate functional disability 43.86±18.77, (p<0.001). QoL estimated by MCS was statistically significantly better with the patients with moderate functional disability compared to the patients with more severe and total functional disability (p<0.001). Average value of EQ5D, in the group of patients with total functional disability was 2.45±0.21, that was statistically significantly worse than in the group of patients with more severe disease and 2.19±0.15, (p<0.001) and in the group with moderate functional disability 1.68±0.25, (p<0.001). QoL estimated by EQ5D was statistically significantly better with the patients with moderate functional disability compared to the patients with more severe and total functional disability (p<0.001)

**Conclusion:** More difficult degree of HAQ functional disability significantly impairs both physical and mental sphere of the quality of life and total quality of life, as well, Used questionnaires and scales for the evaluation of the functional ability and quality of life in patients with RA, complement the overall clinical picture of these patients and significantly contribute to the monitoring of the achieved results of the treatment. Our results have confirmed the hypothesis that functional disability has adverse impact on quality of life. Prompt evaluation of the quality of life and functional abilities using questionnaires and scales, make it possible to identify impaired segments and spheres, with prompt taking measures to preserve them.

P303

**IMPORTANCE OF DIAGNOSTIC ULTRASOUND IN DIFFERENTIAL DIAGNOSIS OF PAINFUL SHOULDER**J. Jovanovic<sup>1</sup>, V. Jovanovic<sup>2</sup>, M. Jovanovic<sup>3</sup><sup>1</sup>Institut Niska Banja, <sup>2</sup>Clinic for Orthopedics, Clinical Centre, <sup>3</sup>Faculty of Medicine, Nis, Serbia

**Objective:** To evaluate the diagnostic significance of musculo-skeletal ultrasound (MSUS) in determining the type and presence of soft tissue changes in patients with a referral diagnosis of painful shoulder.

**Methods:** We examined 63 patients or 67 shoulders, who had referral diagnosis of painful shoulder. Patients with trauma for the past year and what suffering from connective diseases were not analyzed. MSUS examination was performed using 8-13 MHz linear probe.

**Results:** Of the 63 patients there were 34 (54%) and 29 women (46% men), mean age 52.4 y (range 21-69) who were divided into 3 groups according to age. Of 63 patients 48 (76.2%) patients had abnormal and 15 (23.8%) patients had normal results. There were a total of 76 changes and the most common soft tissue pathology is chronic supraspinatus calcific tendinitis 42.1%. The highest percentage of pathological findings were found in the patients of 41-60 y and the lowest percentage in the group of 21-40 y. In the oldest group, the findings of a complete rupture of the rotator cuff. The most common changes detected, at the supraspinatus tendon 64.5% as follows: Chronic calcific tendinitis in 32 (42.1%), complete rupture of the rotator cuff in 10 (13.2%) and partial rupture of the rotator cuff in 7 (9.2%) patients. Subdeltoid bursitis was found in 7 (9.2%), long head biceps tenosynovitis in 9 (11.9%) patients. Subscapularis tendinitis was found in 4 (5.3%) and infraspinatus tendinitis in 1 (1.3%). Joint effusion in humero-scapular in 3 (3.9%) and tendinitis m.bicepsa brachi in 3 (3.9%) patients.

**Results:** Of the 63 patients there were 34 (54%) and 29 women (46% men), mean age 52.4 y. Of 63 patients 48 (76.2%) patients had abnormal and 15 (23.8%) patients had normal results. There were a total of 76 changes and the most common soft tissue pathology is chronic supraspinatus calcific tendinitis 42.1%. The highest percentage of pathological findings were found in the patients of 41-60 y. The most common changes detected, at the supraspinatus tendon 64.5% as follows: Chronic calcific tendinitis in 32 (42.1%), complete rupture of the rotator cuff in 10 (13.2%) and partial rupture of the rotator cuff in 7 (9.2%) patients. Subdeltoid bursitis was found in 7 (9.2%), long head biceps tenosynovitis in 9 (11.9%) patients. Subscapularis tendinitis was found in 4 (5.3%) and infraspinatus tendinitis in 1 (1.3%). Joint effusion in humero-scapular in 3 (3.9%) and tendinitis m.bicepsa brachi in 3 (3.9%) patients.

**Conclusion:** Ultrasound has an important place in the diagnosis of painful shoulder. As a noninvasive, relatively inexpensive and available methods, and because of the high specificity in detecting soft tissue changes the method of choice in the diagnosis of painful shoulder.

P304

**REHABILITATION AND DIAGNOSTIC ASSESSMENT OF HAND FUNCTION IN PATIENTS WITH NEPHROPATHIES**T. Zagorskaya<sup>1</sup>, A. Filipovich<sup>2</sup><sup>1</sup>Minsk Regional Children's Clinical Hospital, Minsk, <sup>2</sup>National Science and Practice Centre of Medical Assessment and Rehabilitation, Yukhnovka, Belarus

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 <2 cm), with a ball grip and holding objects with a diameter of >5 cm and weighing >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 >4 cm, but long-term and strong retention of objects was signif-

icantly 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 advisable to use the assessment method to solve the issues of medical expertise, as well as to assess the effectiveness of rehabilitation

## P305

### ASSESSMENT OF VITAMIN K2 AND VITAMIN D STATUS IN BULGARIAN WOMEN WITH POSTMENOPAUSAL OSTEOPOROSIS

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**Objective:** Vitamins K2 and D have a synergistic effect on bone and blood vessels health by regulating their calcium metabolism. Vitamin D, by stimulating gene expression, is responsible for the synthesis of vitamin K2-dependent proteins. Vitamin K2 is a co-factor of enzyme  $\gamma$ -glutamyl carboxylase, which activates these proteins. There is accumulating evidence of an existing deficiency of both vitamins in humans. Vitamin D and calcium supplementation, in the presence of vitamin K2 deficiency, may cause accelerated calcium deposition in vessels and soft tissues and increase cardiovascular risk in patients with osteoporosis. The aim of our study was to investigate and compare vitamin K2 and D levels in patients with postmenopausal osteoporosis and postmenopausal women.

**Methods:** We studied 46 Bulgarian women divided into two groups after measurement of BMD in lumbar spine by DXA: a work group composed of 24 women with osteoporosis and a control group of 22 women without osteoporosis. Plasma concentrations of calcium, phosphorus, vitamin D, osteocalcin (OC), and undercarboxylated osteocalcin (ucOC) were measured. Vitamin K2 status was assessed by the ucOC/OC ratio.

**Results:** The mean age of the participants in the work and control groups was 64.7 $\pm$ 8.7 and 63.55 $\pm$ 8.7 y, respectively. The OC levels were 24.08 $\pm$ 10.09 ng/ml in the work group and 23.09 $\pm$ 6.94 ng/ml in the control group, and were within the reference range of the kit used. The ucOC concentrations in both groups were 16.92 $\pm$ 2.58 ng/ml in the working group and 17.69 $\pm$ 3.92 ng/ml in the control group. There were no statistically significant differences in the

concentrations of the two parameters between the groups. The percentage ucOC/OC ratio was 73.29 $\pm$ 26.6% and 83.63 $\pm$ 29.27% in the working and control groups, respectively, and no statistically significant difference was found. The results are associated with poor vitamin K2 status. Mean vitamin D levels showed insufficiency: 48.79 $\pm$ 18.98 nmol/l in the working group and 48.34 $\pm$ 23.1 nmol/l in the control group, with no significant differences.

**Conclusion:** Our results indicate poor vitamin K2 and vitamin D status in both groups but more data from our country are needed before they can be confirmed.

**Acknowledgment:** This research was funded by Medical University – Pleven, Project № 8/2020

## P306

### PRESERVED BONE DENSITY IN LONG-TERM POSTBARIATRIC FOLLOW-UP OF A WELL CALCIUM AND VITAMIN D SUBSTITUTED FEMALE COHORT

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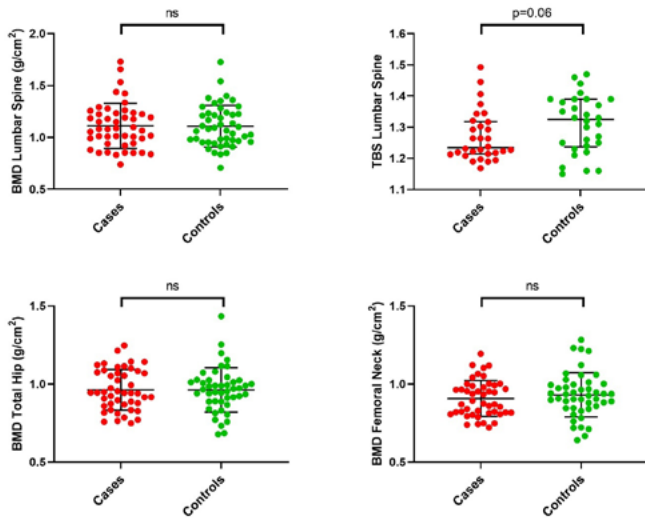
**Objective:** Bariatric surgery leads to a decline in BMD. Most available data on postbariatric loss of bone mass are limited to short-term follow up (<3 y) on premenopausal women. We aim to assess BMD by DXA in postmenopausal women long-term after RYGB (Roux-en-Y gastric bypass) and compare their results with age- and BMI-matched controls.

**Methods:** Cross-sectional and case-control study of postmenopausal women with history of RYGB and available DXA at least 3 years after surgery; controls consisted on age and BMI-matched postmenopausal women. BMD at standard sites (lumbar spine, total hip, femoral neck), and trabecular bone score (TBS) at lumbar spine for women with BMI <37 kg/m<sup>2</sup> were analyzed. History of fractures was inquired and DXA morphometry images were reviewed for vertebral fractures.

**Results:** 95 women were eligible at a mean 8.9 $\pm$ 4.8 y after RYGB. The fracture prevalence was 15% and 8% for major osteoporotic and vertebral fractures, respectively. All participants were receiving calcium/vitamin D supplements, resulting in normal PTH levels in most subjects. Ten women were treated with bisphosphonates. Among the remaining 85 women, 26% had osteoporosis and 36% osteopenia. Higher BMI at study inclusion was the principal BMD predictor after adjustment for age, time since RYGB, one-year weight loss and serum PTH levels (p=0.0009). In



a case-control substudy, 47 RYGB cases were matched for age and BMI with controls. BMD was similar in the two groups at all sites (Figure). TBS tended to be lower in the RYGB group ( $p=0.06$ ).



**Conclusion:** The final BMI after RYGB is a strong determinant of postbariatric long-term BMD. Nine years after surgery, subjects who underwent RYGB with a strict nutritional follow-up did not have lower BMD compared to controls. The trend for lower TBS indicates that further research is needed to characterize potential microarchitectural defects.

P307

**PILOT STUDY OF ULTRALOW DOSE NARROW BAND ULTRAVIOLET IN OFFICE LIGHTING TO MITIGATE SEASONAL DECLINE IN SERUM 25OHD IN CLERICAL WORKERS**

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**Objective:** To conduct a pilot study to investigate the feasibility of supplementing office lighting with ultralow dose ultraviolet radiation within current EU directives, and assess its effect on seasonal decline in 25OHD in working aged, clerical staff.

**Methods:** Double blind crossover study using 10 overhead luminaires fitted with LEDs which continuously emit ~1.1 Werythermal/m<sup>2</sup> narrow band ultraviolet over 8 h at 80 cm, compared with 10 identical placebo luminaires. The two eight weeks study periods, beginning October 2021, were separated by four weeks washout. Twenty healthy female clerical workers were randomized to receive intervention or control during period 1, and crossover during

period 2. The main outcome parameter is serum 25OHD measured at baseline and four weekly during periods 1 and 2. Personalized dose was measured four weekly using polysulphone badges.

**Results:** The preliminary results from period 1 are described, period 2 began January 2022. The decline in 25OHD from October to December 2021 largely depended on the baseline 25OHD, i.e., participants with higher baseline 25OHD had greater decline in 25OHD during period 1. The mean differences in 25OHD between week 8 and the baseline are -11 nmol/L and -16 nmol/L respectively in the active and control groups. The mean difference in 25OHD decline during period 1 between the two groups, 5 nmol/L, is not significant. Preliminary analysis of the ratio between the week 8 and baseline 25OHD data suggest that the week 8 drop in 25OHD is lower for the active group than the control group. The ratio between the week 8 and baseline 25OHD is 19% and 28%, respectively, in the active and control groups. The 9% difference between the two groups is statistically significant at the 10% significance level. The p-value is 0.06 after adjusting for age. The sum of weekly dosimeter badges showed that the control group received no significant UV radiation (mean 0.3 SED in 4 weeks), while over the same period the active group received mean of 7.1SED at the desk (hand/lower arm) position.

**Conclusion:** The lighting was well tolerated, and no study related adverse reactions occurred during period 1. This pilot study was not powered to detect significance, and although the p-value is larger than the usual 5% significance level, the 6% p-value is a quite positive result for the first stage of a small pilot study. The UV dose received to hands and forearms was ultra-low (well within current EU working directives, and the daily equivalent of only a few minutes in midday summer sunlight). This raises the possibility that with further refinement the approach may offer a low cost solution to prevention of seasonal decline in 25OHD in vulnerable groups living in residential or supported care.

**Table 1.** Data summary

Group	Age		Difference (Week 8 vs. Baseline 25OHD)		Percentage (Week 8 vs. Baseline 25OHD)	
	Mean	Range	Mean	Range	Mean	Range
Active	44.8	[28, 59]	-11.01	[-32.4, 0]	81.3%	[60.4%, 100%]
Control	45.1	[28, 55]	-16.12	[-32.7, -9.2]	72.0%	[57.2%, 88.6%]

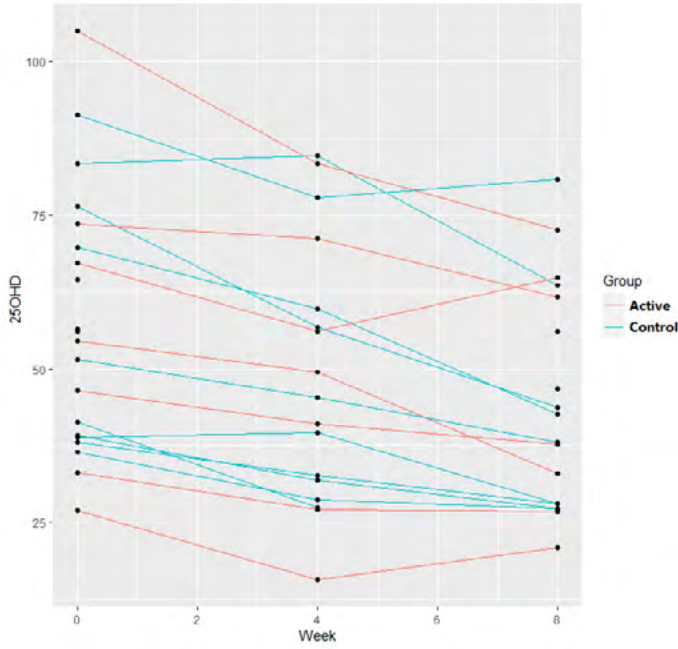
**Table 2.** Results from the linear regression model for the difference between Week 8 and baseline 25OHD

Predictors/Explanatory variables	Coefficient	Standard error	p-value
Age (years)	0.305	0.196	0.142
Active vs. Control	5.064	3.477	0.167
Baseline 25OHD	-0.257	0.082	0.007

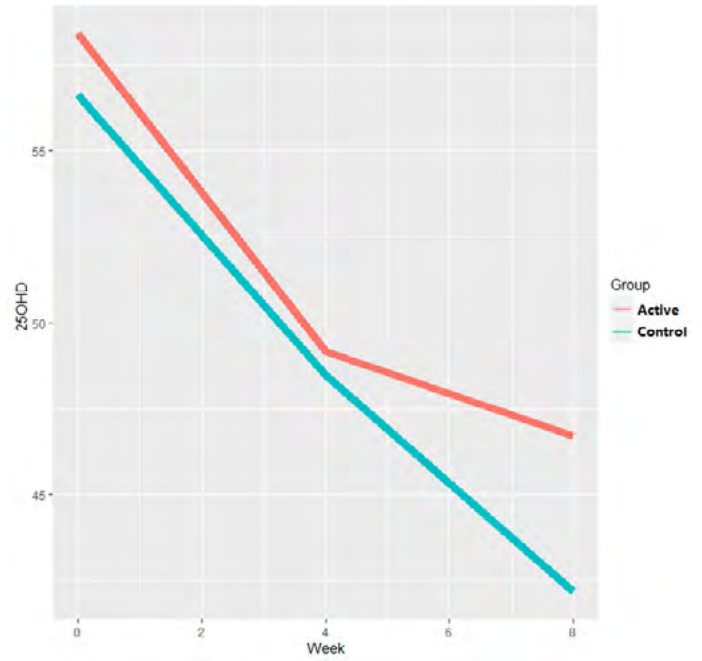
Intercept	-10.05	10.142	0.339
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**Table 3.** Results from the linear regression model for the ratio between Week 8 and baseline 25OHD

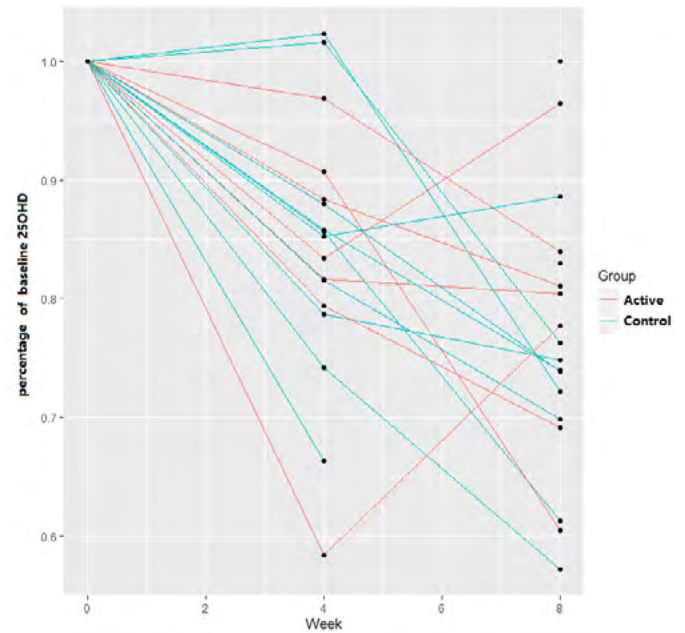
Predictors/Explanatory variables	Coefficient	Standard error	p-value
Age (years)	0.005	0.003	0.1079
Active vs. Control	0.0951	0.048	0.0646
Intercept	0.605	0.126	0.0002



**Figure 1.** Individual 25OHD



**Figure 2.** Mean 25OHD



**Figure 3.** Individual percentage of baseline 25OHD

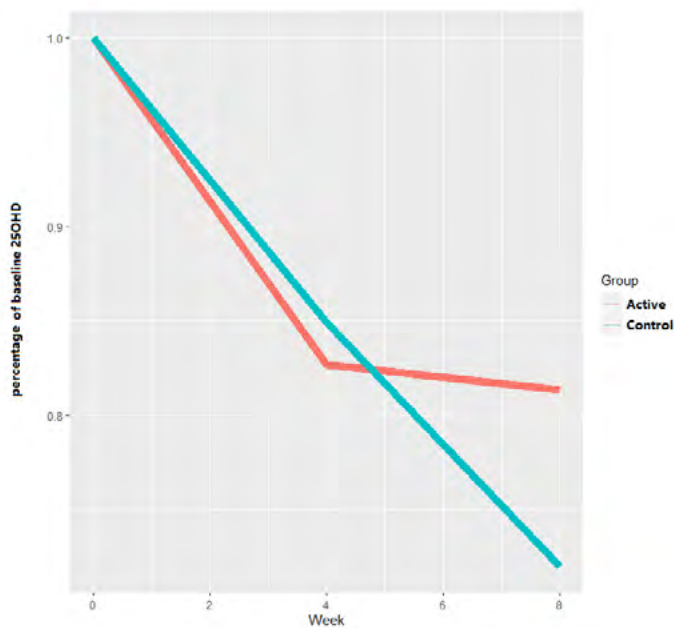


Figure 4. Mean percentage of baseline 25OHD

### P308

#### DESCRIPTION OF A LARGE COHORT WITH A *SLC34A3* C.1248\_1249DEL VARIANT CAUSING HEREDITARY HYPOPHOSPHATEMIC RICKETS WITH HYPERCALCIURIA (HHRH)

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**Objective:** Hereditary hypophosphatemic rickets with hypercalciuria (HHRH) is a rare form of hypophosphatemia caused by mutations in *SLC34A3*, with only 40 reported causative mutations to date. *SLC34A3* encodes the sodium-phosphate co-transporter NPT2c, which is expressed in the renal proximal tubule. We describe a cohort of patients with a *SLC34A3* c.1248\_1249del variant including three individuals who are homozygous and have HHRH. The *SLC34A3* c.1248\_1249del variant results in a frameshift introducing a premature stop codon. This is predicted to lead to loss of normal protein function as it would cause loss of the 5 C-terminal transmembrane segments. This report describes the phenotype of the *SLC34A3* c.1248\_1249del variant.

**Methods:** A retrospective chart review of children and adolescents with the *SLC34A3* c.1248\_1249del variant and their relatives in Alberta, Canada was performed.

**Results:** We identified three individuals homozygous for *SLC34A3* c.1248\_1249del variants who had bone pain, lower limb bowing, and hypophosphatemia. They presented at a median age of 12.4 y (range 12.1 to 21.7) with a mean height Z-score of -2.1 (range -1.6 to -2.5). Biochemistry at diagnosis demonstrated hypophos-

phatemia (mean phosphate 0.76 mmol/L, range 0.67-0.81), inappropriately low-normal tubular reabsorption of phosphate (mean 86%, range 84-92%) and elevated 1,25-dihydroxy vitamin D (mean 307 pmol/L, range 243-384). All affected individuals required orthopedic intervention for limb angulation. Two adolescents were treated with phosphate supplementation which improved rickets and bone pain.

Nine related individuals were identified who were heterozygous and displayed a disease phenotype which included early-onset osteoarthritis (n=4), renal calculi (n=1), hypophosphatemia (n=1), hypercalciuria (n=2), and elevated 1,25 hydroxyvitamin D (n=1).

**Conclusion:** Homozygous *SLC34A3* c.1248\_1249del variants cause HHRH. Interestingly, heterozygous individuals for this variant can also have a disease phenotype including early-onset bone disease, renal calculi, and biochemical abnormalities. As such, investigating should be considered family members of HHRH patients including clinical, biochemical, and genetic alterations.

### P309

#### ETHNIC DIFFERENCES IN MUSCLE MASS AND GRIP STRENGTH IN A MULTIETHNIC UK COHORT: ARE THEY EXPLAINED BY MARKERS OF ADIPOSITY OR INFLAMMATION?

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<sup>1</sup>MRC Lifecourse Epidemiology Centre, University of Southampton, Southampton, <sup>2</sup>MRC Unit for Lifelong Health and Ageing, University College London, London, UK

**Objective:** To investigate whether ethnic differences in muscle mass or grip strength are explained by markers of central adiposity or inflammation in the Southall and Brent Revisited Study (SABRE), a tri-ethnic UK-based cohort study.

**Methods:** SABRE consists of men and women of European, South Asian and African Caribbean origin. At baseline, SABRE included South Asian and African Caribbean migrants to the UK; at study visit 3, presented here, additionally recruited participants included partners of participants. The 422 men and 329 women included in these analyses had measures of grip strength and DXA body composition. Linear regression was used to determine ethnic differences in appendicular lean mass (ALM) and grip strength, and whether BMI, markers of central adiposity (visceral adipose tissue mass or android to gynoid fat mass ratio) or inflammation (log(IL-6) or log(CRP)) attenuated those differences (all models adjusted for age and height, except the model containing BMI which was adjusted for age only). Results are presented as age- and height-adjusted standardised  $\beta$  coefficient (95%CI) unless otherwise stated; European was the referent group.

**Results:** Mean (SD) age and BMI were 74.9(5.7) y and 27.3(3.9) kg/m<sup>2</sup> in men and 70.7(6.9) y and 28.6(5.1) kg/m<sup>2</sup> in women. ALM and grip strength were lower in South Asian men (ALM: -0.45(-0.59,-0.30); grip strength: -0.25(-0.43,-0.07)) and higher in African Caribbean men (ALM: 0.84(0.65,1.02); grip strength: 0.30(0.08,0.53)) compared to European men. In African Caribbean men the difference in grip strength was reduced after adjustment for BMI (0.21(-0.02,0.45)). ALM and grip strength were higher in African Caribbean women (ALM: 0.99(0.81,1.17); grip strength: 0.53(0.33,0.73)) and, in South Asian women, ALM was similar and grip strength lower (ALM: -0.19(-0.39,0.02); grip strength: -0.28(-0.50,-0.06)) compared to European women. The markers of central adiposity or inflammation did not attenuate ethnic differences in ALM or grip strength in men or women.

**Conclusion:** Ethnic differences in ALM and grip strength were not explained by markers of central adiposity or inflammation. It is important to further understand how ethnic differences in muscle mass and strength impact falls and fracture in later life.

## P310

### ASSESSMENT OF FRACTURE RISK IN PATIENTS WITH NONRADIOGRAPHIC AXIAL SPONDYLOARTHRITIS

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**Objective:** Spondyloarthritis (SpA) is a chronic inflammatory disease that predominantly affects the sacroiliac joints and the spine. Patients with SpA have an increased risk of osteoporosis and fracture resulting from a combination of inflammation and immobility. The non-radiographic form for SpA (nr-axSpA) has the same predictors factors of bone fragility however the real fracture risk is unknown in this phenotype. This study aims to investigate BMD and the Fracture Risk Assessment Tool (FRAX) in patients with nr-axSpA.

**Methods:** We conducted a retrospective study including 40 patients with nr-axSpA, according to the ASAS criteria. For the enrolled patient, we collected the clinical and biological data. We calculated the disease activity using the Bath Ankylosing Spondylitis Disease Activity (BASDAI) and the Ankylosing Spondylitis Disease Activity Score (ASDAS). Functional impairment was assessed by the Ankylosing Spondylitis Functional Index (BASFI). We measured the BMD using the DXA in the anteroposterior lumbar, lateral spine, and hip neck. The 10-y probability of major osteoporotic fracture was calculated using the Tunisian version of FRAX.

**Results:** 27 women (67.5%) and 13 men (32.5%) were enrolled. The mean age was 41.5 y ( $\pm 11.2$ ), and the mean disease duration was 3.1 y ( $\pm 2.7$ ). The mean BASDAI and ASDAS CRP was 4.7 $\pm$ 2.2 and 3.27 $\pm$ 1.29, respectively. The mean BASFI was 3.6 $\pm$ 2.5. According to WHO criteria, 45% of patients displayed osteopenia

and 30% osteoporosis. The mean major osteoporotic fracture (MOF) score was 0.09 $\pm$ 0.25 [0-1.3]. The MOF was significantly associated with BMD ( $p=0.000$ ). The variables associated with MOF were a high physician's global assessment score, a high BASFI, and female gender, but without significant relation. However, no correlation was found between the MOF and the disease duration, the presence of peripheral arthritis or enthesitis, and the ASDAS.

**Conclusion:** In nr-axSpA, patients with low BMD had a higher calculated 10-y fracture risk. FRAX score is related to functional impairment and gender. Disease activity does not affect the probability of fracture.

## P311

### ATYPICAL FEMORAL SHAFT FRACTURES SECONDARY TO LONG-TERM BIPHOSPHONATE THERAPY

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<sup>1</sup>Centro Hospitalar Baixo Vouga, Aveiro, Portugal

**Objective:** Bisphosphonates (BP) are one of the most used agents in the treatment of postmenopausal osteoporosis. Atypical femoral fractures (AFFs) are rare events associated with increased duration of BP exposure. We aim to evaluate the outcome of the surgical fixation of AFFs in BP treated patients with an intramedullary device.

**Methods:** The authors retrospectively analyzed data from 25 postmenopausal osteoporotic women under BPs therapy, aged 50 or older, with femoral shaft fractures due to low-energy trauma between 2017-2021. Of these, eleven met the criteria for AFFs according to the American Society for Bone and Mineral Research and were evaluated in this study.

**Results:** The mean duration of BP therapy prior to fracture was 10 y. The eleven postmenopausal osteoporotic women with AFF were treated with intramedullary nail: an intertrochanteric antegrade nail in 7 cases and femoral antegrade nail in 4 cases. The mean duration of fracture union was 5.4 months. The mean follow-up was 12 months. One woman had nonunion with implant failure and underwent revision surgery, whereas two women had delayed fracture union. Stress reaction was observed in the contralateral femur in seven women.

**Conclusion:** Although the incidence of delayed bone healing is high in AFF on BP therapy even treated with intramedullary nailing, the incidence of revision surgery and implant failure was low.



P312

**RISK FACTORS FOR DEVELOPMENT OF ATYPICAL FEMORAL FRACTURES IN PATIENTS ON LONG-TERM ORAL BISPHOSPHONATE THERAPY**R. Cardoso<sup>1</sup>, I. Genrinho<sup>1</sup>, S. Silva<sup>1</sup>, C. Mazedo<sup>1</sup>, P. Vilas Boas<sup>1</sup>, B. Figueiredo<sup>1</sup>, J. Brenha<sup>1</sup>, A. Barcelos<sup>1</sup><sup>1</sup>Centro Hospitalar Baixo Vouga, Aveiro, Portugal

**Objective:** Bisphosphonates (BP) are highly effective in treating osteoporosis post-menopausal women and reducing fractures. However, atypical femoral fractures (AFFs) emerged as a rare event associated with increased duration of BP exposure. We aim to evaluate clinical and metabolic characteristics in patients with AFFs, in order to determine risk factors associated.

**Methods:** We retrospectively reviewed the medical records and radiographs of 25 Caucasian women, 50 years old of age or older, admitted to the emergency of Orthopedic Dept. for surgical repair between 2017-2021. All the women were under BPs therapy prior to the fracture events and suffered a femoral shaft fracture. Of those, 11 were classified as AFF according to the American Society for Bone and Mineral Research criteria and 14 were classified as typical femoral fractures (TFF). Duration of BPs intake, metabolic factors, comorbid conditions and concomitant therapies were compared.

**Results:** AFF patients received BPs therapy for a higher period than TFF ( $p < 0.05$ ). Early menopausal age and hypothyroidism with levothyroxin intake were more prevalent in AFF patients ( $p < 0.05$ ). At the time of the fracture a higher prevalence of hypocalcemia and reduced prevalence of elevated PTH levels were observed in AFF patients, although not statistically significant. Other risk factors as age, race, BMI, pulmonary or collagen diseases, glucocorticoid or pump proton inhibitors use or D vitamin levels did not differ significantly in both groups.

**Conclusion:** Our data indicate that patients treated with BP with early menopausal age and with hypothyroidism with levothyroxin intake are at higher AFF risk. In these patients we should monitor or be alert for signs of incomplete AFFs to consider prophylactic surgery.

P313

**THERE IS AN ASSOCIATION BETWEEN VARUS PROXIMAL FEMORAL GEOMETRY AND ATYPICAL FEMORAL FRACTURES IN POSTMENOPAUSAL WOMEN UNDER CHRONIC BISPHOSPHONATE TREATMENT?**R. Cardoso<sup>1</sup>, I. Genrinho<sup>1</sup>, S. Silva<sup>1</sup>, C. Mazedo<sup>1</sup>, P. Vilas Boas<sup>1</sup>, B. Figueiredo<sup>1</sup>, J. Brenha<sup>1</sup>, A. Barcelos<sup>1</sup><sup>1</sup>Centro Hospitalar Baixo Vouga, Aveiro, Portugal

**Objective:** Bisphosphonates (BPs) are the first-line treatment of osteoporosis post-menopausal women. There is increasing evidence associating atypical femoral fractures (AFFs) with prolonged exposure to BP therapy. The cause of these fractures is unknown and likely multifactorial. We aim to evaluate the hypothesis that patients with AFFs under prolonged BP therapy were associated to a varus proximal femoral geometry.

**Methods:** We retrospectively studied osteoporotic women, aged 50 or older, who were under BPs therapy. Women under BP treatment with AFF (group A) were compared with women under BP treatment without fractures on the inferior limb (group B). The femoral neck-shaft angle was measured on the radiographs of both groups.

**Results:** A total of 23 osteoporotic menopausal women under BP therapy were included: 11 in group A and 12 in group B. The mean neck-shaft angle of the women in group A differed significantly from group B ( $p < 0.05$ ). Side-to-side comparison in patients with a unilateral pathologic involvement and an asymptomatic contralateral lower limb did not demonstrate any significant difference between the neck-shaft angles in the two limbs.

**Conclusion:** Patients on chronic BP therapy who presented with AFF had more varus proximal femoral geometry than those who took BPs without sustaining a lower limb fracture. Varus proximal femoral geometry may help to better identify patients at risk for fracture after long-term BP use.

P314

**FRACTURE DISTRIBUTION IN ELDERLY WOMEN: A FRISBEE SUBSTUDY**A. Mugisha<sup>1</sup>, J.-P. Body<sup>2</sup>, L. Iconaru<sup>3</sup>, F. Baleanu<sup>3</sup>, A. Charles<sup>3</sup>, M. Surquin<sup>1</sup>, P. Bergmann<sup>4</sup>, F. Benoit<sup>1</sup>

<sup>1</sup>Dept. of Internal Medicine, <sup>2</sup>Dept. of Internal Medicine, Dept. of Endocrinology, Laboratory of Translational Medicine, <sup>3</sup>Dept. of Endocrinology, <sup>4</sup>Dept. of Nuclear Medicine, Laboratory of Translational Medicine, CHU Brugmann, Université Libre de Bruxelles, Brussels, Belgium

**Objective:** Though the epidemiology of classical MOFs is well known, the distribution of other fracture sites has been less studied. We examined the incidence of fractures in a cohort of elderly Belgian postmenopausal women and their distribution among skeletal sites as a function of age.

**Methods:** 3560 postmenopausal women, aged 60-85 y (mean±SD, 70.1±6.4 y), included in a prospective study from 2007-2013, were surveyed yearly (FRISBEE). The number of validated incident fractures was recorded according to age and site.

**Results:** 1336 fractures were recorded after a mean follow-up of 9.1 y. 756 fractures (57%) were categorized as MOFs and 580 (43%) as non-MOFs. When classifying fractures as central vs. peripheral, there were 813 (61%) and 523 (39%) fractures, respectively. The increase of fracture incidence with age differed between fracture sites. As a result, the ratio of MOFs to non-MOFs increased significantly with age, from 1.10 [0.83-1.45] (P=0.017) for the 60-69 y group to 1.69 [95%CI: 1.42-2.01] for the 80-89 y age group. The proportion of central fractures was also significantly higher in the group 80-89 y (2.57 [2.13- 3.09]) than in the 60-69 y group (0.91 [0.69- 1.2]), (P<0.001). Lastly, we could differentiate three groups with a mean increase/decade (compared with the 60-69 y age group) of less than 1.5, 1.5-2.0 and 2.0-3.0. The greatest increase per decade was observed for the group including hip, scapula, pelvis, ribs, clinical spine, long bones diaphysis and clavicle fractures. The intermediate increase was in the group consisting of carpal, wrist, elbow and shoulder fractures, while the lowest increase was for metatarsal, metacarpal, tarsal, ankle and knee fractures.

**Conclusion:** The increase of fracture incidence with age varied widely between fracture sites. The fact that the incidence of several peripheral fractures did not increase significantly with age (e.g., ankle) suggests that bone fragility does not play a major role in their occurrence and other mechanical and risk factors might be involved.

## P315

### MOF/HIP FRACTURE RATIO IN A BELGIAN COHORT OF POSTMENOPAUSAL WOMEN (FRISBEE)

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**Objective:** The ratio between major osteoporotic fractures (MOFs) and hip fractures in the Belgian FRAX<sup>®</sup> predictive tool is currently based on Swedish data. We studied the fracture distribution in a prospective cohort of Belgian postmenopausal women.

**Methods:** 3560 women aged 60-85 y (70.1±6.4 y), were included in a prospective study from 2007-2013 and surveyed yearly (FRISBEE). We analyzed the number of validated incident fractures according to age and sites and compared the MOFs/hip ratios in the FRISBEE cohort with the Swedish database. These data were compared with those of the Belgian National Institute of Disease and Disability (RIVIZ/INAMI), collected from the year 2018.

**Results:** We registered 1336 fractures after a mean follow-up of 9.1 y. The MOFs/hip ratios were systematically higher than in Sweden, by a factor of 1.7-1.8, with values of 10.7 (95%CI: [5.6-20.5]), 6.4 [4.7-8.7] and 5.0 [3.9-6.5] for women 60-69, 70-79 and 80-89 years old, respectively, to be compared to Swedish ratios decreasing from 6.5 between 60 and 64 to 1.8 between 85 and 89. The overall MOFs/hip ratio in our cohort was 6.0 [5.9-6.1]), higher than any Swedish ratio between 65 and 85 years. The decrease of the ratios with age was parallel in the FRISBEE cohort to that observed in Sweden. Based on the administrative data from the RIZIV/INAMI, the MOF/Hip ratios would be 14.8, 9.9 and 5.2 for women 60-69, 70-79 and 80-89 years old, respectively.

**Conclusion:** In our large prospective cohort, MOFs/hip ratios were 1.7-1.8 times those observed in the Swedish population used for fracture prediction in the Belgian version of FRAX. Administrative data of the year 2018 confirmed that trend. This can seriously impact the estimation of the risk of MOFs, which is among the main criteria used to recommend a pharmacological treatment for osteoporosis in several countries. Our data suggest that the Belgian FRAX for MOFs should be recalibrated, and that similar validation studies could be conducted in other countries, which use the Swedish MOF/hip ratio for MOFs prediction.

## P316

### AUTOMATED DETECTION OF VERTEBRAL FRACTURES IN ROUTINE CT SCANS OF THE CHEST AND ABDOMEN: EXTERNAL VALIDATION OF A DEEP LEARNING ALGORITHM

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**Objective:** Identification and reporting of vertebral fractures (VF) in routine CT scans remains an area in need for improvement. We aim to evaluate the performance of a new deep learning algorithm in detecting VF in CT scans.

**Methods:** External validation study of a 3D Convolutional Neural Network (CNN) model to automatically detect VF. We utilized 2000 routine chest/abdomen CT scans in men and women  $\geq 50$  y in an observational cohort study. The CT scans were reevaluated to identify prevalent VF in a 2-step process blinded to clinical information. First, the scans were triaged (CL) at subject-level as having certain VF, potential VF or no VF. Second, an external imaging vendor (BioClinica) evaluated scans with certain or potential VF, together with a 5% subset of those with no VF, to derive reference standard readings for the individual vertebrae using the semiquantitative Genant classification. The performance of the CNN in identifying moderate or severe VF (grade 2-3) was evaluated by % agreement, Kappa, sensitivity, specificity, positive and negative predictive value (PPV and NPV), and area under the curve (AUC). Bootstrapping with 1000 repetitions was used to construct the 95% confidence intervals.

**Results:** Few scans were not available for the evaluation (n=57) and were excluded. Of the remaining 1943 scans 15.3% had  $\geq 1$  VF (grade 2-3), while 663 out of 25,102 vertebrae (2.6%) were fractured (grade 2-3). The subject- and vertebra-level CNN performance vs. human expert readings are shown in Table.

**Table.** Subject- and vertebra-level CNN performance in identifying moderate and severe VF.

	Subject-level	Vertebra-level
Sensitivity, %	90.91 (86.82-93.73)	71.95 (68.36-75.36)
Specificity, %	88.82 (87.33-90.24)	98.36 (98.19-98.51)
PPV, %	59.47 (54.64-63.82)	54.27 (51.03-57.47)
NPV, %	98.19 (97.23-98.73)	99.23 (99.11-99.34)
AUC	0.899 (0.876-0.914)	0.852 (0.834-0.867)
Kappa	0.66 (0.62-0.70)	0.61 (0.57-0.63)
Agreement	0.89 (0.88-0.90)	0.98 (0.97-0.98)

**Conclusion:** The deep learning algorithm demonstrated excellent performance in the identification of VFs in chest and abdomen CT scans in patients  $\geq 50$  y. Application of such algorithm may help bridge the known reporting gap of VF on CT scans.

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### EFFECTIVENESS OF TECAR THERAPY COMBINED WITH ECCENTRIC EXERCISES IN LATERAL ELBOW TENDINOPATHY

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**Objective:** Tecar therapy (TT), an endogenous thermotherapy, uses high frequency currents and is supposed to boost tissues healing. Considering the lack of robust research on its effectiveness, the aim of this study was to evaluate the effectiveness of TT combined to an eccentric intervention program (gold standard) in the treatment of lateral elbow tendinopathy (LET).

**Methods:** 17 patients (32-59 y) with chronic LET, were randomly divided into 3 groups:

- A control group (CG, n=6) receiving 18 sessions (3 sessions/wk) of conventional treatment (CoTr): epicondyle massage, eccentric program (using an isokinetic device) and stretching of epicondyle muscles.

- A Tecar group (TG, n=7) receiving the CoTr combined to a TT (in a capacitive and resistive mode).

- A Tecar placebo group (PG, n=4) receiving the CoTr combined to a fake TT.

The assessment sessions, performed at baseline, after 9 and the 18 sessions as well as at a 3- and 6-month follow-up included clinical LET's tests (Cozen test, Middle Finger test), the French version of the PRTEE questionnaire and the pressure pain threshold (pressure algometer) at the painful site.

**Results:** All outcomes improved significantly ( $p < 0.05$ ) in all groups, yet the TG showed no greater improvement compared to the CG and PG.

**Conclusion:** Our study confirms the efficiency of eccentric program in LET and suggests that the combination of TT with CoTr does not provide additional benefit when compared to CoTr used alone.

P318

### ROLE OF RADIOTHERAPY IN THE TREATMENT OF PLANTAR FASCIITIS

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**Objective:** Plantar fasciitis is the most common cause of talalgia in adults. It can affect a variety of individuals and its etiology is still unknown. Several factors are probably involved (repeated

microtrauma; excessive tension, chronic inflammation, etc.). In plantar fasciitis, a bony exostosis can be observed. The latter can also lead to functional disability due to severe pain and therefore has a major impact on quality of life. Several treatments with different efficacy are offered to the patient. The role of radiotherapy is very limited, although it is more frequently applied in Germany. The main objectives of this paper are to evaluate the place of radiotherapy in the therapeutic approach, to confirm its efficacy and to assess the associated risks.

**Methods:** We were able to evaluate the effectiveness of radiotherapy in plantar fasciitis in patients treated at the University Hospital of Liege between 2010-2020. We followed 7 patients for a total of 10 irradiations. Of the 10 irradiations, the total dose was 3 Gy in 6 cases, 6 Gy in 2 cases and 15 Gy in 2 cases. The unit dose varied between 1-5 Gy. It should be noted that since 2016 and the publication of the recommendations by DEGRO, the doses have been reduced and better standardised. In particular, the unit doses are much lower and no longer exceed 1 Gy.

**Results:** Out of a total of 10 irradiations, 4 of them led to an abolition of the painful symptomatology and 2 of them led to a clear improvement of the pain at the time of data collection. Furthermore, if we refer to the VAS scale scored between 0-10, 60% of the irradiations result in a score  $\leq 2$ . It should also be noted that radiotherapy is often only proposed to patients who are refractory to the various conventional treatments. Finally, no early or late adverse events (with a maximum follow-up time of 10 y) were associated with radiotherapy in our series.

**Conclusion:** The results of our follow-up of the few patients with plantar fasciitis are consistent with the results of large retrospective studies (e.g., German), although we are fully aware that this is a limited number of patients.

### P319

#### VALIDITY AND RELIABILITY OF THE FRENCH TRANSLATION OF THE IDENTIFICATION OF FUNCTIONAL ANKLE INSTABILITY (IDFAI)

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**Objective:** To translate and validate the Identification of Functional Ankle Instability (IdFAI) into French.

**Methods:** The IdFAI was translated according to international recommendations. Discriminative power, floor and ceiling effects, construct validity (including confirmatory factorial analysis (CFA)), internal consistency and test-retest reliability were measured. Standard error of measurement (SEM) and smallest detectable change were also calculated.

**Results:** 160 participants were included. The IdFAI-F showed a very good test-retest reliability (ICC=0.95). The SEM was 1.37 and the MDC was 3.79. The internal consistency was moderate (Cronbach's  $\alpha$  coefficient=0.68). The correlation between the IdFAI and the Cumberland Ankle Instability Tool was high ( $r=0.75$ ,  $p<0.001$ ). No floor nor ceiling effects were observed. The CFA analyses did not confirm the factor structure proposed by the authors of the original English version.

**Conclusion:** The IdFAI-F is a valid and reliable tool to accurately identify and measure chronic ankle instability in research and clinical settings for French speaking individuals.

### P320

#### HEALTH-RELATED QUALITY OF LIFE IN PATIENTS WITH OSTEOPOROSIS: RESULTS OF A CROSS-SECTIONAL STUDY

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**Objective:** Osteoporosis increased bone fragility and propensity to fracture. Numerous studies of osteoporotic patients, with or without fractures, have shown a substantial impact on the individual's health-related quality of life (QoL). This study aimed to analyze the impact of nonfracture and fracture osteoporosis in patients' QoL.

**Methods:** In this cross-sectional study, 200 patients with osteoporosis were divided into two groups based on their history of fracture: group A - patients with fracture (n=100) and group B - patients without fracture (n=100) observed in a Fracture Liaison Service. Socio-demographic and clinical data were collected. QoL were measured by the European Quality of Life-5 Dimensions (EQ-5D) questionnaire. General descriptive analysis was performed, p-value<0.05 was statistically significant.

**Results:** Both groups showed a predominance of females (group A with 84% and group B 88%,  $p=0.42$ ) and a similar mean age (group A  $75.20\pm 38.86$ ; group B  $71.87\pm 9.95$ ;  $p=0.79$ ). Most patients in both groups were autonomous, with no significant difference ( $p=0.96$ ). In group A, the most frequent fracture was vertebral (63%). Patients in group A had a higher proportion of patients with limited mobility, self-care, usual activities and pain/discomfort, with statistically significant differences between two groups (Table). The mean value of EQ-VAS was higher in group B ( $68.35\pm 17.01$ ) compared to group A ( $59.10\pm 18.21$ ).



		Group A (n)	Group B (n)	<i>p</i>
Mobility	Level 1	56	86	0.001
	Level 2	43	12	
	Level 3	1	2	
Self-Care	Level 1	79	95	0.002
	Level 2	15	3	
	Level 3	6	2	
Usual Activities	Level 1	44	82	0.001
	Level 2	42	15	
	Level 3	14	3	
Pain / Discomfort	Level 1	43	65	0.005
	Level 2	53	33	
	Level 3	4	2	
Anxiety / Depression	Level 1	70	68	0.337
	Level 2	30	28	
	Level 3	0	3	

**Conclusion:** In our study, lower QoL was found in several dimensions in patients with fractured osteoporosis. In fact, the experience of fracture may lead to a downward spiral of decline in physical function due to pain and loss of bone and muscle strength. This may in turn results in decreased mobility, activity restriction, poor wellbeing and reduced ability to carry out daily activities with great impact on the patient's QoL. Thus, QoL should be investigated at all stages of the disease to implement appropriate strategies and interventions.

### P321

#### FRENCH TRANSLATION AND VALIDATION OF THE KEELE START MSK TOOL

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**Objective:** The Keele STarT MSK Tool is a 10-item questionnaire developed to classify patients suffering from one of the five most common types of musculoskeletal pain into three sub-groups according to their risk of chronic pain (i.e., low risk, medium risk and high risk). The aim of the present study was to translate the Keele STarT MSK Tool into French and to evaluate its main psychometric properties.

**Methods:** The translation and intercultural adaptation of the questionnaire were carried out using a 6-step process. The following psychometric properties were investigated: floor and ceiling

effects, construct validity, internal consistency and test-retest reliability including standard error of measurement and smallest detectable change.

**Results:** 101 patients suffering from musculoskeletal pain participated in the study. No floor nor ceiling effects were observed. A Cronbach's  $\alpha$  of 0.65 was found, revealing moderate internal consistency. All items were demonstrated to be significantly correlated with the total score (range of correlations:  $r=0.2$  for item 7 to  $r=0.78$  for item 1). A significant correlation of  $r=0.78$  between the French Keele STarT MSK Tool and the ÖMPSQ-short was found. Nevertheless, a poor agreement between tools was found, highlighted by a Kappa value of 0.57. Test-retest reliability was excellent (Intraclass Correlation coefficient 0.97). The standard error of measurement and smallest detectable change of  $\pm 1.17$  were 0.42 and  $\pm 1.17$ , respectively.

**Conclusion:** A validated French version of the Keele STarT MSK Tool is now available and can be used by health practitioners to stratify patients as being at low, medium or high risk of persistent musculoskeletal pain.

### P322

#### DOES DEPRESSION INFLUENCE FUNCTIONAL RECOVERY AFTER AN OSTEOPOROTIC FRACTURE? A RETROSPECTIVE STUDY

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**Objective:** Osteoporosis and depression are important conditions with great impact on morbimortality and quality of life. This study aims to evaluate the impact of depression in patients with osteoporosis who suffered a fragility fracture.

**Methods:** Retrospective study of patients, aged 50 or over, observed between 2017-2020, in our hospital for a fragility fracture. Patients who died in orthopaedic ward after surgery were excluded. Depression was considered in patients taking one or more antidepressant medication. Demographic, comorbidities, and clinical results were collected. One year later, new fractures, hospitalizations, functional disability, institutionalization, and deaths were assessed. Patients with fragility fracture and depression (Group A) were compared with patients with fragility fracture without depression (Group B). Descriptive analysis used medians and interquartile range (IQR) for continuous data and frequencies and percentages for qualitative variables. Nonparametric tests were used for statistical analysis, with  $p$  value  $\leq 0.05$ , with SPSS® software.

**Results:** A total of 596 patients were included, which 202 suffered from depression (Group A). 92% of the patients with depression were female ( $p < 0.001$ ). Age at fracture evaluation, pre-

vious fractures, institutionalization, and status of dependence before fracture were similar between groups. Comorbidities as hypertension, diabetes, thyroid diseases, smoking, and alcohol abuse weren't statistically different between the two groups. The type of fracture was also similar between groups, except for vertebral ( $p=0.031$ ) and wrist ( $p=0.028$ ). Antiosteoporotic drugs were equally prescribed after fracture. In both groups, most patients were functionally independent after the fracture (47.7% vs. 53.3%). However, there were differences between partially dependent status (34.2% vs. 23.4%,  $p=0.006$ ) and institutionalizations (27.4% vs. 19.1%,  $p=0.027$ ). More patients died in group B (8.0 vs. 15.3%,  $p=0.011$ ).

**Conclusion:** Depression seems to have a negative impact on functionality recovery. This study should be an alert to address mental health in the recovery of these patients who suffered a fragility fracture.

### P323

#### PERCEIVED SOCIAL SUPPORT IN PATIENTS WITH CHRONIC PAIN

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**Objective:** Social factors could be significant factor in developing of chronic pain. Papers investigating this topic are devastating. We aim to investigate differences in perceived social support between chronic low back pain patients and healthy controls.

**Methods:** The present study included 134 patients (healthy controls – Group I:  $n=60$  (average age  $48.75\pm 12.23$  y, 39 women (65.0%)) and chronic low back pain patients – Group II:  $n=74$  (average age  $49.37\pm 14.76$  y, 45 women (60.8%)). All subjects completed a Multidimensional Scale of Perceived Social Support (MSPSS) which encompasses three dimensions: significant other (SO) support, family support (FA), and friend support (FR).

**Results:** Between groups there are not significant difference in age and gender ( $t=-0.367$ ,  $p=0.543$ ;  $t=1.652$ ,  $p=0.347$ ). Perceived FA support ( $6.56\pm 0.49$  vs.  $6.23\pm 1.31$ ,  $t=2.534$ ,  $p=0.002$ ) and total MSPSS scores was significantly higher in group I ( $6.52\pm 0.47$  vs.  $6.13\pm 1.23$ ,  $t=2.1246$ ,  $p=0.029$ ), while perceived SO ( $6.43\pm 1.09$  vs.  $6.19\pm 1.48$ ,  $t=0.795$ ,  $p=0.405$ ) and FR support were not different among groups ( $6.07\pm 0.73$  vs.  $5.79\pm 1.17$ ,  $t=1.617$ ,  $p=0.083$ ).

**Conclusion:** It seems that family social support is more impaired than friend and partner support in chronic low back pain patients. We suggest further research on larger number of subjects with other types of chronic pain.

### P324

#### THE EXPERIENCE OF USING TELEMEDICINE CONSULTING IN RHEUMATOLOGY DURING THE COVID-19 PANDEMIC IN THE RUSSIAN FEDERATION

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**Introduction:** Telemedicine consulting (TMC) is a technology for providing qualified medical care to patients via videoconference. The demand for TMC has increased due to the COVID-19 pandemic

**Aim:** to present the experience of managing and evaluating the effectiveness of TMC in rheumatology at the medical center in the Russian Federation.

**Materials and research methods:** From June 2020 to December 2021, 102 TMCs about rheumatology were performed in the Medical Association "New Hospital", Yekaterinburg, Russian Federation. Of these, 64 (62.7%) for patients after a previous face-to-face examination and 38 (37.3%) for patients who applied for TMC primarily.

**Research results:** The age of the patients was: 21-30 years old - 5.9%, 31-40 years old - 22.5%, 41-50 years old - 16.7%, 51-60 years old - 25.5%, 61-70 years old - 20, 6%, 71 years and older - 8.8%. Among the respondents, 75.5% were women and 24.5% were men.

Patients treated via TMC mostly had diseases requiring regular monitoring: rheumatoid arthritis - 28.1%, psoriatic arthritis - 12.5%, systemic connective tissue diseases - 18.8%, and also fibromyalgia - 10.9%.

The main reasons for applying to TMC were (multiple responses were acceptable): exacerbation of the disease (34.5%), the emergence of new symptoms (23.5%), laboratory and instrumental monitoring of the state (37.3%) and corrections to the therapy (42.2%). Only 9.1% of referrals were regarding COVID-19.

The choice to use TMC versus face-to-face consultation was due to the quickness of obtaining qualified medical care (50.0%) and convenience of being at home during the TMC (42.2%). But in no less than a quarter of cases, the patient's desire to choose a certain doctor, safety and cost aspects were significant.

TMC patients were satisfied: the proportion of patients who received answers to all their questions of interest was 90.2%, and 9.8% received answers to most of their questions. The doctors's satisfaction was graded  $4.51 \pm 0.79$  points on a 5-point scale. However, according to the doctors, a complete treatment of all the patient's problems was possible only in 77.5% of applications, while in 22.5% of all cases, an in-person visit was offered due

to the impossibility of accurate diagnosis, the need for injection therapy, and the presence of cognitive impairments or deafness in the patient.

TMC lasted an average of  $37.25 \pm 13.16$  minutes, of which  $18.94 \pm 8.75$  minutes was video contact. The doctors who performed the TMC indicated technical problems in 34 (33.3%) cases. Of these, 12 were poor video or sound quality, 10 were problems with the Internet connection, and 7 - patients could not understand the program interface. Special cases: patients have forgotten about the scheduled TMC, the patient's tablet has run out of charge, etc. The doctor was forced to switch to another communication channel (WhatsApp) during 19 (18.6%) of TMC.

**Conclusion:** Telemedicine is a promising branch of rheumatology, however, the technical conditions for teleconsultation need to be improved.

### P325

#### ASSESSMENT OF BONE MINERAL DENSITY IN SYSTEMIC LUPUS ERYTHEMATOSUS

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**Objective:** Patients with systemic lupus erythematosus (SLE) are at an increased risk of developing osteoporosis and osteoporotic fractures. This study evaluate the association of changes in BMD in patients with a long course of SLE with the age, sex and treatment with glucocorticoids who were treated in the V.V. Vinogradov City Clinical Hospital of the Moscow City Health Dept. (Russia).

**Methods:** BMD of the lumbar spine and hip joint was assessed by DXA. A total of 37 patients with SLE (35 women and 2 men), with an average age of 41.5 y and an average duration of SLE of 9.8 y were included in the study. The regional specifics of the treatment of patients with lupus erythematosus in the Chuvash Republic due to a serious deficiency of trace elements, including calcium in soil and water is a mandatory analysis of bone tissue for calcium, phosphorus and vitamin D. During the study on the Lunar Prodigy Advance densitometer (General Electric, USA), using the densi-

tometry method, bone density was diagnosed, calcium levels, total density and structure, thickness of the surface layer of bones were measured, and the probability of fractures was determined.

**Results:** Osteoporosis was diagnosed in 21% of patients and osteopenia in 15% of them. The mean ages of the subgroups with MPCT, osteopenia and osteoporosis were 23.1; 30.4 and 41.3 y, respectively. Variance analysis showed a statistically significant correlation between age and BMD: the duration of BMD was significantly shorter in patients with normal BMD (7.1 y) compared to those with osteopenia (16.3 y) and osteoporosis (12.5 y). All patients were treated with glucocorticoids; at the same time - 23.5% of patients were not taking vitamin D3; 35.7% of patients were not taking calcium medication.

**Conclusion:** Age and glucocorticoid treatment were the main risk factors for osteopenia in the group of patients with SLE. Timely prevention and treatment of osteopenia and osteoporosis in patients with SLE is important to reduce the risk of osteoporotic fractures.

### P326

#### RSM OPTIMIZED SURFACE MODIFIED HYALURONIC ACID TAGGED DEVELOPMENT OF SNEDDS OF PAMIDRONATE HYDRATE FOR THE TREATMENT OF OSTEOPOROSIS

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**Objective:** Osteoporosis is the leading cause of fracture and morbidity in the elderly population. Worldwide, osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture every 3 s. It is estimated that osteoporosis affects 200 million women worldwide. In India, the high prevalence of osteopenia (52%) and osteoporosis (29%) is thought to be due to inadequate nutrition.<sup>1</sup> The aim of the present work was to develop and characterize the surface-modified HA-tagged SNEDDS of pamidronate hydrate for the management of osteoporosis.

**Methods:** In equimolar ratios of 1:1 hyaluronic acid was conjugated with pamidronate in order to enhance the oral bioavailability of pamidronate hydrate. The conjugate was successfully characterized by DSC, TGA, NMR, XRD and SEM. The developed conjugate was loaded onto SNEDDS for the enhancement of permeability. The developed formulation system was optimized to get the desired results was response surface methodology.

**Results:** The SNEDDS shows a sustained release pattern as compared to pamidronate suspension. Finally, a kinetically stable SNEDDS of pamidronate with the particle size of 47.50 nm and self-emulsification time of 04 was obtained after optimization with response surface methodology. The study demonstrated

that a sesame oil-based SNEDDS was a promising strategy to enhance the selfemulsifying ability of pamidronate hydrate and its potential application in the management of osteoporosis.

**Conclusion:** The developed delivery showed a promising strategic formulation of pamidronate that can be included in the oral management of osteoporosis and can be cost-effective to reduce the injection burden. Also, the pamidronate is currently available as a parenteral IV infusion only so the renal patient needs critical attention while infusion to prevent the complex in the renal system. This delivery system will not only enhance the pharmaceutical development skills but also provide a new and easy drug delivery route for the management of osteoporosis with increased bioavailability.

**Reference:** 1. Shatrugna V, et al. Osteoporos Int 2005;16:1827.

**Acknowledgement:** Financial support of DST Nano Mission, Govt. of India, grant no. SR/NM/NS/1162/2015.

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### HA-PAM TAGGED SURFACE MODIFIED SNEDDS PREVENT BONE LOSS IN OVARIECTOMIZED RAT MODEL OF OSTEOPOROSIS

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**Objective:** Osteoporosis is a disease of the musculoskeletal system which affects bones. It is a leading cause of fracture and morbidity in the elderly population. Worldwide, it causes more than 9 million fractures annually, resulting in an osteoporotic fracture every 3 s. It is estimated that osteoporosis affects 200 million women worldwide. In India, high prevalence of osteopenia (52%) and osteoporosis (29%) is thought to be due to inadequate nutrition.<sup>1</sup> The aim of the present work was to develop and characterize the surface-modified HA-tagged SNEDDS of pamidronate hydrate and to determine its anti-osteoporosis activity in an ovariectomized female Wistar rat model for the management of osteoporosis.

**Methods:** In equimolar ratios of 1:1 hyaluronic acid was conjugated with pamidronate in order to enhance the permeability and oral bioavailability of pamidronate hydrate. The conjugate was successfully characterized by DSC, TGA, NMR, XRD and SEM. The developed conjugate was loaded onto SNEDDS for the enhancement of permeability. The drug-loaded SNEDDS were given to ovariectomized Wistar rat model to assess its antiosteoporosis activity.

**Results:** The HA-PAM tagged SNEDDS shows great potential as compared to pamidronate suspension. The HA-PAM tagged SNEDDS enhanced BMD to 124.5% compared to generic formulation and suspension. The bone mechanical strength also showed 13.5-fold increased strength compared to suspension. The study demonstrated that a sesame oil-based SNEDDS was a promising

strategy to enhance the selfemulsifying ability of pamidronate hydrate and its potential application in the management of osteoporosis.

**Conclusion:** The developed delivery showed a promising strategic formulation of pamidronate that can be included in the oral management of osteoporosis and can be cost-effective to reduce the injection burden. Also, the pamidronate is currently available as a parenteral IV infusion only so the renal patient needs critical attention while infusion to prevent the complex in the renal system. This delivery system will not only enhance the pharmaceutical development skills but also provide a new and easy drug delivery route for the management of osteoporosis with increased bioavailability.

**Reference:** 1. Shatrugna V, et al. Osteoporos Int 2005;16:1827.

**Acknowledgement:** Financial support of DST Nano Mission, Govt. of India, grant no. SR/NM/NS/1162/2015.

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### VIT-D3 TAGGED SURFACE MODIFIED HA-PAM SNEDDS PREVENT BONE LOSS IN OVARIECTOMIZED RAT MODEL

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**Objective:** Osteoporosis is a disease of musculoskeletal system which affects bones. It is a leading cause of fracture and morbidity in elderly population. Worldwide, it causes more than 9 million fractures annually, resulting in an osteoporotic fracture every 3 seconds. It is estimated that osteoporosis affect 200 million women worldwide. In India high prevalence of osteopenia (52%) and osteoporosis (29%) thought to be due to inadequate nutrition.<sup>1</sup> The aim of the present work was to develop and characterize the vit-D3 tagged surface modified HA SNEDDS of Pamidronate hydrate and to determine its anti-osteoporosis activity in ovariectomized female Wistar rat model for the management of osteoporosis.

**Methods:** In equimolar ratios of 1:1 hyaluronic acid was conjugated with pamidronate and complexed with vit-D3 in order to enhance the permeability and oral bioavailability of pamidronate hydrate. The conjugate was successfully characterized by DSC, TGA, NMR, XRD and SEM. The developed conjugate was loaded onto SNEDDS for the enhancement of the permeability. The drug loaded SNEDDS were given to ovariectomized Wistar rat model to assess its antiosteoporosis activity.

**Results:** Vit-D3 tagged HA-PAM SNEDDS shows great potential as compared to pamidronate suspension. The Vit-D3 tagged HA-PAM SNEDDS enhanced BMD to 124.5% compared to generic formulation and suspension. The bone mechanical strength also showed 13.5 fold increased strength compared to suspension.



The study demonstrated that a sesame oil based SNEDDS was a promising strategy to enhance the self-emulsifying ability of pamidronate hydrate and its potential application the management of osteoporosis.

**Conclusion:** The developed delivery showed a promising strategic formulation of pamidronate and vit D3 and its codelivery that can be included in the oral management of osteoporosis and can be cost-effective to reduce the injection burden. Also, the pamidronate is currently available as a parenteral IV infusion only so the renal patient needs critical attention while infusion to prevent the complex in the renal system. This codelivery system of vit-D3 with pamidronate enhanced its potential to treat osteoporosis and provide a new and easy drug delivery route for the management of osteoporosis with increased bioavailability.

**Reference:** 1. Shatrugna V, et al. Osteoporos Int 2005;16:1827.

**Acknowledgement:** Financial support of DST Nano Mission, Govt. of India, grant no. SR/NM/NS/1162/2015.

## P329

### ROLE OF TERIPARATIDE IN DISTAL RADIUS OSTEOPOROTIC FRACTURE: CONSERVATIVELY MANAGED PATIENTS IN ASIAN 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. Distal radius fracture is one of the most frequent fractures and it has been shown to be associated with an increased risk of further fractures. Faster time-to-union is important for early return to daily activities and reduction of complications. Teriparatide has been shown to accelerate fracture healing, but the literature is deficient at time of study on osteoporotic distal radius fracture in Asian population. The aim of this study is to assess whether teriparatide accelerates fracture healing.

**Methods:** Double-blinded randomized controlled trial that was conducted from January 2015 to June 2019, patients with osteoporotic distal radius fractures extra articular managed in casting are included. The primary objective of this study was to compare the effect of 8 weeks of once-daily subcutaneous (SC) treatment with teriparatide 20 vs. placebo on time to radiographic healing in osteoporotic patient with a unilateral distal radius fracture. Radiographic healing was defined by cortical bridging in three of four cortices. Secondary objectives include time to healing of four cortices evaluated from X-rays, evaluation of anatomic deformity, and functional assessments. Patients were screened from the day of the fracture and randomization, a treatment period of 8 weeks (teriparatide or placebo), a follow-up period without treatment for 8 weeks, and a safety extension for an additional 36 weeks. Secondary objectives included radiographic evidence

of time to healing of four cortices bridging, early and partial endosteal healing, and trabecular union. Functional assessments included the self-administered Patient-Rated Wrist Evaluation (PRWE) questionnaire and assessment of grip strength via a Jamar dynamometer.

**Results:** A total of 214 patients were screened, and 202 women were enrolled into the study; 12 patients discontinued before receiving and during treatment. The remaining 202 women were randomly assigned to once-daily placebo (n 107) or 20 mg (n 107). Most patients in each group completed 8 weeks of treatment and 8 weeks of follow-up (placebo 100/107, teriparatide 20 mg 102/107, Baseline characteristics were balanced across groups. Median time to healing was shorter in the teriparatide 20 mg group than in the placebo group (95%CI 2.5 to 0.7 weeks, p 0.005). The time to healing was shorter in the teriparatide 20 mg group compared with the placebo group (95%CI 2.4 to 1.4 weeks, p<0.005). There were no statistically significant between-treatment differences in time to healing for the secondary objectives assessed by standard radiographic X-rays. Significant improvement in scores on pain and functional tests and grip strength compared with baseline occurred in each of the treatment groups,

**Conclusion:** This study shows shortened time to healing for teriparatide 20 µg compared with placebo suggest that fracture repair can be accelerated by teriparatide, along with significant improvement in scores on pain, functional tests and grip strength after 8-week treatment in conservatively treated distal radius osteoporotic fractures.

## P330

### OSTEOPOROSIS PREVALENCE, AWARENESS AND PERTINENT RISK FACTORS IN A COHORT OF ELDERLY ASIAN POPULATION PRESENTING WITH LOW-ENERGY DISTAL RADIUS FRACTURES

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**Objective:** To evaluate the awareness of osteoporosis and related risk factors in elderly Asian patients who present with distal radius fractures. The distal radius fracture is one of the most frequent fractures in the elderly cohort, owing to osteoporosis, and maybe a harbinger for further fractures, however, data is scarce regarding awareness of this condition among these patients.

**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 in Karachi from January-December 2018. Data were collected via a self-designed questionnaire, assessing the demographic information, knowledge about osteoporosis and its risk factors. The data was analysed using SPSS 20 for statistical significance.

**Results:** From a total of 550 patients with a mean age of 70.5±32.82 y, there were 442 (80.36%) females and 108 (19.63%)

males. On educational consideration, 243 (44.18%) patients could not read or write and only 110 (20%) of the patients received secondary school education. Only 123 (22.36%) were well informed about osteoporosis, the predominant source of information being their physician. There were 427 (77.63%) patients who were unaware of osteoporosis, 16% of which were smokers, 26% indicated they exercised at least 30 minutes daily, and 2% reported drinking alcohol occasionally. On dietary supplements, 24.27% of patients reported calcium and 17.81% reported vitamin D supplement consumption on regular basis. **Conclusion:** We found a positive correlation between a patient's education status and osteoporosis awareness. We believe that the role of the physician could be crucial in preventing further fractures in such patients via physician lead educational campaigns to target modifiable risk factors.

### P331

#### DOES MALNUTRITION IN CLUBFOOT PATIENTS AFFECT PONSETI TECHNIQUE AND ITS OUTCOME?

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**Objective:** Malnutrition is a crucial health problem predominantly in the developing countries. Malnutrition in children is one of the main risk factors for diseases and mortality. Clubfoot or congenital talipes equinovarus (CTEV) is the most common form of congenital orthopaedic abnormality. Over the past 20 y, the Ponseti method is considered the gold standard for the treatment of clubfoot. This study aimed to determine the prevalence of malnutrition in clubfoot patients, and its effects on the outcome of Ponseti technique in patients presenting to the Orthopaedic Clinic of tertiary care Hospital in Karachi, Pakistan. **Methods:** The cross-sectional study was conducted from January to December 2018. Total 153 clubfoot patients were treated and the WHO classification of weight-for-age index was used to assess the nutritional status of patients, and its impact on outcome of Ponseti technique was recorded and analysed with a P value  $\leq 0.05$  as significant. **Results:** Of the 153 patients, 112 (79.7%) were found in good nutritional status and 42 (20.6%) were malnourished. The average number of casts per patient and patients requiring 6+ casts in the undernutrition group was higher compared with good nutrition group (45.5% vs. 21.42%, respectively). The number of Achilles tenotomy performed in the undernutrition group was also higher (76.4% vs. 51.8%). **Conclusion:** A significant correlation between patients' nutritional status and outcome of the Ponseti technique is found as it influences the number of casts, possible relapse and failure of treatment.

### P332

#### INADEQUATE VITAMIN D LEVEL: ASSOCIATION WITH LOW ENERGY FRACTURES OF DISTAL RADIUS IN YOUNG PATIENTS AND ITS PREDICTORS IN KARACHI, PAKISTAN

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**Objective:** To determine association of inadequacy of vitamin D level with low energy fractures of distal radius and its predictors in young patients in Karachi, Pakistan.

**Methods:** Cross-sectional study was conducted on 220 young patients, visited hospital with low energy fracture of distal radius. A questionnaire was designed and filled after taking consent includes details regarding age, gender, occupation, area of skin and sun exposure duration, dietary habits, type of clothing and residence used. Serum vitamin D3 levels were determined and compared with serum calcium levels, serum phosphorus and alkaline phosphatase levels.

**Results:** Among 220 patients ranging from 12-45 y, mean  $28 \pm 23.33$  SD. Female were 172 (78.18%). Mostly have history of fall 127 (57.72%) and RTA 63 (28.63%). Sun exposure duration in majority of participant was 1-2 hour/d 132 (60%). Variable coloured clothes used by majority participant 135 (61.36%) and variable fabric 102 (46.36%). 202 (91.8%) patients had deficiency of vitamin D and correlated with duration of sunlight exposure significantly, also with exposure of large skin area, dietary consumption of vitamin D rich food and worn variable clothing colours. Serum phosphorus level and serum alkaline phosphatase level were negatively correlated with vitamin D significantly whereas positively correlated with serum calcium.

**Conclusion:** Prevalence of vitamin D deficiency is very high in low energy fracture of distal radius in young population and sun exposure duration found to be most common predictor of inadequate D levels. A national food fortification program and campaign of public awareness to increase sunlight exposure and increase intake of vitamin D rich food are urgently needed.

### P333

#### BONE MINERAL DENSITY AMID PANDEMIC

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**Objective:** COVID-19 pandemic had some changes in terms of skeletal health, especially in menopausal and older females, including limited physical exercise, access to therapy, aggravating sarcopenia and vitamin D deficiency, the potential effect of depression and even antidepressants on skeleton metabolism, not the mention the pro-inflammatory effect on skeleton in positive cases. (1-5) We aim to present changes of BMD on a menopausal female amid pandemic.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 62-year old female admitted for bone evaluation amid pandemic due to limited physical activity during first 18 months. She is known with chronic immune thyroiditis with hypothyroidism, arterial hypertension, arrhythmia, class II NYHA cardiac insufficiency, episode of urinary tract infections, dyslipidemia, dyspepsia, anxiety syndrome. In 2019, before pandemic burst, she had controlled thyroid function under substitution, starting from an initial TSH=11  $\mu$ UI/mL (N:0.5-4.5), FT4=8.9 pmol/L (N:9-19) with normal bone turnover markers: osteocalcin=23 ng/mL (N:15-46), CrossLaps=0.84 ng/mL (N:0.33-0.782), P1NP=65.5 ng/mL (N: 20.25-76.31) and PTH=65 pg/mL (N:15-65) and low 25OHD=20 ng/mL (N>30). Initial DXA was normal: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.984, T-score(SD)=-1.6, Z-score(SD)=-0.8; total hip BMD(g/cm<sup>2</sup>)=0.972, T-score (SD)=-0.3, Z-score (SD)=0.4; femoral neck BMD(g/cm<sup>2</sup>)=0.981, T-score (SD)=-0.4, Z-score (SD)=0.6. After 18 months of pandemic regulations during which she restricted outdoor activities, she came to our attention showing 25OHD=22 ng/mL under daily 1000 UI/d of cholecalciferol, reduced osteocalcin=5.25 ng/mL (N:15-46), and high CrossLaps=0.85 ng/mL (N:0.33-0.782). Lumbar DXA revealed osteoporosis: L1-4 BMD (g/cm<sup>2</sup>)=0.805, T-score(SD)=-2.5, Z-score(SD)=-1.6. No vertebral fractures were detected at lumbar spine profile X-ray. Decision of weekly therapy with risedronate was done and serial follow-up

**Conclusion:** Whether strict pandemic regulations might reflect on bone health is an open question. In this case, we might speculate a certain contribution as it was described in other areas like gonadal and metabolic status (including glucose profile) influences.

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## P334

### SOMATOTROPINOMA AND SKELETON EVALUATION IN DAILY PRACTICE

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**Objective:** Acromegaly may induce abnormalities in bone metabolism and may have a negative impact on bone microstructure, causing secondary osteoporosis. The effect of excessive GH (growth hormone) and IGF-1 is an imbalance between proliferation and differentiation of osteoblastic cells and recruitment and activation of osteoclastic cells, resulting in an increase in bone resorption activity. BMD may vary among acromegalic patients, and may be increased, normal, or decreased in different skeletal sites. Hypogonadism in acromegaly may also be a factor that contributes to loss of bone mass, as well as hyperprolactinemia itself, secondary diabetes mellitus and associated tumors (if any). (1-5) We aim to introduce skeleton assessment in a acromegalic patient.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** A 59-year, nonsmoking female is admitted for evaluation postoperative treatment of acromegaly. Her medical history includes right inguinal hernia, hysterectomy for uterine fibroma without ovariectomy, cholecystectomy, appendectomy, surgery for a nasopharyngeal cyst. Somatotropinoma (15/17/16 mm) related acromegaly was diagnosed a year ago, treated with cabergoline for 11 months followed by transsphenoidal hypophysectomy. Initial IGF1=400 ng/mL(46-238) normalized. 75-g oral glucose tolerance (OGTT) test showed also normal GH.

OGTT	minutes	0'	30'	60'	90'	120'
initial	GH (ng/mL)	1.39	1.24	1.09	<b>1.04</b>	1.14
postoperative	GH (ng/mL)	0.985	0.766	0.119	0.0779	<b>0.069</b>

No pituitary insufficiency, neither diabetes was detected with mild hyperprolactinemia (since start) remission after neurosurgery. Initially, vitamin D deficiency was confirmed: 25-hydroxyvitaminD=24.3 ng/mL (N:30-100), normal PTH, high bone resorption marker CrossLaps=0.82 ng/mL (N:0.33-0.782), and high formation marker P1NP=99.34 ng/mL (N: 20.25-76.31) with normal osteocalcin=40.5 ng/mL (N:15-46). Lumbar DXA was consistent with osteopenia: lumbar L1-4 BMD(g/cm<sup>2</sup>)=1.048, T-score(SD)=-1.2, Z-score(SD)=-0.1; femoral neck BMD(g/cm<sup>2</sup>)=1.09, T-score(SD)=0.4, Z-score(SD)=1.4; total hip BMD (g/cm<sup>2</sup>)=1.233, T-score(SD)=1.8, Z-score(SD)=2.5, while DXA-deri-

vate TBS was low=1200. Due to acromegaly remission, only serial checkup is recommended in addition to daily 1000 UI cholecalciferol.

**Conclusion:** In this acromegalic patient, TBS seems more relevant than BMD-DXA; initial anomalies of bone formation markers may be correlated with GH/IGF1 values; concurrent coxarthrosis might explain hip DXA results.

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### P335

#### CONSIDERATION OF DEPRESSIVE SYMPTOMS IN OUTCOME ASSESSMENT MAY BE CRITICAL TO REFLECT CAPACITIES OF PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** To study the impact that depressive symptoms may have on the results of functional outcome assessment in patients with advanced to severe knee osteoarthritis, according to the degree of objectivity the outcome measure used.

**Methods:** This was an observational study, in which 244 patients with clinical (pain  $\geq 3$ ) and radiological symptoms (KL  $\geq 3$ ) of knee osteoarthritis participated. Patient-reported (subjective), clinician-reported (objective) and performance-based measures were assessed in terms of the Oxford Knee Score (OKS), the knee range of motion (KROM) and the Timed up and go (TUG) respectively. Participants with depressive symptoms were classified for having no, mild or severe symptoms according to the Yesavage scale.

**Results:** Overall, 30.7% of participants presented with depressive symptoms. Depressive symptoms differently correlated with the measures: The association with OKS was moderate ( $r=-0.387$ ); however, the correlation with the TUG was low ( $r=0.176$ ), and no correlation was found with KROM.

**Conclusion:** Consideration of depressive symptoms in outcome assessment may be critical to ensure data collected to accurately reflect patients' capacities and selfperceived status, since the results of patient-reported questionnaires may underestimate the clinical status of patients with severe knee OA who present with

depressive symptoms. Psychological status, as well as outcome measures that consider the perspective of both clinicians and patients should be included on a routine basis.

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### P336

#### RELATIONSHIP OF FUNCTIONAL CLASS AND XANTHINE OXIDOREDUCTASE ACTIVITIES IN PLASMA AND LYMPHOCYTES OF RHEUMATOID ARTHRITIC PATIENTS

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**Objective:** Evaluation of xanthine oxidase (XO) and xanthine dehydrogenase (XDG) activities in plasma and lysed lymphocytes depending on the functional class (FC) of rheumatoid arthritis (RA) patients.

**Methods:** Lymphocytes were isolated by A. Böyum's method. XDG (EC 1.17.1.4) and XO (EC 1.17.3.2) activities in plasma and lymphocytes were measured spectrophotometrically and expressed as nmol/min/ml [1]. Enzymatic activities in lymphocytes were normalized to  $1 \times 10^7$  cells/ml. Statistical tests were selected in line with common guidelines. The results were expressed as Me [ $Q_{25}$ ;  $Q_{75}$ ]. Spearman's correlation coefficient was used. Differences were considered significant when  $p < 0.05$ .

**Results:** 77 RA patients (20 males and 57 females, mean age 45 [37; 49] y, mean disease duration 8 [6; 10] y) from the rheumatology unit of Volgograd Clinical Emergency Hospital #25 as well as 35 healthy controls (16 males and 19 females) were included in the study. Diagnosis of RA had been verified using ACR/EULAR 2010 criteria. Most RA patients (92.8%) had 2 and 3 FC. Reference ranges for plasma and lymphocyte XO activities were 2.29-4.31 and 14.11-31.33 nmol/min/ml, respectively. Similar ranges for XDG activities were 4.52-5.97 and 18.62-39.64 nmol/min/ml, respectively. XO activity is increased in blood plasma, XO and XDG activities ( $p \leq 0.001$ ) is decreased in lymphocytes of RA patients. The XO activity of plasma as well as the XO and XDG activities of lymphocytes were correlated with the FC of RA patients ( $p < 0.001$ ). An increase in the FC were characterized by more high XO activity in blood plasma as well as lower XO and XDG activities in lymphocytes.

**Conclusion:** An increase in the oxidase form of xanthine oxidoreductase activity, which generates reactive oxygen species, is accompanied by a decrease in functional capabilities and a deterioration in the quality of life in RA patients.



**Reference:** 1. Mozgovaya EE, et al. Siberian Journal of Life Sciences and Agriculture 2021; 13:288

P337

### A FALL-CLASSIFICATION FRAMEWORK PROPOSAL FOR PATIENTS UNDERGOING TOTAL KNEE REPLACEMENT

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**Objective:** No classification framework similar to that proposed in other populations, such as older adults or lower limb prosthesis users, has been developed to date for patients undergoing total knee replacement (TKR). This work sought to propose a fall-classification framework for this population.

**Methods:** Observational study in which 253 subjects with severe knee osteoarthritis waiting for primary TKR were evaluated before and after TKR surgery. A three-level fall-classification framework was proposed, which classified falls considering the location of the destabilizing force, source of destabilization and fall pattern. Fall incidence and circumstances were described; the characteristics of fallers and non-fallers in terms of functional and balance performance were compared with F-tests (95%CI).

**Results:** It was possible to classify 97% of falls within the proposed framework. Overall, 40.3% of participants fell at least once in the year before TKR. This figure decreased to 13.1% and to 23.4% at 6 and 12 months after surgery. Most falls were caused by destabilizations in the base of support (n=102, 72%), were due to extrinsic factors (n=78, 76%) and trip patterns. Significant differences between fallers and non-fallers were found in characteristics such as the knee extensor strength and monopodal stability in the surgical limb (p<0.05).

**Conclusion:** The proposed framework was suitable, since most falls were classified. Falls are prevalent in patients with severe knee osteoarthritis. Symptoms and functional performance improve after surgery, and fall incidence tends to decrease. Most fall events are originated by disruptions in the base of support, and precipitated by extrinsic factors, generally trips during walking activities.

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P338

### RELATIONSHIP OF RADIOLOGICAL STAGE AND XANTHINE OXIDOREDUCTASE ACTIVITIES IN PLASMA AND LYMPHOCYTES OF RHEUMATOID ARTHRITIC PATIENTS

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**Objective:** Evaluation of xanthine oxidase (XO) and xanthine dehydrogenase (XDG) activities in plasma and lysed lymphocytes depending on the radiological stage (RS) of rheumatoid arthritis (RA) patients.

**Methods:** Lymphocytes were isolated by A. Böyum's method. XDG (EC 1.17.1.4) and XO (EC 1.17.3.2) activities in plasma and lymphocytes were measured spectrophotometrically and expressed as nmol/min/ml [1]. Enzymatic activities in lymphocytes were normalized to  $1 \times 10^7$  cells/ml. Statistical tests were selected in line with common guidelines. The results were expressed as Me [Q<sub>25</sub>; Q<sub>75</sub>]. Spearman's correlation coefficient was used. Differences were considered significant when p<0.05.

**Results:** 77 RA patients (20 males and 57 females, mean age 45 [37; 49] y, mean disease duration 8 [6; 10] y) from the rheumatology unit of Volgograd Clinical Emergency Hospital #25 as well as 35 healthy controls (16 males and 19 females) were included in the study. Diagnosis of RA had been verified using ACR/EULAR 2010 criteria. 33 (43%) patients had the second RS, 38 (49%) to the third RS, 6 (8%) RS. Reference ranges for plasma and lymphocyte XO activities were 2.29-4.31 and 14.11-31.33 nmol/min/ml, respectively. Similar ranges for XDG activities were 4.52-5.97 and 18.62-39.64 nmol/min/ml, respectively. XO activity is increased in blood plasma, XO and XDG activities is decreased in lymphocytes of RA patients (p<0.001). XO and XDG activities in plasma and lymphocytes did not correlate with the RS in RA patients (p>0,05). However, there is a clear tendency: enzyme activities increase in plasma and decrease in lymphocytes as the RS of joint damage grows.

**Conclusion:** A change in the plasma and lymphocytic parameters of XO and XDG activities about the appearance of destructive processes in the affected joints and the need to adjust treatment may indicate.

**Reference:** 1. Mozgovaya EE, et al. Siberian Journal of Life Sciences and Agriculture 2021; 13(3):288

P339

### BONE EVALUATION IN A FEMALE WITH HYPERCALCITONINEMIA DIAGNOSED WITH DOUBLE INCIDENTALOMA

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**Objective:** Adrenal incidentaloma opposite to pituitary incidentaloma associates in third of the cases autonomous cortisol secretion that is less manifested as clear Cushing syndrome; however, long terms effects might be reflected in bone and cardiometabolic features. Opposite to adrenal, pituitary incidentaloma is not correlated with hormonal anomalies that might impair bone, unless mild hyperprolactinemia. We aim to introduce a female diagnosed with hyper-calcitoninemia and double incidentaloma with considerations on bone status.

**Methods:** Case report.

**Results:** A 66-year-old female was admitted 2 y ago for accidental detection of high calcitonin at evaluation as outpatient for multinodular goiter. She associated arterial hypertension, ischemic cardiac disease, dyslipidemia and episodes of headache (menopause by the age of 53). Her medical records showed normal thyroid function: TSH=1.3  $\mu$ UI/mL (N:0.5-4.5), calcitonin of 4 times upper limit, negative thyroid autoimmunity. A medullary thyroid carcinoma (MTC) was suspected; she also had an abdominal ultrasound done and a right adrenal tumor of 2 cm was identified and confirmed at CT. Also, due to persistent headache, imaging of the head was performed and found a pituitary incidentaloma of 0.6 cm. Pituitary hormones were negative, so was adrenal profile, except for partial inhibition of plasma morning cortisol of 2.2  $\mu$ g/dL (N<1.8) after low dose dexamethasone test, thus a possible autonomous cortisol secretion was confirmed. She was referred for thyroidectomy; pathological report did not confirm MTC. Preoperative bone assessments showed normal bone formation marker osteocalcin=25 ng/mL (N:15-46) and a mild suppression of bone resorption marker CrossLaps=0.3 ng/mL (N: 0.33-0.782) with normal PTH=36 pg/mL (N: 15-65). DXA showed osteopenia: lumbar L1-4 BMD(g/cm<sup>2</sup>)=1.004, T-score(SD)=-1.5, Z-score(SD)=-0.3; total hip BMD(g/cm<sup>2</sup>)=0.933, T-score(SD)=-0.6, Z-score(SD)=0.3; femoral neck BMD(g/cm<sup>2</sup>)=0.859, T-score(SD)=-1.3, Z-score(SD)=-0.1. She continued with vitamin D supplements. She was reassessed recently amid pandemic and identified with mild vitamin D deficiency (25OHD=22.6 ng/mL) with an incidental vertebral fracture and osteoporosis at DXA, requiring antiresorptive medication: DXA: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.9, T-score(SD)=-2.5, Z-score(SD)=-1.2.

**Conclusion:** This case highlights not necessarily the single effect of aging in terms of BMD, but, yet, additional causes: hypercalcitoninemia is less likely to affect the bone, but persistent cortisol excess, even mild, should be considered; also, the role of COVID-19 pandemic and associated restrictions might impair outdoor exercise which is a boost for bone formation.

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P340

### SPONTANEOUS AND INDUCED NEUTROPHIL EXTRACELLULAR TRAPS FORMATION IN OSTEOARTHRITIS PATIENTS

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**Objective:** Evaluation of peripheral blood neutrophils ability to generate NET spontaneously and after induction in vitro in osteoarthritis (OA).

**Methods:** The research was carried out in agreement with the WMA Declaration of Helsinki principles. Neutrophils were isolated with one-step centrifugation procedure using double-layer ficoll-amidotrizoate density gradient with density of upper and lower layers 1080 kg/m<sup>3</sup> and 1090 kg/m<sup>3</sup>, respectively. 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 [1].

**Results:** 23 patients with verified OA (6 males and 17 females, mean age 5.4 y, mean disease duration 12.5 y). 30 healthy volunteers were enrolled as a reference group. OA patients were in clinical remission at the inclusion timepoint. Indicators of the yield of isolated cells, purity of cell fractions, viability and nonspecific activation of neutrophils in the control group were comparable to those of the same name in healthy individuals. Mean contamination fraction of neutrophils both in the reference group and in the OA patients in did not exceeded 3%. Spontaneous and induced NET formation by isolated neutrophils in patients with OA during exacerbation is significantly higher than in OA in remission and in the reference group (p<0.05). The growth rate of

spontaneous NET formation was 149.1%, induced NET formation - 39.8%. The growth rate of spontaneous NET formation is 3.8 times higher than the induced NET formation.

**Conclusion:** We have revealed enhanced spontaneous and induced NET formation by neutrophils from OA patients, suggesting that circulating neutrophils may be primed to NETosis through immune inflammation.

**Reference:** 1. Bedina S, et al. *Med Immunol* 2021;23:1165

### P341

#### INPATIENTS WITH ACROMEGALY: TRABECULAR BONE SCORE IS ASSOCIATED WITH IMPAIRED GLUCOSE METABOLISM RATHER THAN HYPERSECRETION OF GROWTH HORMONE

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**Objective:** Acromegaly is associated with decreased bone structure but not BMD. Our recent study has been showing that impaired quality of cortical bone is associated with vertebral fractures (VF) regardless of acromegaly activity. Previously, trabecular bone compartment was thought to be strongest predictor of VF in growth hormone hypersecretion. Impaired glucose metabolism is common comorbidity in acromegaly, but as the risk factor for bone quality decrease in acromegaly has been not studied yet. We aimed to assess effect of glycemic compensation on DXA-derived bone parameters, such as BMD, TBS, cortical and trabecular volumetric (v)BMD, surface (s)BMD and cortical thickness (Cth) of proximal femur among patients with acromegaly.

**Methods:** A single-center 2-y prospective study of acromegaly patients was conducted. Each subject had L1-4 spine, femoral neck and total hip aBMD measured using DXA, and TBS measurement performed. 3D Shaper™ was used to assess proximal femur trabecular and cortical vBMD, cortical sBMD and Cth. Among all laboratory parameters, glycosylated hemoglobin (HbA1c), fasting plasma glucose (FPG), C-peptide levels and insulin resistance index in each patient was assessed. Abnormal glucose metabolism (GM) was defined as impaired glucose tolerance or diabetes according to current ADA guidelines. Follow-up periods were baseline and year 2.

**Results:** 70 acromegaly patients (24 males/46 females; average age 55.5 y) were included, of whom 25 and 35 had active acromegaly and abnormal GM, respectively. At baseline, subjects with abnormal GM had higher FPG, HbA1c and lower TBS in comparison to normal GM subjects ( $p < 0.05$ ). At both time points multiple regression model adjusted for IGF-1 showed HbA1c negatively

associated with TBS. No significant associations between other parameters of glucose metabolism and TBS were shown at both time points.

**Conclusion:** This study shows in IGF-1 adjusted multiple regression model that HbA1c is negative predictor of TBS among patients with acromegaly. Based on this finding, it is likely that impairment of trabecular bone in acromegaly patients is the result of abnormal glucose metabolism rather than GH hypersecretion, as previously assumed.

### P342

#### EFFECTS OF OSTEOPOROSIS DRUG TREATMENTS ON FEMUR STRENGTH USING 3D-SHAPER BASED FINITE ELEMENT ANALYSES

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**Objective:** To assess the effects of alendronate (AL), denosumab (DMAB), and teriparatide (TPTD) on femur strength using DXA-based 3D finite element analyses.

**Methods:** A cohort of 155 patients stratified by treatment, AL(N=54), DMAB(N=33), TPTD(N=31), and naïve of treatment NAIVE(N=37) were analysed. DXA scans were performed at baseline and after treatment. 3D-Shaper® software estimated 3D femur geometry and bone density distribution from the DXA scans [1]. Patient-specific finite element (FE) models were generated simulating sideways fall and femur strength (integral, cortical, trabecular) were calculated [2]. Percentage changes in aBMD and femur strength at follow-up compared to baseline were calculated and normalised to 24 months.

**Results:** Statistically significant ( $p < 0.05$ ) increase in femoral neck aBMD were observed for DMAB(2.9%) and TPTD(1.8%) only. While total femur aBMD showed statistically significant ( $p < 0.001$ ) increase for DMAB(3.5%) and AL(1.7%) only. The changes in aBMD translated to statistically significant ( $p < 0.001$ ) increase in integral strength for DMAB(4.5%) and AL(3.7%) only. Statistically significant ( $p < 0.05$ ) increase in trabecular strength were observed for DMAB(2.8%) and AL(2.0%) only and in cortical strength for DMAB(1.9%) only. All treatment groups showed average increase in femoral aBMD and strength but were not statistically significant, while NAIVE group showed average decrease for aBMD and strength but were not statistically significant.

**Conclusion:** A DXA-based 3D FE analyses provided insights into effects of osteoporosis drug on femur strength that are not readily evident from aBMD measurements alone.

**References:**

1. Winzenrieth R, et al. *Osteoporos Int* 2018;29:2323

2. Johannesdottir F, et al. Bone 2017;105:93

### P343

#### FRACT: EVALUATION OF POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS AT THE FRACTURE LIAISON SERVICE OF PM&R DEPARTMENT

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This observational, descriptive and cross-sectional study was performed on 210 women with postmenopausal osteoporosis, over 50 years of age. The follow up period was between March 2018 and July 2020. Patients were recruited through clinician referral in the Fracture Liaison Service (FLS) at the Dept. of Physical Medicine and Rehabilitation, İstanbul University – Cerrahpasa Medical Faculty.

Participants were allocated to two groups: Group 1: Patients with postmenopausal osteoporosis without fractures (n:67, 31.9%), and Group 2: Patients with postmenopausal osteoporosis with fractures (n:143, 68.1%). The mean age of the patients was 67.65 (9.64), and the mean BMI was 27.63 (26.98). Site of the fractures were: vertebra (n:65, 46%), wrist (n: 37, 26%), hip (n:17, 12%), leg (n:20, 14%), arm (n:17, 12%), clavícula (n:1, 0.7%).

The mean age at menopause was 45.19 (6.20) y, 94 of the patients had premature menopause, 175 had natural menopause while 30 had induced menopause. Nulliparity was reported in 27 of women, and the mean number of delivery was 2.9 (0.16). The mean duration of lactation was 28.8 (3.57) months in Group 1, while it was 32,57 (2.79) months in Group 2. Although there was a slight difference between groups, with regard to gynecologic profile, none of them showed a statistical significance.

According to the distribution of the patients in terms of Turkish FRAX intervention threshold; 113 (65.7%) patients were above the cutoff value, and FRAX for major fracture score was significantly higher in group 2.

35 of the patients had at least one fall experience within a year in the present study.

There was a statistically significance between group 1 and group 2 in terms of all parameters evaluating fall risk and balance assessed by tandem stance, tandem walking, timed up and go test, and rising from a chair without help.

According to our findings, evaluation of fall risk and balance is one of the most important determinants of fracture risk, and should be an essential issue of the management of postmenopausal osteoporosis.

### P344

#### COVID-19 PANDEMIC: SELFDECISION OF CESSATION ANTIOSTEOPOROTIC MEDICATION

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**Objective:** COVID-19 pandemic had a negative impact on patients' compliance, decreasing the number of hospitalizations for non-infections disorders causes an increase in number of untreated patients including candidates for drugs against osteoporosis. (1-5) We aim to introduce a female patient with osteoporosis followed amid pandemic.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 66-year female diagnosed with uncomplicated osteoporosis one year before pandemic started. She was treated with weekly alendronate for one year and then in March 2020 she decided to stop her medication due to fear of getting outdoor. 18 months later she had a fragility fracture at left elbow. Her medical history includes pituitary incidentaloma of 2.7/4.3/5.2mm, nodular goiter with normal function, chronic sinusitis, anxiety syndrome, and hypercholesterolemia. Prepandemic assessments showed normal thyroid function: TSH=1 µU/ml (N:0.5-4.5), FT4=14.54 pmol/l (N:9-19), 25OHD=31 ng/ml (N:30-100) and bone turnover markers (BTM): osteocalcin=33 ng/ml (N:15-46), alkaline phosphatase=56 U/L (N:38-105), CrossLaps=0.7 ng/ml (N:0.33-0.782), P1NP=63 ng/ml (N:20.25-76.31), and PTH=42 pg/ml (N: 15-65). DXA showed osteoporosis: lumbar BMD L1-4 (g/cm<sup>2</sup>)=0.829, T-score(SD)=-2.8, Z-score(SD)=-1.6; femoral neck BMD(g/cm<sup>2</sup>)=0.769, T-score(SD)=-1.7, Z-score(SD)=-0.5; total hip BMD (g/cm<sup>2</sup>)=0.848, T-score(SD)=-1.3, Z-score(SD)=-0.3. Amid pandemic, 25OHD remained at upper normal limit of 27 ng/ml with nonsuppressed BTM and BMD loss more than LSC, respective lumbar BMD L1-4 (g/cm<sup>2</sup>)=0.8, T-score(SD)=-2.8, Z-score(SD)=-1.7, and deteriorated microarchitecture in terms of low TBS=1,048. Further alendronate was recommended in addition to vitamin D supplementation.

**Conclusion:** This case reflects on social dimensions of the pandemic including adherence to antiosteoporotic medication. Under these circumstances, bone and mineral metabolism has been affected, as similarly seen in other endocrine domains. This aspect comes as a new factor to take into consideration considering the economic burden of osteoporotic fractures.

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1. Ghemigian A, et al. Exp Ther Med 2021;22:1219
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## P345

### USE OF BIOELECTRICAL IMPEDANCE IN CENTENARIANS: A SYSTEMATIC REVIEW

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**Objective:** Centenarians represent one of the best example of successful aging, which is a public health priority. The role of body composition or hydration status are poorly explored in the very old and in particular in centenarians. With this systematic review, We aim to better understand the use and the role of bioelectrical impedance for evaluating body composition and hydration status in centenarians.

**Methods:** We conducted a systematic review of the scientific literature using several databases, until 1 December 2021, for works providing data on bioelectrical impedance to evaluate body composition parameters or hydration status in centenarians. The prevalence of dehydration and sarcopenia were also extracted as outcomes.

**Results:** Among 2117 articles initially screened, four were eligible, providing information on three cohorts and including 291 centenarians (mean age: 100.5 y), mainly females (=88%). In one study, including 24 centenarians, it was observed that bioelectrical impedance overestimated fat-free mass and underestimated fat mass, when compared to deuterium oxide. In an Italian study of 14 centenarians, the authors found a strong correlation between bioelectrical impedance and fat-free mass evaluated using anthropometric tools. In the third cohort, available and explored by two studies, bioelectrical impedance showed a good agreement with anthropometric measures of fat mass, however, the prevalence of obesity estimates in centenarians using anthropometric equations was significantly higher than the value obtained by bioelectrical impedance. Furthermore, in the same sample, bioelectrical impedance reported data regarding sarcopenia and dehydration found a high prevalence of both conditions.

**Conclusion:** Bioelectrical impedance is suitable for assessing body composition in centenarians, but research is limited to a few studies suggesting that this method could be applied for investigating body composition and hydration status in centenarians.

## P347

### DUAL-FREQUENCY BIOELECTRICAL IMPEDANCE ANALYSIS IS ACCURATE AND RELIABLE TO DETERMINE LEAN MUSCLE MASS IN THE ELDERLY

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**Objective:** The study (1) compared the accuracies of lean muscle masses measured by a dual-frequency bioelectrical impedance analysis (DF-BIA) device and DXA in the Thai elderly and (2) assessed the reliability of the DF-BIA device.

**Methods:** This cross-sectional study was conducted on participants older than 60 y who visited the orthopedic clinic of Siriraj Hospital. Whole-body and appendicular skeletal muscle masses (ASMs) were measured using DF-BIA (Tanita RD-545), with DXA (GE Lunar iDXA) as the standard reference. The test-retest reliability of DF-BIA and the agreement between the devices were assessed using the intraclass correlation coefficient (ICC) and Bland-Altman plots. Regression analysis was used to develop an equation to estimate ASM values from BIA that were close to those from DXA.

**Results:** The mean age of the 88 participants was 73.8 (SD 8.0) y, with women predominating (84.1%). The agreement of BIA and DXA was very high for whole-body lean mass (ICC=0.954) and ASM (ICC=0.954), but the mean difference in muscle mass from DF-BIA was overestimated. The ICCs of test-retest reliability for whole-body muscle mass and ASM were 0.987 and 0.988, respectively. The equation for corrected ASM was formulated from a simple linear equation ( $R^2=0.93$ ).

**Conclusion:** Although lean muscle mass from DF-BIA was minimally overestimated relative to DXA, this device had high accuracy and reliability for lean muscle mass evaluation in the Thai elderly. DXA and DF-BIA are interchangeable for the assessment of muscle mass.

P349

### AN INNOVATIVE SCORING SYSTEM FOR PREDICTING AN EXCELLENT OUTCOME AFTER PROXIMAL FEMORAL NAIL ANTI-ROTATION IN ELDERLY PATIENTS WITH INTERTROCHANTERIC FRACTURE

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**Objective:** Typically, intramedullary and extramedullary devices are used to treat elderly with intertrochanteric fractures. 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 such as patient's comorbidities. The aim of this study is to determine the predictive factors associated with excellent outcome, as well as to develop an integrated scoring system to predict the outcome after PFNA fixation in elderly patients with an intertrochanteric fracture. The aim of this study is to determine the predictive factors associated with excellent outcome, as well as to develop an integrated scoring system to predict the outcome after PFNA fixation in elderly patients with an intertrochanteric fracture. **Methods:** A retrospective study was conducted between January 2012 and December 2018. Elderly patients with low-energy intertrochanteric fractures who underwent PFNA fixation and at least a year of follow-up were recruited. Demographics, comorbidities, cognitive status, time of early ambulation, and surgical parameters of the patients were all identified. Excellent and nonexcellent outcomes were assessed by Harris Hip Score (HHS) after a 1-y follow up. Regression analysis was used to determine the predictors for an excellent functional outcome. A new integrate scoring system (ISSI; integrate scoring system in elderly patients with intertrochanteric fracture) was developed and validated. **Results:** 450 elderly patients were randomly divided into two cohorts: a development (n=225) and validation cohorts (n=225). In this study, age <85 y, normal weight/overweight, Charlson comorbidity index (CCI) <6, no cognitive impairment, a modified AO/OTA 31A1.3, time to walk <6 d, and tip apex distance between 20-30 mm were significantly associated with an excellent outcome after PFNA fixation. The range of ISSI score was between 0-16 and the cutoff score of 13 was found to have the highest discriminatory power to determine the excellent functional outcome where the area of ROC was 0.85. In regards to the validation cohort, the sensitivity and specificity of ISSI score was 69% and 87%, respectively, and the AUC was 0.81. **Conclusion:** This integrated scoring system (ISSI score) was developed from surgical and medical characteristics for predicting a good result in elderly patients with an intertrochanteric fracture

treated with PFNA fixation. Orthopedic surgeons can utilize the score to evaluate and treat patients since it is sensitive and specific.

**Table 1.** Clinical characteristics and comorbidity of patients with intertrochanteric fracture

Parameters	Total (N=450)	Development group (N=225)	Validation group (N=225)	P-value
Demography				
Age (y)				0.843
<85	294 (65.3%)	146 (64.9%)	148 (65.8%)	
≥85	156 (34.7%)	79 (35.1%)	77 (34.2%)	
Mean±SD	80.6±8.5	80.7±8.6	80.6±8.4	0.838*
Median (Min-Max)	82.0 (60.0 - 102.0)	82 (60 - 99)	82 (60 - 102)	
Gender				0.753
Male	127 (28.2%)	163 (72.4%)	160 (71.1%)	
Female	323 (71.8%)	62 (27.6%)	65 (28.9%)	
Weight (kg)	55.2±11.1	54.7±11.3	55.7±10.8	0.329
Height (cm)	156.9±8.5	156.9±7.9	156.8±8.1	0.886
BMI (kg/m <sup>2</sup> )				0.115
Underweight	70 (15.6%)	43 (19.1%)	27 (12.0%)	
Normal weight	288 (64.0%)	44 (19.6%)	48 (21.3%)	
Overweight	92 (20.4%)	138 (61.3%)	150 (66.7%)	
Mean±SD	22.4±3.8	22.2±4	22.6±3.6	0.247*
Median (Min-Max)	22.2 (13.3 - 41.9)	22.1 (14 - 41.9)	22.2 (13.3 - 33.3)	
Comorbidity				
ASA class				0.414*
1	9 (2.0%)	3 (1.3%)	6 (2.7%)	
2	131 (29.1%)	70 (31.1%)	61 (27.1%)	
3	310 (68.9%)	152 (67.6%)	158 (70.2%)	
CCI				
Mean±SD	4.7±1.61	4.5±1.5	4.9±1.7	0.013*
Median (Min-Max)	4 (2 - 10)	4 (2 - 9)	5 (2 - 10)	0.034**

CCI=Charlson comorbidity index				
Chi-square				
*Fisher's exact test				
+Independent t-test				
++Mann-Whitney U test				

**Table 2.** Fracture pattern, surgical factors, and functional outcome (HHS at 1 y)

Parameters	Total (N=450)	Development group (N=225)	Validation group (N=225)	P-value
<b>Fracture pattern (Modified AO/OTA)</b>				
Type 31A1.3	194 (43.1%)	97 (43.1%)	97 (43.1%)	1.000
Type 31A2.2	180 (40.0%)	90 (40.0%)	90 (40.0%)	
Type 31A2.3	76 (16.9%)	38 (16.9%)	38 (16.9%)	
<b>Tip Apex Distance (TAD) (millimeters)</b>				
> 30	20 (4.4%)	13 (5.78%)	7 (3.1%)	0.302
<20	131 (29.1%)	68 (30.22%)	63 (28%)	
20 - 30	299 (66.5%)	144 (64%)	155 (68.9%)	
<b>Surgical factors</b>				
<b>Surgical time (min)</b>				
Mean±SD	69.6±19.7	69±18.7	70.1±20.7	0.567*
Median (Min-Max)	65.0 (40.0 - 180.0)	65 (40 - 150)	65 (40 - 180)	
<b>Estimated blood loss (mm)</b>				
Mean±SD	99.7±93.4	101±86.9	98.4±99.6	
Median (Min-Max)	50 (20-700)	100 (20-550)	50 (20-700)	0.132**
<b>Harris Hip Score (HHS)</b>				
Excellent (≥90)	234 (52.0%)	122 (54.2%)	112 (49.8%)	0.345

Nonexcellent (<90) + mortality 1 y	216 (48.0%)	103 (45.8%)	113 (50.2%)	
Mortality 1 y	4 (1.8%)	3 (2.9%)	1 (0.9%)	0.447
Mean±SD	87.1±7.9	87.7±7.5	86.6±8.2	0.150*
Median (Min-Max)	90 (54 - 99)	90 (57 - 99)	90 (54 - 98)	
Chi-square test				
+Independent t-test				
++Mann-Whitney U test				

**Table 3.** Percentage of excellent and nonexcellent outcomes by surgical factors

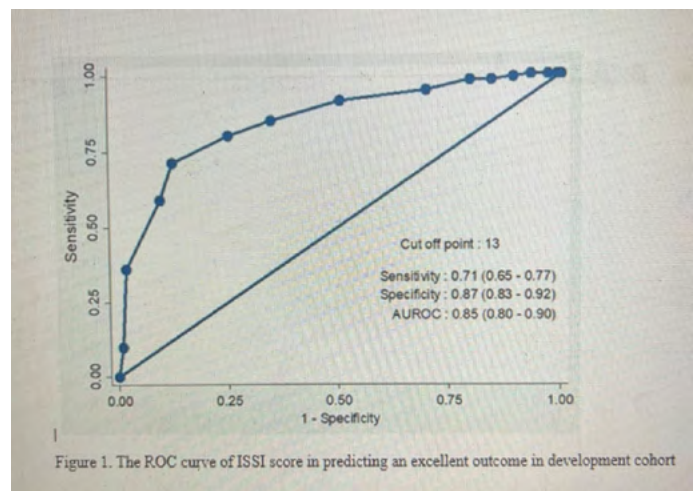
Operation factors	Excellent outcome (n=234)	Nonexcellent outcome (n=216)	P-value
Modified AO/OTA			<0.001
Type 31A1.3*	129 (55.1%)	65 (30.1%)	
Type 31A2.2	84 (35.9%)	96 (44.4%)	<0.001
Type 31A2.3	21 (9.0%)	55 (25.5%)	<0.001
TAD (mm)			<0.001
20-30*	156 (66.7%)	143 (66.2%)	
>30	2 (0.8%)	18 (8.3%)	<0.001
<20	76 (32.5%)	55 (25.5%)	0.263
*>=reference; TAD=tip apex distance			
Note; The outcome assessed by HHS			

**Table 4.** Univariate and multivariate analysis, and predictive score for excellent outcome in development cohort

Factors	Excellent (HHS ≥90) n (%)	Nonexcellent (HHS <90) n (%)	Crude OR	Adjusted OR* (95%CI)	P-value	Co-efficient	Predictive Score
Age							
<85 y	92 (75.4%)	54 (52.4%)	2.78	2.43 (1.18-5.00)	0.016	0.89	2
≥85 y	30 (24.6%)	49 (47.6%)	1.00	1.00			0
BMI							
Normal or Over-weight	109 (89.3%)	73 (70.9%)	3.45	7.02 (2.97-16.60)	<0.001	1.95	4
Under-weight	13 (10.7%)	30 (29.1%)	1.00	1.00			0

CCI							
<6	113 (92.6%)	59 (57.3%)	9.36	9.74 (4.00 - 23.71)	<0.001	2.28	4
≥6	9 (7.4%)	44 (42.7%)	1.00	1.00			0
Cognitive impairment							
No	113 (92.6%)	71 (68.9%)	5.66	3.43 (1.29 - 9.08)	0.013	1.23	2
Yes	9 (7.4%)	32 (31.1%)	1.00	1.00			0
Time to walk	<6 days						
	54 (44.3%)			2.24 (1.09 - 4.59)	0.027	0.80	1
	34 (33.0%)						
	1.61						
≥6 days	68 (55.7%)	69 (67.0%)	1.00	1.00			0
Modified AO/OTA Classification							
Type 31A1.3	69 (56.6%)	28 (27.2%)	6.05	3.09 (1.13 - 8.48)	0.028	1.13	2
Type 31A2.2	42 (34.4%)	48 (46.6%)	2.15	1.73 (0.64 - 4.70)	0.282	0.55	1
Type 31A2.3	11 (9.0%)	27 (26.2%)	1.00	1.00			0
TAD							
20 - 30	84 (68.8%)	60 (58.3%)	1.58	1.71 (0.86 - 3.43)	0.128	0.54	1
<20 or>30	38 (31.2%)	43 (41.7%)	1.00	1.00			0

OR=odds ratio; HHS=Harris Hip Score; 1.000=Reference  
 \*Adjusted for age, BMI, cognitive impairment, DM, hypertension, dyslipidemia, chronic kidney disease, cci, vitamin d, operative time, operative blood loss, TAD, modified AO/OTA, length of hospital stay



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PHARMACOLOGICAL ANALYSIS OF CHONDROPROTECTION IN EXPERIMENTAL OSTEOARTHRITIS ON THE BACKGROUND OF HYPOTHYROIDISM

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**Objective:** As separate nosological forms of osteoarthritis (OA) and hypothyroidism (HIT) differ in their etiology, but the issue of comorbidity of these diseases, which are insufficiently covered in the literature, becomes important. The negative impact of hormonal dysfunction of the thyroid gland on the functional state of organs and systems is due to the key role of thyroid hormones in metabolic processes. The above indicates the existence of a current problem of medicine, which is associated with the search for new approaches to drug protection of joints in patients with OA and HIT by determining the effectiveness of chondroprotective agents in hormone replacement therapy for HIT.

**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 HIT was performed by enteral administration of 0.02% carbimazole solution, which was prepared at the rate of 5 mg per 250 ml of saline.

**Results:** For the intensity of the effect on degenerative dystrophic processes in the bone tissue (for the level of the marker of collagen degradation type I in the blood serum of the rats) the drugs were ranked as follows: diclofenac sodium> ibuprofen> nimesulide=meloxicam> celecoxib> paracetamol (p<0.05), which reflects the different efficacy of the indicated drugs on pathological manifestations of comorbid pathology. For the degree of



influence on degenerative-dystrophic processes in cartilage tissue, evaluated by the level of collagen degradation marker type II in the blood serum of the rats, the drugs were ranked in the following way: nimesulide > celecoxib > meloxicam > ibuprofen > diclofenac sodium > paracetamol ( $p < 0.05$ ).

**Conclusion:** Combined use of diclofenac sodium, chondroitin sulfate and L-thyroxine promotes active regeneration of both cartilage and bone tissue with formation of neovasculogenesis areas, and combined use of L-thyroxine, diclofenac sodium and chondroitin sulfate can be recommended for clinical examination of osteoarthritis comorbid with hypothyroidism.

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### ANTERIOR SKIN NUMBNESS AND FUNCTIONAL OUTCOME AFTER TOTAL KNEE REPLACEMENT BETWEEN LATERAL AND MEDIAL PARAPATELLAR APPROACH: A RANDOMIZED CONTROLLED TRIAL

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**Objective:** Anterior skin numbness from injury of the infrapatellar branch of saphenous nerve (IPBSN) has been reported as a common occurrence after TKR, and may affect the patients' outcome. A prospective study showed that there was no difference in anterior skin numbness between minimally invasive and standard approach TKR while the anterolateral skin incision had a significantly smaller area of skin numbness postoperatively compared to the anterior midline incision. However, no study has compared the skin numbness between lateral parapatellar and medial parapatellar approach undergoing TKR. The purpose of our study was to 1) compare the prevalence of skin numbness between lateral and medial approach undergoing TKR, 2) compare the numbness recovery time after TKR between groups, and 3) identify the patients' satisfaction and functional outcome assessed by KOOS (Knee Injury and Osteoarthritis Outcome Score) in both groups. Methods: A prospective randomized controlled trial of 64 patients underwent TKRs was performed between June 2017 and December 2019. Exclusion criteria was 1) severe osteoarthritic (OA) knee in a diabetic patient undergo TKR, and 2) patients with follow up less than 2 years. The former group ( $n=32$ ) defines that those patients underwent TKR through lateral parapatellar approach (lateral group) and the latter group ( $n=32$ ) is those patients underwent TKR through medial parapatellar approach (medial group). Patients' variables reviewed were demographic data, comorbidity including American Society Anesthesiologist (ASA) classification and Charlson comorbidity index (CCI), range of motion, and VAS were recorded. The primary outcome was a comparison of the prevalence of skin numbness and the numbness recovery time between lateral and medial approach. The

secondary outcome was a comparison of patients' satisfaction and functional outcome in both groups assessed by KOOS at 1 y and 2 y postoperatively. Measurement of skin numbness: Area of skin numbness was measured by Semmes Weinstein Monofilaments (10 g) on the affected knee postoperatively with 29 reference points at 2 weeks, 6 weeks, 3 months, 6 months, 9 months, 1 y and at 2 y. The area of hypesthesia was calculated by SketchAndCalc software. Area of anterior skin numbness ( $\text{cm}^2$ ) was periodically evaluated and was compared between the two groups, to a minimum 2-y follow-up. Measurements of numbness was performed by two physicians who were not involved in the surgery. Results: The smaller area of anterior skin numbness was occurred in the lateral group compared to those with the medial group: 11.2 vs. 20.2 at 2 weeks ( $<0.001$ ), 8.2 vs. 17.2 at 6 weeks ( $<0.001$ ), 7.8 vs. 14.4 at 3 months ( $<0.001$ ), 5.6 vs. 8.9 at 6 months, 1.7 vs. 4.7 at 1 year and 0.0 vs. 1.0  $\text{cm}^2$  at 2 y, respectively. In addition, satisfaction score ( $p=0.027$ ) and symptom component of KOOS ( $p=0.018$ ) were significantly higher in the lateral group. However, there was no difference in knee range of motion and the other components of KOOS (pain, activity of daily living, sport and recreation function, and quality of life) in both groups. Conclusion: Lateral parapatellar approach provided a significantly smaller area of skin numbness and shorter recovery time of skin numbness. In addition, they had a significantly higher patients' satisfaction score and symptom component of KOOS. This should be considered as a good alternative approach for TKR in hypesthesia-concerned patient.

Table 1 Patients' Demography and Comorbidity

Characteristics	Lateral approach (n=32)	Medial approach (n=32)	P-value
<b>Patients' demography</b>			
Age	66.41±12.77	68±7.20	0.542
Gender			0.578
Female	24 (75.0%)	22 (68.8%)	
Male	8 (25.0%)	10 (31.2%)	
BMI (Kg/m <sup>2</sup> )			0.148
Over weight	25 (78.1%)	30 (93.8%)	
Normal weight	7 (21.9%)	2 (6.2%)	
<b>Comorbidity</b>			
ASA class			0.042
I	17 (53.1%)	9 (28.1%)	
II	15 (46.9%)	23 (71.9%)	
CCI	2.25±1.30	2.44±0.80	0.489

BMI = Body Mass Index; ASA class = American Society of Anesthesiologist Classification; CCI = Charlson Comorbidity Index

Table 2 Surgical parameter and Radiograph (Tibiofemoral angle)

Characteristics	Lateral approach (n=32)	Medial approach (n=32)	P-value
<b>Surgical parameters</b>			
<b>Side</b>			
Right knee	20 (62.5%)	15 (46.9%)	0.209
Left knee	12 (37.5%)	17 (53.1%)	
Operative time (minutes)	116.1±16.4	92.0±14.5	<0.001
Operative blood loss (ml)	78.1±33.5	76.6±33.6	0.827
<b>Radiograph (Degree)</b>			
Preoperative TFA	10.7±9.1	4.2±4.1	0.002
Postoperative TFA	6.7±3.4	4.3±2.4	0.005

ml = milliliters; TFA = Tibiofemoral angle

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## WHETHER CKD AFFECTS FUNCTIONAL OUTCOME AND COMPLICATIONS IN INTERTROCHANTERIC FRACTURE TREATED WITH PFNA FIXATION?

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**Objective:** Intertrochanteric fracture is one of the most burdensome osteoporotic fracture found in the elderly. The gold standard treatment is operation with intramedullary nail being the most used implant. Chronic kidney disease, also found in elderly is shown to be associated with sarcopenia in its advanced stages, thus may impact functional status. Burden with intertrochanteric fracture and advanced CKD combined may lead to diminished functional outcome after operation. We aimed to demonstrate the association of having advanced stage CKD in intertrochanteric fracture treated with proximal femoral nail antirotation (PFNA II) may lead to lower functional status.

**Methods:** A retrospective study, reviewing all intertrochanteric fracture treated with PFNA fixation in our hospital from 2012-2018. Elderly patients with aged over 60 y sustained intertrochanteric fracture from low energy trauma who underwent PFNA fixation with at least a 1 y follow up after operation were reviewed. Patients were mainly classified into 2 groups: non-CKD and CKD groups. The former group defined as those patients with glomerular filtration rate (GFR) at least 90 ml/min while the latter group was GFR <90 ml/min. CKD group was further categorized into 4 subgroups (stage 2-5). CKD 2 was GFR between 60-89 ml/min, CKD 3 was GFR between 30-59 ml/min, CKD 4 was GFR between 15-29 ml/min, and CKD 5 was GFR <15 ml/min. Additionally, those patients with advanced CKD included CKD 4 and 5 while nonadvanced CKD was CKD 3. The primary outcome is Harris hip score (HHS) calculated at 1-y follow up. Other outcomes are medical complications, surgical complications and 1-y mortality rate. Results: HHSs are not different between non-CKD and CKD groups (85.75 vs. 87.79 respectively p=0.276), however there is a difference between nonadvanced CKD and advanced CKD groups (87.76 vs. 82.0 respectively p<0.001). Medical complications are not different, except for sepsis in CKD stage 5 compared with stage 1 (17.65% vs. 0%). Even though AO/OTA types are more severe in advanced CKD group, surgical complications are not different among any groups. In addition, there is no statistical difference in 1-y mortality. CKD is associated with sarcopenia and this may lead to lower functional score. Those patients with advanced CKD required particular program for ambulation and rehabilitation. Even though one year mortality was no difference among groups, advanced CKD had a significantly higher rate of sepsis than the others. The strength of this study firstly provided the trend of vulnerability in advanced CKD patients and pointed out the awareness of infection and sepsis. **Conclusion:** Advanced stage CKD (eGFR<30 ml/min/1.73m<sup>2</sup>) is associated with lower functional outcome of intertrochanteric

Table 3 Postoperative Numbness between lateral and medial approach

Characteristics	Lateral approach (n=32)	Medial approach (n=32)	P-value
Rate of skin numbness after TKR (during admission)			
	31 (96.9%)	32(100.0%)	1.000
Rate of skin numbness recover (2 weeks until 2 years)			
2 weeks	0 (0.0%)	0 (0.0%)	NA
6 weeks	2 (6.3%)	0 (0.0%)	0.238
3 months*	10 (31.3%)	0 (0.0%)	<0.001
6 months*	6 (18.8%)	5 (15.7%)	<0.001
1 year	4 (12.5%)	14 (43.8%)	0.292
2 years	9 (28.1%)	9 (28.1%)	0.113
Area of skin numbness after TKR (2 weeks until 2 years) (cm <sup>2</sup> )			
2 weeks*	11.2±6.3	20.2±7.9	<0.001
6 weeks*	8.2±6.8	17.2±9.1	<0.001
3 months*	7.8±7.0	14.4±9.8	0.007
6 months	5.6±5.2	8.9±6.6	0.097
1 year	1.7±0.8	4.7±5.1	0.117
2 years	0.0	1.0±0.5	NA

TKR = Total Knee Replacement; \* = Statistical Significance; cm<sup>2</sup> = square centimeters

Table 4 Visual Analogue Scale, Range of Motion, and Patients' Satisfaction

Characteristics	Lateral approach (n=32)	Medial approach (n=32)	P-value
VAS pain score			
Preoperative VAS	7.78±1.29	7.75±1.27	0.923
Postoperative at 1 year	1.47±1.14	1.47±1.11	0.895
ROM			
Preoperative ROM	106.1±13.1	109.2±13.9	0.359
Flexion	106.7±12.3	110.3±12.8	0.257
Extension	0.6±2.5	1.1±3.0	0.410
Postoperative ROM (1 year)	116.7±14.8	111.3±14.3	0.139
Flexion	117.0±14.3	111.9±13.8	0.147
Extension	0.3±1.2	0.6±1.7	0.395
Postoperative ROM (2 years)	117.5±14.4	111.4±14.5	0.096
Flexion	117.8±13.8	112.0±14.0	0.101
Extension	0.3±1.2	0.6±1.7	0.395
Satisfaction Score			
	8.91±1	8.28±1.20	0.027

VAS = Visual Analogue Scale

Table 5 Knee Injury and Osteoarthritis Outcome Score (KOOS) between lateral and medial approach

Characteristics	Lateral approach (n=32)	Medial approach (n=32)	P-value
Pain component			
Postoperative at 1 year	83.3±10.4	80.6±15.1	0.408
Postoperative at 2 years	87.1±5.2	84.5±7.0	0.105
Symptoms			
Postoperative at 1 year	80.8±13.0	76.4±18.2	0.266
Postoperative at 2 years	86.8±7.1	80.3±13.3	0.018
Activity of daily living			
Postoperative at 1 year	80.9±17.2	76.8±17.6	0.349
Postoperative at 2 years	84.1±12.9	82.7±12.1	0.672
Sport and recreation function			
Postoperative at 1 year	80.5±18.7	82.3±15.7	0.684
Postoperative at 2 years	80.5±11.1	77.68±13.9	0.369
Knee related quality of life			
Postoperative at 1 year	84.4±12.5	83.4±14.2	0.778
Postoperative at 2 years	86.9±8.2	85.4±10.3	0.495



fracture treated with PFNA fixation at 1 y. Sepsis is more prone to be occurred after surgery in CKD stage 5. This vulnerable group should be paid more attention to, postoperatively.

Table 1 Demography and Comorbidity between Non-CKD and CKD patients

Parameters	Non-CKD (n=43)	CKD (n=402)	P-value
<b>Demographic data</b>			
Age	74.7±8.2	81.3±8.3	<0.001
Gender			0.332
Female	28 (65.1%)	290 (72.1%)	
Male	15 (34.9%)	112 (27.9%)	
BMI (kg/m <sup>2</sup> )	24.5±4.1	22.2±3.7	<0.001
<b>Comorbidity</b>			
Type II DM	17 (39.5%)	119 (29.6%)	0.179
Hypertension	27 (62.8%)	284 (70.7%)	0.286
Dyslipidemia	20 (46.5%)	181 (45.0%)	0.852
ASA class			0.001
I	1 (2.3%)	8 (2.0%)	
II	23 (53.5%)	108 (26.9%)	
III	19 (44.2%)	286 (71.1%)	
CCI	4.4±1.9	4.7±1.6	0.157
BMD (T-score)	-2.98±0.6	-2.96±0.7	0.983

CKD is Chronic kidney disease, BMI is Body mass index, DM is Diabetic mellitus, CCI is Charlson comorbidity index, BMD is Bone mass density

Table 2 Surgical parameters between Non-CKD and CKD patients

Parameters	Non-CKD (n=43)	CKD (n=402)	P-value
<b>Modified AO/OTA classification</b>			
31A1.3	14 (32.6%)	179 (44.5%)	0.143
31A2.2	23 (53.5%)	153 (38.1%)	
31A2.3	6 (13.9%)	70 (17.4%)	
<b>Quality of Reduction (n=441)</b>			
Acceptable/Good	36 (87.8%)	371 (92.8%)	0.230
Poor	5 (12.2%)	29 (7.2%)	
<b>TAD (millimeters)(mm)</b>			
20-30 mm	31 (72.1%)	264 (65.7%)	0.366
<20 mm	9 (20.9%)	121 (30.1%)	
>30 mm	3 (7.0%)	17 (4.2%)	
<b>Cleveland zone (n=439)</b>			
5,7,8	31 (75.6%)	297 (74.6%)	0.890
1,2,3,4,6	10 (24.4%)	101 (25.4%)	
<b>Nail Shaft Axis (NSA)</b>			
-2 to +2	35 (81.4%)	311 (77.4%)	0.814
<-2	5 (11.6%)	53 (13.2%)	
>2	3 (7.0%)	38 (9.4%)	

CKD is chronic kidney disease, mm is millimeters

Table 3 Functional outcome assessed by Harris Hip Score (HHS) between Non-CKD and CKD groups

Parameters	Non-CKD (n=43)	CKD (n=402)	P-value
<b>Harris Hip Score (HHS)</b>			
Mean±SD	85.8±9.1	87.3±8.0	0.276
<b>HHS by grading</b>			
Excellent (90-100)	17 (47.2%)	196 (54.1%)	0.467
Good (80-89)	10 (27.8%)	109 (30.1%)	
Fair (70-79)	8 (22.2%)	46 (12.7%)	
Poor (<70)	1 (2.8%)	11 (3.0%)	

Table 4 Surgical parameters and Functional outcome between Non-Advanced CKD and Advanced CKD groups

Parameters	Non-Advanced CKD (n=356)	Advanced CKD (n=42)	P-value
<b>Modified AO/OTA</b>			
31A1.3	181 (45.0%)	12 (27.9%)	0.023
31A2.2	158 (39.3%)	18 (41.9%)	
31A2.3	63 (15.7%)	13 (30.2%)	
<b>Nail Shaft Axis (NSA)</b>			
-2 to +2	319 (79.4%)	27 (62.8%)	0.024
<-2	47 (11.7%)	11 (25.6%)	
>2	36 (8.9%)	5 (11.6%)	
<b>Harris Hip Score (HHS)</b>			
Mean±SD	87.8±0.4	82.0±1.5	<0.001
<b>HHS by grading</b>			
Excellent (90-100)	200 (56.2%)	13 (31.0%)	0.467
Good (80-89)	104 (29.2%)	15 (35.7%)	
Fair (70-79)	44 (12.4%)	10 (23.8%)	
Poor (<70)	8 (2.3%)	4 (9.5%)	

Table 5 Surgical and medical complication among CKD groups

Complications	Stage I	Stage II	Stage III	Stage IV	Stage V
<b>Surgical</b>					
SSI (n=396)	0 (0.0%)	2 (1.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Hematoma (n=396)	0 (0.0%)	0 (0.0%)	1 (0.6%)	0 (0.0%)	0 (0.0%)
Deep infection	0 (0.0%)	0 (0.0%)	2 (1.3%)	0 (0.0%)	1 (5.9%)
PFNA blade cut-out	1 (2.5%)	4 (2.4%)	3 (1.9%)	0 (0.0%)	0 (0.0%)
PFNA blade cut through	1 (2.5%)	0 (0.0%)	2 (1.3%)	0 (0.0%)	1 (5.9%)
Varus collapse	0 (0.0%)	1 (0.6%)	1 (0.6%)	0 (0.0%)	1 (5.9%)
<b>Medical</b>					
Congestive heart failure	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (7.1%)	0 (0.0%)
Pneumonia	1 (2.5%)	0 (0.0%)	4 (2.5%)	1 (7.1%)	0 (0.0%)
Deep vein thrombosis	0 (0.0%)	1 (0.6%)	1 (0.6%)	1 (7.1%)	0 (0.0%)
Pulmonary embolism	0 (0.0%)	0 (0.0%)	1 (0.6%)	0 (0.0%)	0 (0.0%)
Sepsis	0 (0.0%)	4 (2.4%)	3 (1.9%)	0 (0.0%)	3 (17.7%)
Urinary tract infection	3 (7.5%)	4 (2.4%)	8 (5.0%)	2 (14.3%)	1 (5.9%)
One year mortality	6(16.6%)	19(12.1%)	15(9.2%)	0 (0%)	1 (5.3%)

All parameters had no statistical significance except Sepsis  
Rate of Sepsis was 17.7% and 0.0% in CKD V and CKD I, respectively (p=0.023)

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THE DIFFERENCE OF CLINICAL AND ULTRASOUND DATA AND QUALITY OF LIFE IN WORKING AGED PATIENTS WITH PSORIATIC ARTHRITIS DEPENDING ON THE PRESENCE OF OSTEOARTHRITIS

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**Objective:** To study the difference in ultrasound (US) and clinical features and quality of life (QoL) in young and middle-aged patients with psoriatic arthritis (PsA) with/without osteoarthritis (OA).

**Methods:** 92 PsA patients were enrolled to the study (CASPAR, 2006). Data collection: demographical, clinical (current psoriasis, BMI, swollen and tender joint count, clinical enthesitis indices (Spondyloarthritis Research Consortium of Canada (SPARCC, Leeds Enthesitis Index, Maastricht Ankylosing Spondylitis Enthesitis Score), US (synovitis count (by Grey Scale (GS+), Power Doppler (PD)+ synovitis count), count of joints with osteophytes,

count of GS+ enthesitis (thickening and hypoechogenicity at entheses), PD+ enthesitis, entheses with structural components); biological (high sensitive C-reactive protein, Erythrocyte Sedimentation Rate); QoL (Short Form (SF)-36, Functional Assessment of Chronic Illness Therapy, Health Assessment Questionnaire-Disability Index (HAQ-DI)). US examination included bilateral large joints of lower and upper extremities (total number - 14) and entheses of tendons and ligaments in the projection of these joints (total number - 54). The patients were divided into 2 groups depending on the presence of OA: 1<sup>st</sup> group (n=50) – without OA, 2<sup>nd</sup> group (n=42) – with OA. The groups were similar with respect to age, sex, PsA duration, PsA and psoriasis disease activities, laboratory biomarkers, and BMI ( $p>0.05$ ). The Mann-Whitney U test was used to compare whether there is a difference in the dependent variable for two independent groups.

**Results:** There were 25 male (43.9%), mean age was  $42.9\pm 9.6$  (SD) y, PsA duration was 7 (2; 11.8) y, disease activity in PsA score 15.2 (10.2; 21.4), BMI  $27\pm 4.7$  kg/m<sup>2</sup>. In all, 54.3% of patients had OA (ACR criteria), mainly in knees (34.8%), hips (7.6%), shoulders (5.4%), ankles (13%), and wrists (1.1%). US osteophytes were found in 79 (85.9%) young and middle-aged PsA patients. There was found no difference in clinical data of articular involvement. In 2<sup>nd</sup> group SPARCC score was significantly higher ( $p<0.05$ ) as well as US findings – GS+ and PD+ synovitis count ( $p<0.01$ ), and GS+ enthesitis count ( $p<0.05$ ). Physical functioning (SF-36 scale) and HAQ-DI scores were significantly higher in patients with OA ( $p<0.05$ ).

**Conclusion:** OA in patients with PsA independently of disease activity increase the clinical enthesitis score (SPARCC), the active synovitis count and GS+ enthesitis detected by US and decrease the physical functioning of working aged PsA patients.

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### OSTEOPHYTES IN YOUNG AND MIDDLE-AGED PATIENTS WITH PSORIATIC ARTHRITIS DETECTED BY ULTRASOUND: CROSS-SECTIONAL STUDY

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**Objective:** To evaluate the relation of ultrasound (US) osteophytes formation with articular and enthesal inflammation in psoriatic arthritis (PsA).

**Methods:** Totally, 92 PsA patients (18-60 y) were enrolled to the study. Demographical, clinical (current psoriasis, enthesitis, BMI, US (synovitis count (by Grey Scale), Power Doppler (PD)+ synovitis), count of joints with osteophytes, thickening and hypoechogenicity at entheses, PD+ enthesitis, entheses with structural components) and biological (high sensitive C-reactive protein, erythrocyte sedimentation rate (ESR) data was collected. US ex-

amination included bilateral large joints of lower and upper extremities (total number - 14): acromioclavicular joints, shoulders, elbows, wrists, hips, knees and ankles; entheses of tendons and ligaments in the projection of these joints (total number - 54). 1288 joints and 4698 entheses were examined by 2 US rheumatologists.

**Results:** In all, 92 patients: male - 42 (45.7%), mean age  $42.9\pm 9.6$  (SD) y, PsA duration was 7 (2; 11.8) y, disease activity in PsA score 15.2 (10.2; 21.4), BMI  $27\pm 4.7$  kg/m<sup>2</sup>. US osteophytes were found in 79 (85.9%) young and middle-aged PsA patients. It was shown that the number of joints with osteophytes expectedly increased with age ( $r=0.661$ ,  $p<0.01$ ) and BMI ( $r=0.411$ ,  $p<0.01$ ). At the same time, the count of joints with osteophytes did not correlate with PsA and psoriasis duration, PsA and skin psoriasis disease activities, clinical manifestations of articular and enthesal involvement ( $p>0.05$ ). A positive correlation was found between the number of joints with osteophytes and count of entheses with hypoechogenicity and thickening ( $p<0.01$ ), PD+enthesitis ( $p<0.05$ ), synovitis count ( $p<0.01$ ), PD+ synovitis ( $p<0.05$ ) and entheses with structural changes ( $p<0.01$ ) and ESR ( $r=0.335$ ,  $p<0.01$ ).

**Conclusion:** Thus, the more joints with osteophytes were found according to US data, the greater the number of enthesitis and synovitis was found both by Grey scale and PD. The number of joints with osteophytes was increased with laboratory (ESR) and subclinical US articular and enthesal findings ( $p>0.01$ ) that allows to conclude that osteophytes formation and its progression related to subclinical inflammation in young and middle-aged patients with PsA regardless of PsA duration and disease activity score.

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### DIAGNOSTIC CRITERIA FOR SARCOPENIA IN EUROPE: A SYSTEMATIC REVIEW

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**Objective:** In 2018, the EWGSOP2 formed a new definition and an updated version of diagnostic criteria with cutoff points for assessing sarcopenia to increase compliance in clinical practice and research studies. The aim of this systematic review is to determine diagnostic criteria used in European research studies, dealing with sarcopenia, after the publication of EWGSOP2 guidelines.

**Methods:** After forming the research question using the PICO tool, the PubMed database was searched (before January 2022), giving us 102 results. Only articles in English were included. We excluded articles published before EWGSOP2 guidelines. Following a detailed review, ten articles remained, which were included in the analysis.



**Results:** EWGSOP2 guidelines were used to assess and diagnose sarcopenia in all included articles. Besides EWGSOP2, six studies included other international diagnostic criteria for sarcopenia, most often EWGSOP1. With different diagnostic criteria used, three studies determined described different prevalence values, two studies similar ones and one study similar and different values, depending on compared criteria. In research, different tests were used for diagnostics. A measure of muscle strength with hand grip strength was made in all reviewed studies. In 50% of them, the chair stand test was also made. Methods to confirm diagnosis included bioelectrical impedance analysis in 60% and DXA in 40% of research. Physical performance was assessed by gait speed in 55.5% of studies, by short physical performance battery in 33.3% of studies, and by timed-up-and-go test in 11.1% of studies. 400-m walk was not used.

**Conclusion:** Research studies in the field of sarcopenia in Europe follow the EWGSOP2 guidelines. Some studies also use other diagnostic criteria. According to EWGSOP2 guidelines, different diagnostic tests are used to assess sarcopenia, leading to variance in prevalence. The definition, diagnostic criteria, and cutoff points must be clearly determined to achieve consistency and comparability between studies and successful implementation into clinical practice.

## P356

### A CASE OF PREGNANCY AND LACTATION-ASSOCIATED OSTEOPOROSIS

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**Objective:** Pregnancy and breastfeeding are associated with bone loss because calcium is passed from the mother to build the skeleton of the fetus. Those who are affected often have an eating disorder, low calcium intake, and low vitamin D levels.

**Methods:** A 34-year-old woman developed severe back pain two weeks after giving birth. The pain was localized between the shoulder blades and in the lower part of the thoracic spine. The back pain did not disappear after three months of delivery, the patient referred to an orthopedic clinic, the pain was revealed on palpation and movement of the thoracic spine. MRI showed fractures and bone marrow edema in the upper endplate of the D7 vertebral body, the lower endplate of the D9, and in the upper and lower endplates L1 and L3. She had no family history of osteoporosis or previous fractures. During pregnancy, she took a dietary supplement for pregnant women that included calcium and vitamin D. Blood tests showed normal sedimentation response and normal values for C-reactive protein, creatinine, vitamin D,

calcium, PTH, phosphate, magnesium, sodium, potassium, thyroid-stimulating hormone, thyroxine, alkaline phosphatase. BMD in the lumbar spine was lower than expected for the patient's age ((L1-L4) Z-2.5).

**Results:** The patient was injected subcutaneously with 20 mg teriparatide and 1000 mg calcium and 800 IU vitamin D daily. Teriparatide treatment was continued for 2 y. BMD was measured annually.

#### Changes in BMD values

BMD value (g/cm <sup>2</sup> )	09.10.2019	12.02.2020	12.07.2021	IR%
BMD (L1-L4)	0,840	0,854	0,932	
Z-score	-2,5	-2,4	-1,7	3,2%
BMD left (T-h)	0,751	0,770	0,850	
Z-score	-1,8	-1,6	-1,0	2,5%
BMD right (T-h)	0,768	0,806	0,846	
Z-score	-1,6	-1,3	-1,0	4,9%

L lumbar, F-n femoral neck, T-h total hip, IR increase rate

**Conclusion:** Osteoporosis associated with pregnancy and lactation is the loss of cancellous bone (mainly the spine). Compression fractures of the lower thoracic or lumbar spine are the most common. Early diagnosis and treatment is important to prevent further fractures with chronic pain and to optimize bone structure.

## P357

### COMPERATIVE ANALYSIS OF THE EFFECTIVENESS OF MONOTHERAPY WITH STRONTIUM RANELATE AND A COMBINATION OF STRONTIUM RANELATE AND ALFACALCIDOL IN WOMEN WITH CONFIRMED POSTMENOPAUSAL OSTEOPOROSIS

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The study included 48 patients with PMO, of which 16 women (group 1) received strontium ranelate (SR) at a dose of 2 g/d, as monotherapy, 16 women (group 2) received SR at a dose of 2 g/d, as well as alfacalcidol (AD3) at a dose of 1 µg (SR+AD3). All women received calcium preparations of 1000 mg, vitamin D3 800 mg/d. The control group was represented by 16 women who received calcium preparations of 1000 mg, vitamin D3 800 mg/d.

The basal level of BMD of the spine made up of  $0.732 \pm 0.01$  g/cm<sup>2</sup>, femoral neck  $0.776 \pm 0.01$  g/cm<sup>2</sup>. Patients, taking SR in combination with AD3 the level of  $\beta$ -CrossLaps was significantly decreased compared with the control (39.4%;  $P < 0.0001$ ), and 1st (a 24.0%;  $P = 0.008$ ) groups. The level of TP1NP in patients taking SR in combination with AD3, the indicator was significantly higher (by 53.3%;  $P < 0.0001$ ) than in the control group. Against the background of SR+AD3 therapy, an increase in BMD in the femoral neck was observed (from  $0.799 \pm 0.019$  g/cm<sup>2</sup> to  $0.862 \pm 0.02$  g/cm<sup>2</sup>;  $P = 0.01$ ). On average, the increase was  $8.17 \pm 1.44\%$ . BMD in the femoral neck after treatment was significantly higher than in the control and 1st groups. Our studies have shown that before treatment, the time spent on getting up from a chair was on average  $16.8 \pm 0.78$  s. During therapy, the time taken to rise from a chair, was significantly lower by 16.7% ( $P = 0.005$ ) and were equal to the average of  $13.86 \pm 0.63$  s.

The performance test on the balance significantly improved by  $2.62 \pm 0.55$  s ( $8.88 \pm 0.38$  s vs.  $6.26 \pm 0.59$  before treatment;  $P < 0.0001$ ).

**Conclusion:** The use of strontium ranelate, especially in combination with AD3, increases the BMD of the lumbar spine and femoral neck, changes the metabolic activity of bone remodeling processes (according to biochemical markers), increases muscle strength and neuromuscular coordination (according to the ability to perform functional tests), and therefore reduces the risk of falls and fractures, which indicates the need to continue research, the relevance of which is beyond doubt.

## P358

### IRM EXAM IN STAGING KIENBOCK DISEASE

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**Objective:** Kienbock disease is avascular necrosis of the lunate, was described by Robert Kienböck in 1910. The condition is most common within the dominant wrist of young adult men where it appears to be due to repeated loading of the lunate. A 5-stage radiographic classification system exists. The Stahl classification modified by Lichtman, is the most commonly used staging system and is useful in the treatment. This system divides the disease into four stages, and is for the radiographic changes: stage I: normal radiograph; stage II: increased radiodensity of the lunate with possible decrease of lunate height on the radial side only; stage III- IIIa: lunate collapse, no scaphoid rotation, -IIIb: lunate collapse, fixed scaphoid rotation; stage IV: degenerative changes around lunate. We aimed to describe medullary perfusion of the lunate bone in Kienbock disease using contrast enhanced MR.

**Methods:** We evaluated 11 patients (7 male and 4 female, aged between 19-47 y) who underwent MRI examination of the wrist in the Imaging Dept. of the County Clinical Hospital in Oradea. In addition to plain imaging T1-weighted sequences were performed in coronal and sagittal orientations after intravenous application of gadolinium.

**Results:** Plain T1-weighted images revealed decreased signal of the lunate, either focally at the proximal aspect or within the whole bone. Three patterns of medullary perfusion were found with respect to signal changes after application of gadolinium. MR stage I: Homogeneous, excessive enhancement due to intact perfusion was detected in 2 patients of all of them presenting normal radiograms (stage I after Lichtman) Pathoanatomical correlation was bone marrow edema. MR stage II: Inhomogeneous enhancement patterns were found in 6 patients. Contrast enhancement was located distally within the viable tissue, but not in necrotic areas of the proximal aspect. Disease was classified to stages II and III a (after Lichtman) in these cases.

MRI stage III: No signal enhancement after application of gadolinium was visible in 3 patients suffering from stages IIIb and IV (after Lichtman). The avascular pattern always correlated with complete osteonecrosis.

**Conclusion:** In staging Kienbock disease contrast-enhancement MR is more confident in visualizing bone marrow viability when compared to plain sequences. For assessment of prognostic outcome and therapeutic considerations, we strongly recommended contrast-enhancement MRI.

## P359

### CLINICAL AND IMMUNOLOGICAL SIGNIFICANCE OF DETERMINING FIBRONECTIN ANTIBODIES IN RHEUMATIC DISEASE

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**Objective:** Fibronectin (FN) is a high molecular glycoprotein capable of inducing an autoimmune condition so that specific immunoglobulins can cause destruction of connective tissue. We aimed to study the level of FN antibodies in blood serum from patients with rheumatic disease using ELISA test and immobilized magnetic sorbents.

**Methods:** We studied sera from 36 apparently healthy individuals, 68 patients with rheumatoid arthritis, 36 patients with systemic lupus erythematosus, and 25 patients with systemic scleroderma. According to the degree of activity the patients with rheumatoid arthritis were categorized in the following way: 10 people with degree I (15%), 41 people with degree II (60%), 17 people with degree III (25%). Among patients with systemic lupus erythematosus 5 people (14%) showed degree I of disease activity, 22 people

(61%) showed degree II, and 9 people (25%) had the maximum degree of disease activity. Among patients with systemic sclerosis 10 people (40%) had degree I, and 15 people (60%) had degree II of disease activity.

**Results:** Elevated FN antibodies in ELISA test were revealed in 13 (19%) patients with rheumatoid arthritis, 14 (39%) patients with systemic lupus erythematosus, and 8 (32%) patients with systemic sclerosis. In rheumatoid arthritis the level of FN antibodies was associated with the activity of the disease ( $p < 0.05$ ) and the presence of extraarticular manifestations ( $p < 0.02$ ). In patients with systemic lupus erythematosus the level of FN antibodies was associated with the activity of the disease in the group of patients with kidney involvement ( $p < 0.05$ ). In systemic sclerosis with degree I of disease activity high levels of FN antibodies were revealed in 40% of cases and were associated with involvement of lungs and the cardiovascular system.

**Conclusion:** Thus determining FN antibodies permits expanding the present understanding of pathogenesis of rheumatoid arthritis, systemic lupus erythematosus, and systemic sclerosis.

### P360

#### DIFFICULTIES IN INTRODUCING PATIENTS WITH PREGNANCY AND LACTATION-ASSOCIATED OSTEOPOROSIS (PLO)

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**Objective:** Osteoporosis associated with pregnancy and lactation is a rare condition in late pregnancy or in the early postpartum period.

**Methods:** A 23-year-old woman, 5 months of her first pregnancy, began complaining of moderate back pain. One week after giving birth, her back pain worsened as she was unable to breastfeed or take care of the baby on her own. MRI of the spine, performed 2 months after delivery, compression fractures of the vertebrae T12, L2 and L3. BMD was measured using DXA. Laboratory tests: Vit D-28.2 ng/ml, osteocalcin - 45.94 ng/ml, PTH - 78.6 pg/ml, ALP - 70 U/l, calcium -2.59 mmol/l, NTx- 121.3 nM. Scintigraphy of the parathyroid glands revealed no pathology.

**Results:** The patient was stop breastfeeding and was prescribed therapy for one year: ibandronic acid at a dose of 3mg/3ml, vitamin D 1000 IU/d and calcium 1000 mg. In order to assess the quality of treatment after 6 months, the markers of bone remodeling were redetermined: Vit D - 45.3 ng/ml, osteocalcin - 26.6 ng / ml, PTH-83.4 pg/ml, ALP - 59.0 U / l, calcium - 2.30 mmol/l. A year later, DXA was performed. Blood tests showed: Vit D - 64.0

ng / ml, osteocalcin - 36.2 ng/ml, PTH-57.7 pg/ml, ALP - 57.0 U/l, calcium - 2.29 mmol/l, NTx-20.2 nM. Since the patient was planning her next pregnancy in a year, Denosumab was prescribed at a dose of 60 mg subcutaneously every 6 months. After 6 months of treatment, X-ray densitometry was repeated. Since BMD decreased slightly, denosumab treatment was discontinued and it was recommended to continue calcium 500 mg and vitamin D 1000 U daily.

Changes in BMD values.

BMD value (g/cm <sup>2</sup> )	31.01.2020.	12.04.2021.	IR%	06.12.2021.	IR%
BMD (L1-L4)	0.896	1.052		1.033	
Z-score	-2.2	-0.9	17.4%	-1.1	-1.8%
BMD left (T-h)	0.886	0.987		0.867	
Z-score	-0.8	0.0	11.4%	-0.9	-12.2%
BMD right (T-h)	0.848	0.904		0.911	
Z-score	-1.1	-0.6	6.6%	-0.6	1.2%

**Conclusion:** The lack of clear recommendations for patients with osteoporosis associated with pregnancy and lactation complicates the treatment tactics.

### P361

#### LONG-TERM SAFETY AND PERFORMANCE BENEFITS OF KIOMEDINE® CM-CHITOSAN FOR ADVANCED SYMPTOMATIC KNEE OSTEOARTHRITIS: AN OBSERVATIONAL CASE REVIEW SURVEY

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**Objective:** Symptomatic knee osteoarthritis (OA) is commonly treated with hyaluronan; however, nonresponders to hyaluronan and individuals with advanced OA remain difficult to treat. KiOmedine CM-Chitosan is a novel fluid implant intended for symptomatic treatment of knee OA that has proved to be safe and effective in a first-in human trial. We hereby report long-term data (a 6-to-10-month Post-Market Clinical Follow-Up (PMCF) survey) pertaining to KiOmedine CM-Chitosan treatment and assess indicators of safety and performance in advanced symptomatic knee OA.

**Methods:** Advanced knee OA patients were those defined as having at least one of the following: tricompartmental OA, isolated or severe patello-femoral OS, a BMI >30 kg/m<sup>2</sup>, and/or Kellgren-Lawrence grade III or IV classification. One long-term survey was con-

ducted in a real-life setting assessing safety and performance in an advanced symptomatic knee OA patient cohort. Well designed retrospective surveys are an important component of clinical research and PMCF. KiOmedine CM-Chitosan (n=28) was administered according to instructions for use and applying best clinical practice. The survey assessed discomfort post injection, painkiller use, evolution of the knee, stiffness, flexibility, pain, force, activity, and thoughts on a second injection.

**Results:** At 6-10 months postinjection of KiOmedine CM-Chitosan, 78% of patients continued to experience positive evolution of the knee, and this in a group of patients which is known to be predictive of failure of hyaluronan. Improvement in evolution of the knee, stiffness, flexibility, pain, and activity persisted to the end of the follow-up period.

**Conclusion:** A single intraarticular injection of KiOmedine CM-Chitosan is a safe and effective option for the treatment of symptomatic advanced knee OA in the longer term, where the unmet medical need is high and where patients are not responding to hyaluronan. A randomized, controlled clinical trial is currently under way to confirm the results of the PMCF survey.

### P362

#### PREVALENCE OF PSORIATIC ARTHRITIS IN PATIENTS WITH PSORIASIS AND TYPE 2 DIABETES

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**Objective:** Psoriasis risk factors are familial predisposition, overweight, infections, stress, trauma, endocrine diseases, including type 2 diabetes (T2D). At the same time, patients with psoriasis have the insulin resistance and increased T2D risk. When a patient suffers from psoriasis and T2D, exacerbation of psoriasis can reduce the T2D control and T2D probably is associated with more severe psoriasis including psoriatic arthritis. We aimed to study the prevalence of psoriatic arthritis in patients with psoriasis and T2D compared with psoriasis patients without T2D.

**Methods:** we studied hospitalized patients with psoriasis during 5 y. The main group includes patients with psoriasis and T2D, n=62. The comparison group includes patients with psoriasis without T2D and other metabolic diseases, n=44.

**Results:** Patients of the main group (women 56%, men 44%, mean age 61.2±7.4 y) and comparison group (women 55%, men 45%, mean age 60.3±6.7 y) were same in anthropometric, anamnestic and laboratory data (AST, ALT, total cholesterol, creatinine, p>0.05). Patients of both groups were differed in serum glycaemia (p=0.001). The prevalence of psoriatic arthritis in patients of the main group was increased (24.2 %, n=15) compared with the comparison group (9.1 %, n=4; F=0.04, p=0.038).

**Conclusion:** The prevalence of psoriatic arthritis in patients with psoriasis and T2D is increased compared with psoriasis patients without T2D. The result of the study shows an association between T2D and psoriatic arthritis in psoriasis patients.

### P363

#### LOWER LIMBS RELATIVE STRENGTH AND COMPOSITE INDICES OF FEMORAL NECK STRENGTH IN A GROUP OF YOUNG ADULT MEN

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**Objective:** To investigate the relationships between relative strength of the lower limbs and composite indices of femoral neck strength (compression strength index (CSI), bending strength index (BSI) and impact strength index (ISI)) in a group of young adult men.

**Methods:** Body composition and BMD were evaluated by DXA. Composite indices of femoral neck strength were calculated. One repetition-maximum (1-RM) half-squat, 1-RM deadlift and 1-RM bench-press were measured. Because maximum strength varies with body mass, half-squat strength, deadlift strength and bench-press strength were normalized to body mass for each subject. Blood samples were collected after 8 h fasting for glucose, triglycerides, total cholesterol, high-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C) levels (mmol/L). Pearson correlation coefficients were calculated in order to explore relationships among the studied variables.

**Results:** 1-RM half-squat/body mass was positively correlated to CSI (r=0.35; p<0.01), BSI (r=0.33; p<0.05) and ISI (r=0.32; p<0.05), but negatively correlated to fat mass percentage (r=-0.37; p<0.01), blood glucose (r=-0.37; p<0.01) and blood triglycerides (r=-0.30; p<0.05). 1-RM deadlift/body mass was positively correlated to ISI (r=0.28; p<0.05). 1-RM bench press/body mass was positively correlated to BSI (r=0.28; p<0.05). Fat mass was negatively correlated to CSI (r=-0.39; p<0.01) and ISI (r=-0.32; p<0.05). Fat mass percentage was negatively correlated to CSI (r=-0.39; p<0.01) and ISI (r=-0.33; p<0.05).

**Conclusion:** Our results reinforce those of two previous studies which showed that indices of relative power are positively correlated to composite indices of femoral neck strength in young adults. The current study demonstrated negative correlations between relative muscular strength of lower limbs and several health parameters such as fat mass percentage, blood glucose and blood triglycerides. Accordingly, augmenting relative muscular strength of lower limbs may help to prevent the onset of metabolic syndrome. Up to our knowledge, this is the first study to demonstrate positive correlations between relative strength of the lower limbs and composite indices of femoral neck strength. Implementing strategies to increase 1-RM half-squat/body mass



in men is important to prevent osteoporotic fractures later in life. Physical conditioning training programs should be adapted accordingly. Future longitudinal studies seem obligatory to confirm causal relationships between relative strength of the lower limbs and composite indices of femoral neck strength.

### P364

#### THE RESULTS OF RUNNING RHEUMATOLOGY ONLINE SCHOOLS FOR PATIENTS IN A MEDICAL ORGANIZATION IN RUSSIAN FEDERATION

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**Objective:** During the COVID-19 pandemic, patients have limitations in their ability to receive rheumatological care. The development of digital technologies makes possible transferring training and education of patients to the online format. We present the results of managing online rheumatology schools in Russian Federation (RF).

**Methods:** 20 online schools were held in the Medical Association "New Hospital" (Yekaterinburg) in 2020-21. Up to 100 participants were directly attending schools and they were asked to answer the questionnaire; then recordings of the schools are available on YouTube. There were received 157 answers from people aged 18-75 y.

**Results:** The study has demonstrated that not only residents from Yekaterinburg region (71.3%) participated in the school, but also from other regions of the RF (21.1%) and foreign countries (7.6%). The main motivation for participation was the presence of rheumatological disease in the respondent - 57%, the interest in medical issues - 38%, the presence of the disease in relatives - 5%. Considering the form and the content of the school, the quality of information, and the level of confidence in the doctor were rated by patients at 10 points (0-10 point scale) in 71.3-93.6% of cases. 44.6% of the participants realized necessity to correct their lifestyle, 21% - drug treatment, 14.6% understood the causes of the symptoms, 27.4% - further management, 27% - the indications for referring to a rheumatologist. The number of recordings views, assessed on December 31, was maximum to the problems of knee pain (29,100), rheumatoid arthritis (17,941 views), ankylosing spondylitis (7312), fibromyalgia (7212), gout (3957) and psoriatic arthritis (3316). There was low interest in the topic of osteoporosis (1038) and osteoarthritis (817).

**Conclusion:** We state the positive role and high perspectives of organizing rheumatological online schools for patients aimed on medical education.

### P365

#### BONE HEALTH PARAMETERS IN MIDDLE-AGED FORMER BASKETBALL PLAYERS VS. MIDDLE-AGED INACTIVE MEN

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**Objective:** To compare bone health parameters (bone mineral content [BMC], BMD, geometric indices of femoral neck [FN] strength (cross-sectional area [CSA], cross-sectional moment of inertia [CSMI], section modulus [Z], buckling ratio [BR] and strength index [SI]) and composite indices of FN strength (compression strength index [CSI], bending strength index [BSI], and impact strength index [ISI])) in middle-aged inactive men (n=25) and middle-aged former basketball players (n=18).

**Methods:** The participants of the study were 43 middle-aged men; their ages ranged from 38-52 y. DXA was used to evaluate body composition, BMD and geometric indices of FN strength. Composite indices of FN strength (CSI, BSI, and ISI) were calculated. Validated tests were used to evaluate the vertical jump (VJ), horizontal jump (HJ), triple jump (TJ), maximum power (MP) of the lower limbs (W), maximal squat strength, maximal bench press strength, maximal leg extension strength, maximal barbell curl strength, maximal triceps extension strength, sprint performance (10 m), and maximum oxygen consumption (VO<sub>2</sub> max, L/min).

**Results:** WB BMC, WB BMD, L1-L4 BMD, CSA, CSMI and Z were significantly higher in former basketball players compared to inactive men. MP, TJ, VJ, maximal squat strength and maximal bench press strength were significantly higher in former basketball players compared to inactive men.

**Conclusion:** The present study suggests that former basketball practice is associated with greater bone health parameters in middle-aged men.

### P366

#### LABORATORY VERIFICATION OF POST-TRAUMATIC HEMARTHROSIS

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**Objective:** There are unclear clinical situations in which it is impossible to reliably verify the diagnosis of "hemarthrosis" clinically and using instrumental laboratory methods unambiguously. Such cases include insufficient severity of the clinical picture, pink-red or orange staining of the punctate, increased viscoelastic consistency of the fluid (not characteristic of blood), lack of anamnesis of the disease. The purpose of this study was to determine a laboratory indicator that allows the verification of post-traumatic hemarthrosis.

**Methods:** We examined the punctate of 25 patients with a suspected diagnosis of post-traumatic hemarthrosis. The study of laboratory parameters (general clinical, biochemical, immunological) was carried out. Acute-phase proteins (C-reactive protein, globulins, albumin, ceruloplasmin, haptoglobin, as well as immunoglobulins of the main classes) were determined in the samples of biofluid. The final verification of the diagnosis was made based on the results of the performed diagnostic arthroscopy and completed treatment.

**Results:** Laboratory studies of the punctate, in particular the detection of erythrocytes in the composition of the biological fluid, can confirm the fact of the outpouring of peripheral blood into the joint, however, the viscosity and colour of the biofluid vary in different patients. In addition, the appearance of red blood cells in the joint inevitably activates the process of lysis of red blood cells, which leads to the formation of free haemoglobin and a decrease in the population of red blood cells. The more time passes from the moment of injury, the more destroyed red blood cells become and the concentration of free haemoglobin is higher. Laboratory examination of a punctate with the determination of laboratory parameters characterizing the state of protein, carbohydrate, fat, mineral metabolism, immune system cells, acute phase proteins allowed us to establish that the concentration of haptoglobin - an antagonist of free haemoglobin in the bloodstream (a marker of hemolysis) can be a criterion for assessing the presence of post-traumatic hemarthrosis. The value of the detected metabolite of 0.3 g/l or more may indicate the presence of post-traumatic hemarthrosis.

**Conclusion:** Obtaining objective information about the presence of hemarthrosis in a patient can be done by laboratory examination of a punctate (for example, combined with a therapeutic puncture to reduce excessive fluid pressure on the walls of the joint).

P367

### OLDER MEN WITH PARKINSON'S DISEASE HAVE RAPID BONE MICROARCHITECTURAL DETERIORATION: THE PROSPECTIVE STRAMBO STUDY

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**Objective:** Parkinson's disease (PD) is associated with low areal BMD (aBMD) and high risk of fracture. Our aim was to study the link of PD with the rate of bone loss and the decline in bone microarchitecture in older men.

**Methods:** Among 826 men aged 60–87, 15 men self-reported PD at baseline. Areal BMD was measured with a Hologic Discovery A device (Hologic, Marlborough, USA). Bone microarchitecture was assessed at distal radius and distal tibia by HR-pQCT (XtremeCT Scanco, Brüttisellen, Switzerland) at baseline, then after 4 and 8 y. Linear mixed-effect models were adjusted for age, weight, grip strength, serum PTH and 17 $\beta$ -oestradiol, and glomerular filtration rate.

**Results:** Men with PD had more rapid decrease in aBMD at the hip ( $-16.8 \pm 3.7$  vs.  $-12.2 \pm 1.75$  mg/cm<sup>2</sup>/y,  $p < 0.01$ ) and at ultradistal radius ( $p < 0.05$ ) vs. 811 men who did not have PD. At distal radius and tibia, more rapid endocortical expansion (tibia:  $2.88 \pm 0.47$  vs.  $2.19 \pm 0.22$  mm<sup>2</sup>/y,  $p < 0.005$ ) resulted in more rapid cortical thinning (radius:  $-34 \pm 7$  vs.  $-25 \pm 3$   $\mu$ m/y,  $p < 0.005$ ) associated with more rapid decrease in total BMD at both the skeletal sites (radius:  $-6.89 \pm 1.43$  vs.  $-4.76 \pm 0.68$  mg/cm<sup>3</sup>/y,  $p < 0.002$ ). At distal radius, PD was also associated with faster bone loss in the trabecular compartment ( $p < 0.01$ ). This rapid bone loss was associated with more rapid decline in estimated bone strength at the distal radius (failure load:  $-104 \pm 24$  vs.  $-70 \pm 11$  N/y,  $p < 0.005$ ) and distal tibia (failure load:  $-212 \pm 37$  vs.  $-164 \pm 18$  N/y,  $p < 0.01$ ).

**Conclusion:** In a cohort of older men followed prospectively for 8 y, PD was associated with faster bone loss, greater decline of bone microarchitecture and more rapid decrease in bone strength. These phenomena may contribute to the higher fracture risk in this group. However, the results should be interpreted cautiously because of the low number of men with PD.

P368

### TRENDS IN OSTEOPOROSIS CARE PATTERNS DURING THE COVID-19 PANDEMIC IN ALBERTA, CANADA

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**Objective:** To describe changes in osteoporosis-related care patterns during the coronavirus disease 2019 (COVID-19) pandemic in Alberta, Canada, relative to the preceding 3 y.

**Methods:** A repeated cross-sectional study design encompassing three-month periods of continuous administrative health data, between March 15, 2017 and September 14, 2020, described osteoporosis-related healthcare resource utilization (HCRU) outcomes. The percent change related to HCRU outcomes were averaged across the control periods (2017-2019), relative to the COVID-19 periods (2020). Outcomes included patients with osteoporosis-related healthcare encounters, physician visits, diagnostic and laboratory test volumes, and treatment prescription initiations and disruptions of greater than 60 d.

**Results:** Relative to the average control period from March to June, all HCRU outcomes declined during the corresponding COVID-19 period in 2020: patients with osteoporosis healthcare encounters (overall): -14%; general practitioner visits: -13%; specialist practitioner visits: -9%; BMD tests: -47%; vitamin D tests: -13%. Additionally, osteoporosis treatment initiations declined (oral bisphosphonates: -43%, intravenous bisphosphates: -26%, and denosumab: -35%) and treatment disruptions of Ke and denosumab increased by 2.1% and 3.2% increase, respectively. In the subsequent June to September 2020 period, HCRU and treatment initiation either increased back to or surpassed pre-pandemic levels. Treatment disruption was not assessed in this last period due to a lack of sufficient follow-up to assess disruptions.

**Conclusion:** This study demonstrates the impact of the COVID-19 pandemic and corresponding public health lockdowns on further exposing the existing 'crisis' around gaps in osteoporosis care. The decline in healthcare encounters would be expected to limit opportunities to prevent osteoporotic fractures, in particular patients after fragility fracture who are at greater risk. Understanding the impact of the COVID-19 pandemic on patients requiring osteoporosis-related care is fundamental to improving patient care and management.

**Disclosures:** SM, EG, MSF, and SL, are employed by Medlior, which received funding for the study from Amgen Canada. TO, RW, MP and SA are employed by Amgen Canada who funded this study

and hold Amgen stock. DLK reports research support from Amgen, Astellas, AstraZeneca, and Eli Lilly; consulting fees from Amgen, Eli Lilly, Merck, and Pfizer; and is on the speakers' bureau for Amgen, Eli Lilly, and GSK. JPB reports research support from Mereo BioPharma, Radius Health and Servier; consulting fees from Amgen, Paladin Labs Inc, Pfizer and Servier; and is on the speakers' bureau for Amgen. AGJ: has participated in Advisory Boards for Amgen Canada and Paladin Labs Inc; and is on the speakers' bureau for Amgen. PS reports research support from Johnson & Johnson, Smith & Nephew, and DePuy Synthes and has participated on Advisory Boards for Amgen.

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### TRENDS IN OSTEOPOROTIC FRACTURES AND RELATED IN-HOSPITAL COMPLICATIONS DURING THE COVID-19 PANDEMIC IN ALBERTA, CANADA

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**Objective:** This study describes absolute number of low-energy fractures, as well as time-to-surgery, complications and deaths post-surgery in patients with fractures during the coronavirus disease (COVID-19) pandemic in Alberta, Canada, compared to the three years prior.

**Methods:** A repeated cross-sectional study was conducted using provincial-level administrative health data extracted between March 14, 2017, and September 15, 2020. Outcomes were assessed in three-month periods in the three years preceding the COVID-19 pandemic (2017-2019) and in the first two 3-month periods after COVID-19 pandemic restrictions were implemented in 2020 (March to June and June to September 2020). Patterns of fracture- and hospital-related outcomes over the control and COVID-19 2020 periods 2020 were calculated.

**Results:** Relative to the average number of fractures from the control periods, there was a slight decrease in the number of low-energy fractures based on emergency department and hospital admissions (n=4733 vs. n=4308) during the March to June COVID-19 2020 period, followed by a slight rise in the June to September COVID-19 2020 period (n=4520 vs. n=4831). While the number of patients with low-energy fractures receiving surgery within the same episode of care decreased slightly during the COVID-19 2020 periods (n= 64 people in March to June; n= 98 people in June to September, relative to 2019), the proportion receiving surgery and the proportion receiving surgery within 24 hours of admission remained stable. Across all periods, hip fractures ac-

counted for the majority of patients with low-energy fractures receiving surgery (range: 58.9-64.2%). Patients with complications following surgery, and in-hospital deaths following surgery, also decreased slightly during the COVID-19 2020 periods, relative to the control years.

**Conclusion:** These results suggest that the number of low-energy fractures and associated surgeries and surgical outcomes declined slightly in the first few months of the COVID-19 pandemic. Reduced outdoor activities and increased sanitary preventative methods are possible drivers for the observed changes. Further investigation is warranted to explore patterns during subsequent COVID-19 waves when the healthcare system experienced severe strain.

**Disclosures:** SM, CWB, SL, and EG are employed by Medlior, which received funding for the study from Amgen Canada. Amgen Canada was the study sponsor. TO, RW, MP, and SA are employed by Amgen Canada and hold Amgen stock. DLK reports research support from Amgen, and Radius; consulting fees from Amgen, Eli Lilly, and Paladin; and is on the speakers' bureau for Amgen and Eli Lilly. JPB reports research support from Merco BioPharma, Radius Health and Servier; consulting fees from Amgen, Paladin Labs Inc., Pfizer and Servier; and is on the speakers' bureau for Amgen. PS reports research support from Johnson & Johnson, Smith & Nephew, and DePuy Synthes; and has participated in Advisory Boards for Amgen. AGJ has participated in Advisory Boards for Amgen Canada and Paladin Labs Inc and is on the speakers' bureau for Amgen.

## P370

### ASSOCIATION BETWEEN OSTEOPOROSIS KNOWLEDGE AND PATIENTS WITH TYPE 2 DIABETES DURING COVID-19 IN MONGOLIA: A WEB-BASED CROSS-SECTIONAL STUDY

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**Objective:** To determine knowledge of osteoporosis in patients who are diagnosed 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 644 participants (female, male) aged 20-65 who had T2DM. Participants completed an online questionnaire to assess their knowledge of international osteoporosis, which was prepared specifically for them, within 20-30 min during the COVID-19 epidemic from July 2021 to November 2021. Knowledge was defined according to a osteoporosis knowledge assessment

tool (OKAT) good score  $\geq 20$ ; moderate score 14-19; poor score  $\leq 1-13$ . Multivariate logistical regression analyses were used to identify predictors of good to moderate and low OKAT scores.

**Results:** The study involved 644 patients, with an average age of 54. Of the participants 90.2% were married, 3.6% were unmarried, and 6.2% were divorced. When participants were classified according to their knowledge of osteoporosis, 1.08% had good knowledge, 25.62% had intermediate knowledge, and 73.3% had poor knowledge. If participants were classified by duration of T2DM, 47.5% had been ill for 0-5 y, 26.86% for 6-10 years, and 25.62% for  $>11$  y. 25% of participants smoked. According to the level of osteoporosis knowledge of the participants, 78.5% of the male participants had poor knowledge and 69.4% of the female participants had poor knowledge. 0.6% of smokers had good knowledge of diabetes, 24.2% had moderate knowledge, and 75.2% had poor knowledge. After adjusting for gender, odds ratios (OR) for lower education were significantly associated with osteoporosis knowledge in T2DM (OR, 1.00;  $p=0.002$ ; 95% CI (0.55-0.75)). Also showed OR for ophthalmic diseases and rheumatoid arthritis had a significant effect on the osteoporosis knowledge in T2DM (OR, 1.01;  $p=0.001$ ; 95% CI (0.85-1.28)), (OR, 1.00;  $p=0.001$ ; 95% CI (0.93-1.02)).

**Conclusion:** Patients with T2DM aged between 20-65 had inadequate knowledge of osteoporosis. Therefore, there is a need to improve knowledge and understanding of osteoporosis, especially among diabetic patients or patients with lower education.

## P371

### ASSESSING KNOWLEDGE LEVEL OF OSTEOPOROSIS IN MONGOLIAN WOMEN WITH TYPE II DIABETES MELLITUS

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**Objective:** We assessed the knowledge level of osteoporosis in Mongolian women who are diagnosed with type 2 diabetes mellitus (T2DM).

**Methods:** This study was conducted by cross-sectional method and included 644 participants (female, male) aged from 20-65 who have T2DM. We asked participants to complete a 30-min online questionnaire in order to evaluate their knowledge on osteoporosis. The questionnaire was conducted from July 2021 to November 2021 during the COVID-19 pandemic period. Defining knowledge as an osteoporosis knowledge assessment tool (OKAT), indicators are as follows: good score  $\geq 20$ ; moderate score 14-19 and poor score  $\leq 1-13$ .



**Results:** 56.28% of the respondents were women over 55 years old, 80% have secondary and higher education, and 88.61% were married. 50.1% of respondents were diagnosed with diabetes for up to 5 y, 25.75% for 6-10 y, and 24.11% for >11 y. About 30% of women with diabetes have comorbid conditions, with the majority taking antihypertensive drugs (72.68%), 55.42% taking antidiabetic drugs, and 36.4% receiving insulin therapy. Of the study participants, 80.47% were overweight, 12.15% smoked, 8.40% consumed alcohol, 43.08% did not exercise, 82.92% ate salty foods, and 53.92% drank salty tea. Findings suggest that participants' knowledge on osteoporosis is insufficient, or 73.3% had poor knowledge and 25.6% had moderate knowledge. A correlation between knowledge on osteoporosis and mother's level of education was observed – as mother's level of education increased, knowledge on osteoporosis increased ( $p < 0.05$ ). In addition, the level of knowledge in participants with comorbidities of eyes and rheumatoid arthritis was statistically high ( $p < 0.05$ ). However, the duration of diabetes (y) was insignificant.

**Conclusion:** Among women diagnosed with T2DM, knowledge on osteoporosis is clearly insufficient. There is a critical need to educate patients with diabetes on osteoporosis, importance of exercise and calcium intake.

## P372

### PALOVAROTENE FOR THE TREATMENT OF FIBRODYSPLASIA OSSIFICANS PROGRESSIVA: METHODOLOGY OF THE PHASE III OPEN-LABEL PIVOINE ROLLOVER TRIAL

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**Objective:** Fibrodysplasia ossificans progressiva (FOP) is an ultrarare genetic disorder characterized by heterotopic ossification (HO) and progressive disability. To date, no approved disease-modifying treatments for FOP exist, but interim phase III trial (NCT03312634) results suggest marked efficacy for palovarotene (PVO).<sup>1</sup> Here, we describe methodology of the PIVOINE trial (NCT05027802) designed to allow treatment continuity and further evaluation of PVO safety and efficacy.

**Methods:** Patients (pts) will receive 5 mg PVO daily, or the parent study completion dose, for a maximum of 3 y; during flare-ups, pts will receive 20 mg daily for 4 weeks, then 10 mg daily for 8 weeks. Enrollment criteria: completion of a parent study (end of study/treatment visit of NCT03312634 or NCT02279095/NCT02979769),  $\geq 14$  years old, full skeletal maturity if aged  $< 18$  or deemed to be final height. PIVOINE aims to enroll 61 pts; recruitment has not begun. Outcomes are presented in the Table.

**Table.** Trial outcomes

<b>Primary</b>
Incidence of treatment-emergent adverse events <sup>a</sup>
<b>Secondary<sup>b</sup></b>
Cumulative Analogue Joint Involvement Scale total score <sup>c</sup>
Use of aids, assistive devices and adaptations <sup>c</sup>
FOP-Physical Function Questionnaire% of worst score (total score; upper extremities/mobility sub-scores) <sup>c</sup>
Frequency of healthcare utilization
Observed/percentage predicted (PP): <sup>c</sup>
<ul style="list-style-type: none"> <li>• Forced vital capacity (FVC)</li> <li>• Forced expiratory volume in 1 second (FEV<sub>1</sub>)</li> <li>• Diffusion capacity of the lung for carbon monoxide</li> <li>• Absolute/PP:<sup>c</sup></li> <li>• FEV<sub>1</sub>/FVC ratio</li> </ul>
Patient Reported Outcomes Measurement Information System physical and mental function scores <sup>c</sup>
Number of reported flare-ups, outcomes and duration <sup>c</sup>
% of patients with new bone growth

<sup>a</sup>Collected continuously over trial; <sup>b</sup>Collected every 6 months over trial; <sup>c</sup>Raw values and change from inclusion visit.

**Results:** Results from PIVOINE, estimated to end in November 2024, will allow further evaluation of PVO in FOP.

**References:** 1. Pignolo R *et al.* ASBMR 2020;35(Suppl 1):16–17

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## P373

### INDUCED HYPOGONADISM AND LONG TIME MANAGEMENT OF OSTEOPOROSIS IN A PATIENT WITH ENDOMETRIAL CANCER

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**Objective:** Hypogonadism is a frequent secondary cause of osteoporosis due to lack of estrogens at early ages causing abnormalities in bone mass and increased risk of fragility fractures. Additional effects come with the underlying cause, for instance, therapies for gynecological cancers; moreover, some of them

contraindicate hormone replacement therapy (HRT). (1-5) We aim to introduce a female patient with surgically induced menopause due to endometrial cancer and consecutive osteoporosis.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 53-year, nonsmoking female who is admitted for bone assays. She is known with surgically induced menopause at 37 y (total hysterectomy with bilateral adnexectomy for uterine carcinoma stage 2B, with consecutive radiotherapy and brachytherapy, and no HRT). 5 y ago, she was first identified with osteoporosis based on DXA: lumbar L1-4 BMD (g/cm<sup>2</sup>)=0.826, T-score(SD)=-2.9, Z-score(SD)=-1.8; femoral neck BMD (g/cm<sup>2</sup>)=0.647, T-score(SD)=-2.8, Z-score (SD)=-1.6; total hip BMD (g/cm<sup>2</sup>)=0.765, T-score(SD)=-1.9, Z-score(SD)=0.9, and degraded microarchitecture as pointed by low TBS of 1.129. She started weekly alendronate and cholecalciferol and currently, 25-hydroxyvitamin D is high due to intensive supplements of 44.9 ng/mL (N:30-100), while bone turnover markers were mildly decreased: osteocalcin of 16.67 ng/mL (N:15-46), CrossLaps of 0.37 ng/mL (N: 0.33-0.782), P1NP of 24.32 ng/mL (N: 20.25-76.31) with normal PTH of 51.42 pg/mL(N:15-65). BMD-DXA decreased, so was TBS to 1.100. DXA: L1-4 lumbar BMD (g/cm<sup>2</sup>)=0.821, T-score (SD)=-3, Z-score (SD)=-1.7; femoral neck BMD(g/cm<sup>2</sup>)=0.633, T-score (SD)=-2.9, Z-score (SD)=-1.6; total hip BMD (g/cm<sup>2</sup>)=0.747, T-score(SD)=-2.9, Z-score(SD)=-1.6.

**Conclusion:** This case highlights that surgically induced menopause without HRT in cancer survivors might induce osteoporosis at younger ages that typically seen in menopausal osteoporosis requiring lifelong management.

#### References:

1. Ghemigian A, et al. *Exp Ther Med* 2021;22:1219
2. Dumitrascu MC, et al. *Exp Ther Med* 2021;22:804
3. Ghemigian A, et al. *Exp Ther Med* 2022;23:88
4. Gheorghisan-Galateanu AA, et al. *Acta Endocrinol Bucharest* 2017;13:356
5. Radu L, et al. *Revista de Chimie* 2018;69:3565

## P374

### PREVALENCE AND ADHERENCE TO THERAPY FOR OSTEOPOROSIS AND CARDIOVASCULAR COMORBIDITIES IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** The risk of cardiovascular disease (CVD), osteoporosis (OP) and fractures in patients with rheumatoid arthritis (RA) is 1.5- to 2-fold higher than age- and sex-matched individuals from the general population. The purpose is to evaluate the prevalence of OP and cardiovascular comorbidities and their management in RA patients.

**Methods:** 200 patients - 165(83%) females and 35(17%) males, median (Me) age 55 [interquartile range 46;61] y were enrolled in our cohort. RA median duration was 5[1;10] y, early RA ( $\leq 1$  y) was diagnosed in 30% patients (pts), DAS28 score was 3,9[3,1;4,9], 83% pts were seropositive for IgM RF and/or 82% for ACCP, 71% pts had erosions, ACR functional class I RA was established in 23%, II RA in 65%, and III RA in 13% pts. Therapy: 43% pts received prednisone, 70% methotrexate, 9% leflunomide, 3% hydroxychloroquine, 1% azathioprine, 21% biologic DMARDs: rituximab 7%, adalimumab 6%, abatacept 5%, certolizumab pegol 2%, infliximab 2%, and tocilizumab 1%.

**Results:** Fractures of various localizations were detected in 30% of RA patients, OP was diagnosed in 16% pts. Coronary artery disease (CAD) was diagnosed in 21% pts, myocardial infarction in 2%, cardiovascular revascularization procedure (coronary artery bypass graft) in 4%, and stroke in 1%. The following rates of traditional cardiovascular risk factors were identified: hypertension in 60%, BMI  $\geq 25$  in 59%, menopause in 55%, dyslipidemia in 45%, smoking status in 44%, family history of CVD in 29%, diabetes mellitus (DM) in 8% patients. Coverage by therapy for comorbidities was as follows: 82%pts with hypertension received antihypertensive therapy, 80% pts with DM were on diabetes medications, and only 30% pts with dyslipidemia and 29% pts with OP were on lipid lowering and antiresorptive medications (bisphosphonates only) respectively, 70% pts with CAD were on aspirin and 4% of them underwent cardiovascular revascularization procedure.

**Conclusion:** Hypertension, overweight and dyslipidemia are the most common cardiovascular comorbidities. The adherence to therapy of OP and dyslipidemia is low. Revealed low adherence of RA patients could be explained by silence of the OP and potentially higher hepatotoxicity of statins in combination with DMARDs.

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### 5-YEAR EFFECT OF SINGLE ZOLEDRONIC ACID ADMINISTRATION

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**Objective:** Zoledronate 5 mg/y is a useful medication against male and female osteoporosis, either primary or secondary like glucocorticoid – induced or associated with rheumatoid arthritis. Its mechanism of action is slowing down bone mass loss, by increasing bone density and decreasing calcium release. The nonyearly administration is potentially useful, for instance, at 3 y. This should be considered a drug holiday after the first year following the administration or a planned regime of administration every 3 (even 5) y. (1-5) We introduce a female patient with intolerance to oral bisphosphonates who was treated with zoledronate and followed for a few years after.

**Methods:** This is a case report.

**Results:** This is an 83-year, nonsmoker female, known with rheumatoid arthritis on glucocorticoid treatment who is admitted for bone assessment. She associates severe osteoporosis with forearm fracture 20 y ago. 10 y before she started oral bisphosphonates and developed esophageal side effects that contraindicated the oral administration. Her personal medical history also includes postoperative hypothyroidism for Basedow-Graves' disease, arterial hypertension, anxiety syndrome, and also an essential tremor. Due to the tremor, she refused the administration of teriparatide. 5 years ago she was treated with a single administration of zoledronate 5 mg after newly detected vertebral fractures at lumbar vertebral L3, L4, L5. Additional daily 2000 IU cholecalciferol was offered. She delayed the presentation to the hospital, and the admission for another injection/therapy until now. No incidental fracture was detected in the meantime. DXA results showed stationary results for lumbar spine and total hip.

	BMD (g/cm <sup>2</sup> )	T-score (SD)	Z-score (SD)	Region
5 y ago (zoledronate 5 mg)	0.935	-1.9	0	lumbar L1-2
	0.69	-2.5	-0.3	femoral neck
	0.708	-2.4	-0.3	total hip
current admission	0.971	-1.6	0.4	lumbar L1-2
	0.666	-2.7	-0.4	femoral neck
	0.702	-2.4	-0.4	total hip

**Conclusion:** This case illustrates an aspect of real life medicine in patients with long standing conditions: adherence to therapy. Due to patient's option we can analyze the long term effect of 5 mg zoledronate for severe osteoporosis.

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1. Ghemigian A, et al. Exp Ther Med 2022;23:88
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P376

### SEVERE COURSE OF PRIMARY HYPERPARATHYROIDISM IN A PATIENT WITH ATYPICAL PARATHYROID ADENOMA: A CLINICAL CASE

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**Objective:** Primary hyperparathyroidism (PHPT) is an endocrine disease with excessive secretion of PTH and an upper normal or an increased level of blood calcium due to primary pathology of the parathyroid glands.

**Methods:** We present a case of severe delayed diagnosed PHPT in a 62-year-old man who debuted with a mandibular mass.

**Results:** Since 2019, the patient noticed the appearance of a mass in the lower jaw, the pain in the bones, general weakness and deformation of the limbs. The condition was assessed as a giant cell tumor of the jaw, denosumab (120 mg subcutaneously for 1, 8, 15, 28 d and then once on 28th day) was administrated. After that the formation decreased in size. The assessment of mineral metabolism was performed only 2 y after. Labs revealed severe hypercalcemia (3.35 mmol/l, 2.15-2.55), elevated PTH (1548 pg/ml, 10-69) consistent with PHPT. The patient had decreased kidney function (CKD-EPI 19 ml/min/1.73m<sup>2</sup>) in the absence of nephrolithiasis/nephrocalcinosis, compression fracture of Th9, fractures of the ulna and femur neck, of 4,5,8,9,11<sup>th</sup> ribs, multiple foci of fibrocystic osteitis, osteoporosis with a BMD decrease up to -4.6 SD in the radius (T-score). US and CT scan revealed the formation of the right lower parathyroid gland (27x19x38 mm). Considering the late onset of the disease, the absence of a family history, single parathyroid formation, the positive dynamics of the jaw mass after denosumab therapy, examination for HPT-JT was not carried out. The patient underwent surgical treatment. Histological studies confirmed atypical adenoma of the parathyroid gland, with Ki67 expression less than 12%. After parathyroidectomy the patient developed a hypocalcemia due to hungry bone

syndrome, vitamin D metabolites and calcium carbonate were prescribed with achievement of target calcium levels. Nowadays the patient is undergoing dynamic observation.

**Conclusion:** Our clinical case shows the consequences of an untimely diagnosis of PHPT with the development of severe complications. If a patient has specific complaints or history of bone and mineral disorders it is necessary to evaluate PTH and calcium levels to provide timely specialized care.

### P377

#### POST-TRAUMATIC HEMARTHROSIS AS AN INFLAMMATORY PROCESS

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**Objective:** Recently, the total number of injuries of large joints has increased due to the widespread use of mobile vehicles in various age groups. The therapeutic actions taken are an important factor, which, however, in some cases can still lead to the formation of complications. Often there are clinical situations in which osteoarthritis develops due to post-traumatic hemarthrosis. This trend, in particular, can be observed in professional athletes who are prone to permanent injuries. Understanding the observed metabolic changes becomes important. The purpose of this study was to study posttraumatic hemarthrosis from the point of view of the inflammatory process.

**Methods:** The metabolic reactions of the damaged knee joint were studied, evaluated by determining the main laboratory parameters of hemovisous fluid in 25 patients with post-traumatic hemarthrosis. Biochemical, immunological parameters, cellular composition of punctate, acute phase reactants were studied. Statistical methods are implemented using the program Statistica v. 12.5.192.7 (StatSoft, USA).

**Results:** Despite the generally accepted point of view that post-traumatic hemarthrosis in the literal sense is not an inflammation, attention is drawn to the fact that all the main criteria of this process are present: in particular, redness, swelling, pain, hyperthermia. There are significant difficulties in the implementation of the function of the movable articulation of bones. Studies have shown that the effect of blood components on joint structures leads to the activation of oxidative stress, changes in the regulation of the cell cycle, degeneration of cartilage tissue. At the same time, signs of inflammation are revealed: activation of M1/M2 populations of monocytes, increased phagocytic activity of cells, changes in cytokine synthesis. The greatest dynamics is observed in IL-1 and TNF. The microvascular bed is affected by an increasing number of platelets.

**Conclusion:** Post-traumatic hemarthrosis is the cause of the formation of a focus of inflammation that limits the affected area. The implementation of the process is ensured by the participation

of cells of the immune system, components of hemostasis with a change in the functional state and other systems. Taking measures to reduce the activity of inflammation is an important task to ensure rapid and stable stabilization of the patient's condition.

### P378

#### SICKLE CELL BONE DISEASE AND RESPONSE TO INTRAVENOUS BISPHOSPHONATES IN CHILDREN

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**Objective:** To evaluate bone morbidity and the response to intravenous (IV) bisphosphonate therapy in children with sickle cell disease (SCD).

**Methods:** We conducted a retrospective review of patient records from 2003-2019 at three Canadian pediatric tertiary care centers. Radiographs, magnetic resonance images, and CT scans were reviewed for the presence of avascular necrosis (AVN), bone infarcts, and myositis. IV bisphosphonates were offered for bone pain management. BMD was assessed by DXA.

**Results:** 46 children (20 girls, 43%) had bone morbidity at a mean age of 11.8 y (SD 3.9) including AVN of the femoral (17/46, 37%) and humeral (8/46, 17%) heads, H-shaped vertebral body deformities due to endplate infarcts (35/46, 76%), and nonvertebral body skeletal infarcts (15/46, 32%). Five children (5/26, 19%) had myositis overlying areas of AVN or bone infarcts visualized on MRI. Twenty-three children (8/23 girls) received IV bisphosphonate therapy. They all reported significant or complete resolution of bone pain. There were no reports of sickle cell hemolytic crises, pain crises or stroke attributed to IV bisphosphonate therapy. Bone mineral apparent density Z-score increased at the lumbar spine (N=14, mean change +0.6, SD 0.4) and total body less head (N=14, mean change +0.5, SD 0.4) after IV bisphosphonate therapy (mean 1.5 y, SD 0.8).

**Conclusion:** Children with SCD have the potential for extensive and early onset bone morbidity. In this series, IV bisphosphonates were effective for bone pain analgesia and did not trigger sickle cell complications.



P379

### NONOSSIFYING FIBROMAS AND ANGULAR DEFORMITIES IN CHILDREN WITH CONGENITAL FORMS OF RICKETS: DESCRIPTION OF A LARGE COHORT

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**Objective:** Nonossifying fibromas (NOF) are benign, fibrous lesions of the skeleton estimated to occur in about 30% of children. In the general pediatric population, they are more common in males, usually asymptomatic and self-limiting. We have observed NOF in children with various forms of rickets although there is limited information on the characteristics of NOF in this population. The purpose of this study was to evaluate the frequency of NOF in various congenital forms of rickets and describe their characteristics.

**Methods:** This was a retrospective chart review of patients with congenital forms of rickets and at least one bilateral lower extremity radiograph taken between 4-18 y of age at two academic children's hospitals in the USA and Canada between 2004-2020. Data are described as proportions and percentages for categorical variables and means with standard deviations for continuous variables.

**Results:** 64 patients, mean age 13.3±5.1 y (66% female) were included with diagnoses of X-linked hypophosphatemia (XLH, n=55, 86%), renal hypophosphatemia [n=4, 6% (3 Fanconi syndrome, 1 Dent disease)], hereditary vitamin D resistant rickets (HVDRR, n=3, 5%), and hereditary vitamin D dependent rickets type 1 (VDDR1, n=2, 3%). Fifteen patients (23%, 67% female, 87% XLH) had 17 NOF lesions. Angular deformity was present in 81% of limbs with NOF (50% genu varum), and in 74% of limbs without NOF. All NOF were localized to the lower extremities (60% femur, 27% tibia, 13% fibula) and 94% were located medially. The mean NOF height was 24.1±13.8 mm and width 10.1±5.3 mm. Nine of 15 patients with NOF (60%) compared with 22/49 without NOF (45%) required angular deformity surgery. Three patients (20%) experienced fractures within the lesions, and one (7%) had a progressive lesion requiring surgery with grafting.

**Conclusion:** We describe the frequency and characteristics of NOF in children with congenital forms of rickets. NOF were identified in almost a quarter of patients, and patients with NOF required angular surgery more often. Fractures were present within the lesions in one-fifth of those with NOF, suggesting clinically important osteomalacia at that site. Long-term follow-up and future studies are important to further characterize NOF in various forms of rickets, their pathogenesis, progression, and association with disease severity.

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### SARCOPENIA AND COGNITIVE PERFORMANCE IN A COHORT OF MIDDLE-AGED AND OLDER EUROPEAN MEN: DATA FROM THE EUROPEAN MALE AGEING STUDY (EMAS)

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**Objective:** To investigate cross-sectional and longitudinal associations between sarcopenia, its defining parameters (muscle strength, muscle mass and physical performance) and cognition in middle-aged and older men from the European Male Ageing Study (EMAS).

**Methods:** EMAS is a multicenter cohort study of men aged 40-79 y recruited from population registers in 8 European centers. Fluid cognition (Rey-Osterrieth Complex Figure (Rey Copy and Recall: visual memory), Camden Topographical Recognition Memory (CTRM: recognition), Digit Symbol Substitution Test (DSST: processing speed)) and sarcopenia outcomes (gait speed (GS), chair stand test (CST), appendicular lean mass (aLM), handgrip strength (HGS), knee extensor strength) were assessed at baseline and after a median follow-up of 4.3 y. Cross-sectional and longitudinal associations between cognitive performance, sarcopenia-defining parameters, prevalent and incident sarcopenia (EWGSOP2) were analyzed. Linear and logistic regression were used and adjusted for age, age leaving education, center and physical activity.

**Results:** In 3233 participants, data were available on GS and CST, demonstrating that at baseline, GS was associated ( $P<0.05$ ) with Rey Copy ( $\beta=0.017$ ), Rey Recall ( $\beta=0.013$ ), CTRM ( $\beta=0.019$ ), DSST score ( $\beta=0.031$ ) and overall fluid cognition ( $\beta=0.043$ ). CST was associated with DSST ( $\beta=-0.198$ ;  $P<0.05$ ). In the Leuven+ Manchester cohort (n=456) data were available on aLM, HGS and knee extensor strength. HGS was associated with Rey Recall ( $\beta=0.938$ ;  $P<0.05$ ). Rey Recall was associated with quadriceps isokinetic 90°/s peak torque/body weight ( $\beta=7.910$ ;  $P<0.05$ ). aLM was associated ( $P<0.05$ ) with Rey Copy ( $\beta=0.475$ ), DSST ( $\beta=0.477$ ) and fluid cognition ( $\beta=0.674$ ). No association was found between cognition and prevalent nor incident sarcopenia. Longitudinally, low Rey Recall was associated with increase in CST ( $\beta=-1.610$ ,  $P<0.05$ ). Conversely, high CST was associated with decrease in Rey Recall ( $\beta=-1.800$ ;  $P<0.001$ ). Low Rey Copy score was associated with increase in CST in men  $\geq 70$  y ( $\beta=-0.639$ ,  $P=0.013$ ).

**Conclusion:** Specific cognitive domains were associated with muscle mass, muscle strength and physical performance. A bidirectional relationship was found between performance in Rey Recall, a measure of visual memory, and CST.

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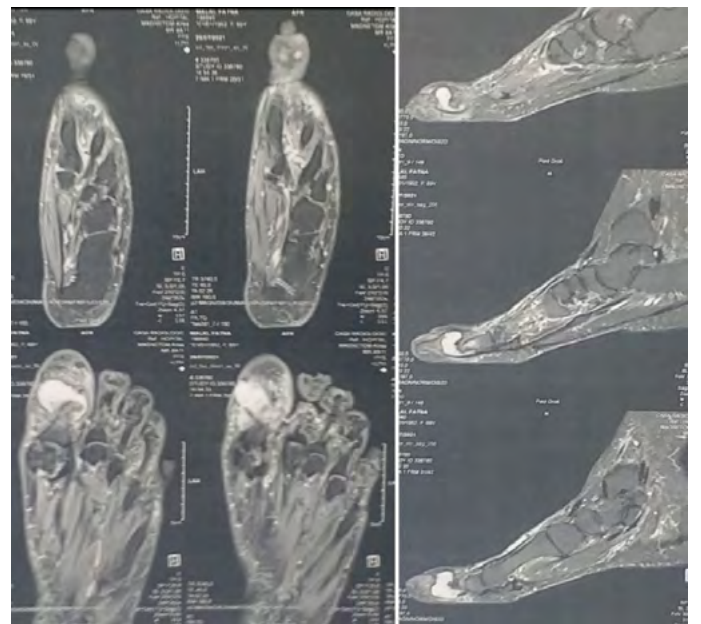
**HISTORICAL GOUT: CLINICAL CASE**A. R. Halidou Idrissa<sup>1</sup>, N. K. Nassar<sup>1</sup>, S. J. Saadia<sup>1</sup><sup>1</sup>CHU Ibn Rochd, Service de Rhumatologie, Casablanca, Morocco

Gout is a disease in which a deposit of uric acid crystals accumulates in the joints, due to high levels of uric acid in the blood (hyperuricemia). The reference values for uricemia are 180-420  $\mu\text{mol/L}$  (30-70 mg/L) in men and 150-360  $\mu\text{mol/L}$  (25-60 mg/L) in women (1,2). The gout attack (podagra) is most often monoarticular, typically involving the first metatarsophalangeal joint (56-78% of cases), however, the other joints are less represented in the literature, which can lead to diagnostic errors. Gout is a potentially destructive rheumatism, more frequent in men. We report a case of gout mistaken for a joint infection due to its atypical clinical location in a woman.

This is a 69-year-old woman, postmenopausal at 49 y of age, with no particular pathological history; she complained of a painful swelling of the left big toe that had been evolving for 2 y with a pattern of relapses/remissions. Faced with the evolution of the symptomatology marked by the appearance of asthenia and fever ( $38^{\circ}\text{C}$ ) at the time of an inflammatory attack of the big toe, she consulted a general practitioner and benefited from an initial biological check-up which revealed an inflammatory syndrome (VS 79 mm at the first hour, CRP 31 mg/l), as well as a radiological checkup showing destructions (juxta-articular, marginal erosion) of the first IPP joint (Fig. 1). She was put on a level 1 analgesic, without response. Secondly, she underwent an MRI of the forefoot, which revealed a collection in the first PPI joint of the toe measuring 27 mm in width, 24 mm in length, and 16 mm in diameter anteroposteriorly in T1 hyposignal and T2 hypersignal, enhancing peripherally after injection of Gadolinium, It was suggestive of an abscessed collection, associated with lysis of the bone marrow and significant infiltration of the soft tissues (Fig. 2), suggestive of an infection, probably germ-specific, given the chronic clinical context. The patient was referred to the rheumatology department of Casablanca. On admission, the clinical examination revealed an asthenic patient, with a normal temperature of  $36^{\circ}\text{C}$ , on nonsteroidal anti-inflammatory drugs which did not relieve her, and a red, hot and swollen big toe. The etiological work-up was completed by a puncture with study of the joint fluid (inflammatory fluid with absence of germs and crystals) as well as a blood uric acid determination (hyperuricemia at 129 mg/l). The patient was put on colchicine, with a spectacular evolution after 7 d, marked by the disappearance of the clinical and biological inflammation (VS at 33 mm at the first hour, CRP at 5 mg/l), and after 2 weeks on allopurinol (200 mg/d).



**Figure 1.** Standard radiograph, front view of both forefeet; destruction of the first PPI joint (juxta-articular, marginal erosion).



**Figure 2.** MRI of the right forefoot, collection at the first PPI joint in T2 hypersignal.

Gout is more common in men than in women. In general, gout occurs in the 50s in men and after menopause in women (3). The diagnosis remains essentially clinical. Involvement of the big toe has a high positive predictive value (sensitivity 96%, specificity 97%) (4). For several years, the gout sufferer will have an attack from time to time (every one to two years), then the attacks will come closer together, but always, the interval between two attacks is normal, it is the acute gout phase (5). The gout attack is often accompanied by general signs such as fatigue and insomnia, fever, chills, nervousness, digestive problems, and difficulty in urinating in some cases (6). Radiologically, there may be joint destruction, with large erosions as in our patient's case. They have a halberd-like appearance, typically of large size. Bone spicules extending these erosions are very suggestive of gout (7). These changes are accompanied by soft tissue edema, without radiological evidence of osteopenia (8). The differential diagnosis of acute gouty disease remains primarily that of septic disease (9).

Colchicine is a drug used primarily in gout to treat an acute attack or to prevent an attack when treatment to lower blood uric acid levels is initiated (10).

Gout is a potentially destructive chronic disease. As in our patient's case, the gout attack can present diagnostic difficulties when it is triggered in unusual areas and makes one think of septic arthritis, especially in the destructive monoarticular forms. Colchicine remains a better treatment in the management of acute gout attacks.

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## P382

### DIAGNOSIS OF ASEPTIC OSTONECROSIS OF THE FEMORAL HEAD (ONATF)

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Osteonecrosis is the cell death of the various components of bone. It is not a specific disease, but the culmination of various pathological conditions that impair blood flow to the femoral head. An abnormality of the perfusion of the femoral head combining platelet aggregation and intravascular coagulation is found. The diagnosis is guided by a careful questioning and clinical examination, and paraclinical explorations allow us to make an early diagnosis of certainty.

Etiological Diagnosis:

A- Individualized causes

- Traumatic:

Fracture: fractures (subcapital), can interrupt most of the vascularization of the femoral head.

Dislocation: with possible vascular compressions, the favouring factors are the delay of reduction.

- Caisson and diver's disease: the mechanism would be the formation of nitrogen bubbles in the tissues, its accumulation allows the appearance of intra and extra vascular bubbles with circulatory arrest.
- Gaucher's disease: appearance of large bones that compress the vessels. ONATF is one of the most frequent complications of Gaucher disease.
- Sickle cell disease: this is the most common associated disease. ONATF is the consequence of a major alteration of the blood.
- Radiation necrosis: direct effect of radiation on bone cells and indirect effect through vascular lesions.

B- Risk factors

- Traumatic: Minor trauma (contusion)
- Nontraumatic: the two main factors are alcoholism (dose dependent) and corticosteroid therapy (dose and duration dependent). We can also mention: disturbances in lipid metabolism, hyperuricemia and gout, pregnancy, organ transplants, systemic lupus erythematosus, other collagenoses, arteriosclerosis, other occlusive vascular diseases, diabetes mellitus, carbon tetrachloride intoxication, hypofibrinolysis syndromes, hypercoagulation syndromes, leukemia, chemotherapy, tobacco, HIV, genetic predisposition.

C- Idiopathic or primary aseptic osteonecrosis (NAOi): no etiology is found in 10 to 40% of cases.

Positive Diagnosis:

- Clinical signs: are not specific, the patient may remain asymptomatic in most cases (Marcus' silent hip), or conversely complain of pain for weeks or months (groin fold+++). The clinical examination is also aspecific. Hip movements are often within normal limits.
- Standard radiography: late on the evolution of the necrosis. Its interest is in the search for a subchondral dissection. It is the most reliable examination to look for the classic eggshell or loss of sphericity of the femoral head.
- MRI: only MRI, with a sensitivity and specificity of almost 100%, allows the diagnosis to be made and provides information on the condition of the contralateral hip. The analysis seeks to specify:
  1. The focus of necrosis: normal signal at the beginning, which may become heterogeneous later on, or even completely obscured/ which may merge with the border.
  2. The border (essential sign): line in hyposignal in T1 and T2, which often has a circular, irregular, roughly concave upward shape and whose extremities connect seam-



lessly with the contour of the femoral head. In half of the cases, this line is matched by a duplicate: a hypersignal border of the same contour (image).

3. Joint effusion: frequent, marked in hyposignal in T1 and especially clear in hypersignal in T2.
4. Intraosseous edema: inconstant, blurs the signal of the fat, decreased in T1.

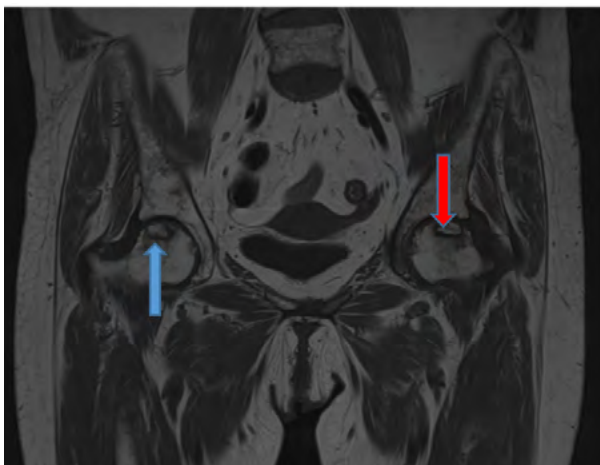
#### Differential Diagnosis:

- Complex regional pain syndrome (Crps): formerly called femoral head algodystrophy.
- Subchondral fatigue fracture: this is the most difficult diagnosis. Its confusion with Onatf explains a number of so-called osteonecroses that heal spontaneously.
- Chondroblastoma of the head of the femur: exceptional location.
- Other: coxarthrosis and other coxopathies, Paget's disease, cruralgia.

**Evolution And Complications:** In the absence of treatment, the natural course of ONATF is a subchondral fracture, followed by irreversible deformation of the joint surface (collapse), which is responsible for a poor joint prognosis. This is particularly true since the hip is a weight-bearing joint. Between 32 and 79% of ONTFs result in joint surface collapse.

**Treatment:** None of the treatments considered (bisphosphonates, extracorporeal shock waves, pulsed magnetic fields, hyperbaric chamber, cervicocephalic drilling) has clearly demonstrated its effectiveness. Drilling with autologous bone marrow stem cells seems to be the most promising. At the stage of subchondral fracture, total arthroplasty remains the reference method if the functional discomfort justifies it. Osteotomies are an alternative that is rarely used, as some of them are relatively heavy and technically difficult. Prevention of ONTF is based primarily on minimizing risk factors.

**Conclusion:** ONATF is a multifactorial and relatively disabling condition. Its asymptomatic clinical nature is the fundamental element of the diagnostic delay. MRI is the best examination for an early diagnosis of certainty. Management depends on the stage of the disease.



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## RHEUMATOLOGICAL MANIFESTATIONS OF DIABETES

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Osteoarticular and abarticular complications of diabetes are represented by a clinical polymorphism. Although frequent, they are often ignored. They can constitute a major handicap in daily life. Their physiopathological mechanisms remain poorly understood. Nevertheless, some manifestations are the direct consequence of diabetes, others are simply associated with it. We report the main ones.

#### I. The Stiffening Syndrome:

1. Diabetic cheiroarthropathy (CA): Also called "stiff hand syndrome" or "diabetic pseudo-scleroderma hand". It has been reported in 50-75% of patients with long-standing diabetes and a history of diabetic neuropathy. The diagnosis is clinical, with the discovery of the prayer sign "palm joined as if to pray" and table sign "inability to flatten the palm and fingers against a flat surface" with an inability to close the fist completely. Treatment of CA is primarily based on rehabilitation, night orthotics may be offered.
2. Dupuyren's disease (MD): 15-20% of diabetics have MD. The disease is 4 times more common in diabetics. The diagnosis of MD is clinical with the presence of a persistent palmar nodule that does not follow finger movements. This is pathognomonic of the condition.
3. Flexor tenosynovitis (jerk finger): stenosing tenosynovitis in which constriction of the tendon sheath is associated with the presence of a nodule on the flexor tendon. The frequency is 10% in diabetics. The diagnosis is clinical, it is described: an initial phase (pain with discomfort, limitation may be missed), a state phase (the constriction may become painful, when the tendon becomes thickened, locatable and palpable as a small mobile nodule) and a severe phase (the finger may remain locked in flexion or extension). Treatment involves local cortisone infiltrations and, if this fails, surgery.
4. Retractable capsulitis: the risk of capsulitis in this population is multiplied by 5 whatever the type of diabetes. Retractable capsulitis of the shoulder evolves in three phases: the painful phase or "congestion" phase, the phase of progressive stiffening with a decrease in pain (the shoulder is said to be "frozen") and the "thawing" phase during which movements gradually regain their amplitude. The diagnosis is confirmed by arthrography. Treatment is based on rehabilitation with active physical therapy after the indolence with the use of analgesics.



5. Carpal tunnel syndrome (CTS): common in diabetics, 14-30% with associated diabetic neuropathy. Symptoms initially include paresthesias and numbness in the median nerve territory. Although the use of the electroneurogram remains controversial, it remains the reference examination for the exploration of CTS. In addition to its medicolegal value, it allows to confirm the diagnosis and to specify its severity.

II. Quervain's Tenosynovitis: It affects 3.6% of diabetics, vs. 0.7% of nondiabetics. The diagnosis is clinical, with the patient usually reporting pain and swelling of the wrist. The Finkelstein maneuver is used, which consists of flexing the thumb in the palm of the hand and causing an ulnar deviation of the wrist, the pain is then reproduced. Medical treatment is always proposed in the first instance (rest, anti-inflammatory drugs, splinting), surgical treatment will be proposed in rebellious forms.

III. Osteoporosis (Diabetoporosis): It is a form of osteoporosis resulting from diabetes, the main risk factors of which are related to the imbalance of diabetes, its duration and the micro and macrovascular and architectural complications.

IV. Nervous Osteoarthropathy (Charcot's foot): Foot problems affect 15% of diabetics. It is described as an acute phase (painless swelling of the forefoot with hyperlaxity and trophic disorders) and a chronic phase (anarchic reconstruction of the foot bones responsible for significant deformities). MRI is the reference examination for the diagnosis of Charcot foot. The goal of treatment is to limit the deformity by immobilization and unloading.

V. Ossifiant Enthesopathy: Forestier's disease or senile spinal ankylosing hyperostosis is characterized by ossification of the paravertebral ligaments and peripheral entheses (39). Type 2 diabetes appears to be an important risk factor in 25-50% of cases. Asymptomatic in the majority of cases, the diagnosis is incidental on a standard spine radiograph. Treatment is symptomatic (analgesics, anti-inflammatories, physiotherapy or chiropractic).

#### VI. Other Manifestations:

1. Tendinitis: Tendinitis in the diabetic hand, as in the general population, is explained by: anatomical factors (multiplicity of joints, long and therefore fragile tendons, the importance of sheaths and inextensible fibrous tunnels) and mechanical factors (very mobile region, complexity and fineness of gestures, frequency of microtrauma).
2. Diabetic muscle infarctus (DMI): It is a rare complication of diabetes, with fewer than 200 cases reported since its initial description. The diagnosis should be suspected in cases of acute painful muscle induration without any notion of trauma.
3. Arthrose and diabetic hand: Some believe that diabetic patients are at greater risk of developing osteoarthritis and that this predisposition may be explained by the fact that insulin stimulates proteoglycan synthesis and collagen growth; cellular insulinopenia and diabetic vascular disease attenuate the chondrogenesis and osteogenesis required for osteophyte formation

4. Infection: While infection of the diabetic foot, a cause of morbidity and mortality, has been the subject of several scientific studies, few studies have focused on the incidence and prevalence of osteoarticular infections.

Conclusion: Osteoarticular complications of diabetes are frequent and diverse. Their pathophysiological mechanisms remain imperfectly elucidated. Some are the direct consequence of chronic hyperglycemia and its effect on collagen, others are simply associated with diabetes without its role being directly incriminated. Diabetes control is the general rule for their management.

## P384

### SARCOPENIA REDUCES QUALITY OF LIFE IN THE LONG-TERM: LONGITUDINAL ANALYSES FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING

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**Objective:** Mixed findings exist for sarcopenia/quality of life (QoL) relationship. However, to date, the majority of studies in this area have utilized a cross-sectional design or specific clinical populations. Therefore, the aim of the present study was to examine the association between sarcopenia at baseline and QoL at 10 y follow-up in a large representative sample of older English adults.

**Methods:** Sarcopenia was diagnosed as having low hand-grip strength and low skeletal muscle mass index. QoL was measured using the CASP (control, autonomy, self-realisation and pleasure)-19, with higher values reflecting higher QoL. Multivariable logistic regression analysis was conducted to assess prospective associations between sarcopenia at baseline and poor QoL at follow-up; generalized linear model with repeated measures was used for reporting mean changes during follow-up between sarcopenia and not.

**Results:** Among 4,044 older participants initially included at baseline (mean age: 70.7 y; 55.1% females), 376 had sarcopenia. In the multivariable analysis, after adjusting for 10 potential confounders, sarcopenia at baseline was associated with a higher incidence of poor QoL (odds ratio=5.82; 95%CI: 3.45-9.82). After matching for QoL values at baseline and adjusting for potential confounders, people with sarcopenia reported significantly lower values in CASP-19 (mean difference=-3.94; 95%CI: -4.77 to -3.10).

**Conclusion:** In this large representative sample of older English adults, it was observed that sarcopenia at baseline was associ-

ated with worse scores of QoL at follow-up compared to those without sarcopenia at baseline. It may be prudent to target those with sarcopenia to improve QoL.

### P385

#### TEMPUS-FUGIT: PROTOCOL OF A STUDY TO EXPLORE THE GUT-MUSCLE AXIS IN DEVELOPMENT AND TREATMENT OF SARCOPENIA IN OLDER ADULTS

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**Objective:** The aim of the Trial in Elderly with Musculoskeletal Problems due to Underlying Sarcopenia – Faeces to Unravel the Gut and Inflammation Translationally (TEMPUS-FUGIT) is to explore the gut-muscle axis by comparing gut microbiota (GM) composition between nonsarcopenic and sarcopenic older adults and by determining, in the latter group, associations between GM, both systemic and intestinal inflammatory markers and the sarcopenia-defining parameters, being muscle mass, muscle strength and physical performance. In addition, the effect of optimized and individualized anabolic treatment interventions for sarcopenia on GM and intestinal inflammation will be explored.

**Methods:** First, in a cross-sectional case-control study, 100 community dwelling healthy controls will be matched according to age-, sex and BMI to 100 participants (>65 y) from the 'Exercise and Nutrition for Healthy Ageing' (ENHANce NCT03649698) trial. ENHANce is an ongoing randomized, placebo-controlled, triple-blind, trial (RCT) exploring the effects of single/combined interventions (exercise, protein and omega-3 supplementation) in 5 intervention arms in older adults with sarcopenia. Sarcopenia is defined according to EWGSOP2. In stool samples, intestinal inflammatory markers, faecal calprotectin, lactoferrin and S100A12, will be assessed and compared between sarcopenic and nonsarcopenic individuals. Systemic inflammatory markers, being hs-CRP, IL-4, IL-6, IL-13, TNF $\alpha$  and IL-1 $\beta$ , will be determined in fasted blood samples. Linear regression will be used to determine associations between GM, inflammatory markers and sarcopenia-defining parameters. Second, ENHANce participants will deliver 5 intermittent stool samples to determine longitudinal GM changes during the 12 week intervention period. Linear mixed models will be used for analysis. Ethical approval was obtained (s65127) and the trial was registered at ClinicalTrials.gov (NCT05008770).

**Results:** The protocol of this study is close to submission. Results are expected by 2024.

**Conclusion:** TEMPUS-FUGIT aims to clarify the relationship between the gut-muscle axis and sarcopenia, possibly opening future perspectives for novel sarcopenia treatment strategies targeting GM.

### P386

#### EFFECT OF ALKALINE POTASSIUM SALTS ON URINARY CALCIUM AND NET ACID EXCRETION: AN UPDATED SYSTEMATIC REVIEW AND META-ANALYSIS

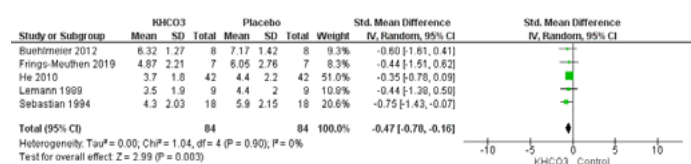
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**Objective:** To undertake an update on our previous systematic review and meta-analysis determining the effects of supplemental potassium bicarbonate (KHCO<sub>3</sub>) and potassium citrate (KCitr) on urinary calcium and net acid excretion (NAE), by including new studies and obtaining further data from authors.

**Methods:** A total of 18 studies evaluating the effect of potassium alkaline salts on calcium metabolism compared to placebo were identified and subsequently analysed with Review Manager (Version 5; The Cochrane Collaboration) using a random-effects model; 10 studies involved KHCO<sub>3</sub> and 8 KCitr. Results are presented as the standardised mean difference (SMD) as measurement units differed between studies. Separate forest plots were created for crossover and parallel studies and for studies reported in absolute and change values.

**Results:** Urinary calcium was lowered by intervention with KHCO<sub>3</sub> SMD=-0.47 (-0.78, -0.16) ( $P=0.003$ ) (Figure 1) and KCitr SMD=-0.77 (-1.16, -0.39) ( $P<0.001$ ). NAE was also lowered by both interventions SMD=-5.51 (-7.82, -3.21) ( $P<0.001$ ) for KHCO<sub>3</sub> SMD=-2.28 (-2.98, -1.59) ( $P<0.001$ ) for KCitr.



**Figure 1.** Forest plot for effects of KHCO<sub>3</sub> supplementation on calcium excretion. Total SMD represented by diamond. IV: inverse variance.

**Conclusion:** This meta-analysis is consistent with previous results indicating supplementation with alkaline potassium salts leads to significant reduction in renal calcium and acid excretion. A high alkaline intake may therefore have a wider beneficial effect on health, particularly musculoskeletal integrity, although further meta-analysis is needed to investigate this.

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### DIFFERENCES IN BMD, TBS AND VERTEBRAL FRACTURES BETWEEN ACROMEGALIC AND HYPOGONADAL PATIENTS

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**Objective:** To compare acromegaly patients to hypogonadal patients though bone metabolism, through bone turnover markers, BMD, TBS and vertebral fracture (VF) assessment.

**Methods:** We performed a cross-sectional, observational study on 31 acromegaly patients and 15 hypogonadal patients, recruited prospectively. All patients were evaluated for alkaline phosphatase, 25 hydroxyvitamin D [25(OH)D], parathormone, osteocalcin (OC), C-terminal telopeptide of type I collagen or  $\beta$ -CrossLaps and total procollagen type 1 N-terminal propeptide and through DXA, TBS and antero-posterior and lateral x-ray scans of the dorsolumbar spine. All tests were performed at the same laboratory and DXA apparatus.

**Results:** Hypogonadal patients significantly higher levels of 25(OH)D (33.57±10.41 vs. 23.77±8.08 ng/dL, p=0.001) and lower OC levels (16.29±5.62 vs. 22.58±11.78 ng/dL, p=0.057). Concerning DXA parameters, hypogonadal patients had significantly lower BMD, T-scores and Z-scores in all analyzed segments, as follows: BMD at the lumbar spine (0.966±0.123 vs. 1.105±0.218 g/cm<sup>3</sup>, p=0.027), T-score [-1.7 (-2.8- -1.2) vs. -0.9 (-1.9-0.8) SD, p=0.03]; BMD at the femoral neck (0.864±0.122 vs. 0.977±0.141 g/cm<sup>3</sup>, p=0.01), T-score [-1.2 (-2- -0.7) vs. -0.6 (-1.5-0.4) SD, p=0.01]; BMD at total hip (0.886±0.142 vs. 0.987±0.136 g/cm<sup>3</sup>, p=0.02) and T-score [-1.2 (-2.1- -0.3) vs. -0.2 (-1.2-0.4) SD, p=0.04]. Nonetheless, hypogonadal patients had no VF, compared to acromegaly patients [0 vs. 32.33%, p=0.01]. TBS did not present any differences between the two groups.

**Conclusion:** In our study, patients with acromegaly had a significantly higher prevalence of fragility vertebral fractures but higher BMD than patients with hypogonadism. Also, TBS was not different between the groups. Different imaging techniques are necessary to evaluate acromegalic osteopathy and, eventually, help prevent vertebral fractures.

P388

### THE ROLE OF BIOLOGICAL DRUGS ON REDUCTION OF OSTEOPOROSIS LEVEL

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**Objective:** Osteoporosis is a metabolic disease characterized by a reduction in bone mass and deterioration of bone architecture that increase the risk of fractures. 1 Approximately 10 million women in the USA currently have osteoporosis. The main consequences of osteoporosis are pain, disability, other concomitant diseases, incapacity for work and death. 2 Biologic drugs are a current method of treatment in patients with rheumatic diseases, mainly RA, who remain untreated by DMARDs. In recent years, many studies have been conducted on the effectiveness of the use of biologic drugs on the role of bone protection and osteoporosis. The aim of this study is to identify the positive relationship between the use of biologic drugs and the reduction of bone loss.

**Methods:** This study will analyze data collected from 25 patients who are being treated with biologic drugs at the University Hospital Center "Mother Teresa", and who have performed densitometry examinations.

**Results:** The expected results are in the context of reducing bone loss from the use of biologic drugs and a positive effect on bone metabolism.

**Conclusion:** Although the association of drug use with bone mass preservation effectiveness has not yet been well established, numerous studies have shown that bone loss has been significantly reduced after the use of biologic drugs.

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### DENTAL PATHOLOGY AND OSTEOARTICULAR DISEASES IN THE HOSPITALISED ELDERLY POPULATION

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**Objective:** The complex problem of elderly health has imposed in recent years a diversification of basic and clinical research methods opening new horizons in dental specialties. The dental-maxillary system is influenced by intra and extra tissue pathology, which in the elderly, although not specific, has an increased incidence, with characteristic clinical forms, determined by the decrease of the defensive processes and exhaustion of the com-

pensatory mechanisms. The propositions for this study were the existence of limited epidemiological and clinical data on elderly patients receiving hospital dental services. In the present study, hospital morbidity was analyzed in elderly patients, hospitalized, in order to identify specific clinical epidemiological data.

**Methods:** A descriptive, retrospective longitudinal study was performed, based on a quantitative research, using the computer statistical database of the Clinical County Emergency Hospital of Oradea, during 2016-2020, from the bucomaxillofacial surgery department. Data was collected on patients over 65 years of age: number of hospitalizations, average length of hospital stay, gender distribution, area of origin, dental pathology, associated systemic pathology, associated risk factors.

**Results:** During the analyzed period, out of a total number of 1458 hospitalized patients, 21.67% were patients aged  $\geq 65$  years old (with an average age of 73.15 y). Male sex predominated (53.80%) and urban areas residence also predominated (60.13%). The referrals by the family doctor were the most frequent (77.6%), emergency hospitalizations representing only 18.77%. The average length of hospital stay was 4 days. The most frequent hospitalization diagnoses were: diseases of the pulp and periapical tissues (56.08%) - decreasing in the analyzed period, chronic periodontitis (20.4%) - increasing in the analyzed period, periapical abscess with fistula (12.13%). Systemic pathology was very complex, with multiple comorbidities in hospitalized patients: vascular and cardiovascular diseases, neurological diseases, respiratory diseases, psychiatric diseases. Osteoarticular diseases were present in over 63.85% of hospitalized patients, with osteoporosis and osteoarthritis predominating. From the anamnestic data, the main risk factors present were: sedentary lifestyle, overeating, smoking, mental stress.

**Conclusion:** The vulnerability of the elderly in terms of oral health, due to specific oral pathology and particularities of this pathology in the context of increased comorbidities, often requires a multi-disciplinary approach in order to establish a correct treatment in the hospital. In view of the above, the diagnosis of oral pathology in the elderly, acquires a special importance, thus becoming necessary to know the status of the elderly patient, through a correct and complete assessment of the underlying condition and associated comorbidities.

## P390

### VITAMIN D DEFICIENCY AS A RISK FACTOR FOR ALBUMINURIA IN TYPE 2 DIABETES MELLITUS

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**Objective:** Vitamin D is essential for balance of calcium metabolism, however more recent research demonstrated that vitamin D is involved in numerous metabolic and immune processes. Low levels of vitamin D are common in patients with diabetes mellitus and advanced chronic kidney disease, however few studies explored the levels of vitamin D in diabetic patients with early reduction of glomerular function or albuminuria. Our objective in this research was to demonstrate the possible pleiotropic effect of vitamin D, a well known molecule involved in calcium metabolism.

**Methods:** The study included 218 patients with type 2 diabetes who were registered at the Diabetes Mellitus Center in Bihor County, Romania. The following inclusion criteria were used: age between 18-75 y, patients with confirmed type 2 diabetes, patients who agreed to participate in the study. Exclusion criteria were: patients with chronic endstage renal disease defined as GFR  $< 15$  ml/min/1.73m<sup>2</sup>. The glomerular filtration rate was calculated using the CKD-EPI equation. The determination of the albumin/creatinine ratio in the urine spot and the serum and the serum value of 25-(OH)vitamin D were done in a private laboratory. Microalbuminuria was defined as albumin/creatinine ratio between 30-300 mg/g and macroalbuminuria as albumin/creatinine ratio  $\geq 300$  mg/g. The serum value of vitamin D was divided into two categories, normal value of 25-(OH) vitamin D (25-(OH)vitamin D  $> 50$  nmol/L) and deficiency (25-(OH)vitamin D  $\leq 50$  nmol/L).

**Results:** The mean age was 49.60 y, with 59% of patients being male, an average HbA1c value of 8.11%, an average albumin/creatinine ratio of 99.73 mg/g, a BMI of 27.25 kg/m<sup>2</sup>, an average GFR of 103.06 mL/min/1.73m<sup>2</sup> and a mean duration of diabetes of 6.42 y. It can be easily observed that patients in our study had a very good glomerular function. In patients with type 2 diabetes included in the study, the prevalence of microalbuminuria was 47.93% and the prevalence of macroalbuminuria was 9.22%. The average value of 25-(OH)vitamin D was 45.40 $\pm$ 16.16 nmol/L, in those with normoalbuminuria, 40.54 $\pm$ 13.84 nmol/L in those with microalbuminuria and 38.92 $\pm$ 18.13 nmol/L in those with macroalbuminuria. 25-(OH)vitamin D  $\leq 50$  nmol/L was identified in 55.91% of patients with normoalbuminuria and in 74.19% of patients with microalbuminuria or macroalbuminuria (p=0.004). Vitamin D deficiency was associated in multiple linear regression with increased albuminuria (p=0.02).

**Conclusion:** Vitamin D deficiency appears to be a risk factors for increased albumin excretion in patients with type 2 diabetes mellitus and further research is needed to explore this association and the potential beneficial effects of vitamin D supplementation.



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### DEVELOPMENT OF NOVEL FULLY AUTOMATIC SEGMENTATION AND QUANTIFICATION TECHNIQUE FOR ASSESSMENT OF MUSCULOSKELETAL ORGANS

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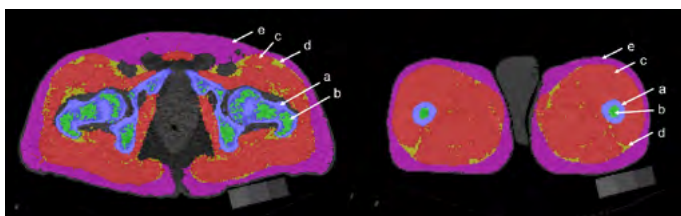
**Objective:** Quantitative measurement of the musculoskeletal (MSK) system is necessary to study conditions such as osteoporosis, sarcopenia, and osteosarcopenia. The process of analysing medical images is time-consuming and labour intensive, limiting the number of quantitative studies in this area and its clinical feasibility. Recently, we have developed and validated a novel semiautomatic image analysis software (Tissue Compass) (1). We developed a fully automatic image processing technique to segment all MSK organs in hip and thigh areas using artificial intelligence (AI).

**Methods:** Several AI models (U-Net deep learning models) were trained and tested for regions of interest: proximal hip and midthigh. Bone, bone marrow, muscle, intermuscular adipose tissue (IMAT), and subcutaneous fat (sub fat) in 200 CT slices were manually analysed using commercially leading software (SliceO-matic by TomoVision) for training and testing and dice coefficient (DC) which indicates the similarity between two techniques has been used to compare the AI models and manual segmentations (Table 1).

Table 1. Dice coefficient score for proximal hip and midthigh in percentage.

	Bone	Bone marrow	Muscle	IMAT	Sub fat
Hip	95.2	90	91.2	64.2	87.7
Midthigh	98	98	98	76	94

**Results:** The new models can automatically segment and quantify bone, bone marrow (including marrow fat), muscle, IMAT, and sub fat in two main areas of study without human intervention. Figure 1 presents an example of detected areas overlaid on the original CT scan.



**Figure 1.** Segmentation results from AI models. On the left side proximal hip, on the right side midthigh. a) bone, b) bone marrow, c) muscle, d) IMAT, e) subfat

**Conclusion:** Presented AI models can analyse CT scan images much faster and without human intervention, significantly decreasing the cost and time needed in extensive studies that include medical images. Moreover, implementing these techniques in previously developed software (Tissue Compass) will make this robust tool accessible to researchers and clinicians in the future.

**Reference:** 1. Imani M, et al. Calcif Tissue Int 2021;https://doi.org/10.1007/s00223-021-00914-4

P392

### EFFECT OF COMPLETE AND INCOMPLETE SPINAL CORD INJURY ON CHANGES IN THE MECHANICAL PROPERTIES OF BONE TISSUE

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**Objective:** A violation of the spinal cord functioning has a significant impact on the motor function. Therefore, it is relevant to study (1) the injured condition of the patient and his individual organs and systems. The purpose of the work is to assess the effect of spinal cord injuries on the mechanical properties of rat bones.

**Methods:** All tests were conducted on nonlinear laboratory rats (180-200 g). The incomplete spinal cord injury (iSCI) with contusion was applied at the level Th7-Th8 so that damage to the sensory and motor axons lead to impaired hind limb function (2). A complete spinal cord injury (cSCI) with transverse spinal cord transection at the Th8-Th9 level was also reproduced (3). All experiments were performed according to bioethical standards and were approved by the local ethical committee of the Kazan Federal University. Full-scale experiments were carried out. The bone organ was subjected to a three-point bending. The analysis of the results was carried out on the tensile strength (TS) and elastic modulus (EM) values.

**Results:** The results were compared with the control group values. It was found that cSCI and iSCI increase the EM by 18% for femurs ( $p < 0.1$ ) and decrease by 18% – for tibiae ( $p < 0.1$ ). cSCI for tibiae decreases the EM by 11% ( $p < 0.1$ ). cSCI decreases the femur TS by 37% ( $p < 0.05$ ). The femur TS after iSCI decreased by 16% ( $p < 0.1$ ). The tibia TS after iSCI and cSCI decreased by 17% and 10% ( $p < 0.1$ ), respectively. cSCI and iSCI decrease the TS and EM of the femurs ( $p < 0.1$ ).

**Conclusion:** The results represent that cSCI decreases the magnitude of the tibia TS ( $p < 0.05$ ). cSCI and iSCI decrease the magnitude of the TS and EM of the femurs ( $p < 0.1$ ).

**References:**

1. Baltina T, et al. BioNanoScience 2018;8:864
2. Baltin ME, et al. Exp Brain Res 2021;239:627
3. Eremeev A, et al. BioNanoScience 2019;9:433

**Acknowledgment:** This research was funded by RFBR, grant number 20-01-00535.

### P393

#### RELATIONSHIPS BETWEEN OSTEOPOROSIS AND ANEMIA IN LONG-LIVING PATIENTS WITH CORONARY ARTERY DISEASE

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**Objective:** Limited and controversial data are available on relationships between osteoporosis and anemia; therefore, we evaluated BMD and its relationship with erythropoiesis 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 197 patients (138 women and 59 men) aged 90-106 y (mean age  $92.4 \pm 2.3$  y) hospitalized with CAD. BMD was analyzed by DXA.

**Results:** Patients with osteoporosis had lower hemoglobin and erythrocyte counts compared to patients with normal BMD: hemoglobin - 117.3 and 125.9 g/l, respectively ( $p = 0.003$ ), erythrocytes -  $3.8 \times 10^{12}/l$  and  $4.1 \times 10^{12}/l$  ( $p = 0.04$ ), MCV - 88.7 and 93.5 fl ( $p = 0.02$ ), MCH - 30.6 and 31.0 pg ( $p = 0.07$ ). Patients with anemia had lower total BMD ( $973$  and  $1036$  mg/cm<sup>3</sup>,  $p = 0.001$ ), BMD of upper ( $772$  and  $845$  mg/cm<sup>3</sup>,  $p = 0.001$ ) and lower ( $956$  and  $1059$  mg/cm<sup>3</sup>,  $p = 0.0003$ ) extremities, BMD of trunk ( $805$  and  $851$  mg/cm<sup>3</sup>,  $p = 0.004$ ), ribs ( $607$  and  $642$  mg/cm<sup>3</sup>,  $p = 0.005$ ), pelvis ( $889$  and  $935$  mg/cm<sup>3</sup>,  $p = 0.03$ ) and spine ( $973$  and  $1034$  mg/cm<sup>3</sup>,  $p = 0.02$ ). Correlation analysis revealed significant direct relationships between hemoglobin level and all BMD parameters ( $r = 0.3$ ;  $p = 0.00003$ ). Significant correlations were also established between all BMD parameters and erythrocytes MCV ( $r = 0.27$ ;  $p = 0.0001$ ) as well as MCH ( $r = 0.22$ ;  $p = 0.002$ ). Significant direct relationships between blood iron concentration and all BMD parameters were found ( $r = 0.28$ ;  $p = 0.003$ ).

**Conclusion:** The study results indicate presence of relationships between BMD and erythropoiesis in centenarians.

### P394

#### MMP-3 AND MPO IN SERUM AND SYNOVIAL FLUID OF PATIENTS WITH IN RHEUMATIC DISEASES

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**Objective:** The study of biomarkers in synovial fluid in patients with rheumatic diseases is a challenge. The aim of the study was to investigate the levels of MMP-3 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  $59.00 \pm 13.18$  (range 29-82 y), 50 patients with activated gonarthrosis (GoA) age of  $61.48 \pm 11.01$  (range 49-81 y) and 15 patients with rheumatoid arthritis age of  $55.22 \pm 7.21$  (range 29-73 y) were analyzed. Serum and synovial fluid samples were examined by human matrix metalloproteinase-3 (MMP-3) 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 MMP-3 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 MMP-3 and MPO in the synovial fluid and the concentrations of circulating MMP-3 and MPO in the patients with PsA ( $R_s = 0.704$ ;  $p = 0.001$ ) and with RA ( $R_s = 0.854$ ;  $p = 0.01$ ). The mean values of MMP-3 and MPO in synovial fluid were significantly lower than in the serum of patients with PsA. The higher level of MMP-3 and MPO strongly correlate with the indices for disease activity in patients with PsA, RA and GoA.

**Conclusion:** MMP-3 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.

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**OSTEOPOROSIS IN PATIENTS WITH PSORIATIC ARTHRITIS**M. G. Geneva-Popova<sup>1</sup>, S. T. Popova-Belova<sup>1</sup>, K. I. Kraev<sup>2</sup>, V. Popova<sup>2</sup>

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**Objective:** Patients with Psoriatic Arthritis (PsA) are usually overweight, have metabolic syndrome, and have concomitant cardiovascular disease. Osteoporosis is rarely found in them. The present study focuses on the incidence of osteoporosis and the identification of potential risk factors associated with lower BMD in the lumbar spine and femoral neck in patients with PsA compared with rheumatoid arthritis patients (RA). The aim of the study was to compare the frequency and risk factors for the development of osteoporosis in patients with psoriatic arthritis and with rheumatoid arthritis.

**Methods:** The study included 90 patients with PsA and 90 patients with RA, similar in sex, age, and duration of the disease. All patients underwent DXA on the lumbar spine and femoral neck. For osteoporosis, a DXA value of -2.5 was assumed. The results were analyzed using the statistical program SPSS, ver 26, at p0.05.

**Results:** Osteopenia was observed in 26% of patients with RA and 14% of patients with PsA, the difference between the two groups is significant (p<0.05). Osteoporosis in the lumbar spine was observed in 47.7% of patients with RA and in 38% of patients with PsA, and the difference between the two groups is not significant (p>0.05). Osteoporosis in the femoral neck was observed in 42% of patients with RA and in 8.2% of patients with PsA, and the difference in the groups was significant (p<0.001). There is no relationship between osteoporosis of the lumbar spine and age or meantime of evolution of PsA. The presence of osteoporosis in patients with RA is more common in patients with high disease activity, lack of biological treatment, and concomitant pathology of the thyroid gland. The presence of osteoporosis in patients with PsA is more common in patients with axial involvement, hypertension, and ischemic heart disease.

**Conclusion:** Localization of osteoporosis of the lumbar spine is more common in patients with PsA than osteoporosis of the femoral neck. The diagnosis is the treatment of osteoporosis in RA and PsA should be part of the overall treatment algorithm in these patients.

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**BODY COMPOSITION AND URIC ACID IN LONG-LIVING PATIENTS WITH CORONARY ARTERY DISEASE**S. Topolyanskaya<sup>1</sup>, T. Eliseeva<sup>2</sup>, O. Vakulenko<sup>2</sup>, L. Dvoretzki<sup>1</sup>

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**Objective:** There are no available data on influence of uric acid on body composition of long-living patients with coronary artery disease (CAD), therefore, we evaluated relationships between uric acid and body composition parameters in such patients.

**Methods:** 136 hospitalized patients with CAD (females 70.9%, males 29.1%) aged 90-106 y were enrolled in this cross-sectional study. Body composition was assessed by DXA.

**Results:** 40.4% of patients had hyperuricemia, 59.6% had normal uric acid levels. The mean concentration of uric acid was  $362.5 \pm 111.1$   $\mu\text{mol/l}$ , varying from 124 to 712  $\mu\text{mol/l}$ . 70.3% of patients were overweight or obese. Mean BMI was 27.6 (18.2-38.8)  $\text{kg/m}^2$ . Women had more fat than men: total fat – 39.8% vs. 30.0% (p<0.0001), lower extremities fat – 42.4% vs. 27.4% (p<0.0001). The greatest BMD was recorded in lumbar spine ( $1005.6 \pm 190.6$   $\text{mg/cm}^3$ ), the lowest BMD – in ribs ( $626.2 \pm 83.9$   $\text{mg/cm}^3$ ). As expected, female patients had lower BMD in all parts of the body (p<0.0001). Mean total lean mass in women was 38.4 kg, and in men - 48.8 kg (p<0.000001). The musculoskeletal index remained within the normal range in 77.2% and was below normal in 22.8%. Patients with hyperuricemia had more total fat (26.4 vs. 20.1 kg, p=0.000006), trunk fat (15.3 vs. 11.5 kg, p=0.00002), legs fat (7.98 vs. 6.42 kg, p=0.0005) and arms fat (2.32 vs. 1.67 kg, p=0.00002), as compared with patients with normal uric acid levels. Significant positive correlations were found between uric acid levels and fat mass: for total fat – r=0.37, p=0.00001, for trunk fat – r=0.41, p=0.000001, for legs fat – r=0.32, p=0.03, for arms fat – r=0.30, p=0.0004. In addition, significant correlations were registered between uric acid concentration and trunk fat/total fat ratio (r=0.26, p=0.001 for positive correlation) and legs fat/total fat ratio (r=-0.24, p=0.005 for negative correlation).

Also, positive correlations were found between uric acid levels and BMD: for total BMD – r=0.24, p=0.004, for arms BMD – r=0.28, p=0.0008, for legs BMD – r=0.23, p=0.007; for trunk BMD – r=0.31, p=0.0003, for ribs BMD – r=0.26, p=0.001, for pelvis BMD – r=0.28, p=0.0009 and for spine BMD – r=0.29, p=0.0006. Women with hyperuricemia had greater BMD in trunk bones (818 vs. 779  $\text{mg/cm}^3$ , p=0.03) and pelvis (907 vs. 855  $\text{mg/cm}^3$ , p=0.02) than women with normal uric acid, but no such differences were observed in men. In total group of patients there were no differences in lean mass between patients with increased and normal uric acid levels (p=0.6-0.7). But woman with hyperuricemia had more total lean mass (38.5 vs. 37.4 kg, p=0.04), trunk lean mass

(20.9 vs. 19.7 kg,  $p=0.03$ ) and arms lean mass (3.8 vs. 3.5 kg,  $p=0.02$ ) than women with normal uric acid. Significant positive correlations were found between uric acid levels and lean mass: for total lean mass –  $r=0.23$ ,  $p=0.007$ , for trunk lean mass –  $r=0.21$ ,  $p=0.01$ , for legs lean mass –  $r=0.22$ ,  $p=0.01$ , for arms lean mass –  $r=0.22$ ,  $p=0.009$ .

**Conclusion:** Study results demonstrated presence of relationships between uric acid and some parameters of body composition in patients with CAD aged 90 years or older. Future research is advisable to clarify the pathogenetic mechanisms of these relationships.

### P397

#### AUTOMATION OF BONE STRENGTH ASSESSMENT BASED ON CT DATA

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**Objective:** The study proposes a method for constructing a finite element (FE) ensemble based on computed tomography (CT) data. The purpose of the work is to implement a technique for static calculation of porous structures based on a three-dimensional isoparametric linear FE.

**Methods:** According to CT data, a weighted function can be constructed, according to which the local stiffness matrix integration is realized (1). Experiments were performed on six 15-20 kg male Vietnamese swine. The protocol of the experiment was approved by the Animal Care Committee of Kazan State Medical University (protocol #5 of 20 May 2020). Segmentation of the area was performed by constructing a regular grid. Elements with a low content of bone material were removed (2). The local main values and directions, and stresses by Mises were calculated. The reliability of the results was based on a local energy error (3). The bone samples were also subjected to a full-scale experiment (three-point bending).

**Results:** The maximum values of the energy error corresponded to the boundary FEs with a low bone fraction. The minimum energy error (20%) and the maximum Mises stress (500 MPa) correspond to the loaded area. In the region of maximum Mises stresses, the first main component reached a maximum (400 MPa), and the third reached a minimum (-400 MPa), which explains the crack formation. The relative error in forces was 3-15%.

**Conclusion:** The method of constructing a FE ensemble based on CT data was considered. The proposed method allows us to take into account the structural properties directly with less computational costs and a simplified process of segmentation.

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### P399

#### STUDIES ON INCREASED DENTINE HYPERSENSITIVITY IN MENOPAUSAL PATIENTS

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Exogenous triggers can include thermal, tactile or osmotic changes. While extreme triggers can cause pain in all teeth, the term hypersensitivity represents the painful response to a stimulus that does not cause pain under normal conditions [1,2,3,4]. The response to a stimulus varies from person to person due to differences in pain tolerance, environmental factors and patient psychology.

Vasomotor changes in menopause lead to vascular changes in the dental pulp, initially resulting in increased dentine hypersensitivity [5,6,7,8,9,10].

Dental hypersensitivity is not associated with large tissue loss, but may be associated with dental erosion lesions, leading to a concomitant pulpal response [9,10].

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## P400

### HIGH FREQUENCY OF MILD ACUTE ADVERSE EVENTS AFTER ZOLEDRONIC ACID INFUSION

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**Objective:** Zoledronic acid (ZOL) is a potent bisphosphonate that is administered as a 5 mg intravenous infusion once yearly in the treatment of several bone diseases. Although tolerability has been found to be good in clinical trials, in the real-life scenario the frequency of acute phase reactions (APRs) is not extensively studied. The aim of this study is to describe the frequency of APRs after ZOL infusion in a group of patients, and to analyze if there is any difference according to the number of ZOL infusions previously received by the patient.

**Methods:** This report is a preliminary analysis of an observational, descriptive and prospective study that started on September 1, 2021, to characterize the real-life acute phase adverse events associated with ZOL. Patients who receive 5 mg of ZOL at our institution, prescribed as a treatment for osteoporosis or other osteopathies, are invited to participate. The ZOL infusion is carried out during an infusion period of 30 minutes, by experienced technicians. After providing written consent, patients completed a health history survey, and 72 hours after the infusion they received an electronic questionnaire by email. We compared patients who received ZOL for the first time vs. those who had received ZOL before.

**Results:** In this 4-month period, a total of 137 ZOL infusions were performed. 80 patients have signed consent, of which 68 responded to the electronic survey, 63 are women (93%), with a mean age of 66.7±7.9 y (SD). 50 patients (73.5%) presented at least one symptom, 44 (64.7%) flu-like symptoms (including malaise, fatigue, headache and/or chills), 34 (50%) musculoskeletal pain and 10 (14.7%) pyrexia. Other symptoms were found less frequently: nausea or vomiting 11.8%, eye pain 7.4%, red eye 5.9%, abdominal pain 4.4%, diarrhea 4.4% and dizziness 4.4%. We found a higher prevalence of APRs in patients receiving ZOL for the first time. The following APRs reached statistical significance: at least one symptom (p=0.002), musculoskeletal pain (p=0.029), and flu-like symptoms, specifically for malaise (p=0.008) and headache (p=0.003), without significant differences for the other symptoms (Table 1). The majority (73%) answered that symptoms did not interfere with their daily activities and 90% would receive ZOL again if necessary.

**Table 1.**

Acute symptoms	Total (n=68)	1st infusion (n=33)	2nd or subsequent infusions (n=35)	p
Any symptoms	50 (73.5%)	30 (90.9%)	20 (57.1%)	<b>0.002<sup>a</sup></b>
Pyrexia	10 (14.7%)	6 (18.2%)	4 (11.4%)	0.507 <sup>b</sup>
Flu-like symptoms	44 (64.7%)	25 (75.8%)	19 (54.3%)	0.064 <sup>a</sup>
• Malaise	17 (25%)	13 (39.4%)	4 (11.4%)	<b>0.008<sup>a</sup></b>
• Fatigue	36 (52.9%)	19 (57.6%)	17 (48.6%)	0.457 <sup>a</sup>
• Headache	27 (39.7%)	19 (57.6%)	8 (22.9%)	<b>0.003<sup>a</sup></b>
• Chills	14 (20.6%)	8 (24.2%)	6 (17.1%)	0.469 <sup>a</sup>
Musculoskeletal pain	34 (50%)	21 (63.6%)	13 (37.1%)	0.029 <sup>a</sup>
Others:				
• Abdominal pain	3 (4.4%)	2 (6.1%)	1 (2.9%)	0.608 <sup>b</sup>
• Nausea/vomiting	8 (11.8%)	4 (12.1%)	4 (11.4%)	1.000 <sup>b</sup>
• Diarrhea	3 (4.4%)	2 (6.1%)	1 (2.9%)	0.608 <sup>b</sup>
• Eye pain	5 (7.4%)	4 (12.1%)	1 (2.9%)	0.191 <sup>b</sup>
• Red eye	4 (5.9%)	3 (9.1%)	1 (2.9%)	0.349 <sup>b</sup>
• Dizziness	3 (4.4%)	2 (6.1%)	1 (2.9%)	0.608 <sup>b</sup>

<sup>a</sup>Pearson's chi-squared test; <sup>b</sup>Fisher's exact test; <sup>c</sup>Student's t-test

**Conclusion:** In this real life study we found a high frequency of acute phase adverse effects after ZOL infusion. Most of them were more frequent after a first exposure to ZOL. Using a survey 72 h after the ZOL infusion we could have detected mild symptoms that usually are forgotten in the long term. In the majority of patients these symptoms did not interfere with their daily activities and would receive ZOL again.

## P401

### EFFECTIVENESS OF GOUT THERAPY IN REAL CLINICAL PRACTICE

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**Objective:** Gout is postulated as a "curable" rheumatological disease, but the majority of patients do not reach the target levels of uric acid (UA) and continue to experience significant discomfort. The purpose of this work is to evaluate the frequency of effective gout therapy in real clinical practice and the factors influencing it, and is the first stage of the study with a planned follow-up period of up to 2 y.

**Methods:** The study included patients with verified gout and an initial UA level of more than 360 μmol/L between attacks. All patients were prescribed urate-lowering therapy (UST) – allopurinol

or febuxostat. The dosage of allopurinol in the first 2 months of admission was 300 mg/d and then adjusted depending on the level of UA, the dosage of febuxostat was 80 mg, adjusted to 120 mg if necessary. To prevent exacerbation, all patients were prescribed colchicine 0.5-1.0 mg/d for up to 6 months. After 2 and 6 months of therapy, the effectiveness of therapy was assessed. All patients were recommended to view an educational school for patients with gout.

**Results:** the average age of 60 patients included in the study was  $46.9 \pm 9.9$  y, the duration of the disease was  $8.5 \pm 3.4$  y, 96.7% were men. The mean number of exacerbations per year prior to therapy was  $7.8 \pm 3.5$ . After the start of therapy, all patients noted a decrease in the frequency of attacks and their duration (from 10.4 to 1.6 d on average), in 46.7%, attacks did not recur while taking colchicine. The mean UA level decreased from  $541.3 \pm 146.8$  to  $299.6 \pm 56.5$   $\mu\text{mol/l}$ , creatinine level changed from  $104.7 \pm 34.9$  to  $97.5 \pm 26.7$   $\mu\text{mol/l}$ . None of the patients discontinued therapy due to intolerance. Most of them cited qualitative information and the effect of treatment as the main factors in continuing therapy.

**Conclusion:** This study proves that achieving the target level of UA is possible in patients with gout and leads to a significant reduction in the number of attacks.

## P402

### PROSPECTIVE RISK OF MUSCULAR STRENGTH LOSS LINKED TO FALLS IN ELDERLY FRAIL PATIENTS

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**Objective:** This study assessed the prevalence of risk of fall in elderly frail patients. Falls are frequent in the eldest and therefore lead to a high risk for morbidity and mortality causing death in 72% of all deceases due to falls among all the people.

**Methods:** This study includes 16 women (mean age  $76 \pm 7$ ) and 12 men (mean age  $75 \pm 6$ ) at risk of fall (group A). They have been compared with a 15 women (mean age  $74 \pm 6$ ) and 10 men (mean age  $76 \pm 5$ ) without risk of fall (group B). Design included: 1) Tinetti balance and gait Scale; 2) Grip Force Measure. The Tinetti Scale is fall-predictive, therefore in this case evaluated the subjects according to specific scores:  $\leq 1$  nonwalking;  $> 2$  or  $< 19$  walking at risk of fall;  $\geq 20$  walking at low risk of fall. The grip force measure is based on three grip measurements obtained by devices based on 500 mg weights.

**Results:** Among the elderly subjects with risk of fall 7 women and 5 men in group A had a  $24 \pm 4$  mean Tinetti score showing a low risk of fall, while 9 women and 7 men had a  $14 \pm 5$  mean score indicating a high risk of fall. In the group B 6 women and 2 men had a  $25 \pm 3$  mean score showing a low risk of fall, while 3 women

and 2 men had a  $16 \pm 3$  mean score related to a high risk of fall. The mean grip force score was 17.5 kg in group A and 21.0 kg in group B. In group A patients with a Tinetti score showing a high risk of fall we also detected significant relations between the risk of fall and the grip force score ( $p < 0.05$ ). In those subjects belonging to group B the same relation was not significant. We also found out that a minor grip force was directly linked to a higher risk of fall ( $p < 0.01$ ). Actually 87% of patients in group A had a grip force score  $< 16$  kg and a Tinetti score = 12 predictive of risk of fall ( $p < 0.5$ ). There they followed an occupational therapy programme including aims like: 1) performing lower limbs mobilization through specific exercises; 2) working on muscle fibers type 2 to counterbalance the muscle loss; 3) promoting use of devices to improve walking abilities.

**Conclusion:** This study detected the prevalence of risk of fall and of a reduced muscular strength in elderly people. It's also been proved that there's a significant connection between the risk of fall and the reduced muscular strength. The study suggests a home occupational therapy programme for the prevention of falls.

## P403

### DOES LATERAL VIEW ENHANCE THE OSTEOPOROSIS ASSESSMENT IN NONRADIOGRAPHIC SPONDYLOARTHRITIS

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**Objective:** Osteoporosis is a frequent complication in patients with spondyloarthritis (SpA). A lateral spine view is a sensitive tool in assessing bone loss in trabecular bone in SpA due to the presence of syndesmophytes and the ligament's calcifications. In the nonradiographic SpA, these abnormalities are usually lacking. The question is whether the anteroposterior view is sufficient to assess bone density in nr-ax-SpA. The aim of this study is to assess the contribution of lateral view compared to the anteroposterior view in the DXA in nr-axSpA.

**Methods:** We conducted a retrospective study including 40 patients with nr-axSpA, according to the ASAS criteria. For the enrolled patient, we collected the clinical and biological data. We calculated the disease activity using the Bath Ankylosing Spondylitis Disease Activity (BASDAI) and the Ankylosing Spondylitis Disease Activity Score (ASDAS). Functional impairment was assessed by the Ankylosing Spondylitis Functional Index (BASFI). Radiologic progression was evaluated by the Bath Ankylosing Spondylitis Radiology Index (BASRI) and the modified Stoke Ankylosing Spondylitis Spine Score (mSASSS). We measured the BMD using DXA in the anteroposterior lumbar, lateral spine, and hip neck.

**Results:** There were 27 women (67.5%) and 13 men (32.5%). Their mean age was 41.5 y ( $\pm 11.2$ ) and they had a mean disease duration of 3.1 y ( $\pm 2.7$ ). According to WHO criteria, 45% of patients displayed osteopenia and 30% osteoporosis. Analyses of T-score values obtained over anteroposterior spine views revealed osteoporosis in 22.5% and osteopenia in 37.5% of patients. On the other hand, analyses of the femoral neck revealed osteoporosis in 10% of the cases and osteopenia in 25% of the cases. However, in the lateral spine view, the prevalence of osteopenia was 15% without any osteoporotic case. Lateral spine measurement detected only one additional osteopenic patient with normal BMD in the hip and anterior-posterior spine. Low BMD was associated with a high physician's global assessment score, female gender and a high BASMI but without significant difference. We found no statistically significant correlation between BMD measured at any site with disease duration, BASDAI, BASFI or BASRI. Decreasing anteroposterior lumbar and hip neck BMD correlated significantly with increasing mSASSS ( $P=0.002$  and  $P<0,001$  respectively). However, in the lateral spine view there was no significant relation in the mSASSS scoring.

**Conclusion:** Our study found a high prevalence of low BMD in nr-axSpA. Lateral spine BMD measurement did not improve bone fragility detection in our population.

## P404

### EWGSOP1, EWGSOP2 OR SLOWNESS: WHICH IS THE BEST PREDICTOR OF MORTALITY RISK IN OLDER ADULTS?

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**Objective:** The EWGSOP1 and EWGSOP2 definitions provide divergent estimates for the prevalence of sarcopenia and its capacity to identify the risk of death. No study has compared the both definitions adopting different cutoffs for muscle weakness or analyzed the importance of gait speed (GS) for the diagnosis of sarcopenia and its association with mortality. We aimed to compare the association between mortality and sarcopenia defined by the EWGSOP1 and EWGSOP2 using different grip strength cutoffs and to analyze whether slowness is better than these two definitions for identifying the risk of death in older adults.

**Methods:** A longitudinal study was conducted involving 4799 individuals aged  $\geq 60$  y who participated in the English Longitudinal Study of Ageing. Sarcopenia was defined based on the EWGSOP1 and EWGSOP2 using different cutoffs for grip strength ( $<32$ ,  $<30$ ,  $<27$  and  $<26$  kg for men;  $<21$ ,  $<20$  and  $<16$ kg for women). Mortality was analyzed in a 14-y follow-up period. Hazard ratios (HR) were adjusted by sociodemographic, behavioral, clinical and anthropometric characteristics.

**Results:** The mean age of the participants was 71 y (54.9% female). Severe sarcopenia was a risk factor for mortality when defined by both the EWGSOP1 and EWGSOP2. The effect size of the association between sarcopenia and mortality was larger when the cutoff for low muscle strength was  $<32$  kg for men and  $<21$  kg for women and the sarcopenia defined by EWGSOP1 [HR=1.55 (95%CI:1.31-1.84)]. Sarcopenia was not associated with death when defined by the EWGSOP2. GS  $\leq 0.8$  m/s was the strongest isolated predictor of mortality. When GS was not included in models, the combination of low muscle mass (LMM) and low muscle strength (LMS) defined by cutoffs  $<32/21$  kg was the best predictor of mortality [HR=1.49 (95%CI:1.26-1.76)].

**Conclusion:** Slowness is better than the EWGSOP1 and EWGSOP2 definitions to identify mortality risk in older adults, perhaps for being an outcome of low muscle mass and strength. When GS is not considered, LMM and LMS at cutoffs of  $<32/21$  kg are the best combination for identifying a greater risk of mortality in older adults.

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## P405

### DYSREGULATION OF MICRORNAS IN OSTEOGENESIS IMPERFECTA: THE MIROI STUDY

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**Objective:** Osteogenesis imperfecta (OI) is a rare bone disease causing fractures and bone deformities. As epigenetic regulators of gene expression, circulating microRNAs (miRNAs) have been described in other bone diseases as potential prognostic markers. The aim of mirOI is to identify circulating miRNAs potentially associated with the severity of OI.

**Methods:** We performed this study in 3 steps. First, we identified, by RNA-sequencing of a small sample of OI patients vs. controls, 19 microRNAs of interest. We then confirmed this on a larger

sample by RT-qPCR. Finally, we looked for a relationship between the level of variation of the confirmed miRNAs and the clinical characteristics of OI.

**Results:** In the first phase of miROI, we found 79 miRNAs that were significantly differentially expressed between the two small groups with a corrected p-value of <0.05. We therefore selected 19 of them as the most relevant. In the second phase, we were able to confirm the significant overexpression of 8 miRNAs in the OI group in a larger population. Finally, the comparison of the variation of the expression level of these miRNAs with the clinical data shows a significant difference of two of them in the OI with dentinogenesis imperfecta. Apart from these parameters we did not find any significant association between the variation in expression level and harder disease severity criteria. After reviewing the literature, we found 6 of the 8 miRNAs already known to have a direct action on bone homeostasis. Furthermore, the use of a miRNA-gene interaction prediction model revealed a 100% probability of interaction between 2 of the 8 confirmed miRNAs and COL1A1 and/or COL1A2.

**Conclusion:** Overall, MiROI is the first study to establish the miRNA signature of OI by highlighting a significant expression modification of miRNAs, potentially involved in the regulation of genes playing an essential role in the physiopathology of OI.

## P406

### UNDERCARBOXYLATED OSTEOCALCIN AND IBANDRONATE COMBINATION AMELIORATES HINDLIMB IMMOBILIZATION-INDUCED MUSCLE WASTING

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**Objective:** Immobilization leads to muscle wasting, which may cause insulin resistance. Undercarboxylated osteocalcin (ucOC) is suggested to improve muscle mass and glucose metabolism. Bisphosphonates were recently reported to protect against muscle wasting, independent of ucOC. We tested the hypothesis that combination treatment with ucOC and bisphosphonates exerts a superior protective effect against immobilization-induced muscle wasting than either treatment alone, while also improves glucose metabolism.

**Methods:** 11-W-old C57BL/6 mice were subjected to hind-limb immobilization for 2 weeks, during which ucOC (90 ng/g; intra-peritoneal) and/or ibandronate (2 ug/g; subcutaneous) injections, Insulin tolerance test and oral glucose tolerance test (OGTT) were performed. After immobilization, muscles (extensor digitorum longus [EDL], soleus, tibialis anterior, gastrocnemius and quadri-

ceps) were excised, and muscle weight was measured. Glucose uptake in EDL and soleus muscles was assessed. Proteins in anabolic/catabolic pathways were examined in the quadriceps muscle. In addition, older adults-originated primary myotubes treated with ucOC and/or IBN were analyzed for the same signaling proteins.

**Results:** Compared with vehicle, individual treatment with ucOC or ibandronate had minimal effect on hind immobilization-induced muscle wasting (p>0.05), while combination treatment increased weight in immobilized soleus (31.7%; p<0.05) and quadriceps (20.0%; p<0.01) muscles, concomitant with elevated p-Akt (S473)/Akt ratio (p<0.05). Although combination treatment had limited effects on muscle glucose uptake in immobilized muscles (p>0.05), it enhanced whole-body glucose tolerance assessed via OGTT (16.6%; p<0.001). In human myotubes, combination treatment stimulated greater activation of ERK1/2 and mTOR, and led to a lesser expression of MuRF1, than individual treatments (all p<0.05).

**Conclusion:** Combination treatment with ucOC and ibandronate exerts ameliorative effects on immobilization-induced muscle wasting in mice, and regulatory effects on anabolic/catabolic pathways in myotubes of older adults. Furthermore, combination treatment improves whole-body glucose tolerance. These findings suggest a therapeutic potential of combination treatment with ucOC and bisphosphonates for treating muscle wasting induced by immobilization and aging.

## P407

### SEX DIFFERENCES IN NUTRITIONAL PREDICTORS OF POOR BONE HEALTH IN GAMBIAN MEN AND WOMEN

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**Objective:** Nutritional and epidemiological transition resulting from rapid urbanization is occurring across sub-Saharan Africa (SSA). We investigated the associations between micronutrient intake and pQCT bone outcomes at the radius in Gambian men and women.

**Methods:** We recruited 249 women (W) and 239 men (M) aged 40-75+ y. Average daily intakes were calculated from a 2-d weighed dietary assessment conducted in the participant's home by



fieldworkers. Data were coded and analysed using Diets-In, Nutrients-Out programme with Gambian food tables. pQCT scans were performed at 4% and 33% of the radius to measure total volumetric BMD (Tot.vBMD), trabecular vBMD (trab.vBMD), cortical vBMD (Ct.vBMD), cross-sectional area (CSA) and cross-sectional moment of inertia (CSMI). Linear regression analyses were performed with adjustments for age, weight and height; B-coefficients and 95% confidence intervals are reported with p-values. The 2017 European dietary reference values (DRV) are provided for comparison with Gambian intakes.

**Results:** Mean intakes in Gambians were – phytate: M:1300mg/d $\pm$ 480, W:1000mg/d $\pm$ 420 (DRV: 180-629mg/d); phosphorus: M:843mg/d $\pm$ 276, W:631mg/d $\pm$ 252 (DRV: 550mg/d); calcium: M:381mg/d $\pm$ 177, W:302mg/d $\pm$ 178 (DRV: 950mg/d); fibre: M:44g/d $\pm$ 14, W:33g/d $\pm$ 12 (DRV: 25g/d); potassium: M:2413mg/d $\pm$ 869, W:1809mg/d $\pm$ 707 (DRV: 3500mg/d); magnesium: M:528mg/d $\pm$ 194, W:390mg/d $\pm$ 151 (DRV: 300-350mg/d). In men, at the 4% radius, dietary fibre (0.43[0.007,0.846],  $p=0.046$ ) and phosphorus (0.02[0.0009,0.06],  $p=0.04$ ) were positively associated with trab.vBMD, these differences were attenuated following adjustments. There were no differences at the 4% radius in women. At the 33% radius, phytate was negatively associated with Ct.vBMD in men (-12.4[-22.6,-2.1],  $p=0.019$ ) and in women (-17.3[-31.0,-2.8],  $p=0.02$ ) following adjustments. In unadjusted analyses in men there were significant associations between phosphorus, potassium and magnesium with CSMI and CSA at the 33% radius, however these differences were attenuated following adjustments, with no differences in women.

**Conclusion:** Phytate intakes are high and are associated with low cortical vBMD at the radius in Gambian men and women.

## P408

### DIETARY VITAMIN K1 INTAKE IS ASSOCIATED WITH LOWER LONG-TERM FRACTURE-RELATED HOSPITALISATION RISK: THE PERTH LONGITUDINAL STUDY FOR AGEING WOMEN

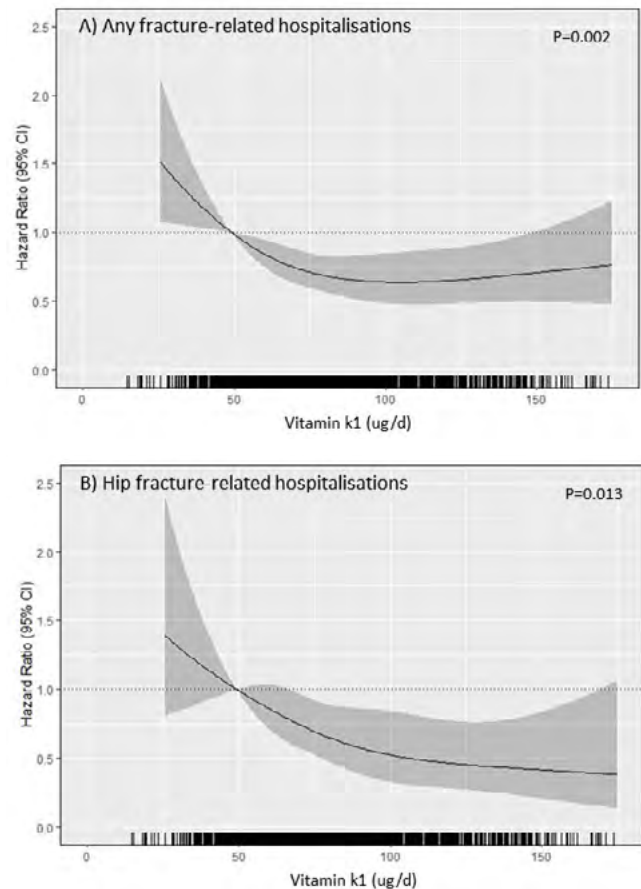
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**Objective:** Low vitamin K intake is linked to increased fracture risk. The optimal dietary intake of vitamin K1 and/or K2 for fracture prevention is unclear. To examine the association between dietary vitamin K1 and K2 intake with fracture-related hospitalisations over 14.5 years in community-dwelling older Australian women ( $n=1373$ ,  $\geq 70$  y).

**Methods:** Vitamin K1 and K2 intake at baseline (1998) was estimated using a validated food frequency questionnaire and a new Australian vitamin K nutrient database we developed. Any fracture ( $n=404$ , 28.3%) and hip-fracture ( $n=153$ , 10.7%) related hospitalisations over 14.5 y were captured using linked health records. Plasma vitamin D status (25OHD) and the ratio of undercarboxylated osteocalcin (ucOC) to total OC (tOC) from serum was assessed at baseline.

**Results:** Estimates of dietary vitamin K1 intake were supported by a significant inverse association with ucOC:tOC; a marker of vitamin K status ( $r=-0.12$ ,  $p<0.001$ ). In multivariable adjusted Cox regression models, compared to women with the lowest vitamin K1 intake (Quartile 1,  $<61$  ug/d), women with the highest vitamin K1 intake (Quartile 4,  $\geq 99$  ug/d) had lower hazards for any fracture- (HR 0.69 95%CI 0.52-0.91) and hip fracture-related hospitalisation (HR 0.51 95%CI 0.32-0.79), independent of 25OHD levels. Spline analysis suggested a nadir in the relative hazard for any fracture-related hospitalisations at a vitamin K1 intake of approximately 100 ug/d (Fig. 1). For hip fractures, a similar relationship was apparent. No significant association between vitamin K2 and fractures was observed.



**Figure 1.** Hazard ratios (HR) from multivariable-adjusted Cox proportional hazards model with restricted cubic spline curves for the association between vitamin K1 and fractures. HR compares the specific vitamin K1 intake to the median intake in the lowest quartile (49 ug/d). Shading represents 95%CI. Rug plot along the x-axis depicts each observation.

**Conclusion:** Higher dietary vitamin K1, but not vitamin K2 intake, is associated with lower risk for fracture hospitalisations in older women. A habitual intake of vitamin K1, equating to approximately 1-2 serves of green leafy vegetables per day (e.g., 75-150 g/d), may play an important role in lowering long-term fracture risk.

P409

### IMPROVED PREDICTION OF PRIMARY OSTEOPOROSIS LEVERAGING A POLYGENIC RISK SCORE IN WOMEN

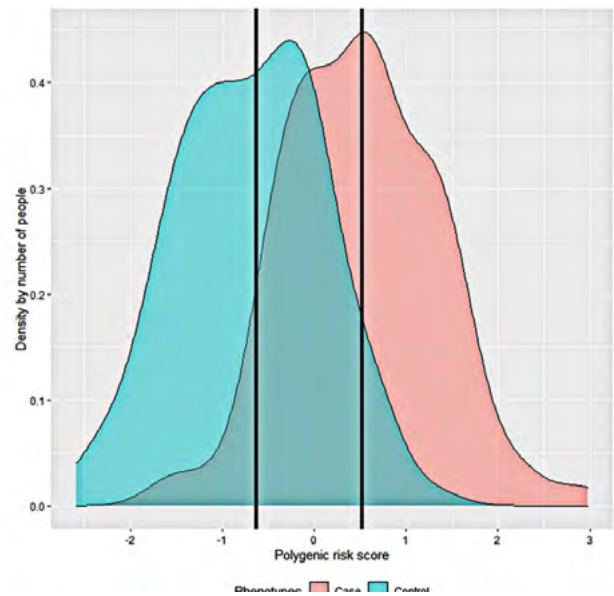
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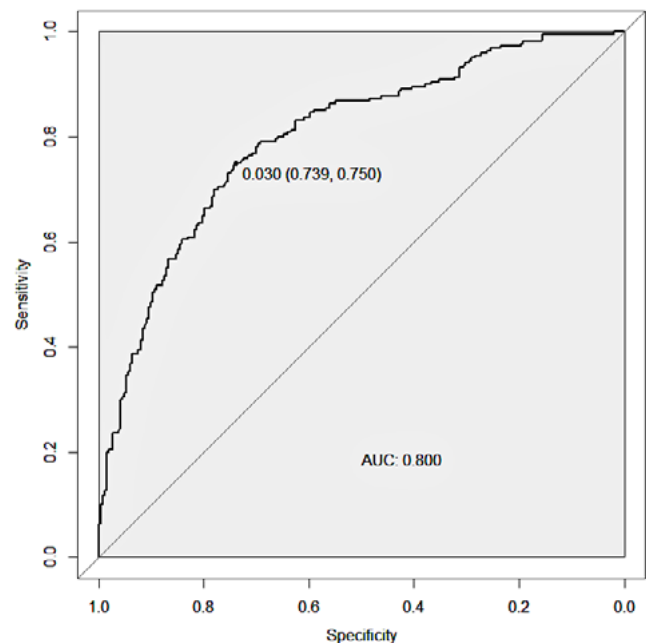
**Objective:** To develop a polygenic risk score (PRS) of fractures and low BMD in postmenopausal women from Volga-Ural region populations based on the analysis of 140 polymorphic loci from replication data of GEFOS consortium.

**Methods:** A total of 701 postmenopausal women from inpatient care units of Ufa (Republic of Bashkortostan, Russia) hospitals were examined using DXA in standard locations. GEFOS DNA genotyping data was used for PRS analysis. The group of women included 294 people with fractures 407 people without a fracture. PRS was carried out by calculating the sum of the risk alleles in an individual, weighted by the magnitude of the effects of the risk alleles in PLINK 1.09 software.

**Results:** We developed a polygenic risk score, which allowed an increase in the odds ratio of developing risk of osteoporosis in women by 6,6 (AUC=0,850), in women of Russian descent by 12,98 times (AUC=0,909), in women of Tatar descent – 20,98 times (AUC=0,902). The distribution of polygenic scores between the experimental and control groups, as well as the ROC curve of the results are shown in Figures 1 and 2.



**Figure 1.** Graph of the distribution of the density of polygenic risk score in control group and cases in Russian woman.



**Figure 2.** ROC-curve analysis of the polygenic risk score analyzes of osteoporosis comorbid state in Russian women.

**Conclusion:** Models with high sensitivity and specificity predicting the risk of osteoporosis, including fractures and low BMD were identified in women considering their ethnicity.

**Acknowledgements:** This work was financially supported by a grant from the Republic of Bashkortostan for young scientists SEC-GMU-2021 and megagrant from the Government of Russian Federation No. 075-15-2021-595.

P410

### ASSESSMENT OF RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY (REMS) SHORT-TERM PRECISION IN OBESE AND NORMAL SUBJECTS

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**Objective:** The presence of excessive fat mass can hamper the correct bone assessment with standard densitometry. The scope of this study was to determine whether the short-term intra-operator precision of REMS at the lumbar spine (LS) and proximal femur (FEM) is influenced by BMI variability.

**Methods:** The participants were stratified based on the BMI classification, resulting in two groups of <25 and >25 kg/m<sup>2</sup>, representing the normal and overweight/obese groups, respectively. All the enrolled patients underwent an ultrasound investigation of the LS and FEM for BMD determination with REMS. Precision, expressed as root-mean-square coefficient of variation (RMS-CV) and least significant change (LSC), was obtained using data from two consecutive REMS acquisitions performed by the same operator.

**Results:** In the normal weight group the precision expressed as RMS-CV yielded a value of 0.44%, with LSC=1.23% and 0.28% with LSC=0.73%, at the LS and FEM, respectively. Similarly, in the overweight/obese group an RMS-CV equal to 0.50% (LSC=1.40%) and 0.39%, (LSC=1.07%) was obtained at the LS and FEM, respectively.

**Conclusion:** When the cohort was stratified in two distinct BMI groups, REMS provided considerably high precision in both obese and normal subjects. This study corroborates the utility of REMS in routine clinical practice as an appropriate technology for the short-term monitoring of BMD change also in obese subjects.

P411

### SINGLE CENTER OBSERVATIONAL STUDY OF TUMOR-INDUCED OSTEOMALACIA PATIENTS

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**Objective:** Tumor-induced osteomalacia (TIO) is a rare paraneoplastic syndrome characterized by chronic hypophosphatemia and osteomalacia. We present a series of clinical cases of TIO.

**Methods:** The study was conducted at the National Medical Research Center for Endocrinology between January 2016 and December 2021. Consecutive patients with biochemically confirmed TIO underwent baseline clinical and instrumental evaluation (somatostatin receptor scintigraphy (SRS) with 99mTc-Tektrotyd-HYNIC-TOC combined with single-photon emission computed tomography (SRS- SPECT/CT); MRI (GE SIGNA pioneer 3T); CT scans (Revolution CT)) in order to localize tumors. The localization of tumor ("gold standard") was confirmed by histopathology after surgery.

**Results:** 23 consecutive patients were enrolled, 13 females and 10 males. The median age at initial evaluation was 49 [41; 61.5] (min 19; max 73) y. The median duration of disease was 8 y [4.5; 10] (min 2; max 21). The median number of fractures registered per patient was 10 [9; 13] (min 4; max 20). Eleven patients had low-traumatic hip fractures, with all having multiple vertebral fractures, 4 patients had severe nephrolithiasis, 2 patients had tertiary hyperparathyroidism and 13 patients had severe deformations of the spinal column and long bones. The TIO patients demonstrated hypophosphatemia, median phosphate levels - 0.49 mmol/L [0.35;0.58] (min 0.2; max 0.73); elevated serum alkaline phosphatase 207.5 U/L[164;307.5] (min 77; max 1119), reduced tubular reabsorption of phosphate TRP% 57.5 [46; 64.75] (min20; max76), normal calcium levels 2,33 [2,21; 2,52] (1,97; 2,72), four patients had moderate hypocalcemia. The tumor was successfully localized in 18 patients (78%) and removed in 14 cases. The tumor was identified by SRS with 99mTc-Tektrotyd-HYNIC-TOC in 16 out of 23 cases (70 %) yielding a sensitivity of 0.8 [0.48;0.89] and specificity of 0.83 [0.43;0.97]. CT identified the tumor in 11 out of 17 cases (65%) with a sensitivity of 0.75 [0.3; 0.9] and a specificity of 0.83[0.43;0.97]. MRI identified the tumor in 9 out of 14 cases (64%) with a sensitivity of 0.8 [0.45;0.89] and a specificity of 0.81[0.39;0.97]. Among the identified tumors 6 were located in bone (1 in the sphenoid edge of the temporal bone, 1 in the sacrum, 1 in the calcaneus, 1 in the ethmoid bone, 1 in the man-



dible bone, 1 in the shoulder blade), the remaining tumors (n=11) were in soft tissues (9 in the legs, 1 in the groin, 1 in the knee-joint). After surgery, phosphate levels normalized to the reference range within a month in 9 out of 14 patients (median phosphate levels - 1,23 mmol/L [1,095;1,28] (min 0,81; max 1,68); serum alkaline phosphatase 76 U/L [62;156] (min 59; max 436), tubular reabsorption of phosphate TRP% 81 [78;84] (min 76; max 87)). Local relapses and metastases developed in 5 patients, 3 of them underwent pre-operative biopsies.

**Conclusion:** Patients with T10 have severe bone complications associated with hypophosphatemia, high alkaline phosphatase and low phosphate reabsorption. SRS- SPECT/CT seems to be the best approach to localize tumors which are typically located in the extremities or skull.

## P412

### A NOVEL QUANTITATIVE COMPUTER-ASSISTED SCORE CAN IMPROVE REPEATABILITY IN THE ESTIMATE OF VASCULAR CALCIFICATIONS AT THE ABDOMINAL AORTA

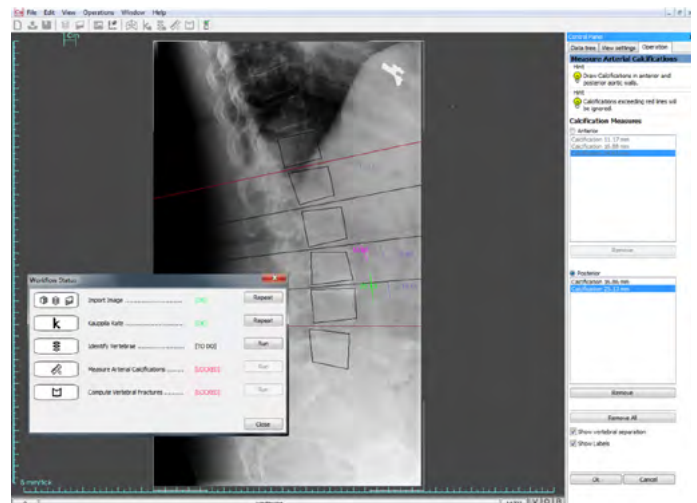
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**Objective:** Vascular calcifications (VCs) are strongly linked to vertebral fractures (VFs) [1]. Several calcifications scores at the abdominal aorta have been developed from lower-dose and low-cost lateral spine RX projections, the most used is the Kaupilla Score (KS, 0-24 score). [2]. Most RX scores are semiquantitative implying an error-prone visual assessment. So far, repeatability studies could not estimate the minimum detectable difference (MDD).

We developed a new RX-based computer-assisted VCs score with the aim to test its precision (repeatability and reproducibility metrics, and MDD estimate) compared to KS.

**Methods:** New quantitative computer-assisted VCs Score (QS) considers both abdominal aorta calcification and column length (range 0-1), then multiplied by 24 to compare with the KS. Dedicated software developed with ALBA framework (Figure). Five experts from four specialties in two institutions evaluated the data twice, with one month interval between series. Additional test-retest evaluation performed on 8 subjects with a second RX within two weeks.



**Results:** Intra-observer analysis (Bland-Altman plots and regression analysis between series): both scores seem not biased; QS showed higher reproducibility (95%CI of differences almost halved) Inter-observer (intraclass correlation coefficient (ICC)): ICC higher for QS in the first series (0.78 vs. 0.64), lower differences second evaluation (0.84 vs. 0.82). MDD (standard error of the mean): reduced by around 25% for the QS (2,98 vs. 4, in the 0-24 scale). Test-retest (Wilcoxon paired test): not significantly different for both scores. Agreement (Bland-Altman plots): scores are discordant. The QS shows significantly higher values and an increasing trend with calcification severity.

**Conclusion:** Our new quantitative computer-assisted score improved precision of RX scores in the estimate of VCs with a higher intra-observer repeatability than KS and, for the first time, an estimate of MDD in the VCs assessment. MDD was 25% lower for the new score. An ongoing study will determine whether this lower MDD may reduce follow-up times to check for VCs progression, and whether this new VCs score may act as risk alert for the development/worsening of VFs.

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## P413

### METABOLIC DYSFUNCTIONS INTRICATE HIP-BONE FRAGILITY FRACTURE RISKS PARADIGM AMID REPRODUCTIVE AGED WOMEN FROM FAISALABAD

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**Objective:** Since last few decades increasing incidents of frequent bone fractures among both genders reasoned as wretched quality of the bone and harbinger of osteoporosis. Current study was planned to examine the quantitative impact of metabolic disorders on bone fragility fracture risks in local hospital population.

**Methods:** Total 271 men and women of 30-90 years of age with fracture history and metabolic syndrome (MetS) were recruited in the study to examine the mixed impact of fixed and random predictors through linear regression modeling on fragility fractures risks using R package.

**Results:** The mean BMI of men (11.05%) and women (11.24%) with MetS was significantly ( $P < 0.001$ ) increased when compared to non-MetS groups. In first set of mixed models for both genders, 33% increment in QFracture® (QF10 risk) score for hip bone was due to low trauma however moderate smoking contributed 28% to QF10 scores for all bones. In second set of models for only women 20% and 42% increment was noticed in QF10 score for all bones and only for hip fractures respectively due to low physical activity profile.

**Conclusion:** More than 45 women with MetS presented progressive trend of QF10 risk score as they aged. While low physical activity level and smoking were mostly contributed in the hip fractures consequences. Whereas efficacy of mixed model to indicate very prospects of osteoporosis were found uncompromising even if it used to address the subethnic groups projections in population.

## P414

### BONE STATUS FOLLOWING PTH CORRECTION

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**Objective:** Increased PTH levels have a catabolic effect on bone metabolism promoting bone resorption, thus making hyperparathyroidism a cause of secondary osteoporosis. (1-5) We aim to introduce a female patient with primary hyperparathyroidism and bone status following PTH correction.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 53-year-old female patient who is followed for bone status after diagnostic of primary hyperparathyroidism due to parathyroid adenoma for which she underwent surgery in 2020, hypercalcemia, and osteoporosis. The patient's medical history includes multinodular goiter, surgically removed kidney stones, hypertension, gastritis, herniated disk, cholecystectomy, intolerance to oral bisphosphonates. In 2020, at first admission amid pandemic, the endocrine panel before surgery showed: TSH=0.9 µUI/mL (N:0.5-4.5), FT4=15 pmol/L (N:9-19), ATPO=55 UI/mL

(N:0-5.61). 25OHD=20 ng/mL (N:30-100), osteocalcin=75 ng/mL (N:15-46), CrossLaps=0.9 ng/mL (N: 0.33-0.782), P1NP=62 ng/mL (N:20.25-76.31), PTH=541 pg/mL (N:15-65), blood calcium=13.2 mg/dL (N:8.4-10.3). DXA confirmed osteoporosis: lumbar L1-4: BMD(g/cm<sup>2</sup>)=0.885, T-score(SD)=-2.6, Z-score(SD)=-1.5; femoral neck BMD(g/cm<sup>2</sup>)=0.722, T-score (SD)=-2.3, Z-score (SD)=-1.2; 1/3 distal radius BMD(g/cm<sup>2</sup>)=0.487, T-score (SD)=-3.2, Z-score (SD)=-3. The histopathological exam showed a parathyroid adenoma lower right with cellularity of oxyphilic type. In 2021 (7 months since surgery) the endocrine panel showed (after parathyroidectomy +1 y of ibandronic acid): 25OHD=28.8 ng/mL (N:30-100), osteocalcin=16.48 ng/mL (N:15-46), CrossLaps=0.1 ng/mL (N:0.33-0.782), P1NP=20.25 ng/mL (N:20.25-76.31), PTH=53.73 pg/mL (N:15-65) while DXA improved: lumbar L1-4: BMD(g/cm<sup>2</sup>)=0.898, T-score(SD)=-2.2, Z-score(SD)=-1.4; femoral neck BMD(g/cm<sup>2</sup>)=0.732, T-score (SD)=-2.2, Z-score (SD)=-1.2; total hip BMD (g/cm<sup>2</sup>)=0.829, T-score (SD)=-1.4, Z-score (SD)=-0.7; 1/3 distal radius BMD(g/cm<sup>2</sup>)=0.528, T-score (SD)=-2.6, Z-score (SD)=-2.3.

**Conclusion:** This case highlights that DXA-BMD improved after PT-ectomy can be expected very soon after PTH correction if vitamin D is not deficient.

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## P415

### EVALUATION OF INTENSIVE REHABILITATION UNDER CONTINUOUS SUPRASCAPULAR NERVE BLOCKADE FOR THE TREATMENT OF REFRACTORY ADHESIVE SHOULDER CAPSULITIS: CASE SERIES

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**Objective:** Treatment of refractory adhesive shoulder capsulitis is a challenge. This observational retrospective study evaluated the long-term effectiveness of intensive physiotherapy protocol under a continuous peripheral blockade of the suprascapular nerve (cSSNB).

**Methods:** We reviewed 29 medical records of patients suffering from adhesive capsulitis and treated with intensive physiotherapy under cSSNB during 10 days. The "disabilities of the arm, shoul-

der and hand" outcome questionnaire (DASH score) and shoulder movements were recorded at the beginning, 10 days after local anesthetic infusion and three months after.

**Results:** Twenty-six patients significant improved shoulder movements after 10 days of treatment. Sixteen patients were followed completely until 3 months after rehabilitation program. Range of four shoulder motion compatible with a normal daily life was acquired in nine patients at three months. There is no significant difference in shoulder motion between the end of LA infusion and at three months. At the end of infusion, DASH score is significantly decreased to 59.3 (n=26), and persists three months 42.1 (n=16). At three months, 33% of the initial population objectively reach the 4 goals, compatible with a correct quality of life.

**Conclusion:** Rehabilitation under cSSNB is associated with a significant long term improvement in shoulder motion and quality of life in patients with adhesive capsulitis. Randomized controlled trials will be necessary to demonstrate our encouraging results.

## P416

### OUTCOMES OF SURGICAL TREATMENT OF SCAPHOID NONUNION USING NONVASCULARIZED ILIAC BONE GRAFT VS. VASCULARIZED DORSAL DISTAL RADIUS BONE GRAFT

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**Objective:** To present the clinical and radiographic results of surgical treatment of scaphoid non-union in our institution, using two different types of bone grafts: nonvascularized iliac bone graft and vascularized dorsal distal radius bone graft

**Methods:** Retrospective revision of surgical treated patients with scaphoid non-union, in a single center, between 2014-2020, with a minimum follow up of 12 months. We collected data such as sex, side, previous treatment, mechanism of injury, local of non-union. The scapholunate angle and carpal height was measured on plains x-rays. We also applied the "Scaphoid Score" and the Quick-DASH questionnaire.

**Results:** From 2014-2020 we surgical treated 20 patients with scaphoid nonunion. The mean age was 31.7±11 y. In 11 patients we used vascularized dorsal distal radius bone graft and in 9 we used nonvascularized iliac bone graft. 6 patients with radius graft shown no integration of the graft and in 4 of them a revision surgery with iliac bone graft was performed. In the group of patients treated with iliac bone graft, only 2 underwent 4-corner fusion. Most of the patients were satisfied with the results, being functionally able to perform their work.

**Conclusion:** Both techniques are good options for the treatment of scaphoid non-union. In our study we found that the patients where we used nonvascularized iliac bone graft had better results in the subjective scores and lower revision rates than the patients with vascularized dorsal distal radius bone graft.

## P417

### THERAPEUTIC MAINTENANCE OF THE FIRST ANTITNF IN AXIAL SPONDYLOARTHRITIS

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**Objective:** Rheumatic diseases (RMD) including axial spondyloarthritis (axSpA) are potentially disabling chronic diseases whose management has been improved by biologics such as TNFi. The objective of this study is to describe the therapeutic maintenance in real conditions of use of the first TNFi, in axSpA in patients naive of biologics at one year and three years and to assess the efficacy, tolerance and discontinuation of treatment in patients with spondyloarthritis.

**Methods:** We included patients treated with TNFi (etanercept, infliximab, adalimumab), all patients met the ASAS criteria. Data on treatment efficacy, safety and discontinuation were collected. Clinical improvement, resulting in a 50% decrease in BASDAI and/or ASDAS and a 20% and 40% decrease in Ankylosing Spondylitis Assessment Study (ASAS20 and ASAS40) score was also assessed. Survival curves were constructed using the Kaplan-Meier method in order to estimate the therapeutic maintenance rate and the comparison made by the logrank test.

**Results:** 192 patients were analyzed. The mean age was 41.1 y, the disease evolved on average for 15 y, the mean time to initiation of the first TNFi/ diagnosis of axSpA was 6.14 years. At Baseline: the mean C-reactive protein (CRP) was 12.19 mg/L, BASDAI score was 4.59, ASDAS 3.26, BASFI 4.39. axSpA treated with etanercept (n=91) have a therapeutic maintenance of 89.8% at 12 months which is superior to axSpA treated with infliximab (n=19), maintenance superior to AS treated with adalimumab (n=82) with a therapeutic maintenance of 85.19% at 12 months (p=0.03). The clinical response is maintained at 3 years and is associated with a high rate of therapeutic maintenance of 72.5%. BASDAI, ASDAS, and ASAS scores improved during the first year and were maintained over the three years of treatment. After 3 y of treatment, the BASDAI 50 ASDAS 50 score was achieved in 65% of patients (125/192), ASAS 20 score in 72.4% (139/192) and the ASAS 40 score in 70% (135/192). The clinical improvement has been associated with a decrease in acute phase markers, such as CRP.

**Conclusion:** The retention rates observed in naïve bDMARDs patients varied depending on the TNFi biologic. This is because there is superior maintenance of etanercept compared to infliximab and adalimumab in axSpA.

P418

### VITAMIN D SUPPLEMENTATION AND EXERCISE FOR IMPROVING PHYSICAL FUNCTION, BODY COMPOSITION AND METABOLIC HEALTH IN OVERWEIGHT OR OBESE OLDER ADULTS WITH VITAMIN D DEFICIENCY: A PILOT RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL

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**Objective:** Vitamin D supplementation may have nonskeletal health benefits and enhance exercise responsiveness, particularly in those with vitamin D deficiency. We investigated whether, compared with placebo, vitamin D supplementation taken prior to and during a 12-week exercise program improves metabolic health, body composition or physical function in overweight and obese older adults with vitamin D deficiency.

**Methods:** 50 overweight or obese older adults (mean±SD age: 60±6 y; BMI 30.6±5.7) with vitamin D deficiency (baseline serum 25-hydroxyvitamin D [25(OH)D] levels <50 nmol/L) were recruited. Participants were randomly allocated to receive either vitamin D<sub>3</sub> (4000 IU/d) or a matching placebo for 6 months. Between months 3-6, all participants completed a 12-week multimodal exercise program (aerobic and resistance exercise) at a frequency of 3 d/week (one supervised and two home-based sessions) while continuing with vitamin D/placebo. Mean changes in biochemical parameters, body composition and physical function at 3 and 6 months were compared between groups.

**Results:** At 3 months, vitamin D supplementation increased serum 25(OH)D levels (placebo: 2.5±14.7 nmol/L; treatment: 43.4±18.4 nmol/L; P<0.001) and reduced stair climb times (placebo: 0.3±1.0 s; treatment: -0.2±1.0 s; P=0.046), but had no effect on the primary outcome, gait speed (placebo: 0.01±0.10 m/s; treatment: 0.00±0.20 m/s; P=0.90), compared with placebo. At 6 months, vitamin D supplementation combined with multimodal exercise reduced waist circumference (placebo: 1.3±7.3 cm; treatment: -3.0±6.1 cm; P=0.02) and decreased waist-to-hip ratio (placebo: 0.01±0.05; treatment: -0.03±0.05; P=0.005), but had no effect on gait speed (placebo: 0.09±0.20 m/s; treatment: 0.03±0.20 m/s; P=0.27) compared with placebo combined with multi-modal exercise. Vitamin D supplementation had no effect on any other biochemical, body composition or physical function parameters when taken alone, or in combination with exercise.

**Conclusion:** Vitamin D supplementation increased 25(OH)D levels and augmented waist circumference losses following a multi-modal exercise program in overweight and obese older adults with vitamin D deficiency. Vitamin D supplementation alone also reduced stair climb times, but it had no effect on gait speed when taken alone, or in combination with exercise. Future

trials should focus on populations with moderate or severe vitamin D deficiency who may be more likely to experience therapeutic benefits from vitamin D supplementation.

P419

### EVALUATION OF EFFICACY AND SAFETY OF BIOACTIVE CONCENTRATE FROM SMALL SEA FISH IN ELDERLY PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** To evaluate the effectiveness and safety of the use of bioactive concentrate of small sea fish (BCSSF) in patients 75 y and older with knee osteoarthritis (OA).

**Methods:** The investigation enrolled 38 patients aged 75 y and older with knee OA (ACR criteria, 1986), Kellgren–Lawrence grades II–III, ≥40 mm pain VAS, who required continuous nonsteroidal anti-inflammatory drug (NSAID) use. All the patients received BCSSF in the standard regimen: a 1-ml intramuscular injection daily for 20 d. The dynamics of pain during movement was assessed using the VAS scale and WOMAC. Comorbidity was determined according to the Charlson comorbidity index, polypharmacy, and the safety of therapy in all the patients. The investigation duration was 8 weeks, the number of visits (V) - 3: V1 - 1st day, V2 - 21st and V3 - 56th day.

**Results:** 94.7% of patients had a high level of comorbidity. Charlson index: 1-2 points in 2 (5.3%) patients, 3-4 points in 26 (68.4%), ≥5 points in 10 (26.3%), with a probability of death in the next 10 years in 26; 52 and 85% of cases, respectively. The average number of drugs taken by patients was 5.0±1.5, which indicates the presence of polypharmacy. Against the background of taking BCSSF, most patients had a significant (≥20%) decrease in knee pain according to VAS: to V2 - in 26 (68.4%) and to V3 - in 28 (73.7%). BCSSF therapy led to a marked reduction in WOMAC pain in most patients. Thus, the pain level to V1 was 215.0±10.7 mm, to V2 - 104.0±4.19 mm and to V3 - 104.0±4.01 mm (p≤0.001). Similar changes were made in the indicators of stiffness according to WOMAC: V1 - 86.6±3.29 mm, V2 - 43.7±1.83 mm and V3 - 37.3±1.69 mm (p≤0.001). A decrease in functional disorders according to WOMAC was also noted throughout the observation: V1 - 824±25.9 mm, V2 - 500±49.6 mm and V3 - 471±47.6 mm (p≤0.001). A statistically significant decrease in the total WOMAC index was revealed compared to the initial indicators: V1 - 1125±135.0 mm, V2 - 647±229.0 mm and V3 - 599.0±50.6 mm (p≤0.001). Improving the wellbeing of patients led to a decrease in the need for NSAIDs. By day 21, 12 (31.6%) patients refused to take NSAIDs. By the 56th, 18 (47.4%) patients, and the number of days of taking NSAIDs decreased (p=0.005). No serious or severe adverse events have been registered.



**Conclusion:** The results of the investigation showed the statistically significant efficacy and safety of BCSSF in patients with knee OA in the elderly group.

## P420

### QUALITY OF LIFE IN ELDERLY PATIENTS WITH KNEE OSTEOARTHRITIS WHEN TAKING BIOACTIVE CONCENTRATE OF SMALL SEA FISH

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**Objective:** To evaluate of quality of life (QL) in patients 75 y and older with knee osteoarthritis (OA) when taking bioactive concentrate of small marine fish (BCSSF).

**Methods:** The investigation enrolled 38 patients aged 75 y and older with knee OA (ACR criteria, 1986), Kellgren–Lawrence grades II–III,  $\geq 40$  mm pain VAS, who required continuous non-steroidal anti-inflammatory drug (NSAID) use. All the patients received BCSSF in the standard regimen: a 1-ml intramuscular injection daily for 20 d. The EQ-5D questionnaire was used to assess QL. The results of the responses are presented in the form of the “health index” EQ-5D-utility and VAS - health thermometer. The minimal clinically significant change in the EQ-5D index before and after treatment was assessed:  $< 0.10$  points – no effect,  $0.10-0.24$  points - minimal,  $0.24-0.31$  points - satisfactory and  $\geq 0.31$  points - pronounced effect. The investigation duration was 8 weeks, the number of visits (V) - 3: V1 - 1st day, V2 - 21st and V3 - 56th day.

**Results:** When filling out the EQ-5D questionnaire during V1, all patients noted health problems of one degree or another. The absolute majority of patients (78.6%) had problems of moderate severity in all components of QL. When calculating the quantitative health index according to the EQ-5D questionnaire, it was found that initially in patients with OA, the health index was 0.480 [0.480; 0.584]. By the 21st day of therapy (V2), there was a statistically significant increase in this indicator to 0.624 [0.507; 0.713] ( $p=0.016$ ). The change in the health index against the background of BCSSF therapy corresponded to a minimal therapeutic effect ( $\Delta$  EQ-5D - 0.144). A similar ratio was preserved by the 56th day. When analyzing the data of the “health thermometer” EQ-5D, your indicators did not significantly change during active treatment. So, the VAS value was initially  $48.1 \pm 3.94$  mm, and on the 21st day (V2) -  $58.7 \pm 3.96$  mm ( $p=0.093$ ). A statistically significant increase in the VAS index compared to the baseline level was noted after 8 weeks of observation (V3) -  $70.1 \pm 3.65$  mm ( $p < 0.001$ ).

**Conclusion:** The results of the study showed a statistically significant improvement in QL in the treatment of BCSSF in patients 75 y and older with knee OA.

## P421

### FALL RISK AND MUSCLE STRENGTH IN POSTMENOPAUSAL WOMEN

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**Objective:** To determine the risk of falls depending on muscle strength in women of different age groups in postmenopause.

**Methods:** 26 postmenopausal women were examined. The mean age of the women was  $65.7 \pm 1.56$  y. All women were divided into 3 age groups: middle-aged (45-59 y) - 7 women, elderly (60-74 y) - 16 women and senile (75-90 y) - 3 women. The risk of falls was assessed using the Morse Fall Scale. Each criterion of the fall scale received a score that ranged from 0-30 points, the scores were summed and classified as follows: low risk, 0-24; medium risk, 25-50; and high risk,  $> 51$ . Muscle strength was measured with a wrist dynamometer. A rank correlation method was used to assess the relationship between the risk of falls and muscle strength and age.

**Results:** In the cohort studied, 17 female subjects (65.4%) had a low risk of falls, 7 female subjects (26.9%) had an average risk, and 2 female subjects (7.7%) had a high risk. Among middle-aged women, 5 women (71.4%) had a low risk of falls, and 2 women (28.6%) had an average risk. High risk of falls was not observed. Among elderly women, 11 women (68.8%) had a low risk of falls, and 5 women (31.2%) had an average risk. No high risk of falls was observed. Among the elderly, 1 woman (33.3%) had a low risk of falls, and 2 women (66.7%) had a high risk. Average muscle strength per dominant arm in middle-aged women was - 27,57 kg, in the elderly - 20,78 kg. In the group of elderly women the muscle strength was 2 times less than in the middle-aged persons (14,03 kg). Correlation analysis revealed no statistically significant correlations between the risk of falls and age. Correlation analysis revealed a statistically significant negative relationship between muscle strength and age ( $r = -0.485$ ,  $p = 0.006$ ). Thus, the findings demonstrate a decrease in muscle strength with age. No statistically significant relationship between risk of falls and muscle strength was found in this study ( $r = -0.026$ ,  $p = 0.900$ ).

**Conclusion:** According to the results of this study, it was found that muscle strength decreased with age. The incidence of medium and high risk of falls was more frequently observed in the elderly and senile age group. A high risk of falls was detected in the group of elderly women.



P422

### PREVALENCE OF ATHEROSCLEROSIS RISK FACTORS IN MALE PATIENTS WITH CORONARY HEART DISEASE AS A FUNCTION OF MUSCLE CONDITION

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**Objective:** To study the prevalence of atherosclerosis risk factors in male patients with coronary heart disease (CHD).

**Methods:** The study enrolled 79 male patients with established diagnosis of coronary angiography verified by coronary angiography (median age 63 (57; 66) y). The diagnosis of sarcopenia was based on the EWGSOP recommendations (2010). Risk factors for atherosclerosis were assessed using the SCORE scale. For comparative analysis the patients were divided into 3 groups: 1st - 31 patients without sarcopenia, 2nd - 21 patients with presarcopenia, and 3rd - 27 patients with sarcopenia.

**Results:** Smoking was recorded in the group of patients with presarcopenia at 38.1%, in patients without sarcopenia and with sarcopenia at 29.0% and 18.5%, respectively. The groups did not differ significantly in the number of patients who smoked ( $p>0.050$ ). Arterial hypertension (AH) was detected in the vast majority of patients regardless of muscle condition: 93.5%, 100%, and 88.9%, respectively. The frequency of AH was not significantly different in the studied groups ( $p>0.050$ ). Diabetes mellitus (DM) type 2 was registered in all groups of patients. So, in the 1st group T2DM was diagnosed in 19.4%, in the 3rd group - in 25.9%, in the 2nd group T2DM was registered in only 1 patient (4.8%). The frequency of this risk factor was comparable in the studied groups of patients ( $p>0.050$ ). Dyslipidemia was registered in all three groups of patients irrespective of their muscular condition - 83.9%, 76.2% and 86.5% respectively ( $p>0.050$ ). The maximum number of obese patients was found in the group of men without sarcopenia (64.5%), which was statistically significantly higher than in the groups of presarcopenia (23.8%) and sarcopenia (22.2%) patients ( $p=0.015$  and  $p=0.048$  respectively).

**Conclusion:** The risk factors of atherosclerosis development were detected in the absolute majority of patients irrespective of their muscular condition. The prevalence of the studied risk factors for atherosclerosis was comparable in the groups of men regardless of the muscular apparatus condition ( $p>0.050$ ), except for obesity ( $p<0.050$ ).

P423

### ASSESSMENT OF PAIN AND SEVERITY OF FUNCTIONAL DISORDERS ON THE VAS SCALE AND WOMAC INDEX DEPENDING ON THE STATE OF THE MUSCULAR APPARATUS IN ELDERLY AND SENILE MEN WITH KNEE OSTEOARTHRITIS

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**Objective:** To assess the pain and severity of functional disorders on the VAS scale and the WOMAC index depending on the state of the muscular system in elderly and senile men with osteoarthritis (OA) of the knee joint.

**Methods:** We examined 32 patients with OA of the knee, established in accordance with the criteria of the American College of Rheumatology (mean age 68.7 (66.1; 70.3)). To assess the clinical manifestations of OA of the knee, patients used the pain VAS and the WOMAC questionnaire. Muscle mass was assessed using multispiral computed tomography on a 64-slice Somatom Sensation 64 CT scanner (Siemens AG Medical Solution, Germany). Muscle strength was determined using a mechanical hand dynamometer. Muscle function was examined using a short battery of physical functioning tests (Short Physical Performance Battery, SPPB). Depending on the state of the muscular system, all patients with OA of the knee were divided into 3 groups (EWGSOP, 2010): group 1 - 9 patients without sarcopenia, group 2 - 11 patients with presarcopenia (a decrease in exclusively muscle mass) and group 3 - 12 patients with sarcopenia (decrease in muscle strength combined with a reduced in muscle mass).

**Results:** When analyzing the average values of pain on the VAS scale, it was found that the groups of patients did not differ statistically significantly. Thus, pain according to the VAS scale in patients without sarcopenia, with presarcopenia and sarcopenia was 48.7 [38.5; 71.3], 47.4 [31.5; 76.8] and 57.6 [50.7; 89.4] mm, respectively ( $p_{1,2}=0.36$ ,  $p_{2,3}=0.089$ ,  $p_{1,3}=0.081$ ).

The values of the total WOMAC index in patients with sarcopenia (814.0 [518.3; 874.7]) were higher compared to those in the groups of patients without sarcopenia (659.4 [458.3; 711.3]) and with presarcopenia (599.0 [464.8; 762.5]), however, the differences did not reach the level of statistical significance ( $p_{1,2}=0.132$ ,  $p_{2,3}=0.092$ ,  $p_{1,3}=0.071$ ).

**Conclusion:** The indicators of pain by VAS and functional disorders by the index WOMAC depending on the state of the muscular system in elderly and senile men with OA of the knee joint did not significantly differ.

P424

**HIP FRACTURE EPIDEMIOLOGY IN THE LAST PREPANDEMIC YEAR IN ROMANIA**D. Grigorie<sup>1</sup>, C. Vladescu<sup>2</sup>, M. Ciutan<sup>2</sup>, A. Sucaliuc<sup>1</sup>

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**Objective:** We observed an increased age-adjusted incidence in hip fracture (HF) in the last decade in Romania (2008-2018)<sup>1</sup>. The aim of the present study was to better characterize this increased risk by collecting more data in the last prepandeemic year, 2019.

**Methods:** Data were extracted from the Romanian National DRG Database

which includes all discharges from hospitals (public and private) in contractual relationship with the National Health Insurance House in Romania. The cohort included patients aged 40 and over, who were hospitalized for a hip fracture as primary diagnosis (ICD10 code S72.0 – fracture of femoral neck, S72.1 – pertrochanteric fracture, S72.2 – subtrochanteric fracture, S72.9 – unspecified site of femoral fracture) and with surgical interventions.

**Results:** From a total of 16880 HF, 11643 were in females (69%; mean age 78.4±9.7 y) and 5237 in males (31%; mean age 72.4±12.3 y). The mean length of hospital stay was 12.3±7.4 d in women and 11.6±7.2 d in men. In hospital mortality was 1.95% in females and 2.6% in males. Distributions by fracture type were: femoral neck (37.9% in females; 38.9% males), trochanteric (61.6% females; 60.4% males), unspecified (0.5% females; 0.7% males). The incidences by gender in urban and rural areas were: in females (urban 50.27%; rural 49.73%) and males (urban 50.58%; rural 49.42%). Treatment methods by gender were: in women - internal fixation (intramedullary nail, sliding hip screw) 61%, hemiarthroplasty 23.8%, total hip arthroplasty 7.2%; in men 66 %, 22.5% and 8.11% respectively.

**Conclusion:** There was no difference in HF incidence between rural and urban areas in both sexes; albeit less frequent than in women, in men HF occurred at a younger age and were associated with higher in hospital mortality.

**Reference:** 1. Grigorie D, et al. Acta Endocrinol (Buchar) 2019;15:505

P425

**EVALUATION OF THE LEVEL OF KNOWLEDGE IN POSTMENOPAUSAL WOMEN REGARDING OSTEOPOROSIS AND THE VALUE OF PHYSICAL ACTIVITY**S. Tomasevic Todorovic<sup>1</sup>, S. Kevic<sup>1</sup>, D. Savic<sup>1</sup>, S. Nikolic<sup>1</sup>, N. Ilic<sup>1</sup>, K. Boskovic<sup>2</sup>, S. Pantelinac<sup>1</sup>, J. Ivacic<sup>3</sup>, S. Kecojevic<sup>4</sup>

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**Objective:** To evaluate the level of knowledge regarding osteoporosis and the assessment of the level of physical activity in postmenopausal women with osteoporosis.

**Methods:** The study includes 250 (mean age 65.86±6.85) female patients and was conducted from September 2020 to September 2021. in the Polyclinic Dept. of the Medical Rehabilitation Clinic, University Clinical Center of Vojvodina in Novi Sad. International Physical Activity Questionnaire was used to determine the level of physical activity in female patients with osteoporosis. Osteoporosis Knowledge Assessment Tool was used to evaluate the level of knowledge concerning osteoporosis.

**Results:** Our research has shown that the highest percentage of patients were those with moderate physical activity (100;40%), followed by high physical activity (78;31.2%) and the smallest percentage of patients were those with low physical activity (72;28.8%). The total osteoporosis knowledge score was 3.69±1.63. There was a statistically significant correlation between all levels of physical activity and the level of BMD of the femur (r 0.306), as well as a statistically relevant correlation between vigorous physical activity and mineral bone density of the lumbar spine (r 0.198).

**Conclusion:** Continuous education of patients is needed in order to raise awareness of osteoporosis, as well as the importance of physical activity. Higher levels of physical activity correlate with higher levels of BMD.

P426

### CALCIUM AND VITAMIN D STATUS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE: CORRELATIONS WITH SPIROMETRY PARAMETERS

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**Objective:** This study aimed to assess calcium and vitamin D status in patients with COPD and to assess correlations between vitamin D and calcium status and spirometry parameters.

**Methods:** A prospective study including men with COPD was conducted in the departments of pneumology and rheumatology of Tunisia between April 2019 and January 2020. Demographic and clinical parameters were collected. Pulmonary function was assessed by spirometry. The following items were noted: forced vital capacity (FVC); forced expiratory volume (FEV1) and FEV1/FVC ratio. The plasma level of vitamin D was determined. Calcium intake was determined using Fardellone questionnaire [1].

**Results:** 39 males were included with a mean age of 68.18±9.51 y [48-84]. All patients were smokers with an average of 45.9±22.49 pack-year [20-140]. 51.3% of patients had inhaled corticosteroids. The average vitamin D level was 12.26 8.94 ng/ml [4.1-56]. Vitamin D deficiency and insufficiency were found respectively in 66.7% and 33.3% of patients. Calcium intake was 542±152.7 mg a day [261-1067]. Dyspnea grade 3 was noted in 10.4%. The FVC, the FEV1 and the FEV1/FVC were respectively 51.51%±10.75[37-110], 51.75%±21.4[17-89], and 74.25±18.52 [34.7-68.6]. Among spirometry parameters, only low FEV1 ratio was correlated with low vitamin D level (p=0.05, r=0.372). However, calcium intake was not correlated with any spirometry parameter (Table).

**Table.** Correlations between spirometry parameters and calcium and vitamin D status

	FCV	FEV1	FEV1/FVC ratio
Vitamin D level	p=0.08 r=0.30	p=0.05 r=0.34	p=0.08 r=-0.31
Calcium intake	p=0.92 r=0.01	p=0.68 r=0.07	p=0.91 r=-0.18

**Conclusion:** Our results showed that vitamin D deficiency is frequent in COPD patients. Besides, calcium intake is not optimal in COPD patients. Low vitamin D level is correlated with decreasing FEV1. However, calcium intake seems not to have an impact on spirometry parameters. Low vitamin D level is correlated with decreasing FEV1. However, calcium intake seems not to have an impact on spirometry parameters.

**Reference:** 1. Fardellone P, et al. Rev Rhum 1991;58:99

P427

### EFFECT OF ANTIPSYCHOTICS AND DOPAMINE ON HUMAN OSTEOCLASTOGENESIS

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**Objective:** Antipsychotics target dopamine and serotonin receptors to treat psychiatric disorders such as schizophrenia. Long-term use of antipsychotics decreases BMD and increases fracture risk. It is vital to elucidate how dopaminergic signalling impacts bone, with current insights into mechanism(s) limited to data from animal models. This study investigates the role of dopamine and a range of commonly prescribed antipsychotics on the process of osteoclastogenesis, which will help inform clinical decisions to reduce possible off-target effects on bone.

**Methods:** The effects of dopamine, dopamine receptor (DR) agonists and DR antagonists were assessed in a human model of osteoclastogenesis. Briefly, human cord blood mononuclear cell-derived osteoclast precursors were cultured on dentine slices in the presence of RANKL and MCSF for 14 d. Cells were fixed and stained for TRAP and dentine slices assessed for resorption. Dopamine and serotonin receptor expression and osteoclastic gene expression were then assessed using quantitative real time PCR. Data were assessed using one-way ANOVA followed by Tukey multiple comparison test with the statistical significance at P<0.05.

**Results:** Dopamine, DR agonists and DR antagonists all dose-dependently inhibited OC formation and resorption where the DR antagonists C<sub>17</sub>H<sub>19</sub>ClN<sub>2</sub>S and C<sub>21</sub>H<sub>23</sub>ClFNO<sub>2</sub> which are both first generation antipsychotics have the highest inhibitory effects on OC formation with IC<sub>50</sub> ~6µM and ~5µM respectively. Whereas, C<sub>8</sub>H<sub>11</sub>NO<sub>2</sub>, its agonist C<sub>16</sub>H<sub>24</sub>N<sub>2</sub>O and its partial agonist C<sub>21</sub>H<sub>32</sub>Cl<sub>2</sub>N<sub>4</sub>O show IC<sub>50</sub> ~10µM, ~100µM and ~10µM, respectively. Osteoclastic genes MMP9, CatK and NFκB expression were increased in mature OCs (fold change?) while relative low expression of dopamine and serotonin receptors.

**Conclusion:** Dopamine, dopamine agonists and antagonists all affect osteoclastogenesis in a dose dependent manner highlighting the importance of dopaminergic signaling pathway in human osteoclastogenesis. Further research is needed to determine the associated signaling pathways.

**Acknowledgements:** The study is supported by the National Health and Medical Research Council (NHMRC), Australia. DKW is supported by a Deakin University Postgraduate Research Scholarship (DUPRS) and LJW by an NHMRC Emerging Leadership Fellowship (1174060).

P428

### DOES LOW BONE MINERAL DENSITY AFFECTS SPIROMETRY PARAMETERS IN CHRONIC OBSTRUCTIVE DISEASE?

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**Objective:** To assess BMD in COPD patients and correlations between BMD and spirometry parameters.

**Methods:** A prospective study including men with COPD was conducted in the Rheumatology and pneumology departments of Tunisia between April 2019 and January 2020. Exclusion criteria were as follows other concomitant pulmonary diseases, rheumatologic and/or vertebral disease that may lead to misinterpretation of BMD. Demographic and clinical parameters were collected. BMD was determined by DXA at the lumbar spine and proximal femur. All patients underwent spirometry. The following items were noted: forced vital capacity (FVC); forced expiratory volume (FEV1) and FEV1/FVC ratio.

**Results:** 39 males were included with a mean age of 68.18±9.51 y [48-84]. All patients were smokers with an average of 45.9±22.49 pack-year [20-140]. 51.3% of patients had inhaled corticosteroids. Dyspnea grade 3 was noted in 10.4%. The FVC, the FEV1 and the FEV1/FVC were respectively 51.51%±10.75[37-110], 51.75%±21.4[17-89], and 74.25±18.52 [34.7-68.6]. Vertebral T-score was lower than the total hip T-score (-2.37±1.07 vs. -2.37±1.35). BMD was normal in 10.3% of patients; however, it showed osteopenia and osteoporosis respectively in 35.9% and 53.8%. Vertebral and total hip T-scores were not correlated with spirometry parameters (Table). Also, vertebral and total hip T-scores were not correlated with dyspnea grade respectively  $p=0.23$  and  $p=0.41$ .

**Table.** Correlations between spirometry parameters and BMD

	FCV	FEV1	FEV1/FVC ratio
Vertebral T-score	p=0.76 r=0.05	p=0.74 r=0.05	p=0.96 r=-0.08
Total hip T-score	p=0.59 r=0.09	p=0.59 r=0.09	p=0.97 r=-0.06

**Conclusion:** Our results showed that osteoporosis is frequent in COPD patients. BMD is lower in vertebral site than femoral site. Despite our results did not show that low BMD affects spirometry parameters, vertebral fractures, which frequency increase when BMD is low, affect lung functions.

P429

### SEVERE VERTEBRAL FRACTURES IN MALE PATIENT WITH ANKYLOSING SPONDYLITIS AND SECONDARY OSTEOPOROSIS

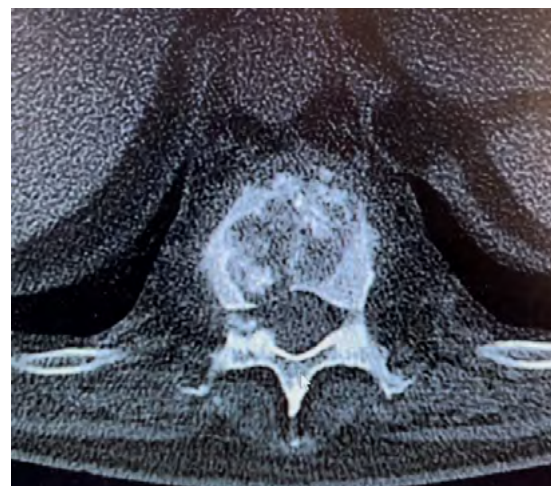
K. Kraev<sup>1</sup>, M. Geneva-Popova<sup>1</sup>, S. Popova<sup>1</sup>, V. Popova<sup>1</sup>, Y. Basheva-Kraeva<sup>1</sup>, M. Kraeva<sup>1</sup>

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**Objective:** The current clinical report is to present uncommon case of male patient with secondary osteoporosis and corresponding fractures of the lumbar spine.

**Methods:** In this case report we have included one male patient with ankylosing spondylitis. For the measurement of the BMD DXA of the spine is performed and for proper imaging a CT-scan of the affected area is made.

**Results:** 45-year-old male is diagnosed with ankylosing spondylitis 20 y ago. In the beginning the therapy included NSAIDs and intermittent use of corticosteroids both oral or muscular. Patients underwent treatment with several biologic agents all of them with variable effect. Current complaints of the patients include severe pain in his lumbar area, accompanied by numbness in both his legs. No effect is seen from the use of NSAIDs, CS and even opioid analgesics. To further clarify the condition DXA T-score is performed on the spine and T-score (-3.3) gave us evidence of underlying osteoporosis. CT scan of the Lumbar spine is performed and fractures grade 3 are seen on 2 of the lumbar vertebrae. Consultation with neuro-surgeon was scheduled for the patient and he was scheduled for vertebroplasty. After the successful operation all the symptoms disappeared and patient went back to his normal daily activities.





**Conclusion:** Throughout the years very often we forget that males also suffer from osteoporosis both from aging and hypogonadism. In addition to this our patients are also exposed to increased risk of osteoporosis both due to the cytokines seen in the inflammatory rheumatic diseases and the corticosteroid treatment. All other possible causes are excluded. This clinical case is an example of male patient with osteoporosis both due to his main disease and his treatment.

## P430

### EPIDEMIOLOGY OF HIP FRACTURE IN QATAR AND DEVELOPMENT OF A COUNTRY SPECIFIC FRAX MODEL

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**Objective:** To describe the epidemiology of osteoporotic fractures in the State of Qatar that was used to develop the corresponding country-specific fracture prediction FRAX<sup>®</sup> tool.

**Methods:** Hip fracture data (ICD 10: S72.0, S72.1, S72.2) were retrieved from electronic medical records for the years 2017-2019 from Hamad Medical Corporation which is the principal public health care provider in the state of Qatar. The age- and sex-specific incidence of hip fracture in Qatari residents and National mortality rates were used to create a FRAX model for Qatar. Fracture probabilities were compared with those from neighboring countries having FRAX models.

**Results:** Age-specific fracture rates were higher in women than in men except for the age intervals 45-54 and 70-74 years with a crude sex ratio (F/M) of 1.25. Hip fracture rates were comparable with estimates from Saudi Arabia, Abu Dhabi and Kuwait. In contrast, probabilities of a major osteoporotic fracture or hip fracture were lower in Qatar than in Kuwait but higher than those in Abu Dhabi and Saudi Arabia due to differences in mortality. The remaining lifetime probability of a hip fracture from the age of 50 years was 11.0% in women and 8.8% in men.

**Conclusion:** The FRAX model should enhance accuracy of determining fracture probability among the Qatari population and help guide decisions about treatment.

## P431

### CHANGES IN HIP FRACTURE INCIDENCE IN ROMANIA AND IMPLICATIONS FOR FRAX

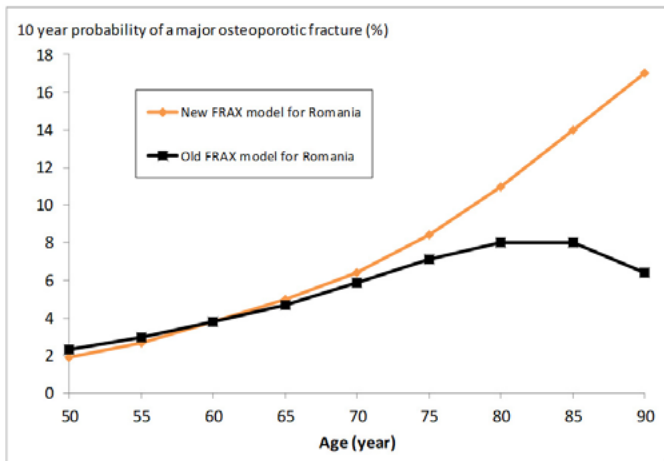
H. Johansson<sup>1</sup>, C. Poiana<sup>2</sup>, C. Barbu<sup>2</sup>, I. Pascanu<sup>3</sup>, A. Ildikó Gasparik<sup>3</sup>, R. Dobre<sup>2</sup>, N. Harvey<sup>4</sup>, E. Liu<sup>1</sup>, L. Vandemput<sup>1</sup>, M. Lorentzon<sup>1</sup>, E. Mc Closkey<sup>5</sup>, J. Kanis<sup>1</sup>

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**Objective:** The construct for FRAX model outputs depends on country specific fracture incidence and mortality. The current FRAX model for Romania is based on hip fracture data from 2010. A recent publication showed a higher hip fracture incidence for older men and women in a Romanian population for 2017-2018. The aim of the present study was to examine the impact of these more recent data on the FRAX probability outputs for Romania.

**Methods:** Hip fracture incidences for Romania from 2017-2018 and mortality data from the UN for Romania in 2015-2019 were used to build a new FRAX model for Romania. The new FRAX model for Romania was compared to the old model which was derived using hip fracture data from 2010 combined with UN mortality data from 2009. For both the old and new models, a ratio from Malmö was used to calculate the incidence of clinical spine, forearm, humerus fractures. The 10 year probability of major osteoporotic fracture (MOF) was used when comparing old and new FRAX model. 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 ages of 50-55 y, the new 10-y probability was lower than the old model. For younger women the difference between the old and new FRAX model was minor up to the age of 65 y (Figure). From the age of 70 the difference between the old and new model was greater, with the new model having higher probabilities. The largest difference between old and new model was seen for age 90 where the difference was 10.6% points (17% vs. 6.4).



**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.

**Conclusion:** Use of the more recent hip fracture incidence data impacts on the outputs from FRAX, leading to higher probabilities than the old model for ages above 65 y. These findings support the need for an updated FRAX model for calculating fracture probabilities in Romania.

## P432

### MILD VERTEBRAL FRACTURES: DO THEY MATTER?

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**Objective:** To evaluate the risk of any future fractures, hip fractures, and death, respectively, associated with opportunistically identified mild (grade 1) vertebral fractures (VF) in subjects not treated with osteoporosis medications.

**Methods:** Observational cohort study in 2000 men and women ≥50 y with a routine CT of chest/abdomen. Scans were reevaluated to identify prevalent VF. Subjects using medications for osteoporosis in the year before the CT were excluded. Subjects with VF matched on age and gender in 1:2 ratio against subjects with no VF available on the CT. Cohorts followed for up to 7 y in Danish health registers and prescription databases. We evaluated the risk of any future fracture (except face, skull and fingers)<sup>1</sup>, hip fracture, and death, respectively, by Cox proportional hazards regression analyses stratified according to the worst VF at baseline.

**Results:** Vertebral fractures were prevalent in 423 of 2000 subjects, of whom 113 (26.7%) had only mild VF. After exclusion, 321 subjects were matched into the VF cohort and 606 the no VF cohort. The Table shows hazard ratios for any fracture, hip fracture, and death, respectively, in the VF vs. no VF cohorts, stratified according to worst VF. Overall results shown for comparison.

**Table.** Hazard ratios (95%CI) and p-value for interaction

	Risk of any fracture	Risk of hip fracture	Risk of death
Any vertebral fracture	1.30 (0.85-2.00)	2.70 (1.27-5.75)	1.59 (1.34-1.89)
Subgroup analysis by worst VF			
Mild	0.92 (0.38-2.22)	2.36 (0.48-11.68)	1.27 (0.93-1.74)
Moderate	1.14 (0.57-2.28)	3.19 (0.80-12.77)	1.93 (1.46-2.56)
Severe	2.15 (1.06-4.37)	2.93 (0.98-8.76)	1.63 (1.21-2.19)
p-value for interaction	0.20	0.06	<0.001

**Conclusion:** Mild VF were associated with neither any future fractures nor death in these analyses. In contrast, moderate VF were associated with death, while severe VF were associated with excess risk of any fracture (though p for interaction not significant) and death. We observed a trend towards all VF grades predicting hip fractures, although insufficient power precluded firm conclusions. Additional studies are needed to fully comprehend the impact of mild VF.

**Reference:** <sup>1</sup>Skjødt et al. WCO-IOF-ESCEO 2021, P415

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JN, CL: Employee and stock ownership, UCB Pharma. CC: Personal fees from Alliance for Better Bone Health, Amgen, Eli Lilly, GSK, Medtronic, Merck, Novartis, Pfizer, Roche, Servier, Takeda and UCB. BA: Speakers fees/consulting fees from UCB, MSD, Amgen, Kyowa-Kirin and Pharmacosmos, Institutional research grants from Novartis, UCB/Amgen, Kyowa-Kirin and Pharmacosmos.

P433

**RHEUMATOID ARTHRITIS IN PATIENTS WITH COMMON VARIABLE IMMUNODEFICIENCY**A. Dobrov<sup>1</sup>, L. Karzakova<sup>2</sup>, S. Kudryashov<sup>2</sup>, A. Odintsova<sup>2</sup>, N. Zhuravleva<sup>2</sup>

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**Objective:** Common variable immunodeficiency (CVID) is the most common form from the group of primary immunodeficiency diseases (PID). For many years, infectious manifestations were considered the only sign of CVID. Due to the use of immunoglobulin replacement therapy in the treatment of CVID, the proportion of infectious manifestations of PID decreased, but autoimmune diseases, including rheumatoid arthritis (RA), began to be detected more often. However, insufficient awareness of PID among rheumatologists makes it difficult to diagnose early cases of PID manifested by RA. The aim of this study was to identify the warning signs of CVID in patients with RA.

**Methods:** The material of the study was data on patients obtained during a retrospective analysis of 32 outpatient records of patients with CVID included in the Republican Register of PID in the Chuvash Republic (Russia). The diagnosis of CVID was carried out in accordance with the criteria developed by the International Union of Immunological Societies (IUIS) [1].

**Results:** From 1993 to January 2022, 32 cases of CVID were registered in residents of the Chuvash Republic. In 5 (15.6%) patients, the disease was manifested by pains in the small joints of the hands and feet, morning stiffness was observed. Laboratory tests for rheumatoid factor and/or antibodies to citrullinated peptide were positive in 3 patients. Methotrexate was prescribed to four patients, and due to its ineffectiveness, an inhibitor of Janus kinases tofacitinib was added to two patients. However, the addition of an infection that required the appointment of long-term antibiotic therapy, repeated pneumonia and cytopenia forced the discontinuation of methotrexate therapy. The average delay in the diagnosis of CVID was 4.5±0.8 y. 4 out of 5 patients had a low BMI (<19 kg/m<sup>2</sup>), all 5 patients had cytopenia (neutropenia, thrombocytopenia and/or B12-deficient anemia) and splenomegaly. The appointment of immunoglobulin replacement therapy did not reduce the manifestations of joint syndrome and did not allow to cancel methotrexate.

**Conclusion:** The low effectiveness of the treatment of RA with methotrexate, the addition of cytopenia, hepatosplenomegaly and infectious complications are alarming signs that require immunological studies to establish CVID.

**Reference:** 1. Picard C, et al. J Clin Immunol 2018;38:96

P434

**FRAXPLUS**H. Johansson<sup>1</sup>, N. Harvey<sup>2</sup>, E. Liu<sup>1</sup>, L. Vandenput<sup>1</sup>, W. Leslie<sup>3</sup>, M. Lorentzon<sup>1</sup>, E. Mc Closkey<sup>4</sup>, J. Kanis<sup>1</sup>

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**Objective:** Despite good performance in fracture prediction, the current FRAX tool has several limitations including failing to account for dose-response in several risk factors. For example, two prior fractures carry a much higher risk than a single prior fracture, and a long-standing vertebral fracture with a mild deformity is a weaker risk factor than a recent severe deformity.

**Methods:** To address some identified limitations, arithmetic adjustments have been developed which can be applied to conventional FRAX estimates of probabilities of hip fracture and a major osteoporotic fracture (MOF). FRAXplus™ is a web-based adjunct to FRAX that adjusts fracture probability with knowledge of: site and recency of prior osteoporotic fracture; high-, moderate- and low-dose oral glucocorticoid exposure; lumbar spine BMD; lumbar spine TBS; falls history; or type 2 diabetes mellitus.

**Results:** The 10-y probability of MOF for a woman aged 50 y with a previous fracture, no other risk factors and a BMI of 25 kg/m<sup>2</sup> is 7.2% using the FRAX model for UK (UK), just below the threshold for high risk (7.3%) according to UK guidelines. When using FRAXplus and adjusting for a recent vertebral fracture occurring in the past 0-6 months, the fracture probability rises to 20%, which is very high risk according to UK guidelines. For the same example but for ages 60, 70 and 80 the probability is adjusted from high risk to very high risk (Table). The 10-y probability of MOF for a woman aged 50 years, with a femoral neck T-score of -2.5 and no other risk factors is 6.3% using the FRAX model for UK, low risk according to UK guidelines. When using FRAXplus and adjusting for a low BMD at the lumbar spine (T-score of -4.0), the fracture probability rises to 7.5%, (high risk). For the same example but for ages 60, 70 and 80 the probability is also increased (Table).

**Table.** 10-year probability of major osteoporotic fracture according to FRAX and FRAXplus for a woman with BMI of 25 kg/m<sup>2</sup> from UK

Age (years)	FRAX	FRAXplus	FRAX	FRAX plus
	Prior fracture	Recent vertebral fracture past 0-6 months	FN T-score -2.5	FN T-score -2.5 LS T-score -4.0
50	7.2	20**	6.3	7.5*
60	12*	23**	9.6	11
70	20*	31**	14	17
80	27*	34**	17	20*
90	34**	34**	17	20*

Low risk

\* High risk

\*\* Very high risk

**Conclusion:** FRAXplus can be used to modify FRAX probability when there is additional information on existing risk factors. FRAXplus should enhance accuracy of determining fracture probability and help guide decisions about treatment.

## P435

### PHARMACOKINETICS OF METHOTREXATE IN PATIENTS WITH RHEUMATOID ARTHRITIS WHO HAVE ACHIEVED REMISSION

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**Objective:** to identify among patients with rheumatoid arthritis (RA) who have achieved remission, the characteristic features of the f methotrexate (MTX) metabolism. Previously, it was shown that the level of MTX tetraglutamate equal to 22.4 nmol/l is a predictor of a good response to MT therapy [1].

**Methods:** The prospective study included 79 adult patients with RA (according to ACR/EULAR 2010 criteria) who were prescribed MTX at the rate of 10-15 mg/m<sup>2</sup> of body surface area. Whole blood samples were studied after 4, 12 and 24 weeks of therapy. Characteristics of the group: 14 men and 65 women, aged 53.6±10.2 y, BMI 27.9±5.8 kg/m<sup>2</sup>, disease duration at the time of MTX prescription was 7.0[5.0;13.0 ] months, DAS28 at the time of MTX prescription 5.2[4.0;5.4]. Seven (35%) were taking glucocorticoids, 11(55%) were seropositive, 4(20%) were smokers, 12(60%) revealed adverse reactions of varying severity which that did not lead to the MTX withdrawal. Remission was determined according to the EULAR criteria. The concentration of monoglutamate MT and polyglutamates with 2, 3 and 4 residues (MTXPGs 2-4), as well as 7-hydroxymethotrexate separately in erythrocytes and mononuclear cells was performed using tandem chromatography-mass spectrometry, the result is presented in nmol/l. Statistical analysis was performed using the Statistica 10 package.

**Results:** patients who achieved remission by week 24 of treatment (n=20) had a statistically significantly higher level of MTX-PG4 (11.04 [5.7; 19.3] nmol/l vs. 3.27 [0.8; 8.95] nmol/l in other patients). At the same time, out of the entire studied cohort, MTX-PG4=22.4 nmol/l after 4 weeks reached 4 patients, after 12 weeks - 7 patients, and by week 24 their number increases significantly and amounts to 19. The concentration of the remaining studied metabolites in the group of patients who achieved remission, did not differ from the corresponding indicators of patients who did not achieve remission.

**Conclusion:** High values of MTXPG4 in erythrocytes by the 24th week of therapy (target - 22.4 nmol/l) might be a pharmacokinetic guideline for basic anti-inflammatory therapy with MTX in patients with RA.

**Reference:** 1. Gridneva GI, et al. Rheumatology Science and Practice 2019;57:171 (In Russ.)

## P436

### SEPTIC KNEE ARTHRITIS IN THE EMERGENCY DEPARTMENT

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**Objective:** Septic arthritis (SA) of the knee is a medical emergency that requires prompt attention and early treatment in order to avoid permanent damage to the joint. Although the medical literature describes the clinical characteristics and the ideal exploratory techniques for its diagnosis, there is no consensus on emergency management in Spain. The purpose of the study is to review the behavior in the emergency room in patients diagnosed with SA and to compare it with a management guide validated in another country.

**Methods:** Descriptive, retrospective study of positive fluids from native joints validated by the Microbiology service. Its processing consisted of a seeding in conventional means for aerobes, anaerobes and enriched medium BHI. Epidemiological and clinical data were obtained in the first hospital contact and evolution. The diagnostic and therapeutic approach was compared with the Guide for the management of the swollen and warm joint published in 2006 by the British Society of Rheumatology.

**Results:** 46 SA cases were included after being admitted from the Emergency Dept. The mean age was 62.3±6.3 y (21-89), 54.3% male. Background: DM in 4 cases (8.6%), diabetic neuropathy in 1 (2.1%), previous AS in 5 (10.8%), history of skin opening in 8 (17.3%), infection of skin without opening in 7 (15.2%) and previous arthrocentesis in 6 (13.0%). Analytical tests: the determination of CRP and ESR with clinical suspicion was performed in 10 (21.7%) and 14 (30.4%) cases respectively. Hepatic and renal profiles were performed in 31(67.3%) and 40 (86.9%) cases respectively. Blood cultures performed in 29 cases (63.0%). Arthrocentesis recommendations and joint fluid analysis: In 40 (86.9%) of the 46 cases, suspicion of SA was established in the first consultation, with arthrocentesis performed in 37/40 (92.5%). The samples were sent for GRAM study 19 (41.3%), for microbiological culture 44 (95.6%), for leukocyte count 26 (56.5%) and study of microcrystals 4 (8.6%). Recommendations for treatment and follow-up: 100% of the cases were treated with antibiotics empirically and 84.7% (39 cases) according to the recommendations. The request for two ESR/CRP determinations until hospital discharge was made in 44 cases (95.6%). IV antibiotic treatment time: 22.90±6.12 d (7 to 42), oral: 20.08±10.52 (7 to 31) d, total antibiotic therapy time of 35.91±6.75 (21 to 50). Hospitalization: 25.39±6.05 (8 to 50) d. Surgery was necessary in 18 (39%). The time between the first consultation and the start of the empirical antibiotic: 2.1±1.64 (0-6) d.



**Conclusion:** This study reviews the cases of SA demonstrated by positive cultures, so it does not reflect all those cases with clinical suspicion. We accept that the diagnostic suspicion must be much higher than the casuistry that we have presented and we admit that it's on this population that the recommendations of the guidelines should affect. Therefore, some shortcomings are demonstrated regarding the diagnostic management during the first consultation, hence the importance of disseminating the SA management guidelines to reduce the lack of adherence that we have detected.

### P437

#### OSTEOPOROSIS ON PATIENTS WITH RHEUMATOID ARTHRITIS AND IMPORTANCE OF NUTRITION IN THE PREVENTION AND MANAGEMENT

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**Objective:** Osteoporosis is a medical problem that increases exponentially with age and affects mostly the female population, especially in patients with RA. It is characterized by a loss of bone mass and an increased risk of suffering fractures, which conditions high morbidity and mortality (1,2). Nutrients can have a direct effect, when they are necessary to form part of the bone structure, or they can act indirectly, improving the absorption and/or utilization of calcium and other important nutrients in bone health. (3) The aim of this study is to evaluate the role of nutrition in prevention of osteoporosis as well as the impact of different types of nutrients in the treatment of osteoporosis in patients with RA.

**Methods:** The research was conducted in the Regional Hospital of Elbasan, Albania, where 50 patients were evaluated for different parameters of osteoporosis in a longitudinal study with focus in nutrition.

**Results:** The research concluded that calorie intake is a valuable aspect of nutrition in terms of osteoporosis in patients with RA. Not only plays it an important role in the prevention of the pathology itself but it can also serve as a prognostic factor. The advisable nutrients for intake are found to be mainly minerals and vitamins. On the other hand, the decrease in fat and carbohydrates is considered to be helpful in maintaining the levels of calcium.

**Conclusion:** The impact of nutrition in the prevention and management of osteoporosis is undeniable. The most important role is played by specific increase of several nutrients and by maintaining a balanced calorie intake.

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### P438

#### THE IMPACT OF OSTEOPOROTIC FRACTURES ON PATIENTS WITH RHEUMATOID ARTHRITIS IN WORK DISABILITY

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**Objective:** Osteoporosis is the one of most common chronic metabolic bone disease, which is characterized by increased bone fragility, which is highly affected by age and menopause.<sup>1</sup> According to the International Osteoporosis Foundation, one in three women over the age of 50 experience at least once in a lifetime a fracture as a result of osteoporosis, which on another hand is a cause for work disability.<sup>2,3</sup> The purpose of the study is to evaluate the economic and social impact of work disability, caused by fractures as a result of osteoporosis on patients with RA.

**Methods:** The study included 50 patients diagnosed with RA and osteoporosis, which have had at least one fracture during their course of disease. The data were obtained in the Regional Hospital of Elbasan and the main focus was the duration of work disability.

**Results:** The research concluded that approximately 20% of the patients required a long term disability benefit after suffering a fracture. Furthermore, most of the patients were reluctant to go back to work after suffering the consequences of the fracture, mainly due to pain and inability to properly move.

**Conclusion:** Fractures due to osteoporosis on patients with RA have an increasing impact in work disability and life quality. Most of the patients taken into research have benefited from work disability policies, whether short or long-term.

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### OPPORTUNISTICALLY IDENTIFIED VERTEBRAL FRACTURES ON ROUTINE CT SCANS ARE PREDICTIVE OF INCREASED MORTALITY: OBSERVATIONAL COHORT STUDY

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**Objective:** To evaluate the risk of death in individuals with vertebral fractures (VF) not treated for osteoporosis, as compared to individuals with no identifiable VF on routine CT scans.

**Methods:** Observational cohort study in 2000 men and women  $\geq 50$  y with CT of chest/abdomen in 2010-2011. Scans were re-evaluated externally to identify prevalent VF. Subjects excluded if treated with osteoporosis medications in the year before baseline (date of CT). Subsequently we matched subjects with VF on age and gender in 1:2 ratio against subjects without VF. We followed the cohorts in national health registers. We evaluated the risk of death by Cox regression analyses, censoring at the time of death, emigration, initiation of osteoporosis treatment, or at 7 y follow-up. Confounders identified by backwards stepwise selection.

**Results:** Prevalent VF identified in 423 subjects, while 1577 subjects had no visible VF on the CT scan. Following exclusion and matching, 321 subjects constituted the VF cohort and 606 the no VF cohort. In the VF cohort, 222 subjects died before censoring as compared to 345 subjects in the no VF cohort, yielding mortality rates of 276 (95%CI 242-315) and 155 (139-172) deaths per 1000 patient-years, respectively. The risk of death was higher in the VF cohort, with a crude hazard ratio of 1.59 (1.34-1.89;  $p < 0.001$ ) and adjusted hazard ratio of 1.51 (1.27-1.79;  $p < 0.001$ ), when adjusting for gender, age, systemic lupus erythematosus, malignancies, type 1 diabetes mellitus, type 2 diabetes mellitus, use of antidepressants, and use of glucocorticoids. The hazard ratios were higher in younger (50-74 y) than in older (75+ y) subjects (1.56 [1.14-2.14] vs. 1.35 [0.98-1.87] in men, and 2.34 [1.56-3.52] vs. 1.30 [0.92-1.84] in women).

**Conclusion:** In the absence of osteoporosis treatment, subjects with opportunistically identified VF available on routine CT scans face an increased risk of death as compared to those with no visible VF, more notable in younger than in older subjects. These results indicate a need for better opportunistic identification and follow-up of individuals with VF.

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### IPN60130 FOR THE TREATMENT OF FIBRODYSPLASIA OSSIFICANS PROGRESSIVA: METHODOLOGY OF THE RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED PHASE II FALKON TRIAL

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**Objective:** Fibrodysplasia ossificans progressiva (FOP) is an ultra-rare genetic disorder caused by *ALK2/ACVR1* mutation and characterized by heterotopic ossification (HO) and progressive disability. IPN60130 is a selective *ALK2/ACVR1* inhibitor being investigated for FOP treatment.<sup>1</sup> Here, we describe methodology of the FALKON trial (NCT05039515) designed to compare efficacy and safety of IPN60130 with placebo in patients (pts) with FOP.

**Methods:** Pts will be randomized to oral placebo, or low or high dose IPN60130 for 12 months; pts receiving placebo will then transition to IPN60130 for 12 months. Enrollment criteria include:  $\geq 5$  years old, FOP diagnosis with disease-causing mutation, and either a flare-up, new HO or joint ankylosis, or increase in Cumulative Analogue Joint Involvement Scale (CAJIS) score in the prior year. Recruitment is ongoing to enroll 90 pts. The primary efficacy outcome will be annualized change from Baseline in HO volume to Month 12, assessed by low-dose whole-body computed tomography (CT). Secondary efficacy outcomes are presented in the Table. Safety will be assessed via adverse event (AE) and serious AE incidence over 25 months. Pts aged  $\geq 15$  y will be eligible for a sub-study assessing HO by [<sup>18</sup>F]NaF positron emission tomography-CT.

**Table.** Secondary efficacy outcomes

Timeframe, months <sup>a</sup>	Outcome	Comparison
12	Change from Baseline (CfB) in volume of new heterotopic ossification (HO) lesions <sup>b</sup>	IPN60130 vs. placebo
	CfB in number of HO lesions <sup>b</sup>	
	Flare-up rate; number of flare-up days	
	Number of body regions with new HO	
	CfB in pain intensity	
	Proportion of patients with new HO	
24	CfB in HO volume <sup>b</sup>	IPN60130 vs. placebo and untreated natural history study (NCT02322255) participants

<sup>a</sup>From Baseline up to the month given; <sup>b</sup>Assessed by low-dose whole-body CT.

**Conclusion:** Results from FALKON, estimated to end in August 2025, will allow evaluation of IPN60130 in FOP.

**Reference:** 1. Davis A, et al. J Bone Miner Res 2019;34(Suppl 1):290

## P441

### BAD BONE AND HIGH SCLEROSTIN IN NON-FUNCTIONING PITUITARY ADENOMA: IS IT REALLY NON-FUNCTIONING?

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**Objective:** Sclerostin reduces bone formation by inhibiting the wnt signaling pathway in bone tissue. This study aimed to evaluate the serum sclerostin level in nonfunctioning pituitary adenoma (NFPA) patients and analyze its relationship with bone metabolism.

**Methods:** The data of the patients who applied to the Dicle University Endocrinology, diagnosed with non-functioning pituitary adenoma, and the control group consisting of healthy individu-

als were included in the study. Serum sclerostin levels and DXA analysis parameters were evaluated and compared with healthy control groups.

**Results:** The study consisted of 39 patients (F/M: 27/12) with NFPA (patient group) and 43 control groups (F/M: 26/17). There was no difference in terms of gender, age, height, weight and serum calcium, phosphorus, creatinine, 25-OH vitamin D, PTH levels. Serum sclerostin levels (32.31±1.53 ng/ml) in the patient group was found to be significantly higher than the control group (22.45±8.9 ng/ml) (p<0.001). BMD(Patients groups vs. control group); total lumbar BMD (0.951-1.56 g/cm<sup>2</sup>) (p<0.001), femoral neck BMD (0.752-1.15 g/cm<sup>2</sup>) (p<0.001), femoral total BMD (0.995- 1.63 g/cm<sup>2</sup>) (p<0.001), were found to be statistically significantly lower.

**Conclusion:** Serum sclerostin levels were increased in nonfunctioning pituitary adenomas, which showed that bone parameters were negatively affected.

## P442

### MICRORNA AS POSSIBLE MEDIATORS OF CELECOXIB AND GLUCOSAMINE SULFATE-INDUCED EFFECTS ON APOPTOSIS AND OXIDATIVE STRESS: AN IN VITRO STUDY ON HUMAN OSTEOARTHRITIC CHONDROCYTES

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**Objective:** To investigate the role of celecoxib and prescription-grade glucosamine sulfate (GS), tested alone or in combination, in regulating the expression levels of microRNA (miRNA)-34a, miR-146a and miR-181a, known to be involved in the pathogenesis of osteoarthritis (OA), in human OA chondrocytes. Furthermore, the potential role of the studied miRNA as possible mediators of drugs-induced effects on apoptosis and oxidative stress was examined.

**Methods:** Chondrocytes were treated with celecoxib (1.85 µM) and GS (9 µM), alone or in combination, in presence of IL-1β (10 ng/mL), for 24 h. Apoptosis and mitochondrial superoxide anion production were assessed by flow cytometry; the gene expression of B-cell lymphoma (BCL)2 and antioxidant enzymes [superoxide dismutase (SOD)-2, catalase (CAT), nuclear factor erythroid 2 like 2 (NRF2)] were evaluated by real time PCR, as well as those of miR-34a, miR-146a, and miR-181a. Then, chondrocytes were

transfected with miR-34a, miR-146a, and miR-181a specific inhibitors, and apoptosis and oxidative stress were assessed after drugs treatment.

**Results:** The treatment of chondrocytes with celecoxib or GS significantly reduced the ratio of apoptosis, the production of superoxide anion, the expression of SOD-2, CAT, and NRF2, whereas increased BCL2 mRNA, induced by IL-1 $\beta$ . Both drugs also down-regulated the gene expression of miR-34a, miR-146a, and miR-181a. The combination of celecoxib and GS demonstrated an increased inhibitory activity on IL-1 $\beta$  detrimental effects with respect to what is observed by each single treatment. Celecoxib and GS -induced effects on apoptosis and oxidative stress were enhanced by using miR-34a and miR-146a inhibitors, while no modifications were found after miR-181a silencing.

**Conclusion:** Our results demonstrated the synergistic chondroprotective effect of celecoxib and GS on apoptosis and oxidative stress occurring in OA chondrocyte, probably mediated by miR-34a and miR-146a.

### P443

#### ATYPICAL SUBTROCHANTERIC FEMORAL FRACTURE IN A PATIENT TREATED WITH DENOSUMAD

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**Objective:** Osteoporosis and low energy fragility fractures consist a significant public health issue accompanied with high medical costs. Denosumab offers an alternative approach to osteoporosis treatment, however this drug is also an antiresorptive agent, while there is correlation in some reports with the atypical femoral fractures (AFFs).

**Methods:** A 75-year-old female patient was admitted to our emergency department due to severe groin pain without trauma. Physical examination revealed pain during passive motion in her right hip without any neurovascular deficit. Her blood counts analysis was within normal limits, while on admission, the radiographic examination detected a subtrochanteric femoral fracture. The fracture fulfilled all the five major features of the current definition of AFFs. For osteoporosis treatment she was initially treated with risedronic acid 35 mg weekly for 6 y and then she switched to denosumab 60 mg subcutaneously every 6 months and had received 4 doses. Her last bone densitometry showed BMD T-Score in her left hip of -1,5, while 25OHVitamin D was 37.8 ng/ml (adequacy levels 30-100) and PTH was 65.1 pg/ml (9.2-44.6).

**Results:** The diagnosis of the atypical subtrochanteric fracture was settled and she underwent intramedullary nail fixation. She discharged from our clinic without any complications. Denosum-

ab was discontinued and teriparatide was initiated accompanied with Vit D and calcium. Union of the fracture was observed 3 months postoperatively and the patient returned to her previous routine 3 months later.

**Conclusion:** Denosumab is a fully human antibody that targets RANKL. The increased incidence of AFFs in patients receiving medication that affects bone turnover can be explained by the deactivation of osteoclasts and suppression of the remodeling process that associates the administration of antiresorptive agents (bisphosphonates and denosumab). All these actions, negatively affect the repair of insufficiency fractures in AFFs, allowing cracks to increase. Clinicians should be aware of the risk of long-term antiresorptive therapies, as well as the safety of transition from bisphosphonates to denosumab.

### P444

#### INSULIN OR ANTIDIABETIC DRUGS USAGE ARE PRONE TO MORE SEVERE VITAMIN D DEFICIENCY IN DIABETIC ELDERLY WITH HIP FRACTURE?

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**Objective:** Diabetes mellitus type 2 (T2DM) is an emerging public health issue with high prevalence among older adults (>60 years old). Taking into consideration the great increase in elderly population we can easily understand the impact of this chronic disease and its complications. On the other hand, vitamin D deficiency (VDD) is also a serious public health problem with significant impacts and multiple health effects. The correlation between DM and VDD has been suggested and established from many observational studies, reviews and meta-analyses. The purpose of this study is to detect if insulin or antidiabetic drugs usage are prone to more severe VDD in diabetic elderly with hip fracture.

**Methods:** We retrospectively evaluated 51 elderly patients with low energy hip fractures. PTH and vitamin D (VD) blood levels were measured. The sample was divided into two groups based on the type of the treatment of the T2DM. 15 patients were treated with insulin (Group A) and 36 with antidiabetic drugs (Group B).

**Results:** The mean VD levels of the group receiving insulin (Group A) was 11.09 ng/ml with 5.84 ng/ml standard deviation, while VD levels in group B was 10.80 ng/ml with 5.84 ng/ml standard deviation. Comparison of vitamin D values between the group A and B revealed statistically significant difference. The P-value was found to be <0.001 using the unpaired t-test. The PTH levels of



group A were 41.98 pg/ml with 26.77 SD, while PTH in group B patients were 64.16 pg/ml with 55.75 SD. P-value was found to be <0,001 using the unpaired t-test.

**Conclusion:** Our study supports that elderly with hip fracture treated with insulin have higher VD levels and lower PTH levels compared with their counterparts, which were treated with anti-diabetic drugs. This may be explained due to the correlation of the insulin resistance with low VD levels. When insulin is initiated, this resistance becomes lower, the VD levels increase and PTH levels reduce. Well designed clinical studies are required to ascertain if antidiabetic drugs in elderly are associated with higher VDD compared with insulin use.

## P445

### BONE MINERAL DENSITY AND TRABECULAR BONE SCORE IN CHRONIC LIVER DISEASE AND POST LIVER TRANSPLANT PATIENTS IN QATAR

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**Objective:** Osteoporosis is one of the recognized complication of chronic liver disease, especially in late stages, and after liver transplantation. The aim of this study is to describe bone profile and fracture risk probabilities in chronic liver disease and post liver transplant patients in the largest tertiary health care hospital of Qatar.

**Methods:** Electronic medical records of all patients who were seen from December 2020 to December 2021 and diagnosed as having chronic liver disease or post liver transplantation were reviewed and included in this study. Osteoporosis was diagnosed if T-score was below -2.5 and Z-score below -2 in younger patients age less than 40 years on DXA (Lunar iDXA<sup>®</sup>) at the lumbar spine (LS), Femoral neck or total hip (TH). Bone microarchitecture was assessed by TBS (iNsight version 3.0). Descriptive statistics were used to summarize frequencies and percentages by using SPSS V21.

**Results:** 74 patients were recruited in this study, 55 (74.3%) were male, 10 (52.6%) of females were postmenopausal. Mean age of study group was 53.28 (13.9) y, 13 (17.5%) were younger patients with age <40 y. Fifty-six (75.7%) were post liver transplant. DXA scan was available in 63 patients (47 posttransplant vs. 16 without transplant). The most frequent primary liver disease was hepatitis C in 37.8% followed by alcoholic cirrhosis in 13.5% and non-alcoholic steatohepatitis in 12.2%. Osteopenia and osteoporosis were identified in 39.7% and 31.7% of the cohort respectively. Nine (12.5%) patients had fragility fractures (4 vertebral, 2 proximal humerus and 3 distal forearm). Low vitamin D (vitamin D level <30ng/ml) was present in 45 (61.6%) patients.

**Table.** Bone profile characteristics and 10-y fracture probability of patients with chronic liver disease and post liver transplant

	Post liver transplant N=47	CLD without liver transplant N=16
<b>BMD</b>		
Osteoporosis by DXA, N (%)	15(31.9%)	5(31.3%)
Osteopenia by DXA, N (%)	19(40.4%)	6(37.5%)
Normal DXA, N (%)	13(27.1%)	5(31.3%)
<b>TBS</b>		
Degraded microarchitecture	4(9.3%)	3(18.8%)
Partially degraded microarchitecture	10(23.3%)	3(18.8%)
<b>10-y fracture probability by FRAX</b>		
Mean (SD), hip FRAX with BMD	1.8(2)	1.1(1.4)
Mean (SD), MOF FRAX with BMD	5.2(3.7)	3.2(1.9)
Fragility fracture	7(12.7%)	2(11.8%)

**Conclusion:** More than two-thirds of patients with chronic liver disease and post liver transplantation were observed to have decreased BMD. Bone health assessment is crucial in this subgroup of patients.

## P446

### EVALUATION OF TRABECULAR BONE SCORE AS A RISK FACTOR PREDICTOR OF OSTEOPOROTIC FRACTURES IN PATIENTS WITH TYPE 1 DIABETES MELLITUS

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**Objective:** Low values of BMD in patients with type 1 diabetes mellitus (T1DM) compared with the control group have been demonstrated in many studies. The presence of osteoporotic vertebral deformities (OVD), despite the BMD values corresponding to the age norm, indicates that qualitative changes in bone tissue are taking place. The aim was to discuss the possibilities of TBS for indirect assessment of bone quality and tissue and predicting the risk of osteoporotic fractures.

**Methods:** 157 patients with T1DM (105 women, 52 males) (mean age: 32.5 (25.5–41.6) y, duration of DM: 13 (7–20) y, age of manifestation: 19 (14–23) y, BMI: 23.43 (21.55–25.70) kg/m<sup>2</sup>; HbA1c: 8.2 (7.6–8.9) %) and 98 (67 women, 31 men) controls, comparable in sex, age and anthropometric data. The research involved general clinic examination, serum bone-specific parameters, DXA (BMD and TBS of lumbar spine) performed on Prodigy Lunar. Z-score of –2.0 or less was regarded as low BMD.

**Results:** A study was conducted to determine the threshold values of TBS in T1DM individuals. Low TBS values of the lumbar spine compared with TBS values in the control group (U=3180; p<0.001) and a high risk of osteoporotic deformities of the vertebral bodies (OR 11.2; 95%CI 2.7-46.2) were established. T1DM patients with OVD, grades 1–3, TBS values were significantly lower than in the subgroup without OVD (U=514; p<0.001). Taking into account significant differences in the TBS parameter in T1DM patients in groups with and without OVD of the thoracic and lumbar spine, an ROC analysis was performed for this parameter. The threshold value of TBS was determined equal to 1.279, for which AUC=0.873±0.091, p<0.001; sensitivity 91%, specificity 78%. Given the threshold value for TBS less than or equal to 1.279, it is possible to identify T1DM individuals with a high risk of vertebral fractures (TBS ≤1.279).

**Conclusion:** The results obtained suggest that bone microarchitectonic is better in patients with T1DM without OVD and is able to withstand greater stress. The use of TBS in clinical practice may improve fracture prediction.

## P447

### ASSESSMENT OF TRABECULAR BONE INDEX AS MARKER OF BONE QUALITY IN PATIENTS WITH SECONDARY HYPERPARATHYROIDISM

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**Objective:** Secondary hyperparathyroidism (SHPT) is a universal complication of chronic kidney disease (CKD), which begins to develop when the glomerular filtration rate (GFR) falls below 60 ml/min. Thus, the aim was to study the features of TBS in CKD patients.

**Methods:** The study involved 487 people aged 18-80 y, the average age was 49.5±10.2 years, 204 men (42%) and 283 women (58%). The participants included 449 patients with CKD and 38 apparently healthy individuals without CKD and diseases that can serve as its cause, which made up the control group. A comprehensive clinical examination was carried out with an assessment

of anthropometric data (height, weight, BMI, waist circumference), general clinic examination, serum bone-specific parameters, DXA performed on Prodigy Lunar.

**Results:** Lower values of the bone quality were noted in women older 50 y compared to men: an absolute value of TBS (U=2477; p=0.009) and the T-score (U=2545; p=0.045). SHPT was confirmed in 31.4% (74 people), including 35.9% (33 people) of men and 28.5% (41 people) women. The predominant decreasing in the mineral component in the femoral neck and lower third of the radius as in the general subgroup with CKD (n=236, c<sup>2</sup>=245.3 p<0.001) and in SHPT subgroup (n=74, c<sup>2</sup>=69.6; p<0.001) were detected. Only 36.3% (37 women) had a normal trabecular bone structure, in 22.5% (23 women) partial violations of microarchitectonic were noted, and 41.2% (42 women) had pronounced violations of the quality. In persons with SHPT was a tendency towards a decrease in TBS with the progression of CKD (c<sup>2</sup>=2.37; p=0.795). In people up to 50 years low bone mass was detected in 32.7% (70 people) Decreasing of TBS (L1-L4) (U=1211; p<0.001) and Z-score TBS (L1-L4) (U=545; p=0,001) was noted in patients with CKD compared with controls. In patients with SHPT, lower TBS values were determined (1.32 (1.22–1.12) vs. 1.39 (1.28–1.45), U=2031; p=0.078). Young adults with CKD (c<sup>2</sup>=7,805; p=0,050), including those with SHPT (c<sup>2</sup>=2,620; p=0,270), showed a decrease in TBS with decreasing GFR, but not in dialysis patients.

**Conclusion:** CKD has a negative impact on the qualitative and quantitative parameters of bone. The absence of gender differences may indicate the specificity of the effect on bone metabolism of the underlying disease.

## P448

### STUDY OF PARAMETERS OF PHOSPHORUS-CALCIUM METABOLISM IN PATIENTS WITH MEDULLARY THYROID CANCER

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**Objective:** The management of patients with medullary thyroid cancer (MTC) has an important endocrinological aspect, because MTC can be a manifestation of multiple endocrine neoplasia syndrome (MEN), a genetically determined pathology with an autosomal dominant inheritance. MEN-2 syndrome is characterized by of MTC as a permanent feature, the combination with pheochromocytoma and/or adenoma of the parathyroid glands. PHPT as part of MEN syndromes will occur in 9.4% - 19.1% of cases. at the same time, PHPT as part of the MEN-2 syndrome is characterized by a mild and asymptomatic course. The aim of the study was to determine the clinical and laboratory characteristics of patients with medullary thyroid cancer in order to form a database of patients with MEN2A.

**Methods:** The research is carried out of the state program "To develop and implement effective technologies for the diagnostic detection and observation of patients with MEN2A." According to the Belarusian Cancer Register in 1987-2017 years 26930 new cases of thyroid cancer were identified (4899 men and 22,031 women), the share of MTC was 2.2% (591 people). The MTC incidence index in the Republic of Belarus is constant, makes 0.2 per 100 thousand population. Examination of 79 patients with MTC was carried out.

**Results:** 91.1% (72 patients) underwent ultrasound of internal organs, revealed minor abnormalities. No data were found for parathyroid hyperplasia. Among the examined patients with MTC, 51.0% (73 patients) take calcium and vitamin D supplements, hypoparathyroidism was found in 18.9% (27 patients). Two patients had elevated calcium levels, while PTH and ionized calcium levels were normal. The ranking of patients with MTC was performed taking into account the intake of calcium preparations. A laboratory study of the biochemical parameters of blood in these subgroups was carried out. Differences in the content of serum calcium in patients depending on the intake of calcium and vitamin D were not established ( $2.31 \pm 0.04$  vs.  $2.31 \pm .03$ ;  $p > 0.05$ ). Transient postoperative and manifest hypoparathyroidism was found in 19.0% (15 patients). In 7.6% (6 patients) calcium levels do not reach the lower limit of normal, which is associated with a lack of adherence to treatment. In 23.9% (11 patients), the level of vitamin D in the blood serum was reduced.

**Conclusion:** Patients with MTC require a multidisciplinary laboratory and instrumental examination due to the possible combined pathology, which, in turn, determines the subsequent therapeutic and surgical treatment of patients.

## P449

### ANALYSIS OF TOTAL BODY COMPOSITION OF BRAZILIANS TRANSWOMEN IN USE OF CROSS-SEX HORMONAL THERAPY

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**Objective:** To evaluate the total body composition in transwomen (TW) from a Brazilian sample, which were under minimum three years of cross-sex hormonal therapy (CSHT). Composing the paired group control were female (CF) and male (CM) cisgenders.

**Methods:** A cross-sectional study was conducted in the city of Curitiba, Paraná, Brazil, from August 2018 to August 2019. After recruitment, 31 TW assisted by the Center of Research and Care for Transvestites and Transsexual. Two control groups of 31 CF

and 31 CM were selected, paired by age, BMI and lifestyle, totaling 93 participants. BMD and total bone densitometry examinations were performed.

**Results:** The BMD of TW is smaller than in the paired groups; 12.9% of TW had low bone mass ( $Z$ -score  $\leq 2$ ), this percentage was 3.2% for CF and 3.3% for CM. TW had a lower  $Z$ -score, both lumbar spine ( $0.26 \pm 1.42$  vs.  $0.50 \pm 1.19$ ) and femoral ( $-0.41 \pm 0.95$  vs.  $0.29 \pm 1.04$ ), than CF. When compared with CM, TW had a lower total femoral  $Z$ -score ( $-0.41 \pm 0.95$  vs.  $0.20 \pm 0.83$ ). Higher values of lean mass correlated positively with femoral total BMD ( $p = 0.4$ ; range of  $95\%CI = 0.009 - 0.68$ ;  $p = 0.04$ ) and femoral neck BMD ( $p = 0.48$ ; range of  $95\%CI = 0.11 - 0.74$ ;  $p = 0.01$ ). Neither the type of CSHT nor its time of use had an impact on bone mass. The median total fat (g) (interquartile range) of TW (20.225 (16.927 to 31.318)) was lower than in CF (30.527 (23.343 to 34.182)) ( $p = 0,009$ ) and CM (24.095 (14.543 to 29.082)).

Total lean mass (g) mean  $\pm$  SD in TW ( $50.597 \pm 7.830$ ) was higher than in CF ( $41.459 \pm 4.414$ ) ( $p < 0,0001$ ) and lower than in CM ( $55.758 \pm 7.036$ ) ( $p < 0,0001$ ).

**Conclusion:** TW had their average percentage of fat higher than CM and lower than CF. The quantity of lean mass in TW is lower than in CM and higher than in CF. Low BMD is often found in TW and that is related to lean body mass.

## P450

### STUDY ON THE PREVALENCE OF ROOT CANAL AND PULP CHAMBER OBLITERATIONS IN THE ELDERLY

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The dental pulp is liable to dystrophic mineralization; this mineralization can be so extensive that the entire root canal system is obliterated. As a result, endodontic treatment can become a difficult if not impossible task [1,2,3,4,5]. This statistical study was conducted on extracted teeth from patients with ages between 55-75 y. Early obliteration of the pulp chamber and root canal may occur following significant traumatic injury to the affected tooth, but also following pulp vitality maintenance treatments [6,7]. However, an increased prevalence of calcium and mineral deposition is seen in older people, particularly in

women who have been given osteoporosis medication[8,9,10]. Successful endodontic treatment relies on proper debridement, disinfection and obturation of the root canal system. The most important procedure is cleaning the canal space of microbial contaminants and pulpal debris. However, this procedure can be difficult to achieve if the pulp space is partially calcified. References:

1. Bechir ES, et al Rev Chim (Bucharest) 2019;70:3176
2. Dăguci L, et al Rom J Morphol Embryol 2020;61:1
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## P451

### DENTAL MANAGEMENT OF PATIENTS WITH OSTEOPOROSIS

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This paper aims to draw attention to the implications of menopause on oral health. This particularly complex syndrome, which is slow in onset and is characterised by a decrease in the concentration of oestrogen hormones and a disturbance of the homeostatic function of the internal environment, leads to the appearance of a series of morpho-clinical dental aspects in relation to the evolutionary stage of the underlying disease [1,2,3,4,5]. In this paper, the oral manifestations of osteoporosis are presented, as well as the ways of preventing and managing them, which is possible only after knowing the exact stage of the disease and correctly assessing the risks that even a minimal dental intervention can cause to the patient's body and the underlying disease[6,7,8]. It is necessary for the dentist to know the patient's biological constants (bleeding time, haematocrit,

haemoglobin, prothrombin time, blood pressure, DXA, etc.) and any treatment requires the agreement of the endocrinologist, who has the patient under supervision and treatment[9,10]. References:

1. Bechir ES, et al Rev Chim (Bucharest) 2019;70:3176
2. Dăguci L, et al Rom J Morphol Embryol 2020;61:1
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## P452

### THERAPEUTIC ATTITUDES IN THE PROPHYLAXIS OF HYPOPARATHYROIDISM-INDUCED OSTEOPOROSIS

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**Objective:** Hypoparathyroidism is a widespread disease in the population. Ectodermal, mental, ophthalmological and bone changes are common in chronic hypoparathyroidism [1,2,3,4].

**Methods:** The study was carried out on 26 patients whose age ranges from 19-58 ys, the distribution of cases by sex and age groups being: female - 15-20 y (1 case), 21-30 y (4 cases), 31-40 y (6 cases), 41-50 y (7 cases), 51-60 y (3 cases) / male 15-20 y (0 cases), 21-30 y (1 case), 31-40 y (2 cases), 41-50 y (1 case), 51-60 y (1 case). Of the cases taken in the study 16 were thyroidectomized for different thyroid conditions (11F+5 M). Correlation endocrine pathology encountered in 18 cases: thyroid insufficiency (16 cases), adrenocortical insufficiency (1 case), gonadal insufficiency (1 case). Paraclinical investigations carried out in the cases studied: calcium (plasma, ionic), magnesium (plasma, erythrocyte), phosphatemia. For the evaluation of bone metabolism were determined: serum values of osteocalcin and C-terminal



teloptides of procollagen type I- CrossLaps, PTH and vitamin D[5,6,7,8,9]. The evaluation of BMD for the diagnosis of osteoporosis was done by DXA. Dosing of these parameters was performed before and 6 months after the end of treatment[4,7,10].

**Results:** Calcium and magnesium preparation was combined with vitamin D, sodium fluoride and sodium alendronate. After 6 months of treatment, the values of all the measured constants (including the T-score) improved.

**Conclusion:** 1. The addition of hydroxylated vitamin D derivatives stimulates calcium binding and prevents trophic and neurovegetative disorders. 2. The combination of sodium fluoride or alendronate sodium not only prevents the onset of tetany attacks, but is also an effective means of prophylaxis of primary osteoporosis therapeutic attitude in thyroxine osteoporosis

#### References:

1. Bechir ES, et al. Rev Chim (Bucharest) 2019;70:3176
2. Dăguci L, et al. Rom J Morphol Embryol 2020;61:1
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9. Țuculină MJ, et al. Rom J Morphol Embryol 2013;54:1081
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## P453

### THERAPEUTIC ATTITUDE IN THYROXINE OSTEOPOROSIS

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**Objective:** Thyroxine osteoporosis has been under-researched, with the focus on postmenopausal osteoporosis in the overwhelming majority of studies. The relationship between BMD and thyrotoxicosis is still controversial, with existing studies

being sometimes antagonistic due to differences between study groups, small numbers of patients studied and limited prospective data[1,2,3]. Hyperthyroidism is a major (but underrecognised) cause of secondary osteoporosis. The mechanism of thyroxine osteoporosis is the action of excess thyroid hormones on both osteoblasts and osteoclasts, stimulating their activity, but especially the activity of osteoclasts, resulting in loss of bone mass[4,5,6,7,8,]. For patients with thyroxine osteoporosis, the earliest possible initiation of anti-thyrotoxicosis treatment remains a standard for the prevention of osteoporosis. Treatment of thyrotoxicosis is differentiated according to the clinical form of thyrotoxicosis. Drug treatment has the stated aim of preventing fractures or reducing their rate[5,8,9,10].

**Methods:** The caseload was represented by 78 patients of which: 31 cases with thyroxine osteoporosis and age between 44-67 y and 47 cases with postmenopausal osteoporosis and euthyroidism with age between 46-69 y. For the assessment of endocrine status (before and 3 months after treatment) was determined: serum total calcium, intact PTH, estradiol, osteocalcin, total alkaline phosphatase (ALP) and C-telopeptide (CTX). BMD was assessed with DXA at the hip and lumbar spine.

**Results:** Lithium salts were administered for the treatment of hyperthyroidism. Mean bone density (+SD) in lithium-treated patients was 5.15% higher at the spine (P<0.05), 6.2% higher at the femoral neck (P<0.05) and 6.85% higher at the trochanter (P<0.05). In addition, lithium-treated patients had lower serum total ALP (P<0.005), lower serum osteocalcin (P<0.005) and lower serum CTX (P<0.05), but total calcium, PTH did not differ significantly between baseline and post-therapy values.

**Conclusions:** Our results suggest that administration of lithium salts may preserve or improve bone mass.

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**THERAPEUTIC ATTITUDES IN HYPOGONADAL OSTEOPOROSIS**S. A. Bugălă<sup>1</sup>, N. M. Bugălă<sup>2</sup>, A. Camen<sup>3</sup>, A. Boicea<sup>4</sup>, M.-J. Țuculina<sup>1</sup>, F. Nechita<sup>5</sup>, L. E. Stoica<sup>6</sup>, D. M. Albulescu<sup>7</sup>

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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 the adoption of prophylactic measures for bone modifications as early as the prepubertal, pubertal or postpubertal stage to ensure maximum bone mass appropriate to sex and age[1,2,3].

The case history is represented by 67 patients, of which with: late puberty (25 cases) and premature ovarian failure (42 cases). Clinical and paraclinical criteria were used to establish the etiological diagnosis[4,5,6,7,8,9,10].

The paper suggests two major goals in the therapeutic strategy of hypogonadal osteoporosis:

- early diagnosis of gonadal insufficiency, for prophylaxis of bone changes;
- estrogen-progestogenic/androgenic replacement associated with antiresorptive or pro-forma medication.

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1. Bechir ES, et al. Rev Chim (Bucharest) 2019;70:3176
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**LATE FEMALE PUBERTY RISK FACTOR FOR OSTEOPOROSIS**S. A. Bugălă<sup>1</sup>, N. M. Bugălă<sup>2</sup>, A. Camen<sup>3</sup>, A. Boicea<sup>4</sup>, F. Nechita<sup>5</sup>, L. E. Stoica<sup>6</sup>, M.-J. Țuculina<sup>1</sup>, D. M. Albulescu<sup>7</sup>

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Puberty is defined as the transition period between childhood and middle age. The onset of puberty is a complex process that takes place over a long period of time as a result of mutual hypothalamic-pituitary-ovarian influences, leading to the gradual and successive maturation of the various components of the reproductive system. Late puberty is defined by the absence of secondary sexual characteristics until 16 years of age or the lack of pubertal development up to the -2SD limit compared to the age at which puberty normally occurs. Important causes involved in the onset of late puberty may be: hypothalamic, pituitary, ovarian[1,2,3]. Determination of bone age is the starting point for assessing the causes of late puberty. If the bone age is delayed in relation to the chronological age, it may be constitutional delayed puberty. If the bone age corresponds to the age at which puberty normally occurs, without the development of secondary sexual characteristics, an organic cause is in question. In these situations, criteria are required for assessment and for differentiating hypogonadotropic from hypergonadotropic hypogonadism. Late puberty is an important risk factor in the development of hypogonadal osteoporosis, which requires the initiation of puberty triggering and osteoporosis prophylaxis therapy[4,5,6,7,8,9,10].

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### IMPACT OF CHRONIC LACK OF PTH ON ATHEROTHROMBOTIC RISK: CROSS-SECTIONAL STUDY

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**Objective:** Clinical and molecular findings have shown that PTH affects the heart and vasculature through downstream actions of G protein-coupled receptors in the myocardium and endothelial cells. Patients with chronic post-surgical hypoparathyroidism (HypoPT) have higher incidences of hypertension, arterial stiffness and increased risk of mortality. This study is to assess endothelial and other atherosclerotic predictors in subjects affected by HypoPT in comparison with primary hyperparathyroidism (PHPT) and controls.

**Methods:** In a monocentric, cross-sectional study we enrolled HypoPT patients treated with calcium and calcitriol, PHPT subjects and age-matched controls. All patients underwent a biochemical examination including calcium-phosphorus metabolism, inflammation markers. Moreover, we evaluated brachial artery endothelial function (flow-mediated dilation-FMD), common carotid intima-media thickness (cclMT), diastolic function and global strain measures with ultrasound.

**Results:** These are the preliminary results of this project that included 49 subjects (20 hypoPT, 18 PHPT and 11 controls) of 150 expected. All study groups presented similar BMI, TSH and kidney function. HypoPT patients had significantly lower PTH and calcium levels ( $p < 0.001$ ) and higher phosphorus levels ( $p < 0.001$ ) than PHPT and controls. HypoPT had higher inflammation markers (erythrocyte sedimentation rate) levels than PHPT and controls ( $34.5 \pm 17.2$  vs.  $27.6 \pm 10.9$  vs.  $15.0 \pm 9.6$  ml/h,  $p = 0.020$ ). All study groups presented no significant differences in basal brachial artery diameter, FMD and diastolic function. HypoPT showed higher global strain value than PHPT subjects ( $-19.6 \pm 3$  vs.  $17.6 \pm 2.5$   $p = 0.042$ ), while compared to controls presented similar values. HypoPT showed lower cclMT than PHPT subjects and higher values than controls ( $10.0 \pm 2.2$  vs.  $11.2 \pm 2.4$  vs.  $7.6 \pm 2.1$  mm,  $p = 0.002$ ).

**Conclusion:** Up to now, our findings suggest that HypoPT has an increased atherothrombotic risk and needs adequate cardiovascular evaluation. We believe that further comprehensive studies are needed.

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### RELATIONSHIP OF OSTEOPOROTIC FRACTURES RISK WITH COMORBIDITIES IN URBAN AND RURAL POPULATIONS

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**Objective:** To analyze the relationship between the absolute risk (AR) of osteoporotic fractures (OPF) and comorbidities among the urban and rural population of the Russian Federation.

**Methods:** Representative samples of Russian women and men 40-69 years old from 12 regions were analyzed. Groups of urban ( $n = 11962$ ) and rural ( $n = 1154$ ) subjects were comparable in terms of their age. AR of OPF was calculated on the basis of the Russian FRAX model without taking into account BMD. The associations between the AR of OPF and the following comorbidities: coronary heart disease, myocardial infarction, stroke, heart rhythm disorder, arterial hypertension (AH), diabetes mellitus, anxiety, depression, chronic bronchitis, gastric ulcer and/or duodenal ulcer, osteochondrosis were studied. To diagnose diseases epidemiological criteria and anamnesis data were used.

**Results:** The frequency of high AR of major OPF in the sample was 7.0%. Among individuals at high AR of major OPF, only 8.3% of men and 3.5% of women had no comorbidities. Adjusted for age and city, at a high AR of major OPF, the chance of detecting four or more diseases increased by 2 times (95%CI, 1.26-2.92) in women and 1.7 times (95%CI, 1.15-2.68) in men. The identified associations did not differ between urban and rural populations regardless of gender. In both urban and rural residents, positive correlations all studied comorbidities with AR of major OPF (except for AH) and AR of hip fractures in women were found. At the same time, in men, positive correlations were observed between AR of major OPF and anxiety, depression, and between AR of hip fractures and all studied comorbidities (except for AH and osteochondrosis).

**Conclusion:** The presence and accumulation of comorbidities were associated with a high AR of OPF in both urban and rural populations, regardless of gender. Assessing the AR of OPF using the FRAX calculator is useful in people over 40 years of age with multiple pathology. It is likely that a comprehensive approach aimed at early detection of comorbid pathology may have equal value for the urban and rural populations.

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### RESULTS OF USING THERAPEUTIC AND DIAGNOSTIC INTERVENTION THRESHOLDS BASED ON 10-YEAR FRACTURES PROBABILITY ACCORDING TO FRAX IN AN EPIDEMIOLOGICAL STUDY

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**Objective:** In the Russian Federation, two specific age-dependent threshold models are used to stratify the absolute risk (AR) of fractures and determine further tactics: the therapeutic intervention threshold (TIT) with 2 risk categories (low and high) and the diagnostic intervention threshold (DIT) with 3 risk categories (low, moderate, high). We aimed to stratify the AR of fractures using TIT and DIT, based on the 10-y probability of major osteoporotic fractures according to FRAX, among the urban and rural population of the Russian Federation.

**Methods:** As part of an epidemiological study, representative samples of urban (n=11962) and rural (n=1154) populations from 12 regions of the Russian Federation were analyzed. In total, 13116 Russian women and men 40-69 years old participated in the study. Over the next 10 years AR of fractures was calculated on the basis of the Russian FRAX model without taking into account BMD. The use of the FRAX model with two high and low risk zones is preferable in epidemiological studies and in regions where densitometric equipment is not available. TIT and DIT were used to stratify the AR of fractures.

**Results:** In accordance with TIT, the frequency of high AR of fractures in the total sample was 7.0% (9.4% in women vs. 1.9% in men, p<0.05). The remaining study participants were classified as those with a low fractures risk. High AR of fractures was more often registered among urban women compared with rural females (10.2 vs. 7.5%, p<0.05), while there were no such differences in men. According to DIT, high AR of fractures was detected in 3.1% of participants (4.4% in women vs. 0.8% in men, p<0.001), moderate risk in 42.2% (52.7% in women vs. 22.9% in men, p<0.001), low risk in 54.7% (42.9% in women vs. 76.3% in men, p<0.001). Differences in high fractures risk rates between urban and rural residents become insignificant in DIT.

**Conclusion:** The use of the Russian FRAX model with three zones of high, moderate, and low risk showed that most of the respondents fall into the zone of moderate risk and require reclassification with an assessment of bone mass using X-ray densitometry to clarify further tactics.

P459

### THE UK HERTFORDSHIRE COHORT STUDY: NUTRITION AND PHYSICAL ACTIVITY (NAPA) STUDY – A PILOT STUDY OF HEALTHY CONVERSATION SKILLS IN OLDER COMMUNITY-DWELLING ADULTS DURING THE COVID-19 PANDEMIC

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**Objective:** Sarcopenia, a major public health problem, is associated with lifestyle factors such as physical activity (PA) and diet. Healthy Conversation Skills (HCS) have been used with younger populations as an intervention to empower them to make lifestyle changes, usually through in-person conversations. We hypothesized HCS could be utilised to improve lifestyle choices in older adults aged 79-89 y in a phone-based intervention.

**Methods:** Of a cohort of 294 community-dwelling Hertfordshire Cohort Study participants, 176 agreed to participate. Baseline data were collected between November 2019 and March 2020; this included data from the Longitudinal Aging Study Amsterdam Physical Activity Questionnaire (LAPAQ), a short-food frequency questionnaire – prudent diet scores were calculated and used as an indicator of diet quality, and anthropometric measurements. At baseline, 87 were randomised to the intervention arm and received a HCS-styled conversation at initial contact and by telephone at 1, 3, 6, and 9 months; 89 were randomised to the control arm and received a healthy-living leaflet. A follow-up postal questionnaire was sent at one year. Differences in annual changes in PA and diet quality between the trial arms were examined using sex-specific t-tests.

**Results:** At baseline, median age was 83.1 (IQR 81.5-85.5) for men and 83.8 (81.5-85.9) for women; median activity time in previous 2 weeks (min/d) was 98.9 (60.8-150.0) for men and 150.0 (102.9-198.6) for women; mean BMI (kg/m<sup>2</sup>) was 27.4 (SD 3.4) for men and 26.8 (4.5) for women. At follow-up, the response rate was 88%. In the intervention group, 95% completed the intervention with all phone calls undertaken as per schedule. Annual changes in LAPAQ and prudent diet score did not differ significantly (p>0.05) between the control and intervention arms in either sex, however there was a trend towards a greater improvement in prudent diet score in intervention women (p=0.075).

**Conclusion:** We have demonstrated that it is possible to engage older adults in conversations about their lifestyles by telephone. Compared to studies with younger populations, there was less impact on health behaviours, possibly reflecting the timing of the study during the COVID-19 pandemic, as many older adults were shielding/experiencing considerable disruption to their usual activities.



P460

### AN EXCEPTIONAL CASE OF HYPERPHOSPHATEMIC FAMILIAL TUMORAL CALCINOSIS

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**Objective:** Tumor calcinosis (TC) is a scarce benign tumor of soft tissues [1]. Hyperphosphatemic familial tumoral calcinosis (HFTC) is a rare autosomal recessive primitive disorder with only 75 cases reported in the literature. Deficiency or resistance to the phosphate-regulating hormone (FGF23) explains hyperphosphatemia in the HFTC disorder [2]. Herein we describe a rare case of HFTC with several extension sites.

**Methods:** We report the case of a 30-year-old male complaining of a mechanical right hip evolving for 2 y. He had been suffering from similar symptoms at both elbows, left femur, and feet since the age of 6. Physical examination showed a postero-lateral mass in the right greater trochanter, firm in consistency, fixed to the deep plane, with no inflammatory signs.

Physical examination showed limited right hip joint mobility in the abduction and intern rotation. Laboratory investigation revealed a high rate of C-reactive protein and erythrocyte sedimentation levels (50 mg/dl and 68 mm/h respectively), and hyperphosphatemia at 1.94 (normal range: 0.8-1.45). Renal function and immunological tests were normal.

**Results:** CT scan 3D reconstruction showed a tumoral calcification of the hip surroundings the medial femoral circumflex artery. X-ray of the elbows and feet showed a similar aspect. The sample histopathological exam confirmed the epithelioid elements with multinucleated giant cells surrounding calcium granules. The HFTC diagnosis was based on the hyperphosphatemia in the patient and his father. We treated the patient with a low-phosphate diet and phosphate binders before the complete resection of the tumor.

**Conclusion:** We report an unusual relapse of HFTC in a young male evolving since the age of six. Imaging findings, as well as biochemical data, are necessary to exclude malignancies. Treatment was not codified and was discussed case-by-case.

#### References:

1. Ramnitz MS, et al. Hyperphosphatemic Familial Tumoral Calcinosis. 2018. In: Adam MP, Ardingier HH, Pagon RA, et al., editors. GeneReviews® [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2021.
2. Dierickx J, Vanhoenacker F. J Belg Soc Radiol 2021;9;105:6

P461

### A FIRST CASE OF GORHAM-STOUT DISEASE WITH A VANISHING HIP IN CHILD

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**Objective:** Gorham-Stout disease (GSD) is a rare bone disease of unknown etiology, characterized by the proliferation of vascular and lymphatic tissues leading to massive resorption, bone matrix destruction, and replacement with fibrosis [1].

**Methods:** Here is the first case of a GSD disease reported in a child, located in the hip and revealed by a painless limp.

**Results:** An 11-year-old boy presented with a limp in his right leg. The onset was insidious, painless, and evolved for 1 y. There was no history of trauma, fever, or any constitutional symptoms. He did not experience lethargy or fatigue, and he was gaining weight. In addition, there was no family history of any bone and joint-related problems. On physical examination, the right leg was limited in external rotation motion, and the thigh was increased in volume, though painless. The pelvic radiograph revealed multiple bony fragments across the iliac crest and the right hip. White blood count, as well as acute phase reactants, were normal.

The phosphocalcic balance, PTH, renal function, inflammatory markers were in the standards ranges. Malignancy was the first diagnosis to rule out. A whole-body CT was performed and did not reveal any primary tumor or lytic lesions located in other sites. A bone marrow biopsy of the iliac crest ruled out chronic infection and malignancies. The anatomopathological exam showed bone remodeling with non-specific inflammatory changes foamy, compounding macrophages, vascular channels of hematic proliferation, and lymphatic origin in bone and near soft tissue. The Gorham-Stout disease was confirmed. We indicated a reconstructive surgery using a bone graft associated with a bisphosphonate cure.

**Conclusion:** We report an exceptional case of GSD in a child located in the hip. Given the aggressiveness of the lesion, clinicians should be aware of this rare disease for prompt treatment and better management.

**Reference:** 1. Takaya K, et al. Br J Neurosurg 2021;35:27

P462

### INCREASING REGISTERED INCIDENCE OF VERTEBRAL AND HUMERUS FRACTURES IN THE YEARS 2011-2018 IN POLAND

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**Objective:** The epidemiology of osteoporotic fractures may change with aging population from one side, with increasing use of antifracture drugs from the other. The aim of this study was to assess the nationwide incidence of fractures in the population aged 50 years or more.

**Methods:** The National Health Fund is the only institution providing reimbursement for the procedures performed in state owned health care units in Poland. Its database comprises therefore most of procedures related to fractures. It has however no information whether the fracture was a low or high energy one. This database was searched for incident fractures registered in the years 2011-2018 in subjects older than 50 y, divided into forearm, finger/wrist/hand, hip, humerus and vertebral fractures (as coded by the ICD-10 classification).

**Results:** Although raw incidence of all examined types of fracture increased, reflecting the increasing population in the same age, we have noticed also a relative increase (per 100,000 inhabitants) of the number of registered humerus and vertebral fractures. In men the incidence of humerus fracture/100,000 increased between 2011 and 2018 in all age groups (from 63 to 82 in the 50-54 years group up to 151 to 240 in the 85+ years group). Similar but higher (especially in oldest group) figure was observed in women (from 72-91 and 2224-3098, respectively). With regard to the vertebral fracture the increase of the number of incident fractures in men was from 86 to 89 in the youngest up to 133 to 263 in the oldest group, whereas in women from 47 to 52 up to 189 to 348, respectively. The number of other types of fractures was rather decreasing, these changes, although significant, were however rather small.

**Conclusion:** In the observed time period, although relatively short, an increase of the number of incident registered humerus and vertebral fractures was observed in all age groups of both sexes.

P463

### EFFECT OF ISOMETRIC AND ISOTONIC EXERCISE ON TOTAL KNEE ARTHROPLASTY OUTCOME (PREOPERATIVE, POSTOPERATIVE, PRE- AND POST-OPERATIVE): SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background:** Rehabilitation is commonly advised before and after total knee arthroplasty although its efficacy and effectiveness need more evaluation.

**Purpose:** There are some discrepancies in the literature regarding the effect of rehabilitation before and after total knee arthroplasty (TKA) on the outcome of surgery, therefore this study was conducted as a systematic review and meta-analysis with a rationale, to explain the effect of rehabilitation with isometric and isotonic exercise pre-operative and post-operative on the outcome of TKA. These exercises don't require any equipment and can be educated to the patients.

**Data Source:** Our systematic review will concentrate on the effect of isometric and isotonic exercise on the outcome of patients with TKA based on pain score and functional score and psycho-social function. In this study, the source of data is from the following databases: Embase, Medline, and CINAHL, the Cochrane Library

**Study Selection:** COVidence tool was used for searching management and study selection.

**Data Extraction and Synthesis:** Data extraction was done by reviewing the articles and tabulating the data in excel sheath, and finally, data synthesis and analysis were done by RevMan.

**Limitations:** Quality of the evidence and heterogeneity of the studies due to baseline data missing in some studies were limitations of the study.

**Conclusion:** This study evaluates the effect of isometric and isotonic exercise on the outcome of total knee arthroplasty. It also explains the role of prehabilitation in pain score, functional score, and psychosocial function. Prehabilitation improves selfconfidence, adoption of surgery and arthritis efficacy score, reduces the length of stay at the hospital (LOS), and returns to daily activity in comparison to cases that did rehabilitation only after surgery. Although prehabilitation mainly improves TUG in the patient with TKA and does not significantly improve pain score, QOL, ADL, 6MW, or ROM, post-operative rehabilitation improves 6mW and QOL but does not significantly improve pain score in the patients undergoing TKA.

**Further Research:** Future studies are needed to clarify the efficacy and effectiveness of rehabilitation before and after TKA.

**Systematic Review Registration:** The study registered in Open Science Framework (OSF) with registration number: <https://doi.org/10.17605/OSF.IO/Q527H>

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### IDENTIFICATION OF VERTEBRAL FRACTURES THROUGH DIGITAL MORPHOMETRY DURING EXAMINATION WITH DUAL-ENERGY X-RAY ABSORPTION

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**Objective:** To evaluate the prevalence of vertebral fractures in patients with osteoporosis through vertebral morphometry. **Methods:** The study included 411 patients who had been diagnosed with osteoporosis and were under treatment for 1 y. The criteria for diagnosing osteoporosis are those set by the WHO, T-score  $\leq$  -2.5. Patients underwent X-ray absorption with dual lumbar and thoracic energy as well as laboratory examinations. The Genant method was used to assess the degree of fracture. **Results:** Out of 411 patients, 91 (22.14%) patients presented with vertebral fractures, of which 62 (68%) of the fractures were in the thoracic part and 38 (32%) in the lumbar part. Of the 91 fracture patients, 12 (13%) had more than one fracture. 7 patients (8%) had severe fractures, 31 (34%) had moderate fractures and 53 (58%) mild fractures. **Conclusion:** Vertebral morphometry is a fast and accurate method with low radiation exposure to assess the prevalence of vertebral fractures and their severity. It is important for both epidemiological studies and clinical practice. We recommend that regardless of treatment and clinical symptoms, patients should be evaluated periodically for vertebral fractures. This will make it possible to change the treatment strategy and lifestyle.

P465

### SCOLIOTIC POSTURE, SCOLIOSIS AND LUMBAR PAIN MANAGEMENT

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**Introduction:** Scoliosis is a deformity of the spine that consists of a relatively progressive displacement of the corpus vertebra, compared to the other parts that make up the entirety of the spine, without losing the osteoligamentary continuity of the spine. Scoliosis develops on one or more parts of the spine, mainly during the growth period. Examined in three study planes (frontal, sagittal and transverse). About 40% of children develop scoliosis; back pain as a result of the weight of the school bag (the standard weight of the bag should be 10-15% of body weight), muscular imbalance from the bag and incorrect postures (scoliotic

posture) on the school benches. 65% of cases with scoliosis are idiopathic; 15% are congenital; 10% are secondary to some neuromuscular pathology.

**Favorable factor:** Genetic presence of CHD7; Obesity; scoliotic posture is a lateral deviation of the axis, without true torsion (torsion) and without structural deformation of the column. Scoliosis has 3 stages: Stage I Koob angle 25°; Stage II 25-50°; Stage III  $\uparrow$  50°

**Study method:** The study was conducted in several 9-y schools in Tirana. The study protocol included the administration of an anonymous questionnaire (age, gender, place of residence, economic level; body weight, weight of school bag; bank stay; physical activity; food preferences). Randomized prospective study.

**Aim:** To evaluate the relationship between obesity, scoliotic posture, scoliosis and back pain in children attending school in Albania.

**Objective:** Postural rehabilitation of patients to prevent further deformities of the spine and to relieve back pain.

**Study material:** 284 children were studied; who continue the 9-y school; average age 10.5 y from December 2015 - June 2016. **Result:** From this study it was observed that:

30% of children suffered from back pain and carried heavy book bags; F > M

39% of children do not suffer from back pain because they apply physical exercises.

18% of children have spinal deformities (scoliosis).

**Recommendations:** It is advisable to reduce overweight; avoid heavy bags; the use of bags with wheels or with two straps. Advising children on the correct attitude to school activities and leisure.

P466

### MANAGEMENT OF OSTEOARTHRITIS WITH HYALURONIC ACID AND REHABILITATION

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**Objective:** Osteoarthritis of the genu joint is a degenerative disease of the genu joint, which due to functional limitations leads to deterioration of the quality of life of these patients. In many cases surgical therapy prosthesis of articular surfaces, represents the gold standard of treatment of these patients. In this study it is proposed to evaluate the effectiveness of hyaluronic acid injected under the direction of Echo (ultrasound) in the genu articulation accompanied by rehabilitation program.

**Methods:** 15 patients with knee osteoarthritis were studied. According to the Kellgren-Lawrence radiological classification, grade II-III arthrosis does not qualify for surgical treatment. Patients underwent intraarticular injection with hyaluronic acid

under ultrasound guidance and after 6 d continued with rehabilitative treatment aimed at combating the patient's analgesic posture, recovery of muscle traction participating in genu joint movement, decompression maneuvers and decoupling in monopodal load. Patients were evaluated at the beginning and after 3-6-9 months of therapy, through: ËOMAC test, VAS degree of pain. **Results:** In the evaluation of patients at the beginning, after 3, 6, 9 months, a reduction in >60% of VAS pain was found and the ËOMAC test in 40% of patients after the first intraarticular injection. No significant side effects were observed during infiltrative procedures. **Conclusion:** This study confirms the effectiveness of the combined treatment of the rehabilitation program and intraarticular therapy under the guidance of Echos, in patients suffering from knee osteoarthritis, significantly reducing pain and recovery of functional capacity.

## P467

### GENETIC STUDY OF SUSCEPTIBILITY TO ATYPICAL FEMORAL FRACTURES RELATED TO BIPHOSPHONATE TREATMENT

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Atypical femoral fractures (AFF) are low-trauma fractures with increased risk under long-term bisphosphonate (BP) treatment. The etiology of AFF is still unclear even though a genetic basis is suggested.

A whole exome sequencing (WES) analysis of 12 patients receiving BPs for at least 5 y who sustained AFF and 4 controls also long-term treated with BPs but without any fracture was performed. In these patients, BPs were prescribed due to postmenopausal osteoporosis.

After filtration and prioritization of rare variants predicted to be damaging and present in genes shared among at least two patients, a total of 272 variants in 132 genes were identified. We then selected those genes involved in bone metabolism and/or AFF. Twelve genes were identified, highlighting *DAAM2* (mutated in four patients) and *LRP5* (mutated in other three patients), both involved in the Wnt pathway, as the most representative. Interestingly, three of the patients with *DAAM2* rare variants had received glucocorticoid treatment. The fourth patient, who had not been treated with corticosteroids, was homozygous for a predicted damaging variant. Afterwards, we intersected all mutated genes with a list of 34 genes obtained from a previous study of three sisters with BP-related AFF. Nine genes were obtained, one of them (*MEX3D*) harboring damaging variants in two AFF patients from

the present study plus one variant shared among the three sisters. Of note, this gene was found underexpressed in BP-treated osteoclasts according to the GSE63009 database. Gene interaction analysis using the AFFNET web suggested a complex network among bone-related genes as well as with other mutated genes. BinGO biological function analysis highlighted cytoskeleton and cilium organization.

In conclusion, the AFF may present a multigenic background, specific to each patient, in which an accumulation of susceptibility variants may lead to a predisposition to BP-related AFF. Hence, a genetic network along with BP treatment and in some cases with glucocorticoids may trigger this so feared complication.

## P468

### DOES PARTICIPATION IN ELITE SPORTING ACTIVITY IN YOUNG ADULTHOOD HAVE LASTING BENEFITS FOR BONE HEALTH? A SYSTEMATIC REVIEW

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**Objective:** Recreational physical activity has commonly been associated with better bone health in later life; weight bearing sporting activity at the time of peak bone mass (PBM) acquisition may be particularly beneficial, as higher PBM is a key determinant of later osteoporosis risk. While it might be assumed that elite sporting activity may produce greater benefits, risk of injury and the female athlete triad mean that this is unproven. The aim of this study was to evaluate the evidence that elite sporting activity in young adulthood has lasting benefits for bone health, through a systematic review of available literature.

**Methods:** We considered retired athletes aged >50 y who participated in elite sport in young adulthood (aged 15-30 y). Elite sport was defined as national level or above. After protocol development, the search strategy was applied to PubMed, Medline, Embase and Web of Science. References were managed using Rayyan software and bias assessed using the Newcastle-Ottawa scale. One reviewer identified papers; a second screened those considered for inclusion. The protocol was registered with PROSPERO (CRD42021293644).

**Results:** 1366 papers were screened, 1349 were removed, 717 had title and abstract full-screening, and 17 were retrieved. Five papers were included in the final sample. Sample size varied from 32 to 668; 3 reported findings in men, 2 in women. None included both sexes. Sports considered were football, weightlifting, endurance running and running, tennis and swimming. Ex-athletes showed varying activity levels at time of DXA measurement. BMD was measured at femoral neck, trochanter, and lumbar spine. All studies noted higher BMD measurements in former elite athletes



relative to controls, though relevant lifestyle confounder information available and considered was variable. Meta-analysis was not possible as studies were too heterogeneous.

**Conclusion:** Our study suggests that elite sporting activity in young adulthood has lasting benefits to bone health, though level of physical activity and other lifestyle factors post-retirement from elite sport may be important confounders. The few studies available have highlighted the need for future research in this area.

## P469

### EVALUATION OF RELUGOLIX COMBINATION THERAPY (REL-CT) AND BONE MINERAL DENSITY (BMD) IN WOMEN WITH ENDOMETRIOSIS-ASSOCIATED PAIN THROUGH 52 WEEKS: SPIRIT LONG-TERM EXTENSION (LTE) STUDY

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**Objective:** To assess the effect of Rel-CT (relugolix 40mg, estradiol [E2] 1mg, norethisterone acetate [NETA] 0.5mg) on BMD for up to 52 weeks (wks).

**Methods:** Women with moderate-to-severe dysmenorrhea and non-menstrual pelvic pain who completed double-blind, placebo-controlled SPIRIT 1&2 trials of Rel-CT, delayed Rel-CT (relugolix 40mg monotherapy then Rel-CT for 12 wks each) or placebo for 24 wks, and met entry criteria could enrol in an 80-week LTE study in which all women received once-daily, open-label Rel-CT. BMD was assessed by DXA of the lumbar spine (LS) (L1-4), total hip (TH), and femoral neck at baseline (BL), Week(Wk) 12, 24, 36, 52 (reported here) and 104. BMD% change from BL was summarized by location, according to original treatment assignment, using a mixed-effect model with repeated measures adjusted for region, years since surgical endometriosis diagnosis, visit, and selected BL characteristics.

**Results:** Of 1251 women treated in SPIRIT 1&2, 1044 completed the pivotal studies, 802 (77%) enrolled in the LTE and 681 (85%) completed 52 wks' treatment. Least squares mean BMD% change from pivotal study BL to Wk52 for Rel-CT was -0.81% (LS) and -0.19% (TH). Values were relatively unchanged from Wk24 and similar to values in the placebo group that transitioned to Rel-CT at Wk24. There was significant bone loss in the delayed Rel-CT group after 12 wks of relugolix monotherapy; BMD then remained stable after transition to Rel-CT, the upward trend at Wk52 (-1.27%), likely resulting from E2/NETA addition.

**Conclusion:** With Rel-CT, there was minimal bone loss through 24 wks' treatment after which BMD stabilized. Rel-CT represents a potential long-term treatment for women with endometriosis-associated pain, providing therapeutic benefit while minimizing bone loss.

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## P470

### SERUM LIPIDS ARE ASSOCIATED WITH PERSISTENT MULTISITE MUSCULOSKELETAL PAIN: A LIPIDOMIC STUDY

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**Objective:** Lipid mediators have been suggested to have a role in pain sensitivity and response; however, longitudinal data on lipid metabolites and persistent multisite musculoskeletal pain (MSMP) are lacking. This study was to identify lipid metabolic markers for persistent MSMP.

**Methods:** Lipidomic profiling of 807 lipid species was performed on serum samples of 536 participants from a cohort study. MSMP was measured by a questionnaire and defined as painful sites  $\geq 4$ . Persistent MSMP was defined as having MSMP at every visit. Logistic regression was used with adjustment for potential confounders. The Benjamini Hochberg method was used to control for multiple testing.

**Results:** A total of 530 samples with 807 lipid metabolites passed quality control. Mean age at baseline was 61.54 $\pm$ 6.57 y and 50% were females. 112 (21%) of the participants had persistent MSMP. Persistent MSMP was significantly associated with lower levels of monohexosylceramide (HexCer)(d18:1/22:0 and d18:1/24:0), acylcarnitine (AC)(26:0) and lysophosphatidylcholine (LPC)(18:1 [sn1], 18:2 [sn1], 18:2 [sn2], and 15-MHDA[sn1] [104\_sn1]) after controlling for multiple testing. After adjustment for age, sex, BMI, diabetes status, and physical activity, HexCer(d18:1/22:0 and d18:1/24:0) and LPC(18:1 [sn1] and 15-MHDA [sn1] [104\_sn1]) were significantly associated with persistent MSMP [Odds Ratio (OR) ranging from 0.24 - 0.32]. Two lipid classes -- HexCer and LPC were negatively associated with persistent MSMP after adjustment for covariates (OR=0.19 and 0.21, respectively).

**Conclusion:** This study identified four novel lipid signatures of persistent MSMP, suggesting that lipid metabolism is involved in the pathogenesis of persistent pain.

P471

### DIETARY INFLAMMATORY INDEX AND KNEE STRUCTURES ON MRI AND PAIN: A 10.7-YEAR COHORT STUDY

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**Objective:** While some individual dietary nutrients/components have been shown to be associated with knee osteoarthritis (OA) progression, the associations of the dietary inflammatory index (DII<sup>®</sup>), which reflects the overall inflammatory potential of a diet, with MRI-detected structural changes and pain have not been investigated. This longitudinal study aimed to determine whether DII scores are associated with knee structural changes and pain over a 10.7-y follow-up in community-dwelling older adults.

**Methods:** This study utilised the data from a prospective population-based cohort study (mean age 63 y, 51% women) in which 1099, 875, 768 and 563 participants completed assessments at baseline, 2.6, 5.1 and 10.7 y, respectively. T1-weighted or T2-weighted MRI of the right knee was performed to measure cartilage volume (CV) and bone marrow lesions (BMLs) at baseline and 10.7 y. The WOMAC pain questionnaire was used to measure knee pain at all assessments. Baseline energy-adjusted DII (E-DII) scores were calculated using a validated Food Frequency Questionnaire. X-ray was performed to assess radiographic knee osteoarthritis (ROA). Linear, log-binomial regression and linear mixed-effects modelling with adjustments for covariates were used to examine the associations of E-DII with CV loss, BML size increase and knee pain, respectively. Pain trajectories (i.e., 'Minimal Pain', 'Mild Pain', and 'Moderate Pain') were previously identified in this cohort using group-based trajectory modelling [1]. Multinomial logistic regression was used to examine the association between E-DII and pain trajectory groups.

**Results:** The mean E-DII at baseline was  $-0.48 \pm 1.39$ . In multi-variable analyses, E-DII score was not associated with tibial CV loss and BML size increase [CV loss:  $\beta=0.03\%$  per annum, 95%CI  $-0.01-0.06$ ; BML size increase: relative risk (RR)=0.94, 95%CI 0.84–1.05;]. Higher E-DII was associated with greater pain score over 10.7 years ( $\beta=0.21$ , 95%CI 0.004-0.43) and an increased risk of belonging to 'Moderate pain' as compared to 'Minimal Pain' trajectory group [relative risk ratio (RRR): 1.19, 95%CI 1.02-1.39] after adjustment for age, BMI, physical activity, education level, employment, emotional problems, comorbidities, and ROA.

**Conclusion:** Higher DII was associated with greater pain score and higher risk of more severe pain trajectory, but not structural changes, suggesting discordance between effects of diet on structural damage and pain, and that targeting pro-inflammatory diets may be beneficial to reduce pain.

**Reference:** 1. Pan F, et al. Osteoarthritis Cartilage 2018;26:1619

P472

### A SURROGATE FRAX MODEL FOR MALAYSIA

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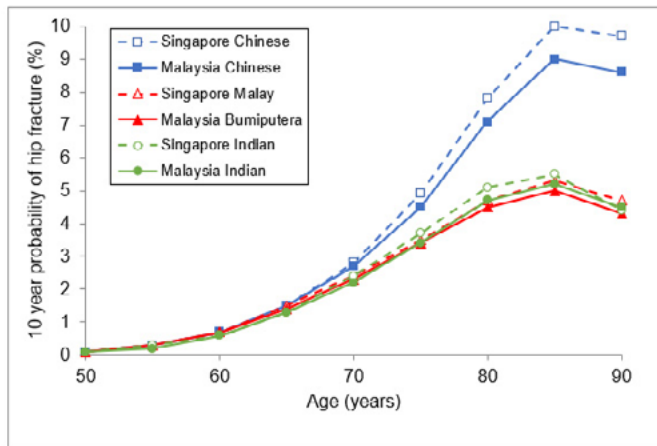
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**Objective:** FRAX models are frequently requested for countries with little or no data on the incidence of hip fracture. In such circumstances, the International Society for Clinical Densitometry and International Osteoporosis Foundation recommend 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 ethnic-specific FRAX model for Malaysia.

**Methods:** The FRAX model used the ethnic-specific incidence of hip fracture in men and women living in Singapore, combined with the death risk for Malaysia (2015).

**Results:** Fracture probabilities increased with age in all ethnic groups and were higher in women than in men. With advancing age, the surrogate models gave slightly lower 10-y fracture probabilities for women compared to the models for Singapore for all ethnicities, reflecting a higher mortality risk in Malaysia (Figure). For example, at the age of 85 y, the 10-y probability of hip fracture was 10% for Singaporean Chinese and 9% using the Malaysian Chinese model (Figure). For Indian ethnicity the corresponding probabilities for Singapore and Malaysia were 5.5% and 5.2%. A similar pattern was observed for Malay/Bumiputera ethnicity with probabilities of 5.3% and 5.0%. In contrast, for older ages for men the surrogate model gave somewhat higher 10-y fracture probabilities than in men from Singapore, reflecting a lower mortality risk in Malaysia. There were very close correlations in fracture

probabilities between the surrogate and authentic models, so that the use of the Malaysia model had little impact on the rank order of risk.



**Figure** The 10 year probability of hip fracture (%) for women with no clinical risk factors, BMI 25 kg/m<sup>2</sup> where the BMD was not known.

**Conclusion:** The surrogate FRAX model for Malaysia provides an opportunity to determine fracture probability within the Malaysia population and help guide decisions about treatment.

## P473

### VITAMIN D LEVEL, MUSCLE STRENGTH AND FUNCTIONAL STATUS IN WOMEN WITH RHEUMATOID ARTHRITIS

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**Objective:** To study the relationship between vitamin D level, muscle strength (MS) and physical performance (PP) in women with rheumatoid arthritis (RA).

**Methods:** 135 women (mean age 58.5±8.9) with confirmed RA according to ACR/EULAR criteria (2010) were enrolled in the study. MS was assessed using a mechanical dynamometer and PP using the Short Physical Performance Battery test (SPPB). Handgrip strength 16 kg and less was a criterion of low MS. SPPB score 8 points and less was a criterion of low PP. Serum level 25(OH) D was performed using the Cobas E411 immunochemiluminescence analyzer and Elecsys Vitamin D total kit, Roche.

**Results:** Median 25(OH)D level was 23.7 [18.2; 30.7] ng/ml in women with RA (minimum 7.9 ng/ml and maximum 70.0 ng/ml). Insufficiency and deficiency of vitamin D were detected in 56 (41.5%) and 42 (31.1%) women, respectively, with median level 24.1 [21.8; 26.6] ng/ml in the patients with insufficiency and 15.6 [13.6; 17.9] ng/ml in deficiency group. 37 (27.4%) women had nor-

mal 25(OH)D level with median 37.0 [32.9; 49.5] ng/ml. Low MS had 48 (35.5%), low PP - 12 (17.8%) and combination of low MS and PP - 51 (37.8%) persons. 24 (17.8%) women had normal MS and PP. Women with normal MS and PP rates had 25(OH)D level 26.8 [19.0; 39.7] ng/ml, patients with low MS or low PP - 26.1 [19.1; 30.9] ng/ml and 21.5 [19.5; 24.3] ng/ml, respectively and persons with both low MS and PP - 21.0 [17.0; 25.8] ng/ml (p=0.111). At the same time, vitamin D level was significantly higher in women with SPPB>8 points than in patients with the low PP: 26.3 [17.8; 32.9] ng/ml and 21.0 [18.0; 25.1] ng/ml, respectively (p=0.015). No differences were found in 25(OH)D level between patients with low and normal MS: 23.8 [17.8; 30.2] ng/ml and 23.1 [19.5; 32.2] ng/ml, respectively (p=0.701).

**Conclusion:** 72.6% women with RA had hypovitaminosis D, including 25(OH)D deficiency in 31.1% patients. There was no difference in 25(OH)D between patients with low and normal MS, but in patients with reduced PP vitamin D level was significantly lower.

## P474

### FREQUENCY OF LOW BONE MINERAL DENSITY, LOW MUSCLE MASS AND VITAMIN D STATUS IN WOMEN WITH RHEUMATOID ARTHRITIS

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**Objective:** To study the BMD, appendicular muscle mass (AMM) and their relationship with vitamin D level in women with rheumatoid arthritis (RA).

**Methods:** 135 women aged 40 and over (mean age 58.6±8.8 y) with confirmed RA accordance to the 2010 ACR/EULAR classification criteria were included. DXA of lumbar spine, hip and total body was performed. Blood sampling was carried out in February-April 2021. Vitamin D blood serum level was assessed using Cobas E411 immunochemiluminescent analyzer and Elecsys Vitamin D total kit, Roche.

**Results:** low BMD was detected in 92 (68.1%) women, including osteoporosis (OP) - in 38 (28.1%), and osteopenia in 54 (40.0%) patients. AMM less than 15 kg was found in 22 (16.3%) and an appendicular muscle index (AMI) of 5.5 kg/m<sup>2</sup> or less in 14 (10.4%) patients, but all these women had normal BMI or obesity. 26 (19.2%) patients with low AMM or AMI had confirmed sarcopenia. Women with low BMD had lower AMM and AMI than patients with normal BMD (p=0.0003 and p=0.015, respectively). The average serum level of 25(OH)D was 26.3±11.9 ng/ml. 25(OH)D insufficiency was found in 56 (41.5%) women, deficiency in 40 (29.6%) and severe deficiency in 2 (1.5%) patients. No significant correlations were detected between 25(OH)D level and BMD at any site, AMM and AMI.



**Conclusion:** Low BMD was found more than in 2/3 patients with RA and reduced AMI in 1/10 of cases. Patients with low BMD had significantly lower AMM and AMI than women with normal BMD. Insufficiency and deficiency of 25(OH)D level was observed in 72.6% patients. There was no difference in vitamin D level in patients depending on the presence of low BMD or low AMI/AMI.

## P475

### FREQUENCY OF DIFFERENT PHENOTYPES OF BODY COMPOSITION IN PATIENTS WITH SYSTEMIC SCLERODERMA

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**Objective:** To evaluate the frequency of different phenotypes of body composition and risk factors in patients with systemic scleroderma (SSc).

**Methods:** 60 women (age 54.0 [47.0;62.0] y) with SSc were enrolled in the study: 37 (61.7%) with limited and 23 (38.3%) with diffuse cutaneous subtype. Lumbar spine, femoral neck, total hip and whole-body DXA was performed. The appendicular muscle index (ALMI) was calculated (appendicular lean mass (ALM) to height kg/m<sup>2</sup>). Overfat was defined as body fat percentage >35%. Univariate logistic regression was performed for risk factors identifying.

**Results:** OP occurred in 23 (38.3%), osteopenia in 24 (40.0%) and obesity in 47 (78.3%) patients. 30 (81.1%) women with limited and 17 (73.9%) with diffuse skin subtype had obesity phenotypes (p>0.05). 2 (3.3%) women had sarcopenic phenotype, 3 (5%) osteopenic, 4 (6.7%) osteosarcopenic, 18 (30%) isolated obesity, 13 (21.7%) osteopenic obesity, 2 (3.3%) sarcopenic obesity, 14 (23.3%) osteosarcopenic obesity and only 4 (6.7%) patients normal body composition. Low muscle strength was found in 37 (61.7 %) women, meanwhile confirmed SP (low muscle strength and muscle mass) was diagnosed in 22 (36.7%) patients: in 10 (37%) cases with limited and in 12 (52.1%) with diffuse skin subtype (p=0.049). SP associated with low BMI (OR 1.36 [1.14; 1.61], p=0.01) and nutrition status by MNA score (OR 1.24 [1.02;1.52], p=0.03); OP with presence of hand joint contractures (OR 4.73 [1.39;16.08], p=0.01), duration of disease (OR 1.10 [1.03; 1.18], p=0.07), age (OR 1.06 [1.00; 1.12], p=0.04), low diffusing capacity of the lung for carbon monoxide (DLCO) (OR 5.68 [1.33; 24.24], p=0.02), duration of using proton pump inhibitors (PPI) (OR 1.02 [1.01; 1.03], p=0.007), postmenopause (OR 4.76 [1.15; 19.56], p=0.03), duration and cumulative dose of glucocorticoids (GC) (OR 1.13 [1.03; 1.23], p=0.008 and OR 1.06 [1.02; 1.10], p=0.003 respectively), low fat free mass (OR 1.13 [1.02; 1.24], p=0.01). No associations with obesity was found.

**Conclusion:** Different pathological phenotypes had 93.3% of patients. Only low BMI and nutrition status by MNA score were risk factors for SP in SSc patients, meanwhile age, menopause, hand joint contractures, duration of SSC, DLCO, PPI use, duration and cumulative dose of GC, fat free mass for OP.

## P476

### FACTORS AFFECTING BONE MINERAL DENSITY IN MEN WITH SYSTEMIC SCLERODERMA

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**Objective:** To determine the frequency of low BMD and identify factors associated with it in men with systemic scleroderma (SSc).

**Methods:** 37 men (age 56.0 [46.0; 61.0] y) with SSc were enrolled in the study: 19 (51.4%) with limited and 18 (48.6%) with diffuse cutaneous subtype without overlap rheumatic syndromes. The duration of SSc was 6.0 [3.0; 9.0] y. 31 (83.8%) patients took glucocorticoids (GC) for more than 3 months, the median duration of GC use 3.7 [2.0; 7.0] y. DXA of lumbar spine (LS), femoral neck (FN) and total hip (TH) was performed. For osteoporosis (OP) diagnosis WHO criteria were used. The search for traditional (age, smoking) and SSc-specific risk factors was carried out.

**Results:** Low BMD at least in one region of interest was detected in 19 (51.4%) patients: OP in 8 (21.6 %) and osteopenia in 11 (29.7%) men, without statistically significant difference between subtypes of the disease (p>0.05). 9 (24.3%) men had a history of low-trauma fracture, among them 2 (5.4%) patients had OP, 3 (8.1%) osteopenia and 4 (10.8%) persons normal BMD. A univariate linear regression analysis was performed to identify factors affecting the BMD: the level of alkaline phosphatase (AP) (b=-0.43, p=0.027) and uric acid (UA) (b=0.69, p=0.009) were associated with BMD in LS; SSc duration (b=-0.36, p<0.04), duration of GC intake (b=-0.5, p<0.005), number of falls during the past year (b=-0.98 p<0.003), the level of AP (b=-0.44, p<0.02), erythrocyte sedimentation rate (ESR) (b=-0.37, p<0.03) - with BMD in FN; and duration of GC intake (b=-0.53, p<0.003), AP (b=-0.4, p<0.04), creatinine level (b=-0.35, p<0.04) and ESR (b=-0.42, p<0.02) with BMD in TH.

**Conclusion:** Low BMD was found in 51.4% of men with SSc. There was no significant difference in the frequency of OP depending on the subtype of the disease. We found out that BMD associated with SSc duration, duration of taking GC; AP, UA, creatinine levels and ESR.



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### FREQUENCY AND RISK FACTORS FOR LOW BONE MINERAL DENSITY IN FERTILE WOMEN WITH SYSTEMIC SCLERODERMA

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**Objective:** To determine the frequency and risk factors for low BMD in fertile women with systemic sclerosis (SSc).

**Methods:** 64 women (36.0 [31.5; 43.5] years old) with SSc were enrolled in the study: 35 (54.7%) with limited and 29 (45.3%) with diffuse cutaneous subtype without overlap rheumatic syndromes. The duration of the disease was 5.0 [2.0; 9.0] y. DXA of the lumbar spine (LS), the femoral neck (FN) and the total hip (TH) was performed. To estimate the value of the BMD the Z-score was used. Low BMD was considered at the Z-score < -2.0 SD. A univariate linear regression analysis was performed to analyze the suspected factors affecting the BMD.

**Results:** Low BMD was detected in 8 (12.5%) patients. 5 (7.8%) women had a history of low-trauma fracture, among them 1 (1.6%) patient had low BMD and 4 (6.2%) persons - normal BMD. 24 (7.8%) patients smoked, the median smoking index was 4.2 [1.0; 7.5]. Glucocorticoids (GC) and proton pump inhibitors (PPI) were taken by 49 (76.6%) patients with the median duration of treatment 5.0 [2.0; 10.0] y and 52 (81.3%) women with the median duration of treatment 24.0 [7.0; 42.5] months, respectively. For the LS, BMD associated with the smoking index ( $b=0.65$ ,  $p<0.001$ ) and the cumulative dose of GC ( $b=-0.32$ ,  $p=0.021$ ); for BMD in FN and TH with duration of the disease ( $b=-0.28$ ,  $p=0.029$  and  $b=-0.31$ ,  $p=0.017$ , respectively), BMI ( $b=0.4$ ,  $p=0.001$  and  $b=0.53$ ,  $p<0.001$ , respectively), duration of PPI use ( $b=-0.43$ ,  $p=0.001$  and  $b=-0.32$ ,  $p=0.023$ , respectively), cumulative dose of GC ( $b=-0.44$ ,  $p=0.001$  and  $b=-0.49$ ,  $p<0.001$ , respectively) and additionally for TH BMD serum level of calcium and phosphorus ( $b=0.95$ ,  $p=0.004$  and  $b=0.97$ ,  $p=0.026$ ) and nutrition status according to the MNA questionnaire ( $b=0.44$ ,  $p=0.036$ ).

**Conclusion:** Low BMD was detected in 12.5% of fertile women with SSc. Among traditional factors, BMI and smoking had an impact on BMD, and among the specific ones - the duration of the disease and use of PPI, the cumulative dose of GC, nutrition status according to the MNA, the serum level of calcium and phosphorus.

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### DIABETES MELLITUS PREDICTS GREATER FRACTURE RISK INDEPENDENT OF ADIPOSITY AND BMD: A PROSPECTIVE STUDY IN UK BIOBANK

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**Objective:** We examined associations between diabetes and BMD, and secondly the predictive value of diabetes for incident fracture, independent of traditional clinical risk factors, adiposity, and BMD.

**Methods:** We used multivariate linear regression to ascertain cross-sectional relationships between diabetes (type 1 or 2) and heel estimated BMD (eBMD, quantitative ultrasound) in the UK Biobank, controlling for clinical risk factors [age, smoking, alcohol use, deprivation, physical activity, comorbidities, menopause (in women), total fat mass (bioimpedance)]. We estimated the independent predictive value of diabetes for incident fracture using Cox proportional hazards models.

**Results:** We studied 273,353 women (mean age 56.3 y) and 229,107 men (mean age 56.7 y). In fully adjusted models, eBMD was 0.02 (95%CI: 0.02, 0.03) g/cm<sup>2</sup> higher in diabetic vs. nondiabetic women with a smaller mean difference in men [0.01 (0.00, 0.01) g/cm<sup>2</sup>]. In longitudinal analyses (3,147,694 person-years for women; 2,662,834 person-years for men), individuals with diabetes at baseline had a greater risk of incident fracture independent of traditional risk factors [women; hazard ratio: 1.29 (95%CI: 1.21, 1.39); men: 1.24 (1.15, 1.33)] and additionally for either total fat mass [women: 1.31 (1.22, 1.41); men: 1.25 (1.17, 1.35)] or estimated heel BMD [women: 1.44 (95%CI: 1.27, 1.64); men: 1.21 (1.07, 1.38)].

**Conclusion:** Diabetes is associated with greater risk of incident fracture independent of traditional risk factors, adiposity, and BMD. These findings support potential mechanisms linking diabetes with bone fragility that are not captured by BMD measurements and thus may add value to fracture risk assessment.

**Acknowledgment:** This work was undertaken using the UK Biobank resource under approved application 3593.

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### ARE SERUM 25-HYDROXYVITAMIN D DEFICIENCY AND INSUFFICIENCY RISK FACTORS FOR THE INCIDENCE OF DYNAPENIA?

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**Objective:** To analyze whether serum 25(OH)D deficiency and insufficiency are risk factors for the incidence of dynapenia in individuals aged 50 or older and whether osteoporosis or vitamin D supplementation could modify these associations.

**Methods:** Longitudinal study including 3205 nondynapenic ELSA study participants (handgrip strength  $\geq 26$  kg for men and  $\geq 16$  kg for women) at baseline. Vitamin D was measured at baseline by the serum concentration of 25(OH)D and classified as sufficient ( $>50$  nmol/L), insufficient ( $\geq 30$  and  $\leq 50$  nmol/L) or deficient ( $<30$  nmol/L). The incidence of dynapenia was determined by a grip strength  $<26$  kg for men and  $<16$  kg for women at the end of the 4-y follow-up. Poisson regression models were adjusted for sociodemographic, behavioral, clinical, and biochemical characteristics.

**Results:** The mean age of the 3205 eligible subjects was 67.4 ( $\pm 7.6$ ), and 53.9% of the participants were female. The incidence density of dynapenia (per 1000 persons/y) was 13.1 (95%CI: 9.69-17.73) among those with sufficient 25(OH)D, 20.2 (95%CI: 14.70-20.71) among those with insufficiency and 27.4 (95%CI: 19.55-38.29) among those with deficiency. Serum 25(OH)D deficiency was a risk factor for the incidence of dynapenia (IRR=1.70; 95%CI: 1.04-2.79  $p<0.05$ ). In individuals without osteoporosis and those who did not use vitamin D supplementation, both serum 25(OH)D deficiency (IRR=1.78; 95%CI: 1.01-3.13  $p<0.05$ ) and insufficiency (IRR=1.77; 95%CI: 1.06-2.94  $p<0.05$ ) were risk factors for the incidence of dynapenia.

**Conclusion:** A serum level of 25(OH)D  $<30$  nmol/L is a risk factor for the incidence of dynapenia. Among individuals without osteoporosis and those who do not take vitamin D supplementation, the threshold of risk is higher ( $\leq 50$  nmol/L).

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### GENDER DIFFERENCES IN FRAGILITY FRACTURES: ASSESSMENT OF PATIENTS OBSERVED AT EMERGENCY DEPARTMENT

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**Objective:** To assess the gender differences in OP and FF regarding treatment rate, risk of new fractures and overall mortality in patients observed at the Emergency Dept. (ED).

**Methods:** Retrospective monocentric study, that included patients with a FF (wrist, hip and vertebrae), observed at the ED in a tertiary center between 1 January 2017 and 31 December 2018. The search for fractures was performed through ICD9 codes and clinical data was reviewed until 31 December 2020. We excluded totally dependent patients or in palliative care, periprosthetic fractures and patients with osteometabolic diseases other than OP. We identified 1673 FF and after calculating a representative sample (95%CI) 457 patients were included. In addition to the demographic data, the prescription of antiosteoporotic agents (AOA), the occurrence of a new FF and all-cause mortality were assessed and compared between genders. SPSS was used for statistical analysis and significance level was defined as 2-sided  $p<0.05$ .

**Results:** 172 patients with hip fracture, 173 with wrist fracture and 112 with vertebral fracture were included. Most patients were women (79.9%). The mean age at the time of the fracture for men and women was 76.9 (SD=10.8) and 77.8 (SD=10.2) years old, respectively.

There was an association between male gender and higher mortality risk ( $p=0.024$ ). Overall, 120 patients (26.3%) died during the follow-up, 35.9% of men and 23.8% of women. Regarding male mortality, 57.6% occurred in the first year, whereas only 20.7% of all female mortality occurred in the same period. Most deaths occurred after hip fracture, in both genders. The treatment rate with AOA after FF was lower in men than in women (4.35% and 8.22% respectively), however, with no statistically significant differences. Similarly, only a minority ( $n=2$ ) of men included in this study performed a densitometry after the FF. There was also no association between gender and occurrence of a new FF.

**Conclusion:** In this study, mortality after a FF was higher in men, in line with the existing literature. Also, although it did not reach statistical significance, the proportion of men treated with AOA was lower when compared to women. Effective screening for osteoporosis and early treatment for high-risk patients must be considered, whatever the gender.

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### BONE MATRIX RELATED STRENGTH FEATURES OF THE TIBIA IN DIABETIC RATS AFTER REPEATED FRACTURE

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**Objective:** To test strength features of the tibia with respect to state of bone matrix in diabetic rats after repeated fracture.

**Methods:** 64 female rats were separated into three groups as follows: group 1 comprised intact animals. Group 2 – nondiabetic animals with single 2-mm openings in the femur and the tibia made for purposes of fracture modeling. Opening in the femur was placed between the distal metaphysis and the shaft and in the tibia opening was applied to the proximal area. 45-day space between interventions was assigned for complete healing of the femur fracture. Group 3 comprised the animals that underwent the same surgery after 60-d adipogenic diet that lasted up to the end of the experiment. Observation terms were 7, 15, 30, and 60 d. Upon expiration of each observation term tibiae were collected and prepared for strength testing. Strength test employed three-point bending technique. Parameters calculated from testing were specific sag and Young's modulus.

**Results:** In animals of the group 2 values of elasticity modulus exhibited decrease in all observation terms as compared to those of the group 1. Specific sag exhibited insignificant increase in all terms. Generally, bone strength in this group tended to recovery. In the group 3 in comparison with group 2 specific sag values increased though insignificantly except for the 60<sup>th</sup> day when its value increased by 18.15%. Larger deflection distance here testifies for inability of the bone to withstand bending deformation. Young's modulus values decreased in the period from the 15<sup>th</sup> to the 60<sup>th</sup> day by 25.23%, by 25.37%, and by 34.21% ( $p \leq 0.05$  for all data) respectively. Lower Young's modulus results from low quality of bone matrix in diabetes accompanied by repeated fracture.

**Conclusion:** In diabetic rats strength of fractured tibia after fracture of the femur decreases in part due to bone matrix impairment. Restoration of strength in this case is not observed.

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### IS BONE MINERAL DENSITY OF THE FEMORAL NECK PREDICTIVE OF VERTEBRAL FRACTURES?

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**Objective:** Osteoporotic fractures constitute a major public health concern. Indeed, they have a substantial impact in terms of quality of life, disability not to mention the economic implications, particularly after hip and vertebral fractures. In this context, site-specific BMD generally predicts osteoporotic fracture for their respective sites [1]. The aim of this study was to investigate the association between BMD of the femoral neck (FN) and the presence of a vertebral fracture.

**Methods:** We conducted a cross-sectional study including patients with no FN fractures, referred for an assessment of the BMD through DXA. BMD was measured using standard methods over the lumbar spine L1-L4, and the total proximal femur. The results were expressed as T-scores according to the WHO definition. Vertebral fractures were identified by an experienced rheumatologist through Vertebral Fracture Assessment. The level of significance was fixed for  $p < 0.05$ .

**Results:** 100 patients were included with a mean age of  $66.9 \pm 9.5$  [46.7-83] y. There was a female predominance (91%), with a sex ratio of 0.1. Half of the patients had osteopenia (48.9%), 27.7% had osteoporosis and 23.4% had normal BMD. Nearly 28.4% of the patients had a vertebral fracture. The mean right and left T-scores at the femoral neck were  $-1.22 \pm 1.05$  [-3.3, 2.4] and  $-1.16 \pm 1.08$  [-3.7, 3.1] respectively. The mean bone mass in both sites was  $0.87 \pm 0.16$  [0.09, 1.45] and  $0.89 \pm 1.4$  [0.56-1.55] respectively. There was no association between the presence of VF and the T-score of both FN ( $p = 0.275$ ,  $p = 0.221$  respectively). The mean bone mass in both sites (right and left FN) was similar between patients with and without VF ( $p = 0.67$  and  $p = 0.26$  respectively). However, there was a significant association between age and the presence of VF ( $p = 0.03$ ).

**Conclusion:** Our study showed that lower BMD of the femoral neck was not associated with the presence of vertebral fractures. This should be studied further to understand possible correlations with patients' future fracture risk.

**Reference:** 1. Iconaru L, et al. JBMR Plus 2019;3:e10238

P483

### BONE MINERAL DENSITY PROFILE IN CHILDREN WITH HEMATOLOGICAL DISORDERS

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**Objective:** Despite the significant improvement in hematological disorders, there are growing concerns regarding their long-term complications, especially those related to treatments. Thalassemia is associated with osteopenia and osteoporosis and is of multifactorial origin including iron overload, increased bone re-

sorption, and decreasing bone formation [1]. This study aimed to evaluate the status of bone health of children with hematologic disorders.

**Methods:** We conducted a cross-sectional study including children followed for hematological diseases, who were referred for an assessment of BMD. Sociodemographic data, disease history as well as treatment modalities were recorded. BMD was measured over the lumbar spine L1-L4 and the whole body. The results were expressed as Z-scores. A low bone mass (LBM) was defined as a Z-score of  $-2$  or more according to the International Society for Clinical Densitometry [1].

**Results:** The mean age of the studied population was  $13 \pm 3.7$  y [6-17], and 64% were males. The main hemopathies were  $\beta$  thalassemia major (n=7) treated with chelating agents and transfusions, metabolic disorder (n=1), lymphoproliferative disorder (n=1), IgG4 related disease (n=1), and primitive nephrotic syndrome (n=1). The prescribed immunosuppressive treatments included corticosteroids (n=4), Mycophenolate mofetil (n=1), and rituximab (n=1). The mean weight was  $37 \pm 11.8$  kg [23-65]. The mean height was  $1.4 \pm 0.1$  m [1.2-1.6]. The mean BMI was  $18 \pm 3.8$  [13-27] kg/m<sup>2</sup>. The mean Z-score and bone mass at the femoral site were  $1.2 \pm 1.8$  SD [-2.9, 2] and  $0.8 \pm 0.2$  g/cm<sup>3</sup> [0.6-1.2] respectively. The mean Z-score and bone mass of the whole body were  $-0.5 \pm 1.5$  SD [-3.2, 1.6] and  $0.9 \pm 0.15$  g/cm<sup>3</sup> [0.6-1.1] respectively. The prevalence of low BMD was 63% at the lumbar spine and 18% at the whole body. The discrepancy in BMD concerned patients with B thalassemia. There was a significant correlation between the Z-score at the lumbar spine and the whole body ( $p=0.014$ ) as well as the BMI ( $p=0.016$ ). However, there was no association between low BMD and age ( $p=0.128$ ), sex ( $p=1$ ) as well as BMI ( $p=0.208$ ). Similarly, patients with  $\beta$  thalassemia major had higher BMD according to the Z-score and bone mass than other hemopathies without reaching a statistically significant difference ( $p=0.792$ ,  $p=0.662$ ).

**Conclusion:** Our study showed a high prevalence of low BMD among children with hematological disorders. Particularly, this prevalence was higher at the lumbar spine in patients with B thalassemia, which is in accordance with previous studies suggesting that the lumbar spine may be more affected in thalassemia major patients in comparison to the other sites of BMD assessment.

**Reference:** 1. Bordbar M, et al. Arch Osteoporos 2020;15:148

P484

## PSYCHOLOGICAL HEALTH OF PATIENTS WITH RHEUMATOID ARTHRITIS AND ARTERIAL HYPERTENSION

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**Objective:** Rheumatoid arthritis (RA) is a chronic inflammatory disease of the joints, often leads to disability and social restrictions, the presence of comorbid pathology further worsens the quality of life (QoL) of patients. We aimed to assess the psychological component of health, the level of anxiety and depression in RA patients with concomitant arterial hypertension.

**Methods:** The study involved 20 patients with RA receiving basic therapy and nonsteroidal anti-inflammatory drugs (100%), prednisolone (in dose up to 10 mg/d - 55%). The mean age was  $52.6 \pm 12.8$  y, the disease duration was  $6.3 \pm 4.6$  y. All patients had arterial hypertension of 1-3 degrees. RA was diagnosed according to the ACR/EULAR 2010 criteria; arterial hypertension was diagnosed according to the ESC/EOAH 2018 guidelines for the treatment of patients with arterial hypertension. The QoL of patients was determined according to the SF-36 questionnaire (Short Form-36-Item Health Survey), the level of anxiety and depression was determined according to HADS (Hospital Anxiety and Depression Scale).

**Results:** The SF-36 scale assessed the physical and psychological components of health, which were reduced (mean 34.82 and 36.56, respectively). Vitality and social functioning were decreased among the QoL indicators characterizing psychological health. Scales of physical and psychological health had moderate correlations with age, disease activity, number of tender and swollen joints. The study of the psychoemotional status revealed clinically pronounced anxiety in 30% of RA patients and subclinical anxiety in more than half (55%). The severity of anxiety on the HADS scale had direct positive correlation with age ( $r=0.32$ ), disease activity according to DAS28-CRP(4) ( $r=0.34$ ), disease duration ( $r=0.28$ ), functional class ( $r=0.36$ ); intensity of depression - with age ( $r=0.38$ ) of patients.

**Conclusion:** The study of QoL in RA patients with concomitant arterial hypertension revealed the decreased indexes of psychological health component. Anxiety-depressive disorders were registered in 85% of patients. Indicators of QoL and level of anxiety correlated with age, degree of disease activity, its duration, and functional class. The presence of psychoemotional changes in comorbid patients requires a comprehensive approach to the correction of all spheres of life activity.



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### AROMATASE INHIBITORS AND SKELETAL HEALTH: NATURAL HISTORY AND INTERVENTIONAL EPIDEMIOLOGY

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**Objective:** Determine the real-world impact of aromatase inhibitor bone loss (AIBL) and if bone sparing therapy utilising standard risk stratification model is sufficient for fracture prevention.

**Methods:** A longitudinal study of patients prescribed AI for breast cancer over 7 y at our university teaching hospital with access to demographics, disease parameters, investigations and drug management. DXA prior to initiation of AI was compared with subsequent imaging (over a mean of 3 y). Outcome data for cancer and fractures was collected. Statistical analysis was done to investigate relationships amongst variables of interest.

**Results:** 1001 women were identified. Mean age was 64 y (range 29-93). 929 (93%) were Caucasian, 723 (72%) had invasive ductal carcinoma and 863 (86%) were postmenopausal. At diagnosis, 428 (43%) had node positive disease and 35 (4%) had metastases. 91 (9%) had fractures prior to their cancer diagnosis. Baseline DXA showed: 496 (49.6%) had osteopenia, 151 (15%) osteoporosis and 354 (35.4%) normal. 478 (48%) had a repeat scan. There was a decline (mean of 0.888 to 0.858 g/cm<sup>2</sup>, p<0.0001) in left neck of femur (LNOF) BMD over a mean of 3 y (range 1-6). 334 (33%) received bone active therapy, 276 (83%) received oral bisphosphonates. BMD improved by 0.4% (LNOF mean BMD of 0.785 g/cm<sup>2</sup> at baseline vs. LNOF mean BMD of 0.788 at repeat DXA, p=0.82). Women who were not offered any treatment (n=667, 66%), showed a -5% decline in BMD (LNOF mean BMD of 0.939 g/cm<sup>2</sup> at baseline vs. LNOF mean BMD of 0.888 g/cm<sup>2</sup> at repeat DXA, p<0.0001). The rate of fractures remained the same between the treatment (n=19, 5.67%) and nontreatment group (n=38, 5.70%).

**Conclusion:** We provide long term data for AIBL and confirm bone sparing therapy is effective in reducing the pace of decline in BMD. However, standard risk stratification model (e.g., FRAX based intervention thresholds) in mainly those with osteoporosis (T ≤ -2.5) are ineffective in fracture prevention in keeping with prior literature. Our study period overlaps with publication of newer guidelines recommending different T-score-based risk model, further studies are required to confirm their utility.

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### UPDATE OF THE FRACTURE RISK PREDICTION TOOL FRAX: A SYSTEMATIC REVIEW OF POTENTIAL COHORTS AND ANALYSIS PLAN

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**Objective:** The availability of the fracture risk assessment tool FRAX<sup>®</sup> has substantially enhanced the targeting of treatment to those individuals at high risk of fracture. Accordingly, FRAX has been incorporated in more than 100 clinical osteoporosis guidelines worldwide. The aim of the present study is to determine whether the current algorithms can be further optimised by deriving more precise sex- and/or ethnicity-specific coefficients for current and novel risk factors from existing and novel cohorts.

**Methods:** A computerized literature search was performed in PubMed from inception until May 17, 2019 to identify eligible cohorts for updating the FRAX coefficients. Prospective cohort studies with data on baseline clinical risk factors and incident fractures were eligible.

**Results:** Of the 836 records retrieved, 53 were selected for full-text assessment after screening on title and abstract. Twelve cohorts were deemed eligible and of these, 4 novel cohorts were identified. These cohorts, together with 60 previously identified cohorts will provide the data source for constructing an updated version of FRAX. The study population comprises 2,138,428 participants with a follow-up of approximately 20 million person-years and 116,117 documented incident major osteoporotic fractures. For each known and candidate risk factor, multivariate hazard functions for hip fracture, major osteoporotic fracture and death will be tested using extended Poisson regression. Sex- and/or ethnicity-specific differences in the weights of the risk factors will be investigated. After meta-analyses of the cohort-specific beta coefficients for each risk factor, models comprising 10-year probability of hip and major osteoporotic fracture, with or without femoral neck BMD, will be computed.

**Conclusion:** The assembled cohorts and described models will provide the framework for an updated FRAX tool enabling enhanced assessment of fracture risk, facilitating more accurate identification of individuals at high risk of fracture, and further optimising appropriate intervention strategies for osteoporosis.

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**INCREASED DEGRADATIVE METABOLISM AT HIGH VITAMIN D LEVELS TO PREVENT HYPERCALCEMIA**N. N. Katamadze<sup>1</sup>, Z. V. Abilov<sup>1</sup>, E. A. Pigarova<sup>1</sup>, A. A. Povaliaeva<sup>1</sup>, L. K. Dzeranova<sup>1</sup>, L. Y. Rozhinskaya<sup>1</sup><sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** Maintaining Ca and vitamin D (vitD) levels within the reference range prevent the deterioration of BMD. Recently, due to the multiple positive pleiotropic effects of vitD on various organs and systems, there has been a boom in the popularity of this vitamin with a high frequency of its self-administration and administration in high doses. Without regard of favorable effects, we have to take caution and avoid excessive vitD and Ca supplementation. The aim of this study was to evaluate the metabolism of vitD in a patient with vitD-induced hypercalcemia.

**Methods:** A 61-year-old woman with secondary hyperparathyroidism and postmenopausal osteoporosis referred to our department of parathyroid pathology in 2015. Antiosteoporosis treatment was initiated: ibandronate 150 mg PO monthly, alfacalcidol 1.0 µg/d, calcium carbonate 500 mg/d, cholecalciferol 20 000 IU/wk.

**Results:** During the examination at our center in November of 2021, we found out a decline in BMD. DXA showed a T-score at spine -2.7 (-6.7% from 2020), femoral neck - 2.2 (-16%). Additionally, laboratory tests have been run: PTH 4.24 pg/ml (1.8-6.5), total Ca 2.62 mmol/l (2.15-2.55 mmol/l), ionized Ca 1.18 mmol/l (1.03-1.28 mmol/l), 25(OH)D (Diasorin) 89 ng/ml (30-60 ng/ml). The patient was recommended to stop all vitD preparations for 1 month and to reevaluate after. In December 2021: 25(OH)D (Diasorin) levels declined to 60.1 ng/ml. LC/MS/MS: 1.25(OH)2D -77 pg/ml (18-78), 25-OH-D3 60.6 > ng/ml (20.0 - 60.0), 25-OH-D2 < 0.1 < ng/ml (20.0 - 60.0), total 25-OH-D 61 > ng/ml (20 - 60), 3-epi-25-(OH)-D3 5.8 ng/ml (1.0 - 10.0), 24,25-(OH)2-D3 9.5 > ng/mL (0.5 - 5.6), 25-(OH)-D3/24,25-(OH)2-D3 6.4 < (7.0 - 25.0).

**Conclusion:** In this case report we would like to emphasize the importance of maintaining 25(OH)D within the target range (30-60 ng/ml) and avoid excessive supplementation in order to prevent degradative metabolism at high vitD levels to impede hypercalcemia.

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**ASSOCIATION OF OSTEOARTHRITIS WITH FRACTURE RISK AND BONE MINERAL DENSITY**K. Markovic<sup>1</sup>, S. Bacevic<sup>2</sup>, M. Bacevic<sup>3</sup>, M. Bacevic<sup>3</sup>

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**Objective:** Osteoarthritis (OA) is associated with an increased risk of osteoporotic fractures. Numerous studies have demonstrated low bone density in OA. These studies have examined the risk of fragility fracture, another major contributor to the pathogenesis of fractures (particularly hip fractures). This work aims to investigate the relationship between fragility fracture and OA, define high-risk subgroups, and determine what proportion of patients have increased risk of hip fracture due to osteoporosis and increased fall risk.

**Methods:** Data from 290 men and 482 women older than 43 y were analyzed. Individuals were followed up for up to 10 y (average: 3.4 y). BMD of the neck of the femur and lumbar spine was measured by DXA Hologic Discovery. The presence of OA was determined based on the primary diagnosis. The frequency of fractures with minor traumas was determined based on X-rays.

**Results:** A total of 772 patients were analyzed, of which 62.4% were women and 37.6% were men, with a diagnosis of OA. The risk of fracture was significantly higher in patients with OA compared to those without OA (risk ratio (HR)=1.50; 95% confidence interval (CI), 1.18-1.86). The association was mainly observed in women with osteopenia BMD (HR=1.74; 95%CI, 1.28-2.27) and normal BMD (HR=1.50; 95%CI, 1.16-2.03), and not in those with osteoporosis. Further analysis revealed that women with osteopenia with OA had a significantly increased risk of vertebral fractures (HR=1.85; 95%CI, 1.34-2.65) and limb fractures (HR=2.49; 95%CI). 1.87-3.38), but not hip fracture. In men, no comparable relationship was found that defines high-risk subgroups.

**Conclusion:** Patients with OA have an increased risk of fragility fracture. The risk is mainly observed in the group of non-osteoporotic women. In men, this correlation was not observed.

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**RISK OF FALLS AND FRACTURE IN WOMEN WITH PROBABLE SARCOPENIA**N. Grygorieva<sup>1</sup>, M. Bystrytska<sup>1</sup>, A. Musiienko<sup>1</sup>, N. Zaverukha<sup>1</sup>

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**Objective:** It is well known that sarcopenia is a potential risk factor for falls and fractures in an older population, however, the strength of its influence on falls, and fractures risks is unclear and currently being actively discussed. The aim of the study was to determine the risk of falls and fractures in older age women with probable sarcopenia.

**Methods:** Our study included 460 women 50-84 years old (mean age 66.4±8.8 y, mean BMI 27.5±5.2 un.) which were divided into 2 groups: the group of healthy subjects (n=322), the group with probable sarcopenia (n=138). The probable sarcopenia was determined due to muscles strength (handgrip strength using spring

hand dynamometer ( $\leq 16$  kg) and physical performance (5-time chair stand test ( $>15$  s)). Desmond Fall Risk Questionnaire and the Ukrainian version of FRAX<sup>®</sup> (calculated without and with BMD using with DXA) were used for falls and fractures risk assessment.

**Results:** In women with probable sarcopenia, a higher fall risk according to the Desmond Fall Risk Questionnaire was revealed compared to women without sarcopenia (8.0 [7.0-8.0] and 2.0 [0-4.0] un., respectively,  $p < 0.001$ ). The risk of major osteoporotic fractures and hip fracture according to FRAX, determined without BMD was higher in subjects with probable sarcopenia (8.3 [5.2-11.0] vs. 5.0 [3.8-8.5]%) and 2.6 [1.6-4.8] vs. 1.0 [0.6-2.4] %, respectively). The FRAX indices which took into account the BMD parameters were also higher in females with probable sarcopenia. The women with probable sarcopenia were significantly older than women without sarcopenia ( $63.7 \pm 7.8$  and  $72.7 \pm 7.7$ ,  $p < 0.05$ ). After conducting standardization by age, significant differences in the risk of falls and fractures still persisted.

**Conclusion:** Women with probable sarcopenia have poorer muscle strength, a higher risk of falls and fractures, and are more likely to need outside help. Significant differences in the risk of falls and fractures persisted after age standardization, indicating their independent effect on sarcopenia.

## P490

### COST-EFFECTIVENESS OF FRACTURE LIAISON SERVICES IN CHINA

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**Objective:** To assess the cost-effectiveness of fracture liaison services (FLSs) from the Chinese healthcare perspective with a lifetime horizon.

**Methods:** A previously validated Markov microsimulation model was adapted to estimate the cost-effectiveness of FLS compared to no-FLS. The evaluation was conducted in patients with a recent fracture aged 65 years. Treatment pathways were differentiated by gender, FLS attendance, osteoporosis diagnosis, treatment initiation, and adherence. Given the uncertainty in FLS cost, the cost in the base-case analysis was assumed at USD 200. Analyses were also performed to determine the maximum cost that can make the FLS to be cost-saving and cost-effective at the Chinese Willingness-to-pay (WTP) threshold. One-way sensitivities analyses were conducted.

**Results:** Compared with no-FLS, FLS was dominant (lower costs, higher quality-adjusted life years) in our target population at the FLS cost of USD 200 per patient. For every 100 patients who were admitted to the FLS, approximately four hip fractures, nine clinical vertebral fractures, and three wrist fractures would be avoided over their lifetimes. Our findings were robust to numerous one-way sensitivity analyses, however, the FLS was not cost-effective in patients aged 80 years and older.

**Conclusion:** FLS is cost-saving in secondary fracture prevention in the Chinese setting. Our results support the necessity of the implementation and development of FLSs in China.

## P491

### CAN TELOMERE LENGTH PREDICT OSTEOPOROSIS IN THE UKRAINIAN POPULATION?

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**Objective:** Telomeres are repetitive DNA sequences located at the end of chromosomes. Their length indicates cellular senescence and can be a marker for the progression of age-related diseases. The relationship between telomeres length and bone health is currently actively studied as results from in Vivo, and in Vitro researches are ambivalent. However, some clinical studies demonstrate that the shortest telomeres length can be associated with the highest bone loss. The aim of this pilot study was to evaluate the relationship between relative telomere lengths (RTLs) in Ukrainian postmenopausal women depending on osteoporosis (OP) presence.

**Methods:** We examined 63 females aged 45 years and older (mean age  $64.5 \pm 9.1$  y, height  $160.7 \pm 6.6$  cm, body mass  $81.5 \pm 15.5$  kg), which were divided into two groups: 1st one: 15 women with OP, 2nd group - 48 healthy females. Patients with OP were significantly older than women of the 2nd group and had lower height and body mass ( $p < 0.05$ ). BMD was measured by DXA ("Prodigy" unit, CE Medical systems, model 8743, 2005) in the spine, femoral neck, and total hip, and the lowest index was chosen for confirmation of the diagnosis of OP. The RTLs were measured by a multiplex real-time quantitative polymerase chain reaction (qPCR). DNA was extracted from the PBMC using a standard protocol for phenol-chloroform DNA extraction. PCR reaction mix was prepared using a commercial reagent kit Luna<sup>®</sup> Universal qPCR and RT-qPCR (New England Biolabs) with the addition of betaine (Sigma-Aldrich) at a final concentration of 1 M. All DNA samples were run in triplicates.

**Results:** The mean parameters of RTLs were 0.49 [0.31-0.73] vs. 0.40 [0.25-0.55] in the 1st and 2nd groups, respectively, and the difference was statistically insignificant. Also, we did not find any reliable relationship between the RTLs and age ( $p = 0.55$ ), main

anthropometric characteristics (body weight, height, BMI), BMD of the spine ( $p=0.98$ ), hip ( $p=0.86$ ), and femoral neck ( $p=0.87$ ) in entire group and separately in subjects with and without OP also after conducting standardization by age.

**Conclusion:** Our pilot study did not reveal any differences in RTLs in Ukrainian postmenopausal women depending on OP presence and any relationship between RTLs and BMD of various skeleton sites. These results require continuing studies with stricter design.

## P492

### A HEAD-TO-HEAD COMPARISON OF EQ-5D-5L AND SF-6D IN DUTCH PATIENTS WITH FRACTURES VISITING A FRACTURE LIAISON SERVICE

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**Objective:** This study compared the psychometric properties of EQ-5D-5L and SF-6D to assess the interchangeability of both instruments in patients with a recent fracture presenting at a fracture liaison service (FLS).

**Methods:** Data from a prospective observational study in a Dutch FLS clinic were used. Over three years, subjects were interviewed at several time points using EQ-5D-5L and SF-36. Floor and ceiling effects were evaluated. Agreement was evaluated by intra-class correlation coefficients and visualized in Bland-Altman plots. Spearman's rank correlation coefficients were applied to assess convergent validity. Mann-Whitney U test or Kruskal-Wallis H test as well as effect size (ES) were used to explore known-groups validity. Longitudinal validity was explored using standardized response mean (SRM) and ES. For each measurement property, hypotheses on direction and magnitude of effects were formulated.

**Results:** A total of 499 patients were included. EQ-5D-5L had considerable ceiling effect in comparison to SF-6D (21% vs. 1.2%). Moderate agreement between the (UK and Dutch) EQ-5D-5L and SF-6D was identified with intra-class correlation coefficients of 0.625 and 0.654, respectively. Bland-Altman plots revealed proportional bias as the differences in utilities between two instruments were highly dependent on the health states. High cor-

relation between instruments was found (UK:  $\rho=0.758$ ; Dutch:  $\rho=0.763$ ). EQ-5D-5L and SF-6D utilities showed high correlation with physical component score but low correlation with mental component score of SF-36. Both instruments showed moderate discrimination ( $ES>0.5$ ) for subgroup by baseline fracture type, and moderate responsiveness ( $SRM>0.5$ ) in patients that sustained a subsequent fracture.

**Conclusion:** Both EQ-5D-5L and SF-6D appeared to be valid utility instruments in patients with fractures attending the FLS. However, they cannot be used interchangeably given only moderate agreement was identified, and differences in utilities and ceiling effect were revealed. Comparable construct and longitudinal validity were indicated, and neither instrument was found to be clearly superior.

## P493

### BONE MINERAL DENSITY AND RISK OF OSTEOPOROTIC FRACTURES IN UKRAINIAN WOMEN WITH SYSTEMIC LUPUS ERYTHEMATOSUS

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**Objective:** Osteoporosis and fragility fractures are common in patients with systemic lupus erythematosus (SLE) due to the inflammatory disease itself, low serum vitamin D level, use of glucocorticoids, and their connection in the different populations being currently studied. The aim was to determine the BMD parameters and risk of osteoporotic fractures in Ukrainian women with SLE.

**Methods:** We examined 150 women aged 20-75 years old, which were divided into 2 groups: 50 patients with confirmed SLE and 100 healthy subjects. The females did not differ in terms of age ( $p=0.60$ ), height ( $p=0.86$ ), body mass ( $p=0.09$ ), and the duration of the postmenopausal period ( $p=0.81$ ), however, the menopause age was significantly lower in subjects with SLE ( $47.9\pm 4.7$  and  $42.1\pm 15.3$  y, respectively,  $p<0.05$ ). We measured the parameters of BMD in the different areas of the skeleton by means of the "Prodigy" unit (CE Medical systems, model 8743, 2005). The 10-y probability of major osteoporotic and hip fractures was measured using the Ukrainian version of the FRAX questionnaire without and with BMD in the subgroup of women aged 40-75 y.

**Results:** BMD was significantly lower in women with SLE than in healthy subjects (lumbar spine:  $0.87\pm 0.13$  vs.  $0.96\pm 0.17$  g/cm<sup>2</sup> ( $p=0.02$ ), femoral neck:  $0.68\pm 0.11$  vs.  $0.75\pm 0.14$  g/cm<sup>2</sup> ( $p=0.03$ ), proximal femur:  $0.83\pm 0.10$  vs.  $0.92\pm 0.16$  g/cm<sup>2</sup> ( $p=0.02$ ), and total body:  $0.95\pm 0.05$  vs.  $1.06\pm 0.12$  g/cm<sup>2</sup>, respectively ( $p=0.03$ )). In women with SLE the risk of osteoporotic fractures according to the FRAX questionnaire without BMD was significantly higher compared to parameter in control group (risk of major osteoporotic fractures was  $9.0$  [6.0-13.0] vs.  $3.6$  [3.0-6.1]%) ( $Z=5.9$ ;  $p<0.001$ );



hip fractures – 2.4 [0.8-4.2] vs. 0.5 [0.3-1.2]% (Z=5.4; p<0.001)). Similar differences between the studied groups were observed in FRAX questionnaire parameters with BMD calculation.

**Conclusion:** BMD in Ukrainian women with SLE was significantly lower than in the healthy females; however, the risk of major osteoporotic and hip fractures was significantly higher than in the healthy subject that requires the dynamic monitoring of bone health and risk of fracture in patients with SLE.

## P494

### QUS CHARACTERISTICS IN NORMAL IRANIAN POPULATION

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**Objective:** Quantitative ultrasound (QUS) is a bone densitometry method that is less expensive and more portable than DXA. It is also noninvasive. QUS parameters include speed of sound (SOS), broad band ultrasound attenuation (BUA), and stiffness index (SI). This study defined normal values of QUS parameters in Iranian men and women.

**Methods:** QUS of heels measured in 258 Iranian men and women, aged 20-76 y/o. They were participants of Iranian Multicenter Osteoporosis study (IMOS), selected by randomized sampling. QUS device was an Achilles+ (GE-Lunar) device.

**Results:** Percentiles of SI (2.5%, 50%, and 97.5%) determined. We found a good agreement between the Iranian reference values and western reference (used by device) value in defining normal and osteoporotic people (k=0.875).

**Conclusion:** Results from this study suggest that QUS of the heel may be a good method for diagnosis of low bone mass in different regions in the world.

## P495

### DOCTORS ARE A RISK GROUP FOR THE DEVELOPMENT OF OSTEOPOROSIS, PROBLEMS EXAMINATIONS AND TREATMENTS

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**Objective:** Among medical workers there is a fear of examination and there is a low adherence to the prevention and treatment of a number of diseases, including osteoporosis (OP). We started a course of training lectures for the basics of diagnosis and treatment of OP with a survey of students and a practical lesson following it. Purpose of the study. Assess the frequency of decreased BMD in physicians, raise awareness of the frequency of decreased BMD, assess attitudes towards therapy.

**Methods:** The risk of fractures was calculated according to FRAX in physicians of therapeutic specialties; A. B. Zborovsky, Volgograd. BMD was determined using the Lunar DPX (GE) apparatus.

**Results:** The average age of 59 students was 54±10.55 (M±σ) years, 36 women aged 50 y and older, 23 under the age of 50 y, the average BMI - 26.51±4.8 kg/m<sup>2</sup>. In 47 (79.6%) out of 59, a decrease in BMD below normal values (according to the T/Z criterion, according to age) was detected in at least two positions. In 15 (25.4%) of them, a decrease in BMD by T-criterion by -2.5 SD and below was detected, which corresponds to the diagnosis of osteoporosis, 9 had previously undergone DXA, was diagnosed with OP, and prescribed drug therapy. 3 people take medicines on a regular basis. 6 previously treated, the last 2-3 y were not examined and did not take anything. In 6 listeners, OP was detected for the first time, for 2 listeners the diagnosis of OP was a complete surprise, 4 suspected a possible decrease in BMD, but did not expect such low indicators to be detected (T-test -2.5 and -2.6 SD for the lowest values). Of the 5 students under 50 y of age with a decrease in BMD according to the Z criterion <-2.0 SD, 4 had significant risk factors. No obvious risk factors were identified in 1 student. Mean TL1-L4 values were -1.26±1.06 SD [0.8 to -3.1], ZL1-L4=-0.68±0.9 [+1 to -2.7], mean values for T Neck were -1.14±1.04 [range 1.5 to -2.7], Z Neck -0.26±0.88 [range 1.9 to -1.7].

**Conclusion:** As a result of the study, a high percentage of detecting a decrease in BMD in female doctors was found. Low compliance with treatment was found in doctors over 50 years old, a positive attitude towards preventive measures among younger doctors. Invited doctors with a history of low-traumatic fractures did not come for examination, citing high employment. Conducting theoretical and practical classes in small groups based on the assessment of their own survey data allows increasing the interest of practitioners in studying the problem of OP. The listeners are most interested in the DXA procedure itself with protocol decoding. When creating motivation for the personal interest of

doctors in maintaining personal bone health, the likelihood of a more attentive attitude of doctors to the prevalence of OP among the population increases.

P496

### A COMPARISON OF BACK PAIN CHARACTERISTICS AND ASSOCIATED SYMPTOMS IN SUBJECTS WITH AND WITHOUT SPONDYLOARTHRITIS

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**Objective:** To compare characteristics of back pain in subjects with and without the diagnosis of spondyloarthritis (SpA) in the Ukrainian population.

**Methods:** The questionnaire with 39 questions has been developed to determine the prevalence and main characteristics of back pain. A total of 1799 individuals of both sexes aged from 15-88 y were interviewed. Among the respondents, there were 1558 individuals with back pain at the current time or in history, including 82 patients with a confirmed diagnosis of SpA before the start of basic therapy. Subjects, who didn't notice back problems (pain, stiffness, discomfort), were excluded from the study (13,4%). Calin and ASAS criteria were used for the detection of inflammatory back pain. Fisher's exact test and the chi-square test have been used to determine statistically significant differences.

**Results:** Only half (55.5%) of subjects with back problems without confirmed SpA consulted the doctor. At the same time, 18.2% of them met  $\geq 4$  from 5 Calin criteria and 8.4% ASAS criteria. The patients with SpA significantly more often compared with subjects with back pain without SpA had: the duration of pain for more than 3 months (82.9 vs. 35.2%), waking up at night with back pain (58.5 vs. 19.8%), morning stiffness (78 vs. 48.4%), uveitis (4.9 vs. 1.0%) and heels pain (39 vs. 23.2%). Simultaneously they were less likely to have a sudden onset of pain (29.3 vs. 41.5%), 60.9 vs. 75.4% reported a reduction of pain after rest, 69.5 vs. 47.9% after physical activity (compare with subjects without SpA). However, we found no differences in the back problems in relatives or buttocks pain or scleritis in these two groups. Joint pain, swelling, or diagnosed arthritis were significantly more common in patients with SpA (64.6%, 40.2%, 43.9%, respectively) than in individuals with back pain without SpA (36.5%, 16.2%, 7.5%). In most cases, patients with SpA used NSAIDs to relieve pain (89.1 vs. 49.3%).

**Conclusion:** The high prevalence of inflammatory back pain in subjects without SpA points to the need for targeted screening of such patients to detect SpA. The key differences of the pain syndrome in SpA were its longer duration, reduction after physical activity, night pain, peripheral joint involvement, back pain at night.

P497

### PREGNANCY-EXACERBATED SEVERE OSTEOPOROSIS IN A PATIENT WITH OSTEOGENESIS IMPERFECTA DUE TO NOVEL MUTATION IN LRP5 GENE

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**Objective:** Osteogenesis imperfecta (OI) is a collagen related disorder with an autosomal inheritance that is characterized by low bone density leading to recurrent fractures and deformities. There has been the identification of diverse mutations related to OI and one of them is the mutation of the *LRP5* gene, but only a few mutations in *LRP5* have been published. According to previous reports, *LRP5* allelic variations contribute significantly to the determination of vertebral bone mass and size and appear to be an important genetic factor of susceptibility to osteoporosis and vertebral fractures. We present a clinical case of a young woman with severe osteoporosis and multiple fractures caused by a novel variant of mutation in *LRP5* gene.

**Case report:** A 36-yo woman with joint hypermobility and a history of several low-traumatic and traumatic limb and one thoracic vertebra fractures at a young age presented 2 months postpartum due to additional seven low-traumatic vertebral fractures. OI was suspected at the age of 8 y.o., but no further examination/treatment was performed. Family medical history of fractures/osteoporosis was negative. Genetic testing was performed at mid-pregnancy before exacerbation of OI. From 17 genes in the panel of OI a heterozygous not previously described missense mutation c.4028 G>A, p.Cys1343Tyr was found in exon 19 of *LPR5* gene and predicted to be pathogenic. At 36 weeks of her first pregnancy, she started experiencing acute back pain, reaching the maximum after childbirth. Lactation was medically stopped at 1 month. DXA confirmed severe osteoporosis (Z-score of L1-L4 -3.9SD, max loss at L1 -4.7SD, total hip -2.1SD, TBS 1,158 defined degraded bone microarchitecture). MRI demonstrated multiple consolidated fractures of the thoracic spine. The laboratory data indicated high levels of P1NP and CTx, consistent with intense bone remodeling, and 25(OH)D deficiency (18 nmol/l) with normal  $Ca_{adj}$  and PTH.

**Conclusion:** Our case shows a novel variant of mutation in *LRP5* gene that caused a young-onset osteoporosis and multiple fractures with exacerbation during pregnancy. The novel mutation reported here expands the spectrum of genetic pathology underlying OI and will help in the future to carry out a more accurate diagnosis of OI.

P498

### KIDNEY FUNCTION CHANGE AND MORTALITY IN DENOSUMAB USERS WITH AND WITHOUT CHRONIC KIDNEY DISEASE

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Denosumab has been used worldwide for osteoporosis treatment in subjects with and without chronic kidney disease (CKD). Confirmation is required for its safety, treatment adherence, renal function effect, and mortality in patients with CKD. A retrospective cohort study was conducted to compare new users of denosumab in terms of their two-year drug adherence in all participants (overall cohort) and CKD participants (CKD subcohort), which was defined as baseline estimated glomerular filtration rate (eGFR) less than 60 mL/min/1.73m<sup>2</sup>. The eGFR was calculated using the 2021 CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration) equation. We defined high adherence (HA) users as receiving three or four doses and low adherence (LA) users as receiving one or two doses. All-cause mortality was analyzed using Kaplan-Meier curves and Cox regression models. In total, there were 1142 subjects in the overall cohort and 500 subjects in the CKD subcohort. HA users had better renal function status at baseline than LD users in the overall cohort. A decline in renal function was only observed among LD users in the overall cohort. In the CKD subcohort, no baseline renal function difference or renal function decline was demonstrated. The all-cause mortality rate of HA users was lower than LA users in both the overall cohort and CKD. A randomized control trial is warranted to target this unique population to confirm our observations.

P499

### ARE WE DOING TOO MANY ARTHROSCOPIC SUBACROMIAL DECOMPRESSIONS? AN ANALYSIS OF RECENT CHANGES IN PRACTICE

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**Objective:** To identify the true incidence of primary ASDs performed in contrast to those performed as an adjuvant. The effectiveness of the Arthroscopic subacromial Decompression (ASD) operation compared to a placebo procedure or no treatment has shown no difference. Recent evidence recommends reduction of unnecessary surgery for patients with subacromial shoulder pain<sup>1</sup>.

**Methods:** Combination of retrospective study of patients who underwent shoulder arthroscopy over a 12 months period in 2017 and prospective study over 6 months in 2021. Information was collected from clinical letters, preoperative MRI/USG scans. Number of isolated ASD were separated from ASDs done as an adjuvant.

**Results:** During the retrospective study, a total 207 ASDs were done. 57 (27.5%) patients underwent isolated ASD whereas in 150 (72.5%) patients it was done as an adjuvant procedure. Out of patients who had isolated ASD, 17 (8.2%) patients had preoperative suspected diagnosis of rotator cuff tear or calcific tendonitis, however intraoperatively primary pathology was not found and ASD was performed for symptom relief. Only 39 (18.8%) had a preoperative diagnosis of pure impingement syndrome. In the prospective study, there were 38 patients who underwent ASD. Isolated ASD was done in 7 (18.4%) patients. The 5 (13.1%) patients had preoperative suspected diagnosis of rotator cuff tear and later found during surgery that they don't need rotator repair and ASD was offered. Only 2 (5.2%) patients had preoperative diagnosis of pure impingement, one of these patients had malunited greater tuberosity fracture.

**Conclusion:** The number of primary Arthroscopic subacromial decompressions offered for pure subacromial impingement has decreased significantly in recent years. A small number of isolated Arthroscopic subacromial decompressions were performed with suspected preoperative diagnosis of rotator cuff tear or as a diagnostic procedure. Most of the Arthroscopic subacromial decompressions are being done as an adjuvant procedure.

**Reference:** 1. Beard D, et al. Lancet 2018;391:329

P500

### ACTORS OF BONE MINERAL DENSITY IN SPONDYLOARTHRITIS PATIENTS: PRO-INFLAMMATORY AND ANTI-INFLAMMATORY CYTOKINES' INVOLVEMENT

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**Objective:** Loss of BMD is common in spondyloarthritis (SA) patients. Different studies have suggested the role of systemic inflammation. We aim to study of role of pro-inflammatory and anti-inflammatory cytokines in changes of BMD in SA patients.

**Methods:** We conducted a cross-sectional study including 42 patients followed for SA meeting the Assessment of SpondyloArthritis international society (ASAS). For each patient we col-

lected the following data: age, disease duration, disease activity using ASDAS-CRP and BMD in the lumbar spine and in the hip using DXA. C-reactive protein (CRP), Erythrocyte sedimentation rate (ESR) were measured. We also measured these following pro-inflammatory cytokine levels: IL-1, IL-6 and IL-17 as well as an anti-inflammatory cytokine level: IL-10. Statistical analysis was performed using SPSS software.

**Results:** There were 34 men and 8 women. The mean age was  $45.58 \pm 12.46$  y. The disease duration was  $10.43 \pm 8.34$  ye. 93 patients per cent had axial radiographic SA form (n=39). The mean ASDAS-CRP was  $2.99 \pm 1.71$ . The mean BMD in the lumbar spine and in the hip were  $1.103 \pm 0.178$  g/cm<sup>2</sup> and  $0.943 \pm 0.130$  g/cm<sup>2</sup>, respectively. The mean CRP and ESR levels were  $19.6 \pm 23.55$  mg/L and  $41.46 \pm 27.02$  mm, respectively. The mean IL-1, IL-6 and IL-17 levels were  $9.87 \pm 24.07$ ,  $14.84 \pm 43.82$  and  $95.15 \pm 81.23$  pg/mL, respectively. The mean IL-10 level was  $8.04 \pm 15.63$  pg/mL. Osteoporosis was noted in 12% of the cases (n=5) and osteopenia was noted in 50% of the cases (n=21). No difference was found between patients with low BMD and normal one regarding the measured interleukins' levels (IL-1:  $11.94 \pm 30.35$  vs.  $6.5 \pm 5.4$  pg/mL, p=0.5, IL-6:  $21.04 \pm 54.99$  vs.  $4.76 \pm 5.8$  pg/mL, p=0.21, IL-17:  $98.06 \pm 83.74$  vs.  $90.41 \pm 79.44$  pg/mL, p=0.81 and IL-10:  $6.71 \pm 6.82$  vs.  $10.11 \pm 23.78$  pg/mL, p=0.36).

There was a negative correlation between ESR and spine BMD (r=-0.431, p=0.005).

Moreover, IL-10 level was correlated to hip BMD (0.455, p=0.004).

**Conclusion:** Our study highlights the role of inflammatory mediators in the pathophysiology of osteoporosis in SA. Interestingly, we found a positive correlation between IL-10 level and hip BMD. Indeed, this result is consistent with several studies which have suggested the osteoblastogenic role of IL-10 [1–3].

#### References:

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## P501

### SECONDARY POSTTRAUMATIC KNEES OSTEOARTHRITIS AND OSTEOPOROSIS: CASE REPORT

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**Objective:** To assess the role of a complex program which include physical and kinetic rehabilitation treatment for a patient with secondary posttraumatic osteoarthritis of knees and osteoporosis.

**Methods:** We present the case of a 68 years female, which was hospitalized for mixed pain of hips and knees, functional impotence - difficult gait, with support on crutches. From the past medical history: road accident with multiple trauma (2021): comminuted fracture of the right femur intra-supracondylar, right spine tibial and left tibial plateau fractures Schatzker VI, right patella fracture, treated orthopedic surgery- metal osteosynthesis. DXA examination reveals spinal osteoporosis (score: - 4,2) and femoral neck (score: - 4,1) and patient begins treatment with ibandronic acid in intravenous infusion. On local examination: increased thoracic kyphosis, reduction of lumbar lordosis, paravertebral contracture of the cervico-dorso-lumbar spine, Schober=10/13 cm. Hips joint exam: spontaneous pain, on loading and on mobilization, 75° flexion, 20° abduction. Knees joint exam: spontaneous pain, on loading, on mobilization; 60° active flexion, 70° passive flexion, 10° flexum; difficult gait, with support in crutches. The complex program of rehabilitation: pharmacological treatment; electrotherapy with antalgic and myorelaxant effect; Diapulse of knee, sedative massage; kinetotherapy with postural therapy exercises; for improving the mobility on the kinematic chain of lower limbs; exercise of walking, coordination. For evaluation were used: VAS, joint and muscle testing, FIM.

**Results:** After the treatment: VAS score reduced from 8 points at admission to 5 points at discharge; improved dysfunction syndrome from hip and knee: increased active flexion to 70° and passive flexion to 80°, improvement pattern of the gait. FIM - Modified Dependence were 4 at admission, 5 at discharge.

**Conclusion:** The rehabilitation program improved algo-dysfunctional syndrome from hip and knee. The patient will be reevaluated, will continue the kinetic program at home and pharmacological treatment.

## P502

### SECONDARY OSTEOARTHRITIS OF KNEES IN GOUT DISEASE: CASE REPORT

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**Objective:** To assess the role of a complex program which include physical and kinetic rehabilitation treatment for a patient with gout disease with secondary knees osteoarthritis.

**Methods:** We present the case of a 62 years female, which was hospitalized for predominant inflammatory pain, tumefaction of the small joints of the hands and ankles, morning stiffness; mixed pain at the knees, functional impotence - difficult gait, with sup-



port in the Canadian crutch. From the past medical history: in 2021 the patient had gout disease, with secondary knees osteoarthritis and received treatment with NSAIDs, uricosuric, pain relievers. The knees joint exam: spontaneous pain, on loading, on mobilization, cracking when mobilizing the bilateral patella, bilateral liparthritis, 70° active flexion, 80° passive flexion, 10° flexum; spontaneous pain at ankles, on loading and on mobilization; inflammatory syndrome at proximal and distal interphalangeal joints, metatarsophalangeal, bilateral interphalangeal toe joints, difficult gait with support in the Canadian crutch. The complex program of rehabilitation utilised: pharmacological treatment; electrotherapy with antalgic and myorelaxant effect; cryotherapy on the small joints of the hand, metatarsophalangeal, bilateral interphalangeal toe joints, sedative massage; kinetotherapy with postural therapy exercises; for improving the mobility on the kinematic chain of lower limbs. For evaluation were used: VAS, joint and muscle testing, FIM. **Results:** After the treatment: VAS score reduced from 10 points at admission to 6 points at discharge; relief of the inflammatory syndrome from small hands joints with 50%, from metatarsophalangeal, bilateral interphalangeal toe with 70%; increased active flexion to 80° and passive flexion to 90° at the knees, improvement pattern of the gait. FIM – Modified Dependence were 4 at admission, 5 at discharge. **Conclusion:** The rehabilitation program improved algo-dysfunctional syndrome from small hands joints, metatarsophalangeal, bilateral interphalangeal toe joints; increased active and passive flexion at the knees. The patient will be reevaluated at 6 months and continue the kinetic program and pharmacological treatment at home.

## P503

### MITIGATION OF OSTEONECROSIS OF THE JAW (ONJ) THROUGH RISK STRATIFICATION: VALIDATION OF A QUESTIONNAIRE TO SCREEN FOR ONJ RISK FACTORS IN ARABIC SPEAKING OSTEOPOROSIS PATIENTS

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**Objective:** Osteonecrosis of the jaw (ONJ) has been classically attributed to avascular necrosis or disruption of the vascular supply with exposure of the jaw bones. Several factors able to disrupt the bone turn over or the vascular supply have been identified as risk factors for ONJ, including radiation, high-dose steroid therapy, and medications (e.g., antiresorptive therapies). There is a real

need for an evidence-based tool able to facilitate the recognition of those patients at higher risk of ONJ development. A questionnaire to screen for medication related ONJ risk in osteoporotic patients was published recently [1], however, there is no validated questionnaire available for Arabic speaking patients. We aimed to translate and validate an Arabic self-administered questionnaire to facilitate risk stratification as well as risk minimisation of medication related ONJ in osteoporotic patients receiving treatment with, or planned to start, an anti-resorptive medication.

**Methods:** After translation and retranslation of the questionnaire, it was administered and tested for: 1. Validation of the questionnaire by comparing the patients answers with their medical records; 2. Comprehensibility: using numerical visual analogue scale (0-10); 3. Reproducibility: Two-week reproducibility (test-retest reliability). The questionnaire is composed of 27 items stratified into 4-domains: Personal: 3 risk factors (age, elevated BMI and smoking), Dental and oral health (11 risk factors), current medications (3 risk factors) and associated comorbidities (10 risk factors). The medication list was reviewed to verify the patient's current therapies.

**Results:** 102 patients participated in this work, age range 55-86 y. Analysis of the answers revealed that the mean time to answer the questionnaire was 2.04±0.543 min. The translated questionnaire demonstrated acceptable comprehensibility scores with a mean of 9.2 ranging between 7.0-10. The questionnaire has shown a strong validity when compared to the patients' data record (range 0.87-0.94). Reproducibility of the overall questionnaire and individual domains was excellent (Spearman-Brown index, 0.91 to 0.96). 13/102 (12.7%) had a dental procedure in the past 6-months, 14/102 (13.7%) were advised to stop smoking, whereas 27/102 (26.5%) had associated comorbidities. Treatment was postponed till complete healing for those with recent history of invasive dental procedure (high risk).

**Conclusion:** The Arabic version of the ONJ risk assessment questionnaire (ONRAQ) showed adequate validity, reproducibility and comprehensibility in patients with osteoporosis. The measurement properties were comparable to the English version indicating that the questionnaires can be used for evaluation of osteoporosis Arabic speaking patients.

**Reference:** 1. El Miedany et al. Ann Rheum Dis 2021;80 (Suppl 1):832

P504

### PREOPERATIVE ECHOCARDIOGRAPHY FOR TYPE 2 DIABETIC PATIENTS WITH HIP FRACTURES UNDERGOING SURGERY: A NATIONWIDE TAIWAN POPULATION-BASED STUDY

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**Objective:** Type 2 diabetes mellitus (T2DM) is a common metabolic disease and associated with high comorbidity rate, including osteoporosis and cardiac disease. The effect preoperative echocardiography on the clinical outcomes of patients with hip fractures (HFx) undergoing surgical treatment remains controversial. We hypothesized that preoperative echocardiography is associated with reduced postoperative morbidity and improved T2DM patient survival after surgery of hip fractures.

**Methods:** A population-based propensity-matched retrospective cohort study was conducted using the Longitudinal Cohort of Diabetes Patients from National Health Insurance Research Database in Taiwan. Patients with T2DM who had undergone operations for HFx between 2000-2008 were identified and divided into the screening group and nonscreening group according to the use or nonuse of preoperative echocardiography. Nonscreening group was matched in a 1:1 ratio with three controls. We used the chi-squared test, independent sample t-test, and Cox proportional hazards model to assess length of hospital stay, medical cost, complications, early readmission, and 1-y mortality.

**Results:** Totally 4562 subjects were recruited. The screening group exhibited significant longer hospital stay ( $p < 0.001$ ), higher medical costs ( $p < 0.001$ ), more complications, and higher 1-y mortality rate with hazard ratio 1.20 ( $p = 0.011$ ) compared to the nonscreening groups.

**Conclusion:** The available evidence on the effectiveness of preoperative echocardiography for T2DM patient with hip fractures is still controversial. Our findings revealed the preoperative echocardiography was not associated with lower postoperative complications or one-year mortality. However, our study does not imply causation between the screening and outcome. This potential confounding by indication may make our study difficult to interpret. This large, retrospective, nationwide cohort study demonstrated that preoperative echocardiography was not associated with reduced postoperative complications or one-year mortality in T2DM patients with HFx.

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### SPECTRUM OF RHEUMATIC MANIFESTATIONS IN COVID-19 PATIENTS

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**Objective:** Recently evolved from a monochromic flu-like disease to a polysyndromic "spectrum of disease", our understanding of coronavirus disease 2019 (COVID-19) is still far from being complete [1]. Hyperinflammation involving not only the lungs but also the musculoskeletal system, skin, cardiovascular, genitourinary systems is immune-mediated resembling the flares of a full-blown rheumatic disease [2,3]. We aimed to describe the prevalence and type of rheumatic manifestations in a cohort of COVID-19 patients hospitalized in the COVID-19 rheumatology department in University Hospital St. Marina, Varna, Bulgaria.

**Methods:** In the present single-center cohort study, a retrospective database analysis was performed among all COVID-19 patients hospitalized from 1 Dec 2020 to 22 Jan 2021. All 243 patients (age 19-93 y) were treated for moderate or severe SARS-CoV-2 infection confirmed by laboratory tests, including PCR test, and imaging modality. Inpatient treatment included antibiotics, dexamethasone, anticoagulants, and antiviral drug remdesivir (optional). Detailed disease history and clinical examination were carried out by a fully certified rheumatologist and/or specialist in internal medicine.

**Results:** Among all 243 COVID-19 patients, those with prominent self-reported myalgia and arthralgia were 26% ( $n=63$ ) and 21.3% ( $n=52$ ), respectively. We had 4 (1.6%) cases of newly developed cutaneous vasculitis and 2 (0.8%) cases of severe Raynaud's phenomenon after SARS-CoV-2 infection onset. Two patients experienced severe muscle weakness, had elevated creatine phosphokinase, and were diagnosed with inflammatory myopathy secondary to COVID-19. Lupus-like syndrome was observed in 2 (0.8%) patients.

**Conclusion:** Rheumatic manifestations are part of the heterogeneous spectrum of COVID-19 disease. Amidst the COVID-19 crisis, each newly onset rheumatic manifestation warrants exclusion of SARS-CoV-2 infection. Therefore, a rheumatologist should be a part of a multidisciplinary approach towards the COVID-19 treatment.

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**CORRELATION BETWEEN MUSCULOSKELETAL PAIN AND EMOTIONAL STATE IN COVID-19 PATIENTS**S. Bogdanova-Petrova<sup>1</sup><sup>1</sup>Medical University - Varna, First Dept. of Internal Medicine, Varna, Bulgaria

**Objectives:** Since the outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), responsible for the coronavirus disease 2019 (COVID-19) (1), our understanding of the underlying pathophysiology is constantly evolving in order to explain the wide range of heterogenic clinical manifestations (2). Nevertheless, limited data are available for the severity and multifactorial causality of musculoskeletal pain in COVID-19 patients (3). This study aimed to evaluate the prevalence and intensity of rheumatic pain symptoms – arthralgia and myalgia and their association with anxiety and depression in a cohort of COVID-19 patients, hospitalized at the COVID-19 rheumatology department of the University Hospital St. Marina, Varna, Bulgaria.

**Methods:** In the present single-center cohort study, a prospective analysis was performed among COVID-19 patients who were hospitalized from 1 Oct 2021 to 20 Jan 2022 and self-reported for new-onset of musculoskeletal pain. All 226 patients (age 26-91 y) were treated for moderate or severe SARS-CoV-2 infection confirmed by laboratory tests, including positive antigen test or PCR test, and imaging modality. Detailed disease history and clinical examination were carried out by a fully certified rheumatologist. All patients who reported new onset of musculoskeletal pain during the acute phase of the infection, participated on a voluntary basis in a questionnaire survey, by completing Zung self-rating anxiety scale (SAS), Zung self-rating depression scale (SDS) and VAS for arthralgia and myalgia. The questionnaire form also elicited information on sociodemographic characteristics of the patients. In all patients, inflammation and thrombotic biomarkers were assessed. The level of significance was set to 0.05.

**Results:** Among all 226 COVID-19 patients with musculoskeletal pain, 46.5% (n=105) were women and 53.5% (n=121), were men. Mean age was 65.6 y. We found a significant correlation of depression and anxiety scales scores with pain intensity (both arthralgia and myalgia), all <0.001. A multiple regression analysis found that SDS and SAS accounted for significant variance in the prediction of muscle pain ( $\beta=0.441$ ,  $p<0.001$ ;  $\beta=0.293$ ,  $p=0.003$ , respectively) while SDS significantly predicted joint pain ( $\beta=0.341$ ,  $p=0.043$ ). On the other hand, musculoskeletal pain does not correlate with any of inflammation and thrombotic biomarkers assessed in SARS-CoV-2 patients ( $p>0.05$ ).

**Conclusion:** Rheumatic pain manifestations are part of the heterogeneous spectrum of COVID-19 disease. The pain intensity is significantly associated with anxiety and depression symptoms and does not correlate with inflammation and thrombotic biomarkers.

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**ASSOCIATION BETWEEN IMMUNOLOGICAL, OSTEOIMMUNOLOGICAL MARKERS IN RHEUMATOID ARTHRITIS AND RISK OF FRACTURE BY FRAX IN A LONG-TERM STUDY**P. Kovalenko<sup>1</sup>, I. Dydykina<sup>1</sup>, P. Postnikova<sup>1</sup>, M. Diatroptov<sup>1</sup>, S. Glukhova<sup>1</sup><sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** Due to the relevant task of bone loss in rheumatoid arthritis (RA) the aim of this work was to study the association between the main immunological, osteoimmunological markers and FRAX score.

**Methods:** There are presented the preliminary results of a prospective long-term research to study the outcomes of local and generalized bone loss in 44 women with RA, age at baseline  $56.8\pm 6.9$  y, the duration of follow-up  $8.3\pm 1.5$  y. In all patients at baseline and in dynamics there were measured RF, ACCP, CRP, IL-6, RANKL, CTX-I, osteocalcin and BAP (bone alkaline phosphatase). The immunological control group: healthy donors (n=12). BMD was measured at L1-L4 and total hip using DXA at baseline by Hologic. The 10-y probability of fractures was measured using the FRAX tool in 41 (93%) patients. A high risk of fractures was estimated in 25 (61%) patients, a low risk in 16 (39%).

**Results:** Over the follow-up period, 12 (48%) patients with high risk of fractures and 2 (12%) low-risk patients has had peripheral fractures (between groups  $p=0.01$ ). Correlation analysis showed that initially patients with a high risk of fractures were more often RF (+) ( $p=0.01$ ), while the level of BAP was higher ( $p<0.05$ ) in the low-risk group, both at baseline and in dynamics. At the same time, in both groups, the level of BAP was significantly lower ( $p<0.05$ ) both at baseline and in dynamics, compared with the healthy donors. In the low-risk group, IL-6 and CTX-I values in dynamics were higher than in healthy donors.

**Conclusion:** Initial RF positivity in patients with RA was associated with a high risk of fractures according to FRAX. Level of marker of bone formation BAP in RA patients was lower than in healthy donors regardless of FRAX risk. Higher BAP values in the low-risk fracture group may suggest slower rates of bone loss and substantiate fewer fractures over the follow-up period.

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### CAROTID ATHEROSCLEROSIS IS ASSOCIATED WITH A HIGHER RISK OF FALL-RELATED HOSPITALIZATION IN OLDER AUSTRALIAN WOMEN

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**Objective:** Previously, an association between clinical cardiovascular disease and falls has been reported. However, the relationship between measures of carotid atherosclerosis and injurious falls are unclear. We sought to investigate the association between measures of carotid atherosclerosis including carotid plaque and common carotid intima media thickness (CCA-IMT) with long-term fall-related hospitalizations.

**Methods:** Community-dwelling older Western Australian women (N=1116, age=75.1±2.7 y) were included. B-mode carotid ultrasound was used to assess the presence of focal carotid plaque, and CCA-IMT at baseline. Six images of the left and right common carotid arteries (3 on either side) were used to obtain a mean and maximum CCA-IMT. Focal carotid plaque was defined as a focal increased thickness ≥1 mm of the intima-media layer. Fall-related hospitalizations were identified from linked health record over 11.5 y.

**Results:** 428 (38.4%) women experienced a fall-related hospitalization. In a multivariable adjusted model, presence of carotid plaque was associated with 44% greater relative hazard for a fall-related hospitalization (HR 1.44 95%CI, 1.18-1.76). Such association persisted after adjustment for measures of muscle function including hand grip strength and timed-up-and-go performance. Each SD increase in the mean (SD 0.13) (HR 1.10 95%CI, 1.00-1.21) or maximum (SD 0.15) CCA-IMTs (HR 1.11 95%CI, 1.01-1.22) were also associated with greater risk of falls (Table 1).

Table 1: Hazard ratios (HR) for injurious fall-related hospitalizations.

Outcome	Carotid Plaque (HR 95%CI)		CCA-IMT (HR 95%CI)	
	Absent (n=563)	Present (n=553)	Per SD of the mean (n=1100)	Per SD of the maximum (n=1100)
Injurious falls, n (%)	189 (33.6)	239 (43.2)	428 (38.9)	428 (38.9)
Unadjusted	Referent	1.51 (1.25-1.83)	1.13 (1.04-1.23)	1.14 (1.04-1.24)
Minimally-adjusted	Referent	1.48 (1.22-1.79)	1.11 (1.01-1.21)	1.12 (1.02-1.22)
Multivariable-adjusted	Referent	1.44 (1.18-1.76)	1.10 (1.00-1.21)	1.11 (1.01-1.22)

Bolded number indicate p ≤ 0.05; Minimally-adjusted: age, BMI and treatment; Multivariable-adjusted: minimally-adjusted plus prevalent diabetes, atherosclerotic vascular disease and falls, statin and antihypertensive medication use, and physical activity; CCA-IMT: Common Carotid Artery Intima-Media Thickness.

**Conclusion:** Measures of carotid atherosclerosis are associated with a higher long-term risk of injurious falls independent of measures of muscle function. Further investigations into the importance of clinical and subclinical vascular disease for assessing falls risk are warranted.

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### THE EFFECT OF NON-WEIGHT BEARING EXERCISE AND WEIGHT BEARING PHYSICAL ACTIVITY ON GROWTH, BONE METABOLISM AND MUSCLE MASS IN MALE WISTAR RATS

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**Objective:** There is controversy regarding the potential negative effects of swimming on bone health, particularly during growth, as this may compromise bone modeling and bone strength later in life. Our aim was to investigate the effect of swimming on bone length, bone metabolism and muscle mass in growing male rats.

**Methods:** Male Wistar rats (n=19, 3 months and 323.9±18.0 g) were randomized into three groups: (i) active (AG; n=10) with running wheel in cages; (ii) swimmer active (SWA; n=10) with running wheel and submitted to a swimming exercise protocol (2h/d; 5 d/week) and (iii) swimmer (SW; n=9) housed in normal cages and submitted to the same swimming protocol. Body weight (BW), weekly food intake and running wheel distance were recorded. After 8 months, all animals were sacrificed and the right femur, tibia, gastrocnemius and soleus muscles harvested, weighted on a precision balance and measured. Venous blood was collected for determining osteocalcin and CTX concentration.

**Results:** No differences were found between groups regarding femur (AG: 40.9±1.07, SWA: 40.02±1.08, SW: 39.75±1.23 mm; p=0.085) and tibia (AG: 43.97±0.73, SWA: 43.82±1.18, SW: 43.77±1.24 mm; p=0.911) length, plasma osteocalcin



(AG: 77.15±16.76, SWA: 79.96±25.80, SW: 75.00±36.95 ng/mL,  $p=0.929$ ) and CTX concentration (AG: 9.71±3.90, SWA: 13.43±3.04, SW: 12.1±4.90 ng/mL,  $p=0.142$ ). BW increases during the experiment were higher in the AG group (D+69%;  $p<.001$ ) compared to both SWA and SW (D+42 and D+44%), despite there were no differences in initial BW (AG: 315.50±12.40; SWA: 324.90±15.18; SW: 332.22±23.03 g;  $p=0.12$ ). Interestingly, there were also no differences in weekly food intake between groups (AG: 666.13±73.73; SWA: 678.34±31.53; SW: 636.58±36.27 kcal/week;  $p=0.21$ ), neither on the running wheel distance between AG and SWA (9.09±9.36 vs. 3.86±3.25 km/week, respectively;  $p=0.12$ ). Differences in BW were most likely due to muscle mass differences since the pooled gastrocnemius and soleus weight was higher in the AG (6.54±0.47 g;  $p=0.002$ ,  $d=1.34$ ) compared to both SWA and SW (5.94±0.27 and 5.98±0.32 g) groups.

**Conclusion:** Although swimming compromised BW gain during growth, most likely due to a reduction in skeletal muscle mass gain, no negative effect of swimming was identified on bone length or bone metabolism.

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### ON THE USABILITY OF ILIAC CREST BIOPSIES FOR BONE LEVEL DETERMINATION OF ANTIBIOTICS

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**Objective:** Responsible for the clinical effectiveness of an antibiotic (AB) in local infections of the bone system (e.g., osteomyelitis) is above all its "bone mobility". In previous work on the pharmacokinetic behavior of AB in the bone system were sample sizes of several grams required that only in larger operations - e.g., the hip - under general anesthesia could be obtained. It was therefore our aim to conduct a pilot study to examine whether the usual iliac crest biopsy cylinders in their smallness are of sufficient size to be able to detect effective AB concentrations therein.

**Methods:** We biopsied 7 patients (age: 64.7(36-84) y, weight: 52.0 (38.3-63.5) kg) due to suspected bone marrow involvement from a systemic haematological disease. All agreed to the additional removal of biopsy cylinders to determine the bone concentration of AB Azlocillin (Securopen®, Bayer AG) administered by short infusion as infection prophylaxis (reduced immune defence!). One and four hours post infusion (p.i.), a blood sample, a bone marrow (BM) aspirate and a bone cylinder were taken in parallel using the JAMSHIDI technique under surgical precautions. The azlocillin level determinations were carried out microbiologically using the agar diffusion method using the ATCC 6633 strain as a test germ.

**Results:** The average weight of the resulting bone cylinder samples after crushing was 33.6+ 6.6 mg. Despite the small size of these samples, measurable azlocillin concentrations (in ug/ml) could always be detected: After one hour p.i.: 146.0 in the serum, 77.6 in the marrow aspirate, 22.2 in the bone cylinder. After 4 h p.i. corresponding to 67.6 or 36.0 and 8.0 µg/ml. The differences between the three materials after one and four hours are just as significant (t-test:  $p<0.001$  or 0.05) as is the drop in concentration of azlocillin in the three materials from the first to the fourth hour ( $p<0.001$  or 0.01).

#### Conclusion:

1. The bone cylinders obtained using the JAMSHIDI technique are large enough to allow measurable AB concentrations - here azlocillin - to be measured in them with the most subtle microbiological technique for both one and four hours p.i.

2. From the combined consideration of the drug concentration curves in the serum, contrast agent aspirate (also referred to as "marrow blood") and bone biopsy cylinders, some insights into the pharmacokinetic behavior of an AB should be possible - also subject to the small number of patients, but which must be discussed critically (e.g., so-called Hb correction of the bone values).

3. Even if the AB concentrations in the marrow aspirate and in the bone casts are significantly lower than in the serum (consistently high bactericidal values for Pseudomonas strains), they leave - above all one hour p.i. - a good therapeutic effect of azlocillin - e.g., in osteomyelitis - to return to the starting point of the investigation.

4. Larger studies must show to what extent this "mini-procedure" of AB determination in bone tissue can also be applied to other/new AB.

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**HIPERURICEMIA AND TENDINOPATHY OF THE TIBIALS ANTERIOR**N. Grana<sup>1</sup><sup>1</sup>Centro Medico Rawson, Campana, Argentina**Objective:** Think about tendinosis the presence of metabolic disorders**Methods:** Clinical case report. 38-year-old male patient with a history of obesity, high blood pressure and hyperuricemia. Habitually medicated with amlodipine 5 mg, hydrochlorothiazide 12.5 mg and valsartan 160 mg daily Consultation for pain at the level of both anterior tibial tendons. presents laboratory with uricemia value of 12.2 mg/dl. Symmetrical thickening of both anterior tibial tendons is confirmed by ultrasound.**Results:** Hydrochlorothiazide is suspended and a feeding plan for weight loss is indicated. Two months later, he presented with a weight loss of 6 kg and uricemia of 7.8 mg/dl with reversal of symptoms associated with pain at the level of his anterior tibial tendons**Conclusion:** Hyperuricemia is a metabolic disorder. Hyperuricemia is considered when the serum urate concentration is >7 mg/dl in men and >6 mg/dl in women. Depending on whether or not it produces clinical manifestations, hyperuricemia is classified as symptomatic or asymptomatic. The most well-known form of clinical manifestations is gouty arthritis. The deposition of monosodium urate crystals in soft tissues (tendon/enthesis insertion sites) is a characteristic of chronic gouty arthritis. Inflammation is the main pathophysiological mechanism associated with tendinosis. Ultrasonography has been shown to be a valid imaging modality for detecting musculoskeletal involvement in patients with gout. The diagnosis of this condition is made by clinical suspicion in patients with metabolic disorders and by performing an ultrasound that demonstrates the typical alterations.

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**PATIENTS' ADHERENCE AND SATISFACTION FROM DAILY VS. MONTHLY VITAMIN D SUPPLEMENTATION: RESULTS FROM A DEDICATED BONE CLINIC**P. Rotman Pikielny<sup>1</sup>, L. Barzilai-Yosef<sup>1</sup>, E. Ramaty<sup>1</sup>, S. Braginski-Shapira<sup>1</sup>, O. Tell Lebanon<sup>2</sup><sup>1</sup>Institute of Endocrinology, Diabetes and Metabolism, Meir Medical Center, affiliated with the Sackler Faculty of Medicine, Tel Aviv University, Kfar-Saba, Israel, <sup>2</sup>Institute of Endocrinology, Diabetes and Metabolism, Meir Medical Center, Kfar Sava, Israel, affiliated with the Sackler Faculty of Medicine, Tel Aviv University; Maccabi Health Services, Kfar-Saba, Israel**Objective:** To evaluate osteopenic/osteoporotic patients' adherence and satisfaction from vitamin D supplementation after switching from monthly to daily (MtD) dosing and vice versa (DtM).**Methods:** Ambulatory osteopenic/osteoporotic patients visiting the endocrine clinic at a tertiary medical center were asked to switch their vitamin D supplementation from MtD and vice versa. Total monthly dose remained unchanged. Patients answered questionnaires regarding socio-demographic and medical status, compliance with vitamin D dosing (Morisky Adherence Scale 8; MMAS-8), satisfaction with vitamin D regimen and physical functional status (OPAQ-15) at baseline and 6 months after switching. Each group was compared to its baseline characteristics and to the parallel group.**Results:** Among 72 ambulatory patients recruited (mean age 71.5±7.4, 91.7% female), 52 (72.2%) were switched from DtM treatment and 20 (27.7%) from MtD. 84.7% were taking anti-osteoporosis medications, 51.4% had a prior osteoporotic fracture and 76.5% were taking calcium supplementation. Baseline vitamin D level was 86.1±17.2 nmol/l. Both groups expressed good baseline compliance (mean 98.1%) with vitamin D regimen (MMAS-8 score ≥8). Baseline satisfaction with vitamin D regimen was good: 74% and 77.7% among DtM and MtD dosing, respectively. Baseline physical status was good in 63.9% and moderate in 33.3%. After switching, satisfaction level, adherence to vitamin D regimen, vitamin D level and functional capacity were not different compared to baseline. Yet, 68.8% of MtD and 52% of DtM patients wanted to remain on the current regimen. Among patients who experienced both regimens, 56.1% preferred daily and 43.9% preferred monthly.**Conclusion:** Patients with osteopenia/osteoporosis had good adherence to monthly and to daily vitamin D regimens and expressed high level of satisfaction with them. All parameters remained stable after switching regimens. Most MtD patients preferred the new regimen. Additional large-scale studies are needed to evaluate the effects of various dosing regimens on patients' satisfaction and adherence.

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### OSTEOPOROSIS TREATMENT GAP IN PATIENTS AT RISK OF FRACTURE IN EGYPT: A MULTICENTRE CROSS-SECTIONAL OBSERVATIONAL STUDY

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**Objective:** Despite recent development and therapies to reduce fracture risk and updated clinical practice guidelines, only a small fraction of subjects at high risk of sustaining a fragility fracture receive osteoporosis treatment, reflecting a treatment gap in osteoporosis management. Aims: 1. The primary outcome was assessment of the treatment gap: the proportion who were not receiving any osteoporosis medication among those at increased risk of fragility fracture (using 10-year probability of FRAX); 2. Secondary objective: analysis of the patients' characteristics at increased fragility fracture risk.

**Methods:** This was a multicenter, cross-sectional, observational study which included 7 centres in Egypt as part of the national fracture liaison service. Older adults, both men and women >50-years old, attending the fracture clinics after sustaining an osteoporotic fracture (whether major osteoporosis fracture or hip fracture) were consecutively recruited for this work. The risk of fracture was assessed for everyone based on their FRAX calculation prior to the last fracture which was the cause for them attending the hospital. Increased risk of fragility fracture was defined based on increased 10-year probability of either hip (>3%) and major osteoporotic fracture (>20%); calculated using FRAX tool without BMD. DXA scan was carried out for every patient.

**Results:** 116 patients presenting with fragility fractures were included in this work. 67.2% were women and 32.8% were men. Mean age was 69.09 (SD: 10.29) y. The frequency of the osteoporotic fractures was: 94.8% hip fractures (32.9% trochanteric fractures, 31.8% neck of the femur), 2.3% vertebral fractures, 2.3% humerus fracture. Overall 19.8% had a prior fracture (25% of them were wrist fractures) and 75% of them met the definitions for increased risk of fragility fracture prior to the current fragility fracture as their fracture probability scores exceeded the FRAX threshold. The mean 10-y probability of fracture (without BMD) for the enrolled patients with previous fracture was 7.4% (SD 5.3) for the hip and 17.3% (SD 8.4) for major osteoporotic). Overall, regardless of the presence of a previous fracture, 82.8% of the

cohort included in this work were identified to have a high fracture risk and met the definitions for increased risk of fragility fracture prior to their presenting fragility fracture. In those at increased fracture risk, the mean 10-year probability of hip and major osteoporotic fracture were 8.6% (SD 5.03) and 19.4% (SD 7.6). The treatment gap was 82.8%.

**Conclusion:** There is a large treatment gap in Egyptian adults and older adults aged ≥50 y. The recent guidelines for osteoporosis management in Egypt endorsed fracture centric approach to identify people at risk. The gap appears to be related to a low rate of osteoporosis diagnosis and lack of patient education. The fracture liaison service is expected to help in closing this gap.

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### MANAGING BONE HEALTH, FALLS AND FRACTURE RISK IN PARKINSON'S DISEASE: DEVELOPMENT OF A QUESTIONNAIRE FOR BONE HEALTH ASSESSMENT IN STANDARD PRACTICE

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**Objective:** Parkinson's disease (PD) patients are at high risk of hip, vertebral as well as nonvertebral fractures. This has been attributed to several factors including balance problems inherent to the disease, poorer bone health, increase falls risk, vitamin D deficiency and sarcopenia. These findings endorsed the inclusion of bone health assessment as part of the standard care for PD patients. Patient reported measures were recognized as a useful tool for the patients to follow their medical condition, set up treatment plan tailored to the individual patient's condition and seek medical advice on demand. We aimed to develop an evidence based targeted self-assessment questionnaire that can be used to identify PD at high risk of developing falls and fractures.

**Methods:** Literature review was conducted with the assistance of an expert in methodology to identify risk factors linked to impaired bone health in PD patients. The PICO approach was used to conduct the literature search. Items were generated after having unstructured interviews with PD patients as well as health care professionals who work closely with PD patients. The questionnaire was designed to assess all areas of potential bone health affection amongst patients living with PD. To ensure responsiveness a dichotomous answer "Yes/No" or 3-point scale (none, some, a lot) were used where responses vary. Items were reduced based on frequency, importance and impact (the product

of frequency and importance). The questionnaire will be tested for validity and reliability using test-retest and criterion validity measures.

**Results:** The initial purpose of the questionnaire was to be screen PD patients to identify those at higher risk of falls or fracture. 6-domains were identified: increase fracture risk, high falls risk, sarcopenia, serum vitamin D, PD stage and PD medications. The developed questionnaire included: FRAX to assess for fracture probability, falls risk assessment score (FRAS) to assess for falls, SARC-F to assess for sarcopenia, Stage of PD (Hoehn and Yahr, 1967), serum vitamin D level and list of current medications. Scores for each item within a domain are then summed to create the domain score. Cutoff points have been identified for the FRAX, FRAS as well as SARC-F.

**Conclusion:** Falls, poor bone and muscle health are the top reasons for high fracture risk in PD. The developed questionnaire largely mirrors the evidence-based findings as well as the patients and healthcare professionals' views. Assessment of the questionnaire psychometric properties is the next step towards validation.

## P515

### TARGETING TO TREAT INITIATIVE: TOWARDS EARLY DETECTION AND PREVENTION OF FALLS AND CONSEQUENT FRAGILITY FRACTURES – OUTCOMES OF THE FRACTURE LIAISON SERVICE IN EGYPT, AN INITIATIVE LED BY THE EGYPTIAN ACADEMY OF BONE HEALTH

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**Objective:** The snowball effect of falling does not halt at hospital admissions. Principally for older adults, one fall predispose to more problems, such as fractures, loss of confidence and independence, leading to deterioration of both physical and mental abilities as well as frailty. People who fall are also more likely to suffer further falls. Early identification of those people at high risk of falling is important to prevent fragility fractures particularly in older adults.

**Aim:** 1. to analyze the risk factors for falls and fragility fractures. 2. to clarify the falling mechanisms predisposing to fragility fractures. 3. Assess the potential of post-fracture care program

**Methods:** 116 patients with a fresh fragility (fracture of the neck of the femur 31.8%, trochanteric fracture 32.9%, 2.3% vertebral fracture, 2.3% proximal humerus) were recruited for this work

as part of the FLS service in Egypt. The inclusion criteria of the subjects were: patients' age 50 years or older at the time of the accident, and that the fracture/injury had occurred as a result of low-energy trauma (typically a fall from standing height or less) within 2 weeks before the assessment. All patients completed a questionnaire to assess for fracture risk (FRAX), falls risk (FRAS), sarcopenia risk (SARC-F) as well as functional ability (HAQ). Specific evaluation of the mechanism of falling was also carried out. Multivariable associations of fracture-related, and health-related characteristics were evaluated using logistic regression.

**Results:** A total of 116 participants were included in the statistical analysis. 30% of the participants had at least one fall in the past 12 months prior to their fracture. The incidence of falling was negatively correlated with the activities of daily living (ADL, represented by HAQ score)  $P=0.01$ , but was positively correlated 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. A great majority of these fractures (75%) occurred as a result of an indoor fall and a subsequent direct impact of the fractured site. Mechanism of falling analysis revealed that 75% of the falls were indoors, with raising the leg whilst washing for praying the highest at 25%, followed by slipping (19%). The most prevalent fracture was hip (94.8%), followed by spine 2.3% and humerus 2.3%. The postfracture care program helped in supporting the patients and identifying the underlying causes of falling and how to prevent them.

**Conclusion:** Falls should not be an inevitable part of ageing. Assessment for falls risk (FRAS), fracture risk (FRAX), functional disability and sarcopenia measure (SARC-F) can simply and effectively assess the risk of new falls and fragility fractures amongst the older adult population, and their use should be widely implemented in the community. Patient education and psychological support to avoid the most common causes of falling are vital to prevent fragility fractures. This can be carried out by implementing postfracture care program.

## P516

### THE CHRONIC NONBACTERIAL OSTEOMYELITIS: AUTOIMMUNE OSTEOPATHY OR BENIGN HYPEROSTOSIS – A CASE REPORT

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Male, 22 years old, student of Medical Faculty started the follow-up of chronic recurrent multifocal osteomyelitis (CRMO) in the outpatient clinic in our department in 2019. This disorder had been diagnosed when he was 12 years old. His first symptoms appeared with pain in the distal femur on both sides.

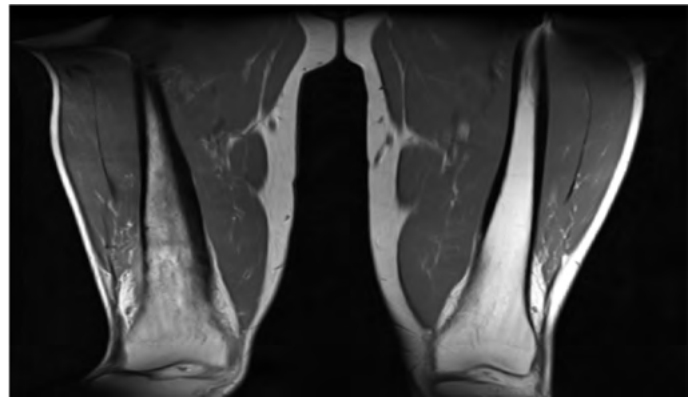


The disease has a relapsing course and it became worse over time, because the flare-ups occurred approximately 1-2 times a year and lasted for maximum 2 weeks, but later on they occurred up to 4 times a year and one acute lasted up to 3 months. The family history was negative for any inherited cases. On the physical examination, he showed tenderness in the right tortoise, limitation on the leg extension as well as bone-hard swelling. The pain was provoked by leg movement. The chief complaint occurred in the right distal femur, followed by some pain in the left distal femur, right distal radius and left proximal tibia/fibula. The pain was markedly increased during night and sometimes even disappeared in the morning. Further complaints included swelling and calor of the affected area, great loss of appetite (10 kg lost in 2 weeks) associated with insomnia. Approximately in the first 3 y since disease onset, there were no restrictions in movement, whereby even running and exercising was possible without any problems. But over the years, with the disease progression, it changed, since the patient has difficulties to walk or even stand due to the increased pain now. Patient managed to relieve the pain to some extent with the help of ice-cold water, massaging, and bandages. The remaining musculoskeletal sites didn't show any affection. No skin involvement was noticed or anything else on the general appearance. Patient refused to take recommended methotrexate, anti-TNF, bisphosphonates.

Sterile bone inflammations always remain a challenge and unclear in its pathogenesis and etiology. This disorder can be a manifestation of different autoinflammatory disorders including CRMO, chronic nonbacterial osteomyelitis, familial chronic multifocal osteomyelitis known as Majeed syndrome, the IL-1 deficiency syndrome known as DIRA, PAPA syndrome as monogenic autoinflammatory bone disorder and SAPHO syndrome. The benign hyperostosis, hypophosphatasia and Camurati-Engelmann disease may resemble the sterile bone inflammation.



X-ray: Hyperostosis and sclerotic lesion in a distal part of right femur



MRI: osteomyelitis with periosteal reaction in the same area

## P517

### TARGETING TO TREAT INITIATIVE: EFFECTIVE SECONDARY PREVENTION OF FRAGILITY FRACTURES: FRACTURE LIAISON SERVICE DATABASE SEMI-ANNUAL REPORT: AN INITIATIVE BY THE EGYPTIAN ACADEMY OF BONE HEALTH

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**Objective:** A fracture liaison service (FLS) aims to reduce the risk of subsequent fractures by systematically identifying, assessing, treating and referring to appropriate services, all eligible patients aged 50 and over who have suffered a fragility fracture. 14-FLS centers, recognized by the IOF, have been providing the service for an estimated 71.8% of the Egyptian population. National clinical standards have been published recently [1]. We aimed to evaluate the clinical effectiveness of the fracture liaison service in closing the osteoporosis care gap in Egypt

**Methods:** Patients aged 50 y and above presenting with low trauma fragility fracture have been enrolled under the FLS. Every patient completed a self-administered questionnaire to assess

fracture risk (FRAX), falls risk (FRAS) as well as sarcopenia risk (SARC-F). Patients' data were recorded electronically using online database. Every patient has blood tests for bone profile and kidney functions as well as DXA scan. Falls management, cognitive assessment and rehabilitation program tailored to the individual patient condition was set.

**Results:** Of the 116 records, the index fracture site was: spine 2.3%, 94.8% hip and 2.3% other fragility fractures. 2.3% of the patients died. There has been an improvement in most key performance indicators in 62.1% of the patients. The percentage of patients being recommended antiosteoporosis medication was 72.4%. Falls management: 76% of patients received (or were referred for) a falls management. Monitoring: 38% of patients recommended anti-osteoporosis medication being contacted at 12–16 weeks post fracture.

**Conclusion:** The FLS was found to be effective at targeting patients at risk for future osteoporotic fractures. Results are in agreement with the overwhelming evidence reflecting the FLS importance in endorsing bone health assessment and osteoporosis management in patients presenting with fragility fractures. It also promotes the clinical value and the patient-centered positive outcomes of the implementation of such strategy.

**Reference:** 1. Gadallah N, El Miedany Y. Egyptian Rheumatol Rehab 2022;49:11

## P518

### SECONDARY FRACTURE PREVENTION IN EGYPT: LEADING FLS IMPROVEMENT THROUGH IMPLEMENTING NATIONAL FLS DATABASE — AN INITIATIVE BY THE EGYPTIAN ACADEMY OF BONE HEALTH

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**Objective:** The FLS-database is commissioned and managed by the Egyptian Academy of Bone Health as part of the national fracture liaison service (FLS) program. This program has been developed aiming to improve the delivery of care for patients who have falls or sustain fragility fractures through effective measurement against standards [1] and feedback to providers. We aimed to evaluate the quality of the FLS provision for secondary fracture prevention in Egypt and highlight areas for improvement per individual centre.

**Methods:** Web-based collection of continuous data was recorded for all patients aged 50 and over who were diagnosed with a fragility fracture and reviewed in the different FLS centres in Egypt. Every patient completed a questionnaire either in paper format or over the phone to assess for their fracture risk (FRAX), Falls risk (FRAS), associated risk factors or comorbidities for impaired bone health, sarcopenia (SARC-F), current medications, osteoporosis therapy, DXA scan and laboratory result. The FLS-database comprises of 9 components: patient's data, survey, dxa results, lab results, fracture and falls risk, sarcopenia risk, reports, demographics, statistical analysis.

**Results:** 8 out of the 14 (57.1%) FLS centers in Egypt have contributed to the FLS-database. Patients' data recorded included their initial visit, as well as all their data in the follow up visits. Its statistical analysis tool facilitates the auditing process and evaluation of the services provided against the clinical standards as well as the FLS agreed key performance indicators/outcomes and the national guidelines for osteoporosis management. 86% of the patients were assessed by an FLS within 90 d of their fracture. 82% of patients were referred for DXA scan within 90 days of their fracture. 80% of the patients who were prescribed antiosteoporosis medication within 90 d of their fracture.

**Conclusion:** The FLS-database helped in the evaluation of the local FLS centers services and the percentage of achieving quality in a number of key performance indicators. Although positive contribution from good percentage of the FLS centers, national coverage of secondary fracture prevention by FLSs require further improvement. the FLS-database is a good opportunity to share learning lessons and good practice.

**Reference:** 1. Gadallah N, El Miedany Y. Egyptian Rheumatol Rehab 2022;49:11

P519

### ASSOCIATION BETWEEN NSAIDS AND BONE HEALTH IN A COMMUNITY DWELLING OLDER POPULATION: BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

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**Objective:** Nonsteroidal anti-inflammatory drugs (NSAIDs) are frequently prescribed for back and various joint pains in elderly patients. However, the association of NSAIDs consumption and density and quality of bone is still not widely understood.

**Methods:** Data of 2353 individuals aged  $\geq 60$  y, selected using a random cluster sampling method in Bushehr, Iran, were considered for analysis. Total osteoporosis was defined as T-score values  $\leq -2.5$  in each site. TBS partially degraded and degraded were defined as  $1.23 < \text{TBS} < 1.32$  and  $\text{TBS} \leq 1.23$  in men and  $1.28 < \text{TBS} < 1.35$  and  $\text{TBS} \leq 1.28$  in women, retrospectively. Association between NSAIDs and osteoporosis and bone health indicators were assessed using univariate- and multiple logistic and ordinal logistic regression models. In full adjustment, the results were adjusted for age, smoking, physical activity, BMI and diabetes in both sexes.

**Results:** Osteoporosis was diagnosed in 973 (41.3%) of the participants (58.7% women and 22.9% men,  $P < 0.001$ ). Among them, 678 (28.8%) had evidence of spinal osteoporosis (41.5% women and 15.3% men), 239 (10.1%) total hip osteoporosis (18.1% women and 1.75% men) and, 745 (31.6%) femoral neck osteoporosis (47.9% women and 14.4% men). Multiple logistic regression models showed taking NSAIDs in comparison to the nonconsumers had odds ratio (OR)=1.52 (CI 95% 1.12 to 2.06,  $P=0.007$ ), [OR=1.54 (CI 95% 1.03 to 2.31,  $P=0.035$ )] and [OR=1.48 (CI 95% 1.09 to 2.02,  $P=0.012$ )] of femoral neck, total hip, and total osteoporosis among women, respectively. However, no association was observed between consumption of NSAIDs and spinal

osteoporosis ( $P=0.38$ ). Taking NSAIDs was also associated with low TBS (OR=1.36, CI 95% 1.00 to 1.85,  $P=0.047$ ) among women. However, such associations were not observed in men.

**Conclusion:** Using NSAIDs in older adults may be associated with the deterioration of bone density and architecture among women but not in men. It is recommended to study the causal relationship between two variables in longitudinal studies. On the same ground, screening, adopting preventive measures, and regular follow ups could be of utmost importance.

P520

### EFFECTIVENESS AND SAFETY OF PARENTERAL FORM OF PHARMACEUTICAL GRADE CHONDROITIN SULFATE IN PATIENTS WITH KNEE OSTEOARTHRITIS IN THE POST-COVID PERIOD

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**Objective:** To evaluate the efficiency and safety of parenteral form of pharmaceutical grade chondroitin sulfate (CS) in patients with knee osteoarthritis (KOA) in the post-COVID period.

**Methods:** We conducted an open prospective controlled randomized study (duration 50 d) in accordance with including/excluding criteria. The study included 82 patients (age 57–63 y, males 29, females 53) with KOA stage I (Kellgren-Lawrence), grade 1 of functional joint failure (FJF), long COVID type 2 (negative SARS-CoV2 swab), previously free from any joint diseases: Group 1 (n=42), Group 2 (control group, n=40). All patients received celecoxib 200 mg/d, with the option to reduce to 100 mg/d or to refuse it. Group 1 patients were administered CS in parenteral form (pharmaceutical substance CS-Bioactive® "Bioiberica S.A.U.", Spain, "Sotex", Russia): first 3 d intramuscularly 100 mg/d; 4-25 injections 200 mg/d, once every 48 h. On days 0 and 50, we assessed pain by VAS, functional impairment by Lequesne's indices, joint ultrasound data, the safety of therapy (the WHO, Naranjo scales), laboratory tests (complete blood count, immune status from peripheral blood, CRP, D-dimer, lupus anticoagulant test, TNF $\alpha$ , IL-1 $\beta$ , -6), proteomic analysis of serum (2DE, MALDI-TOF/MS). Data is presented as frequencies, mean $\pm$ SEM, Mann-Whitney test, Fisher's exact test.

**Results:** CS therapy was well tolerated by patients and was accompanied by a reduction of VAS pain ( $p < 0.0001$ ), the severity of OA (Lequesne's indices,  $p < 0.0001$ ), the number of combined synovitis and tendinitis, inflammatory markers (CRP,  $p=0.044$ ; IL-6,  $p < 0.001$ ; IL-1 $\beta$ ,  $p=0.002$ ), D-dimer ( $p=0.001$ ) level, negative lupus anticoagulant confirmatory test ( $p=0.002$ ), by the improvement of immune status (lymphocyte count, T lymphocytes (T lym),  $p < 0.001$ ; helper T lym, cytotoxic T lym, CD3+CD4+/CD3+CD8+,  $p < 0.008$ ), a decrease of eotaxin, T cell-attracting chemokine,  $\beta$ -nerve growth factor, IL-1Ra, 7,8,12,15, interferon  $\gamma$ -induced protein 10 expression in serum proteomic profile (83%) compared with Group 2 (55%).



**Conclusion:** Pharmaceutical grade CS is effective and safe in patients with stage I KOA, grade 1 FJF and long COVID type 2, what could be related with influence on the immunological mechanism responsible for the onset of COVID-19-related KOA.

P521

### DO SOCIAL ISOLATION, SELF-EFFICACY, OR MENTAL HEALTH INFLUENCE THE RELATIONSHIP BETWEEN SELF-PERCEPTION OF FRACTURE RISK AND PRIOR FRACTURE? FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY

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**Objective:** Self-perceived risk of fracture (SPR) has previously been shown to be associated with personal fracture history, falls, education about osteoporosis, and lifestyle, although previous studies have also reported that many individuals underestimate their fracture risk. In this study of community-dwelling older adults, we considered whether the presence of social isolation, self-efficacy, or mental health status influenced the relationship between SPR and fracture.

**Methods:** Participants were recruited from the Hertfordshire Cohort Study, an established cohort study of UK community-dwelling adults. SPR, compared to individuals of the same sex and age, was assessed via questionnaire and categorised into 'lower', 'similar' and 'higher'. Fractures since age 45 were self-reported. Social isolation was assessed using the six-item Lubben Social Network Scale. Self-efficacy was assessed using a shortened General Self-Efficacy Scale (GSE). Mental health status was assessed using the anxiety/depression item from the EuroQoL questionnaire. Associations between SPR and previous fracture were examined using logistic regression with adjustment for sex and age.

**Results:** 146 men and women (median age 83.3 [IQR 81.5-85.5] y) participated. More than half of the participants (n=79 [54.1%]) reported a lower than average SPR, and the majority (n=109 [74.7%]) reported no previous fractures. As expected, SPR was associated with increased odds of previous fractures (OR 1.72, 95%CI 1.03-2.87, per higher band of SPR) when adjusting for sex and age only. The association was unaffected by further individual adjustment for social isolation (1.73, 1.04-2.89), self-efficacy (1.71, 1.02-2.85), and mental health (1.77, 1.05-2.96). However, the association between SPR and fracture history was removed by adjustment for BMI, smoking, alcohol consumption, physical activity, diet quality, number of comorbidities, and use of bisphosphonates.

**Conclusion:** Higher SPR was indeed related to prior fracture since age 45 in a cohort of UK community-dwelling older adults. Adjustment for social isolation, self-efficacy or mental health status did not affect this association although adjustment for BMI, lifestyle,

comorbidity and use of bisphosphonates did remove it. These observations suggest that prior medical history and lifestyle factors are the major determinants of SPR, while psychological factors appeared less important in this sample.

P522

### CORRELATION BETWEEN EROSION SCORE AND BIOMARKERS DEPENDING ON FRACTURE RISK IN RHEUMATOID ARTHRITIS

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**Objective:** to study the correlation between erosion score (ES) and biomarkers depending on fracture risk in rheumatoid arthritis (RA) according to preliminary results of the prospective long-term research to study the outcomes of local and generalized bone loss in RA.

**Methods:** 44 RA women, mean age at baseline 56.8±6.9 y, duration of follow-up 8.3±1.5 y. At baseline and in dynamics there were measured RF, ACCP, CRP, IL-6, RANKL, CTX-I, osteocalcin and BAP. ES score was measured using Sharp-Van der Hejde method by X-rays of hands and feet, in both groups it was observed an increase (p<0.05). BMD was measured at L1-L4 and total hip using DXA (at baseline by Hologic). The 10-year probability of fractures was measured using FRAX in 41(93%) patients. A high risk of fractures was estimated in 25(61%) patients, low risk in 16(39%).

**Results:** 12(48%) patients from high-risk group (HR-group) and 2(12%) patients of low-risk group (LR-group) has had peripheral fractures (p=0.01). At baseline and in dynamics in HR-group it was noted the higher ES than in LR-group (p=0.001 and p=0.002, respectively), while the delta of erosion between groups did not differ. The correlation analysis showed (p<0.05) that in general it was a "+" correlation between the baseline CRP value and ES (at baseline and in dynamics). Also, it was noted that the ACCP positivity in dynamics positively correlated with erosion delta and ES in dynamics. In HR-group ES at baseline and in dynamics was "+" correlated (p<0.05) with baseline CRP level. In LR-group ES was "+" correlated (p<0.05) with osteocalcin level (at baseline and in dynamics for both indicators), and the erosion delta was "+" correlated with ACCP positivity in dynamics.

**Conclusion:** Preliminary analysis showed an increase in ES in both risk groups, and fractures in HR-group. Higher baseline CRP values both in general and in HR-group were associated with a larger ES both initially and in dynamics. Delta of erosions in all group and in LR-group was influenced by ACCP positivity (visit in dynamics) and it was noted that the level of osteocalcin, marker reflecting osteoblast activity, was "+" correlated with the ES, possibly reflecting bone turnover activity.



P523

### PROTEIN INTAKE AND BONE MINERAL DENSITY: CROSS-SECTIONAL RELATIONSHIP AND LONGITUDINAL EFFECTS OF PROTEIN SUPPLEMENTATION IN A COMBINED COHORT OF FRAIL, MALNOURISHED AND HEALTHY OLDER ADULTS

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**Objective:** To investigate the association between dietary protein intake (total, plant and animal) with BMD, and the effects of protein supplementation on BMD.

**Methods:** Individual data from four trials that included either (pre-)frail, undernourished or healthy older adults (aged  $\geq 65$  y) were combined. Dietary intake was assessed with food records (2, 3 or 7 d) and BMD with DXA. Associations and effects were assessed by adjusted linear mixed models.

**Results:** A total of 1452 participants for which at least total protein intake and total body BMD were known were included in cross-sectional analyses. In fully adjusted models, total and animal protein intake were associated with higher BMD at the level of total body and spine ( $\beta$  ranging from 0.0010 to 0.0017 g/cm<sup>2</sup>), while plant protein intake was associated with a lower total body and spine BMD ( $\beta$  ranging from -0.0019 to -0.0011 g/cm<sup>2</sup>). Associations were similar between sexes. In addition, participants with a high ratio of animal to plant protein intake had higher BMD. In total, 340 participants were included in longitudinal analyses. Interventions of 12 or 24 weeks with protein supplementation or protein supplementation combined with resistance exercise did not lead to significant improvements in BMD.

**Conclusion:** An association between total and animal protein intake with higher BMD was found. In contrast, plant protein intake was associated with lower BMD. Research is warranted to further investigate the added value of dietary protein alongside calcium

and vitamin D for BMD improvement, especially in osteopenic or osteoporotic individuals. Secondly, more research on the impact of a plant-based diet on bone health is needed.

P524

### EFFECT OF OZONE THERAPY ON PAIN AND FUNCTIONAL STATUS IN FIBROMYALGIA PATIENTS

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**Objective:** Fibromyalgia (FM) is a collection of widespread body pain and symptoms unrelated to pain, such as fatigue, sleep disturbances, and cognitive dysfunction (1). It is suggested that ozone therapy, which provides tissue oxygenation and activates antioxidant mechanisms, may be used in patients with FM (2-5). The aim of this study is to determine the effect of ozone therapy on pain and functional status in FM patients.

**Methods:** It is a retrospective study. 20 female FM patients who attended to Baskent University polyclinic between 01.05.21 and 01.10.21 were included to the study. Patients aged between 20-65 y, diagnosed with fibromyalgia according to ACR 2013 diagnostic criteria, recommended major ozone autohemotherapy and accepted this treatment were included to the study. Patients who were diagnosed with another rheumatic disease, had another systemic disease, did not continue treatment regularly were excluded from the study. Demographic and follow-up information of patients who received 10 sessions of ozone majorohemotherapy - 25  $\mu$ g/mL concentration of 100 mL blood and 100 mL ozone gas 2-3 times a week were obtained from the hospital database. VAS, Fibromyalgia Impairment Scale (FIQ) scores recorded in the health system before therapy, after 10 sessions therapy, 1 and 3 months after therapy were compared.  $P < 0.005$  was considered statistically significant.

**Results:** All of the patients included in the study were women, their mean age was  $54.8 \pm 15.5$ , and their demographic data were similar. The mean initial VAS score of the patients was  $8.2 \pm 2$ , after treatment  $3.8 \pm 2.5$ ,  $3.7 \pm 2.3$  at 1 month, and  $3.8 \pm 2.3$  at 3 months. When the 3-month follow-up values were compared, it was observed that the pain level decreased significantly after ozone therapy ( $p < 0.001$ ). The mean FIQ score of the patients was  $72.3 \pm 19.4$  at baseline,  $33.2 \pm 16.8$  after treatment,  $32.5 \pm 16.7$  at 1 month, and  $32.5 \pm 16.7$  at 3 months. When the follow-up values were compared, significant functional improvement was detected in the patients ( $p < 0.001$ ).

**Conclusion:** It was shown that after 10 sessions of ozone major autohemotherapy in the patients included in the study, the VAS and FIQ score decreased significantly and this state of well-being continued in the 3rd month. Ozone therapy may be preferred as a

complementary treatment in FM patients. However, prospective and randomized controlled clinical studies with a larger number of patients are needed.

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## P525

### PRELIMINARY EXPERIENCE AFTER IMPLEMENTATION OF A FRACTURE COORDINATION UNIT (FLS) IN A TERTIARY HOSPITAL

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**Objective:** To analyze the general characteristics of patients with osteoporotic hip fracture (OHF) treated after the implementation of a FLS Unit in our hospital.

**Methods:** We designed a retrospective descriptive study. We included all patients admitted with an OHF of any type and treated by the FLS from March 2021 to January 2022. We analyzed the epidemiological characteristics, risk factors and therapeutic interventions in our sample.

**Results:** A total of 89 patients were identified. The women/men ratio was close to 4/1 (67 women and 22 men) with a mean age of 78.8±8.9 y. The mean weight is was 67.8 kg±14.7 kg and the mean height was 162.62 cm±8.86 cm. The mean BMI was 25.64 kg/m<sup>2</sup>±7.8 kg/m<sup>2</sup>, being classified as overweight according to the WHO nutritional scale. Analyzing risk factors: 34 (38.2%) patients had had a previous fracture, of these 18 (52.94%) had a vertebral fracture and 7 (20.58%) suffered a Colles' fracture. Checking toxic habits, 9 (10.11%) of our patients were active smokers and 3 (3.37%) had active alcoholism at the time of the OHF. 8 (8.99%) patients had received long term corticosteroid treatment (>5 mg of prednisone for >3 months) and 4 (4.49%) had received aromatase inhibitors. 26 (56.52%) patients presented vitamin D insufficiency (21-29 ng/ml) and 20 (43.48%) presented vitamin D deficiency (<20 ng/mL).

Elevated PTH (>72 pg/ml) was present in 15 (16.85%) patients and hypoalbuminemia (albumin <3.5 g/dL) in 34 (38.2%). Only 12 (13.48%) patients had received or were receiving treatment for osteoporosis at the time of the fracture. Regarding therapeutic

interventions, antiresorptive or osteoforming treatment was prescribed for 83 (93.25%) patients and calcium and vitamin D supplements in 87 (97.75%) patients.

**Conclusion:** We identify a deficit in prevention and treatment in osteoporotic fractures (OF) in our health department, since, in our sample, only 12 (13.48%) patients were receiving treatment before the fracture, and 34 (38.2%) patients previously had OF. The establishment of the FLS in our center has allowed us to treat 89 patients so far, who would not have been treated a year earlier.

## P526

### EVALUATION OF RHEUMATOLOGY PRACTICE IN ALGERIA DURING THE DIFFERENT WAVES OF THE COVID-19 PANDEMIC

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**Objective:** The occurrence of the COVID-19 pandemic has disrupted the daily activity of rheumatologists especially during epidemic peaks, resulting in an upheaval in the management of chronic pathologies such as chronic inflammatory rheumatism (CIR). This has led to a discontinuity of care and sometimes harmful complications for patients, which has prompted some health organizations and some rheumatologists to adapt their daily practice according to the epidemic context. Through this study, we wanted to assess the impact of the different waves of the COVID-19 pandemic on the organization of care in private and public rheumatology practice, but also health staff position on vaccination against COVID-19.

**Methods:** This is an online descriptive study with an anonymous questionnaire spread through a national network bringing together the most Algerians rheumatologists from both the private and public sectors. We thus collected the data of practitioners interviewed by estimating their attitude during their daily medical practice during the COVID-19 pandemic and in the various epidemic peaks.

**Results:** We collected the response of 98 rheumatologists from different regions of the country, half of which is in the public sector, 58% have adapted their activity during epidemic peaks (46% decreased this activity and 12% had it interrupted during the different waves) against 39% who did not adapt at the various peaks (23% maintained the activity without adjustment from the beginning of the pandemic while 16% limited the activity to certain tasks). We noted that 11% of those questioned did not carry out any infiltration or osteoarticular ultrasound during this pandemic for fear of contamination. Regarding therapeutic management, 22% stopped prescribing NSAIDs to their patients while 58% did not stop any treatment; 70% of rheumatologist maintained corticosteroids in their patients and 54% kept the hydroxychloroquine.

To start treatment with rituximab, 44% of doctors felt it necessary to delay its prescription during peaks epidemics. About the COVID-19 vaccination, 67% were in favor of the vaccination of all their patients against 33% who were against. Half of the practitioners have recommended the suspension of the intake of methotrexate during the administration of different doses of the vaccine, while 33% postponed either the course of rituximab for their patients either postponed the vaccination against COVID-19.

**Conclusion:** The management of rheumatological treatment is severely disrupted by the pandemic COVID-19, thus hampering the effectiveness rheumatic patients' cure. It invites rheumatologists to review the various recommendations of the companies in order to better manage patients suffering from CIR, but also better handle the different antirheumatic therapies during the various epidemic peaks and during COVID-19 vaccination.

P527

### BEHAVIORAL ASSESSMENT OF ALGERIAN PATIENTS WITH A CHRONIC RHEUMATISM DISEASE DURING COVID-19 PANDEMIC

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**Objective:** The COVID-19 pandemic has completely changed patient care with chronic pathologies following the incessant reorganization of care which each time adapted to the epidemic context. This prompted patients with chronic inflammatory rheumatism (CIR) to self-manage and take sometimes inappropriate attitudes regarding their treatment. We have wanted through this work, to know the impact of this pandemic on the behaviour of subjects suffering from CIR with regard to their treatments, but also appreciate their position regarding COVID-19 vaccination.

**Methods:** This is a cross-sectional observational study carried out on patients with CIR followed in an Algerian rheumatology department or registered on a secure online platform all over the national territory. We collected sociodemographic data from patients and their attitudes towards the management of their treatment during COVID-19 pandemic particularly once contaminated and their position front of COVID-19 vaccination.

**Results:** We collected data from 102 patients, the average age is 37±3.2 y with a predominance of women at 57%, 43/102 suffered from spondyloarthritis ankylosing, 37/102 had rheumatoid arthritis and 12/102 had psoriatic arthritis. Regarding symptomatic treatment taken by patients, 54/102 were taking regularly nonsteroidal anti-inflammatory drugs (NSAIDs) and 51/102 were on corticosteroids. On the other hand for the basic treatments, 48/102 were under methotrexate and 40/102 were on biological. Among the 102 patients, one third of them has already been contaminated with SARS-CoV-2 with 10% severe forms requiring hos-

pitalization; the one quarter of subjects had stopped their therapies during this pandemic. One-third of drug stops concerned NSAIDs and one-fifth of drugs corticosteroids, three-quarter of patients justified this stopping by fear to be contaminated under these treatments. Concerning the COVID-19 vaccination, only 20% of patients were vaccinated, where the majority was apprehensive about the safety and the effectiveness of the vaccine. More than half of those surveyed claimed that their rheumatologist did not educate them about the COVID-19 vaccination.

**Conclusion:** It is quite clear that the COVID-19 pandemic has had a bad impact on the management of rheumatic disease patients and their treatments, which thus exposes them to harmful complications, hence the importance of establishing therapeutic education programs in the sense of teaching patients how to selfadapt in this context of a global epidemic but also to raise awareness of COVID-19 vaccination.

P528

### DEPRESSION AND ANXIETY IN PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** Osteoarthritis (OA) related joint pain impairs functionality contributing to the financial burden for individuals. It has been documented that patients with OA experience fatigue, poor sleep quality, depressed mood, and loss of independence. However, data about the prevalence of depression in OA patients remains scarce. This study aimed to assess the prevalence of depression and anxiety among patients with OS and evaluate correlations between VAS, neuropathic-like knee pain, knee joint symptoms, and polyarticular involvement.

**Methods:** Prospective observational study which included patients with knee OA who attended a rheumatology center in Guayaquil, Ecuador. Depression was measured by Patient Health Questionnaire (PHQ-9), which included 5 categories: nonminimal (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27). Dimensions included: anhedonia, depressed mood, sleep disturbance, fatigue, appetite changes, feelings of worthlessness, concentration difficulties, psychomotor disturbances, and thoughts of death. The severity of anxiety was measured with the Generalized Anxiety Disorder-7 (GAD-7) questionnaire, symptom severity included mild (5-9), moderate (10-14), and severe (15-21). Data was analyzed with SPSS v.22.

**Results:** 68 patients were included 78% [53] were women and 22% [15] men. The mean age was 63.16±9.7 [40-86] y and the mean duration of the disease was 7±5.71 y. OA changes were also seen in hands 47% [32], hips 23.5% [16] and spine 34% [23]. VAS mean was 4.21±2.99. The mean of PHQ-9 was 5.25±4.61 [0-16] which represent that 47% [32] of the patients presented depression at

some level; 25% [17] mild, 19% [17] moderate and moderate-severe 3% [2]. Patients reported presence of anhedonia 46% [31], depressed mood 50% [34], sleep disturbance 40% [27], fatigue 59% [38], appetite changes 30% [20], feelings of worthlessness 28% [19], concentration difficulties 37% [25], psychomotor disturbances 25% [17] and 10% [7] thoughts of death. VAS mean in patients without depression was  $3.7 \pm 2.9$ , mild  $4.2 \pm 2.6$ , moderate  $5.4 \pm 3.5$ , moderate-severe  $6.5 \pm 2.1$  [ $p=0.02$ ]. OA symptoms included pain 58% [39], crepitus 60% [38], locking 22% [15] and limited ROM 63% [43]; depression was seen 57% [22] of patients with pain ( $p=0.05$ ), 55% [21] with crepitus ( $p=0.06$ ), 67% [10] with locking ( $p=0.18$ ) and 67% [29] with limited ROM ( $p=0.04$ ). Neuropathic pain was seen in 22% [15] and approximately 60% [9] of the patients with NPK presented some level of depression [0.04]. Patients with concomitant hip OA presented depression in 56% [9], 47% [15] with hands OA and 43% [10] with spine. On the other hand, the mean of GAD-7 was  $4.8 \pm 5.26$  [0-19] and 44% [30] of the patients presented anxiety. Lastly, 51% [20] of the patients with pain presented anxiety ( $p=0.03$ ).

**Conclusion:** Depression and anxiety were seen in 47% and 44%, respectively. Depression was associated with the presence of pain, limited range of motion, and neuropathic pain. Furthermore, the presence of mild to severe depression was associated with higher levels of pain measured by VAS. This is the first study of depression and anxiety prevalence in Ecuadorian patients with knee OA.

## P529

### NEUROPATHIC PAIN IN ECUADORIAN PATIENTS WITH KNEE OSTEOARTHRITIS MEASURED BY PAINDETECT

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**Objective:** Pain is the most common feature of osteoarthritis (OA). It could be nociceptive and neuropathic. Recent data has shown an abnormal response in pain pathways of peripheral and central nervous systems which results in central sensitization in OA. Local damage to nerve fibers in articular and periarticular structures can lead to the presence of neuropathic-like knee pain (NPK). We aimed to determine the prevalence of neuropathic pain in knee osteoarthritis patients using the painDETECT questionnaire, and to evaluate correlations between VAS, gender, age, BMI and types of treatment, and the presence of neuropathic pain.

**Methods:** Prospective observational study which included patients with knee OA who attended a rheumatology center in Guayaquil, Ecuador. Neuropathic pain was assessed by painDETECT, classified into three groups (likely, possible, or unlikely) Pain was measured using VAS. Kolmogorov-Smirnov test was applied to check for normality of data distribution. For differences in vari-

ables including age, gender, BMI, VAS, one-way ANOVA was used for categorical variables. Pearson correlation was applied. All  $p$ -values  $< 0.05$  were considered significant. SPSSv22 was used for data analysis.

**Results:** 68 patients were included, mostly female 78% [53], male 22% [15] and all of mestizo race. The mean age was  $63.16 \pm 9.7$  [40-86] y, the mean duration of the disease was  $7 \pm 5.71$  y. The symptoms associated with the disease were pain 57.4% [39] with a mean VAS of  $4.21 \pm 2.99$ , edema 38.2% [26], crepitus 55.9% [38], locking 22.1% [15], limitation to the extension 32.4% [22], limitation to the flexion 30.9% [21], valgo 7.4% [5] and varus 7.4% [5]. The severity of the disease measured by Kellgren scale was grade I (doubtful) 4.4% [3], grade II (minimal) 60.3% [41], grade III (moderate) 32.4% [22] and grade IV (severe) 2.9% [2]. Patients presented osteoarthritic changes also in hands 47.1% [32], hips 23.5% [16] and spine 33.8% [23]. Pharmacological treatment included pregabalin 29.4% [20], NSAIDs 79.4% [54], acetaminophen 7.4% [5], opioids 8.8% [6], glucosamine 5.9% [4], unsaponifiables 35.3% [24], corticosteroids 27.9% [19], vitamin D 77.9% [53], calcium 38.2% [26], antidepressants 10.3% [7]. Neuropathic pain was seen likely in 11.8% [8], possible 10.3% [7] and unlikely 77.9% [53]. Men presented NPK in 20% [5], in contrast with women that reported 9.43% [ $p=0.41$ ]. Patients with ideal body weight and gabapentin treatment showed NPK in 14% [2]; those with overweight presented neuropathic pain in 7% [2] and obese patients showed neuropathic pain in 18% [3] [ $p=0.97$ ]. Of the patients receiving pregabalin only 20% [4] presented neuropathic pain and all of them showed moderate Kellgren scale [ $p=0.03$ ]. We found a positive association between VAS and painDETECT [ $P=0.05$ ] (Figure 1) [ $p=0.043$ ].

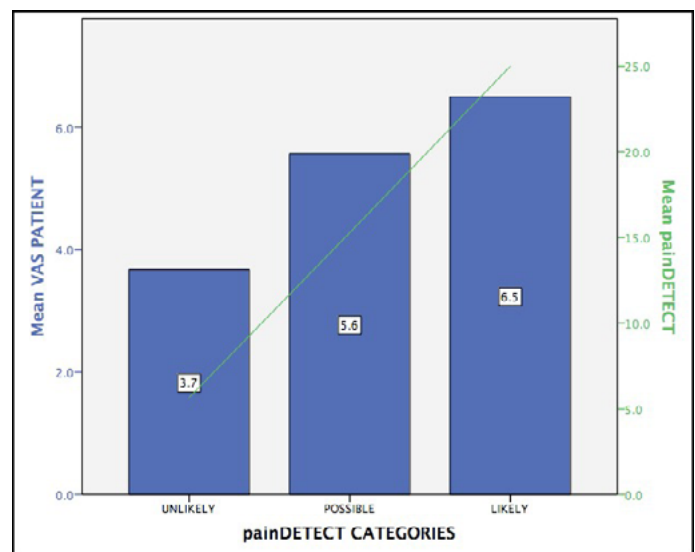


Figure 1. Patients with neuropathic pain presented an increased VAS score.



**Conclusion:** The prevalence of neuropathic pain was 12% and it was associated with higher levels of VAS. Patients receiving pregabalin are less likely to present neuropathic pain. More data needs to be recollected to study this association. This is the first study of neuropathic pain in Ecuadorian patients.

## P530

### HYPOCALCEMIA LINKED TO 1-YEAR MORTALITY IN PATIENTS WITH HIP FRACTURE: A MONOCENTRIC COHORT STUDY

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**Objective:** Hypocalcemia is associated with acute complications in patients hospitalized for hip fracture, but its role in 1-y mortality is not well established.

**Methods:** Retrospective study that included patients admitted to our hospital with hip fracture for 3 consecutive months. Data collected were cerebrovascular disease, heart failure (HF), dementia, chronic obstructive pulmonary disease (COPD), diabetes mellitus (DM), chronic kidney disease (CKD), neoplasm, previous fragility fracture, calcium, and vitamin D. These variables were evaluated upon admission and mortality was seen at 1-y. Calcium was assessed as a continuous variable and hypocalcemia was defined as a categorical variable if calcium was less than 8.6 mg/dl. Comparison between groups was performed using the chi-square test and t-test. Linear regression analysis was performed.

**Results:** 82 patients were included, 71 (86.6%) females, aged 81.5±6.4 y. Five (6.1%) patients had acute myocardial infarction, 14 (17.1%) stroke, 11 (13.4%) HF, 15 (18.3%) dementia, 5 (6.1%) COPD, 8 (9.8%) CKD, 14 (17.1%) neoplasm, and 22 (28.9%) had previous fragility fracture. Mean calcium was 9.6 (0.4) mg/dl, and mean vitamin D was 30.1 (13.5) ng/ml. Nineteen patients (23.2%) died within 1 y of fracture. Patients who died were found to have more frequent hypocalcemia (60.0% vs. 13.2%, p=0.01), age over 85 y (63.2% vs. 33.3%, p=0.02) and dementia (36.8% vs. 12.7%, p=0.04). There were no statistically significant differences in the remaining variables studied, although there was a tendency for the deceased patients to have a higher percentage of previous fragility fracture, previous acute myocardial infarction, HF and CKD, and lower values of vitamin D. In linear regression analyses, when adjusted for comorbidities, age and gender, hypocalcemia was an independent predictor of 1-y mortality (OR 9.37, 95%CI 1.73-50.68, p=0.01).

**Conclusion:** Hypocalcemia was associated with 1-y mortality after hip fracture, regardless of age, gender, or comorbidities. The identification and treatment of hypocalcemia may play an important role in the prognosis of these patients, and further studies are needed to better assess this association.

## P531

### BONE MANIFESTATIONS IN SYSTEMIC MASTOCYTOSIS AND RELATED RISK FACTORS

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**Objective:** Clinical characteristics in systemic mastocytosis (SM) range from asymptomatic (indolent) to aggressive forms. Up to 28-34% of patients with SM have symptoms related to bone involvement at diagnosis and 16% have fractures (1). Skeletal manifestations include bone pain, osteoporosis (OP), osteosclerosis, focal osteolytic and osteoblastic lesions. OP is frequently related to indolent SM but not the aggressive forms (2). We aimed to describe bone involvement in patients with SM and analyze related risk factors.

**Methods:** Retrospective cohort study comprising patients with SM that attended the Rheumatology Dept. from 2010 to 2021. Sociodemographic variables, SM classification, OP risk factors, bone lesions, fracture presence and analytical parameters were collected, and we analyzed whether they were associated with the presence of fractures (Table 1). Densitometry data were registered at diagnosis and up to 8 y of follow-up.

Table 1. Clinical features and differences between fractured and not fractured patients

	All (N=22)	Fractures (N=3)	No fractures (N=19)	p
Age (y), mean (SD)	47.05(12.4)	44.3 (13.3)	47.5 (2.5)	0.69
Sex W/M, N(%)	15(68.2)/7 (31.8)	1(33.3)/2(66.7)	14 (73.7)/5(26.3)	0.23
Mastocytosis classification N(%)				
Indolent	19(86.4)	2(66.7)	17 (89.5)	0.37
Aggressive forms*	3(13.6)	1(33.7)	2(10.5)	
Menopause, N(%)	8 (36.4)	1 (100%)	7(83.6)	0.66
Low calcium intake, N(%)	16(72.7)	2 (66.7%)	14 (73.7)	0.63
Low BMI, N(%)	5 (22.7)/17(77.3)	0	5(26.3)	0.44
Smoking, N(%)	2 (9.1)	0	2 (10.5)	0.74
Alcoholism, N(%)	2(9.1)	0	2 (10.5)	0.74
Hypovitaminosis D, N(%)	5(22.7)	0	5(41.7)	-
Hyperparathyroidism, N(%)	5(22.7)	0	5(45.5)	-
Tryptase, mean (SD)	34.4(26.1)	20(-)	35.3(26.7)	0.58
BMD at diagnosis, mean (SD)				
Lumbar spine (g/cm <sup>2</sup> )	0.976 (0.2)	0.509	1.012(0.3)	<0.01
Femoral neck (g/cm <sup>2</sup> )	0.860 (0.1)	0.704	0.872(0.1)	0.17

\*Aggressive forms include smoldering, hematologic malignancy, and mast cell leukemia

**Results:** 22 patients were included, 19 SM were indolent, 1 smoldering, 1 hematologic malignancy and 1 mast cell leukemia. Radiologically, 17 patients did not present lesions, 4 presented sclerotic lesions and 1 lytic lesions. Vertebral fractures were observed in 3 patients and 2 of them were before SM diagnosis. 10 patients received antiosteoporotic treatment, 3 of them with teriparatide. At diagnosis, 2 patients (9.1%) had osteoporosis and 11 (50%) osteopenia. None of the analyzed risk factors were associated with OP presence. Of note, during follow-up significant changes were observed between those with indolent SM and aggressive forms at lumbar spine (LS) and femoral neck (FN) at 2 y (change in LS in indolent form -2.9% vs. 29.6% in aggressive

forms,  $p < 0.001$  and change at FN of 1% vs. 20.5%, respectively,  $p = 0.003$ ). At 4 years change at LS was -4.1% vs. 25.8%,  $p = 0.034$  between indolent and aggressive forms but there were no differences regarding the presence of fractures (2 fractures in indolent group and 1 in aggressive,  $p = 0.371$ ).

**Conclusion:** Bone involvement was present in more than 50% of patients at diagnosis and the presence of fractures was not uncommon (14%), especially at LS. Aggressive forms were associated with an increase in aBMD. The presence of fractures was associated with lower LS aBMD at diagnosis.

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### P532

#### BONE MINERAL DENSITY IN WOMEN WITH PERIODONTAL PATHOLOGY

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**Objective:** The pathogenesis of osteoporosis is mainly due to violations of mechanisms of bone remodeling which entail loss of skeletal mineralization, in particular, affecting jaw bones which aggravates destruction of the alveolar part of the process and connective tissue of the periodontium and results in tooth loss. Decline in skeletal bone mass, typical for osteoporosis, correlates with reduction of density of cancellous bone substances of mandibles, decrease of cortical plate thickness and interdental septum height. The clinical effects of osteoporosis on oral health of women are associated with non-inflammatory gingival recession apical to the cemento-enamel junction, thinning of the gingival epithelium, microcirculatory disorders, predominant sclerotic changes in the vessels, involutive changes in the periodontium; all these make possible the assertion of the association between osteoporosis and periodontitis. We aimed to determine the BMD in osteoporotic women with chronic generalized periodontitis of moderate severity.

**Methods:** 62 women aged 45-65 y with chronic generalized periodontitis of moderate severity and clinical attachment loss (CAL)  $> 5$  mm (ICD-10 – K05.3) were examined. Anamnesis of patients was collected, the patients underwent X-ray densitometry, the amount of 25-OH vitamin D in the blood and comorbidity index of each women with somatic pathology ( $CI \leq 2$ ) were determined, approval of the ethics committee for the study and patients' consent to participate in the study were obtained.

**Results:** Using data from densitometry of the right femoral neck of women with chronic generalized periodontitis of moderate severity, the study found that 9 participants had normal BMD, osteo-

porosis was detected in 15 patients, osteopenia was detected in 38 women ( $P < 0.000$ ). Accordingly, the patients were divided into three groups: the first group consisted of patients with normal bone density, the second one - with osteopenia, the third one - with osteoporosis. In each group, periodontal status was determined and blood test for 25 OH vitamin D was taken. The close association and links between periodontal diseases and disorders of BMD in women ( $P < 0.000$ ) were found. In patients with chronic generalized periodontitis, vitamin D deficiency and insufficiency in serum blood were defined, though no statistical differences were found ( $P = 0.294$ ).

**Conclusion:** The association between chronic generalized periodontitis of moderate severity and BMD disorders has been revealed.

### P533

#### CONDITION OF BONE TISSUE IN SCHOOL-AGED CHILDREN TAKING INTO ACCOUNT OF VDR GENE POLYMORPHISM AND VITAMIN D LEVELS

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**Objective:** The structural and functional features of bone tissue in school-aged children, taking into account the FokI polymorphism of the VDR gene and vitamin D levels.

**Methods:** 205 children aged from 9-17 were examined. They were divided into three groups depending on growth spurt (GS) and its intensity: group 1 included 50 children who gained 8-12 cm in height over the year; group 2 covered 46 children who grew by over 12 cm this year, group 3 included 109 children who had no GS. To participate in the study, the children were documented to have no chronic somatic or endocrine pathology or hereditary diseases. The examination required collection of information from the clinical history and objective evaluation to assess the level of physical and sexual development, 25(OH)-D levels, molecular diagnostics of FokI polymorphism of the VDR gene (PCR method), ultrasound (QUS), and X-ray densitometry (DXA). BMD Z-score  $\leq -2$  was considered to be the criterion for diagnosing a decreased BMD in accordance with the recommendations ISCD, 2019.

**Results:** The low BMD with QUS was diagnosed in 24 children of group 1 (48.0%) (Z-score  $-1.8 \pm 0.56$ ); in 28 children of group 2 (60.87%) (Z-score  $-1.96 \pm 0.27$ ); and in 43 children of group 3 (39.45%) (Z-score  $1.68 \pm 0.72$ ). 32 children diagnosed with the low BMD after QUS were examined with DXA. 18 of them (56.25%) had the low BMD. The number of children with the low BMD in group 1 reached 38.9%, in group 2, it was 50.0%. The average 25(OH)-D level in children with a low BMD belonging to Group 1 was  $39.04 \pm 11.84$  nmol/L; in children with a normal BMD, it was  $42.43 \pm 6.3$  nmol/L; Group 2 the low BMD was  $45.68 \pm 5.48$  nmol/L,

the normal BMD was  $45.47 \pm 4.69$  nmol/L; and Group 3 the low BMD was  $36.73 \pm 8.94$  nmol/L, the normal BMD was  $42.91 \pm 9.1$  nmol/L. The following variants of FokI polymorphism: a normal genotype in 27.81% of children, a heterozygous mutation in 61.95% and a homozygous mutation in 10.24% of children. Heterozygous mutations in the FokI polymorphism of the VDR gene were most frequent in the group of children with the low BMD but without GS (72.48%).

**Conclusion:** The low BMD in school-aged children, especially during the growth spurt, is due to insufficiency or deficiency of vitamin D and is based on genetic factors. However, the fact that bone mass accumulation is not as intensive as linear skeleton growth is the most important factor for a decrease in BMD.

## P534

### BISPHOSPHONATE USE AND RISK OF SEVERE ACUTE KIDNEY INJURY IN OLDER PATIENTS WITH COMPLEX HEALTH NEEDS: A SELF-CONTROLLED CASE SERIES

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**Objective:** To assess the risk of severe acute kidney injury (AKI) associated with oral bisphosphonates (BP) use in older patients with complex health needs.

**Methods:** We used the CPRD GOLD primary care dataset from UK, linked to Hospital Episode Statistics (HES) inpatient and Office for National Statistics mortality data. All subjects aged >65 at start date (01/01/2010), who did not use BP in 2009 were included. Among these, we identified 3 cohorts of patients with complex health needs, defined by 1) unplanned hospitalisations, 2) frailty and 3) polypharmacy in 2009. For each cohort of complex health needs, we conducted a self-controlled case series (SCCS) among patients with severe AKI recorded during follow-up. Severe AKI was identified based on ICD-10 codes N17 and N19 recorded as main hospital diagnosis in HES, with a 30-day washout to avoid duplicates. BP were identified using product-specific codes in CPRD. Treatment durations were combined to create continuous episodes, allowing for a maximum refill-gap of 90 d. A 90-d period was added to the end of each continuous treatment episode. Incidence rate ratios (IRR) were estimated by comparing AKI rates between exposed and nonexposed periods. SCCS models were adjusted for age. Additionally, we conducted sensitivity analyses to test the assumptions of the SCCS model, including 1) using only the first event per patient, 2) adding a 6-month pre-exposure washout period, and 3) including only patients who survived during follow-up.

**Results:** We identified 78,184, 94,364 and 95,621 eligible patients in the hospitalisation, frailty and polypharmacy cohort, respectively. Of these, 1950 (2.5%), 3023 (3.2%) and 2992 (3.2%) individuals experienced severe AKI during follow-up. Our SCCS model showed increased risk of AKI associated with BP use in all three cohorts, with IRR 1.50 [95%CI 1.05 - 2.12] in the hospitalisation cohort, IRR 1.65 [1.25 - 2.19] for the frailty cohort and IRR 1.60 [1.22 - 2.08] for the polypharmacy cohort. Sensitivity analyses were consistent with our main results.

**Conclusion:** Our study found a 50-65% increased risk of severe AKI associated with BP use in older patients with complex health needs.

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## P535

### ASSOCIATION EXPRESSIONS NESFATIN-1 WITH A MARKER FOR BONE MATRIX FORMATION IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** Currently, the role of tissue cytokines in the pathogenesis of various diseases is being actively studied. Nesfatin-1 (NF-1) is an endogenous peptide with pleiotropic activity [1,2]. The aim of the study was to determine the relationship between the level of NF-1, BMD, composite body composition and markers of bone metabolism in patients with rheumatoid arthritis (RA).

**Methods:** The study randomized 110 patients with RA, 2010 and 30 people in the control group. All of them underwent osteodensitometry LUNAR DPX-Pro. NF-1 levels and bone turnover markers were determined using ELISA test.

**Results:** The average concentration of NF-1 in patients with RA was  $50.49 \pm 34.05$  ng/ml, which is significantly higher than in healthy individuals ( $31.61 \pm 3.17$  ng/ml) ( $M \pm \sigma$ ). According to the level of NF-1, all patients with RA were divided into 2 subgroups. The 1st group included patients (n=44) with normal serum NF-1 (less than 37.95 ng/ml), the 2nd group (n=66) - patients with elevated NF-1 levels. During the analysis of the results of the study, we revealed a statistically significant correlation between NF-1 and the N-terminal propeptide of type I procollagen (P1NP)) ( $r=0.218$ ,  $p=0.022$ ).

**Conclusion:** Thus, the relationship between nesfatin-1 and a marker of bone matrix formation (P1NP) was revealed.

**References:**



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## P536

### DIABETES HAS A GREATER IMPACT ON SUBSEQUENT FRACTURE INCIDENCE IN TIME THAN PREVIOUS FRACTURES, SEX AND AGE: A SURVIVAL ANALYSIS

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**Objective:** Diabetes may induce osteometabolic disorders that lead to increased fracture risk, relation with subsequent fractures remains unclear. We aimed to establish the impact in time of fragility fractures, age, sex and diabetes on subsequent fractures after an index hip fracture.

**Methods:** Retrospective, observational and descriptive study. From database of 670 records of patients aged  $\geq 50$  y with an index hip fracture between 2014-2017. Follow-up at least 2 months. Retrieved information: previous fracture, age, sex, diabetes and subsequent fracture. Statistical analysis: Central tendency, dispersion, frequency and percentages. T-Student, Chi-square test. Kaplan-Meier method, logrank test. Cox regression model.

**Results:** We included 570 patients, mean age 80.09 y (SD $\pm$ 9.45), 79.8% women. Mean follow-up time 24.8 months (SD $\pm$ 20.8). Subsequent fractures on 96 cases, mean time to subsequent fracture 25.9 months (SD $\pm$ 19.5); of these 56.2% occurred within 2 y after incident fracture. No associations were found between previous fracture (p=0.3), sex (p=0.265), and diabetes (p=0.54) for subsequent fractures. Survival analysis only found association for subsequent fractures with diabetes (p=0.01) and biological sex (p=0.03). Cox regression analysis model showed an increased risk only for diabetes (HR=3.8; p=0.017; 95%CI 1.275-11.484).

**Conclusion:** Patients with diabetes had an increased risk of developing subsequent fractures. Men patients develop subsequent fractures earlier.

## P537

### SYSTEMIC LUPUS ERYTHEMATOSUS AND OSTEOPOROSIS

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**Objective:** To identify osteoporosis in patients with lupus.

**Methods:** We conducted an observational study, that included 132 patients, diagnosed with systemic lupus erythematosus according to American College of Rheumatology revised criteria. We analyzed demographic, clinical, laboratory data and information about their therapy. Disease activity was assessed according to the Systemic Lupus Disease Activity Index. BMD was measured using DXA. The criteria for diagnosing osteoporosis are those set by the WHO, T-score  $\leq -2.5$ .

**Results:** Mean age was 43.5 $\pm$ 9.6 y, their mean weight was 68.7 $\pm$ 8.1 kg, mean height was 158.9 $\pm$ 3.2 cm, mean BMI was 25.7 $\pm$ 2.3 kg/m<sup>2</sup> and duration of the disease 11.6 $\pm$ 4.1 y. 86 (65%) patients had high disease activity, 41 (31%) patients had osteoporosis, 61 (46%) of the patients had osteopenia and 30 (23%) patients had normal values.

**Conclusion:** Disease duration, disease activity, duration of therapy, patient age, and menopause play an important role in increasing the risk for osteoporosis in patients with Lupus. We recommend the use of calcium and vitamin D supplements as well as bisphosphonate therapy for the prevention and treatment of osteoporosis in order to prevent major consequences, such as vertebral fractures.

## P538

### PREVALENCE OF SARCOPENIA AND ITS ASSOCIATION WITH ANTIRHEUMATIC DRUGS IN MIDDLE-AGED AND OLDER ADULTS WITH RHEUMATOID ARTHRITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective:** Adults with RA have several factors that can be associated with the development of sarcopenia, including chronic systemic inflammation, physical inactivity, and antirheumatic drug use. However, at the time of this review, the prevalence of sarcopenia and the relationship between anti-rheumatic drugs



and sarcopenia were lacking. We aimed to examine the prevalence of sarcopenia and its association with anti-rheumatic drugs in adults with rheumatoid arthritis (RA).

**Methods:** This review was registered on PROSPERO and followed PRISMA guidelines. Electronic databases were searched for studies reporting on the prevalence of sarcopenia in adults with RA using any muscle index (muscle mass, strength and/or physical performance) and cutpoints as recommended by established criteria (EWGSOP1/2, AWGS, FNIH, SDOC). The secondary objective was to investigate the relationship between antirheumatic drugs and sarcopenia.

**Results:** Among 2240 middle-aged and older adults with RA (mean age: 47.7±5.5 to 75.0±6.2 y, 83.8% women), the pooled prevalence of low muscle mass/sarcopenia was 30.2% (95% CI 24.2-36.2%; 16 studies; I2: 89.2%). Subgroup analysis showed a non-significant higher prevalence of low muscle mass alone (32.6%, 95%CI 25.0-40.3%; I2: 87.9%) vs. consensus definitions of sarcopenia (25.4%, 95%CI 15.4-35.3%; I2: 91.2%, p=0.255). In adults with RA, corticosteroid use was positively associated with sarcopenia [odds ratio (OR) 1.46, 95%CI 0.94-2.29, 7 studies; I2: 47.5%] while conventional synthetic disease-modifying anti-rheumatic drugs (csDMARDs) was inversely associated (OR 0.70, 95%CI 0.52-0.94; 6 studies; I2: 0.00%) with this muscle disease. No association was found for biological/targeted synthetic disease-modifying antirheumatic drugs (b/tsDMARDs) (OR 0.83, 95%CI 0.54-1.30; 6 studies; I2: 47.6%).

**Conclusion:** Sarcopenia is a common comorbidity of RA, and as such, clinicians should screen for this muscle disease in adults with RA. Further longitudinal studies are needed to understand the role of anti-rheumatic drugs (particularly type, dosing, and duration) in the development of sarcopenia.

## P539

### SECONDARY OSTEOPOROSIS IN ADULT WOMEN WITH PSEUDOHYPOPARATHYROIDISM: CASE REPORT

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**Objective:** Pseudohypoparathyroidism is an inherited disorder characterized by patients resistant to PTH. This leads to hypocalcemia and hyperphosphatemia and elevated levels of PTH. While there are numerous case reports addressing PHP in the pediatric population, few cases describe its late presentation. We report a case of osteoporosis in adult women with pseudohypoparathyroidism.

**Methods:** 58 years old Caucasian women come to our center with complaints on slouch and pain in bones. 6 month ago she had a fracture of the wrist. A systemic physical exam was unremarkable, including a neurological and a musculoskeletal examination. Vital signs were within normal limits. Height 161, weight 59 kg. The thyroid gland was soft and smooth. Chvostek's and Trousseau's symptoms were negative.

**Results:** Laboratory results revealed low serum calcium level of 1.56 (2.1-2.6 mmol/l) combined with a high serum phosphorus level of 2.05(0.87-1.45 mmol/l) while creatinine level was normal 68.5 (44-90 mmol/l). These biochemical changes were combined with a high serum intact PTH of 110 (15-65 pg/ml) and low serum vitamin D level of 21 (30-80 ng/m), calcium in urine was also low 1,4 (2.5-7.5 mmol/l). All of these findings were indicative for pseudohypoparathyroidism. She had neither characteristic findings of Albright hereditary osteodystrophy nor evidence of tetany. DXA showed a T-score value -2.9 in the hip, which is the precursor to osteoporosis, and a T-score value -1.2 in the lumbar spine. An electrocardiogram showed prolonged QT interval. Thyroid function tests revealed subclinical hypothyroidism. Magnetic resonance imaging of the head found bilaterally calcifications involving the dentate nuclei, basal ganglia and subcortical white matter regions. The patient was consult by endocrinologist and was given oral calcium carbonate with cholecalciferol, calcitriol, levothyroxini natrii.

**Conclusion:** Pseudohypoparathyroidism is a rare cause of osteoporosis that typically gets discovered during early childhood. Pseudohypoparathyroidism 1b is characterized by a milder course, which is caused by isolated renal resistance to parathormone and thyroid dysfunction. Genetic analysis could help to verify the diagnosis.

## P540

### GLP1 AGONISTS AND BONE METABOLISM: INNOVATIVE APPROACH OR HOPE

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**Objective:** Patients with diabetes mellitus are at increased risk of fracture incidence. This led to the investigation of the impact of antidiabetic agents on bone metabolism, especially GLP-1 agonists. The latter are promising drugs in lowering blood glucose effects with pleiotropic actions such as beneficial effect on bone metabolism, although the underlying mechanism is not yet clearly understood.

**Methods:** A systematic review of the literature conducted on PubMed, Cochrane Central Register of Controlled Trials (CENTRAL) and Google Scholar from October 2019 to January 2020, for articles related to diabetes mellitus, bone metabolism and GLP1RAs. Only papers in English were included. Finally we included four randomized controlled trials, three meta-analyses, a case control study and a population based cohort analyses.

**Results:** Although, animal studies indicated a salutary effect on bone metabolism, human studies did not show the same effect. Instead of this, human studies showed no impact on BMD, bone turnover markers, and fracture incidence as compared to other antidiabetic agents

**Conclusion:** GLP1RAs is a promising class according to their effect on bone health, as this was demonstrated from animal studies, however further double blind randomized controlled trials required in order to highlight their efficacy.

P541

**MACHINE LEARNING TECHNOLOGY FOR A BETTER FUTURE CURRENT CARE OF FRAGILITY HIP FRACTURE: PREDICTORS OF 30-DAY MOBILITY**

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**Objective:** In recent years, several calculation tools or scales have been developed to assess the risk of mortality and disability after a hip fracture in the long term. However, how these factors jointly or independently at the time of hospital admission can dynamically impact in the future functionality of the patients is not well known. Spurred by advancements and the wealth of data that we work with every day, we apply machine learning principles to predict hip fractures mortality and estimate the importance factors.

**Methods:** We have studied a dataset of 1159 patients who, retrospectively discharged after a fragility hip fracture from January 2017 to March 2021 and participating in a local registry three

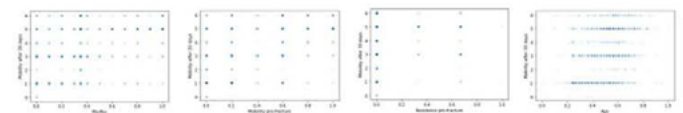
regional Catalonia hospitals. Demographic variables, cognitive and functional status, prefracture osteoporosis treatment, fracture type, anesthetic risk, hospital volume, and antiosteoporotic prescription at discharge were analyzed. The main targets of this study were to define the weight and the correlation of the different parameters captured from the patients (before surgery, during hospital and after 30 d) and to predict the mobility after 30 d through machine learning algorithms, and 30-d mortality. Gradient boosting used for regression analysis and statistical classification problems, which produces a predictive model in the form of a set of weak prediction models, typically decision trees.

**Results:** Results comparison statistical were built on 75% of data points through k-5, 5-repeat crossvalidation, and then validated on the remaining 25% of data points to calculate area under the curve (AUC) and calibrate probability estimates. For our dataset, bootstrap aggregated flexible discriminant analysis (“Gradient Boosting”) performed best with a test AUC of 0.89 [0.89; 0.94] and well-calibrated probabilities following Naïve Bayes adjustments.

**Conclusion:** Previous functionality vs. mobility, together with place of residence at 30 d and adherence to pharmacological treatment to prevent new fractures at 30 d, are the factors with the greatest weight in functionality 30 d after discharge. Followed by treatment at hospital discharge, ASA and Pfeiffer. Machine learning is truly a positive and welcome disrupting force in care of fragility hip fracture. More data means better results for sure and it has been demonstrated in our project.

**4 main correlations**

	Residence pre-Fracture	1.000000	Mobility pre-Fracture	1.000000
1	Mobility pre-Fracture	0.524900	Mobility after 30 days	0.532416
2	Pfeiffer	0.375568	Pfeiffer	0.482428
3	Mobility after 30 days	0.331306	Residence postfracture	0.332600
4	ASA	0.248913	ASA	0.204590
5	Age	0.143129	Age	0.242284
	Residence after 30 days	1.000000	Mobility after 30 days	1.000000
1	Mobility after 30 days	0.442404	Mobility pre-Fracture	0.532416
2	Destination after hospital	0.399893	Residence after 30 days	0.342409
3	Mortality after surgery	0.289704	Pfeiffer	0.334987
4	Mobility pre-Fracture	0.214708	ASA	0.215284
5	ASA	0.144773	Mortality after surgery	0.243715



Mobility after 30 days	1.000000
Mobility pre-fracture	0.444092
Residence after 30 days	0.442113
Mortality after surgery	0.276807
ASA	0.230701
Pfeiffer	0.214657
Residence pre-fracture	0.198413
Age	0.196543
Destination after hospital	0.178725
Sit first day	-0.170465
Treatment after 30 days	-0.288078
Treatment5 after 30 days	-0.374951

P542

### PREVALENCE OF LOW BONE MINERAL DENSITY MEASURED AT AXIAL SITES AND FRACTURE RISK IN BULGARIAN POPULATION

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**Objective:** Osteoporosis is a chronic disease characterized by low BMD and microarchitectural deterioration of the bone, which are associated with increased risk of fragility fractures. Currently the most popular tool is the fracture risk assessment model FRAX to calculate the 10-y probability of major osteoporotic fractures (MOF) and hip fractures (HF). The aim of this study was to investigate the prevalence of low BMD measured at axial sites and fracture risk in Bulgarian population.

**Methods:** We retrospectively analyzed DXA scans of 12 478 subjects. Participants were divided into groups according to the age at an interval of 10 y. Scan results included BMD and T-score assessments of the lumbar spine of 9 336/12 478 subjects (74.8%) and of the femoral neck of 3 140/12 478 subjects (25.2%). FRAX MOF and FRAX HF were calculated for 1863 subjects between 40-90 y using BMD values.

**Results:** Of total 12 478 subjects, 12 119 were women and 359 were men. The mean age of the subjects was 61±10 y. The overall prevalence of low BMD at the lumbar spine was 6084/9336 subjects (65.2%). 3502/9336 subjects (37.5%) were considered as osteopenic and 2582/9336 subjects (27.7%) were considered as osteoporotic at the lumbar spine. The overall prevalence of low BMD at the femoral neck was 2036/3140 (64.8%). 1641/3140 subjects (52.3%) were classified as osteopenic and 395/3140 subjects (12.6%) were classified as osteoporotic at the femoral neck. The mean total BMD values of the lumbar spine and the mean BMD values of the femoral neck differed significantly between the age decades ( $p=0.000$  for each axial site). The mean values of FRAX MOF and FRAX HF increased significantly with increasing the age interval,  $p=0.000$ .

**Conclusion:** This study is the largest epidemiological research in Bulgaria up to date about the prevalence of low BMD measured at axial sites.

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### COMPARISON OF BMD MEASURED AT AXIAL SITES AND FRACTURE RISK BETWEEN BULGARIANS AND BULGARIAN TURKS THROUGH DXA

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**Objective:** Osteoporosis is a systemic bone disease caused by complex interactions between genetic, metabolic and environmental factors. The aim of the current study was to compare the mean BMD and T-score values measured at axial sites between the Bulgarian ethnicity (Bulgarians) and Turkish ethnic group from Bulgaria (Bulgarian Turks).

**Methods:** We assessed DXA scans of 1573 subjects (812 Bulgarians and 761 Bulgarian Turks) aged 59±10 y, (range 16-86 y). Of 812 Bulgarians, 800 were female and 12 were male and of 761 Bulgarian Turks, 741 were female and 20 were male. Of overall 1573 subjects, 518 were scanned at the hip and 1055 at the spine. We used independent sample T-test to compare the mean age, weight, BMD values and T-scores measured at axial sites, FRAX major osteoporotic fracture (MOF) and FRAX hip fracture (HF) calculated with BMD between Bulgarians and Bulgarian Turks.

**Results:** The mean age and weight of the Bulgarians (62 y, 98.7 kg, respectively) were significantly higher ( $p=0.000$  for both parameters) compared to Bulgarian Turks (58 y, 72.5 kg, respectively). Turkish ethnic group had significantly lower femoral neck mean T-score (-1.0 SD), lower mean total hip BMD (0.923 g/cm<sup>2</sup>) and lower mean total hip T-score (-0.8 SD) compared to the Bulgarians (-0.5 SD for femoral neck T-score; 1.009 g/cm<sup>2</sup> for total hip BMD and -0.1 SD for total hip T-score),  $p=0.000$  for all variables. Mean total spine BMD and T-score of the Bulgarian Turks were also significantly lower (0.869 g/cm<sup>2</sup>, -1.7 SD, respectively) than those of the Bulgarian subjects (1.087 g/cm<sup>2</sup>; -0.4 SD, respectively),  $p=0.000$  for the both spinal values. The mean FRAX MOF was significantly higher in the Turkish population (5.65%) than those in Bulgarian population (4.88%),  $p=0.012$ . There wasn't any significant difference between both ethnical groups concerning the FRAX HF (0.95% for Bulgarian Turks and 0.71% for Bulgarians),  $p=0.077$ .

**Conclusion:** Bulgarian Turks showed significantly lower mean BMD values and T-scores measured at axial sites and higher fracture risk compared to the Bulgarian ethnic group.

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### MANAGEMENT ALGORITHM FOR NURSING PRACTICE IN PRIMARY HEALTHCARE AFTER EVALUATION OF THE ABSOLUTE FRACTURE RISK USING BULGARIAN FRAX MODEL

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**Objective:** There are several tools for assessment of osteoporotic and fracture risk (1,2). Despite of the development of a country-specific FRAX model in Bulgaria (3), it hasn't been actively used in the clinical practice. The aim of the current study was to introduce a management algorithm for nursing practice in primary healthcare after evaluation of the absolute fracture risk using Bulgarian FRAX model.

**Methods:** 51 nurses in the primary healthcare were asked to use Bulgarian FRAX model to assess fracture risk in subjects over the age of 50 y. After calculating FRAX each nurse was requested to fill inquiry concerning the management algorithm for fracture risk.

**Results:** The mean age of the nurses was 47±9 y. 47/51 nurses (92.2%) were of the opinion that they could independently evaluate the country-specific FRAX. 42/51 nurses (83.4%) were firmly convinced that they are able to use a specific management algorithm concerning fracture risk. 45/51 nurses (88.2%) answered that they could successfully educate patients how to prevent osteoporotic fractures. Based on these answers we introduced a management algorithm for nursing practice in primary healthcare including the following steps: evaluation of the FRAX without using BMD in subjects over 50 y, triage of the subjects according to their fracture risk as follow: low, moderate and high fracture risk and advisement of the subjects with low fracture risk to change their lifestyle, those with moderate fracture risk to undergo DXA scan and to reassess FRAX with inclusion of BMD and those with high fracture risk to visit a specialist.

**Conclusion:** Nurses in the primary healthcare in Bulgaria could independently evaluate the country-specific FRAX and use successfully the introduced management algorithm.

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P545

### SOLITARY BROWN TUMOR OF THE TIBIA: REPORT A CONSERVATIVE CASE AND REVIEW OF LITERATURE

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Brown tumors, also known as osteitis fibrosa cystica, are focal benign bone lesions caused by increased osteoclastic activity because of parathyroid hormones. They have been reported to occur in primary hyperparathyroidism (HPT) and secondary HPT resulting from renal failure and vitamin D deficiency. Brown tumor usually presents with pain and/or fractures and evaluation may reveal solitary or multiple sites of osteolytic lesions that may mimic bone malignancies. Brown tumors in weight-bearing bone usually require surgical prophylaxis. We report a very rare case of impending fracture of proximal tibia because of a brown tumor that was successfully managed conservatively after treating the primary cause.

A case of a 26-year-old Thai female who visited the clinic because of right leg pain and swelling for 3 weeks. Plain radiography revealed a solitary osteolytic lesion with an incomplete fracture at the anterior cortex of the right proximal tibia. The patient underwent a core needle biopsy. The initial histopathology report depicted a giant cell lesion. The patient had elevated serum parathyroid hormones. On further investigation with contrast-enhanced computed tomography of the neck, a parathyroid adenoma was discovered. The immunochemistry and molecular study report were consistent with brown tumor. The patient underwent parathyroidectomy for her adenoma and was on weight-bearing restrictions for her leg. After 3 months of follow-up, she could bear weight on her right leg without pain and radiographic evaluation showed restoration of the tibial cortex.

P546

### OPTIMAL INTERVENTION TIMING OF ROBOTIC ASSISTED GAIT TRAINING IN PATIENTS WITH HEMIPLEGIC STROKE

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**Objective:** To determine the optimal time to conduct Walkbot robot-assisted gait training (RAGT) rehabilitation by comparing cognition and motor sensorimotor functions across the stroke acute, subacute, and chronic stages.



**Methods:** 47 stroke survivors (acute stage, n=18; subacute stage, n=14; chronic stage, n=15) consistently underwent Walkbot RAGT for 30-min a session, three times a week, for 4 weeks. Ten clinical outcome variables, including the Mini-Mental State Examination (MMSE), Fugl-Meyer Assessment (FMA), Berg Balance Scale (BBS), Modified Ashworth Scale, Modified Barthel Index (MBI), Trunk Impairment Scale (TIS), and gait parameters, comprising steps, distance, stride length, and speed, were analyzed.

**Results:** Among between-group comparisons, there was a significant difference in the gait steps, and distance between the acute and other groups. Among within-group comparisons, the acute group showed significant differences in seven variables, including FMA, BBS, MBI, TIS, gait steps, distance, and speed. Compared with the subacute and chronic groups showing significant differences for three and two variables, respectively.

**Conclusion:** Walkbot RAGT was more effective for functional improvement in the acute stage than in the subacute and chronic stages. Our research provided clinical evidence-based insights in determining the optimal intervention timing for robotic gait rehabilitation.

## P547

### EFFECT OF FRAILTY ON CLINICAL OUTCOMES OF HIP FRACTURE PATIENTS; A SYSTEMATIC REVIEW

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**Objective:** To determine the impact of frailty on clinical outcomes of hip fracture (HF) patients.

**Methods:** Original studies published during the last 10 y were searched in PubMed and Cochrane using the key terms (frailty) AND (clinical outcomes OR adverse outcomes OR prognosis) AND (hip fracture OR femoral fracture). The PRISMA guidelines were followed in selecting articles and case reports, conference reports, review articles, meta-analyses and articles published in other languages were excluded.

**Results:** The original search retrieved in 117 articles. Based on selection criteria 13 quantitative studies (4 retrospective cohort studies, 6 prospective and 3 hospital databases) were considered covering 211,461 total HF patients aged  $\geq 50$  y. These studies have used 10 different tools to assess frailty: those were Frailty index (including number of deficits such as 51, 44, 32, 22, 19 deficits), modified frailty index, Edmonton frailty scale, Clinical frailty scale, Groningen Frailty Index and Hospital frailty risk score. Clinical outcomes included six themes such as functional outcomes, medical complications, surgical complications, readmissions, length of hospital stay and mortality at 1, 3, 6 months and 1 y post

fracture. HF patients with higher degree of frailty had higher risk of short-term mortality, other medical and surgical complications, impaired functional recovery, readmissions, increased length of hospital stay and impaired quality of life (QoL).

**Conclusion:** HF patients with frailty experience more short-term mortality, adverse medical or surgical outcomes, impaired functional recovery and poor QoL compared with nonfrail patients. Frailty is a determinant of adverse clinical outcomes of HF patients.

## P548

### SURGICAL TREATMENT FOR FRAGILITY HIP FRACTURES DURING THE COVID-19 PANDEMIC RESULTED IN LOWER SHORT-TERM POSTOPERATIVE FUNCTIONAL OUTCOME AND A HIGHER COMPLICATION RATE COMPARED TO THE PREPANDEMIC PERIOD

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**Objective:** To investigate the in-hospital complication rate and short-term postoperative functional outcomes of fragility hip fracture (FHF) patients compared between the COVID-19 pandemic and pre-pandemic periods.

**Methods:** Using data from the Siriraj Fracture Liaison Service registry, FHF patients treated during the COVID-19 pandemic (1 March 2020 to 30 April 2021) were time-matched with FHF patients treated during the pre-pandemic period (1 March 2018 to 30 April 2019). We collected the rate of in-hospital postoperative complications, and postoperative functional outcomes at discharge and 3-months as measured by Barthel Index (BI) and the Euro-QoL-visual analog scale (EQ-VAS). Functional outcome measures were compared between the pre-pandemic and pandemic periods.

**Results:** During the study period, there were 197 and 287 patients in the pre-pandemic and pandemic groups, respectively. At the 3-month postoperative follow-up, the mean postoperative BI and change in BI scores were both significantly lower in the pandemic group indicating poorer postoperative function. Moreover, FHF patients treated during the pandemic had significantly more in-hospital complications (36.6% vs. 22.8% respectively; p=0.002). There was no significant difference in the 3-month EQ-VAS or change in EQ-VAS between the 2 study groups.

**Conclusion:** This study revealed a higher in-hospital complication rate and lower postoperative function at 3 months among FHF patients treated during the COVID-19 pandemic compared to pre-pandemic rates. Therefore, modifications of in-hospital and postdischarge protocols should be developed for implementation during pandemic crisis periods.

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## TWO-STAGE SURGERY: AN ALTERNATIVE SURGICAL MANAGEMENT FOR EWING SARCOMA PATIENT USING PERSONALIZED AND ECONOMICAL 3D PRINTED TITANIUM FOR DISTAL CLAVICLE RECONSTRUCTION

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**Objective:** Report a case of two-stage reconstruction surgery as an alternative strategy for managing localized Ewing sarcoma in unfavorable financial situations.

**Methods:** We report case of a 13-year-old boy who presented with a growing lump at left clavicle for 5 months. Plain radiograph revealed an osteolytic mass with aggressive periosteal reaction, suggesting a malignant lesion. Advanced imaging and histopathological examinations revealed that the patient had Ewing sarcoma without metastasis. A standard chemotherapy protocol was subsequently initiated. The patient responded to the treatment, and then surgical resection was planned. However, owing to rarity of Ewing sarcoma of the clavicle, no consensus has been achieved on surgical techniques. The 1st stage operation with wide resection at the left distal clavicle and reconstruction with plate and cementation.

After no evidence of recurrence in 2 y, the patient was operated on with the 2nd stage operation with patient-specific 3D-printed personalized left distal clavicle reconstruction.



**Results:** We performed a two-stage surgery in this patient: resection-observation-reconstruction. Underlying rationale was that Ewing sarcoma has high recurrence rates and limited implant availability; the patient's family's financial constraints were also

considered. After 2 y of treatment, patient had remission, and he currently has a personal 3D printed titanium implant with intact shoulder function.

**Conclusion:** Two-stage surgery: observation and confirmation of potential recurrence in the first stage and reconstruction with 3D printed personalized prosthesis in the second stage. Definite reconstruction provides a reasonable balance between recurrence and financial risks.

P550

## CALCIUM SUPPLEMENTS AND VASCULAR AGING

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**Objective:** There is a still controversy regarding the calcium supplementation associated with cardiovascular calcifications and relation to cardiovascular disorders, morbidity and mortality. A systematic analysis of randomized controlled trials, cohort and observational studies, expert opinions provides a difference observations about the impact of calcium on cardiovascular health. There is a strong evidence that dietary calcium is of great benefit for cardiovascular and bone health, while on the other hand the supplementary calcium in the dosage above 1400 mg/d has negative consequences on the heart and vascular health. Dietary calcium, but not supplementary calcium reduce the absorption of oxalates that are responsible for kidney stones. The higher intake of calcium supplements increase the risk. The higher intake of calcium supplements increase the blood concentration of calcium and therefore promote vascular aging, vascular stiffness, and vascular calcifications. Calcium supplement vs. dietary calcium increase the risk for vascular calcification by around 20%.

**Methods:** The case series of 11 randomized patients taking supplementary calcium were included. Diagnostic methods like echocardiography, 3-D Echo, Doppler examination, multislice CT scan of coronary arteries, arterial stiffness measurement, vitamin D were included in investigation.

**Results:** Our results indicate the higher calcification in the heart valves and coronary arteries in patients taking long term supplements. The biological age was increased by 8 y in selected patients (range 03-09 y), especially in osteoporotic individuals.

**Conclusion:** The supplementary calcium contribute to the vascular aging and cardiovascular calcifications and influence the cardiovascular morbidity and mortality. The more intensive randomized studies are imminent to prove this hypothesis and findings on this case series study.

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### EFFICACY OF CABBAGE AND COOLING GEL PAD FOR RELIEVE PAIN IN KNEE OSTEOARTHRITIS PATIENT

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**Objective:** Osteoarthritis is one of the most common joint degeneration ailments affecting the elderly population by impairing their physical movements and their quality of life. The study aimed to establish the efficacy of cabbage leaf application in alleviating pain distress and positively improving osteoarthritis conditions.

**Methods:** Osteoarthritis patients with moderate severity and appropriate Oxford knee score were selected to enroll in the clinical trial. Participants were divided into three arms with interventions, including cooling gel pad (n=20) and diclofenac gel (n=20) as Control group (Total n=40) and cabbage leaf (n=20) as the experimental group (Total n=20). All the trial participants were trained to record their pain score by employing the Numerical rating scale and Oxford knee score and advised for a weekly follow-up for continuous assessment for one year. Data were analyzed by paired T-test and ANOVA.

**Results:** The average Oxford Knee score for cabbage leaf application: 33.85±7.28, for cooling gel pad application: 29.6±6.71, for diclofenac gel application: 29±5.39 was noted. Average numerical rating scales (NRS) for cabbage leaf application: 2.15±1.27, for cooling gel pad application: 3.8±1.51, for diclofenac gel application: 4.1±1.71 was noted. Cabbage leaf application and cooling gel pad group before and after intervention showed a statistically significant value of p<0.05 (paired t-tests) and three study procedures were found to be statistically significantly different both Oxford knee score and NRS (ANOVA).

**Conclusion:** The study clinically demonstrated that cabbage leaf application and cooling gel pad showed similar improvements in reducing osteoarthritis symptoms in terms of overall NRS and Oxford knee score. Noted observations were better than diclofenac gel.

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### THE PEAK VALUE AND LONGITUDINAL CHANGE RATE OF TRABECULAR BONE SCORE IN CHINESE ADULT MEN

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**Objective:** To explore the peak value and longitudinal change rate of TBS in Chinese adult men.

**Methods:** We collected Chinese adult men who underwent regular health examinations at our hospital from 2013-2020. Subjects who had at least twice DXA in different health examinations were included in the study. Their BMD and lumbar spine (LS) TBS values were recorded at the first and the last visit. The baseline value and annual change rate of BMD and LS TBS were analyzed during follow-up.

**Results:** A total of 290 men were included (mean age 59 y, range 36-85, mean follow-up 3.1 y). Subjects were divided into different age subgroups per 10 y. The baseline data showed that LS TBS peaked (1.319) around 50 y in men by quadratic term trend test (P for trend=0.03). During the mean follow-up of 3.1 y, the annual change rate of TBS was -0.17% in Chinese men. More importantly, the annual change rate of TBS was statistically significantly decreased in men aged 66-75 y (-1.08%) compared with other age subgroups (P<0.05). However, the mean annual change rate of the LS BMD in different subgroups of men increased with age (P for trend=0.001). There was no significant decrease in the mean annual change in the hip and femoral neck BMD at all age subgroups in men (all P>0.05).

**Conclusion:** Unlike peak BMD at around 35 y, TBS peaks later than BMD, reflecting developmental differences between bone microstructure and bone mineral. Rapid loss of TBS occurred in men around 70 y, which may have important implications for bone loss and osteoporosis prevention in clinical practice for men. As the change rate of BMD did not show a significant decrease in all age groups, TBS may be used as a better indicator for changes in bone strength in adult men.

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### OSTEOARTHRITIS OF THE KNEE JOINT I-III STAGES: IS THERE A DIFFERENCE IN EFFECTIVENESS BETWEEN HYALURONIC ACID PREPARATIONS WITH DIFFERENT MOLECULAR WEIGHTS AND IN COMBINATION WITH CHONDROITIN SULFATE?

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**Objective:** Intraarticular injection (IAI) of hyaluronic acid (HA) preparations is a method of conservative treatment of the knee osteoarthritis (KOA). However, the results of the use of HA for the treatment of KOA are contradictory. We aimed to study the effectiveness of IAI of HA preparations with different molecular weights and in combination with chondroitin sulfate (CS) in the treatment of patients with KOA I-III stages.

**Methods:** IAI of HA preparations were performed 160 patients with primary and post-traumatic knee OA of the I-III stages at the department of rheumo-orthopaedic and rehabilitation, V. A. Nasonova Research Institute of Rheumatology for the period from September 2017 to June 2019. Patients were divided into 4 groups. Group 1 consisted of 80 patients treated with low molecular weight (LMW) HA, group 2 - 20 patients treated with medium molecular weight (MMW) HA, group 3 - 30 patients treated with high molecular weight (HMW) HA, and group 4 - 30 patients who were intraarticular introduced HA with CS. The course of IAI was 2 for LMW, HMW, and HA with CS, and 3 for MMW HA. Injections were performed with an interval of 1 week. To evaluate the results of treatment, we studied the intensity of pain according to VAS and the total score of KOOS before treatment and on follow-up examinations 1, 3 and 6 months after the course of IAI of HA preparations.

**Results:** the maximum reduction in pain with IAI of HA preparations at stage I of KOA occurred by 3 months after the course of treatment. Moreover, improvement was detected by 1 month in 84.3% of cases, and remained until the end of the study in 71.1% of patients. All HA preparations used in stage I of KOA were effective. At stage II of the KOA after 3 months after the course of IAI of HA, different efficiencies of HA preparations were revealed. So, in the groups of LMW, MMW and HA with CS, the improvement persisted up to 3 months, and in the group of HMW HA - up to 1 month. After 3 months, the best results were shown by HA with CS, by 6 months the results were comparable. IAI of HA preparations at the II stage of the KOA led to good and excellent results 1 month after the course of treatment in 53.9% of cases, but by the end of the study, improvement remained in only 30.8% of patients. In the case of the use of HA in stage III of the KOA, the effectiveness of the studied drugs was comparable, and the maximum improvement was achieved by 1 month. The positive effect of IAI of HA preparations in patients with stage III of the KOA one month

after the course of treatment was obtained in 40.6% of cases, by 3 months it decreased to 18.8%, and by 6 months - to 15.7% of patients.

**Conclusion:** IAI of HA preparations at stage I of the KOA is a highly effective method of conservative treatment, which allows to relieve pain and improve the function of the knee joint for a period of 6 months or more. The use of HA preparations at stage II of the KOA allows reducing pain up to 3 months with IAI of LMW and MMW HA, as well as HA with CS. HMW HA helps reduce pain intensity for a period of 1 month. The use of HA preparations in stage III of the KOA leads to a short-term relief of symptoms of OA.

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### TRABECULAR BONE SCORE BY DUAL-ENERGY X-RAY ABSORPTIOMETRY: A CROSS-SECTIONAL AND LONGITUDINAL ANALYSIS IN HEALTHY ADULT MALES

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**Objective:** To identify whether bone turnover markers and sex steroids are associated with TBS and longitudinal change in TBS.

**Methods:** A longitudinal, population-based sibling pair study was conducted. The cross-sectional and longitudinal data of 465 healthy men, aged 25-45 y at baseline, were used. Mean follow-up time was 12.5 y. Lumbar spine TBS (L1-L4) was calculated using the TBS iNsight<sup>®</sup> software. SHBG, CTX and P1NP were measured using immunoassays. Total testosterone and estradiol were determined by liquid chromatography tandem mass spectrometry, while free testosterone and free estradiol were calculated. Linear mixed-effects modelling was used to perform the cross-sectional and longitudinal analyses.

**Results:** At baseline, total and free estradiol showed a positive association with TBS while BMI showed a negative association. Lumbar spine BMD and TBS were moderately and positively correlated at baseline. No associations were found between baseline TBS and total and free testosterone nor between baseline TBS and bone turnover markers.

The longitudinal study observed a decline in TBS. Further, a higher BMI at baseline was associated with a more pronounced decline in TBS over time. Greater increases in BMI over time were associated with more pronounced decreases in TBS. Total and free estradiol showed no associations with changes in TBS. In contrast, lower levels of total testosterone at baseline were associated with more pronounced decreases in TBS during follow-up. Moreover, an association was found between greater decreases in to-



tal testosterone and more pronounced decreases in TBS. Lastly, more pronounced decreases in bone turnover markers, CTX and P1NP, were associated with greater decreases in TBS over time.

**Conclusion:** These findings suggest that total testosterone could be seen as a determinant for changes in TBS, while estradiol could not. These divergent results for the individual sex steroids suggest that testosterone and estradiol have an effect on different properties of bone, namely bone microarchitecture and bone mass. Further, as changes in bone turnover markers are associated with changes in TBS, it could be suggested that change in bone turnover rate has an impact on bone microarchitecture.

## P555

### ROLE OF MANUAL THERAPY IN DECREASING DISABILITY CAUSED BY KNEE OSTEOARTHRITIS

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**Objective:** Knee osteoarthritis (OA) is a common chronic condition that determines long-term disability. Several factors have been identified that influence the degree of disability. At the same time, exercise can improve the patient's condition, reduce pain and increase joint function. The diversity of exercise programs determines the need to compare their efficiency and their influence on joint disability. The aim of this study was to compare the effect on knee disability of conventional exercises program and combined with manual therapy in patients with knee OA.

**Methods:** 164 patients that fulfilled the ACR classification criteria for knee OA (127 females and 37 males) ranging in age from 42-84 y (mean 62.2 SD 8.76), participated in a 10 d two-arm randomized trial. One group (Gr.1) received an exercises program, the other group additionally manual therapy methods (Gr.2). Pain, joint function, and disability were measured with a Visual Analogue Scale (VAS, mm) and Knee Injury and Osteoarthritis Outcomes Score (KOOS) with 5 domains (Pain, Symptoms, Activity in Daily Living (ADL), Sport and Recreation (Sport/rec.) and Quality of life (QoL)), a level  $\geq 30\%$  was considered as high disability.

**Results:** In the Gr.1 were 82 patients mean age 61.8 $\pm$ 9.2 y and in Gr.2 – 82 patients 62.7 $\pm$ 8.3 y ( $p>0.05$ ). The initial level of pain (63.4 $\pm$ 14.2 vs. 60.2 $\pm$ 18.8mm) and knee functionality according to KOOS were similar in both groups,  $p>0.05$ . After 10 d rehabilitation program, VAS in Gr.1 was 39.6 $\pm$ 14.8 mm, in Gr.2- 28.5 $\pm$ 11.6 mm, ( $p<0.01$ ). A marked degree of disability in the daily activities of KOOS ADL $<30\%$ , was mentioned by 8.5% of patients in Gr.1 and 31.7% cases in Gr.2, at the end of the program in Gr.1 this indicator improved by 9%, and in group 2 by 27% ( $p\leq 0.05$ ). The degree of disability was higher on domain KOOS Sport/rec mentioned by

87% of patients in both groups, after 10 d of the rehabilitation program in Gr.1 this indicator improved by 39% and 54% cases. The KOOS results at the end of the rehabilitation program were with improvement, statistically significant in the Gr.2 ( $p<0.05$ ).

**Conclusion:** Kinetotherapy improves the physical functionality of the joint and decreases the level of pain, the combined program with manual therapy techniques resulted in better rehabilitation outcomes and decreased disability caused by knee OA.

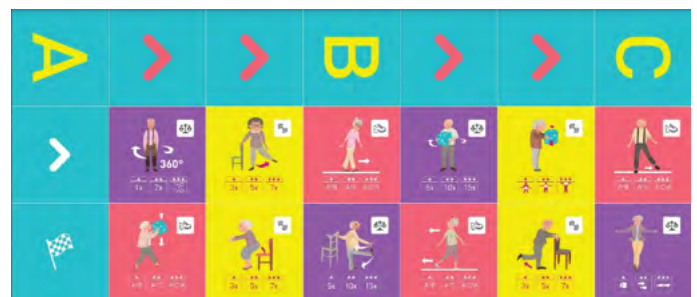
## P556

### DEVELOPMENT OF NEW EXERCISES TO PROMOTE PHYSICAL ACTIVITY IN NURSING HOME SETTINGS USING THE GAMOTION

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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 (Figure). The aim of the present study is to develop new balance, muscle strength, walking and flexibility exercises to be included in the GAMotion, to promote physical activity in nursing home settings.



**Methods:** A two-step qualitative study combining Focus group and Delphi method was conducted among healthcare professionals divided into two independent samples. The first sample was asked to develop exercises during a focus group. During this discussion, the experts have listed the difficulties encountered by the elderly and then selected the appropriate exercises to overcome these difficulties. The second sample participated in a two-round Delphi method, each with a questionnaire. The first questionnaire asked participants to rate the exercises developed during the focus group on a 4-point Likert scale (from 0: not adapted to 4: very adapted); the second questionnaire asked them to rank the exercises from most suitable to least suitable.

**Results:** The focus group developed 12 strength, 12 flexibility, 9 balance 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 (consensus established: median  $\geq 3$  in the Likert scale and at least 75% of experts rating the exercises as 'adapted' or 'very adapted'). In the second round, the remaining 10 strength, 10 flexibility, 7 balance and 7 walking exercises were ranked by the experts. This classification determined the 5 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 be included in the GAMotion boardgame.

## P557

### AN AUDIT OF REFERRAL LETTERS FROM GENERAL PRACTICE TO A METROPOLITAN PUBLIC HOSPITAL ORTHOPAEDIC OUTPATIENT FOR ADULT KNEE PAIN, PREDOMINANTLY FROM OSTEOARTHRITIS

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**Objective:** General practitioners (GPs) write referrals to other specialists "with the material required to make the most informed decisions and provide patients with genuine continuity of care". The Royal Australian College of General Practitioners (RACGP) published "Referring to other medical specialists: A guide for ensuring good referral outcomes for your patients" in 2016 to support GP referrals to other medical specialists. Queensland Health Clinical Prioritisation Criteria (CPC) also provides referral templates which can improve clinical communication/handover. It is unknown if these improve quality standards in GP referrals for adult knee pain of which osteoarthritis (OA) is a common cause. We assessed adult knee pain referrals from GPs complying with RACGP guide and another simplified quality criteria (Nash et al. 2016, doi:10.1111/1742-6723.12592), determine proportion of history/treatment reflected in adult knee pain referrals from GPs, corroborated by clinical history taken from patients at specialist clinics.

**Methods:** 99 consecutive adults (> 40 y) referred for knee pain in 2016-7 to orthopaedic outpatient clinic at Redland Hospital (250 beds, in South Brisbane) were reviewed over 12-month period. Referral letters, clinical history, assessment (including imaging reports) and management determined at outpatient clinic were recorded. Referrals are checked for compliance with RACGP guide ( $\geq 80\%$  adherence with 11-item standard) and what was missing; the same for standard assessment criteria (9-item) from reference paper ( $\geq 60\%$  checklist data).

**Results:** 72% patients (51% female, mean 56.2 y) had OA diagnosis. Only 2% referrals comply with RACGP guide; 88% had missing examination findings and 87% omitted current management. 82%

referrals met compliance expectation of standard criteria from reference paper; however 66% were missing relevant past medical history and 40% omitted investigation results.

**Conclusion:** Despite RACGP guide and CPC referral template, there are still significant omissions in basic information in referral letters. Considering CPC is actually built into the referral process, the lack of inclusion of key clinical details raises concern. No relationship between GP diagnosis and quality of referral letter is found. International experience suggests much can be done to improve referral quality; "The Quality of GP diagnosis and referral" by The King's Fund (UK) found much practice variation despite available guidelines, and adherence to established guidelines can improve quality of referrals.

## P558

### ASSOCIATION BETWEEN TRYPTOPHAN METABOLITES, PHYSICAL PERFORMANCE, AND FRAILITY IN OLDER PERSONS

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Frailty is defined as a syndrome of physiological decline in late life, characterized by marked vulnerability to adverse health outcomes. A robust biomarker for frailty is still lacking. Tryptophan (TRP) metabolism through the kynurenine pathway (KP) plays essential roles in aging, the musculoskeletal system, and physical performance. In this study, we quantified 7 KP metabolites, including kynurenine (KYN), kynurenine acid (KYNA), quinolinic acid (QUIN), picolinic acid (PIC), 3-hydroxykynurenine (3-HK), 3-hydroxyanthranilic acid (3-HAA), and anthranilic acid (AA) using ultra-high-performance liquid chromatography and gas chromatography-mass spectrometry in the serum of 85 participants (median age 75; 65% female; 28 non-frail, 29 pre-frail, and 28 frail) at the Nepean Osteoporosis and Frailty (NOF) Study. We looked at the association between TRP metabolites and physical performance, sarcopenia, and frailty. After adjusting for age and sex, our results showed that KYN and KYN/TRP were associated with higher IL-6 levels ( $r=0.324$  and  $r=0.390$ , respectively). KYNA and its ratios to other products (mainly KYNA/KYN, KYNA/QUIN, and KYNA/PIC) were associated with a lower likelihood of frailty by Fried's criteria (OR 0.93 [0.88, 0.98],  $P=0.009$ ) and Rockwood index ( $r=-0.241$ ,  $P=0.028$ ) as well as a lower likelihood of sarcopenia (OR 0.88 [0.78, 1.00],  $P=0.049$ ). QUIN and QUIN/KYN showed an association with increased IL-6 ( $r=0.293$  and  $0.204$  respectively), higher likelihood

of frailty (OR 1.02 [1.00, 1.04],  $P=0.029$  and OR 6.43 [2.23, 18.51],  $P=0.001$  respectively) and lower physical function ( $r=-0.205$  and  $r=-0.292$ ). In conclusion, different TRP metabolites have various associations with physical performance, frailty, and sarcopenia. Defining the underlying mechanisms may permit the development and validation of new biomarkers and therapeutics for frailty and musculoskeletal conditions targeting specific metabolites of the TRP catabolic pathway.

### P559

#### LIPID SIGNALING MEDIATORS REGULATE BONE-MUSCLE CROSSTALK DURING AGEING

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Due to its association with adverse outcomes, the simultaneous concurrence of sarcopenia and osteoporosis, a condition termed osteosarcopenia, is of public health concern and interest. Osteosarcopenia is an age-related pathological condition characterized by fragile bone and exhibiting low muscle mass and function thus leading to high mortality and financial threat. Fat infiltration contributes to age-related bone and muscle decline. This effect could be explained by fat-secreted factors, which could be locally secreted in the muscle and bone milieu thus affecting cell-cell interactions, and cell function and survival. However, the specific fat-related secretory factors that simultaneously affect those tissues remain unknown. Using new targeted-lipidomics approach via a targeted liquid chromatography with tandem mass spectrometry (LC-MS/MS) approach, we comprehensively quantified fat composition (lipid mediators [LMs]) in gastrocnemius, serum and bone marrow flushes from tibia and femur obtained from 6, 24 and 42 weeks C57BL6 mice. Compared to young mice (6 wks), all tissues in older mice showed significantly higher levels of arachidonic Acid (AA) ( $p=0.042$ ) and AA-derived eicosanoids,  $PGA_2$  ( $p<0.0001$ ),  $TXB_2$  ( $p<0.001$ ), 11,12-EET, which are known to affect muscle and bone function. Moreover, Lipoxin  $B_4$ , another AA product and an enhancer of bone turnover and negative regulator for muscle, showed significantly lower values in older mice compared to young mice in both genders ( $p=0.0092$ ). Furthermore, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) autoxidation products (20-HDoHE, 11-HDoHE, 7-HDoHE and 4-HDoHE), an omega-3 fatty acids that negatively regulate bone and muscle health were significantly higher in older mice ( $p=0.003$ ,  $p=0.020$ ,  $p=0.025$ ,  $p=0.045$  respectively). In conclusion, elucidation of those LMs that are present in ageing muscle, serum and bone marrow could provide valuable evidence on the role of fat infiltration in osteosarcopenia. These results suggest that

LMs could play a role in modulating musculoskeletal function during aging, which might relate to sarcopenia and osteoporosis, and could become therapeutic targets in the future.

### P560

#### HEALTH TECHNOLOGY ASSESSMENT OF DIFFERENT GLUCOSAMINE FORMULATIONS AND PREPARATIONS CURRENTLY MARKETED IN THAILAND: IMPACT OF THEIR CLINICAL EFFECT AND SELLING PRICE

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**Objective:** To assess to cost-effectiveness of different glucosamine formulations and preparations used for the management of osteoarthritis in Thailand.

**Methods:** We use a validated model to simulate the individual patient Utility score from aggregated data available in 10 different clinical trials. We then used the Utility score to calculate the quality-adjusted life year (QALY) over a 6-month treatment horizon. We used the 2019 public costs of glucosamine products available in Thailand to calculate the incremental cost/effectiveness ratio. We separated the analyses for prescription-grade crystalline glucosamine sulfate (pCGS) and other formulations of glucosamine. A cost-effectiveness cutoff of 3.260 \$/QALY was considered.

**Results:** Regardless of the glucosamine preparation (tablet or powder/capsule), the data show that pCGS is cost-effective compared to placebo over a 3 and 6-month time horizon. However, the other glucosamine formulations (e.g., glucosamine hydrochloride) never reach the breakeven point at any time.

**Conclusion:** Our data show that pCGS is cost-effective in the management of osteoarthritis in the Thai context while other glucosamine formulations are not.

### P561

#### NESFATIN-1 IS ASSOCIATED WITH OSTEOPOROSIS IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** Nesfatin-1 is a multifunctional protein, associated with an insulin-sensitivity and demonstrating an anorexigenic effect [1]. Nesfatin-1 is positively associated with an inflammation level in patients with rheumatoid arthritis [2]. However, there is lack



of evidence, whether nesfatin-1 level may be associated with a bone metabolism. Our aim was to study the association between serum nesfatin-1 level and prevalence of osteoporosis in patients with rheumatoid arthritis.

**Methods:** 110 patients with rheumatoid arthritis were enrolled in our study. Nesfatin-1 serum levels were assessed by ELISA using a commercial test system. The diagnosis of osteoporosis was set according to the recommendations of WHO. We determined serum levels of 25-hydroxycalciferol (25(OH)D), C-terminal telopeptide of type I collagen (CTX-1) and procollagen type I N-propeptide (P1NP). Nonparametric characteristics are presented as Me [Q1-Q3]. The Mann-Whitney test (Z) was performed to determine the differences between groups. Spearman's  $\rho$  was used to describe correlation.

**Results:** Median level of nesfatin-1 was 44.5 [25.9-67.2]. Median nesfatin-1 serum levels were higher among 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 was observed between serum levels of nesfatin-1 with 25(OH)D and CTX-1 ( $\rho=-0.10$ ;  $p=0.304$  and  $p=0.09$ ;  $p=0.351$  respectively). Weak positive correlation was observed between nesfatin-1 and P1NP serum levels ( $\rho=0.25$ ;  $p=0.009$ ).

**Conclusion:** Serum nesfatin-1 levels were higher in patients with osteoporosis. Weak positive correlation was observed between serum nesfatin-1 and P1NP levels. Due to our study, nesfatin-1 is positively associated with the level of bone metabolism and osteoporosis development. More studies are needed to clarify the mechanisms of observed associations.

#### References:

1. Su Y, et al. *Biochem Biophys Res Comm* 2009;391:1039
2. Kvlivdze T, et al. *Ann Rheum Dis* 2021;80(S1):1437

## P562

### OSTEOPOROSIS MEDICATION ADHERENCE TOOLS: A SYSTEMATIC REVIEW

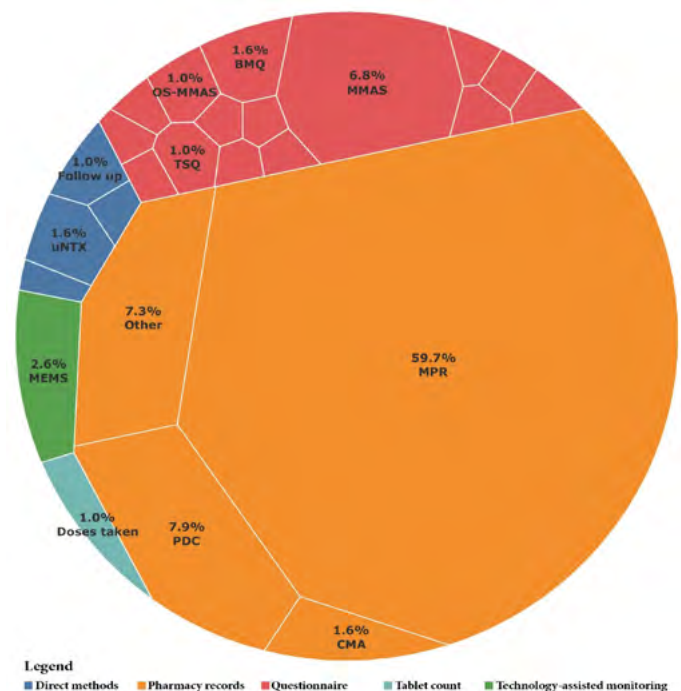
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**Objective:** Poor adherence reduces the effectiveness of osteoporosis treatment, resulting in lower BMD gains and subsequently higher fractures rates. Reliable and practical tools are needed to measure medication adherence. The aim of this systematic review was to find osteoporosis medication adherence measurement tools and assess their applicability.

**Methods:** We searched for osteoporosis adherence measurement tools and all their related keywords in PubMed, Embase, Web of science and Scopus databases on 12 April, 2021. After excluding duplicates in the Endnote software, two researchers independently investigated the remained articles and included all articles that used a method for measuring medication adherence of osteoporosis. Adherence meant both terms compliance and persistence. Quality assessment was performed for selected articles by Newcastle-Ottawa Quality Assessment Scale.

**Result:** A total of 3821 articles were found, of which 180 articles met the inclusion and exclusion criteria. In general, 5 types of methods were observed to measure medication adherence of osteoporosis including direct methods (n=4), pharmacy records (n=17), questionnaires (n=13), electronic methods (n=1) and tablet counting (n=1) (Figure). Direct methods included measurement of bone turnover markers such as uNTX, sCTX and the BMD. The most commonly used adherence measurement based on pharmacy records was medication possession ratio (MPR). Among questionnaires, Morisky Medication Adherence Scale was mostly used.



**Figure.** Osteoporosis medication adherence tools based on their frequency among the retrieved studies

**Conclusion:** A variety of direct and indirect tools have been introduced or used in researches aiming at measuring adherence to osteoporosis treatment. Feasibility, cost, validity, availability, invasiveness, simplicity, and flexibility are among the factors that should be considered.



P563

### REMISSION AND QUALITY OF LIFE OF PATIENTS WITH RHEUMATOID ARTHRITIS TREATED WITH UPADACITINIB IN REAL CLINICAL PRACTICE

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**Objective:** To evaluate the effect of upadacitinib (UPA) on disease activity and quality of life (QOL) in patients with rheumatoid arthritis (RA) in real clinical practice.

**Methods:** The study included 41 patients with RA who had moderate or high disease activity and inadequate response to conventional synthetic disease-modifying antirheumatic drugs (csDMARDs) or biological DMARDs (bDMARDs). All patients received UPA at a dose of 15 mg/d. The majority of patients (86%) were female, the mean age was 53.1±5.4 y, mean disease duration 11.5±8.2 y, mean BMI 26.55±4.1, positive for RF - 96.6%, ACPA -75.9%. 86.2% had comorbid pathology, most patients had 3-4 concomitant diseases. All patients received csDMARDs, 65,5% bDMARDs, glucocorticoids -9.5% of patients at a mean dose of 6.7±2.4 mg/d. After 3 months of therapy, disease activity was assessed by the DAS28-CRP, SDAI and CDAI indices, QOL by the EQ-5D index.

**Results:** Before initiation of UPA therapy, patients had pronounced morning stiffness (51.9±33.7 mm on the VAS scale), its duration was 140.4±240.2 min, the number of painful joints was 10.5±5.7, swollen joints - 6.8±4.1, patient's global health was 59.8±16.2, CRP (18.1±17.0 mg/l), ESR (27.8±17.5 mm/h), EQ-5D 0.52 [-0.18;0.8]. During the first week, there was a marked decrease in pain from 60 to 30 mm VAS, which persisted to the third month of therapy. After 3 months, there was a significant decrease in the disease activity according to DAS28, SDAI, CDAI indices (p<0.001). The goals of therapy (remission or low disease activity) by the 3rd month of therapy according to DAS28-CRP reached 63.4% of patients; according to the SDAI index - 56.7%, CDAI-25.9% of patients. Remission was achieved by 27.6% of patients. A 50% improvement in the QOL according to the EQ-5D questionnaire was noted in 98.5% of patients.

**Conclusion:** The first results of prescribing UPA in patients with RA in real clinical practice indicate a rapid decrease in pain, a decrease in disease activity, and an improvement in patients QOL by the 3rd month of treatment.

P564

### RELATIONSHIP OF URINARY COLLAGEN TYPE II C-TELOPEPTIDE AND KNEE CARTILAGE THICKNESS MEASURED WITH ULTRASOUND IN PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** Osteoarthritis (OA) includes clinical, structural, biochemical, and mechanical changes. The present study aims to estimate the relationship between the sensitive marker of cartilage degradation - urinary collagen type II C-telopeptide (uCTX-II) level and knee cartilage thickness measured with ultrasound in patients (pts) with OA.

**Methods:** Knee joint ultrasound and uCTX-II levels (ng/ml; ELISA) were evaluated in 46 pts with OA. The mean age of pts (71.7% female) was 62.6±6.2, mean disease duration 10.2±6.3 y. X-ray stage of OA defined according to Kellgren-Lawrence grade was: I - 0%, II - 63%, III - 27%, and IV - 0%. Estimation of knee cartilage thickness (mm) was performed using a linear L50 sensor in standard sensor positions, frequency 5-12 MHz. We determined cartilage thickness in the patellofemoral region in three compartments (medial, middle, lateral), calculating an average for each knee joint and both joints. For correlation, the Spearman correlation coefficient was used.

**Results:** Mean value (M±σ) of uCTX-II was 0.18±0.12. The mean values of cartilage thickness were: 1.7±0.33 for the right and 1.7±0.36 for the left knee joints, and 1.7±0.31 as a mean for both knee joints. According to disease duration following tertile groups were detected: 1 group: means interval <7 y; 2 group: interval 7-10 y; 3 group: >10 y. There were negative correlations between uCTX-II and medial, middle compartments of left knee joint cartilage thickness (r=-0.474, p=0.03; r=-0.592, p<0.01, respectively) in group 2. uCTX-II negatively correlated with the mean value of middle compartments of both knee joints (r=-0.538, p=0.04) in men only, also with middle compartment of left knee joint cartilage thickness (r=-0.548, p=0.03) in overweight pts. All correlations were moderate. There were no correlations between uCTX-II and cartilage thickness in other subgroups and in all pts.

**Conclusion:** Despite the high sensitivity of the uCTX-II as a marker of cartilage degradation, its level didn't correlate with thickness of the cartilage in all pts with knee OA in our study. However, it correlated with the cartilage thickness in men, pts with 7-10 y disease duration and in overweight pts.

P565

## HUMORAL IMMUNOGENICITY TO A SECOND AND THIRD DOSE OF COVID-19 VACCINE BNT162B2 IN PATIENTS WITH SPONDYLOARTHRITIS RECEIVING SECUKINUMAB: A PROSPECTIVE STUDY

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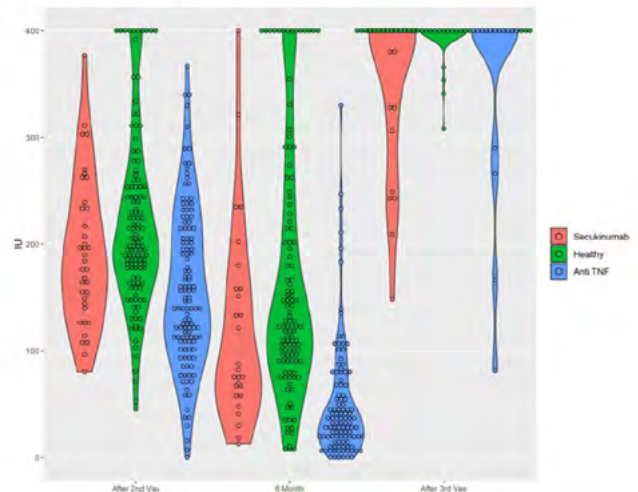
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**Objective:** We sought to prospectively assess the effect of secukinumab on humoral immune responses to BNT162b2 mRNA vaccine in patients with spondyloarthritis (SpA).

**Methods:** Prospective study in patients with psoriatic arthritis (PsA) or ankylosing spondylitis (AS) receiving secukinumab or TNFi and healthy controls vaccinated with BNT162b2 mRNA vaccine. Clinical and safety data and blood samples were collected at 2-8 weeks and 6 months after the 2 doses. A subgroup of patients was evaluated after the third vaccine dose. The seropositive response was defined as detectable S1/S2 IgG  $\geq 15$  binding antibody units (BAU)/ml.

**Results:** The analysis included 162 individuals with SpA receiving secukinumab (37) or TNFi (n=125), and 122 healthy volunteers. The second dose of the vaccine successfully elicited a similar immunogenic response in all groups (seropositivity rates of 100%, 98%, and 100% in secukinumab, TNFi treated patients, and healthy controls, respectively). After 6 months, the rate of seropositivity remained as high as 96% in both secukinumab group and healthy controls and it declined to 79% in TNFi treated patients. The decline of spike-specific IgG titres within 6 months was numerically higher in patients receiving TNFi and was similar in controls and secukinumab group (mean [min, max] change -107[-309, 23] for TNFi; -66 [-219, 131] for secukinumab and -55[-293, 214] BAU/ml for healthy controls). The third dose successfully boosted S1/S2 IgG titres in all groups. At all time points, S1/S2 IgG titers were similar in secukinumab treated patients and healthy controls and numerically lower in TNFi treated patients (Figure 1). No participants reported COVID-19 during the study. Only mild adverse events were reported, injection site reactions being the commonest.

**Figure 1** Kinetics of an immunogenic response (S1/S2 IgG titer) to two and three doses of the BNT162b2 mRNA vaccine in SpA patients treated with secukinumab or TNFi and immunocompetent controls



**Conclusion:** Humoral immunity within short-term and 6 months after a second dose and after a third dose of BNT162b2 was not impaired by secukinumab in patients with psoriatic arthritis or ankylosing spondylitis.

**Disclosure:** This study is part of a research collaboration between The Medical Research, Infrastructure and Health Services Fund of the Tel Aviv Medical Center and Novartis Pharma AG.

P566

## CASE OF ENDOMETRIOSIS-ASSOCIATED MUSCULOSKELETAL PAIN

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Musculoskeletal pain is extremely common and occurs due to dysfunction of skeletal muscle tissue. The localization is very diverse, but more common is lumbar and sacral spine, lower legs, upper arms and neck. The reasons underlying the occurrence of this muscle spasm can differ. Muscles respond with tension to any pathological impulse, being a non-specific indicator of the pathological process. This type of pain can be associated with pathology not only of vertebral segments or extravertebral structures (joints, ligamentous apparatus, etc.), but also of internal organs. We represent a case of endometriosis-associated musculoskeletal pain.

**Methods:** A 23 year old women come at our outpatient department with complaints on musculoskeletal pain in her right leg. The pain appeared a week ago in the popliteal area, gradually worsening and spread throughout the leg. There were no trophic changes in skin, it was equally dry and of the same temperature

as the corresponding area on the left leg. The reflexes were present and equal. There was some weakness in the right limb proximally. The Laseque test was positive. The MRI report revealed normal anatomy of the lumbar spine. However, a hypertensive signal from the right ovary was detected. The patient was consulted by gynecologist. Endometriosis of the right ovary was diagnosed. After a course of treatment of endometriosis, the pain syndrome disappeared completely.

**Discussion:** Endometriosis is a chronic, progressive disease characterized by the proliferation of tissue similar in structure and function to the endometrium, but located outside the uterine cavity. The pressure of growing endometrioid tissue into nerve fibers, especially in the Douglas space could be one of the mechanism of pelvic musculoskeletal pain.

**Conclusion:** Physicians should be aware of somatic pathology as part of the evaluation of musculoskeletal pain. Endometriosis can be accompanied by myofascial pain syndrome, that's why the identification of causes of pain always requires a detailed analysis of complaints, anamnesis of the patient's life and diseases, general somatic, neurological and orthopedic status.

## P567

### STIMULATION-DRIVEN BIOSYNTHESIS AND TRAFFICKING OF THE CALCIUM-SENSING RECEPTOR

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The calcium-sensing receptor (CaSR) is a GPCR receptor that regulates serum calcium homeostasis by controlling the level of circulating PTH. The impairment of CaSR activity and expression cause hyperparathyroidism disorders that lead to calcium/PTH imbalance. It appears that the CaSR, once activated, is able to stimulate the membrane recruitment of newly synthesized CaSR receptors and in general its biosynthesis, by mechanisms that are still unclear and require further proofs.

With the present study we aim to understand how CaSR activation triggers its own biosynthesis and trafficking, and whether this is further enhanced by its pharmacological stimulation.

We are investigating the changes in CaSR expression and activity via RT-qPCR, western blot, IP-one and intracellular calcium mobilization assays, using healthy bovine and human adenoma parathyroid cells and cell lines stably transfected with CaSR-expressing vectors, i.e., HEK<sup>CaSR</sup>, HT29<sup>CaSR</sup>, Caco2<sup>CaSR</sup>, PTHC1<sup>CaSR-HA</sup> and PTHC1<sup>CaSR-CFP</sup>. With the transfected PTHC1, the only known parathyroid cell line, we will be able to: i) monitor CaSR biosynthesis and membrane trafficking through live cell imaging; ii) CaSR activity by assessing PTH secretion; iii) assess the interaction of the CaSR

with down-stream signaling factors via immunoprecipitation and further discover novel interacting proteins through mass spectrometry and confocal analysis.

Our preliminary data show that in the HEK<sup>CaSR</sup>, HT29<sup>CaSR</sup> and Caco-2<sup>CaSR</sup> cells, 24h stimulation with 1 $\mu$ M of cinacalcet increases CaSR mRNA and protein levels by 2-fold compared to untreated control, while inhibiting the CaSR with 1 $\mu$ M of NPS 2143 reduces CaSR expression.

Based on our preliminary results, we suggest the existence of a feedback mechanism that promotes CaSR biosynthesis upon its stimulation. Commonly, GPCRs internalize after activation, causing thus desensitization, whereas the CaSR seems to guarantee a sustained signaling by recruiting newly synthesized CaSR receptors on the cell surface. Exploiting this mechanism will allow us to improve current pharmacological treatments for hyperparathyroidism disorders.

## P568

### BONE MARKERS IN PERIMENOPAUSAL AND POSTMENOPAUSAL WOMEN WITH ABNORMAL UTERINE BLEEDING

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**Objective:** To determine the histopathological changes of the endometrium that occur during the period of perimenopause and postmenopause and to determine their association with the presence of obesity and the levels of bone markers for bone resorption and bone formation, serum parathormone, vitamin D and calcium levels.

**Methods:** This study involved 120 patients with fractionated explorative curettage due to abnormal uterine bleeding. The examined group was divided in two subgroups: 60 women in perimenopausis and 60 women in postmenopause. Anamnestic data were taken from all respondents. Body height and weight were measured. This laboratory analyses were performed: Serum Osteocalcin, beta CTX, parathormone, Vitamin D and calcium levels.

**Results:** The most common pathological change of the endometrium was an endometrial polyp. History of previous bone fractures was significantly more common in postmenopausal women than in perimenopausal women. Postmenopausal women were older than perimenopausal and had significantly higher BMI, higher levels of serum osteocalcin and beta CTX in serum. Postmenopausal duration significantly positively correlated with osteocalcin and  $\beta$ -CrossLaps serum values. Higher serum osteocalcin and

$\beta$ -CrossLaps values were measured in patients with longer postmenopause duration. There was not significant difference in the levels of vitamin D and calcium between the groups.

**Conclusion:** In the period of perimenopause and postmenopause, there are changes in the genital organs, but also there are internal disorders (obesity, metabolic syndrome, diabetes, thyroid disorders, cardiovascular disease, osteoporosis), which should be timely prevented, diagnosed and treated. Estrogen deficiency in postmenopause is the most common cause of postmenopausal osteoporosis.

## P569

### RISK OF OSTEOPOROTIC FOREARM FRACTURES IN POSTMENOPAUSAL WOMEN AGED OVER 55 YEARS

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**Objective:** To assess the frequency of osteoporotic forearm fractures (OFF) in women aged over 55 y and their association with risk factors for chronic non-communicable diseases (NCD).

**Methods:** The study was based on the material from the Russian arm of the HAPIEE project (Novosibirsk). The design of present work is cross-sectional study. In a subsample of postmenopausal women aged 55-84 years old (n=2005) we assessed the history of OFF during the last 3 y, risk factors for fracture and common NCD, socioeconomic parameters, and blood lipids and glucose. Cross-sectional analysis of association between history of OFF and their potential determinants was conducted using multivariable-adjusted logistic regression. Statistical analysis was processed using the SPSS (v.13.0)

**Results:** A history of OFF was found in 3.9% women. The frequency of OFF in the last 3 y did not differ in women with DM2 (3.0%) and without DM2 (4.3%),  $p=0.218$ . In age-adjusted analysis, the risk of OFF in postmenopausal women was positively associated with history of past smoking (OR=2.29; 95%CI 1.13–4.65), total cholesterol >200 mg/dL (OR=2.03; 95%CI 1.25–3.41), and negatively associated with BMI (OR=0.92; 95%CI 0.87–0.97). In multivariable adjusted analysis, these relationship remained significant and the risk of OFF was positively associated with a history of past smoking (OR=2.23; 95%CI 1.10–4.55), elevated total cholesterol value >200 mg/dL (OR=1.98; 95%CI 1.19–3.29), and negatively associated with BMI (OR=0.91; 95%CI 0.86–0.96) regardless of other factors.

**Conclusion:** In the studied Siberian population sample of postmenopausal women aged 55–80 years old, the frequency of osteoporotic forearm fractures during the last 3 y was 3.9%. The cross-sectional determinants of OFF were smoking in the past and high total cholesterol value; BMI value was inversely related to the risk of osteoporotic fractures. The identification of mutual risk factors suggests deep relationships between pathways of NCD and osteoporotic fracture development. The obtained data might have implications for fracture prevention in postmenopausal women.

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## P570

### MINERAL BONE DENSITY, TRABECULAR BONE SCORE AND FRAX<sup>®</sup> IN POSTMENOPAUSAL WOMEN WITH AND WITHOUT DIABETES MELLITUS

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**Objective:** To study the indicators of BMD and TBS and to assess the 10-y fracture risk (FRAX<sup>®</sup>) in women with diabetes mellitus type 2 (DM2).

**Methods:** The study included 103 postmenopausal women aged 58-84 y with and without DM2. In studied group of women, 52 women had DM2 (25 indicated a history of osteoporotic fracture (OF), 27 without a fracture), 51 women were without diabetes (26 with a history OF, 27 without OF). The design this work is case-control study. All persons were examined with assessment of fracture risk and risk factors by the FRAX score, anthropometry, DXA, determination of TBS. Statistical analysis was processed using the SPSS (v.13.0)

**Results:** Women with DM2 in groups with and without fractures didn't differ in terms of fasting blood glucose ( $p=0.681$ ) and duration of menopause ( $p=0.214$ ), but the history of DM2 was longer in women with fractures ( $p=0.028$ ) compared to those without fractures. We did not find the difference by the site of fractures in individuals with and without DM2.

Among women with DM2, those with a history of OF had significantly lower T-scores in the femoral neck ( $p=0.039$ ) than women without OF. The frequency of osteoporosis according to densitometry among women with DM2 and OF was insignificantly higher than in those without OF: 36.4% and 16.0%, respectively ( $p=0.148$ ). The frequency of osteoporosis according to densitom-



etry among women without DM2 was also insignificantly higher in those with a history of OF than without OF, 42.3% and 24.0%, respectively ( $p=0.172$ ).

We didn't find differences in TBS ( $p=0,674$ ), fracture risk according to FRAX without densitometry, and FRAX adjusted for TBS between women with and without DM2 ( $p=0.841$ ,  $p=0.094$ , respectively). In women with DM2 and OF, the FRAX risk based on the T-test was lower than in women having OF without DM2 ( $p=0.034$  for major fractures,  $p=0.002$  for the hip).

**Conclusion:** In studied sample, postmenopausal women with DM2 and fractures have higher BMD values, lower fracture risk (according to FRAX corrected for the T-score), and did not have significant differences in TBS value, compared to women without DM2 and with a history OF. The relationship between BMD and fracture risk according to the FRAX score, seems to be controversial in women with DM2 and OF; the data obtained reflect the difficulties in early diagnosis of osteoporosis in these patients.

**Acknowledgement:** The study was supported by State target №AAAA-A17-117112850280-2

## P571

### USE OF ULTRASOUND SCORING SCALE FOR LESIONS OF SMALL JOINTS OF THE HAND IN PATIENTS WITH EARLY UNDIFFERENTIATED ARTHRITIS

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**Objective:** To evaluate the possibility of using ultrasound signs of small hand joint lesions to predict the outcomes of early undifferentiated arthritis (EUA).

**Methods:** Ultrasound examination of the hand joints (Accuvix V10, Samsung Medison) was performed consecutively in 102 patients (women 71.6%; mean age  $44.8 \pm 17.2$  years old) with early undifferentiated arthritis. The following parameters were recorded: 1) synovial thickness; 2) blood flow in synovial membrane by Doppler; 3) presence of hyperechogenic inclusions in synovial membrane; 4) cortical bone contour; 5) signs of tendon inflammation (finger flexors and extensors). The patients were prospectively observed at baseline, after 3 months and after 1 y.

**Results:** 47 patients (46.1%) were diagnosed with early rheumatoid arthritis (RA) at 12 months follow-up. At baseline, patients in this group most frequently (46.8%) had tree-like blood flow in the synovial membrane of the joint from the cortical contour of the bone ("pannus") according to ultrasound of the hand, in 83% of cases the presence of finger extensor tenosynovitis and/or synovial membrane thickening with Doppler blood flow was noted. For more accurate prediction the possible transition of EUA to RA we

proposed a ball score of ultrasound indices: 1) symmetric arthritis of metacarpophalangeal joints - 2 points; symmetric arthritis of proximal interphalangeal joints - 2 points; 2) unexpressed extensor tenosynovitis - 1 point, expressed extensor tenosynovitis - 2 points; 3) synovial thickening  $>3$  mm - 1 point, synovial thickening  $>3$  mm with Doppler blood flow - 2 points; erosion with disruption of the cortical bone contour - 1 point, reliable erosion - 2 points. When the sum of points was calculated (minimum 0 points, maximum 10 points), the accuracy in predicting a low risk of progression to RA ( $\leq 6$  points) was 72-76%, and a high risk ( $\geq 8$  points) was 83-90%, depending on the gender and age of the patients.

**Conclusion:** The use of ultrasound scoring scale of small joint lesions of the hand in patients with EUA can more clearly predict the development of RA.

## P572

### INCREASED VALUE OF BASELINE CENTRAL SENSITIZATION AND CATHEPSIN S GENE EXPRESSION FOR PROGNOSIS OF POSTOPERATIVE PAIN DEVELOPMENT IN PATIENTS WITH ENDSTAGE HIP OSTEOARTHRITIS

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**Objective:** To assess the importance of clinical indices, pain-related cathepsin S and proinflammatory cytokine gene expressions in the peripheral blood in prediction of postsurgical pain development in patients with endstage hip OA prior to arthroplasty.

**Methods:** We examined peripheral blood of 31 endstage hip OA patients (average age  $61.3 \pm 9.8$  years old) undergoing joint replacement surgery and 26 healthy volunteers. Patients were tested before and 6 months after surgery. Pain was assessed prior to surgery using VAS index and neuropathic pain questionnaires DN4 and PainDETECT. Functional activity was evaluated by WOM-AC. After surgery pain indices according to VAS of 30% and higher were considered. Total RNA isolated from whole blood was used in expression studies for cathepsin S, IL-1 $\beta$ , TNF $\alpha$ , and cyclooxygenase (COX)2 genes using quantitative real-time RT-PCR.

**Results:** After 6 months post-surgery pain complaints were obtained from 12 patients (38.7%) out of 31. Prior to surgery expression of cathepsin S, IL-1 $\beta$ , TNF $\alpha$ , and COX2 genes was significantly upregulated in both subsets of patients compared with healthy controls. Moreover, neuropathic pain according to DN4 questionnaire and cathepsin S gene expression was significantly higher in patients who developed post-operative pain compared with painless subjects while no significant difference in proinflammatory cytokine gene expressions was noted between the examined subsets prior to surgery.

**Conclusion:** Postoperative pain development in patients with hip OA might be associated with disturbances in central sensitization while upregulation of cathepsin S gene expression measured in the peripheral blood prior to surgery might serve as its prognostic biomarker.

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## P573

### DOWNREGULATION OF RESPIRATORY ACTIVITY AND CITRIC ACID CYCLE-RELATED GENE EXPRESSION IN PERIPHERAL BLOOD MONONUCLEAR CELLS FROM PATIENTS WITH RHEUMATOID ARTHRITIS CULTURED WITH TOFACITINIB PRIOR TO THERAPY AS BIOMARKERS OF POSITIVE RESPONSE TO JAKINIBS

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**Objective:** To examine the association JAK inhibitor therapy outcome with changes in respiratory activity and expression of genes involved in ATP production in the peripheral blood mononuclear cells (PBMCs) obtained at baseline from patients with rheumatoid arthritis (RA) and cultured with tofacitinib.

**Methods:** Two Jakinib-naïve patients with RA aged 44 and 26 years old, disease duration 5 and 7 y, respectively were treated with upadacitinib (15 mg/d) during 6 months. Clinical response was assessed by disease activity score (DAS28-ESR), serum levels of ACPA, ESR, CRP, and RF. PBMCs were isolated prior to therapy using Ficoll density gradient and cultured with 1 µM tofacitinib citrate (TFCN) during 48 h. Total RNA isolated from whole blood before therapy was used for ATP5B, PGK1, IDH, MDH2, and OGDH gene expression studies performed with quantitative real-time RT-PCR. Using Seahorse™ technology basal respiration, ATP-bound respiration, and maximal and spare capacity in PBMCs treated with TFCN compared with untreated controls were determined.

**Results:** Both patients demonstrated significant improvement after 6 months of upadacitinib therapy indicated by significant decrease in DAS28. Significant downregulation of basal respiration, ATP-bound respiration, and maximal respiration in PBMCs cultured with TFCN from both patients with RA was associated with downregulation of citric acid cycle-related IDH, MDH2, and OGDH gene expression compared with untreated counterparts and accompanied with upregulation of PGK1 and ATP5B.

**Conclusion:** Decreased respiratory activity associated with downregulation of Krebs cycle-related gene expression in cultured with TFCN PBMCs compared with untreated counterparts in Ja-

kinib-naïve patients with RA prior to therapy might serve as prognostic biomarker of personal positive response to JAK-inhibitor therapy.

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## P574

### PERSONALIZED PREDICTION OF TOFACITINIB THERAPY EFFICACY USING PROINFLAMMATORY CYTOKINE GENE EXPRESSION ANALYSIS IN CULTURED PERIPHERAL BLOOD MONONUCLEAR CELLS FROM PATIENTS WITH RHEUMATOID ARTHRITIS PRIOR TO THERAPY

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**Objective:** To examine the association of changes in the expression of TNFα and ILβ genes in the peripheral blood mononuclear cells (PBMCs) obtained at baseline from patients with rheumatoid arthritis (RA) and cultured with tofacitinib (TFCN) with therapy outcome.

**Methods:** 12 patients with RA (median age 55 y), median disease duration 28.5 months (without previous history of therapy with TFCN) were examined. 6 of these patients with RA gained remission after 3 months of TFCN therapy while 6, maintained high and moderate disease activity. PBMCs were isolated prior to therapy using Ficoll density gradient and cultured with 10 nM tofacitinib citrate during 48 h. Cell viability was monitored with 0.2% Trypan blue staining. Total RNA isolated from these cells was used for TNFα and IL-1β gene expression studies performed with quantitative real-time RT-PCR.

**Results:** Baseline expression of the examined genes was significantly upregulated in all the examined patients with RA. TFCN was capable of modifying gene expression in cultured PBMCs from the examined patients with RA compared with untreated cells both collected prior to therapy. TNFα gene expression was significantly downregulated in cultured with TFCN PBMCs from patients who gained remission compared with untreated cells. No significant changes in the expression of IL-1β gene was observed in cultured with TFCN PBMCs compared with untreated counterparts from patients with RA who maintained high and moderate disease activity after TFCN therapy.

**Conclusion:** Downregulation of TNFα gene expression in cultured with TFCN PBMCs compared with untreated counterparts in TFCN-naïve patients with RA prior to therapy might serve a prognostic biomarker of personal positive response to TFCN therapy.

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P575

### BUILDING A SIMPLE COMPREHENSIVE SCREENING SCALE FOR ELDERLY PATIENTS WITH FRAGILITY FRACTURE TO PREDICT FUTURE DISABILITY AND HOSPITALIZATION: A PROSPECTIVE COHORT STUDY

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**Objective:** To build a simple comprehensive screening scale (SCSS), based on geriatric syndromes and associated with future disability and hospitalization, for elderly patients admitted due to fragility fracture.

**Methods:** This prospective cohort study enrolled elderly osteoporosis patients ( $\geq 80$  y/o and bone density T-score  $\leq -2.5$ ), who were admitted due to hip, spine, or wrist fractures, and followed up at six months (first) and one year (second) later. The numbers of disability items (the 10 activities of daily living in Barthel Index) of the patients at baseline and follow up were recorded. Clinical outcomes were the increased number of disability items ( $\geq 1$ ,  $\geq 2$  and  $\geq 3$ ) and hospitalization during follow up. The SCSS contained three domains (13 dimensions): physical health (Clinical Frailty Scale, bodyweight decrease, polypharmacy, dizziness, balance, fall, pressure sore), psychological health (insomnia, depression, delirium), and socioenvironmental status (live alone, elderly neglect or abuse, economic problem). Each dimension represented a different score, and was added to obtain the total score. The association between the SCSS total score and outcomes was assessed using logistic regression analysis with adjustment for age.

**Results:** In total, there were 126 and 62 patients who completed the first and second follow ups, respectively. The mean SCSS total score at enrollment and the first follow-up was  $10.1 \pm 2.5$  and  $7.0 \pm 3.0$ , respectively. The results demonstrated that a higher SCSS total score at enrollment was significantly associated with an increased risk of the increased number of disability items  $\geq 2$  (OR 1.36, 95%CI 1.15-1.60) and  $\geq 3$  (OR 1.31, 1.08-1.59) at the first follow up. Furthermore, a higher SCSS total score at the first follow-up was significantly associated with an increased risk of the increased number of disability items  $\geq 1$  (OR 2.42, 1.48-3.94),  $\geq 2$  (OR 1.50, 1.15-1.97),  $\geq 3$  (OR 1.46, 1.02-2.10), and hospitalization (OR 1.89, 1.10-3.24) at the second follow up.

**Conclusion:** A higher SCSS total score was related to an increased risk of disability and hospitalization in the future. Conducting SCSS for elderly patients with fragility fracture during admission is suggested, because it can be examined rapidly and promote early intervention for patients by health providers.

P576

### THYROID-STIMULATING HORMONE LEVELS CAN PREDICT FUTURE FUNCTIONAL DECLINE AFTER FALLS IN ELDERLY OSTEOPOROSIS PATIENTS WITH SUBCLINICAL HYPERTHYROIDISM: A PROSPECTIVE COHORT STUDY

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**Objective:** To investigate whether thyroid-stimulating hormone (TSH) levels are the predictive indicator of functional decline for elderly osteoporosis patients with subclinical hyperthyroidism (SH), who had experienced falls recently.

**Methods:** This prospective cohort study enrolled elderly osteoporosis patients with SH in the outpatient department. The inclusion criteria were  $\geq 80$  years of age, a bone density T-score of  $\leq -2.5$ , normal functional status, a fall in the last three months, and no history of fracture. The functional status included basic activities of daily living (ADL) and instrumental ADL (IADL), measured by the 10-item Barthel Index and the total score on the Lawton IADL scale, respectively. We excluded subjects with serious diseases, such as terminal illness and malignancy. Participants were equally divided into three groups according to their TSH levels by tertile, and followed up for 1 y. The outcomes were functional decline (ADL and IADL), falling again, and hospital admission during the 1-y follow-up period. The associations between the three groups at baseline and future outcomes were determined using multivariable Cox regression, adjusted for age, sex, and BMI. In addition, time-to-event analysis and the differences among three groups were estimated using Kaplan-Meier method and log-rank test, respectively.

**Results:** A total of 360 patients (144 men and 216 women) were enrolled and divided into three groups (TSH-1, TSH-2, and TSH-3 from the highest to lowest tertiles of TSH levels). The results indicated that TSH-2 had a significantly higher risk than TSH-1 regarding functional decline (IADL) and falling again. TSH-3 had



a significantly higher risk than TSH-1 regarding functional decline (climbing stairs and IADL), falling again, and hospital admission. Among the significant outcomes, the adjusted hazard ratios of IADL decline were the highest: 1.67 (95%CI 1.01-2.77) and 2.01 (95%CI 1.23-3.27) for TSH-2 and TSH-3, respectively, compared with TSH-1 during the 1-y follow-up period.

**Conclusion:** TSH levels are recommended to be examined when dealing with elderly osteoporosis patients with SH suffering from falls. Patients with lower TSH levels have a higher risk of functional decline, falling again, and hospital admission in the future.

## P577

### PSYCHOEMOTIONAL STATUS OF PATIENTS WITH RHEUMATOID ARTHRITIS RECEIVING BASIC ANTI-INFLAMMATORY THERAPY

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**Objective:** To assess quality of life (QoL), degree of fatigability, anxiety and depression in rheumatoid arthritis (RA) patients receiving basic anti-inflammatory drugs and to determine their relation with clinical and laboratory manifestations of the disease.

**Methods:** 30 patients with RA were included in the study, 26.7% men and 73.3% women. Age of the patients was 54.6±7.8 y, disease duration from 0.5-15 y, DAS28-CRP(4) was ≥5.1. All patients received methotrexate, NSAIDs. VAS of pain, determined by patient, was used to determine pain syndrome intensity. To assess QoL questionnaires was used, including SF-36, HAQ-DI, to assess anxiety and depression - HADS questionnaire, to assess fatigue - FACIT-fatigue scale.

**Results:** The SF-36 assessed the physical and psychological components of health, which were reduced. The indicators of physical health (physical functioning, physical role functioning) changed the most. Vitality and social functioning were decreased among the QoL indicators characterizing psychological health. The psychological component of health had correlations with disease activity ( $r=-0.42$ ), RF ( $r=-0.18$ ), radiological stage ( $r=-0.12$ ); moderate - with age ( $r=-0.64$ ), VAS ( $r=-0.62$ ), HAQ-DI ( $r=-0.71$ ). The anxiety was clinically pronounced in 20% of RA patients and subclinical in 40%. HADS anxiety severity correlated directly with age ( $r=+0.58$ ), DAS28-CRP(4) ( $r=+0.69$ ), disease duration ( $r=+0.61$ ), functional class ( $r=+0.47$ ). FACIT-fatigue scores ranged from 28 to 39. There was a strong negative correlation of fatigue with HAQ-DI ( $r=-0.7$ ), a moderate with DAS28-CRP(4) ( $r=-0.57$ ), VAS ( $r=-0.68$ ).

**Conclusion:** The study of QoL in RA patients revealed the decreased indexes of physical and psychological health components. Anxiety-depressive disorders were registered in 60% of

patients. Indexes of psychological health component and anxiety level correlated with age, RA activity, RA duration, functional class.

## P578

### A DIFFERENTIATED APPROACH TO THE THERAPY OF CHRONIC PAIN IN OSTEOARTHRITIS CONSIDERING THE PHENOMENON OF CENTRAL SENSITIZATION

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**Objective:** Central sensitization (CS) and emotional-affective accretions play an important role in the formation of chronic pain syndrome in osteoarthritis (OA). We aimed to determine the therapeutic potential of different variants, analgesic therapy in patients with OA with signs of CS.

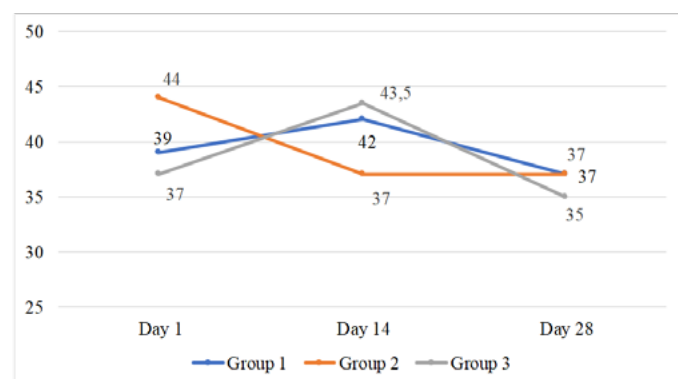
**Methods:** 60 patients with osteoarthritis of the knee and/or hip joints with chronic pain syndrome were included in the study. The somatosensory nervous system state, pain syndrome severity according to VAS, WOMAC index, pain neuropathic component severity according to DN4 questionnaire, CSI scale, anxiety and depression level according to HADS scale were evaluated before the study, as well as on study day 14 and 28. After screening, all patients were divided into three groups: Group 1 patients with chronic pain and signs of CS, without signs of organic lesions of the nervous system, depression and anxiety; Group 2 patients with chronic pain and signs of CS and signs of depression and anxiety without signs of organic lesions of the nervous system; Group 3 patients with OA with chronic pain and signs of somatosensory lesions. Each group of patients received differentiated therapy: Group 1 - etoricoxib 60 mg/d + gabapentin 900 mg/d (300 mg 3 times a day); Group 2 - etoricoxib 60 mg/d + duloxetine 60 mg/d; Group 3 - etoricoxib 60 mg/d + gabapentin 900 mg/d + Motaren gel 2 times a day for local pain area.

**Results:** The clinical characteristics of the patients included in the study are presented in Table. Groups 1 and 2 differed in duration of illness, severity of neuropathic pain symptoms according to the DN4 questionnaire, the CSI scale and the HADS scale. Differences in age, CSI and anxiety and depression levels were observed between groups 2 and 3. These differences are explained by the criteria of patients' distribution among groups. The dynamics of the CSI scores are shown in Figure. Positive dynamics in CS severity was noted only in group 2, having clinically significant CS and receiving combined therapy, including anticonvulsant gabapentin. Decrease of pain syndrome intensity according to VAS, and WOMAC index was noted in all groups.



**Table.** Clinical characteristics of patients.

	Group 1 (n=20)	Group 2 (n=20)	Group 3 (n=20)
Age, ys	50.0 [43.0;55.0]	51.0 [46.0;60.0]	69.5 [65.0;79.0]
Duration of OA, y	3.5 [1.0;6.0]	6.0 [5.0;7.0]	12.0 [5.0;26.0]
VAS, score	6.0 [5.0;7.0]	5.0 [5.7;7.0]	7.0 [6.0;8.0]
DN4	4.0 [3.0;4.0]	5.0 [4.0;6.0]	4.5 [4.0;6.0]
CSI	44.0 [41.0;46.0]	48.0 [46.0;52.0]	39.0 [36.0;43.0]
HADS-A	5.0 [4.0;7.0]	11.0 [10.0;13.0]	7.0 [6.0;8.0]
HADS-D	1.0 [0;2.0]	8.0 [7.0;8.0]	3.0 [1.0;5.0]
WOMAC	1465.0 [1093.0;740.0]	1059.0 [940.0;1150.0]	1215.5 [1033.0;1395]
WOMAC (pain)	282.5 [243.0;333.0]	248.0 [174.0;310.0]	227.0 [212.0;291.0]
WOMAC (stiffness)	94.0 [59.0;160.0]	100.0 [76.0;110.0]	92.0 [81.0;112.0]
WOMAC (function)	1042.5 [779.0;1208.0]	708.0 [666.0;1130.0]	862.0 [731.0;985.0]

**Figure.** Dynamics of CSI scale scores.

**Conclusion:** This study demonstrates the need to develop an algorithm for a differentiated approach to the therapy of chronic pain in osteoarthritis, considering the phenomenon of CS.

P579

### USE OF INTERLEUKIN-6 INHIBITOR IN THE TREATMENT OF RHEUMATOID ARTHRITIS IN ELDERLY PATIENTS

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**Objective:** To evaluate the efficacy and safety of IL-6 inhibitors (iIL-6) in combination with methotrexate (MT) in elderly RA patients.

**Methods:** The study included 14 patients with RA (all women). Patients' age ranged from 60-69 y, the duration of disease was at least 18 months. All patients were rheumatoid factor positive, had DAS28-CRP(4) >5.2. All patients received MT at a dose of at least 15 mg/week for more than a year in combination with NSAIDs. Tocilizumab (TCZ) was administered at a dose of 8 mg/kg according to the standard regimen.

**Results:** By week 24 all patients registered a 50% improvement in ACR criteria scores. There was a positive dynamics of clinical and laboratory manifestations of the disease: reduction of number of tender and swollen joints (from 21.8 to 9.6 and from 12.6 to 3.4 respectively), pain intensity and disease activity as judged by the patient and physician by the VAS, ESR (from 49.6 to 11.2 mm/h), CRP (from 16.3 to 3.8 mg/L), DAS28-CRP(4) (from 6.3 to 3.1) and DAS28-ESR(4) (from 6.8 to 3.2) indices. There was also an improvement of QoL according to HAQ-DI questionnaires (from 1.32 to 0.54) and SF-36 (physical component from 34.5 to 41.7, mental component from 50.7 to 56.4). The changes of all the above parameters were significant ( $p < 0.05$ ). Tolerability of the drug was good, no adverse reactions were observed, and no latent forms of tuberculosis were detected.

**Conclusion:** Thus, the use of iIL-6 as a pathogenetic therapy increases the possibilities of treatment in elderly RA patients, which is manifested in a pronounced positive dynamics of indicators of the activity of inflammatory process, achievement of improvement according to ACR20/ 50/70 criteria. Increasing the effectiveness of RA treatment helps to reduce the risk of cardiovascular disease by reducing the activity of systemic inflammation, the main risk factor for the development of clinical and subclinical manifestations of atherosclerosis in RA.

P580

### COMPARING THE RESULT OF BMD ALONE WITH THE INTERVENTION THRESHOLD OF IRANIAN COUNTRY-SPECIFIC FRAX IN DECIDING TO TREATMENT INITIATION FOR OSTEOPOROSIS: AN ANALYSIS ON THE BUSHEHR ELDERLY HEALTH PROGRAM DATA

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**Objective:** The final aim of osteoporosis treatment is to prevent fragility fracture. In some cases, the fracture risk is high, but the BMD result is normal. This study aims to investigate how the BMD alone identifies individuals at higher risk for major osteoporotic fractures (MOFs) and nominate them for treatment compared to the age-specific intervention thresholds of the Iranian country-specific fracture risk assessment tool (FRAX).

**Methods:** The baseline data of 2424 samples from the second stage of the first phase of the Bushehr Elderly Health program (1, 2) was used in the analysis. BMD was measured in all participants using the DXA by a Hologic Discovery machine. Osteoporosis was defined as a T-score  $\leq -2.5$  (compared to the ideal BMD of a young, healthy white person of each sex) at any site (total hip, spine, or neck of femur). The 10-y risk of MOFs was calculated by the Iranian country-specific FRAX. The age-specific intervention threshold of the FRAX calculated by Khashayar et al. (3) was used to identify individuals at high risk for MOFs and candidates for treatment initiation. The intervention threshold was calculated to be equivalent to a woman's fracture risk with a previous fragility fracture, but without other clinical risk factors and BMD. We calculated the kappa agreement coefficient between BMD and FRAX for identifying candidates for treatment and the frequency of the individuals at high risk for MOFs based on the FRAX intervention threshold among non-osteoporotic subjects diagnosed by the BMD.

**Results:** Mean (SD) of the participants' age was 69.34 (6.4) y (range: 60-96 y), and 48.06% of the participants were men. 23.34 %, 27.35 %, and 30.16% of the participants were at high risk for MOFs based on the age-specific intervention threshold of the FRAX without BMD, with BMD, and with TBS, respectively. Table presents the contingency table and the kappa agreement coefficient between BMD and FRAX results.

**Table.** Contingency table and the kappa agreement coefficient between BMD and FRAX results in identifying candidates for treatment initiation for osteoporosis (the frequencies of the individuals at high risk for MOFs based on the FRAX's intervention threshold among nonosteoporotic individuals diagnosed by the BMD were highlighted).

Type of FRAX	Candidate for treatment initiation based on the FRAX result	Candidate for treatment initiation based on the BMD result		Kappa (SE)
		Yes	No	
Without BMD	Yes	335 (33.94%)	224 (15.91%) <sup>b</sup>	0.19 (0.02) <sup>a</sup>
	No	652 (66.06%)	1,184 (84.09%)	
With BMD	Yes	508 (51.47%)	147 (10.44%) <sup>c</sup>	0.43 (0.02) <sup>a</sup>
	No	479 (48.53%)	1,261 (89.56%)	
With TBS	Yes	550 (55.72%)	172 (12.22%) <sup>d</sup>	0.45 (0.02) <sup>a</sup>
	No	437 (44.28)	1,235 (87.78%)	

<sup>a</sup> P-value<0.001

<sup>b</sup> 95%CI: 14.09-17.91%

<sup>c</sup> 95%CI: 8.95-12.15%

<sup>d</sup> 95%CI: 10.61-14.04%

**Conclusion:** For any reason, BMD results alone may not be able to identify all people at high risk for MOFs, so it cannot nominate all eligible people for treatment. It is recommended that the FRAX result be also considered when deciding about treatment initiation for osteoporosis.

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P581

### CHARACTERISTICS OF METABOLIC SYNDROME IN PATIENTS WITH GOUTY ARTHRITIS AND NONALCOHOLIC FATTY LIVER DISEASE

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**Objective:** To study incidence and pattern of metabolic syndrome (MS) in patients with gouty arthritis combined with non-alcoholic fatty liver disease (NAFLD) and to reveal conventional and associated with disease risk factors.

**Methods:** 70 patients with gouty arthritis were included in the study according to the criteria of S. Wallace et al. All patients underwent general biochemical blood tests, physical examination, calculation of HOMA index, ultrasonic examination of the liver.

**Results:** Men and women accounted for 60% and 40% of those examined, respectively, mean age was 52 y, mean duration of disease 8.2±3.5 y. The debut of gouty arthritis was observed at 35.6 y. A family history of gouty arthritis was traced in 25 patients. 64 patients had arterial hypertension (AH). Patients were divided into two groups: the first group included 50 patients with primary gouty arthritis and with signs of NAFLD (signs of steatosis in 64%, non-alcoholic steatohepatitis in 36%), the second group included 20 patients with gouty arthritis without signs of NAFLD. In group 1, 20 patients (40%) had grade 1 AH and 30 (60%) had grade 2 AH. Uricemia level varied from 390.8 to 612.2 µmol/l. Dyslipidemia (type IIa and IIb) was diagnosed in 72% of patients. Mean fasting glycemia was 7.8±3.0 mmol/L and glycosylated hemoglobin was 7.0±1.5%. The mean serum insulin level of group 1 patients was 7.9 mIU/L, group 2 was 2.2 mIU/L, and the mean HOMA index was 18.0. BMI ranged from 29.05 to 49.39 kg/m<sup>2</sup> (70% were obese, the rest were overweight). All indexes of MS in patients of the 1st group differed significantly from those of the 2nd group.

**Conclusion:** High prevalence of MS in patients with gouty arthritis and signs of NAFLD was revealed. This group of patients has a higher risk of insulin resistance and dyslipidemia, abdominal obesity, AH, hyperuricemia. All of the identified metabolic syndrome factors directly correlated with the duration of gouty arthritis.

P582

### REAL-WORLD EFFICACY OF INTRAARTICULAR CARBOXYMETHYL CHITOSAN IN PATIENTS WITH KNEE OSTEOARTHRITIS

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**Objective:** Evaluate the real-world efficacy and safety of a single intraarticular injection of carboxymethyl (CM) chitosan in knee osteoarthritis (OA) patients.

**Methods:** This postmarketing study included adult knee OA patients, with a recommendation of treatment with CM-chitosan prior to the study recruitment. Patients received a single injection of 60 mg CM-chitosan (Benart®) and follow-up was performed at Week 1, 12, 24 and 36. Efficacy was evaluated using a VAS score for pain, the Knee injury and Osteoarthritis Outcome Score (KOOS), Patient's Global Assessment (PGA) and overall patient satisfaction. Results of an interim analysis performed once all patients had reached the Week 12 time point are reported.

**Results:** 49 patients were included in the study. VAS pain score significantly decreased from a median of 49.0 mm at baseline to 24.0 mm at Week 1 and to 18.0 mm at Week 12. At Week 12, 70.8% of patients showed pain reduction. All KOOS subscales (symptoms, pain, activities of daily living, sports and recreational activities, quality of life) improved significantly compared to baseline both at Week 1 and Week 12. 72.9% of patients reported a condition gain (PGA) after 12 weeks, well matching with the 76.6% of patients satisfied or very satisfied by the treatment at this time point. Preliminary results at Week 24 (27 patients) confirmed a stable pain improvement, with a median VAS pain score of 9.00 mm, p=0.002 vs. baseline. A significant improvement vs. baseline of all KOOS subscales was also reported at this time point. The study is ongoing to gather results at Week 36. 24 (49.0%) patients reported a treatment-related adverse event requiring a medical intervention, mainly postinjection pain, which responded well to paracetamol or nonsteroidal anti-inflammatory drugs.

**Conclusion:** In a real-world setting, treatment with CM-chitosan was effective to reduce pain, improve function and global condition in knee-OA patients. The most frequent adverse event was self-resolving postinjection pain, not affecting the treatment efficacy.

P583

**ANTIRESORPTIVE THERAPY AND DENTAL IMPLANT OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSIS**R. D. Mirza<sup>1</sup>, M. El-Rabbany<sup>2</sup>, D. S. Ali<sup>3</sup>, G. Guyatt<sup>1</sup>, A. Morrison<sup>4</sup>, S. L. Ruggiero<sup>5</sup>, S. Tetradis<sup>6</sup>, A. A. Khan<sup>7</sup>

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**Objective:** To inform the 2022 update by the International Taskforce on Osteonecrosis of the Jaw (ONJ), we conducted a systematic review and meta-analysis evaluating the excess risk of dental implant failure and ONJ related to antiresorptive therapy (bisphosphonates or denosumab) in osteopenia and osteoporosis (OP).

**Methods:** A health services librarian experienced in systematic review conducted a search of 5 databases between 1946 and November 2020. An updated search to January 2022 is underway. We included case series (with 5 or more patients), observational, and interventional studies reporting rates of dental implant failure or osteonecrosis in those with OP. Two reviewers independently screened all titles and abstracts and potentially eligible full texts. Risk of bias was assessed with the modified Ottawa-Newcastle scale, and the evidence was assessed using GRADE.

**Results:** Our search revealed 691 unique citations, of which 111 met criteria for full text screening, and 33 were included for data abstraction. Six comparative studies (n=181) reported rates of dental implant failure in patients with OP either taking or not taking anti-resorptive therapy. These six studies were included in the meta-analysis. Random effects meta-analysis at the level of the patient revealed a non-significant increase in dental implant failure in those using anti-resorptive (RR 1.56, 0.43 – 5.70, p=0.50). Sensitivity analysis at the level of implant was similar. Risk of bias for implant failure was deemed high in 5 of 6 studies. We identified 156 cases of ONJ in patients with OP undergoing dental implantation. The rate of ONJ following implantation in those taking anti-resorptive therapy is 0.4% pooled from 18 cohorts. We identified one study evaluating excess risk of ONJ in OP patients taking antiresorptive therapy. This study found dental implantation did not increase the risk for ONJ.

**Conclusion:** The limited evidence does not suggest an association between anti-resorptive therapy and dental implant failure or ONJ. The certainty of evidence is very low due to serious methodologic concerns including high risk of bias, and very serious

imprecision. Decisions regarding anti-resorptive therapy should be based on factors other than dental implant failure or ONJ including other harms and benefits to bone health.

P584

**DOES HYPOPARATHYROIDISM PROTECT AGAINST FRACTURES?**I. Slutzky-Shraga<sup>1</sup>, D. Hirsch<sup>1</sup>, A. Gorshtein<sup>1</sup>, T. Shochat<sup>2</sup>, E. Robenshtok<sup>1</sup>, I. Shimon<sup>1</sup>, G. Tsvetov<sup>1</sup>

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**Objectives:** Patients with hypoparathyroidism (hypoPT) have low bone turnover and high BMD due to the lack of PTH-mediated bone resorption. Yet, data on fracture risk is controversial. Aims: 1. To assess fracture rate in patients with hypoPT of different etiologies; 2. To compare fracture incidence between gender and age-matched groups of post-thyroidectomy patients with/without hypoPT.

**Methods:** Retrospective analysis, based on a computerized database of patients treated between 2010-2021 at a tertiary medical center.

**Results:** The study included 137 patients (91% women, age 64±13), of whom 105 (79%) had post-thyroidectomy hypoPT, and 21% had autoimmune/idiopathic etiology. Mean follow-up was 21±12 and 27±12 y, respectively, p=0.09. Patients with postsurgical hypoPT had significantly higher fracture risk than the nonsurgical hypoPT patients (HR 9.04, 94%CI (1.31-62.19). Comparison of 105 patients with postsurgical hypoPT to 142 post-thyroidectomy patients without hypoPT revealed a higher BMD in hypoPT patients. Yet, the prevalence of fractures was 31% (32/105) in the hypoPT patients and 21% (30/142) in patients without hypoPT (p=0.1) during a similar follow-up period (median 17 and 18.4 y, respectively). In both groups, the most common fracture site was the spine (50% and 70% in hypoPT and control group, p=0.33). Most vertebral fractures were nonclinical morphometric.

**Conclusion:** The relatively high BMD in patients with hypoPT is not associated with a lower fracture risk. As clinically-undiagnosed vertebral fractures are common, spinal imaging should be routinely performed, and treatment with PTH replacement therapy should be considered in patients with increased fracture risk.



P585

**VITAMIN D DEFICIENCY AND INSUFFICIENCY IN CHILDREN WITH CEREBRAL PALSY**A. Halasheuskaya<sup>1</sup>, A. Pachkaila<sup>1</sup>, V. Samahkavets<sup>2</sup>, P. Marozik<sup>3</sup><sup>1</sup>Belarusian Medical Academy of Postgraduate Education, <sup>2</sup>1st City Clinical Hospital, <sup>3</sup>Institute of Genetics and Cytology of the National Academy of Sciences of Belarus, Minsk, Belarus**Objective:** To determine the prevalence of vitamin D deficiency and insufficiency in children with cerebral palsy (CP).**Methods:** 90 children (45 girls and 45 boys) aged 2-18 y (median age 9.0 (6.1; 13.0) y) with CP were included in our study. 36 (40.0%) children with CP were ambulatory (GMFCS levels I-III), 54 (60.0%) children were non-ambulatory (GMFCS levels IV-V); 41 (45.6%) children were taking antiepileptic drugs. The level of 25-hydroxyvitamin D (25(OH)D) was defined by the method of electrochemiluminescence. We used the following cutoff of 25(OH)D to define vitamin D status: deficiency <20 ng/ml; insufficiency 20-29 ng/ml; sufficiency ≥30 ng/ml.**Results:** Vitamin D levels in the surveyed sample ranged from 2.30-76.60 ng/ml (median 16.43 (12.08; 22.91) ng/ml). Vitamin D deficiency and insufficiency were detected in 59 (65.6%) and 19 (21.1%) of children, respectively. Among those with vitamin D deficiency, 13 children were severely deficient (25(OH)D <10 ng/ml). The prevalence of both vitamin D deficiency and insufficiency was higher in adolescents 14-18 y, as well as in subjects with overweight and obesity, reaching 100%. A negative correlation was found between 25(OH)D levels and body weight ( $r_s = -0.41$ ,  $p < 0.001$ ), BMI ( $r_s = -0.37$ ,  $p < 0.001$ ), age ( $r_s = -0.37$ ,  $p < 0.001$ ). Only 27.7% (25/90) of parents reported giving their child vitamin D supplement. Children who took vitamin D had statistically significant higher levels of 25(OH)D ( $p < 0.001$ ), than nonusers (27.10 (21.87; 35.91) and 14.90 (11.00; 17.48), respectively). Severe vitamin D deficiency, deficiency and insufficiency in children who did not take vitamin D supplements were 20.0%, 66.2%, 7.7%, respectively (total 93.8%).**Conclusion:** Our study demonstrated that the prevalence of vitamin D deficiency and insufficiency is high in children with CP – 86.7% of the entire sample, reaching 93.8% in the group of children not taking vitamin D.

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**BONE MINERAL DENSITY IN CHILDREN WITH CEREBRAL PALSY DEPENDING ON MOBILITY STATUS**A. Halasheuskaya<sup>1</sup>, A. Pachkaila<sup>1</sup>, V. Vadzianava<sup>1</sup>, I. Lazarchyk<sup>2</sup><sup>1</sup>Belarusian Medical Academy of Postgraduate Education, <sup>2</sup>Minsk Regional Children's Clinical Hospital, Minsk, Belarus**Objective:** To evaluate mineral bone density (BMD) in children with cerebral palsy (CP) depending on mobility status.**Methods:** 72 children (35 girls and 37 boys) aged 5-18 y with CP were included in our study. The median age of the patients was 10.1 (8.1; 13.7) y. The patients were divided into two groups based on their ambulatory function classified by Gross Motor Function Classification System (GMFCS): group 1 – ambulatory children (GMFCS level I-III, n=30), group 2 – nonambulatory children (GMFCS level IV-V, n=42). BMD and Z-score were measured at lumbar spine with DXA. According to international guidelines (ISCD 2019 Pediatric Official Positions) low BMD was defined as Z-score ≤ -2.0.**Results:** In group 1 the median for lumbar spine BMD was 0.556 (0.446; 0.683) g/cm<sup>2</sup>; the median Z-score was -0,6 (-1.7; 0.0); low BMD was registered in 6 (20%) children. In group 2 the median for lumbar spine BMD was 0.419 (0.361; 0.477) g/cm<sup>2</sup>; the median Z-score was -2.6 (-3.5; -2.0); low BMD was registered in 32 (76%) children. It was found that in group 2 both BMD median values and Z-score BMD were statistically significantly lower, and there was also a higher frequency of low BMD ( $p < 0.001$ ). Fractures were reported in group 1 in 3 (10%) patients and in group 2 in 8 (19%) patients. Fractures were observed more in lower extremities with tibia and fibula as the most fractured bones (7 cases), followed by femur (4 cases). According to the ISCD 2019 criteria, secondary osteoporosis was detected in group 1 in 1 (3%) child, in group 2 in 6 (14%) children.**Conclusion:** The present study showed that both low BMD and secondary osteoporosis are more common in non-ambulatory children with CP (GMFCS level IV-V).

P587

**BONE MINERAL DENSITY AND VITAMIN D STATUS IN CHILDREN WITH CELIAC DISEASE**A. Pachkaila<sup>1</sup>, A. Halasheuskaya<sup>1</sup>, E. Rudenka<sup>2</sup><sup>1</sup>Belarusian Medical Academy of Postgraduate Education,<sup>2</sup>Belarusian State Medical University, Minsk, Belarus**Objective:** To evaluate BMD and vitamin D status in children with celiac disease.**Methods:** The study included 90 (50 girls, 40 boys) children with celiac disease aged 1-18 y (median age 10.2 (7.3; 13.8) y) who were examined at the Republican Center for Pediatric Osteoporosis. Total body less head (TBLH) BMD and lumbar spine (L1-L4) BMD were measured by means of DXA. In accordance with the ISCD 2019 Pediatric Official Positions low BMD for chronologic age was defined when BMD Z-scores were  $\leq -2.0$  SD. The level of 25-hydroxyvitamin D (25(OH)D) was defined by the method of electrochemiluminescence. We used the following cutoff of 25(OH)D to define vitamin D status: deficiency  $<20$  ng/ml; insufficiency 20-29 ng/ml; sufficiency  $\geq 30$  ng/ml.**Results:** The median L1-L4 BMD in the cohort of examined patients was 0.559 (0.457; 0.690) g/cm<sup>2</sup>, TBLH BMD was 0.643 (0.563; 0.778) g/cm<sup>2</sup>. The median BMD Z-score (L1-L4) was -0.1 (-1.1; 0.6) SD, BMD Z-score (TBLH) was 2.2 (0.4; 3.9) SD. Low BMD was registered in 10% (9/90) of children. BMD Z-scores from -1.9 to -1 SD were detected in 20% (18/90) of patients. Secondary osteoporosis in accordance with the ISCD 2019 Pediatric Official Positions was not diagnosed in any of the examined children with celiac disease. The median 25(OH)D value for the whole cohort was 24.85 (18.09; 30.20) ng/ml (range: 4.51-54.12 ng/ml). The prevalence of vitamin D deficiency and insufficiency was 31.1% (28/90) and 43.3% (39/90) respectively.**Conclusion:** A high frequency of vitamin D deficiency and insufficiency among children with celiac disease has been revealed, reaching 74.4%. Low BMD was detected in every tenth of the examined patients. The obtained results determine the need to optimize measures to prevent vitamin D deficiency and bone mineralization disorders in children with celiac disease.

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**PREVALENCE OF OSTEOPOROSIS IN PATIENTS WITH EPILEPSY IN NORTH MACEDONIA: A RETROSPECTIVE NATIONWIDE COHORT STUDY**M. Foteva<sup>1</sup>, M. Babunoska<sup>2</sup>, B. Boskovski<sup>2</sup>, A. Jovanovski<sup>3</sup>, E. Cvetkovska<sup>2</sup><sup>1</sup>University Clinic for Orthopedic Surgery, "Ss. Cyril and Methodius" University, Skopje, North Macedonia, <sup>2</sup>University Clinic of Neurology, "Ss. Cyril and Methodius" University, Skopje, North Macedonia, <sup>3</sup>Dept. of Clinical and Biological Sciences, San Luigi Gonzaga Hospital, Orbassano University, Turin, Italy**Objective:** To evaluate the prevalence of osteoporosis and pharmacological treatment among all prevalent epilepsy cases in North Macedonia between 2015-2018.**Methods:** Study participants were selected through a systematic search of the NEHRP (National Electronic Health Records Platform). First, we identified all subjects with a diagnostic code of epilepsy (ICD-10 codes G40.0-9) and evidence of prescribed antiepileptic medications (ASM). In this cohort we searched for diagnosis of osteoporosis (ICD-10 codes M80.0-9, M81.0-9) during the study period and we included all subjects where osteoporosis was established with bone densitometry (DXA). Also, we searched in this group of patients for prescribed medications for osteoporosis (antiresorptive drugs and/or calcium and vitamin D supplement therapy). Patients were divided into three age groups: children and adolescents (0-19 y), adults (20-49 y) and late mid-life and elderly (>50 y).**Results:** Out of 13825 prevalent epilepsy cases, 6383 (46.2%) were female and 7435 (53.8%) male. There were 418 (3.02%) prevalent patients with diagnosis of osteoporosis (381 F, 37 M,  $p < 0.00001$ ) in this cohort. In the age groups: 0-19 y: 3 patients; 20-49 y: 44; and >50 y: 371 patients. Bisphosphonate therapy was prescribed in 274 patients (65.5%). Calcium (48 patients) and vitamin D supplements (219 patients) were prescribed either alone or with bisphosphonates.**Conclusion:** Most of the patients were in the >50 age group, but osteoporosis was discovered in all age groups. Female patients were significantly more affected than male in all age groups. These results show that patients with epilepsy on ASM in North Macedonia are examined and diagnosed with osteoporosis, but not all have prescribed appropriate therapy.

P589

**THE NEW COVID WARRIORS AND THEIR ACHILLES HEEL**J. Bacarese-Hamilton<sup>1</sup>, E. Iliopoulos<sup>1</sup>, H. Shishtari<sup>1</sup>, J. Dalrymple<sup>1</sup>, T. Y. Kwan<sup>1</sup><sup>1</sup>University College Hospital, London, London, UK

**Objective:** During the strict lockdowns and subsequent restrictions enforced during the coronavirus pandemic, many people turned to outdoor exercise to escape their homes. We believe this has created a new class of amateur sportsperson: the COVID Warrior.

**Methods:** All patients with U/S confirmed Achilles tendon ruptures between April and November of 2019, 2020 and 2021 (before, during and after the lockdown) were included in the study. Partial ruptures and reruptures were excluded.

**Results:** A total 60 cases were identified from April 2019 to November 2021 (54 during our specific time periods), an average of 1.8 per month. The mean age of the cohort was 37 ( $\pm 12$ ) years, 72% were male and 8% smoked. 13 patients were treated operatively (22%), 43 nonoperatively (72%) following our local policy, and four were treated elsewhere. There was no significant difference between the time periods for these ( $p=0.963, 0.467, 0.413$  and  $0.12$  respectively). In the 2019 period of interest there were 10 cases (averaging 1.3/month); in 2020 there were 10 (1.3/month); and in 2021 there were 34 (4.3/month): the incidence rose by 250% in 1 y. During the first national lockdown there was only one case (0.3/month); the period between lockdowns had 1.8/month (rise of 500% to prelockdown levels); the second period of lockdown had 0.8/month (fall of 56%). The highest months were after reopening in April 2021 with a rate of 8/month (rise of 500% compared to pre-COVID levels).

**Conclusion:** Our experience suggests that people have either taken up exercise to escape lockdown rules, or more likely, have deconditioned during these periods before returning to previous activity levels, leading to a rising number of tendo-achilles ruptures. These are the new COVID Warriors.

P590

**SAFE DISTANCE OF A PROXIMAL FEMORAL SHAFT FRACTURE FROM THE PROXIMAL LOCKING SCREW IN RETROGRADE INTRAMEDULLARY NAILING: A MECHANICAL STUDY**C. A. Santos<sup>1</sup>, A. C. Apalisoc<sup>1</sup><sup>1</sup>Philippine Orthopedic Center, Quezon City, Philippines

**Objective:** Femoral shaft fractures located supraisthmally have been considered a relative contraindication for retrograde intramedullary nailing because of the high strain surrounding this

area. However, there have been no biomechanical studies verifying this. The objective of this study was to determine the shortest distance of a proximal femoral fracture to the more distal proximal locking screw that would not lead to failure.

**Methods:** Nine fourth generation composite femurs were instrumented with retrograde nails with two locking screws proximally and distally. Fracture gaps were made at 1-, 2-, and 3-cm from the more distal proximal locking screw. 700-N cyclic loading was applied axially at 3 Hz for 1 million cycles.

**Results:** All 9 femurs did not fail after 1 million cycles. There were no significant differences among the 3 groups in fracture gap displacement, coronal and sagittal angulation, and nail-to-cortex distances. All 3 femurs in the 1-cm group had toggle of 3° of internal rotation and loosening of the more distal proximal locking screw holes after 1 million cycles.

**Conclusion:** Fractures as close as 2 cm from the more distal proximal locking screw can be safely fixed with retrograde intramedullary nailing. The contact loading of the cortical bone in the subtrochanteric area provides load sharing, which decreases the stresses carried by the proximal locking screw. Fractures located 1 cm or less decrease the contact area for loading, thereby increasing the stress carried by the more proximal locking screw. Extra caution is advised for retrograde nailing of fractures located 1 cm or less.

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P591

**FEATURES OF MORPHOLOGICAL AND FUNCTIONAL CHANGES OF THE HEART VALVE APPARATUS IN PATIENTS WITH RHEUMATIC DISEASES**N. V. Aleksandrova<sup>1</sup>, V. A. Aleksandrov<sup>2</sup><sup>1</sup>Research Institute of Clinical and Experimental Rheumatology named after A.B. Zborovsky, <sup>2</sup>Volgograd State Medical University, the Dept. of Hospital Therapy, Volgograd, Russia

**Objective:** To assess the severity of cardiac valve calcification by echocardiography in patients with various rheumatic diseases.

**Methods:** Cardiac ultrasound (Accuvix V10, Samsung Medison, South Korea) was performed in 30 patients with osteoarthritis (OA) of the knee (22 women; mean age, 54.3 $\pm$ 19.8 year old; mean duration, 8.25 $\pm$ 5.39 y), 57 patients with rheumatoid arthritis (RA) (50 women; mean age, 50.5 $\pm$ 10.1 years old; mean duration, 9.2 $\pm$ 6.8 y), and 60 patients with systemic lupus erythematosus (SLE) (55 women; mean age, 36.32 $\pm$ 15.27 years old). When assessing the degree of calcification of aortic (AV) and/or mitral

(MV) heart valves, the following grading was used: 0 - no calcification, grade I - no significant calcification, grade II - moderate calcification, grade III - significant calcification of heart valves.

**Results:** Ultrasound signs of calcification of various heart valves were significantly more common in RA patients (23/57; 40.4%) compared with SLE patients (14/60; 23.3%;  $p=0.047$ ) and OA patients (5/30; 16.7%;  $p=0.025$ ). A high prevalence of AV calcification of varying severity was noted in RA patients: in 82.6% of cases (19/23) vs. 40% (2/5) in OA ( $p=0.046$ ) and 35.7% (5/14) in SLE ( $p=0.004$ ). The incidence of MV calcification signs in the group of RA patients (12/23; 52.17%) did not differ from the group of SLE patients (6/14; 42.9%,  $p>0.1$ ). The prevalence of cases with II-III degree calcification of cardiac valves (16/23; 69.6%) was observed in RA patients, in 21.7% of cases (5 patients) there were combined AV and MV lesions (no such patients were found in OA and SLE groups). The presence of autoimmune chronic inflammatory process is an independent sign of premature atherosclerosis formation, causes the highest risk of cardiovascular complications in RA patients and accelerates the processes of cardiac valve calcification.

**Conclusion:** Regular examination of patients with RA and SLE for early detection of morphological and functional changes in the heart and its valve apparatus with the use of simple and effective ultrasound criteria will help in choosing specific therapy and prevention of cardiovascular complications.

## P592

### SUCCESSFUL TREATMENT OF ANXIETY AND DEPRESSION IMPROVES RHEUMATOID ARTHRITIS TREATMENT RESPONSE

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**Objective:** Anxiety and depression significantly affect rheumatoid arthritis (RA) disease activity. Treatment with antidepressants (psychopharmacotherapy, PPT) could possibly lead to improvement in treatment response. Aim is to determine predictors of RA treatment response according to SDAI criteria.

**Methods:** 128 RA-patients (pts) were enrolled, 86% were women with a mean age of  $47.4 \pm 11.3$  (M $\pm$ SD) y. All pts met the full ACR criteria for RA. The SDAI treatment response criteria were used. Mean RA activity by SDAI was high ( $33.5 \pm 15.5$ ) at baseline. Anxiety and depressive disorders (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, pain – with Brief Pain Inventory (BPI). Biologics treatment duration varied from 1-6 y, 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 logistic regression analysis was conducted to determine predictors of treatment response.

**Results:** At 5-y endpoint in 83 RA-pts SDAI response rate was 73.5% (38.6% and 34.9% for major and minor improvement, respectively). Nonresponse rate was higher in DMARDs group (58%) vs. groups 2 (10.4%), 3 (23.8%) and 4 (0%),  $p<0.05$ . According to regression model, SDAI treatment response was associated with baseline BPImax (OR=1.42; 95%CI: 1.0-2.02), baseline SDAI (OR=1.08; 95%CI: 1.0-1.18), successful treatment of ADD (OR=7.07; 95%CI: 1.04-48.24) and younger age (OR=0.93; 95%CI=0.87-0.99).

**Conclusion:** Response rate was lower in DMARDs only group vs. bDMARDs and/or PPT groups. Younger age and successful treatment of anxiety and depression independently predict RA treatment response.

## P593

### GENETIC MODEL FOR PREDICTION OF OSTEOPOROTIC VERTEBRAL FRACTURE RISK IN WOMEN

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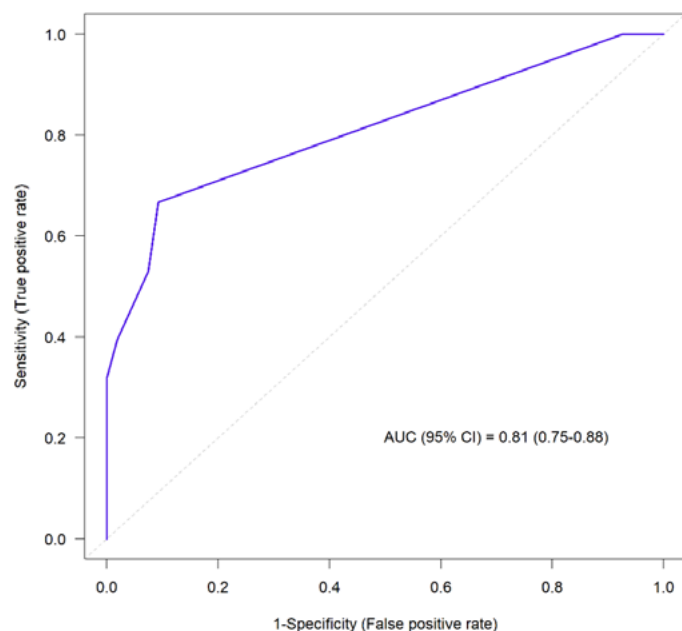
**Objective:** Early identification of individuals with high risk of osteoporotic vertebral fractures is very important for their prevention. Genetic predisposition is one of the strongest determinants of fracture risk. The purpose of present research was to develop genetic model for predicting risk of vertebral fractures in women with postmenopausal OP.

**Methods:** In total, 620 Belarusian women met inclusion criteria, of them 456 with OP and 164 controls. Using PCR, 57 variants located in 28 osteoporosis susceptibility genes were genotyped as previously described [1]. Genetic risk score (GRS) was calculated using multiple logistic regression analysis.

**Results:** We revealed statistically significant associations of *COL1A1* rs1800012, *COL1A2* rs42517, *VDR* rs7975232, rs1544410 and rs731236, *ESR1* rs9340799 and rs2234693, *MTHFR* rs1801133 gene variants with vertebral fracture ( $p<0.05$ ). The negative GRS was allotted to the protective genotypes and positive – to the risk. The lowest value of the logistic regression coefficient was assigned to 1 point (rs2234693); rs1800012 and rs7975232 had the greatest impact on fracture risk (3 points); other variants



were equivalent to 2 points. The only protective was rs9340799 (-1 point). In GRS of 5-7 points, individuals with fractures exceeds those without (OR=8.3,  $p<0.0001$ ), and at 8 points and higher, there were only 5% of study participants without fractures. Therefore, GRS of 4 points and less was taken as an ordinary, 5 to 7 points – increased, 8 and more – high fracture risk. To determine the prognostic value of the developed model, ROC-curve was analyzed (Figure). The AUC of 0.81 indicates very good diagnostic level. The model is characterized by high sensitivity (83%), average specificity (67%), good accuracy (78%).



**Figure.** ROC curve for a model of vertebral fracture risk.

**Conclusion:** The developed model has very good predictive value and may help to identify individuals with increased fracture risk to perform preventive measures. Average specificity suggests that the model may be improved with additional genetic and/or clinical factors.

**Reference:** 1. Marozik P, et al. *Nutrients* 2021;13:837

## P594

### EFFECTIVENESS OF MEDICAL MANAGEMENT IN THE FIELD OF RARE DISEASES: EXAMPLE OF FIBROUS DYSPLASIA OF BONE

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**Objective:** Healthcare organization into Reference Centers and Rare Disease Health Networks aims to improve management of patients with rare diseases. The French reference center for fibrous dysplasia (FD) was certified in 2006. The aim of our study was to assess the effectiveness of our reference center since its constitution.

**Methods:** In a retrospective cohort study, we compared the activity of our center, including the time elapsed between diagnosis and access to the center and the diagnostic delay (defined as the time to diagnosis  $\geq 6$  months) of patients with FD between two periods, 1996-2006 (before certification) and 2007-2019 (after certification). Data were extracted from CEMARA (rare diseases databank) and patients records (Easily® software). Wilcoxon and Fisher tests were performed, using R software, v3.3.3.

**Results:** Our cohort included 528 patients. The activity of the FD center increased with 140 patients for the first period (1996-2006) and 388 patients for the second period (2007-2019). Mean time elapsed to diagnosis of FD was 18 months before 2007 and 22 months after 2007 ( $p=0.14$ ). 37 patients (44%) in the first period had a diagnostic delay vs. 94 patients (33%) in the 2nd period ( $p=0.07$ ). Patients were referred to our center on average 6.8 y (before 2007) and 7.9 y (after 2007) after their FD diagnosis ( $p=0.86$ ).

**Conclusion:** Healthcare organization with reference centers did not significantly impact the management of FD patients, in terms of time elapsed to diagnosis and access to the center. Patients were referred to our center on average 7-8 y after their diagnosis of FD. However, this healthcare organization has resulted in a significant increase in the number of patients treated in our center: indeed, the activity increased 2.8 fold since certification. The current challenge lies in informing primary care providers and patients about the existence of reference centers for earlier and more effective specialized management of rare diseases.

P595

**AROMATASE INHIBITORS AND SKELETAL HEALTH: DO NEW GUIDELINES PREVENT FRACTURES?**A. Mirza<sup>1</sup>, Z. W. Naing<sup>1</sup>, P. Khonsari<sup>1</sup>, H. Khan<sup>1</sup>, P. Rezai<sup>1</sup>, A. K. Abbas<sup>1</sup>, M. K. Nisar<sup>1</sup><sup>1</sup>Luton and Dunstable Hospital, Luton, UK

**Objective:** To determine the impact of 2017 consensus guidelines on aromatase inhibitor bone loss (AIBL) and if bone sparing therapy utilising proposed risk stratification model is effective in fracture prevention.

**Methods:** 1001 women were given AI at a university teaching hospital over 7 y. New guidelines were adopted in July 2017. Participants were placed in two groups: 361 (36%) commenced AI prior to the adoption of guidelines and 640 (64%) were in the postimplementation group. First group were offered bone active treatment based on NOS 2009 guidelines and second group followed the 2017 consensus guidelines. Women with osteoporosis were all offered treatment, however the difference in guideline is pertinent to osteopenia and we analysed that group.

**Results:** Mean age was 64 y. 929 (93%) women were Caucasian, 723 (72%) had invasive ductal carcinoma and 863 (86%) were postmenopausal. At diagnosis, 428 (43%) had node positive disease and 35 (4%) metastases. 91 (9%) had fractures prior to their cancer diagnosis.

276 (28%) received oral bisphosphonates and 58 (6%) received parenteral therapy. First group (n=361): baseline DXA with a mean left neck of femur (LNOF) BMD of 0.888 g/cm<sup>2</sup> (range 0.552-1.222). 143 (40%) women were normal, 174 (48%) osteopenic and 44 (12%) osteoporotic. Osteopenia: 44 women (25%) were treated and 33 had a repeat DXA after 4 y (mean). In the treatment group, LNOF mean BMD remained unchanged from 0.814 g/cm<sup>2</sup> to 0.812 g/cm<sup>2</sup> at the repeat (p=0.94). 22 (13%) women had a fracture. Second group (n=640): baseline DXA with a mean LNOF BMD of 0.888 g/cm<sup>2</sup> (range 0.512-1.390). 216 (33%) women were normal, 322 (50%) osteopenic and 107 (17%) osteoporotic. Osteopenia: 127 women (39%) were treated and 56 had a repeat DXA after 3 years (mean). In the treatment group, LNOF mean BMD remained relatively unchanged from 0.822 g/cm<sup>2</sup> to 0.829 g/cm<sup>2</sup> at the repeat (p=0.6169). 8 (2.5%) women had a fracture.

**Conclusion:** This shows the success of 2017 consensus statement in lowering fracture risk. Though there has been data for positive impact on BMD decline with this approach, evidence for fracture prevention has been limited. A significant reduction in fractures pre (13%) and post (2.5%) guidelines change was demonstrated which has implications for healthcare systems worldwide.

P596

**DECISION OF DRUG HOLIDAY AFTER MULTIPLE YEARS OF BISPHOSPHONATES IN A FEMALE WITH GYNECOLOGICAL MALIGNANCY**L. Gheorghită<sup>1</sup>, N. M. Bugălă<sup>2</sup>, D. E. Rentea<sup>3</sup>, A. M. Gheorghie<sup>3</sup>, M. J. Tuculina<sup>1</sup>

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**Objective:** Bisphosphonates are widely used as the first line of osteoporosis treatment. The concept of "drug holiday" has appeared as a response to concerns associated with the long-term use of bisphosphonates, such as the increased risk of osteonecrosis of the jaw and atypical fractures. (1-5) We aim to introduce a female patient treated with bisphosphonates for multiple years and her bone status following "drug holiday".

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 68-year female patient who is admitted for bone assessment. She has a history of multinodular goiter with normal thyroid function, hypercholesterolemia, non-secreting pituitary microadenoma (incidentaloma), and chronic venous insufficiency.

She is diagnosed with osteoporosis (without fragility fractures). She was treated with oral bisphosphonates for 6 y: alendronate for 2 y (2004-2006), risedronate for 1 y (2011-2012), ibandronate for 3 y (2015-2018). In the meantime, she developed gastritis and oral antiosteoporotic medication was stopped. At that moment, the decision of drug holiday was taken. The following assessments were done showing normal vitamin D levels, suppressed bone turnover markers and a T-score within the range of osteopenia. 25OHD=41 ng/mL (N:30-100), osteocalcin=11 ng/mL (N:15-46), CrossLaps=0.12 ng/mL (N: 0.33-0.782), P1NP=32 ng/mL (N: 20.25-76.31), PTH=55 pg/mL (N: 15-65). DXA: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.921, T-score(SD)=-2.2, Z-score(SD)=-0.8; femoral neck BMD(g/cm<sup>2</sup>)=0.799, T-score (SD)=-1.7, Z-score (SD)=-0.3; total hip BMD (g/cm<sup>2</sup>)=0.799, T-score (SD)=-1.7, Z-score (SD)=-0.3; 1/3 distal radius BMD(g/cm<sup>2</sup>)=0.552, T-score (SD)=-2.3, Z-score (SD)=-0.6. She remained on 1000 UI cholecalciferol/d. Yet, soon she received the diagnostic of a nonmetastatic endometrial malignancy which required extensive surgery and radiotherapy. After 20 months, she was reassessed in terms of bone turnover makers which remained low and DXA which was stationary. The decision of continuing drug holiday for 6-12 months was taken. First DXA assessment during drug holiday: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.892, T-score(SD)=-2.4, Z-score(SD)=-1.1; femoral neck BMD(g/cm<sup>2</sup>)=0.773, T-score (SD)=-1.9, Z-score (SD)=-0.4; total hip BMD (g/cm<sup>2</sup>)=0.789, T-score (SD)=-1.7, Z-score (SD)=-0.5; 1/3 distal radius BMD(g/cm<sup>2</sup>)=0.554, T-score (SD)=-2.2, Z-score (SD)=-0.4.

**Conclusion.** This case highlights that the decision of drug holiday from bisphosphonates might prove useful despite severe co-morbidities. However, we mostly know that this is only a gap to drug resumption.

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## P597

### EFFECTS OF TWO STRENGTH TRAINING MODALITIES (HYPERTROPHY VS. CONTRAST) ON BONE PARAMETERS, MUSCULAR STRENGTH AND QUALITY OF LIFE IN A GROUP OF ELDERLY SUBJECTS WITH LOW SKELETAL MUSCLE MASS INDEX

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The aim of the current study was to compare the effects of two strength training modalities (hypertrophy vs. contrast) on bone parameters, muscular strength and quality of life in a group of elderly subjects with low skeletal muscle mass index. 45 elderly subjects with low skeletal muscle mass index were randomly divided into three groups: hypertrophy training group (HTG), contrast training group (CTG) and control (CG). Changes from baseline to six months in bone parameters, physical performance, body composition and quality of life were investigated. The current study indicates that the two training modalities show common benefits but have no effect on BMD and bone mineral content. The influence of training was more marked for improved maximal strength and reduced fracture risk for the contrast group (which executes movement at fast speed) compared to the hypertrophy group (with executes movement at spontaneous speed). It has been shown that hypertrophy training is more beneficial for quality of life compared to the contrast training. This tends to show that depending on the objectives sought, the two methods can be relevant.

## P598

### VOLUMETRIC BONE MINERAL DENSITY AND BONE MICRO-ARCHITECTURE, ANALYZED WITH HIGH-RESOLUTION PERIPHERAL QUANTITATIVE COMPUTED TOMOGRAPHY (HR-pQCT), CORRELATE WITH DISEASE ACTIVITY IN RHEUMATOID ARTHRITIS

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**Objective:** Osteoporosis is a significant comorbidity in rheumatoid arthritis (RA). HR-pQCT provides additional information on bone microarchitecture and BMD. We investigated (1) correlations between RA disease activity and bone measurements with bone densitometry (DXA) and HR-pQCT, (2) if ESCEO 2020 (Kanis JA, Osteoporos Int 2020) and Belgian Bone Club (BBC) 2020 (Sanchez-Rodriguez D, Maturitas 2020) osteoporosis treatment guidelines are discriminative in terms of bone microarchitecture.

**Methods:** 61 patients with RA underwent clinical, biological and ultrasound evaluation, DXA and HR-pQCT.

**Results:** In multivariate analysis (also considering age, gender, BMI and treatment), DXA correlated with only a few RA characteristics: DAS28VS and femoral neck BMD; VAS-fatigue and lumbar spine / total hip BMD; number of ultrasounds synovitis and total hip demineralization. FRAX was only associated with number of painful joints, while TBS exhibited no correlation. However, several RA characteristics correlated with HR-pQCT parameters:

- (1) Lower total bone density if active disease (swollen joints / HAQ and Tt.vBMD)
- (2) Lower trabecular density and architecture if active disease (swollen joints / DAS28CRP and Tb.vBMD; DAS28CRP and Tb.Th)
- (3) Lower cortical bone thickness if active disease (HAQ and Ct.Th)
- (4) Lower trabecular density and architecture if ultrasound activity (ultrasound positivity and Tb.vBMD / BV/TV / Tb.1/N.SD.; tenosynovitis and Tb.Th)
- (5) Higher cortical porosity if ultrasound activity (wrist PDI and Ct.Po.dm; PDI positivity and Ct.Po / Ct.Po.dm)

17% of our RA patients received treatment for osteoporosis. If we retrospectively applied the ESCEO 2020 or BBC 2020 recommendations for osteoporosis treatment, 26 and 43% of patients should have been treated (similar ratio of treated patients but lack of agreement with ESCEO; lower ratio but correct agreement with BBC). HR-pQCT identified that patients that should be treated according to ESCEO or BBC guidelines had impaired bone architecture: total and trabecular volume densities (Tt.vBMD and Tb.vBMD) were lower, with lower trabecular volume/total volume ratio (BV/TV) and cortical thickness (Ct.Th) for both. Trabecular

structure (Tb.N, Tb.Th) was also lower for RA patients identified by BBC treatment guidelines. Disease activity (VAS, DAS28CRP, CDAI, SDAI), but also ultrasound effusion and synovitis for BBC, were higher in the subgroups that needed an anti-osteoporotic treatment.

**Conclusion:** RA activity is associated with impaired HR-pQCT parameters: lower trabecular and cortical bone densities and impaired bone microarchitecture (organization of spans and cortical porosity). HR-pQCT better reflects RA characteristics than DXA. Screening should be emphasized, especially when disease is active. Application of ESCEO 2020 and BBC 2020 treatment guidelines identified patient with impaired bone densities and microarchitecture with HR-pQCT. These patients also have a higher disease activity.

P599

### CHARACTERIZATION OF PAGET'S DISEASE OF BONE PATIENTS FROM THE INTERIOR OF PORTUGAL (BEIRA INTERIOR)

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**Objective:** Paget's disease of bone (PDB) is characterized by highly localized areas of increased bone resorption and disorganized bone remodeling. The purpose of the study was to evaluate and characterize the demographic, clinical, biochemical, imaging and treatment parameters of patients with PDB followed at the Rheumatology department of the Unidade Local de Saúde de Castelo Branco (ULSCB).

**Methods:** An observational, retrospective and cross-sectional study of patients with PDB was made from March 2011 until September 2021, at the ULSCB Rheumatology department. 10 patients were identified and followed with PDB. Demographic data, symptoms, existence or not of complications at the time of the disease presentation and during the follow-up, analysis of the imagiologic exams and clinical features were collected by chart review.

**Results:** Male predominance (90%) with a mean age at diagnosis of 66.1±11.4 years old (ranging from 51-84 y). No positive family history was reported nor was any patient asymptomatic at diagnosis, having everyone exhibited a certain degree of bone pain or low back pain. No report about the occurrence of any pathologic fracture. The monostotic form was the most prevalent (80% of the patients). The bones affected were the sacrum (30%), the iliac (50%) and the femur (30%). 50% of the patients had serum alkaline phosphatase (AP) increased at diagnosis (mean of 150.2 IU/L). Vitamin D deficiency was detected (mean 23.3ng/mL, optimal>30 ng/mL). All cases were submitted to bone scintigraphy. 80% patients underwent treatment with zoledronic acid (ZA) with

very good results both in controlling the symptoms and reducing the levels of AP. There was only one case where a second cycle of treatment was necessary, after 5 years, due to a new increase in AP levels.

**Conclusion:** Our cohort of PDB patients was mostly monostotic, with a male predominance and without significant family history or any complications. The intravenous administration of ZA in our patients was efficient in remission of symptoms like pagetic pain and decrease of serum alkaline phosphatase level. These data seem to confirm that ZA achieves the goal of prolonged remission in the majority of patients.

P600

### EFFECTS OF INTRAVENOUS MESENCHYMAL STEM CELLS INJECTION ON THE 3RD DAY AFTER TIBIA FRACTURE ON CHEMICAL COMPOSITION OF BONE REGENERATE

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**Objective:** To test changes of chemical composition of bone regenerate after intravenous mesenchymal stem cells (MSC) injection at the 3<sup>rd</sup> day after tibia fracture.

**Methods:** 90 male rats with the body weight of 190-225 g were distributed into three groups like the following: group 1 – the controls, group 2 - animals with tibia fracture (modeled as 2.2 mm round hole between the proximal metaphysis and shaft), and group 3 for the animals with the same tibia fracture that received intravenous injections of 5 million MSC per injection. Bone marrow cells previously sampled from the tibia were placed into Eagle's MEM with L-glutamine and 10% bovine embryonic serum and antibiotic and were cultured and phenotyped according to standard methods. On reaching the respective observation term (7, 15, 30, 60, and 90 d after intervention) the animals were withdrawn from the experiment and bone regenerate was collected for chemical analysis.

**Results:** After fracture, amount of water in bone regenerate exceeded that of the controls by 28.01%, 14.12%, and 12.45% in the period from the 7<sup>th</sup> to the 30<sup>th</sup> day after intervention respectively. Minerals share in the same period decreased by 17.50%, 8.95%, and 6.74%. Amount of organic substances also decreased by 13.62%, 6.52%, 6.87%, and 4.73% in the period from the 5<sup>th</sup> to the 60<sup>th</sup> day. Calcium levels exhibited decrease in the period from the 7<sup>th</sup> to the 90<sup>th</sup> day by 16.83%, 16.35%, 9.69%, 6.51%, and 4.48% respectively. Phosphorus levels decreased by 23.84%, 20.18%, and 4.79% in the period from the 7<sup>th</sup> to the 30<sup>th</sup> day. After MSC administration on the third day after intervention minerals share increased in comparison with that of the group 2 by 4.17% by the



7<sup>th</sup> day and water share increased by 5.35% on the 30<sup>th</sup> day. Calcium share increased in the period from the 15<sup>th</sup> to the 60<sup>th</sup> day by 6.29%, 6.49%, and 4.98% respectively.

**Conclusion:** Intravenous mesenchymal stem cells injection at the 3<sup>rd</sup> day after tibia fracture optimizes restoration of chemical composition of bone regenerate.

## P601

### ACTIVE VITAMIN D ELDECALCITOL EXERTED OSTEOPRESERVE EFFECTS THROUGH PROTECTING OSTEOCYTES FROM SENESCENCE BY INHIBITING FERROPTOSIS

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**Objective:** Osteocytes are the most abundant bone cells and play essential roles in the homeostasis of bone metabolism. The senescence of osteocytes leads to deleterious effects on bone tissue, subsequently resulting in bone disorder such as osteoporosis. Studies have reported the potential regulation of vitamin D on the survival of osteocytes. This study aimed to investigate if vitamin D protects osteocytes from senescence *via* regulation on ferroptosis.

**Methods:** The osteocyte-like cells MLO-Y4 were treated with D-galactose (D-gal), a classical inducer for senescence, with the presence or absence of active vitamin D, eldecalcitol (ELD). The activity of senescence-associated- $\beta$ -galactosidase (SA- $\beta$ -Gal) was measured by immunofluorescence staining. Immunoblotting was used to detect molecular expression. The ovariectomized (OVX) mice treated with D-gal were injected (i.p.) with ELD (low dose & high dose) for 7 weeks.

**Results:** Treatment of MLO-Y4 with ELD dramatically suppressed D-gal-triggered increase in activity of SA- $\beta$ -Gal and in cell size as well as up-regulation in expression of molecules (IL-1 $\beta$ /IL-6) of senescence-associated secretory phenotype by inactivating p16/p53 senescence signaling. Intriguingly, ferroptosis, in MLO-Y4 cells upon to D-gal induction, could be repressed by ELD as demonstrated by the rise in protein expression of Nrf2 and GPX4, both of which are central regulators for ferroptosis. *In vivo* study showed the beneficial effects of ELD on mechanical strength accompanied by the increase in maximal load and break load in cortical bone. The analysis on biomarkers found the elevated level in Fe<sup>2+</sup> and malondialdehyde in osteocytes-enriched tissue fraction isolated from femur of D-gal-treated OVX mice, and these alterations could be effectively reversed by ELD, which also alleviated the reduction in content of GSH.

**Conclusion:** The studies preliminarily elucidated the regulation of active vitamin D eldecalcitol on ferroptosis of osteocytes might, at least partially, contribute to its protection against osteocytes senescence.

**Acknowledgments:** This study was supported in part by Program of Shanghai Academic Research Leader (19XD1423800) and Scientific and Innovative Action Plan from Science and Technology Commission of Shanghai Municipality (21400760400).

## P602

### RADIOGRAPHIC AND FUNCTIONAL OUTCOMES OF DELAYED TREATMENT OF SUPRACONDYLAR HUMERUS FRACTURES IN PEDIATRIC PATIENTS

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**Objective:** Closed supracondylar humerus fractures in the pediatric population that present more than 21 d post-injury are commonplace in low resource settings. However, delayed open treatment of these fractures are believed to be associated with higher complication rate. The objective of this study was to document the postoperative radiographic and functional outcomes of pediatric patients with Gartland III closed supracondylar fracture treated with open reduction and pinning more than 21 days post-injury.

**Methods:** 25 pediatric patients with closed displaced supracondylar humerus fracture who underwent open reduction and pinning via posterior paratricepetal approach at 21 d postinjury or later were included. Postoperative radiographic lines, range of motion, and functional outcomes using the Mayo Elbow Performance Index (MEPI) were examined on follow-up.

**Results:** All elbows had functional range of motion with average elbow flexion of 131.5° (range: 106-148°) and average elbow extension of 2.7° (range: -10 to 30°). Average MEPI score was 98.2 points with 88% (22 out of 25) having excellent outcomes. Only two patients had complications (pin tract infection and pin loosening), but did not have an untoward long term effect.

**Conclusion:** Open reduction and pinning using a posterior paratricepetal approach is safe and effective in the treatment of pediatric supracondylar humerus fractures 21 d postinjury or older.

P603

### CLINICAL OUTCOMES AND HEALTH-RELATED QUALITY OF LIFE AFTER SINGLE INTRAARTICULAR INJECTION OF SORBITOL-MODIFIED HYALURONIC ACID FOR HIP DISEASES IN AMATEUR SPORTSPEOPLE: 6 MONTHS FOLLOW UP

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**Objective:** Osteoarthritis is the most common chronic disease in the hip joint and is characterized by hip joint pain and functional limitation. Viscosupplementation (VS) with hyaluronic acid (HA) is one of the most widely used conservative treatment aiming to improve synovial fluid properties and to decrease pain. Sorbitol-modified hyaluronic acid also reduces oxidative stress, apoptosis and inflammation mediators in osteoarthritic chondrocytes. The objective of this prospective study was to evaluate the efficacy and safety of a single ultrasound guided intraarticular (IA) injection of high molecular weight HA combined with Sorbitol for hip osteoarthritis.

**Methods:** 33 patients (14 M) were enrolled in the study (age 57.39±12.2 SD, range 32-75 years old). 31 out of 33 patients were amateur sports players. They were evaluated before IA injection (T0), after 1 month (T1), after 3 (T2) and after 6 months (T3) from injection. Results were evaluated by Harris Hip Score, visual analog scale of pain (VAS), WOMAC. Inclusion criteria were primary coxarthrosis and aged between 18-75 years old, exclusion criteria were grade 4 according to Kellgren-Lawrence (KL) score, rheumatoid arthritis or hypersensitivity to hyaluronic acid or excipients presents in the prefilled syringe.

**Results:** All treated patients were considered for statistical analysis. The VAS scores showed a statistically highly significant improvement between T0 and T3 ( $p < 0.005$ ). The evolution of the Harris Hip Score and WOMAC score were statistically significant over times. No systemic adverse events were observed and reported during the entire follow-up period.

**Conclusion:** This study shows that a single IA Sorbitol-modified high molecular weight HA injection is effective in conservative treatment of 1-3 KL hip osteoarthritis at 3 months follow up and that the scores are stable or continue to improve up to 6 months.

**Acknowledgement:** This research was supported by Aptissen S.A.

P604

### TRANSITIONING TO ALENDRONATE AFTER LONG-TERM DENOSUMAB TREATMENT MAY PREVENT BONE LOSS

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**Objective:** Denosumab (DMAb) discontinuation is associated with the reversal of effects achieved with treatment. The aim of our study was to assess the effect of alendronate (ALN) in maintaining BMD after DMAb cessation.

**Methods:** 42 women with osteoporosis receiving continuous DMAb treatment (60 mg SC Q6M) for up to 6 y, who achieved a BMD T-score above -2.5 at both the lumbar spine (LS) and total hip (TH) were enrolled in the study. LS and TH BMD values were obtained using DXA, TBS was calculated using TBS iNsight software. 36 of enrolled patients were switched to ALN over 12 month period. The switched subjects showed >90% persistence with therapy; The remaining 6 patients stopped the treatment.

**Results:** Patients who received ALN showed a smaller decrease of BMD at the LS ( $4.1\% \pm 0.013$ ) and TH ( $3.8\% \pm 0.012$ ) compared with the patients who discontinued the treatment -  $7.9\% \pm 0.15$  and  $6.81\% \pm 0.012$  respectively. TBS follow-up didn't show significant changes in bone microarchitecture in both groups.

**Conclusion:** In patients who achieved non-osteoporotic T-scores after DMAb treatment transitioning to ALN may prevent bone loss.

P605

### BONE MARROW ADIPOSITY AND FRAGILITY FRACTURES IN POSTMENOPAUSAL WOMEN: THE CASE-CONTROL ADIMOS STUDY

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**Objective:** Noninvasive assessment of bone marrow adiposity (BMA) using MRI may improve the prediction of fractures. However, little data are available on the relationship between BMA and fractures. We aimed to determine whether an association exists between BMA and fragility fractures in post-menopausal women.

**Methods:** We conducted a case-control study with two groups of post-menopausal women: a group with major osteoporotic fractures (MOF) that were <12 months old, and another group with no fractures. Outcomes measures included vertebral (L1-L4) and hip (femoral head, neck, and diaphysis) proton density fat fraction

(PDFF) as measured by MRI (Dixon method), vertebral (L3) and femoral neck bone marrow fat (BMF) content and composition (MRI with spectroscopy), and DXA scans of the spine and hip.

**Results:** In 199 participants with no recent use of bone-active medication, controls (n=99) were significantly younger (mean (SD) 64.7±8.5 vs. 70.2±10.6,  $p<0.001$ ), and had significantly higher BMD at lumbar spine, femoral neck, and total hip ( $p<0.001$  for all) than post-menopausal women with fractures. We included 52 patients with vertebral fractures and 48 with non-vertebral fractures. After adjustment for age and BMD, comparison of PDFF (vertebral and hip) revealed no significant differences between patients with fractures and those without fractures (e.g., femoral neck PDFF 80.7% (Standard Error (SE) 0.82) vs. 83.0% (SE 0.81),  $p=0.051$ ). On comparing PDFF in those with vertebral fractures (n=52), we found lower femoral neck PDFF (79.0% (SE 1.21) vs. 83.1% (SE 0.81),  $p=0.010$ ) and femoral diaphysis PDFF (77.6% (SE 1.35) vs. 81.6% (SE 0.91),  $p=0.019$ ) than in those with no fractures. After adjustment for age and BMD, we found lower femoral neck BMF content, but not BMF composition (unsaturated lipids), in those with fractures than in those with no fractures (84.9% (SE 1.02) vs. 87.9% (SE 0.89),  $p=0.039$ ).

**Conclusion:** Lower bone marrow adiposity at the femoral neck was found to be associated with recent fractures in post-menopausal women, after adjustment for age and BMD.

## P606

### INTERPRETING THE RESPONSE TO MULTIPLE SEQUENCES OF BISPHOSPHONATES

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**Objective:** Bisphosphonates are often the first line of osteoporosis treatment. The decision depend on efficacy, adherence, side effects, reimbursement protocols, etc. (1-5) We aim to introduce a female patient with osteoporosis in treatment with different anti-resorptive agents.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 74-year-old female patient with severe osteoporosis (prevalent vertebral fractures) who is admitted for anti-osteoporotic drug decision. She associates goiter with hypothyroidism in treatment with levothyroxine, cataract, and arterial hypertension. She was first treated for 3 y with weekly alendronate, than she experienced dyspepsia and came to our attention (in 2015). The assessments showed controlled thyroid function TSH=2.6  $\mu\text{UI/mL}$ (N:0.5-4.5) under levothyroxine,

suppressed bone turnover markers (BTM) and osteoporosis according with T-score at central DXA. Lumbar L1-4: BMD( $\text{g/cm}^2$ )=0.860, T-score(SD)=-2.7, Z-score(SD)=-0.9; femoral neck: BMD( $\text{g/cm}^2$ )=0.701, T-score (SD)=-2.4, Z-score (SD)=-0.6; total hip: BMD ( $\text{g/cm}^2$ )=0.776, T-score (SD)=-1.8, Z-score (SD)=-0.3. Due to gastric accuses, therapy was switched to weekly risendronate. One year later, she was reassessed. She had iatrogenic thyrotoxicosis based on TSH=0.0019  $\mu\text{UI/mL}$  (N:0.5-4.5), FT4=21 pmol/L (N:9-19) under levothyroxine, and no particular anomalies of bone metabolism according to blood assays: 25OHD=25 ng/mL (N:30-100), P1NP=28 ng/mL (N: 20.25-76.31), PTH=36 pg/mL (N:15-65). BMD-DXA was decreased: lumbar L1-4: BMD( $\text{g/cm}^2$ )=0.837, T-score(SD)=-2.9, Z-score(SD)=-1.1; femoral neck BMD( $\text{g/cm}^2$ )=0.708, T-score (SD)=-2.4, Z-score (SD)=-0.5; total hip BMD ( $\text{g/cm}^2$ )=0.790, T-score (SD)=-1.7, Z-score (SD)=-0.1. Thus the decision of single zoledronate injection 5 mg was done. After one year, BTM were suppressed: osteocalcin=10 ng/mL (N:15-46), CrossLaps=0.17 ng/mL (N: 0.33-0.782), P1NP=12 ng/mL (N: 20.25-76.31), normal 25OHD and PTH with good BMD evolution at DXA: lumbar L1-4 BMD( $\text{g/cm}^2$ )=0.857, T-score(SD)=-2.5, Z-score(SD)=-0.7; femoral neck BMD( $\text{g/cm}^2$ )=0.757, T-score (SD)=-2, Z-score (SD)=-0.1; total hip BMD ( $\text{g/cm}^2$ )=0.812, T-score (SD)=-1.6, Z-score (SD)=-0.1. Single dose zoledronate was re-administrated and 1 y later, DXA decreased again: lumbar L2-4 BMD( $\text{g/cm}^2$ )=0.850, T-score(SD)=-2.9, Z-score(SD)=-1.1; femoral neck BMD( $\text{g/cm}^2$ )=0.714, T-score (SD)=-2.3, Z-score (SD)=-0.4; total hip BMD ( $\text{g/cm}^2$ )=0.798, T-score (SD)=-1.7, Z-score (SD)=0.1. Denosumab was not reimbursed at that time, the patient refused teriparatide, so intravenous ibandronate was considered feasible at that moment and continued for 3 more years with BMD improvement: lumbar L2-4: BMD( $\text{g/cm}^2$ )=0.874, T-score(SD)=-2.7, Z-score(SD)=-0.9; femoral neck; BMD( $\text{g/cm}^2$ )=0.684, T-score (SD)=-2.5, Z-score (SD)=-0.6; total hip BMD ( $\text{g/cm}^2$ )=0.790, T-score (SD)=-1.7, Z-score (SD)=0.1.

**Conclusion:** In this case, the sequence of bisphosphonates was done based on response, comorbidities (thyrotoxicosis, gastritis), and reimbursement of drug payment. Also, in our country in order to prescribe an antiosteoporotic drug yearly evaluation is mandatory in terms of DXA scans.

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P607

### EFFECTS OF AN EXERCISE INTERVENTION PROGRAM ON BONE HEALTH PARAMETERS AFTER BARIATRIC SURGERY IN A GROUP OF OBESE PREMENOPAUSAL WOMEN

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The aim of the current study was to explore the effects of an exercise intervention program (based on stairs descending) on bone health parameters after bariatric surgery in a group of obese premenopausal women. 52 women with obesity undergoing sleeve gastrectomy were randomly assigned at the time of surgery to an intervention group (stairs descending; n=18), a dancing group (n=17) and a control group (n=17). The primary outcome was pre- to 12-month post-surgery changes in BMD and hip bone geometry (evaluated by DXA). The current study showed that stairs descending can be considered as an effective physical exercise intervention in obese premenopausal women submitted to sleeve gastrectomy. In fact, stairs descending can limit the loss of femoral neck (FN) BMD, maintain lumbar spine BMD and even increase several bone geometry parameters such as FN cross-sectional area, FN cross-sectional moment of inertia and FN section modulus. Our findings suggest that an exercise program based on stairs descending is an effective strategy to ameliorate bone health parameters in post-bariatric surgery premenopausal women.

P608

### SECONDARY HYPERPARATHROIDISM IN CHRONIC HEMODIALYSIS PATIENT

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**Objective:** Hyperparathyroidism is a major problem for patients with chronic kidney disease (CKD) stage 5. Our aim is to investigate bone and mineral disorders in CKD and epidemiology of secondary hyperparathyroidism. **Methods:** Our study conducted in rheumatology department of Taher Sfar university hospital in Mahdia, Tunisia. The study involved 61 patients with chronic hemodialysis. They were invited to participate and were included after signing informed consent. Serum levels of iPTH, calcium were measured be-

fore the dialysis session. Patients were asked to undergo Cervical ultrasound and radiographs of the skull and hands. **Results:** The studied group of 61 patients was 26 females (42.6%) and 35 males (57.4%), their mean age was 53.9 [17-83] y, with mean dialysis duration 6.1 y. The mean onset age of hemodialysis therapy was 44.7±15.4 y. It was diabetic nephropathy in 25 cases (41%) vascular nephropathy in 15 cases and tubulointerstitial nephropathy in 21 cases (34.4). 9 patients (14.8%) have benefited of parathyroidectomy. The mean dialysis duration of patients with parathyroidectomy and without parathyroidectomy 14.55 vs. 4.74 y (p<0.05). 20 patients (33.3%) had parathyroid adenoma. 23 patients (37.7%) had brown tumor in their radiographs. 41 patients (67.21%) had vascular calcifications on their radiographs. **Conclusion:** CKD stage 5 can cause many bone and mineral bone disorders like hyperparathyroidism which can cause brown tumor and vascular calcifications.

P609

### OSTEOPOROSIS DIAGNOSIS AND TREATMENT GAPS AMONG WOMEN AGED OVER 50 YEARS IN IRAN

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**Objective:** Despite the availability of diagnostic equipment and effective drugs to diagnose and treat osteoporosis, only a minority of women at high risk for fractures are cared. The aim of this study was to investigate the osteoporosis care gaps among postmenopausal women.

**Methods:** This cross-sectional observational study in one of the provinces of Iran, collected data from women 50 years and older who are registered in the integrated health system of Iran. Initially, participants were surveyed through FRAX. Then, a questionnaire was prepared in 3 concepts (socioeconomic status, diagnosis status, medication initiation status). OS-MMAS-8 was used to assess the status of adherence to treatment. Due to the COVID-19 pandemic, data was collected by telephone. Chi-square test and independent sample t-test were applied to explore the association of groups with different variables.

**Results:** A total of 998 women with a mean age of 64.6±10.4 participated in this study. Overall, 346 women (34.6%) were at high risk for bone fractures through FRAX. In women at high fracture risk, the median 10-y probability of hip and major osteoporotic



fracture was 6.9% and 12%. 130 women (37.5%) underwent BMD, and 108 (31.21%) were diagnosed with osteoporosis. Medication initiation was reported in 98(28.3%) of patients, of whom 52(15.02%) were persistent. Overall, 10(2.89%), 35(10.11%), and 0 had low, medium, and high OS-MMAS-8 scores (<6, 6 to<8, and 8, respectively). The diagnosis, treatment gaps were 68.5% and 71.6%, respectively.

**Conclusion:** There is a large diagnosis and treatment gap in women aged  $\geq 50$  y at increased risk of fragility fracture registered in the health system of Iran. Identification and assessment women at high fracture risk is effective in improving the diagnosis and treatment of osteoporosis.

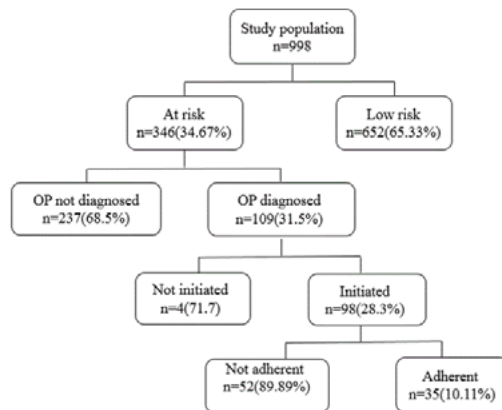


Fig. 1 Participants flowchart. OP, osteoporosis.

## P610

### PROS AND QUALITY OF LIFE IN PSORIATIC ARTHRITIS

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**Objective:** Psoriatic arthritis (PsA) is an extremely heterogeneous chronic inflammatory disease with physical as well as psychological and mental impact (especially on physical activities, participation, emotional aspects, anxiety, fatigue and sleep disturbances). As a result, the quality of life is most often impaired. Several questionnaires called PROs (Patient Reported Outcomes) are available to better assess these aspects of PsA. The objective of this work is to assess the quality of life of PsA patients through the PROs questionnaires.

**Methods:** This is a descriptive analysis of 30 PsA patients under biologics, we tried to analyse patient characteristics at baseline then we calculated some composite score of PRO in PsA, data was analyzed by SPSS.20 software.

**Results:** In total, 30 patients were analyzed: mean age  $40.4 \pm 19.5$  y, 50% women, all under biologics (13% under etanercept, 33% under infliximab and 54% under adalimumab), the average duration of the disease was 12.87 y, the delay of introduction of the biological after the diagnosis was 6.53 y. The average number of csDMARDs received was 1.63. The PsA was peripheral in all cases, axial 63%, nail involvement 30%, dactylitis 30%, enthesitis 43%, associated uveitis 13%. Therapeutically: 97% of patients had or are receiving methotrexate, 36% NSAIDs, 66% corticosteroids and 17% topicals. Biologically: ESR was  $48.87 \pm 20$  and CRP was  $14.24 \pm 6.20$ . Regarding the evaluation parameters: Global health related (QdV)  $38.67 \pm 30$ , patient VAS  $40.33 \pm 30$  and physician VAS  $30 \pm 30$ . We note a patient/physician discrepancy for quality of life perception which is more evident on mental than on physical aspect with an area under the curve of 25%. DAS28  $3.50 \pm 1.86$ , HAQ  $1.01 \pm 1.4$ , BASDAI  $2, 83 \pm 1.9$ , BASFI  $2.91 \pm 2.35$ , ASDAS  $2.46 \pm 1.95$ . The PASI score was 13.61 with 36.6% having mild psoriasis 1–5% of body surface area (PASI<10); 16.7% reached MDA (Minimal Disease Activity) remission and 76.6% with a low level of activity according to the Disease Activity in Psoriatic Arthritis (DAPSA) score. 56.6% had sleep disorders, 26% morning derailment, 90% impact on daily living activities, 73% decreased productivity at work and 43% impaired sexual life. The Dermatology Quality of Life Index (DLQI) was 10.9 / 30, the SF-36 body pain was  $49 \pm 10.05$ , the SF-36 physical function  $50.39 \pm 29$ , Health Related Quality of Life (HRQL)  $60.54 \pm 10.3$ , EuroQol Questionnaire (EQ5D3L)  $1.46 \pm 0.75$ , the PsA Quality of Life Instrument (PsAQoL) of  $5.86 \pm 1.6$  (0-20) and the FACIT-fatigue= $3,42/5$  ( $35,57/52 \pm 8.2$ ).

**Conclusion:** In this study, quality of life disorders were present in more than half of PsA patients. The impact of mental parameters was greater than the physical component. Evaluating these PROs and gaining a better understanding of the quality of life issues facing patients could improve overall disease management.

## P611

### FACTORS ASSOCIATED WITH REMISSION AFTER GRADUAL DECLINE OF TNFI IN SPONDYLOARTHRITIS

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**Objective:** The natural history of axial spondyloarthritis (axSpA) includes periods of remission interspersed with flares. It is recommended to target remission during the disease management, the 2 most used definitions are ASAS partial remission and inactive disease (ASDAS<1.3 and / or BASDAI score<3.6). The factors associated with the gradual decline of biologics after achieving remission have been little explored. The objective of this work was to assess the proportion of patients with axSpA treated with

TNFi in whom remission was maintained concomitantly with tapering at 3 years of follow-up and to identify the factors associated with this remission.

**Methods:** Single-center prospective descriptive study. A total of 44 patients included who attempted to space TNFi injections (etanercept, infliximab, adalimumab) among the 192 patients treated with bDMARDs, all of the patients fulfilled the ASAS criteria for SpA. Data collected: sociodemographic, clinical-biological and imaging data up to 3 y of follow-up.

**Results:** At the 3-y visit, a biologic decrease was achieved in 22.9% (86.4% maintenance of remission and 9.1% with relapse). That is a total of 19.8% (38/192) of patients (mean age 34.2±8.1 y; 71% of men with HLAB27 positive 63.2% with low BMI in 68.4%) maintained clinical remission with TNFi tapering at the 3-y visit. There was a significant association between ASDAS ( $p<0.001$ ), BASDAI ( $p<0.001$ ) and CRP ( $p=0.004$ ) per visit and maintenance of remission. Likewise, patients in remission more often presented strictly axial damage without enthesitic or peripheral damage and minimal structural on concomitant radiography ( $p=0.03$ ). They reported low smoking and stopping use of NSAIDs. Factors associated with successful 3-y TNFi spacing were a shorter delay between diagnosis and initiation of the biologic (0.9 [0.64-1.3]) and initial presentation of acute illness according to patient examination (2.37 [1.06-5.26]), a lower BASDAI and BASFI (respectively 1.3 [0.84-1.6] and 0, 9 [0.74-1.4]) and a lower NSAID score (0.715 [0.43-0.9]).

**Conclusion:** AxSpA patients in remission as defined by ASAS had significantly fewer objective signs of inflammation concomitantly but also over time. It is possible to maintain this remission after gradual decline in the biologics at 3 years in axSpA. Low activity and functional scores, as well as low consumption of NSAIDs are predictive of the success of tapering. Discontinuation treatment is not recommended due to the high risk of relapse.

## P612

### COMPARATIVE EFFECTIVENESS OF OSTEOPOROSIS (OP) THERAPIES AMONG A POPULATION OF POSTMENOPAUSAL (PM) WOMEN IN THE UNITED STATES (U.S.)

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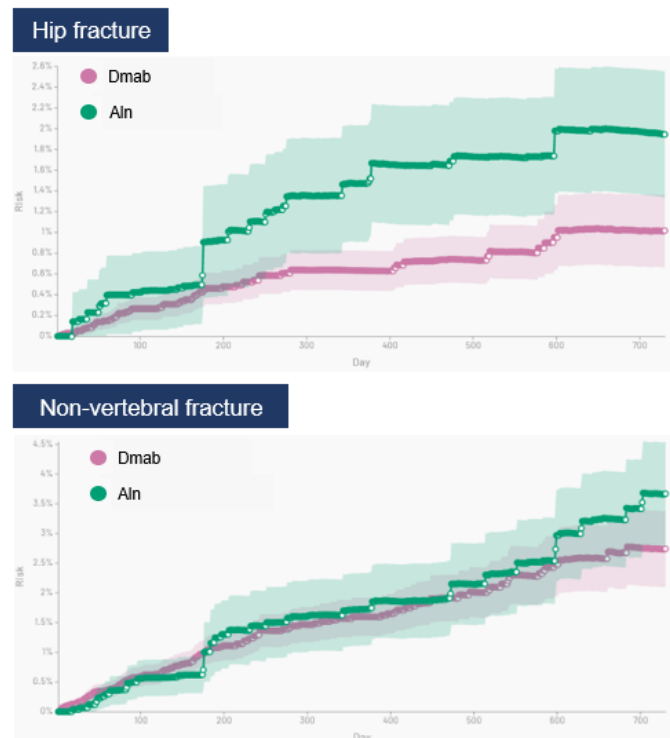
**Objective:** Although clinical trials have shown that denosumab (Dmab) significantly increases BMD at pivotal sites compared to oral bisphosphonates, evidence is lacking from head-to-head randomized trials or observational studies evaluating fracture

outcomes. This study evaluated the effectiveness of Dmab compared to alendronate (Aln), in reducing fracture risk among commercially-insured PM women in the U.S.

**Methods:** Women 55 years or older who newly initiated Dmab or Aln from 2012-2019 were identified using an administrative health claims database consisting of members of large commercial and Medicare Advantage plans. Using a doubly-robust inverse-probability of treatment and censoring weight function, we estimated the risk ratio (RR) of major osteoporotic, hip, clinical vertebral, and non-vertebral fractures over a 24-month follow-up among treatment-experienced patients (switched from a different therapy within 455 d of treatment initiation). Because Dmab is primarily used as a second-line therapy administered to patients with more severe disease, numerous pre-specified sensitivity and subgroup analyses were conducted in patients at higher fracture risk and among those initiating treatment in different time periods post-approval.

**Results:** When comparing Dmab (n=13,871) to Aln (n=8,747) for patients over the entire study period (2012-2019), no differences in the incidence of fracture outcomes were observed. However, among patients initiating treatment in 2015 or later, Dmab users had a 48% reduction in hip (RR=0.52, 95%CI: 0.28-0.77) and a 25% reduction in nonvertebral (RR=0.75; 95%CI: 0.50-0.99) fracture risk compared to Aln users. Cumulative incidence curves within the recent data cohort suggest a growing difference in the risk of hip and non-vertebral fractures through 24 months of treatment when patients adhere to Dmab compared to Aln (Figure 1).

**Figure 1:** Cumulative incidence of fracture over a 24-month follow-up using recent data (>2015): Dmab vs. Aln



**Conclusion:** In this cohort of PM women receiving OP treatment in clinical practice, we observed a clinically meaningful reduction in fractures for patients who remained adherent to Dmab compared to Aln through 24 months, once the effects of preferential prescribing of Dmab to high-risk patients in the early years after drug approval were removed. These findings need to be confirmed in larger studies using recent data and longer-term follow-up.

P613

### THE USE OF BONE DENSITY SCAN IN MONITORING TREATMENT RESPONSE IN PATIENTS DIAGNOSED WITH OSTEOPOROSIS AT A PRIVATE HOSPITAL IN DUBAI, 2016-2019: A RETROSPECTIVE COHORT STUDY

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**Objective:** Osteoporosis is defined by low BMD, a reduction in bone thickness, and a rise in porosity due to an imbalance between bone resorption and formation. In the UAE, the prevalence of osteoporosis is gradually increasing due to multiple factors, including increased life expectancy and the increasing prevalence of vitamin D deficiency. Since most of the studies are about the effectiveness of the DXA scan as a diagnostic tool, therefore, this study assesses the efficacy of the DXA scan as a monitoring tool in osteoporosis treatment. We aimed to assess the effectiveness of DXA scan in monitoring the response to osteoporosis treatment and comparing the scan's response to different osteoporosis (OP) treatments.

**Methods:** A retrospective study included 51 adults selected from 1112 patients diagnosed with OP based on WHO diagnostic criteria of T-score of -2.5. Data were extracted from the electronic medical records between January 2016 and December 2019 from a private hospital in Dubai, United Arab Emirates. The study included sociodemographic characteristics, biomedical parameters, comorbidities, history of fracture, medications, laboratory, and DXA scan results.

**Results:** 94% of the patients were females; the mean ( $\pm$ SD) age was 58.1 $\pm$ 11.5 y. Most of the patients were expatriates (84.3%) and from which the Asian ethnicity was (66.7%). The mean ( $\pm$ SD) duration of osteoporosis was 2.82 $\pm$ 1.8 y. Eleven (21.6%) patients had a history of fragility fracture. 96% of the patients had vitamin D deficiency. One-third (29.4%) of the patients had hyperparathyroidism, in which they had a significant improvement (p-value<0.05) in the BMD of the femoral neck and lumbar spine compared to other comorbidities. Denosumab was received by 25 patients (49%), Alendronate was received by seven patients (13.7%), teriparatide was received by two patients (3.9%), ibandronate was received by two patients (3.9%). Whereas alendronate/cholecalciferol, which

was received by nine patients (17.6%), showed a significant improvement (p-value<0.05) in the BMD of the femoral neck among the study group.

**Conclusion:** The DXA scan as a monitoring tool has shown a significant improvement in the BMD of the femoral neck among patients taking alendronate/cholecalciferol treatment compared to other medications. These findings may help inform clinicians about the effectiveness of the DXA scan in monitoring BMD among patients taking alendronate/cholecalciferol.

P614

### ROLE OF MAGNESIUM IN THE TREATMENT OF DISTAL SENSORY POLYNEUROPATHY

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**Objective:** Distal sensory polyneuropathy is one of the most common complications of diabetes and occurs in 50% of patients. It is characterized by the decrease or absence of distal reflexes, presence of numbness or pain in the limbs and neurotransmission failure, which can be found by running an electroneurographic analysis. The purpose of this study is to demonstrate the role of magnesium in the "treatment" of distal sensory polyneuropathy.

**Methods:** 158 patients (both men and women) aged 50-75, who had had diabetes for at least 5 y, were enrolled in the study. The patients were separated into 2 groups. For the first group (n=108) the traditional treatment was used (gabapentine and glycemic control). However, the second group, which is the control group, (n=50) were also prescribed magnesium, which is registered as a biologically active supplement in the Republic of Armenia, with a daily dose of 300 mg per os alongside the treatment. All patients were informed about the potential aim and expectations of magnesium.

**Results:** We found that patients from the control group ( $\approx$ 31,65%) stopped experiencing the symptoms of distal sensory polyneuropathy earlier than the patients from the first group ( $\approx$ 68,35%).

**Conclusion:** From the above mentioned can be concluded that magnesium as a biologically active supplement plays a significant role in distal sensory polyneuropathy treatment.

Taking into account our results, the administration of magnesium could be an option in the scheme of treatment of distal sensory polyneuropathy.

P615

## DEVELOPMENT OF CARPAL TUNNEL SYNDROME AS A CONSEQUENCE OF HYPOTHYROIDISM

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**Objective:** Carpal Tunnel syndrome (CTS) is an entrapment neuropathy that occurs due to compression of the median nerve. Hypothyroidism is a condition in during which the thyroid gland does not produce sufficient amount of thyroid hormone. It is one of the most important causes of CTS. We aimed to demonstrate the early discovery and compensation of hypothyroidism for effectively treating CTS.

**Methods:** 30 women, aged 21-50, were enrolled in the study, who had CTS syndrome and undiagnosed hypothyroidism. The patients were put into 3 groups. The first group were prescribed nonsteroidal anti-inflammatory medicine. After 2 weeks we found the treatment ineffective, so steroidal anti-inflammatory injections were also prescribed. The second group were prescribed steroidal medicine with levothyroxine and lastly, the third group, which is the control group, were given nonsteroidal medicine and levothyroxine (the doses were regulated according to levels of TSH and FT4 in the blood).

**Results:** The treatment was considered efficient when it not only included nonsteroidal anti-inflammatory medicine, but also levothyroxine.

**Conclusion:** Nowadays the golden standard of CTS treatment is considered to be steroidal medicine. However, with this study we showcased that even the compensation of subclinical hypothyroidism, alongside nonsteroidal medicine, has a positive effect in patients with CTS.

P616

## IS TBS A USEFUL TOOL IN PATIENTS WITH DISH?

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**Objective:** Patients with rheumatic and musculoskeletal diseases (RMD) have an increased fracture risk (FxR). Diffuse idiopathic skeletal hyperostosis (DISH) is a non-inflammatory disease characterized by calcification and ossification of ligaments and entheses also reported to be associated with increased risk of vertebral

fractures. However, DXA measured BMD is being falsely elevated by changes caused by DISH. Trabecular bone score (TBS) is said to be less affected by calcifications and degenerative changes. In this study we investigated whether TBS can improve FxR estimation in patients with RMD and DISH.

**Methods:** A subgroup of patients with RMD from a larger cohort (OsteoSys cohort) was analyzed, Patients aged 65 and older were recruited at a single tertiary hospital. DXA of the lumbar spine and hips was performed and TBS calculated. FRAX<sup>®</sup> major osteoporotic fracture (MOF) and hip fracture risk were calculated 1) without BMD, 2) with BMD and 3) with BMD and TBS. Available conventional X-ray and CT scans of the spine and chest were used to diagnose DISH using the Resnick criteria. Student T-tests and chi-square statistics were used to examine differences between patients with and without DISH.

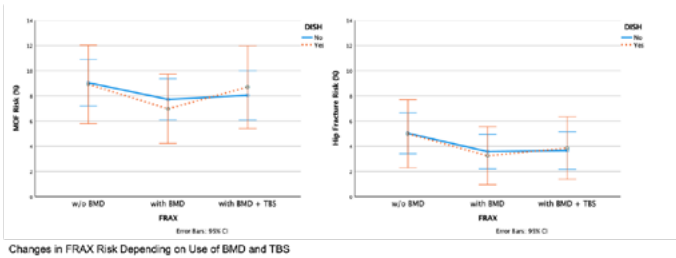
**Results:** A total of 153 patients (mean age 72.8±5.4 y; 72.5% women) was included in the analysis. 20.9% had DXA T-scores ≤ -2.5 meeting WHO criteria for osteoporosis. Women had lower BMD and higher FRAX FxR. 19 patients (12.3%) fulfilled the criteria for DISH. DISH was significantly more common in men than in women (26.2% vs. 7.2%). BMD and T-scores were higher and FRAX FxR was lower in patients with DISH compared to controls whereas TBS was similar. Reported previous fractures and falls in the last 12 months were similar between groups. However, 0% of patients with DISH had osteoporosis by WHO criteria compared to 23.9% in the control group. For details see table. Adding BMD in the FRAX calculation decreased FxR in both groups whereas adding TBS to BMD numerically increased FRAX risk in men with DISH (see Table and Figure).

Variables	Both Sexes Combined		Women		Men	
	DISH	Control	DISH	Control	DISH	Control
Number of Individuals	19	134	8	103	11 <sup>▲</sup>	31
Age (years)	73.1	72.8	73.2	72.7	73.1	72.9
BMI (kg/m <sup>2</sup> )	30.2	28.5	34.8	29.0 <sup>*</sup>	26.7 <sup>▲</sup>	27.2
Falls in the last 12 months (%)	42.1	41	37.5	44.7	45.5	29.9
Previous Fracture (%)	21.2	29.1	25	31.1	18.2	22.6
Osteoporosis, T-score ≤ -2,5 (%)	0	23.9	0	24.3	0	22.6
TBS	1.240	1.269	1.276	1.262	1.215	1.294
BMD L-Spine (g/cm <sup>2</sup> )	1.290	1.117 <sup>*</sup>	1.168	1.072	1.371	1.254 <sup>▲</sup>
T-score L-Spine	0.7	-0.5 <sup>*</sup>	-0.1	-0.8	1.3	0.3
BMD Femur Neck (g/cm <sup>2</sup> )	0.926	0.850 <sup>*</sup>	0.888	0.837	0.954	0.893 <sup>▲</sup>
T-score Femur Neck	-0.8	-1.2	-0.8	-1.2	-0.9	-1.4
BMD Total Hip (g/cm <sup>2</sup> )	0.998	0.901 <sup>*</sup>	0.977	0.880 <sup>*</sup>	1.015	0.965 <sup>▲</sup>
T-score Total Hip	-0.4	-1 <sup>*</sup>	-0.2	-1.0 <sup>*</sup>	-0.6	-1.0
FRAX MOF w/o BMD (%)	11.5	18.9 <sup>*</sup>	15.1	21.9	8.9	9.0 <sup>▲</sup>
FRAX Hip Fx w/o BMD (%)	5.9	10.7 <sup>*</sup>	7.2	12.4	5.0	5.0 <sup>▲</sup>
FRAX MOF w BMD (%)	9.1	15.8 <sup>*</sup>	12.1	18.2	7.0	7.7 <sup>▲</sup>
FRAX Hip Fx w BMD (%)	3.7	7.5 <sup>*</sup>	4.3	8.6	3.2	3.6 <sup>▲</sup>
FRAX MOF w BMD+TBS (%)	10.1	15.8 <sup>*</sup>	12.0	18.2 <sup>*</sup>	8.7	8.0 <sup>▲</sup>
FRAX Hip Fx w BMD+TBS (%)	4.1	7.3 <sup>*</sup>	4.3	8.4	3.9	3.7 <sup>▲</sup>

\* Indicates p<0.05 DISH vs Control

▲ Indicates p<0.05 Women vs Men





**Conclusion:** In this cohort patients with RMD and DISH report similar frequencies of previous fractures and falls compared to RMD patients without DISH. However, DISH patients had higher BMD (0% with T-score osteoporosis) and lower FRAX risk. TBS appears to improve FxR estimation in men with DISH but larger, prospective studies with fracture outcomes need to confirm this observation.

## P617

### ASSOCIATION OF ABDOMINAL AORTIC CALCIFICATION WITH PERIPHERAL QUANTITATIVE COMPUTED TOMOGRAPHY BONE MEASURES IN OLDER WOMEN: THE PERTH LONGITUDINAL STUDY OF AGEING WOMEN

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**Objective:** Abdominal aortic calcification (AAC), a marker of advanced atherosclerotic disease, is associated with reduced two-dimensional areal BMD (aBMD) of the central skeleton. However, to fully understanding the vascular-bone health relationship further studies are needed to explore this association with other key determinants of whole bone strength and fracture risk at other skeletal sites often assessed, such as cortical and trabecular volumetric BMD (vBMD) and bone structure. This study examined associations of AAC with total, cortical and trabecular vBMD, bone structure and strength of the radius and tibia measured by pQCT among community-dwelling older women.

**Methods:** A sub-sample of women (n=648; mean±SD age 79.7±2.5 y) from the Perth Longitudinal Study of Aging in Women were included with AAC assessed on lateral DXA images at 1998/1999 and 2003. We assessed associations between cross-sectional (2003) and longitudinal (progression from 1998/1999-2003) AAC with cross-sectional (2003) and longitudinal (change from 2003-2005) pQCT measures of vBMD, bone structure and strength at the 4% radius and tibia (predominantly trabecular), and 15% radius (predominantly cortical).

**Results:** Partial (adjusted for age, BMI, calcium treatment) Spearman correlations revealed no cross-sectional associations between AAC and any pQCT bone measures. AAC progression was not associated with any bone measure after adjusting the alpha level for multiple comparisons, despite trends for inverse correlations with total bone area at the 4% radius ( $r_s = -0.088, p = 0.044$ ), 4% tibia ( $r_s = -0.085, p = 0.052$ ) and 15% radius ( $r_s = -0.101, p = 0.059$ ). Neither AAC in 2003 nor AAC progression were associated with subsequent 2-year pQCT bone changes. ANCOVA showed no differences in bone measures between women with and without AAC or AAC progression, nor across categories of AAC extent (low, moderate, extensive).

**Conclusion:** Collectively, these findings suggest that peripheral bone density and structure, or its changes with age, are not implicated with central vascular calcification in older women.

## P618

### MANAGEMENT OF HIP FRAGILITY FRACTURE DURING COVID-19 PANDEMIC IN TERTIARY TEACHING HOSPITAL

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**Objective:** Fragility hip fractures have been recognized as major health concern among aging populations, and were associated with high mortality, morbidity, and economic burden. COVID-19 pandemic has negatively alter the care of fragility fracture patients. We aimed to assess the incidence and osteoporotic management of hip fractures in Hospital Canselor Tuanku Muhriz, Kuala Lumpur during COVID-19 pandemic

**Methods:** This is a prospective study from January 2020 to 31 December 2021, all patients with fragility 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 206 patients (58, 28% male and 148, 72% female) were identified with mean age of 78.06 years old. Majority were Chinese ethnics (134, 65%), followed by Malay (54, 26%) and Indian (18, 9%). 117 patients (57%) were treated surgically and 45 (22%) were operated within 72 hours from admission. Among conservatively treated patients, 37(42%) were unfit for surgery, 34(40%) due to family decision and 10 (11%) passed away before intervention. The mean surgical delay in 2021 is lower (5.08 d) compared to 2020 (6.55 d) and 2019 (6.38 d). The shorter surgical delay in 2021 is contributed by lesser motor vehicle accident cases due to Malaysian movement control order (MCO). 135 patients (65%) were treated with antiosteoporosis medications, while 178 patients (86%) were discharged with calcium and 174 patients (84%) with vitamin D supplements.

**Conclusion:** COVID-19 pandemic had resulted in lesser surgical intervention for fragility hip fractures but improvement in time to surgery. More effort should be emphasized to achieve time to surgery within 72 h to attain better outcome.

## P619

### THE NEED FOR LONG-TERM PAIN CONTROL IN PATIENTS WITH OSTEOARTHRITIS IN REAL CLINICAL PRACTICE

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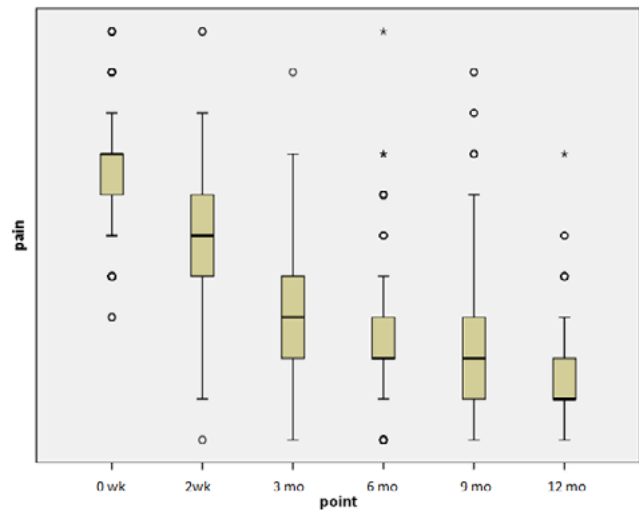
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**Objective:** To evaluate the need for the long-term use of NSAIDs in patients with OA in real clinical practice.

**Methods:** The study included 611 patients with knee or hip OA with joint pain  $\geq 4$  cm on a 10-cm VAS, for at least 3 months prior to inclusion in the study. 64.5% were female, mean age 58.3 $\pm$ 11.0 y. Most patients had comorbidities: 48.4% arterial hypertension, 23.5% dyspepsia, 10.8% type 2 diabetes mellitus, 5.2% ulcer history, 2.1% chronic kidney disease. All patients received aceclofenac at a dose of 200 mg/d. Pain at movement was determined on a 10-cm VAS. The number of patients with severe pain ( $\geq 6$  cm by VAS), number of patients with pain reduction  $\geq 50\%$  and number of patients continuing treatment were evaluated. The assessment was carried out 2 weeks, 3, 6, 9 and 12 months after the start of therapy. Adverse events were noted at each visit.

**Results:** The mean pain severity at baseline, after 2 weeks, 3, 6, 9 and 12 months was 6.5 $\pm$ 1.2; 4.8 $\pm$ 1.4; 3.2 $\pm$ 1.4; 2.6 $\pm$ 1.4; 2.2 $\pm$ 1.1; 1.4 $\pm$ 1.1 cm VAS ( $p < 0.05$ ). The number of patients with severe pain ( $\geq 6$  cm by VAS) decreased from 77.8% to 24.9%, 2.9%, 2.3%, 0.9% and 0%. The number of patients with pain reduction  $\geq 50\%$  was 12.0%, 65.1%, 81.0%, 88.5% and 84.0%. The number of patients continuing treatment was 100%, 80.2%, 79.4%, 75.1% and 53.3%.

Adverse events were observed in about 30% of patients, mainly mild or moderate dyspepsia (11.1%- 23.3%) and arterial hypertension (7.1% - 10.9%). No serious complications were recorded.



**Figure.** Dynamics of pain at movement

**Conclusion:** Approximately half of patients (53.3%) with OA require long-term NSAIDs during 1 y of follow-up in real clinical practice. Aceclofenac is effective and well tolerated and can be used for long-term pain control in patients with OA.

## P620

### BENCHMARKING OF THE REMS TRANSABDOMINAL SCAN AGAINST BIOELECTRICAL IMPEDANCE ANALYSIS (BIA) FOR THE ASSESSMENT OF BODY COMPOSITION

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**Objective:** An accurate diagnosis of the nutritional status, including malnutrition and obesity, is needed in the clinical routine to assign the best treatment option to the patient. Although bioelectrical impedance analysis (BIA) is commonly used for the assessment of body composition, ultrasound (US) imaging is gaining attention thanks to its noninvasiveness and user-friendly usage for the patient. The aim of the present study is to determine the accuracy of an innovative transabdominal US technique, called radiofrequency echographic multispectrometry (REMS), in comparison to BIA for the assessment of body composition.

**Methods:** A total of 151 patients, including males and females aged between 30-60 y, underwent the body mass measurement by transabdominal REMS and BIA. Both body fat percentage (BFP) and basal metabolic rate (BMR) were measured in all subjects.

**Results:** BIA-measured median BFP yielded 33.2% (interquartile range [IQR]: 28.9 to 40.3%), which did not differ from the REMS-measured median BFP of 32.7% (IQR: 28.5 to 39.4%), with  $p=0.8$ . Similarly, BIA-measured median BMR was 1386.0 kcal/d (IQR: 1292.3 to 1504.3 kcal/d), whereas REMS-measured median BMR was 1389.0 kcal/d (IQR: 1293.0 to 1515.0 kcal/d), with  $p=0.8$ .

**Conclusion:** REMS technology has shown the high capacity to accurately evaluate the body composition alternatively to the standard BIA technology in a clinical setting.

## P621

### ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN THE FRACTURE LIAISON SERVICE

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**Objective:** Significant care gap exists for those suffering from fragility fracture and osteoporosis. We reported the effect of our protocol and risk factors on 2-y mortality, falls, and recurrent fractures of a fracture liaison service (FLS) program.

**Methods:** Our FLS program enrolled patients with incident hip fracture (HF) and untreated vertebral fracture (VF) from both inpatient and outpatients services from 2 hospitals (N=600).

Different from the traditional statistical analysis, the advanced machine learner XGBoost (eXtreme Gradient Boosting), which integrates multiple tree models and stronger interpretability, was used to identify significant determinants of 2-y mortality, falls, and recurrent fractures.

**Results:** The mean age for this cohort was  $77.5 \pm 10.5$  y with 72% female. 2-y mortality was 14.2%, fall rate 33.2%, and recurrent fracture rate 6%. The top 5 risk factors of mortality are "To do regular exercise or not", "Have ever hip fracture", "Self-pay for osteoporosis drugs", "Self-care of EQ-5D-5L", "Use steroid or not". The accuracy, precision and recall of the mortality model are 85%, 0.88 and 0.95. The top 5 risk factors of falls are "Parkinson's disease or not", "Osteoarthritis or not", "Self-care of EQ-5D-5L", "Use osteoporosis drugs or not", "T-score". The accuracy, precision and recall of the fall model are 70%, 0.76 and 0.85. The top 5 risk

factors of recurrent fractures are "Have ever used osteoporosis drugs in previous 3 months", "Self-pay for osteoporosis drugs", "Have ever hip fracture", "The 10-y probability of a major osteoporotic fracture", "The 10-y probability of hip fracture". The accuracy, precision and recall of the recurrent fractures model are 97.5%, 0.97 and 1.0.

**Conclusion:** This study used XGBoost model to discuss risk factors for mortality, falls, and recurrent fracture among these patients. In the further, we want to crossvalidation results on osteoporosis datasets of bone radiographs. We hope the artificial intelligence and machine learning can be a contribution in developing new methods as diagnostic tools in clinical settings.

## P622

### OSTEOPOROSIS AND FRACTURE MANAGEMENT DURING THE PANDEMIC PERIOD

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**Objective:** Patients with fragility fractures and osteoporosis generally require sustained medical interventions to limit the risks for additional bone loss, preserve skeletal integrity, and prevent fracture occurrence. In COVID-19 era, some therapies can be stopped or delayed. The objectives of this study are to determine whether medication adherence of a fracture liaison service (FLS) patients is to be affected by the pandemic and whether mitigation strategies are effective to improve adherence.

**Methods:** Our FLS program enrolled 600 patients with hip or vertebral fracture. When patients cancel appointments for medication refills or injections because of COVID-19, we called out to patients to reschedule appointments and try to do modify medication regimens (using oral medications or annually iv injection when appropriate). We will continue to provide the best care possible for our patients by addressing the clinically important issue of osteoporosis in COVID-19.

**Results:** In Taiwan, the domestic COVID-19 cases gradually increased since January 2021. On 19<sup>th</sup> May 2021, the CECC (Central Epidemic Command Center) announced that a nationwide Level 3 alert for COVID-19. Many elective services were postponed and many clinical visits were delayed including osteoporosis cares. On 27<sup>th</sup> July, the CECC lowered the nationwide alert for COVID-19 to Level 2 until today. Before the Pandemic period, the medication adherence of our FLS patients is about 90%. From January to early May 2021, about 15% patients cancel appointments, but the medication adherence did not decrease significantly. From the nationwide Level 3 alert for COVID-19, about 50% patients cancel

appointments. the medication adherence decreased about 10% (90% to 80%). From Level 2 alert for COVID-19 to end of 2021, the appointments and the medication adherence are almost the same as before the Pandemic period.

**Conclusion:** During the pandemic periods, even clinic cancellation rates were high, with active called out from FLS coordinators to reschedule appointments, medication adherence rate can still be maintained at an acceptable level. Further studies are needed to observe the refracture rate and mortality in one to two years to understand the impact of the COVID-19 pandemic on long-term health outcomes.

## P623

### RADIOFREQUENCY ECHOGRAPHIC MULTI SPECTROMETRY (REMS) TECHNOLOGY FOR EVALUATION OF MATERNAL BONE MINERAL DENSITY IN HEALTHY PREGNANT WOMEN

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**Objective:** During pregnancy, a net bone loss is observed in a woman due to the transfer of calcium from the mother to the fetus. This condition renders women more vulnerable to the occurrence of bone fragility, that in some cases, culminates into pregnancy- and lactation-associated osteoporosis (PLO). This study aims to determine the bone health status in pregnant vs. non-pregnant women with the innovative radiofrequency echographic multispectrometry (REMS).

**Methods:** A cohort of 80 pregnant women at least at 37 weeks of gestation were matched with a reference group of nonpregnant women on the basis of ethnicity (Caucasian and non-Caucasian), age, BMI and parity. All the enrolled subjects underwent an examination of the femur using the REMS technology. A t-test was performed to assess the difference in the BMD at the femoral neck between the two groups and regression analyses were used to investigate the association between the BMD and patients' characteristics.

**Results:** The mean femoral neck BMD measured in the pregnant women was significantly lower than nonpregnant controls ( $0.770 \pm 0.093$  vs.  $0.832 \pm 0.100$  g/cm<sup>2</sup>,  $p=0.0001$ ). At univariate linear regression, femoral BMD appeared positively associated with BMI ( $p<0.001$ ) and negatively with age ( $p=0.040$ ). The parity did not impact the femoral BMD.

**Conclusion:** In this study, a significant reduction of BMD has been objectively demonstrated in pregnant women compared to non-pregnant ones by means of the REMS technology. Thanks to the nonionizing nature, it is proposed as the first technique that can be safely used during pregnancy for effective monitoring of bone health changes. This research paves the way for the development of reference curves that enable the prediction of bone loss during pregnancy and lactation.

## P624

### TREATMENT ACCEPTABILITY AND ENGAGEMENT AMONGST PATIENTS ON ORAL AND INTRAVENOUS BISPHOSPHONATES: A QUALITATIVE STUDY

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**Objective:** To explore treatment acceptability and engagement amongst patients prescribed oral and intravenous bisphosphonate treatment regimens for the prevention of osteoporotic fragility fractures.

**Methods:** Semistructured interviews were conducted with 78 patients aged 49 y and over, who had taken or received bisphosphonates within the previous 24 months for the prevention of fragility fractures. Data was analysed through iterative categorization (Neale, 2016), utilising the seven constructs of the Theoretical Framework of Acceptability (TFA, Sekhon et al., 2017) to compare the acceptability of oral (e.g., alendronic acid) and intravenous (e.g., zoledronic acid) bisphosphonate treatment regimens.

**Results:** Treatment acceptability and engagement were influenced by the extent to which patients had understanding around the prescribed treatment and associated regimen (intervention coherence), evidence of the treatment working, and/or expectancy that it would work (perceived effectiveness). Acceptability and engagement were compromised when patients could not meet the opportunity costs required to participate in the treatment, when treatment was perceived to be burdensome, and where patients' values did not align with the treatment regimen (ethicality). The balancing of these factors contributed to how well patients were able to cope with the treatment regimen (self-efficacy) and their overall emotional responses to treatment (affective attitudes). Intravenous treatments were generally perceived as easier to understand, more effective, less burdensome with fewer opportunity costs, and the preferable regimen compared with oral bisphosphonates.



**Conclusion:** Intravenous bisphosphonate treatments were generally more acceptable to patients, perceived as more straightforward to engage in, although a portion of patients on oral bisphosphonates were satisfied with their current treatment. Further research is needed to identify whether findings are applicable to other patient groups.

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## P625

### THE RELEVANCE OF THE REMS TECHNOLOGY FOR THE ASSESSMENT OF BONE HEALTH STATUS IN A MALE POPULATION

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**Objective:** To evaluate the diagnostic accuracy of the ultrasound-based densitometric technology radiofrequency echographic multispectrometry (REMS) in the diagnosis of osteoporosis in a population of adult males based on lumbar spine scans in comparison with the standard DXA.

**Methods:** A cohort of Caucasian males was enrolled in the study. Inclusion criteria were: age between 30-65 y, BMI less than 40 kg/m<sup>2</sup>, no significant walking impairments and lumbar spine DXA medical prescription. All the enrolled patients underwent lumbar spine scans with both DXA and REMS. The agreement between REMS and DXA-measured BMD was expressed by the Pearson correlation coefficient and Bland-Altman method. The classification into patients "with osteoporosis" or "without osteoporosis" was carried out considering the conventional T-score threshold (-2.5) for both techniques independently. The accuracy of the diagnostic classification was evaluated by the assessment of sensitivity and specificity considering the standard DXA as reference.

**Results:** A total of 224 men were included in the analysis, with a mean age of 50.25±10.63 y. The REMS technology displayed the capacity to discriminate patients with osteoporosis from the healthy ones with a sensitivity of 90.00% and specificity of 92.39%. Considering the three diagnostic classes (healthy, osteopenia, osteoporosis), the diagnostic concordance between technologies reached 87.05%.

**Conclusion:** REMS, applied to the lumbar spine site, is a reliable technology for the diagnosis of osteoporosis in men. This evidence corroborates its high diagnostic performance already observed in previous studies carried out in female populations [1, 2, 3].

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## P626

### INDICES AND FORMS OF AGGRESSION IN PATIENTS WITH RHEUMATIC DISEASES

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**Objective:** The study of immunobiological and psychosomatic factors of predisposition for the development of rheumatic diseases remains relevant. Aggression is one of the basic emotions of a person, its suppression and repression can act as an important factor in the development of a psychosomatic symptom. The aim of this study was to study the indices and forms of aggressiveness in rheumatological patients.

**Methods:** 37 patients with rheumatoid arthritis (27 patients) and systemic lupus erythematosus (10 patients) were examined. The study was carried out using the Bass-Darky Test for the Level of Aggression (1957).

**Results:** The index of aggressiveness in 56.75% of the subjects was below the norm, in 40.55% the norm of aggressiveness was revealed, and only 2.7% showed high levels of aggressiveness. The index of hostility in 59.45% of the subjects was within the normal range, in 32.43% high hostility was revealed, in 8.1% of the subjects the hostility was low. The most characteristic form of manifestation of aggression is guilt (76.1±21.12 points in average). The indicators of indirect aggression (59.7±22.81) and resentment (55.2±22.81) turned out to be high. Less pronounced were the indices of verbal aggression and irritation - 49.3±22.35 and 47.2±21.12 points in average, respectively. Patients are least prone to manifestations of suspicion (44.9±27.97), physical aggression (41.6±25.02) and negativism (34±23.97).

**Conclusion:** The data obtained indicate that patients are more prone to manifestations of hostility than direct aggressiveness, i.e., hostile tendencies in this group of patients remain unreacted. The mechanisms of the development of the disease are based on both psychological (through guilt) and autoimmune self-destruction. Psychosomatic symptoms can act as unconscious self-punishment designed to alleviate feelings of guilt. It is necessary to provide not only medical, but also psychological assistance to rheumatic patients. Psychological correction should be aimed at overcoming tendencies to self-destruction, feelings of guilt and

resentment, at reducing hostility and developing a sense of security, as well as at developing skills for constructively responding to aggressive impulses.

## P627

### VERTEBRAL FRACTURE AS RISK FACTOR FOR SUBSEQUENT VERTEBRAL FRACTURE: ICD-10 BASED ANALYSIS OF A REAL-WORLD DATABASE

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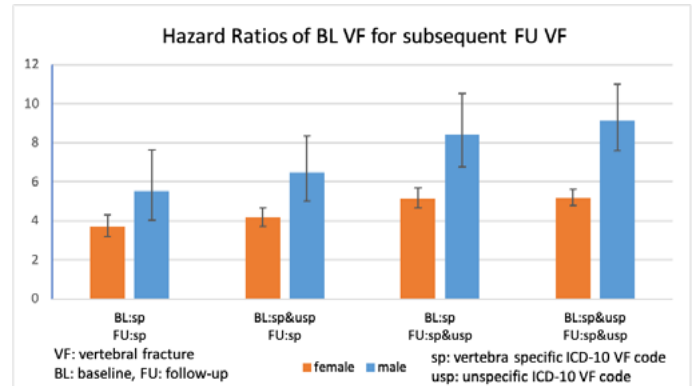
**Objective:** Large sample size real world databases allow multi-factorial fracture risk modeling. However, vertebral fracture (VF) risk modeling is hampered by ambiguities of ICD codes. We developed an analysis scheme that largely eliminates repeated coding to yield accurate estimates of VF risk.

**Methods:** In a representative German health insurance data set we evaluated the 19 most frequently used ICD-10 VF codes, including 10 that are specific to 1 or 2 vertebral levels (sp) plus 9 level unspecific codes (usp). VF incidence was evaluated for a 4-y baseline (BL) and a 3-y follow-up (FU) period. We identified the first incidence of a VF during FU with a VF ICD code different from any VF ICD code of that patient during BL, thus eliminating repeated recording of the same fracture. Here we analyzed subjects with 0 or 1 BL VF code, excluding other patients. Impact of BL VF on subsequent VF incidence was expressed as age-adjusted Cox proportional hazard ratio (HR).

**Results.** Among 242,478 subjects (154,393 women, 88,085 men age 70 to age 90) we identified 2585 and 684 incident sp-coded baseline VF in women and men, respectively. HR for sp codes was 3.7 (95%CI. 3.2-4.3) for women and 5.6 (4.0-7.6) for men. Allowing additional usp codes in BL enriched the sample to 4,667 and 1,007 BL VF, respectively with only a limited impact on HRs (+13% for women, +17% for men). Allowing additional usp codes also during the FU period led to larger increases of HRs by +40% in women and +60% in men reflecting the broader range of VF outcomes.

**Conclusion:** Employing our analysis scheme, addition of usp ICD codes to BL VFs substantially enhanced fracture numbers and thus study power, with only a limited impact on HRs (+10-20% if allowed in BL). This approach may thus be used to evaluate multivariate risk models for VF employing real-world data sources.

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## P628

### ESTABLISHMENT OF IN VITRO MESENCHYMAL STEM CELLS MODELS OF GORHAM-STOUT SYNDROME: AN EXTREMELY RARE BONE DISEASE

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**Objective:** To evaluate the biological and molecular changes at the base of the mineralization process which characterize the Gorham Stout disease (GSD).

**Methods:** Bone marrow cells were obtained from a patient with GSD. After enzymatic digestion, mechanical dispersion and centrifugation the cell pellet was incubated with an erythrocyte lysis buffer and the remaining cells were cultured in growth medium at 37°C in humid atmosphere with 5% CO<sub>2</sub>. The characterization of isolated cells as mesenchymal stem cells has been done by studying the expression of mesenchymal and hematopoietic stem cell markers, by evaluating their differentiation potential through adipogenic and chondrogenic differentiation assays and their clonogenic potential through the colony forming unit (CFU) assay.

**Results:** Isolated cells, obtained from a GSD patient, called as BMSC-GS-1 have been characterized as mesenchymal stem cells, observing the presence of the mesenchymal stem cells markers (i.e., CD44, CD90, CD105 and STR01) and the complete absence of the hematopoietic stem cells markers (i.e., CD34 and CD45). Furthermore, adipogenic and the chondrogenic differentiation assays confirmed their ability to differentiate into two of the four mesenchymal stem cell-derived cell lines, adipocytes and chondrocytes. Finally, the clonogenic rate observed was more than 30% through the CFU assay.

**Conclusion:** In this work we have established and characterized a primary cell line of human bone marrow mesenchymal stem cells to study the cellular and molecular alterations at the base of the GSD disease. The establishment of this in vitro model will permit identifying which could be the molecular and epigenetics mechanisms responsible for the altered mineralization process and the inhibition of bone regeneration in osteolytic lesions of GSD. This study will permit not only to understand the molecular basis of the altered bone homeostasis in GSD, but also to understand if molecules as miRNAs are involved in this process and if they could be molecular target to development of new therapeutic strategies against GSD.

P629

### ASSOCIATION BETWEEN CLINICAL FEATURES AND IL-6, IL-10 LEVELS IN HOSPITALIZED PATIENTS INFECTED WITH COVID-19

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**Objective:** Upper respiratory tract infection symptoms, worsening cough, fever, anosmia, respiratory failure, various complications and even death may be detected in COVID-19 infection (1-3). The aim of this study was to determine association between clinical features and IL-6, IL-10 levels in hospitalized patients infected with COVID-19.

**Methods:** A cross-sectional study was conducted of patients at Baskent University between March 11 and December 31, 2020. Hospitalized patients aged above 18 y, diagnosed with COVID-19 via RT-PCR from nasopharyngeal or throat swab specimens are included the study. Pregnant patients, those with severe endstage disease or with missing documentation were excluded. Data were obtained from electronic health records. Information was collected about patient demographics; comorbidities; history and duration of complaints, history of fever or anosmia, respiratory problems, length of stay, history of intensive care, biochemical parameters and IL-6, IL-10 levels. The correlation between clinical features and IL-6, IL-10 levels were observed. P-value <0.05 was considered statistically significant.

**Results:** Total 109 patients included to the study. 39.45% of patients were female (n=66), 60.55% of patients were male (n=43). Mean duration of hospitalization was 7.54±6.53 d, intensive care duration was 2.19±6.28 d and O<sub>2</sub> support duration was 6.97±6.60 d. Mean IL-6 level was 40.23±123.78 and IL-10 level was 36.47±66.21. Mean basal C-reactive protein (CRP) was 56.30±56.62 mg/L and control CRP was 60.82±150.93 mg/L. There was significant correlation between CRP, fever, length of stay, duration of intensive care, control CRP and IL-6 levels (p<0.05). There was significant correlation between IL-6 level, control CRP, length of stay, duration of intensive care, oxygen

support (p<0.05). There was significant correlation between arthralgia and IL-6 levels (p=0.037) but there was no correlation fever and anosmia (p>0.05). Correlation between IL-10 levels and duration of intensive care was significant (p<0.05). Also correlation between control CRP and length of stay, duration of intensive care, oxygen support was detected (p<0.05).

**Conclusion:** There may be correlation between clinical features like length of stay, duration of intensive care, oxygen support, CRP and interleukin levels in hospitalized COVID-19 infected patients.

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P630

### IMPACT OF REHABILITATION TECHNOLOGIES ON QUALITY OF LIFE INDICATORS IN PATIENTS WITH RHEUMATOID ARTHRITIS AND OSTEOARTHRITIS WITH COMORBID PATHOLOGY

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**Objective:** To evaluate the effectiveness of a post-hospital rehabilitation program (PHRP) on the dynamics of health-related quality of life (HRQoL) indicators in patients with rheumatic diseases (RD) combined with arterial hypertension (AH).

**Methods:** We examined 66 patients with osteoarthritis (OA) (mean age 56.8 [46.4:73.8] years old, disease duration 12.8 [6.5:24.3] y) and 94 patients with rheumatoid arthritis (RA) (mean age 52.1±9.6 years old, disease duration 9.2 [4.8;13.6] y) with signs of AH. HRQoL was studied using the Short Form 36-item Health Status Questionnaire (SF-36). PHRP (kinesotherapy, low-frequency magnetic therapy - LFMT and biofeedback therapy) was used in the complex treatment of RA (group I, n=53) and OA patients (group III, n=30). Other patients with RA (group II, n=41) and OA (group IV, n=33) did not receive PHRP.

**Results:** A combined mean HRQoL score for the physical and mental components of the SF-36 was preliminarily calculated in patients. RA patients showed significant impairments in the physical sphere (p=0.006); OA patients showed impairments in the mental sphere (p=0.033). We found that a more severe increase in blood pressure in RA patients was more strongly associated with the patients' physical health scores (PF: r=-0.38, p=0.019 and BP: r=-0.33, p=0.041) than with the other SF-36 subscales. After

PHRP (3-week course), group I showed improvement on six SF-36 scales (PF, RP, VT, SF, RE, MH), group III showed improvement on five SF-36 scales (MH, SF, GH, VT, RE), and groups II and IV showed improvement on three and two scales (PF, SF, MH and RE, BP). Group I showed the highest increase in physical function scores (PF,  $p=0.011$ ; RP,  $p=0.045$ ), general health (GH,  $p=0.036$ ), vitality (VT,  $p=0.02$ ), social functioning (SF,  $p=0.046$ ), and mental health (MH,  $p=0.039$ ), while group III showed the highest increases in social functioning (SF,  $p=0.028$ ), mental health (MH,  $p=0.031$ ), and general health (GH,  $p=0.022$ ). These results can be explained by the combined effect of PHRP on both the physical (kinesotherapy and LFMT) and mental (biofeedback therapy) components of HRQoL.

**Conclusion:** Patients with RD and AH have lower quality of life indicators. Periodic assessment of HRQoL dynamics and wide use of nonmedicamental methods of treatment for health improvement are recommended in this group of patients.

## P631

### TWO EXPERIMENTAL RAT MODELS FOR STUDYING DEGENERATIVE CHANGES IN THE LUMBAR PARAVERTEBRAL MUSCLES

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**Objective:** To study the structural features of the lumbar m. multifidus and the m. psoas after keeping rats on a high-fat diet (obesity) or compressing their lumbar paraspinal muscles by binding its using Nurolon® 3.

**Methods:** The study was performed on 2-month-old male rats ( $n=15$ ) into three groups. Control animals ( $n=5$ ) were fed standard chow without any surgery. Model I: rats ( $n=5$ ) were kept on a high-fat diet (40-45% kcal from fat) without any surgery also. Model II: rats ( $n=5$ ) underwent a paraspinal muscles compression. The paraspinal muscles were tied from L2 to S1 with Nurolon 3 until the tied muscle became pale at each vertebral level to induce muscle ischemia. The experiment lasted for 90 days, after those fragments of the lumbar m. multifidus and m. psoas removed and histomorphometry analysis performed. The percentage of fat for Model I and fibrous tissue for Model II relative to the total area of said muscles was calculated.

**Results:** In the control group, m. multifidus and m. psoas maintained normal structure. It was determined that the fat area in the m. multifidus was 4.1 times larger than the fat area in the m. psoas ( $p<0.001$ ). 12 weeks from the beginning of the experiment, the high-fat diet rats (model I) weighed, on average, 22% ( $p=0.001$ ) more than the control group rats. Similar degenerative changes such as uneven muscle fibre width and sarcoplasm colouring, 'wavy' and swollen fibres, loss of striation, karyopyknosis were

observed in the lumbar paraspinal muscles in both models. The structural changes found in model I are classified as fat dystrophy. As opposed to the control group and the model I, in the perimysium and endomysium of rats from the model II, large areas of fibrous tissues with high fibroblast density were discovered. The fat area in the m. psoas was greater in model I than in the control by 2.2 times ( $p<0.001$ ), but 3.3 times less than in the m. multifidus of the same animals ( $p<0.001$ ). In model I the fat area in the m. multifidus was 1.8 times larger ( $p<0.001$ ) and in the m. psoas was greater by 2.2 times ( $p<0.001$ ) than in the control. Fibrous tissue replaced muscle fibres in m. multifidus in model II and was 12.66%.

**Conclusion:** The relevance of the models is proven: after 3 months, it is possible to obtain degenerative changes in the muscle tissue that are extremely similar to those observed in the muscles of patients with degenerative spine diseases.

## P632

### PHASE I/III STUDY TO CONFIRM BIOEQUIVALENCE AND SAFETY OF PROPOSED BIOSIMILAR (MB09) EU-DENOSUMAB IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS

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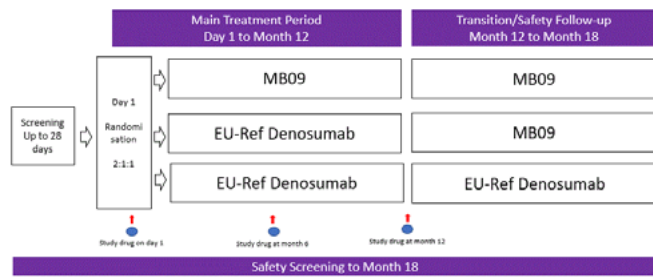
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**Objective:** To conduct a phase I/III study to compare the efficacy, pharmacokinetics, pharmacodynamics, safety and immunogenicity of MB09 (proposed Denosumab biosimilar, BsD) vs. European Union-Reference Denosumab (EU-RD) in postmenopausal women with osteoporosis (PMO).

**Methods:** PMO was chosen as a sensitive indication to confirm bioequivalence of BsD with its reference. SIMBA Study is a multicentre, multinational global comparative efficacy study (MB09-C-01-19), randomised, double-blind, parallel 3 arm study. 528 eligible PMO patients 55-80 y of age with an absolute lumbar spine BMD (LS-BMD) T-score between  $\leq -2.5$  and  $\geq -4$  during screening period will be randomised in a 2:1:1 ratio to receive BsD - BsD (Arm 1), EU-RD - BsD (Arm 2), or EU-RD - EU-RD (Arm 3). In main treatment period, patients will receive BsD or EU-RD (60 mg subcutaneous at day 1 and month 6). In transition/safety Follow-up period (month 12 to month 18), patients receive third dose at month 12. The women in arm 2 receiving EU-RD, will be switched to the biosimilar (MB09). All other patients continue their treatment up to month 12. (Figure)



## Study Design



Primary objective to demonstrate equivalent efficacy as aligned with regulatory authorities are percentage change from baseline (%CfB) in terms of lumbar spine BMD at month 12. Secondary objectives to assess the efficacy in terms of lumbar spine BMD at Month 6, and hip and femur neck BMD at Month 6 and Month 12; to assess the PD profile in terms of the area under the effect vs. time curve of bone resorption marker (sCTX), and standard pharmacokinetic parameters. The safety profile and the development of antibodies will be monitored throughout the study.

Study has started in 2022.

**Conclusion:** SIMBA study design allows the comparison of proposed biosimilar denosumab MB09 with its reference EU-RD in terms of efficacy, pharmacodynamics, pharmacokinetics, safety, and immunogenicity. The safety of a single switch will be investigated too.

## P633

### TERIPARATIDE AS FIRST OPTION OF ANTI-OSTEOPOROTIC THERAPY FOLLOWED BY 3 YEARS OF ANTIRESORPTIVE MEDICATION

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**Objective:** Teriparatide (TPT) increases bone mass, it improves bone microarchitecture, decreases the risk of vertebral fractures, and can be considered as the first option of antiosteoporotic therapy in patients with severe osteoporosis, depending on country protocol. (1-5) We aim to introduce a female patient who received teriparatide as the first option of anti-osteoporotic therapy.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 77-year female patient who is admitted for osteoporosis evaluation. The patient's medical history includes multiple vertebral fractures within last decade, toxic nodular goiter for which she received treatment with antithyroid drugs a few years prior, chronic bronchitis, ischemic heart disease, chron-

ic atrial fibrillation, and chronic rhinitis. Due to multiple gastric intolerances, TPT was started (DXA lumbar T-score of -2.7SD). After 1 y of TPT, thyroid function was normal, bone turnover markers (BTM) were within normal limits: osteocalcin=26 ng/mL (N:15-46), CrossLaps=0.4 ng/mL (N: 0.33-0.782), P1NP=49 ng/mL (N: 20.25-76.31) as well as PTH=49 pg/mL (N: 15-65) and 25OHD=51 ng/mL (N:30-100) under daily 1000 UI cholecalciferol. DXA showed increased of lumbar BMD: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.863, T-score(SD)=-2.6, Z-score(SD)=-0.8, T-score (SD)=-2.3, Z-score (SD)=-0.4; femoral neck BMD(g/cm<sup>2</sup>)=0.716, T-score (SD)=-2.3, Z-score (SD)=-0.4. By the end of the 2-y protocol of TPT, no incidental fracture was detected; we did not assess BTM during the anabolic window, apparently they remained within normal limits, except for P1NP: osteocalcin=27 ng/mL (N:15-46), CrossLaps=0.4 ng/mL (N: 0.33-0.782), P1NP=120 ng/mL (N: 20.25-76.31) with normal PTH=53 pg/mL (N: 15-65) and 25OHD=51ng/mL Lumbar DXA-BMD increased consistent with a T-score for osteopenia range: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.915, T-score(SD)=-2.2, Z-score(SD)=-0.3; femoral neck BMD(g/cm<sup>2</sup>)=0.722, T-score (SD)=-2.3, Z-score (SD)=-0.3; total hip BMD (g/cm<sup>2</sup>)=0.754, T-score (SD)=-2, Z-score (SD)=-0.2. She continued with a single injection of zoledronate 5 mg/y and after that she did not come to another evaluation for 2 y due to COVID-19 pandemic. By the end of the third year post-TPT protocol, BTM were normal: osteocalcin=22.71 ng/mL (N:15-46), CrossLaps=0.66 ng/mL (N: 0.33-0.782), P1NP=36.82 ng/mL (N: 20.25-76.31), and DXA showed a decreased BMD (more severe than pre-TPT): lumbar L2-4 BMD(g/cm<sup>2</sup>)=0.773, T-score(SD)=-3.4, Z-score(SD)=-1; femoral neck T-score (SD)=-2.6, Z-score (SD)=-0.2; total hip BMD (g/cm<sup>2</sup>)=0.766, T-score (SD)=-1.9, Z-score (SD)=0.4. She continued with zoledronate 5 mg/y.

**Conclusion:** This case highlights the importance of re-setting lumbar BMD with an osteoanabolic option and then strictly we need to follow antiresorptive medication response and adherence. COVID-19 pandemic impaired the hospitalizations of chronic patients like those with osteoporosis which limited the access to intravenous medication.

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**INFLUENCE OF OBESITY IN BONE DENSITY, MICROSTRUCTURE AND SEVERITY OF LOW-TRAUMA FRACTURES**

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**Objective:** Obesity influences skeletal health. The high prevalence of type 2 diabetes and vitamin D deficiency seem deleterious to bone strength, irrespective of BMD. The aim of this study is to evaluate bone density and microstructure using DXA and HR-pQCT and the severity of prevalent fractures in non-diabetic women with 25(OH)D levels  $\geq 20$  ng/mL.

**Methods:** Only women 60 y and older, considered osteoporotic due to prevalent low-trauma fractures (at least a mild vertebral fracture on X-ray evaluation) were included. Excluding criteria were GFR  $< 35$  mL/min/1.73m<sup>2</sup>, secondary causes of osteoporosis and use of any antiosteoporosis drug in the preceding year.

**Results:** 48 obese (OB: BMI  $> 30$  kg/m<sup>2</sup>) and 103 age-matched nonobese (nonOB: BMI 18-30 kg/m<sup>2</sup>) were compared. Serum calcium and 25(OH)D were similar, but OB had lower GFR and higher PTH. Areal BMD (spine, femoral neck and total hip) and the lowest T-score ( $-1.72 \pm 1.11$  vs.  $-2.45 \pm 1.11$  SD) were higher in OB women ( $p < 0.001$  all DXA data). Thus only 19.5% OB would be classified as osteoporosis by DXA, while the proportion of this diagnosis among nonOB was 45.2%. At HR-pQCT evaluation of distal radius OB had higher vBMD at total bone and trabecular compartment, higher trabecular bone fraction and number, lower Tb separation, and thicker cortical bone as well ( $p < 0.03$  for all HR-pQCT parameters). The total number of fractures (corrected for 100 individuals) was similar: 104 (217corr) in OB and 225 (218corr) in nonOB. However, hip fractures were only reported in nonOB ( $n=8$ corr),  $p=0.005$ , and the frequency of moderate to severe vertebral fractures and/or non-vertebral fractures was lower in OB: 34 (71corr) vs. 120 (116corr),  $p=0.001$ .

**Conclusion:** The higher PTH in OB may be associated with lower GFR and eventual differences in calcium intake, not evaluated. The positive influence of obesity on bone density and microstructure seems associated to less severe fractures, although the cushioning effect of adiposity may also contribute to the absence of hip fractures.

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**ELDERLY MEN HAVE BETTER VOLUMETRIC BONE DENSITY AND MICROSTRUCTURE AND LESS SEVERE FRAGILITY FRACTURES AS COMPARED TO WOMEN WITH SAME AREAL BONE DENSITY**

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**Objective:** To evaluate elderly men and women with similar areal BMD (DXA) for bone microstructure and severity of prevalent fractures.

**Methods:** Cross-sectional study of 28 men and 119 women 60 y and older classified as osteoporotic due to prevalent fragility fractures. All participants performed biochemistry evaluation, X-rays of the spine to identify and classify vertebral fractures (VFX) according to Genant's scale as mild (grade 1), moderate (grade 2) or severe (grade 3), DXA of the lumbar spine, femoral neck and total hip (T-scores calculated using NHANES female database for both genders), and HR-pQCT to evaluate volumetric BMD and microstructure at distal radius and tibia.

**Results:** No significant differences were seen between genders for age, BMI, proportion of patients with type 2 diabetes, serum 25(OH)D, PTH, CTX, areal BMD or T-scores at all sites evaluated. The lowest BMD T-score was  $-1.79 \pm 1.34$  SD in men and  $-1.95 \pm 1.08$  SD in women,  $p=0.78$ . The proportion of patients identified as osteoporosis based on the lowest T-score at or below  $-2.5$  SD was 32.1% (men) and 35.3% (women). However, significant differences were found at HR-pQCT of distal radius: men showed higher cortical and trabecular area, cortical perimeter, trabecular bone fraction (BV/TV), trabecular number and density, and lower trabecular separation,  $p < 0.03$  all comparisons. The absolute number of fractures and values corrected for 100 participants ( $n$  corr) were compared between genders. Non-vertebral fractures (hip, pelvis, wrist, shoulder, ribs) were less frequent in men: 9 (32corr) vs. 78 (65corr),  $p=0.001$ . Same was true for moderate and severe VFX and/or nonVFX considered together: 21 (75corr) in men vs. 168 (141corr) in women,  $p < 0.001$ , and also for the total number of fractures: 55 (196corr) in men vs. 292 (245corr) in women,  $p=0.020$ .

**Conclusion:** Elderly men have better bone volumetric density and microstructure and less severe fractures than age-matched women with same areal BMD and BMD T-scores.

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### CORRELATIONS BETWEEN CUMULATIVE CRITERIA OF METABOLIC SYNDROME, BONE MINERAL DENSITY AND MARKERS IN PRIMARY OSTEOPOROSIS PATIENTS FROM ROMANIA

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Primary osteoporosis (OP) and Metabolic syndrome (MetS) are complex conditions with strong genetic background and severe impact on Public Health. Their interplay remains poorly understood, particularly regarding insulin resistance (INSR). Indeed, bioinformatic analysis revealed only few genes in common (e.g., *FTO*, *IRS1* and *Wnt* genes). To help better characterize patients with OP we investigated the relationship between OP and MetS by stratification of population as function of cumulative criteria for MetS. Women (n=157) aged 66.2±8.2 years (mean±SD) underwent DXA for BMD, muscle strength and physical performance tests, assessment for metabolic parameters of MetS (ATP III criteria), including HOMA<sub>IR</sub> for INSR, and bone markers: osteocalcin (OC), P1NP and CrossLaps (Ctx). A proportion of 37.2% of women with OP and 29.4% of women with severe OP (fragility fractures) displayed MetS; of the remaining subjects (n=38) with osteopenia or normal BMD, 9.8% and 25.5% had MetS respectively. OP patients with MetS had higher BMI compared to the rest of the population (30.4±0.9 vs. 25.2±0.49 kg/m<sup>2</sup>; mean±SEM, P<0.0001). In ANOVA, cumulative criteria (1, 2, 3, 4 or more) were well correlated with HOMA<sub>IR</sub> (p<0.0001) indicating progressive increase of INSR. Lumbar spine, femoral neck and hip BMD were positively correlated with cumulative MetS criteria (best values for hip BMD or T-score, P<0.0025). HOMA<sub>IR</sub> and hip BMD were positively correlated (P<0.004, Spearman), feature also recognized by logistic regression (P<0.009). Although BMI and waist circumference were clearly confounding factors, in severe OP BMD was correlated with cumulative criteria even after BMI adjustment (P<0.0017, OR 0.47, 95%CI [0.2-0.71]). No correlations were found with muscle strength or physical performance tests. While some parameters tend to increase with cumulative criteria (e.g., C-reactive protein), OC decreased (24.2±2.5 to 16.0±0.9 ng/ml, P<0.0014) as well as Ctx (0.45±0.076 to 0.28±0.61 ng/ml, P<0.06) and P1NP (52.2±5.7 to 40.38±5.7, P<0.014), indicating low bone turnover. We concluded that stratification by cumulative criteria for MetS is a valuable analysis for further genetic studies and may give new insight on the role of INSR.

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### THE RELATIONSHIP BETWEEN DEPRESSIVE SYMPTOMS AND LOWER EXTREMITY FUNCTION IN THE ELDERLY WOMEN

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**Objective:** Elderly women are at a greater risk of a decrease in emotional health, which results in the occurrence of depressive symptoms. Increasing depressive symptoms and age-related physical function deterioration determine the significance to evaluate relationship between depressive symptoms and physical function. Scientific data about depressive symptoms associations with physical function, including muscle strength in elderly women, are scarce. The aim of this study was to investigate the relationship of depressive symptoms with lower extremity function in community dwelling elderly women.

**Methods:** This cross-sectional study was conducted on community dwelling women aged ≥60 y with normal cognition and mild cognitive impairment. Exclusion criteria were acute musculoskeletal injuries. Depressive symptoms were assessed by the Geriatric Depression Scale short form (GDS-short form). The lower extremity function was evaluated by Short Physical Performance Battery (SPPB) tool and Manual Muscle Tester - Lafayette Hand-Held Dynamometer. The isometric muscle strength was measured for eight different muscle groups: hip flexors, extensors, abductors and adductors, knee flexors and extensors, ankle flexors and extensors. The relationship between variables was calculated using Spearman correlation coefficients with statistical significance p<0.05. Data was analyzed using IBM SPSS Statistics 28.0 version.

**Results:** A total of 50 women with average age 72.38±5.43 y were involved in this study. Depressive symptoms were present in 48 of 50 patients, 28% of individuals scored mild to severe depression. The average score of SPPB was 9.7±2.04. The mean muscle strength were: hip flexors/extensors - 10.81±3.37/9.67±2.79 kg, hip abductors/adductors - 9.81±2.53/8.02±2.76 kg, knee flexors/extensors - 10.56±3.03/16.38±3.81 kg, ankle flexors/extensors - 11.83±3.01/10.16±2.47 kg. The analysis revealed a statistically significant moderate negative correlation between GDS and SPPB scores (r=-0.448, p=0.001). There was found a statistically significant negative correlation between GDS and muscle strength: hip abductors (r=-0.301, p=0.033) and ankle extensors (r=-0.313, p=0.027).

**Conclusion:** Results of our study showed that depressive symptoms were related to reduced lower extremity function among community dwelling elderly women.

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### TREATMENT GUIDELINES VS. TREATMENT REALITY: CURRENT MANAGEMENT OF OSTEOPOROSIS PATIENTS AT VERY HIGH RISK FOR FRACTURE

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**Objective:** To evaluate the gap between treatment guidelines and real-world practice for patients at very high risk for fracture according to the AACE/ACE 2020 clinical guidelines for postmenopausal osteoporosis.

**Methods:** A retrospective cohort study was conducted using claims data from Symphony Health PatientSource™. Index was defined as the date the patients became eligible during the identification period (Jan. 1, 2018-Dec. 31, 2018). Eligible patients met ≥1 of the very high risk criteria including: fractures during osteoporosis therapy, multiple fractures, fractures in the last 12 months, fractures while on drugs causing skeletal harm, high risk for falls, or history of injurious falls. Patients with conditions contraindicated or associated with warnings and/or precaution in prescribing labels and those <50 y of age were excluded. Treatment patterns were evaluated through Aug. 31, 2020.

**Results:** Of the 10,739,286 patients with osteoporosis, 47.3% (5,078,111) were identified as very high risk. Mean age (SD) was 72.7 (7.1), 84.2% were ≥65 y, and 87.0% were female. 1,667,794 (32.8%) were eligible for therapy per guidelines. Only 16.8% of eligible patients received any treatment including those with multiple fractures (20.3%): females (18.2%); males (9.5%). 63.6% of treated patients received alendronate (a second-line agent per guidelines) and 21.2% received guideline-recommended first-line agents: abaloparatide, denosumab, romosozumab, teriparatide, or zoledronate. A separate analysis found that most very high-risk patients with GI disorders were eligible for therapy (59.9%). The treatment rate was similarly low (16.9%) including that for patients with multiple fractures (20.1%). Alendronate (61.5%) remained the most utilized agent with fewer than a quarter of patients (23.4%) on first-line recommended agents.

**Conclusion:** This US claims data analysis found that most patients with osteoporosis at very high risk for fracture were not treated, men had a higher rate of undertreatment than women, and the majority treated did not receive recommended first-line agents.

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### PERIOPERATIVE MANAGEMENT OF PATIENTS UNDERGOING FRACTURED NECK OF FEMUR SURGERY AT PRINCESS ALEXANDRA HOSPITAL, BRISBANE

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**Objective:** Patients undergoing surgical management of neck of femur fractures are often frail, putting them at risk of poor perioperative outcomes. This audit aims to assess the achievement of evidence-based targets in the management of patients undergoing fractured neck of femur surgery at the Princess Alexandra Hospital.

**Methods:** A retrospective chart review was performed for all patients aged >60 y undergoing surgery for fractured neck of femur at the Princess Alexandra Hospital from July to December 2020. Patients were identified through searching hospital coding data. Outcomes to be assessed were developed from the RCoA quality improvement compendium. [1]

**Results:** 71 cases were identified, with a mean age of 81.5 y. 34 (47%) of cases arrived in theatre within 36 h of presentation. 15 (21%) of cases had delays, of which 4 were due to medical/organisational reasons. 47 (66%) cases received nerve block, of which 42 were ultrasound guided. 47 (66%) had consultant anaesthetist presence in theatre. 4 (6%) received combined spinal and general anaesthetic. 23 (32%) had intraoperative hypotension for >10 min. 47 (66%) cases were reviewed by the acute pain team post-operatively and pain score were documented for 33 (32%) cases. 66 (93%) were mobilised day 1 postoperatively. 63 (89%) received delirium screening, identifying 22 (31%) cases of delirium, and 16 (72%) received medical review. 26 (37%) were discharged to rehabilitation and 3 (4%) newly admitted to an aged care facility.

**Conclusion:** 80% attainment was achieved in 4/12 outcomes: avoidance of combined general/spinal anaesthetic, use of ultrasound for nerve blocks, mobilisation day 1 post-op and screening for delirium. Due to the complexity of coordinating multidisciplinary care for these patients, many hospitals have instigated care pathways to assist in attaining key outcomes, although these require buy in from all stakeholder teams to be effective.

**Reference:** 1. Royal College of Anaesthetists. Raising the Standards: RCoA quality improvement compendium, 4<sup>th</sup> London. 2020. p. 166-7.



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### SOCIOECONOMIC COST OF CHRONIC LOW BACK PAIN MANAGEMENT IN PATIENTS FOLLOWED IN A RHEUMATOLOGY CLINIC IN DOUALA, CAMEROUN

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**Objective:** The increasing incidence of chronic low back pain (CLBP) in both developed and developing countries is causing physical, but more importantly, economic and social problems. This study will provide data that will help economic policymakers to develop more cost-effective strategies for the management of these patients, in a country without universal social security. This study aimed to determine the social and economic costs of CLBP management.

**Methods:** We conducted an analytic cross-sectional study over a period of 3 months with retrospective data collection. We included in our study, outpatients above 18 years old with nonspecific CLBP followed at the Rheumatology Unit, Dept. of Internal Medicine of Douala General Hospital (Douala, Cameroon) for at least 1 y. All the economic costs were evaluated from the societal perspective and using a bottom-up approach. Respondents' functional disability level was assessed using The Oswestry Low Back Pain Questionnaire. Data were analysed with Epi info<sup>®</sup> version 7.2.3.1. The Person/Spearman correlation tests were used to access the correlation between independent variables and the overall economic cost with p-value < 5% considered as statistically significant.

**Results:** A total of 196 patients (130 women) with CLBP were included (mean age, 50.86±16.29 y). The median monthly income was 44.28 €. The mean annual number of consultations per participant was 8.44±4.72. The mean annual global cost of CLBP management per patient was 4732.15 €, with the mean annual direct cost representing 57.84% (2737.33 €) of this amount while the mean annual indirect cost was 42.15% (1994.82 €). The majority of patients had a moderate disability (n=84; 42.8%). There was a weak negative correlation between the amount of monthly income and the level of disability (r=-0.008; p=0.04). There was also a strong positive correlation between the cost of CLBP management and the functional disability score among respondents (r=0.6; p=0.006).

**Conclusion:** Subject to the monocentric and hospital-based study design, the cost of care of patients with CLBP is high, compared to the annual guaranteed inter-professional minimum wage in Cameroon (55.73 €). The management of CLBP constitutes a substantial burden that is largely attributed to direct costs in a Sub-Saharan Africa setting.

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### ATYPICAL FEMORAL FRACTURES IN PATIENTS WITH OSTEOPOROSIS TREATED WITH DENOSUMAB OR BISPHOSPHONATES

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**Objective:** To identify the risk of atypical femoral fractures (AFF) in a real-world population of patients with osteoporosis receiving different antiosteoporotic therapies.

**Methods:** This cohort study analysed the incidence and risk of AFF in patients with suspected or confirmed osteoporosis who were included in the osteoporosis register of the Swiss Society of Rheumatology between January 2015 and September 2019. Statistical analyses included incidence rates, rate ratios and hazard ratios for AFF, and considered sequential therapies and drug holidays as time-dependent covariates.

**Results:** Among the 9956 subjects, 53 had subtrochanteric or femoral shaft fractures (n=21 with high-energy trauma). Ten fractures occurred under bisphosphonate (BP) or denosumab and two under teriparatide therapy. Five subtrochanteric or femoral shaft fractures were classified as AFF based on the revised American Society of Bone and Mineral Research case definition of AFF from 2014. Three AFF occurred in women being treated with denosumab at the time of diagnosis with AFF, and one developed in a woman receiving ibandronate. One woman with AFF received glucocorticoids rather than antiresorptive therapy. The incidence of AFF per 10,000 observed patient-years was 7.1 in patients receiving denosumab and 0.9 in patients with BP-associated AFF, yielding a rate ratio of 7.9 (95%CI: 0.63 to 413), p=0.073. Two of the three women who developed AFF during denosumab treatment had been pretreated with BP (7 y and 1 y, respectively). The risk of AFF was not significantly higher in patients receiving denosumab therapy compared to BP therapy (hazard ratio 7.07, 95%CI: 0.74 to 68.01, p=0.090).

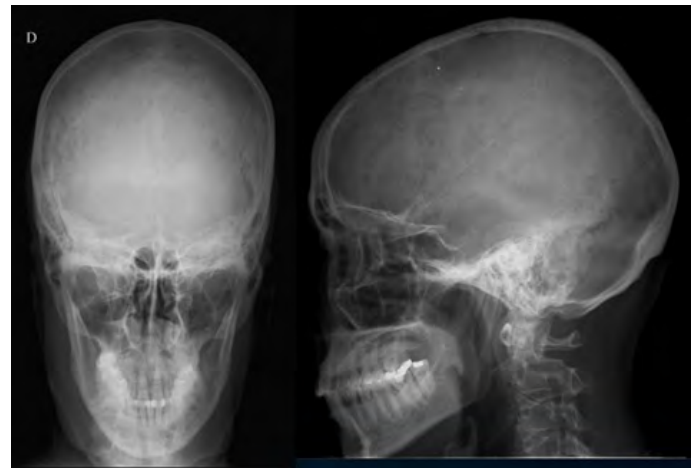
**Conclusion:** The risk of AFF was low in patients receiving BP therapy, denosumab, or both sequentially.

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same area of the skull. Years later, the patient's sister was referred to the consultation for the same incidental finding and she too had been exposed to the same treatment.

**Conclusion:** Radiation therapy was a treatment used up to 1960s for *Tinea capitis* that has been linked to the later development of cancer in the exposed areas. To our knowledge, this is the first report to suggest an association between this ancient therapy and benign lytic skull lesions, mimicking other clinical situations.



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### LYTIC SKULL LESIONS: FINDING THE CAUSE

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**Objective:** Lytic skull lesions can be attributable to a wide range of diagnoses, like bone metastases, multiple myeloma, or metabolic bone disease. This case report describes an atypical cause for these lesions.

**Methods:** Description of a case report.

**Results:** 67-year-old woman referred to the Rheumatology consultation for an incidental finding of lytic lesions in the skull on a cranial CT scan during a recent-onset headache study. She had a history of arterial hypertension, dyslipidaemia, chronic gastritis, depression and osteoporosis with previous fragility fracture. She was chronically medicated with lansoprazole 30 mg, bisoprolol 1.25 mg, losartan-hydrochlorothiazide 50/12.5 mg, atorvastatin 20 mg, annual zoledronate 5 mg, cholecalciferol 600 UI and sertraline 50 mg. She was initially observed on the Haemato-Oncology consultation to exclude multiple myeloma. She only had asthenia and the physical examination was unremarkable. The blood tests showed normal blood count, protein electrophoresis, immunofixation, immunoglobulin assay,  $\beta$ -2-microglobulin and light chain ratio as well as proteinuria, light chains, immunofixation and immunoglobulin on 24-h urine. Vitamin D and serum and urinary calcium and phosphorus were normal. PTH was slightly elevated (76.3 pg/mL) but primary hyperparathyroidism was excluded. Radiographs of the skeleton were performed showing no other lytic lesions (figure). FDG-PET scan excluded foci of hypermetabolism suggestive of plasmacytoma. The bone marrow biopsy ruled out non-secretory multiple myeloma. The paraneoplastic study was also negative. The patient's clinical history was reviewed, and it came to our attention that she was exposed to irradiation therapy for the treatment of *Tinea capitis* in childhood, exactly in the

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### COMPARATIVE ASSESSMENT OF THE CLINICAL AND COST-EFFECTIVENESS OF TWO APPROACHES TO IDENTIFY PATIENTS AT HIGH RISK OF FRACTURES

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We conducted a multicenter, cross-sectional study of postmenopausal women who did not receive anti-osteoporosis therapy. The sample included 4042 postmenopausal women aged 40 years and older, residents of 6 cities of the Russian Federation. Two approaches to identifying patients at high risk of fractures were analyzed: referral of patients to densitometry based on the 2019 ISCD recommendations, and identification of patients at high risk of fractures based on the calculation of the 10-y risk of fractures using the FRAX algorithm. Indicators of diagnostic value of the methods were evaluated: sensitivity, specificity and accuracy of the test, and the cost of diagnosing one case of high risk of fractures.

The analysis showed that the use of a strategy based on the recommendations of the ISCD leads to an unreasonably high number of densitometric studies and an increase in the cost of diagnosing high risk fractures. The use of the FRAX algorithm made it possible to identify a larger number of patients with optimal use of the DXA resource. The proportion of individuals who needed densitometry was 71.4 and 54.0% for ISCD and FRAX, respectively ( $p=0.0001$ ). The sensitivity index of the method using the FRAX score was 86.3% and did not differ from that (85.1%) when detecting osteoporosis based on the ISCD recommendations ( $p=0.07$ ). The FRAX method demonstrated higher specificity when

compared with the ISCD recommendations approach (43.4% and 31.9%, respectively;  $p=0.002$ ) and accuracy (55.4% for FRAX and 42.2% for ISCD recommendations;  $p=0.001$ ). The use of FRAX reduced the cost of diagnosing 1 case of high-risk fractures by 1.9 times compared to the use of the ISCD recommendations.

So, with sensitivity indicators comparable to the ISCD recommendations, FRAX is characterized by higher specificity and accuracy, which minimizes the cost of diagnosing a high risk of fractures.

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### MORPHOLOGICAL AND MORPHOMETRIC CHARACTERISTICS OF THE FEMORAL HEAD IN AVASCULAR NECROSIS

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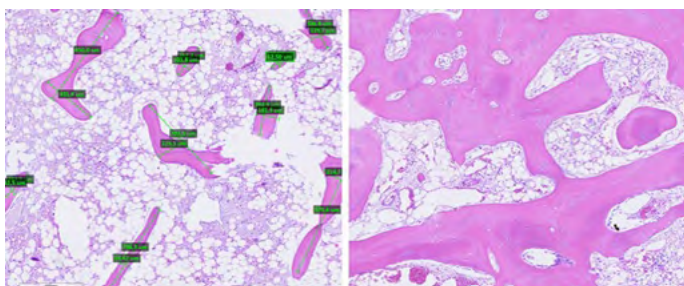
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**Objective:** To describe and compare the features of the adjacent viable tissue in the upper and lower parts of the femoral head (FH) and to observe the reaction of morphological components to the osteonectin and CD-34 antibodies in patients with avascular necrosis of the femoral head (ANFH).

**Methods:** For the morphological study, we used sections of the FH and neck obtained from 20 patients with ANFH (13 with ARCO 3 stage and 7 with ARCO 4 stage) during total hip arthroplasty. The histological samples were stained using hematoxylin and eosin. For the immunohistochemical study, the samples were stained with antibodies to osteonectin and CD-34. The image processing was performed with Aperio Image Scope. The statistical data was managed with Microsoft Excel and Statistica 10.0.

**Results:** The morphometric study showed an increased intertrabecular space, which was noted predominantly in the upper part of the FH. Morphometric study showed that the rate of the osteoporotic area (Fig. 1) was significantly higher in the upper part of the FH, than in the lower part (75.29 (68.27-80.55)% vs. 46.73 (38.52-53.58) %,  $p<0.05$ ). The rate of the osteosclerotic area (Fig.2) was significantly lower in the upper part of the FH (16.79 (11.83-23.36)% vs. 29.60 (23.59-39.78) %,  $p<0.05$ ). An immunohistochemical study showed the pronounced expression of osteonectin in the paranecrotic area, as well as the decreased number of mature osteocytes. In the distant areas of the bone tissue, the number of osteoblasts was significantly less. Immunohistochemical study of CD-34 positive cells showed a reactive zone in the paranecrotic area with multiple small newly formed vessels.





**Conclusion:** The difference in morphological pattern in the upper and lower parts of the FH is due to the adaptive reaction of the bone tissue to the injury and due to the mechanical overload of the FH. These structural differences may be an additional risk factor for the progression of the disease, as the biomechanics in ANFH is impaired, which has been demonstrated in studies. The pattern of osteonectin and CD-34 expression indicated a pronounced osteogenic process in the paranecrotic area.

### P645

#### FRAX PERFORMANCE CHARACTERISTICS IN IDENTIFYING PATIENTS AT HIGH FRACTURE RISK FOR INITIATING OSTEOPOROSIS TREATMENT VS. SPECIALIST CLINICAL DECISION

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For the selection of patients in the study, the register of the osteoporosis center for 2018-2021 was used. A sample of 362 patients with newly diagnosed osteoporosis was obtained, which included 311 patients who were recommended to start osteoporosis treatment, and 51 people who were not recommended treatment. In the resulting sample, the existing FRAX value was assessed on the therapeutic intervention threshold graph, primary medical documentation was analyzed in all of them. The study included 362 patients - 11 men (3.0%) and 351 women (97.0%) aged 40 to 94 years. As a result of the consultation 311 people received a recommendation to start treatment of osteoporosis (Group 1), 51 patients were not recommended treatment (Group 2). In the Group 1, the doctor's decision to prescribe therapy and the risk value above the threshold for therapeutic intervention coincided in 121 patients (38.9%). An analysis of outpatient records showed that in the remaining 190 patients, the decision to start anti-osteoporosis therapy was based on other factors: previous low-energy fractures or low BMD. In the second group (without treatment), the proportion of individuals with a FRAX value below the threshold for therapeutic intervention was 90.2%. The positive predictive value of the FRAX calculation (10-year probability figures for major osteoporotic fractures above the threshold of therapeutic intervention) was 100%, the predictive value of the negative re-

sult (10-year probability figures for major osteoporotic fractures below the threshold of therapeutic intervention) was 19.5%. Thus, when assessing a high risk of fractures and selecting candidates for osteoporosis treatment, it is necessary to supplement the results of calculating the 10-year probability of fractures according to FRAX with anamnestic data on typical osteoporotic fractures suffered by patients, and to interpret low BMD through the calculation of FRAX. Proper use of FRAX adds value to this technology.

### P646

#### INVESTIGATION OF MUSCLE MASS IN YOUNG ADULTS WITH JUVENILE IDIOPATHIC ARTHRITIS

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**Objective:** Low muscle mass play a major role in the progression of sarcopenia. In this reason the investigation of low muscle mass in context of sarcopenia in young adults with juvenile idiopathic arthritis (JIA) might be very perspective. The aim of this study is to identify the low muscle mass in young adults with JIA.

**Methods:** Inclusion criteria: young adults with JIA, disease duration  $\geq 3$  y. Exclusion criteria: pregnancy, severe comorbidities (severe diabetes mellitus, heart failure, chronic kidney disease with a decrease in GFR  $\leq 30$  ml/min by CKD/EPI, neuropathy, obesity). The investigation of muscle mass was determined using DXA. Patients were divided into two groups based on reduced skeletal mass index (SMI) (the cutoff points - SMI  $< 7$  kg/m<sup>2</sup> for male,  $< 5.67$  kg/m<sup>2</sup> for female).

**Results:** The study involved 40 adult patients with JIA, including 17 male and 23 female patients. The mean age of the patients was  $24.4 \pm 5.1$  y. The first group (1 group) included 25 patients with reduced muscle mass (SMI -  $5.18 \pm 0.76$  kg/m<sup>2</sup>). These patients were considered as sarcopenic. The second group (2 group) included 15 patients without reduced muscle mass (SMI -  $7.74 \pm 1.01$  kg/m<sup>2</sup>). They were considered as non-sarcopenic. Sarcopenic adults with JIA have lower height and weight comparing with nonsarcopenic (height  $1.6 \pm 0.07$  vs.  $1.7 \pm 0.08$  m;  $p=0.01$ ; weight  $56.1 \pm 9.2$  kg,  $71.6 \pm 12.7$  kg;  $p=0.001$ , respectively). The patients of 1-st group had statistically reduced arm lean mass  $3.432 \pm 0.95$  vs.  $6.273 \pm 1.77$  kg;  $p=0.0001$ ; arms total mass  $5.350 \pm 1.51$  vs.  $8.265 \pm 1.39$  kg;  $p=0.001$ ; leg lean mass  $10.962 \pm 2.32$  vs.  $17.585 \pm 2.73$  kg;  $p=0.0001$ ; legs total mass  $19.430 \pm 7.53$  vs.  $24.253 \pm 4.77$  kg;  $p=0.03$ ; trunk lean mass  $17.442 \pm 2.66$  vs.  $23.836 \pm 3.62$  kg;  $p=0.0001$ ; total lean mass  $35.748 \pm 5.76$  vs.  $51.475 \pm 7.71$  kg;  $p=0.0001$ ; but higher percentage of fat: arms tissue (%fat)  $32.7 \pm 11.4$  vs.  $21.8 \pm 13.7$ %,  $p=0.01$ ; legs tissue (%fat)  $36.13 \pm 12.3$  vs.  $24.5 \pm 11.8$ %,  $p=0.007$ ; total tissue (%fat)  $32.0 \pm 10.6$  vs.  $23.3 \pm 11.2$ %,  $p=0.02$ .



**Conclusion:** This study shows that JIA in young adults can be accompanied by low muscle mass. Therefore, further research is needed to study not only muscle mass, but also strength and performance, in order to elucidate and study sarcopenia in this category of young patients.

## P647

### IMPROVING TREATMENT OF OSTEOPOROSIS: RESULTS OF THE FIRST THREE YEARS SINCE THE IMPLEMENTATION OF A SHARED MODEL FOR INTEGRATED HOSPITAL-TERRITORY MANAGEMENT

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**Objective:** Osteoporosis (OP) and fragility fractures (FF) are a complex pathological continuum with inadequate prevention and treatment. In order to improve the management of patients with bone fragility, a multidisciplinary group within the territory of Pavia created a diagnostic therapeutic care pathway (PDTA) based on AIFA Note 79. According to the PDTA the most severe and complex patients are referred to the bone specialist in a third-level outpatient clinic. We aimed to evaluate the appropriateness of referral to our third-level outpatient clinic in the first three years from PDTA application (February 1, 2019 – January 31, 2022).

**Methods:** We retrospectively evaluated first referrals to our outpatient clinic and considered it appropriate, according to PDTA criteria, in the presence of: 1. Three or more FF, refractures under OP treatment, T-score  $\leq -4$ , chronic steroid therapy with one FF or hormone blockade for breast or prostate cancer; 2. Need of second-line therapy according to AIFA note 79; 3. Patients with HIV or undergoing solid organ transplantation.

**Results:** First referrals were 289, females 91%, mean age 65.2 y (SD 12.7). The appropriateness was 80%, and 36 patients (12%) fulfilled more than one criterion (Table).

II line drug were prescribed to 66% patients: 12% teriparatide, 38% denosumab, 16% zoledronic acid. The major referral specialists were oncologists (38%), followed by general practitioners (16%), rheumatologists and physiatrists (11% both).

**Table.** Characteristic of the cohort and its fulfillment of PDTA criteria.

	Mean (SD)	Total (%)
Days to first visit	50.3 (42.5)	
Age (y)	62.5 (12.7)	
Sex F		262 (91)
Appropriateness		231 (80)
≥ 3 fragility fractures		13 (5)
Refracture in Note 79		6 (2)
T-score $\leq -4$		10 (3)
Chronic steroid usage & FF		4 (1)
Hormone blocking therapy		131 (45)
I line treatment contraindications		15 (5)
HIV		0 (0)
Solid organ transplantation		16 (6)
≥2 criteria		36 (12)

**Conclusion:** During the first 3 y of PDTA application we observed, as expected, an 80% appropriateness of referral with 190 patients receiving II line treatments. The application of a shared PDTA can improve collaboration with both specialists and the territory resulting in a reduction of inappropriate access and optimization of resources and therapies.

## P648

### OSTEOPOROTIC RISK FRACTURE CATEGORIZATION IN ECUADORIAN POSTMENOPAUSAL WOMEN FRAX-BASED

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**Objective:** The refinement of risk fracture categorization into “high and very-high” with the application of FRAX-based intervention thresholds has not been explored in Latin America. We aimed to estimate the proportion of individuals categorized at risk fracture high and very-high in Ecuadorian postmenopausal women.

**Methods:** 2367 women aged 60-94 were selected from the SABE 2009 survey. We calculate the risk of major osteoporotic fractures with the FRAX model specific (without BMD) to the Ecuadorian population. We use an age-specific intervention threshold and a fixed threshold from age 75 onwards. High risk was defined as those individuals whose probability of fracture is equal to or above the age-specific intervention threshold. Very high risk is defined as a fracture probability that lies above the upper assessment threshold after a FRAX assessment, with or without the inclusion of BMD

**Results:** The proportion of women candidates for intervention tripled with the use of the hybrid threshold. The proportion of women categorized at high risk with the hybrid threshold increased 3.2-fold compared to the age-specific threshold. And those categorized as very-high risk increased 3.1-fold. The number and proportion of women assigned according to categorization is presented in Table 1.

Table 1. Fracture risk categorization in Ecuadorian postmenopausal women FRAX-based.

Risk categorization	Age-specific threshold n (%)	Hybrid threshold n (%)
Candidates to intervention	93 (3.93)	298 (12.59)
High risk	56 (2.37)	183 (7.73)
Very high risk	37 (1.56)	115 (4.86)
Low risk	2274 (96.07)	2069 (87.41)

**Conclusion:** The use of the hybrid threshold triples the proportion of women candidates for treatment and the assignment of women to the high and very high-risk category. Recategorization of risk fracture will allow us to refine patient selection to optimize treatment.

## P649

### ASSESSMENT OF BONE MINERAL DENSITY IN YOUNG WOMEN WITH ANOREXIA NERVOSA BY MEANS OF RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY (REMS) TECHNOLOGY

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**Objective:** Bone loss and increase risk of fragility fracture are common complication of anorexia nervosa (AN). BMD by DXA present several limits in subjects with AN. Recently, an innovative echographic approach for osteoporosis diagnosis, defined as REMS, has been introduced and clinically validated. This study aimed to evaluate the usefulness of the new REMS technique in the assessment of bone status in young women with AN.

**Methods:** In 50 subjects with restrictive AN and 30 healthy age-matched controls we measured BMD at the lumbar spine (LS-BMD), at femoral neck (FN-BMD) and total hip (TH-BMD) using a DXA device; In all women, an echographic scan of the same anatomical sites was performed with the REMS technique.

**Results:** BMD evaluated by DXA and REMS technique were all significantly ( $p < 0.01$ ) lower at all sites in subjects suffering from AN subjects than in controls. Good correlations were detected

between BMD by DXA and BMD by REMS measurements at LS ( $r = 0.64$ ,  $p < 0.01$ ) at FN ( $r = 0.86$ ,  $p < 0.01$ ) and at TH ( $r = 0.84$ ,  $p < 0.01$ ) in subjects suffering from AN. This good agreement between the two techniques were confirmed also by Bland-Altman analysis. Moreover, the subjects suffering from AN with previous vertebral fragility fractures presented lower values of both BMD-LS and BMD-TH by DXA and by REMS with respect to those without fractures; however, the difference was significant only for BMD-TH by REMS ( $p < 0.05$ ).

**Conclusion:** Our preliminary study suggest that REMS technique due to its characteristic of precision and reproducibility may represent an important tool for the evaluation of the BMD in AN young women, especially during the fertile age.

## P650

### EFFECT OF SWIMMING EXERCISE ON BONE METABOLISM AND TRABECULAR MICROARCHITECTURE: AN EIGHT-MONTH FOLLOW-UP STUDY

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**Objective:** Young swimmers can present lower bone mass values than sedentary individuals, but this pattern seems not to happen in experimental animals. We aim to investigate the effect of swimming throughout growth on bone metabolism and trabecular microarchitecture in animal models.

**Methods:** Male Wistar rats (3 months;  $320 \pm 14$  g) were randomized in two groups: i) physically active controls (PA;  $n = 10$ ), housed with running wheel and ii) physically active swimmers (ASW;  $n = 10$ ),

housed with running wheel and submitted to a swimming protocol (2 h/d; 5 d/week) for 8 months. Body weight (BW), pooled gastrocnemius and soleus muscles mass, food intake and running distance were recorded. Plasma osteocalcin and CTX concentration were measured before and at 4 and 8 months of the experiment. Proximal tibia trabecular microarchitecture was analysed through uCT. Between-group differences on trabecular bone were determined adjusting for tibia length, muscle mass, food intake and BW (ANCOVA). The effect of swimming on bone biomarkers was determined through linear mixed models, adjusting for food intake, running distance and BW.

**Results:** At sacrifice, no differences between PA and ASW were found in trabecular BV/TV ( $20.70 \pm 7.13$  vs.  $22.35 \pm 7.51$  %;  $p=0.70$ ), Tb.N ( $2.21 \pm 0.63$  vs.  $2.18 \pm 0.67$  mm<sup>-1</sup>;  $p=0.94$ ), Tb.Sp ( $0.11 \pm 0.01$  vs.  $0.11 \pm 0.01$  mm;  $p=0.72$ ) and Tb.Th ( $0.43 \pm 0.19$  vs.  $0.49 \pm 0.20$  mm;  $p=0.64$ ). There was a decrease on osteocalcin in both groups throughout the experiment ( $p<0.01$ ), but CTX concentration decreased only in swimmers between 4 and 8 months (ASW:  $27.9$  ng/mL, CI=[19.1; 36.8];  $17.9$  ng/mL, IC=[11.3; 24.5]). Nevertheless, biomarkers concentration did not differ between groups in any of the experimental moments ( $p>0.05$ ). BW and muscle mass at sacrifice were higher in PA than in ASW animals ( $533 \pm 48.2$  vs.  $462 \pm 28.4$  g;  $p=0.001$ ,  $d=1.81$ ;  $6.54 \pm 0.47$  vs.  $5.94 \pm 0.27$  g;  $p=0.003$ ,  $d=1.57$ , respectively), although there were no differences in food intake ( $666.13 \pm 73.73$  vs.  $678.34 \pm 31.53$  kcal/week;  $p=0.64$ ) and running distance between PA and ASW ( $9.09 \pm 9.36$  vs.  $3.86 \pm 3.25$  km/w;  $p=0.12$ ) groups.

**Conclusion:** Swimming exercise did not negatively affected bone metabolism and trabecular microarchitecture throughout growth.

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## P651

### BONE MINERAL DENSITY IN PATIENTS WITH VARIOUS CAUSES OF CHRONIC KIDNEY DISEASE STAGE 5

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**Objective:** BMD is an indicator of risk of fractures and cardiovascular mortality in patients with chronic kidney disease (CKD) [1, 2]. The aim of the study was to assess the impact of the underlying renal disease on BMD in patients with CKD stage 5.

**Methods:** The study included 343 patients (men 174, women 169) before the start of hemodialysis. BMD was assessed by DXA. Z-score was used to compare BMD in different groups.

**Results:** All patients were divided into 8 subgroups: 1. glomerulonephritis - patients with primary and secondary glomerulonephritis; 2. hypertension with kidney damage; 3. congenital anomalies of the upper urinary tract and kidney; 4. type 2 diabetes mellitus; 5. type 1 diabetes mellitus; 6. polycystic; 7. chronic tubulointerstitial nephritis, not associated with proven congenital kidney pathology and urolithiasis; 8. urolithiasis, including hydronephrosis and chronic tubulointerstitial nephritis caused by urolithiasis. The performed analysis showed that the lowest BMD was in patients with kidney abnormalities and type I diabetes mellitus. When conducting a variance analysis of Z-scores in patients with other kidney diseases, no significant difference was obtained ( $p>0.05$ ).

**Conclusion:** The most likely reason for the detection of the lowest BMD scores, in groups of patients with congenital kidney abnormalities and type I diabetes mellitus, was the age of those patients at the time of the onset of CKD that did not reach the age of the "peak" bone mass (usually 20-25 y).

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## P652

### BONE MARKERS IN POSTMENOPAUSAL WOMEN: EVALUATION OF OSTEOPOROSIS RISK INDEX IN WOMEN TREATED WITH DENOSUMAB

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**Objective:** Predomination of bone resorption compared to bone formation in postmenopausal (PM) osteoporotic women and inversion of this relation during denosumab treatment (DT), indicated the need to discover their relationship as an index of the osteoporotic risk (IOR) and  $\beta$ -CrossLaps (CTX) reduction and IOR increase were determined during one year of DT in order to discover its efficacy.

**Methods:** Bone turnover markers N-MID osteocalcin (Oc) and CTX, expressed in ng/ml, and their ratio IOR=Oc/CTX were determined during DT in 18 PM women with osteoporosis. The mean value of the percentage of Oc and CTX reduction and IOR increase from the basal levels during one year of DT were determined.

**Results:** Pretreatment Oc levels as well as the correspondent CTX levels lowered and IOR levels increased significantly during one year of denosumab treatment ( $p < 0.0001$ ). Oc% reduction for 12 months was  $46.88 \pm 22\%$ , CTX% reduction was  $78.6 \pm 17\%$  and mean IOR% increase was  $166.24 \pm 118\%$ , confirming bone formation predominance compared to bone resorption that will enable BMD increase.

**Conclusion:** Significant Oc and Oc% decrease, highly significant CTX and CTX% decrease, as well as IOR and IOR% significant increase confirmed predominance of bone formation compared to bone resorption, decreased bone turnover, which indicated reduced osteoporotic risk and fracture risk in postmenopausal women as a result of DT. Determination of the relation of the two processes, bone formation and bone resorption through IOR enabled follow up of the osteoporotic risk and the efficacy of the antiresorptive treatment and confirmed very high efficacy of DT in PM osteoporosis.

## P653

### AORTIC INSUFFICIENCY IN RHEUMATOID ARTHRITIS: A CASE REPORT

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**Objective:** The most common cardiac involvement in RA is pericarditis followed by necrotizing or granulomatous myocarditis, coronary vasculitis, aortitis. Valvular heart disease have been rarely reported. The most prevalent valve disease in RA is mitral valve insufficiency, followed by aortic valve insufficiency. Here, we report a case of RA associated with a severe aortic insufficiency.

**Methods:** Case presentation.

**Results:** A 52-year-old woman with a history of diabetes, hypertension and hypothyroidism, followed for erosive and immunopositive RA since 2005 was admitted to the cardiology department due to a heart failure. Indeed, the patient complained of 3-month history of gradually worsening dyspnea. Physical examination revealed a diastolic murmur at the aortic focus on cardiac auscultation with signs of left heart failure (orthopnea, crackles on pulmonary auscultation and tachycardia) and signs of right heart failure (hepato-jugular reflux, edema of the lower limbs soft white taking the cup). The patient was afebrile. Systolic blood pressure was 12 mmHg. Diastolic blood pressure was 6 mmHg. The heart rate was 96 bpm. On the electrocardiogram, the patient had a reg-

ular sinus rhythm with a heart rate of 110 cycles/min. Her disease was strongly active as attested by a DAS28 (disease activity score) at 7.52. At admission, blood tests revealed high levels of leucocyte and C-reactive protein. The blood cultures were negative. The urine culture was negative. The pro-BNP were 11000. Chest scanner showed bilateral pleurisy of moderate abundance. Transthoracic echocardiography revealed a significantly enlarged left ventricle with an end-diastolic diameter at 58 mm, with preserved systolic function. The tricuspid aortic valve was thickened, with a severe aortic insufficiency (effective regurgitant orifice (ERO)=67 mm<sup>2</sup>, aortic regurgitant volume (RV)=66ml, pressure half-time=165 ms), without stenosis. No signs of infective endocarditis were present. The mitral valve was competent. No pericardial effusion was noted. The ascending aorta was morphologically normal. The diagnosis of global heart failure following aortic insufficiency was retained. Concerning therapeutic management, the patient received intravenous furosemide at a dosage of 120 mg/d for 3 d and oxygen therapy with good outcome and disappearance of the signs of heart failure. A valve replacement was indicated but refused by the patient.

**Conclusion:** Cardiovascular disease is the leading cause of death during of RA but heart failure remains a rare complication. At the least doubt, faced with an abnormality on the cardiovascular examination, an echocardiography should be practiced.

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### FERTILITY AND OBSTETRIC MORBIDITIES IN WOMEN FOLLOWED FOR SPONDYLOARTHRITIS

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**Objective:** Spondyloarthritis (SA) occurs most often in young patients of childbearing age. However, given the small number of female forms, knowledge remains limited on the impact of the disease on fertility and the course of pregnancy and childbirth. The aim of our study was to describe the possible obstetric morbidities in women with SA.

**Methods:** A prospective descriptive and analytical study was conducted among married patients of childbearing age at the time of diagnosis of SA. A questionnaire was conducted to collect data relating to the fertility problem, the age of the first pregnancy, the course of the pregnancy and the postpartum period.

**Results:** Thirty patients followed for SA were selected for the study. Their SA phenotype was as follows: 12 ankylosing SA, 8 inflammatory bowel disease (IBD) rheumatism, 10 psoriatic arthritis. The average age was 49 y [33-71]. The mean duration of SA was 10 y [1-27]. The axial form was found in 23 of the patients, the peripheral articular form in 25 patients and the enthesitic form in 3 patients. SA was radiographic in 18 cases. Coxitis was diag-



nosed in 5 patients. Only one patient was a smoker. The mean age at menarche was on average 13 y [10-17]. A history of primary infertility was found in 2 patients. Six patients were infertile (no pregnancy after 12 months of regular intercourse without contraception) and 2 of them were undergoing treatment to conceive. The mean age of first pregnancy was 24 y [20-36]. The majority of patients have had at least 2 pregnancies with at least one parity. The incidents during pregnancy were miscarriage in 10 patients, gestational diabetes in 5 patients, macrosomia and preeclampsia in 3 patients each. A cesarean delivery was noted in 6 patients, the causes of which were: 1 cord circular, 2 acute fetal distress, pre-eclampsia, premature rupture of membranes and a precious pregnancy. Complications of childbirth were delivery haemorrhage, infection, and retained placenta. Only one prematurity was noted. Twin pregnancy has been observed. No rheumatic treatment has been taken during pregnancy or while breastfeeding. In our series, there was no correlation neither the axial form nor the psoriatic arthritis and prematurity ( $p=0.6$ ,  $p=0.5$  respectively), miscarriage ( $p=0.9$ ,  $p=0.26$  respectively), cesarean section ( $p=0.2$ ,  $p=0.1$  respectively).

**Conclusion:** Our study does not show a correlation between the form or type of SA and obstetric morbidities, unlike other studies conducted previously. But the risk of complications during pregnancy and postpartum seems to be increased in women followed for SA.

## P655

### DOES A LACK OF PHYSICAL ACTIVITY EXPLAIN THE RHEUMATOID ARTHRITIS LIPID PROFILE?

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**Objective:** In rheumatoid arthritis(RA), cardiovascular risk is associated with paradoxical reductions in total cholesterol, low density lipoprotein cholesterol (LDL), and high density lipoprotein cholesterol (HDL). We aim to describe lipid abnormalities in RA patients and to look for predictor factors of these changes.

**Methods:** The prospective study was carried out on patients with RA who met the 2010 American ACR/EULAR classification criteria. We collected the sociodemographic data, biological and immunological parameters. The lipid assessment included: a measurement of total cholesterol (TC), HDL, LDL, and triglycerides (TG). Lipoproteins APOA1 and APOB were measured.

**Results:** Of the 50 patients recruited, 78.7% were female. The mean age was  $52.5 \pm 11.06$  [32-76]. The average RA progressed from  $86.25 \pm 63$  months [5-288] and was erosive in 81.6% of cases. Rheumatoid factor (RF) was positive in 57.8% of patients, and citrullinated antipeptide antibodies (ACPA) were present in 62.2%. Eight patients had a previous CV history. Mean TC was  $4.42 \pm 1.3$  [1.2-7.58], mean HDL was  $1.38 \pm 0.73$  [0.18-4.10], mean LDL was

$2.55 \pm 1.16$  [0.24-5.54]. The mean TG value was  $1.28 \pm 0.6$  [0.24-5.54]. TC 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. Mean APOB/APOA1 ratio was  $0.67 \pm 0.18$  [0.46-1.11]. LDL elevation was associated to a high DAS28 ( $p=0.03$ ). APOA1 was associated to a low DAS28 ( $p=0.04$ ). Average BMI was  $25 \text{ kg/m}^2$  [19.5-39]. Mean waist size was 91 cm [74-120]. HDL, LDL and APOB were associated with increased waist size ( $p=0.057$ ,  $p=0.036$ ,  $p=0.012$ ). Physical activity was practiced in 29 patients and was associated only with HDL ( $p=0.04$ ). There was no correlation between exercise frequency and RA lipoprotein profile.

**Conclusion:** We identified intriguing associations for basal or minimal physical activity and abdominal obesity with lipoprotein parameters suggestive that a large part of the RA lipid profile is mediated by lack of physical activity.

## P656

### ASSOCIATION BETWEEN MULTIMORBIDITY, POLYPHARMACY AND SARCOPENIA IN OLDER ADULTS

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**Objective:** To investigate the relations of sarcopenia and multimorbidity and medication usage in community-dwelling older people.

**Methods:** An inclusion criteria to this cross-sectional study were: age 60 or more years, unrestricted mobility, MMSE  $\geq 21$ . Number of diseases was assessed by participants selfreporting and physician assessed medical diagnoses. Use of medications was evaluated by total medication count. Polypharmacy was defined as using  $\geq 5$  medications regularly. Sarcopenia was defined according to EWGSOP2. Muscle mass was measured by iDXA (GE Lunar, USA), muscle strength was evaluated measuring handgrip strength (JAMAR, Patterson Medical, UK), and physical performance was evaluated by the Short Physical Performance Battery (SPPB) test. Associations between sarcopenia and number of diseases or medications assessed using binary logistic regression.

**Results:** The study was performed on 246 subjects: 87 (35.4%) men and 159 (64.6%) women. Mean age was  $79.27 \pm 6.48$  y, ranging from 62.8-94.7 y. Mean number of medications taken was  $3.76 \pm 1.82$ . All participants had comorbidities, ranging from 1 (69 participants, 28%) to 5 (2 participants, 0.8%). Most of the participants had two diseases (36.2%). More than two-thirds of the participants had multimorbidity (177, 72%), of which 70 (39.5%) were men and 107 (60.5%) were women. The study results revealed that 7 (2.8%) subjects did not take any medications. Five subjects were taking 8 medications. Polypharmacy was observed in 81 (32.9%) participants. Sarcopenia was diagnosed in 40 (16.2%) subjects. Sarcopenic older adults were more likely to have more diseases, have multimorbidity ( $p < 0.001$  for both). Also sarcopenic subjects took more medications ( $p < 0.001$ ) and were more likely to have polypharmacy ( $p = 0.003$ ). Logistic regression anal-

ysis showed that sarcopenia was associated with multimorbidity (OR: 1.63 (1.12-2.26) and polypharmacy (OR: 2.46 (1.2-5.02)). **Conclusion:** Our study showed that in older adults sarcopenia is associated with increased number of concurrent diseases and polypharmacy.

## P657

### ASSOCIATIONS BETWEEN FALLS, FEAR OF FALLING AND SARCOPENIA IN OLDER ADULTS

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**Objective:** To investigate the relationship of previous falls in the past 12 months and fear of falling with sarcopenia in community-dwelling older adults.

**Methods:** A cross-sectional study was performed in community-dwelling older adults. Inclusion criteria were: age 60 y or more, unrestricted mobility, MMSE score  $\geq 21$ . History of falls was assessed by asking whether the subject had experienced fall in past 12 months. Fear of falling was assessed by asking participants single question "Are you afraid to fall?" Sarcopenia was defined according to EWGSOP2. Muscle mass was measured by iDXA (GE Lunar, USA), muscle strength was evaluated measuring handgrip strength (JAMAR, Patterson Medical, UK), and physical performance was evaluated by the Short Physical Performance Battery (SPPB) test. Relationship between number of falls, fear of falling and sarcopenia, was assessed using binary logistic regression.

**Results:** The study was performed on 246 subjects: 87 (35.4%) men and 159 (64.6%) women. During previous 12 months, 144 (58.5%) people had fallen, 38 (26.4%) were men and 106 (73.6%) were women. 141 (57.3%) participants had reported that they were afraid of falling: 54 (38.3%) were men and 87 (61.7%) were women. Sarcopenia was diagnosed in 79 (32.1%) subjects. Fear of falling was associated with previous falls and sarcopenia ( $p < 0.001$  for both syndromes). Logistic regression analysis showed that sarcopenia was associated with falls and fear of falling (OR: 0.5 (0.32-0.75) and 2.96 (1.16-7.56), respectively).

**Conclusion:** Results of our study show that previous falls and fear of falling were associated with increased risk of sarcopenia.

## P658

### RELATIONSHIP BETWEEN SEVERITY OF SECONDARY OSTEOARTHRITIS AND FEATURES OF THE COURSE OF RHEUMATOID ARTHRITIS

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**Objective:** To conduct a comparative assessment of the features of the course of rheumatoid arthritis (RA) depending on the severity of secondary osteoarthritis (OA).

**Methods:** The study involved 282 patients with RA and secondary OA. Some patients underwent endoprosthetics of at least one large joint due to severe OA: 48 patients who made up group 1. Group 2 included 234 patients with RA and secondary OA of functional class 1-3 who did not require endoprosthetics. In both groups, some patients had systemic manifestations of RA. All patients, in addition to routine research methods, underwent echocardiography. The DAS28 index was used to assess the activity of RA.

**Results:** Group 1 was characterized by later clinical and radiological stages ( $p < 0.0001$ ), as well as a higher functional class ( $p < 0.0005$ ). Both groups differed in the level of ESR ( $p < 0.05$ ). We compared two subgroups, which included patients without systemic manifestations of RA: the 1st subgroup - 17 patients without systemic manifestations from the 1st group; the 2nd subgroup - 99 patients without systemic manifestations from the 2nd group. The DAS28 index in the 1st subgroup was 5.62 [5.22; 6.28] and was higher than in the 2nd, where it was 5.32 [4.75; 5.64] ( $p = 0.046$ ). In addition, the relative wall thickness of the left ventricle was increased in the 1st subgroup. It was 0.44 [0.37; 0.47], and in the 2nd subgroup - 0.37 [0.34; 0.41] ( $p = 0.007$ ). However, there were no significant differences between the two subgroups in terms of ESR or age. Apparently, these parameters (age and ESR), largely, determined the presence of systemic manifestations of RA than the severity of OA.

**Conclusion:** The inflammatory component of RA affects the severity of secondary OA. With an increase in duration, activity and with an increase in the radiological stage, the course of osteoarthritis also worsens. Age also matters, but it influenced the development of systemic manifestations largely than OA.

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### CARDIAC DISORDERS IN PATIENTS WITH SECONDARY OSTEOARTHRITIS ON THE BACKGROUND OF RHEUMATOID ARTHRITIS

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**Objective:** To identify the features of cardiac disorders in patients with secondary osteoarthritis (OA) on the background of rheumatoid arthritis (RA).

**Methods:** The study involved 282 patients with RA and secondary OA. Some patients underwent endoprosthetics of at least one large joint due to severe OA: 48 patients who made up group 1. Group 2 included 234 patients with RA and secondary OA of functional class 1-3 who did not require endoprosthetics. In addition to routine methods of investigation, all patients underwent electrocardiography with the calculation of the QT interval variance, vectorcardiography and echocardiography. The DAS28 index was used to assess RA activity.

**Results:** During the correlation analysis in 1st group, the following correlations were found: inverse, average and reliable relationship between age and the E/a transmitral flow index ( $r=-0.63$ ,  $p<0.0001$ ); direct, average relationship between the level of DAS28 and the relative wall thickness of the left ventricle ( $r=0.39$ ,  $p<0.05$ ); inverse, average relationship between the level of rheumatoid factor and the vectorcardiographic parameter MV-rise ( $r=-0.32$ ,  $p<0.05$ ); direct, strong relationship between relative wall thickness of the left ventricle and P-loop area on vectorcardiography ( $r=0.76$ ,  $p=0.01$ ); the inverse, average relationship between the final diastolic size of the left ventricle and the T-loop area ( $r=-0.65$ ,  $p=0.03$ ). In 2nd group, a direct, average correlation was found between the DAS28 index and the value of the maximum vector according to vectorcardiography ( $r=0.6$ ,  $p<0.05$ ), as well as an inverse, strong relationship between the E/a of the transmitral flow and the QT interval variance ( $r=-0.73$ ,  $p=0.02$ ).

**Conclusion:** In patients with RA and severe secondary OA, high activity of the disease contributes to structural and geometric remodeling of the heart and in the milder form of secondary OA is accompanied by electrophysiological remodeling in the form of increased electrical activity of the ventricles and the risk of malignant arrhythmias.

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### TENOFOVIR BASED ANTIRETROVIRAL THERAPY EFFECT ON BONE MINERAL DENSITY IN HIV INFECTED CHILDREN

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**Objective:** To determine the BMD in children with HIV who take tenofovir as part of antiretroviral therapy.

**Methods:** A retrospective analysis of 32 case histories of patients aged 10-17 y with a diagnosis of HIV infection was conducted. All children had tenofovir-based antiretroviral therapy and had some symptoms that required tenofovir-induced Fanconi syndrome confirmation. Individual regimens and timing of antiretroviral treatment were analyzed, as well as the results of biochemical blood analysis with the determination of total and ionized calcium, phosphorus; general urine analysis with a determination of glycosuria, proteinuria, pH, and urine N-Acetyl-b-D-glucosaminidase (NAG) test. BMD of the lumbar spine was measured by DXA "Discovery wi".

**Results:** The average age of children was  $13.2\pm 2.3$  y. The duration of tenofovir-based antiretroviral therapy was  $3.5\pm 2.6$  y (from 6 months till 9 y). 8 (25%) patients had ossalgia, 5 (15.6 %) fragility fractures of upper or low extremities, 3 (9.3 %) low back pain, 9 (28.1 %) had gait problem. DXA was performed in 26 children. Low BMD was registered in 17 (65.4 %) children. BMD at L1-L4 level was  $-1.97\pm 1.2$  SD (min. -4.2, max. 1.2 SD), BMD at left femur neck was  $-2.07\pm 0.93$  SD (min. -4.4, max. -0.5 SD), BMD at left femur total was  $-2.21\pm 1.28$  SD (min. -5.0, max. -0.3 SD). Mean calcium level was  $2.41\pm 0.13$  mmol/l (min. 2.09, max. 2.62 mmol/l), phosphorus  $1.08\pm 0.43$  (min. 0.55, max. 1.89 mmol/l). 12 (37.5 %) patients had tenofovir-induced Fanconi syndrome with typical manifestation: proteinuria, hypophosphatemia, elevated NAG and low BMD.

**Conclusion:** Tenofovir-based antiretroviral therapy may affect BMD in children. BMD screening besides blood biochemistry and urinalysis is recommended.

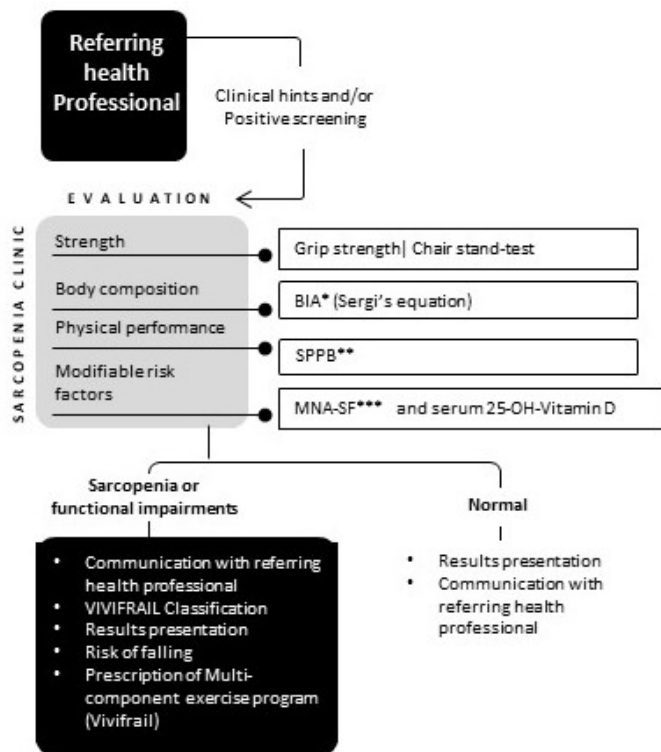
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### SARCOPENIA UNIT? A PROPOSAL FOR A COMPREHENSIVE APPROACH

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**Objective:** Awareness on the frequency and burden on sarcopenia is limited among general population and health professionals<sup>1,2</sup>. There is a need for available and pragmatic approaches for its detection and management. We aimed to propose a established sequential approach for identification and management of sarcopenia and to describe the first patients seen in our clinic.

**Methods:** Figure 1 proposes an algorithm for attention of patients with suspected sarcopenia, developed according to the 2019 EWGSOP consensus<sup>3</sup>. When the clinician considers a patient at risk for sarcopenia, referral to the Sarcopenia Unit leads to scheduled evaluations, including measurement of strength and muscle mass; physical performance test and modifiable risk factors like vitamin D deficiency and malnutrition.



**Results:** We studied 61 patients between June and November, 2021. Mean age was 65.92+9.45 y and 69.2% were women. Table 1 summarizes findings. Every patient was included in a nutritional orientation and assignment to a multicomponent exercise program (ViviFrail), according to their status.

**Table 1.** Findings in the first 61 patients seen in the Sarcopenia Unit

Evaluation	Interpretation	Frequency of findings
Nutritional assessment	Normal nutrition	53.8% (n=35)
	Risk of malnutrition	30.8% (n=20)
	Malnutrition	10.8% (n=7)
Grip strength	Normal	67.7% (n=40)
	Low	32.3% (n=21)

Appendicular muscle mass index	Normal	70.5% (n=43)
	Low	29.5% (n=18)
Physical performance	Normal	77% (n=47)
	Poor	23% (n= 14)
Diagnostic conclusion	Normal	83.62% (n=51)
	Sarcopenia	9.83% (n=6)
	Severe sarcopenia	6.55% (n=4)

**Conclusion:** This methodology allows the identification of subjects with sarcopenia and perisarcopenic conditions and may lead to early preventive and therapeutic approaches.

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**FEASIBILITY OF A CONTROLLED TRIAL OF A SUPERVISED EXERCISE INTERVENTION FOR PATIENTS WITH FRAGILITY FRACTURES AND PATIENTS AT VERY HIGH FRACTURE RISK**

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**Objective:** This pilot study aims to evaluate the feasibility of recruitment, retention, and adherence for a combined supervised and home exercise program compared with usual care.

**Methods:** Quasi-experimental controlled 12-month pilot trial with a non-random assignment. The sample was recruited from the Center for Bone Research, Guadalajara (Mexico), and the Institute of Sciences Applied to Physical Activity and Sport, University of Guadalajara (Mexico). Subjects eligible for the study were post-menopausal women, aged 50–85 years, with osteoporosis, with one or more clinical or morphometric vertebral fractures, or history of a fragility non-vertebral fracture, or otherwise at very high fracture risk. Participants were assigned to the experimental group or the control group, based on their decision to participate; the control group consisted of patients who self-excluded for schedule or logistic issues reasons. The intervention consisted of a supervised program of a twice a week for three weeks, followed by a 5d/week exercise at home with periodic monthly supervision. Loads and volumes were calculated individually and adjusted



according to progression. All patients received specific medical treatment for osteoporosis. Main outcomes were recruitment, retention, and adherence. Feasibility was defined as a capability to recruit 30 patients in the intervention group for each center, with 80% retention and 80% adherence. Secondary outcomes include changes in physical performance capabilities, postural changes, falls, BMD, and incidence of new fractures.

**Results:** 62 women 50-85 years old (mean 66.2, SD 8.3) with osteoporosis (T-score mean -2.7, SD 1.02) and at least one incident vertebral fracture or very high risk were recruited in the experimental group. Both centers recruited the necessary number of patients, 32 and 30 patients, retention was 85% and 83%, and adherence was 84 and 79%, respectively. Most of them were due to scheduling and logistics patient issues. During follow-up, improvements in physical capabilities were documented in the intervention group, and no injuries nor new vertebral or non-vertebral fragility fractures were observed.

**Conclusion:** Our observations suggest that a twelve-month supervised exercise program multicentric trial is feasible in populations with osteoporosis, fracture, and high fracture risk receiving osteoporosis treatment.

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### THE RELATIONSHIP BETWEEN OSTEOSARCOPENIA AND COGNITIVE FRAILITY AMONG OLDER PEOPLE: THE BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

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**Objective:** Osteosarcopenia, Cognitive impairment and frailty are the important health concerns among older adults. Cognitive frailty is the simultaneous presence of physical frailty and cognitive impairment with an increased risk of dementia. This study aimed to explore the association between cognitive frailty and osteosarcopenia in Iranian older people.

**Methods:** From among 2426 individuals aged  $\geq 60$  y selected in BEH Program, Iran; data of 1422 participants were analyzed. Osteosarcopenia was considered as the presence of both osteopenia/osteoporosis and sarcopenia. Frailty was assessed by Fried

criteria including; weight loss, exhaustion, low muscle strength, slow gait speed, and low physical activity. Cognitive status was assessed using Category Fluency Test and Mini-cog assessment instrument. Cognitive frailty was defined as the coexistence of physical frailty and mild cognitive impairment. Association between osteosarcopenia and cognitive frailty were assessed using multivariable logistic regression models.

**Results:** Among 1422 subjects, 21.4% had osteosarcopenia and 6.5% had cognitive frailty. The prevalence of cognitive frailty was higher in osteosarcopenic group (19.2%) compared with people without osteosarcopenia (2.5%,  $P < 0.001$ ). Osteosarcopenia was associated with cognitive impairment alone: OR 1.83, 95%CI; 1.37-2.44, frailty alone OR 8.14, 95%CI; 3.65-18.15 and a higher OR with combination cognitive impairment and frailty OR 12.78, 95%CI; 7.84-20.86. After adjusting for other variables (i.e., age, sex, smoking, physical activity, BMI, and protein intake), the association between osteosarcopenia and cognitive frailty remained significant [OR, 3.31(1.78-6.14)], whereas no significant relationship was observed between osteosarcopenia and cognitive impairment alone and also frailty alone.

**Conclusion:** Osteosarcopenia was independently associated with combination of physical frailty and cognitive impairment. This association is more than frailty and cognitive impairment alone. Further studies are needed to clarify the causal relationship between these two concepts.

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### COMPLIANCE OF ANTIOSTEOPOROSIS MEDICATION IN PATIENTS WITH FRAGILITY FRACTURE IDENTIFIED DURING COVID-19 OUTBREAK

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**Objective:** Since early 2020, an unprecedented public global health emergency caused by coronavirus (COVID-19) resulted in imposing confinement measures. During pandemics, lockdowns and isolation had made the disease management and medication adherence more difficult. As osteoporosis is a chronic condition, it generally requires long term medical treatments to prevent further bone loss, skeletal integrity and fractures. Fracture Liaison Service (FLS) which is a multidisciplinary approach has been implemented to ensure osteoporotic patients are on treatment and comply with their medications (1). We aimed to investigate the compliance of antiosteoporosis medication, calcium and vitamin D supplements among osteoporotic patients identified during COVID-19 lockdown.

**Methods:** Patients under FLS follow-up from January 2020 to December 2020 taking their anti-osteoporosis medications such as bisphosphonate, denosumab, teriparatide and calcium and vitamin D supplements were identified. Compliance on medication were evaluated after six months and one year on medication.

**Results:** A total of 143 patients were identified. After six months of initiating anti-osteoporosis treatments in the year 2020, 110 (77%) patients were still compliant to their anti-osteoporosis medications and 115 (80%) patients with calcium and vitamin D supplements. However, the adherence of antiosteoporosis medications has reduced to 75 (52%) patients after one year, while 92 (64%) patients continued taking both calcium and vitamin D supplements without antiosteoporosis medication. Patients taking denosumab (n=47, 63%) have shown better compliance to those on bisphosphonate (n=24, 32%) and teriparatide (n=4, 5%) after 1 y. The commonest reasons for noncompliance were attributed to loss to follow up due to lockdown (60.3%), cost (19.2%), feeling well (14.7%) and doctor's decision to stop medication (5.8%).

**Conclusion:** Compliance of antiosteoporotic medications was reduced during COVID-19 lockdown due to the closure of hospital as the patients were unable to collect the medications. Denosumab which is given 6-monthly has the best adherence among the antiosteoporosis medications during lockdowns.

**Reference:** 1. Hampson G, et al. Calcif Tissue Int 2021;109:351

## P665

### PRE- AND POST- COVID-19 PANDEMIC ADHERENCE OF ANTIOSTEOPOROSIS MEDICATION AFTER ONE YEAR FOLLOW-UP

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**Objective:** COVID-19 pandemic has forced a transformation in the healthcare system hindering the continuum of treatment of patients. Many countries had implemented lockdown to control the spread of the COVID-19 pandemic (1). This study aims to analyse the barriers encountered by the fragility fracture patients for the follow-up visit and medication adherence during the pandemic.

**Methods:** Patients aged 50 y and older with fragility fractures were identified from our tertiary university hospital before pandemic (January 2019 to December 2019) and during pandemic (January 2020 to December 2020). Outpatients' appointments and drug prescriptions were analysed from hospital records over periods of 6 and 12 months.

**Results:** 200 patients were identified before pandemic, while another 143 patients during pandemic. The pandemic group has significant lower medication adherence at 6 months (100,69.9%) and

12 months (74,51,7%) compared to pre-pandemic group (176,88%, p<0.0001) and (123,68.5%, p=0.002) respectively. Adherence to follow-up at 6 months was significantly lower in year 2020 (107,74.8%) compared to 2019 (178,89%, p=0.001) but was not significant at 12 months (55% in 2019, 46.9% in 2020, p=0.137). The major barriers for follow-up and medication adherence were lockdown restriction, cost, and transport difficulties.

**Conclusion:** During the COVID-19 pandemic, fewer patients with fragility fractures attended the follow-up and thus lowered medication adherence. This emphasized the need for reformation in the health care system for accessibility of medical care to patients in rural areas. Implementation of fracture liaison services is an important program to aid in early intervention and prevention of future fragility fracture.

**Reference:** 1. Orfanos G, et al. Surgeon 2021;19:e440-e5

## P666

### FRACTURE RISK ASSESSMENT IN DIABETIC PATIENTS WITH FRAGILITY FRACTURE: FRAX OR BMD?

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**Objective:** Patients with type 2 diabetes mellitus (T2DM) are known to have higher BMD owing to higher BMI. Paradoxically, there is an increased risk of fracture among diabetic patients, implying the hypothesis of impaired bone quality in diabetic subjects. We aimed to investigate if diabetic status affects the decision to initiate treatment using the WHO 10-y fracture risk algorithm (FRAX) score and BMD.

**Methods:** This retrospective study consists of 154 patients over 50 y of age, who presented to our teaching hospital with fragility fractures. All available medical records were examined to confirm diabetes status, and all patients had a DXA done for lumbar spine and femoral neck. The risk of fracture was calculated using the FRAX algorithm.

**Results:** The prevalence of T2DM was 37% (n=58) in our fragility fracture patients. The mean BMD femoral neck and lumbar spine is higher in diabetic patients as compared to nondiabetic patients (-1.9 vs. -2.31, p=0.038) and (-1.64 vs. -2.17, p=0.036) respectively. Prevalence of osteoporosis is significantly lower in diabetic (46.6%) compared to non-diabetic group (64.6%, p=0.028). On comparing FRAX score, there were no significant difference between diabetic and non-diabetic groups (p=0.079) and both groups show similar percentage of patients meeting criteria to start treatment (p=0.851). In diabetic group, FRAX without BMD

shows more patients meeting criteria for treatment initiation (93.1%) compared to with BMD (84.5%) but were not statistically significant ( $p=0.54$ ).

**Conclusion:** Despite FRAX score showing similar risk between diabetic and nondiabetic subjects, more than half of T2DM patients were normal/osteopenia on BMD, thus not indicated for anti-osteoporosis. By using FRAX algorithm, more diabetic patients with fractures are indicated for treatment, and is applicable in centers without DXA scan.

## P667

### MORTALITY OF HIP FRACTURE DURING COVID-19 PANDEMIC IN A TERTIARY HOSPITAL, MALAYSIA

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**Objective:** The COVID-19 pandemic has greatly affected the management of hip fractures. As this frail patient group requires specialized care, interruption in treatments has resulted in increased morbidity, mortality, and long-term healthcare expenses. We aimed to analyse the impact of COVID-19 pandemic on the mortality of fragility hip fracture.

**Methods:** This retrospective multicentre cohort study compared all fragility hip fracture patients admitted between January 1 and December 31, 2019, with patients admitted during the same period in 2021. We compared year 2019 with 2021 because the third wave of COVID-19 commenced in 2021, where infection rate was highest in Malaysia. The data was obtained from a prospectively designed orthopaedic database at Hospital Canselor Tuanku Muhriz, Malaysia through fracture liaison services (FLS).

**Results:** A total of 92 hip fractures were recorded in 2021, compared to 128 cases in 2019, showing a 28% reduction in hip fractures admissions. 30-d mortality was higher (8, 8.7%) during the COVID-19 crisis than in 2019 (2, 1.6%,  $p=0.019$ ). Causes of death during pandemic are sepsis (3, 37.5%), COVID-19 pneumonia (3, 37.5%) and acute coronary syndrome (2, 25%). Only 9 patients (9.8%) were tested positive for COVID-19 infection in 2021, and 8 of them (89%) were treated conservatively. During pandemic, the 30-d mortality rate is higher in COVID-19 patients (3, 33.3%) compared to non-COVID-19 patients (5, 6%,  $p=0.029$ ). COVID-19 infected patients had a longer mean length of stay (17.3 d), compared to non-COVID-19 infected patients (10.3 days,  $p=0.009$ ).

**Conclusion:** COVID-19 negatively impacts the outcome of elderly with fragility hip fracture, resulting in higher mortality, lesser surgical intervention, and longer hospital stay. Separate circuits for patients with and without COVID-19 infection are needed for adequate hip fracture care.

## P668

### PREVALENCE AND DISTRIBUTION OF OSTEOPOROTIC VERTEBRAL FRACTURES IN ELDERLY ADULTS

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**Objective:** Osteoporotic vertebral fractures are associated with higher morbidity and mortality rate compared with hip fractures. Malaysia is expected to have one of the highest recorded prevalences of hip fractures in Asia by 2050 (1). However vertebral fractures are not extensively studied due to methodological difficulties. We aimed to describe the age- and sex-related occurrence, and fracture distribution of osteoporotic vertebral fractures in a tertiary university hospital in Malaysia.

**Methods:** Data was collected from January 2019 to June 2021 in Hospital Canselor Tuanku Muhriz, Malaysia from a prospectively designed orthopaedic database through Fracture Liaison Services (FLS). Each patient was analysed by reviewing their medical records, the initial radiographs and CT scans. Individuals with severe trauma, known malignancy and atypical fracture were excluded from the study.

**Results:** A total of 105 patients (93 women and 12 men) were included in this study with a mean age of 77.1 years old. The majority of patients were Chinese (63%), followed by Malays (29%) and Indians (8%). Single vertebral fracture was the most common; multiple vertebral fractures were present in approximately 41% of the cases. Fractures were seen from the fourth thoracic to the fifth lumbar vertebrae, most commonly in the first lumbar (39, 24%), twelfth thoracic (32, 20%) and second lumbar vertebrae (21, 13%). 70% of patients were initiated with antiosteoporotic medications, while 91% were on calcium and 90% with vitamin D supplements.

**Conclusion:** The prevalence of vertebral fractures increased in both women and men with age. Thoracolumbar region was the most common fracture site. FLS is a secondary fracture prevention service that assesses and improves the bone health of patients in order to prevent future fragility fractures.

**Reference:** 1. Ong T, et al. Malays Orthop J 2020;14:16

P669

**PREVALENCE OF WRIST FRACTURE IN A TERTIARY REFERRAL CENTRE, MALAYSIA**Z. F. C. Lim<sup>1</sup>, Y. K. Choo<sup>1</sup>, J. F. Leong<sup>1</sup>, L. K. Belani<sup>1</sup>, R. A. Rani<sup>1</sup>, S. A. Mokhtar<sup>1</sup><sup>1</sup>Fracture Liaison Service / Orthopaedic and Traumatology/ Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** Apart from hip and spine fractures, radius fractures are one of the most common osteoporosis related fragility fractures in elderly group. The rise in the number of elderly owing to an aging population is directly responsible for the increase of wrist fractures (1). Understanding the incidence of this fracture is thus an important step towards improving the treatment strategies and preventative measures for this debilitating injury. We aimed to describe the incidence of wrist fractures and management in our Hospital Canselor Tuanku Muhriz, Malaysia.

**Methods:** It is a prospective study from January 2019 to December 2021. Patients presented to our tertiary care hospital which wrist fracture in-patients and out-patients are identified. The diagnosis and demographic data were recorded. Patients with fractures following severe trauma, known malignancy and atypical fractures were excluded from the study.

**Results:** A total of 113 patients (17 male and 96 female) were identified with wrist fractures, with a mean age of 72.7 years old. 24 patients (21%) had undergone surgical intervention with median time to surgery of 2 days from admission. 64 (57%) patients were started on anti-osteoporosis medication, while 102 (90%) patients were taking calcium and 98 (87%) on vitamin D supplements. The reasons for patients not taking anti-osteoporosis medications are cost (46%), belief in complementary medicine (42%), doctor's decision (6%) and side effects (6%).

**Conclusion:** Wrist fractures are associated with an increased risk of subsequent hip, vertebral and lower extremities fractures. There may be a substantial missed opportunity for intervention in wrist fracture caused by osteoporosis. Increased attention to wrist fracture as a fragility fracture is important. Implementation of fracture liaison service program in hospital setting allows early identification of patients as risk for future fracture and improvement of after fracture care.

**Reference:** 1. Crandall CJ, et al. J Bone Miner Res 2015;30:2086

P670

**ASSESSMENT OF CARDIOVASCULAR DISEASE RISKS USING FRAMINGHAM RISK SCORES AMONG OLDER WOMEN WITH OSTEOSARCOPENIC OBESITY: THE BUSHEHR ELDERLY HEALTH (BEH) PROGRAM**R. Heshmat<sup>1</sup>, G. Shafiee<sup>1</sup>, A. Ostovar<sup>2</sup>, N. Fahimfar<sup>2</sup>, F. Sharifi<sup>3</sup>, I. Nabipour<sup>4</sup>, B. Larijani<sup>5</sup>

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**Objective:** Osteosarcopenia and obesity are two conditions with some adverse outcomes in older people. The association osteosarcopenia and obesity status that newly termed osteosarcopenic obesity, with cardiovascular diseases (CVDs) remains unknown. This study aimed to explore the association between Framingham risk score and osteosarcopenic obesity in the older women.

**Methods:** We included 1231 women aged  $\geq 60$  y from the 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 plus 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 BMI  $\geq 25.0$  kg/m<sup>2</sup>. Subjects were classified into 4 groups according to their obesity and osteosarcopenic status. Cardiovascular risk was assessed with framingham risk score (FRS). The distribution of the Framingham risk score (low <10%; moderate, 10%-19%; high,  $\geq 20\%$ ) according to BMI and osteosarcopenic status was also presented.

**Results:** The prevalence of high risk of CVD ( $\geq 20\%$ ) was much higher in the osteosarcopenic obese group (39.8%) compared with other groups (P=0.03). The osteosarcopenic obese group was associated with an increased high risk of CVD than the non-osteosarcopenic/nonobese group (odds ratio [OR], 3.79; 95%CI, 1.79-8.03, P<0.001). Osteosarcopenic/nonobese and nonosteosarcopenic obese subjects were not associated with an increased high risk of CVD. After adjusting for independent variables (i.e., total calorie intake, protein intake, and physical activity), the association between the  $\geq 20\%$  10-y CVD risk and the osteosarcopenic obese group remained significant (OR, 4.02(1.87-8.66), whereas no significant relationship was observed in moderate risk of CVD and also other groups of osteosarcopenia and obesity status.



**Conclusion:** Osteosarcopenic obesity was associated with cardiovascular disease and may be an early predictor of its susceptibility in older women. Thus, management of osteosarcopenia and obesity is necessary to prevent cardiovascular disease.

P671

### IMPACT HIP FRACTURE ON MORTALITY AND DEPENDENCE

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**Objective:** Osteoporotic hip fracture is a public health issue, its incidence increases exponentially from the age of 70, due to its high frequency, the huge sociosanitary cost, and above all the frequent associated morbimortality. The objective of this study was to evaluate dependency according to the Barthel score and mortality after hip fracture and their related factor.

**Methods:** Cross-sectional study of patients hospitalized for hip fracture at Hospital Plató (Hospital Clinic of Barcelona-Plató) during 2019 and assessed by the Rheumatology Dept. (in the multidisciplinary hip fracture unit-Fracture Liaison Service [FLS]). The clinical history was reviewed 2 y after the fracture, including demographic, geriatric variables (Charlson comorbidity index, the Barthel score, mortality) and laboratory tests (assessing vitamin D deficiency [25-OH-D value<20 ng/ml]). Results were analyzed according to age ( $\geq 85$  and <85 y). High-impact trauma fractures were excluded from the study.

**Results:** 92 patients were included, with a mean age of  $86 \pm 10$  y. The Table shows the results according to age ( $\geq 85$  vs. <85 y). Before the fracture, 67 (72.8%) patients were independent from Activities of Daily Basic (BADLs) and after the fracture: 25 (37.3%) patients in this group became dependent, 18 (26.9%) were institutionalized, and 18 (26.9%) died within the first year. First-year mortality of all patients was 31.8%, being higher in individuals aged  $\geq 85$  y, with statistically significant differences compared to the group aged <85 y. All patients who died had high comorbidity (>3 points) according to the Charlson index at the time of the fracture. 57.6% of the patients had vitamin D deficiency, being more frequent in individuals  $\geq 85$  years old (63.9%). Only 16.5% of the patients received treatment with vitamin D supplements and 23% with vitamin D and calcium supplements before the fracture.

Table: Characteristics of the study population

Variables	<85y (n=31)	$\geq 85$ y (n=61)	p value
Female gender	23 (74.2%)	43 (70.5%)	0.709
Glucocorticoid use	2 (6.4%)	5 (8.2%)	0.765
Calcium and vitamin D supplement	9 (29%)	12 (19.7%)	0.312
Vitamin D supplement	6 (19.4%)	9 (14.8%)	0.572
Smoking (smoker and ex-smoker)	11 (35.5%)	3 (4.9%)	<0.001
Previous fractures	7 (22.6%)	11 (18%)	0.603
Barthel score, dependent pre-fracture (< 60)	6 (19.4%)	17(27.9%)	0.373
Barthel score, dependent post-fracture (< 60)	8 (25.8%)	40 (65.6%)	<0.001
Institutionalized prior to fracture	4 (12.9%)	19 (31.1%)	<0.056
Institutionalized post fracture	4 (12.9%)	26 (42.6%)	<0.004
Mortality	4 (12.9%)	25 (41%)	<0.006
*ICC > 3 at the time of fracture	4 (12.9%)	25 (41%)	
Surgical intervention	28 (90.3%)	56 (91.8%)	0.812
Laboratory			
25-OH-Vit D-deficiency (<20ng/mL)	14(45.1%)	39 (63.9%)	0.099
Parathyroid hormone-High (>88pg/ml)	6 (19.3)	28 (50%)	0.014
Creatinine-High (>0.9 mg/dl)	7 (22.5%)	42 (68.8%)	<0.001
*GFR <50ml/min/	3 (9.6%)	29 (47.5%)	<0.001
Albumin-Low (<35g/l)	14 (45.1%)	38 (62.2%)	0.417

\*CCI: Charlson comorbidity index

\*GFR: Glomerular filtration rate

**Conclusion:** Hip fracture due to fragility is a determining factor in the loss of dependency for BADLs. In these patients, the advanced age is determinant in dependency and mortality, being this one, higher in dependent patients.

P672

**DISTAL RADIUS FRACTURE: AN OPPORTUNITY FOR OSTEOPOROSIS INTERVENTION**M. M. T. Chung<sup>1</sup>, D. K. H. Yee<sup>1</sup>, E. Fang<sup>1</sup>, F. Leung<sup>1</sup>, C. Fang<sup>1</sup><sup>1</sup>Dept. of Orthopaedics & Traumatology, Queen Mary Hospital, Hong Kong, China

**Objective:** Distal radius fractures have been reported as a predictor of subsequent osteoporotic fragility fractures. This retrospective study evaluated the proportion of patients with distal radius fractures at a government hospital in Hong Kong who received diagnostic evaluation or treatment for osteoporosis within 1 y.

**Methods:** 561 postmenopausal women aged >50 y admitted to a public hospital between 2013-2017 for a low-energy distal radius fracture were analysed for initiation of osteoporosis medications and/or arrangement of DXA screening within 1 y of injury.

**Results:** Within 1 y, 8.4% of patients were prescribed osteoporosis medication and 6.1% of patients had DXA arranged. Patients with a previous fracture were more likely to receive osteoporosis medication (18.6 vs. 7.5%,  $P=0.012$ ) and either intervention (screening or medication) overall (23.3 vs. 10.4%,  $P=0.011$ ).

**Conclusion:** Few postmenopausal women who suffered a distal radius fracture received osteoporosis intervention within 1 y. Orthopaedic surgeons should be aware of the possibility of underlying osteoporosis and opportunity for intervention when managing fragility distal radius fractures.

P673

**VITAMIN D STATUS AND BONE MINERAL DENSITY IN CHILDREN WITH DUCHENNE MUSCULAR DYSTROPHY**A. Halasheuskaya<sup>1</sup>, A. Pachkaila<sup>1</sup>, D. Zaitsau<sup>2</sup>, Y. Sasnouskaya<sup>2</sup><sup>1</sup>Belarusian Medical Academy of Postgraduate Education, <sup>2</sup>Minsk Regional Children's Clinical Hospital, Minsk, Belarus

**Objective:** To evaluate vitamin D status and BMD in children with Duchenne muscular dystrophy (DMD).

**Methods:** The study included 59 boys with DMD aged 3-18 y (median age 9.7 (6.7; 11.2) y) who were examined at the Republican Center for Pediatric Osteoporosis. 38 (64.4%) children were ambulatory, 21 (35.6%) children were nonambulatory; 18 (30.5%) children were using steroids. The level of 25-hydroxyvitamin D (25(OH)D) was defined by the method of electrochemiluminescence. We used the following cutoff of 25(OH)D to define vitamin D status: deficiency <20 ng/ml; insufficiency 20-29 ng/ml; sufficiency  $\geq 30$  ng/ml. Total body less head (TBLH) BMD and lumbar

spine (L1-L4) BMD were measured using DXA. According to international guidelines (ISCD 2019 Pediatric Official Positions) low BMD was defined as Z-score  $\leq -2.0$ .

**Results:** The median 25(OH)D value for the whole cohort was 17.60 (11.70; 22.36) ng/ml (range: 4.40-47.02 ng/ml). Of 57 patients, 34 (59.6%) presented with vitamin D deficiency, 16 (28.1%) with vitamin D insufficiency and only 7 (12.3%) showed sufficient levels of 25(OH)D. No significant difference was found in levels of vitamin D between the patients with DMD who were using steroids and those not using steroids and between the patients who were ambulatory or nonambulatory ( $p=0.246$  and  $p=0.114$ ). The median L1-L4 BMD in the cohort of examined patients was 0.472 (0.437; 0.550) g/cm<sup>2</sup>, TBLH BMD was 0.505 (0.469; 0.540) g/cm<sup>2</sup>. The median BMD Z-score (L1-L4) was -1.0 (-1.7; 0.2) SD, BMD Z-score (TBLH) was -0.3 (-1.3; 2.0) SD. Low BMD was registered in 13/59 (22.0%) children. According to the ISCD 2019 criteria, secondary osteoporosis was detected in 3/59 (5.1%) children.

**Conclusion:** A high frequency of vitamin D deficiency and insufficiency among children with DMD has been revealed, reaching 87.7%. Low BMD was detected in every fifth of the examined patients with DMD.

P674

**OSTEOPOROSIS AS A PREDICTOR OF CARDIOVASCULAR RISK IN PATIENTS WITH RHEUMATOID ARTHRITIS**S. A. Lapshina<sup>1</sup>, L. I. Feiskhanova<sup>1</sup>, A. R. Garaeva<sup>1</sup><sup>1</sup>Kazan State Medical University, Kazan, Russia

**Objective:** Most patients with rheumatoid arthritis (RA) are diagnosed with osteoporosis or osteopenia. RA is a disease in which the cardiovascular risk increases 1.5-2 times. Osteoporosis (OP) is indirectly able to affect the cardiovascular system. We aimed to study some markers of cardiovascular risk in patients with osteoporosis on the background of RA.

**Methods:** 100 patients with RA were examined, average age 55 $\pm$ 12.4 y. High activity on the DAS28 scale was observed in 68%, moderate in 30%, low in 2%. Basic anti-inflammatory therapy was received by 78%, steroids by 60% of patients. OP according to densitometry was detected in 39% of patients, according to its presence, patients were divided into 2 groups (OP+ and OP-). All patients underwent standard examinations, including EchoCG.

**Results:** There were no differences in pain intensity, CRP level, and CIC in both groups. In the OP+ group, the average dose of prednisone (7.7 $\pm$ 3.38 mg) and ESR were higher ( $p<0.05$ ). In the OP+ group, the prevalence of coronary heart disease, atherosclerosis and CHF was higher ( $p<0.05$ ). According to EchoCG data in the group with OP, the relative wall thickness, the thickness of the posterior wall of the left ventricle, the mass index of the myocardium of the left ventricle were higher ( $p<0.05$ ), despite

the absence of differences in the prevalence of hypertension. At the same time, the ejection fraction in the OP+ group was lower ( $p < 0.05$ ).

**Conclusion:** The presence of OP is characterized by the absence of significant features of the course of RA, which confirms the complexity of its clinical diagnosis and the need for densitometry in all patients. The presence of OP in patients with RA is associated with negative cardiovascular manifestations. Such patients are significantly more likely to have concomitant cardiovascular pathology: atherosclerosis, coronary heart disease, CHF. Echocardiographic parameters of myocardial hypertrophy, being independent predictors of an unfavorable prognosis, indicate that the presence of OP in patients with RA leads to an increase in cardiovascular risk.

## P675

### CALVARIAL DOUGHNUT LESIONS WITH BONE FRAGILITY IN A CHILD: A CASE REPORT

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**Objective:** To present a case of an extremely rare skeletal disorder. Calvarial doughnut lesions with bone fragility is a rare autosomal dominant primary bone dysplasia characterized by multiple doughnut-shaped calvarial lesions associated with numerous pathologic fractures, elevated serum alkaline phosphatase levels and osteopenia.

**Methods:** Case presentation.

**Results:** We present a case of 5-year-old boy with periodic episodes of sharp crying with cyanosis and subsequent loss of consciousness for several minutes after sudden movements, bumps or falls from the first year of life. From the age of 3 the boy began to complain of back pain, stopped running and jumping, avoided active games. Laboratory examination revealed an elevated serum alkaline phosphatase level during the life (461-782 u/l). MRI of the spine: compression fractures of the C7, Th2-9, Th12 vertebral bodies. Bone densitometry: low BMD at the lumbar spine (Z-score -4.2 SD). Whole exome sequencing identified heterozygous mutation c.148C>T in the SGMS2 gene, located in GRCh37/hg19 chr4:108816857. The computational (in silico) analysis using predictive programs revealed the probability of pathogenicity of 87%. This mutation was previously described in two patients with autosome-dominant condition «Calvarial doughnut lesions with bone fragility» (OMIM: # 126550). The proband's father had about 40 fractures during his life. A CT scan of his skull revealed doughnut-shaped calvarial lesions. The same lesions of the skull were also found in proband's cousin. He had no fractures, but was short in stature. The proband's grandmother also had mul-

tle fractures and complains of back pain. All family members were found to have low density according to bone densitometry. Bisphosphonate therapy (pamidronic acid) was started to the boy because of the progression of vertebral compression deformities, a decrease in bone density and severe pain. After 2 courses of treatment, the boy began to run and jump and his back pain stopped; bone density increased markedly (Z-score -1.9 SD). Bisphosphonate therapy is also planned for the boy's grandmother. All examined family members receive treatment with calcium and vitamin D.

**Conclusion:** It is important for a medical specialist to know about rare genetic diseases of the skeleton, modern possibilities for their diagnosis and treatment.

## P676

### ASSOCIATION BETWEEN SARCOPENIA AND OSTEOPOROSIS IN WOMEN WITH HIP FRACTURE: A CROSS-SECTIONAL STUDY.

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**Objective:** To assess the association between sarcopenia defined according to the revised criteria from EWGSOP2 and osteoporosis in women with a hip fracture. A second aim was to investigate the thresholds for low appendicular lean mass (aLM) and handgrip strength to optimize osteoporosis detection.

**Methods:** We investigated women with subacute hip fracture consecutively admitted to our rehabilitation ward. A scan by DXA was performed to assess body composition. A Jamar dynamometer was used to measure handgrip strength. Sarcopenia was diagnosed with both handgrip strength <16 kg and aLM <15 kg. Osteoporosis was identified with femoral BMD <2.5 SD below the mean of the young reference population.

**Results:** We studied 262 of 290 women. Osteoporosis was found in 189 of the 262 women (72%; 95%CI from 67% to 78%) whereas sarcopenia in 147 (56%; 95%CI from 50% to 62%). After adjustment for age, time interval between fracture and DXA scan and body fat percentage the odds ratio to have osteoporosis for a sarcopenic woman was 2.30 (95%CI from 1.27 to 4.14; P=0.006). Receiver operating characteristic curve analyses showed that the best cutoff points to discriminate osteoporosis were 20 kg for handgrip strength and 12.47 kg for aLM. Adopting the optimized thresholds to define sarcopenia, the adjusted odds ratio to have osteoporosis for a sarcopenic woman was 3.68 (95%CI from 1.93 to 7.03; P<0.001).

**Conclusion:** We show a positive association between sarcopenia defined according to the EWGSOP2 criteria and osteoporosis in 262 women with hip fracture: the EWGSOP2 criteria can capture the concomitant presence of bone fragility. The association may be bettered by refining the cutoff points for low aLM and handgrip strength.

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### IMPACT OF HEREDITY ON DENSITY-INDEPENDENT FRACTURE RISK

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**Objective:** Numerous genetic and environmental factors - triggering different pathways - can cause fractures. The risk of osteoporotic fracture is influenced by inherited factors, as geometry, trabecular morphology, intrinsic bone tissue quality, biophysical markers of bone remodeling, BMI, the age of onset of first menstruation and menopause.

**Methods:** We analysed the data provided by 665 respondents with performed densitometry over a 10-y period. To examine the correlations between fractures, T and Z values and the family history of fragility fractures, we used logistic regression analysis.

**Results:** We checked the distribution of fractures based on T and Z values. Among those with a positive family history, we found higher T values in all ranges, but a highly significant difference ( $p=0.002$ ) was observed in the range -1.49 to -1, with a total of 134 cases and a percentage difference of 30,2. The average values of Z-scores for those with a family history was 30% lower ( $p=0.0173$ ). The history-positive individuals were more likely ( $OR=2.853$ ,  $p<0.001$ ) to develop fractures than those with a negative family history.

**Conclusion:** Most fractures in those without a family history occur at lower BMD scores than in the other group. Having a family history of fractures, will increase by almost 3-fold the risk of an individual to suffer a fracture. This effect is independent of the family history's effect on the BMD.

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### PREVALENCE OF GERIATRIC SYNDROMES IN PATIENTS 60 YEARS AND OLDER WITH HIP FRACTURE

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**Objective:** The presence of geriatric syndromes (GS) in patients with hip fractures may reduce rehabilitation and impair quality of life. They have a negative impact on major outcomes after fractures (falls, fractures, quality of life, physical activity, mortality). We aimed to study the prevalence of GS in patients 60 years and older with hip fracture.

**Methods:** The study included all patients ( $n=140$ ) with a hip fracture aged 60 y or older who admitted to an emergency care hospital within 3 months. We used assessment scales: Barthel activities daily living index, Lawton instrumental activities of daily living scale, questionnaire "Age is not a hindrance", Morse Fall Scale, SARC-F, Mini-Cog test, Mini Nutritional assessment, VAS, Overactive Bladder Questionnaire Short Form, Geriatric depression scale, Insomnia Severity Index.

**Results:** The mean age of patients was  $81.3\pm 7.67$  y (women  $82.5\pm 6.54$  y, men  $75.86\pm 10.81$  y). Because of dementia 40 (30.7%) patients were not interviewed for other GS. Decreased cognitive function was noted in 55 (55.0%) patients. 3 (3.0%) patients were completely dependent on assistance, 7 (7.0%) were severely dependent, 31 (31.0%) moderately and mildly dependent. According to Lawton scale 66 (66.0%) were dependent on assistance. Frailty was detected in 20 (20.8%) patients, prefrail condition was detected in 37 (38.5%). A high risk of falls was noted in 95 (95.0%) patients. Probable sarcopenia was revealed in 65 (69.2%) patients. Malnutrition was detected in 3 (3.2%), increased risk of it in 13 (13.7%). Chronic pain syndrome disturbed 34 (35.4%) patients. Nicturia was detected in 61 (61.0%) patients, stress urinary incontinence in 3 (3.0%), combined urinary disorders in 6 (6.0%) persons. Depression was detected in 47 (53.4%) respondents. Mild sleep disturbances were revealed in 24 (27.3%) patients, moderate - in 17 (19.3%), severe - in 2 (2.3%). Visual impairments were noted in 90 (75.6%) patients, hearing loss in 68 (57.1%). 6 (6.12%) patients didn't have any GS, 15 (15.3%) had 1-2 GS, 14 (14.3%) had 3-4 GS, 63 (64.3%) had  $\geq 5$  GS.

**Conclusion:** The results of this study confirm the high prevalence and severity of GS in elderly patients with hip fracture.



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**LIPID PROFILE OF PATIENTS WITH RHEUMATOID ARTHRITIS RECEIVING INTERLEUKIN-6 INHIBITORS**S. Spitsina<sup>1</sup>

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**Objective:** To evaluate changes in lipid profile in RA patients receiving inhibitors of IL-6 (iIL-6) with methotrexate (MT).

**Methods:** The study enrolled 15 patients with RA receiving MT in a dose of 15 mg or more per week for at least a year and tocilizumab as an infusion according to the standard scheme. Lipid profile, DAS28-CRP(4) were assessed before and after 24 weeks of combined therapy. Exclusion criterion was the presence of concomitant disease, which could affect lipid metabolism.

**Results:** The mean age of RA patients was 52.4±7.8 y with a disease duration of 6.2±3 y. All patients were positive for rheumatoid factor, had DAS28-CRP(4)>5.2, advanced and late clinical stages. Elevated levels of total cholesterol (TC) were registered in 80% of cases. The mean value of the TC was 6.45±1.7 mmol/l. Increase of triglycerides level was registered in 40% of cases, LDL - in 80%, and decrease of HDL - in 60%. Most patients had type II hyperlipidemia with a high degree of atherogenicity: IIa - 8 persons (53.3%), IIb - 4 persons (26.7%). Correlation analysis showed a direct correlation of TC with age, menopause, and excess body weight. The duration of RA was directly correlated with TC, LDL; disease activity had a negative effect on HDL. By week 24 all patients had positive dynamics of clinical and laboratory manifestations of the disease: ESR (from 42.8 to 8.6 mm/h), CRP (from 12.4 to 2.1 mg/l), DAS28-CRP(4) indices (from 6.2 to 2.9). By week 24 of the combined therapy, hypercholesterolemia was already detectable in 93.3% of patients; mean TC level increased from 6.45 to 6.96 mmol/L.

**Conclusion:** iIL-6 improves the effectiveness of treatment in RA patients, reduces the activity of the inflammatory process. High frequency of hypercholesterolemia is revealed in patients, whose degree increases by the 24th week of combined therapy, which requires timely correction of lipid profile in RA patients with hypercholesterolemia by means of statins.

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**DYNAMICS OF PAIN SYNDROME IN PATIENTS WITH RHEUMATOID ARTHRITIS RECEIVING INTERLEUKIN-6 INHIBITOR**L. Shilova<sup>1</sup>, S. Spitsina<sup>2</sup>

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**Objective:** To assess pain syndrome dynamics in rheumatoid arthritis (RA) patients receiving IL-6 inhibitor (iIL-6) in combination with methotrexate (MT) in clinical practice using clinical and laboratory indexes as well as quality of life indexes.

**Methods:** The study enrolled 15 patients diagnosed with RA. Among them there were 11 women, 4 men. The mean age was 56.6±7.4 y, duration of disease was not less than 12 months. All patients had DAS28-CRP(4)=6.4±0.46. All the patients received MT at a dose of 15 mg/week for at least a year. Tocilizumab (TCZ) was administered in the form of infusions at a dose of 8 mg/kg according to the standard regimen. DAS28-CRP(4), CDAI, SDAI, quality of life by HAQ-DI and SF-36 questionnaires, pain perception and disease activity by patient and doctor on VAS before combined therapy and after 24 weeks were assessed.

**Results:** By week 24 of the combined MT and TCZ treatment all patients registered a 50% improvement in ACR criteria scores. Positive dynamics of clinical and laboratory manifestations of the disease were observed: reduction of ESR (from 44.4 to 7.6 mm/h), CRP (from 21.4 to 0.96 mg/L), DAS28-CRP(4) (from 6.4 to 3.4), CDAI (from 45.8 to 14.72) and SDAI (from 47.94 to 14.82). There was a significant improvement in the form of pain intensity reduction: decrease of pain intensity (from 54.4 mm to 8.4 mm) and disease activity according to patient (from 58.4 mm to 8.2 mm) and physician (from 59.6 mm to 14 mm) on the VAS. There was also an improvement of quality of life on the HAQ-DI (from 1.176 to 0.652) and SF-36 questionnaires (physical component from 32.04 to 43.74, mental component from 51.7 to 56.42).

**Conclusion:** iIL-6 increases potential of the combined therapy with MT in RA, which is manifested in marked positive dynamics of parameters, reflecting severity of pain syndrome, activity of inflammatory process, achievement of improvement according to ACR20/50/70 criteria.

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### PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG GREEK FARMERS: A CROSS-SECTIONAL STUDY

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**Objective:** To investigate the prevalence rates of musculoskeletal disorders (MSDs) in Greek farmers.

**Methods:** This cross-sectional study was conducted among 101 farmers from two Greek provinces (Crete Island and Achaia County). Data were collected using a structured questionnaire consist of demographic questions and the Nordic Musculoskeletal Questionnaire (NMQ) for WMSDs assessment in nine body regions. The study protocol was approved by the Ethical Committee of the Technological Educational Institute of Western Greece.

**Results:** The sample comprised 101 Greek farmers (69 men and 32 women), with a mean age of 54.33±2.48 y. The proportion of female farmers was 31.7% (n=32) while men were 68.3% (n=69). The overall prevalence of work-related injuries during the past 12 months was 71.6%. The most common anatomic areas involved, were the lower back (78 %) followed by the shoulders (62%) and the knees (54.5%). Female therapists reported a significantly higher prevalence of work-related musculoskeletal disorders than the male therapists (73.0%, P<0.05). The mean number of hours worked was found to be significantly higher among those with an MSD (P<0.05). Type of farming was not a factor in influencing the development of MSDs.

**Conclusion:** The results from this study found a high prevalence of MSDs among Greek farmers. Results show that lower back and upper extremity MSDs were the most affected areas among Greek farmers. Overall, MSDs were more common in farmer working longer hours. Further investigation is needed to explore risk factors in the development of MSDs among farmers living in Greece.

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### PHYSIOTHERAPISTS' PERCEPTIONS OF AND WILLINGNESS TO USE TELEREHABILITATION IN GREECE DURING THE COVID-19 PANDEMIC

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**Objective:** To investigate physiotherapists' perceptions of and willingness to use telerehabilitation in Greece during the COVID-19 pandemic

**Methods:** Greek physiotherapists completed an online survey between January and February 2022. A questionnaire was distributed via the Panhellenic Physiotherapy Association (PSF). The questionnaire involved 26 items on demographic background, working situation, private and professional use of digital technology, overall experience and challenges of telerehabilitation and 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 206 physiotherapists (women 57.3%; mean age of 39.71 y). Most physiotherapists (n=112; 54.4%) were working in a private clinic, in the areas of outpatient orthopedics, geriatrics, and neurorehabilitation. Overall, most participants (54.4%) reported increased use of telerehabilitation strategies during the COVID-19 pandemic. 113 physiotherapists (n=59.2%) believed that telerehabilitation may be beneficial as supplementary way of patient management. Greek physiotherapists made use of low-cost and easily-accessible digital technologies, such as a mobile phone and online meeting tools (e.g., Skype, Zoom). One disadvantage of telerehabilitation is the limited scope for a physical examination. Most Greek physiotherapists (79.6%) reported that they want to receive more information about digital technology and telerehabilitation.

**Conclusion:** Most of the participants were willing to deliver physiotherapy via telerehabilitation. Specific education and training programs need to be provided among Physiotherapists during and after the pandemic. Healthcare managers should consider the use of telerehabilitation and should design guidelines and policies to manage the telerehabilitation practices in Greece.

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**BONE HEALTH IN SURVIVORS OF A PROLONGED STAY IN INTENSIVE CARE UNIT**A.-F. Rousseau<sup>1</sup>, R. Deroisy<sup>2</sup>, M.-P. Lecart<sup>2</sup>, V. Massenet<sup>2</sup>, N. Sarlet<sup>2</sup>, B. Misset<sup>1</sup>, E. Cavalier<sup>3</sup>, J.-F. Kaux<sup>2</sup>

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**Objectives:** Few studies have investigated the impact of a stay in intensive care unit (ICU) on the skeleton. The aim of this retrospective analysis was to describe the bone status of ICU survivors 3 months (M3) after discharge and to compare it with pre-ICU status and status at 12 months (M12) after discharge.

**Methods:** All adults who survived an ICU stay  $\geq 7$ d from January 1, 2019 to September 30, 2021 were included if they attended the M3 consultation at our follow-up clinic. The standardized assessment included lumbar spine, total hip and femoral neck BMD measurement (Hologic Discovery and Delphi scans, cross-calibrated), serum bone turnover biomarkers (bone alkaline phosphatase and tartrate-resistant acid phosphatase 5b) and vitamin D (VTD) status (25(OH)-D) measurements. BMD was categorized as normal, osteopenic or osteoporotic according to T- and Z-scores, age and sex. Some patients also attended a similar consultation at M12. BMD was compared to pre-ICU values, if available.

**Results:** 155 patients (35.5% women, age 63 (55-70)y.o., BMI 28.6 (24.2-31.9)kg/m<sup>2</sup>) survived an ICU stay of 14 (9-23) d and had a bone status assessment at M3. At M3, 86/155 patients (55.5%) were on VTD supplementation. Osteopenia and osteoporosis were found respectively in 26/155 (16.8%) and 9/155 (5.8%) at lumbar spine, in 40/155 (25.8%) and 6/155 (3.9%) at total hip, and in 57/155 (36.8%) and 14/155 (9%) at femoral neck. Bone markers were into normal ranges, and 25(OH)-D reached 29.6 (21.5-37.9) ng/ml. Only 17/155 patients had pre-ICU data: BMDs were not different compared to M3. On the contrary, 37/155 were followed at M12, and 22/37 (59.5%) were supplemented with VTD. Compared to M3, there was a significant decrease in BMD for total hip (-1.7 (-3.6 to -0.5)%,  $p < 0.001$ ) and for femoral neck (-2.6 (-5.1 to +0.3)%,  $p = 0.001$ ), but not for lumbar spine (-1.2 (-3.8 to +1.1)%). These changes did not translate in change of bone diagnostic category, and were not influenced by gender, age, ICU length of stay. No significant change in bone markers was observed. 25(OH)-D significantly decreased, reaching 23 (17.2-30.5)ng/ml ( $p = 0.001$ ).

**Conclusion:** Total hip and femoral neck BMD significantly decreased at M12 compared to M3, without any translation in bone diagnostic category. Potential association with patients and ICU characteristics requires further investigation.

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**INCIDENCE OF JUVENILE ONSET POLYARTHRITIS IN A RHEUMATOID ARTHRITIS POPULATION**A. A. Ibovi Mouondayi<sup>1</sup><sup>1</sup>CHU Ibn Rochd, Casablanca, Morocco

**Objective:** Juvenile idiopathic arthritis (JIA) is not an isolated disease; the term applies to a number of non-infectious chronic arthritis in children that share certain characteristics. The current classification system of the International League of Associations for Rheumatology defines the categories of the disease according to clinical and laboratory signs, including polyarticular juvenile idiopathic arthritis (negative or positive rheumatoid factor), the most progressive form often towards rheumatoid arthritis (RA). This study aimed to determine the incidence of juvenile onset arthritis in a general RA population.

**Methods:** This is a retrospective descriptive study, from January 2019 to October 2021.

Inclusion criteria: all patients diagnosed with RA according to the ACR/EULAR 2010 criteria

Exclusion criteria: all patients followed for chronic inflammatory arthritis other than RA.

**Results:** 278 patients were included, 268 women and 10 men with a sex ratio of 0.037.

The average age of patients was 56.14 y with extremes ranging from 16-79 y. The mean disease duration was 9.89 y with extremes ranging from 4 months to 34 y. Four patients or 1.43% of patients were initially diagnosed with JIA and the average age was 20.5 y. The mode of onset of the disease was in polyarticular form with positive rheumatoid factor and ACPA with lesions on standard radiography.

**Conclusion:** Juvenile onset rheumatoid arthritis is rare, the age of onset of the pathology is around 20 years old with a polyarticular onset mode.

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### MULTIPLE MYELOMA IN A MALE PATIENT WITH INADEQUATE RESPONSE TO OSTEOPOROSIS TREATMENT: A CASE REPORT

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**Objective:** Osteoporosis, known as the silent disease, in the absence of a fracture is an asymptomatic condition and an often overlooked problem in men. Osteoporosis-related mortality and morbidity rates are higher in men but men are less evaluated for osteoporosis and are less likely to receive treatment after a fracture. Secondary osteoporosis is more frequent in men than in women. Multiple myeloma is one of the rare causes of male osteoporosis. The aim of this case report is to draw attention to the importance of investigating the causes of secondary osteoporosis in a male patient with inadequate response to osteoporosis treatment.

**Methods:** Case report

**Results:** A 66-year-old male patient presented with chest and flank pain a year ago. The pain, which lasted for 2 d, started while playing games with her 3-year-old grandson. Physical examination revealed no swelling bruise or crepitation in the chest area. In the radiological examination, the patient was found to have no rib fracture, and height loss was detected in the lower thoracic vertebrae. BMD and laboratory tests were requested. Laboratory examinations revealed hemoglobin 12.6 g/dL, MCV 96, erythrocyte sedimentation rate (ESR) 62 mm/h, vitamin B12 126 pg/mL, an increased level of leukocytes in the urine while other laboratory tests were normal. In the BMD results, L1-L4 total T-score was -3.1 BMD 0.750 g/cm<sup>2</sup>, femur total T-score was -1.5 BMD 0.802 g/cm<sup>2</sup>, femoral neck T-score was -1.1 BMD 0.774 g/cm<sup>2</sup>. Zoledronic acid 5 mg/iv, calcium carbonate and cholecalciferol treatments were planned in addition to antibiotic therapy and vitamin B12 replacement. The patient, who was readmitted to our clinic 11 months after his first examination, had a complaint of flank pain. In the control laboratory tests, the total protein was 8.2 g/dL and the ESR was high as 106 mm/h; hemoglobin 11.7 g/dL, platelet 141000, parathormone 9.2 pg/dL, magnesium 1.7 mg/dL, and serum calcium and phosphorus, liver function tests, kidney function tests, thyroid function tests, free testosterone, gonadotropin and prolactin, prostate-specific antigen, C-reactive protein, albumin values were within normal limits. In bone densitometry results, L1-L4 total T-score was -3.7 BMD 0.680 g/cm<sup>2</sup>, femur total T-score was -1.4 BMD 0.819 g/cm<sup>2</sup>, femoral neck T-score was -1.0 BMD 0.790 g/cm<sup>2</sup>. Serum and urine electrophoresis and immunofixation, protein and creatinine in spot and 24-h urine, IgA, IgG, IgM, kappa and lambda light chain were evaluated. The patient was

consulted to hematology clinic with the detection of IgA elevation and kappa light chain elevation. The patient who underwent bone marrow biopsy was diagnosed with multiple myeloma.

**Conclusion:** Multiple myeloma is an important pathology that should not be ignored in the differential diagnosis of patients with inadequate response to osteoporosis treatment.

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### ROLE OF PLATELET-RICH PLASMA AND HYALURONIC ACID IN THE TREATMENT OF PATIENTS WITH IMPINGEMENT SYNDROME OF VARIOUS AGE GROUPS

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**Objective:** Impingement syndrome is one of the most common causes of shoulder pain. PRP and HA are widely used in this disease. The question of the effectiveness of these drugs in patients of different ages has not been studied enough. We aimed to compare the effectiveness of PRP and HA in patients with impingement syndrome, taking into account age and the presence of risk factors that may affect the outcome of treatment

**Methods:** The study included 100 patients, 54% men and 46% women, mean age 51.5±15.1. All had chronic shoulder pain (≥3 months). Patients ≥45 y 66%, <45 y 34%. All patients are divided into 2 groups. 1st group - 3 subacromial injections of PRP with an interval of 7 d, 2nd group - 2 subacromial injections of HA. The dynamics of pain was assessed by VAS, functional disorders according to the ASES (American Shoulder and Elbow Surgeon Assessment) and CSS (Constant Shoulder Assessment) scales, and a decrease in the need for NSAIDs after 6 months.

**Results:** Pain decreased from 56.0±14.6 to 31.8±26.3 and from 57.6±17.8 to 30.2±26.3 (p=0.768), ASES increased from 54.8±13, 8 to 74.6±22.4 and from 54.7±15.1 to 77.3±22.5 (p=0.552). CSS from 59.2±14.4 to 66.9±17.4 and from 47.8±16.9 to 65.6±19.3 (p=0.245). The dynamics of functional and pain parameters is higher in patients under 45 y of age. VAS after 6 months was 22.4±26.3 and 35.5±26.2 (p=0.022), ASS 83.3±20.9 and 72.1±22.6 (p=0.017), CSS 76.2±16.1 and 63.2±18.2 (p=0.001). Patients with VAS <40 mm: women 55.6%, men 52.1%, BMI<30 kg/m<sup>2</sup> 59.4%, BMI >30 kg/m<sup>2</sup> 50.2%, single tendon involvement 58.2%, damage to more than one tendon 50.7%, baseline VAS <50 mm 56.9%, VAS >50 mm 51.2%. These factors did not affect the outcome of treatment. No serious adverse reactions reported



**Conclusion:** The effectiveness of PRP and HA does not differ. Efficiency is higher in patients under 45 y of age. Treatment was not affected by gender, BMI, pain level, number of affected tendons.

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### EXPERIENCE OF USING RITUXIMAB IN SYSTEMIC LUPUS ERYTHEMATOSUS

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**Objective:** To study the efficacy of rituximab (RTM) in patients with active systemic lupus erythematosus (SLE).

**Methods:** The study included 102 patients with SLE (SLICC, 2012) (mean age 33.85±10.58 y). A high (30.8%), very high (39.2%) degree of disease activity by SLEDAI 2K (mean±SD -17.64±8.80). All patients received glucocorticoids (GCs), cyclophosphamide-37.2%, mycophenolate mofetil-55.9%, azathioprine-20.6%, methotrexate-11.8%, hydroxychloroquine-55.9% and biological drugs-11.9%. According to indications and recommendations of EULAR (2019) 11 patients were prescribed the drug RTM "KPhK" (biosimilar). Risk factors for an unfavorable outcome were identified in all 11 patients: the onset of the disease in adolescence (n=4), male sex (n=2), central nervous system damage ((n=2), active nephritis in the first 3-6 months from the onset (n=8), and of them with progressive renal failure (n=3), high activity of the disease (n=11), thrombocytopenia (n=2), the presence of ≥2 organ damage (n=10). RTM was administered to 9 patients 500 mg weekly N<sup>o</sup>4 (max dose -2000 mg), 1 patient - only 3 infusions (allergic reaction), 1 patient - 500 mg weekly N<sup>o</sup>2 (cancellation for nonmedical reasons).

**Results:** After 12 months, all patients showed positive dynamics, a significant decrease of activity (from 17.64±8.80 to 10.61±6.01), a reduction in the dose of GCs to maintenance doses, and cancellation. In the group of patients receiving RTM, there was a decrease in the activity of the disease by 2 times (from 15.58±6.40 to 6.58±4.23 points), a decrease in the level of proteinuria, edematous syndrome (in 7 patients), a distinct improvement in kidney function (decrease in creatinine, urea (n=3), withdrawal from programmed hemodialysis (n=1). In patients with neuropsychiatric manifestations, there was a decrease in headache attacks, cognitive disorders and epileptic seizures, normalization of platelet levels.

**Conclusion:** Rituximab is the drug of choice in the presence of risk factors for an unfavorable outcome of SLE. Early diagnosis of SLE and timely treatment can achieve rapid clinical improvement,

effective reduction of disease activity and the opportunity to manage patients at low maintenance doses (or cancellation) of GCs and reduce the risk of irreversible organ damage.

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### DEVELOPMENT OF A GLOBAL STRATEGY TO STRENGTHEN HEALTH SYSTEMS FOR PREVENTION AND MANAGEMENT OF MUSCULOSKELETAL HEALTH

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**Objective:** To empirically derive strategies to strengthen health systems in response to the rising burden attributed to musculoskeletal (MSK) conditions to guide strategy development.

**Methods:** A 3-phase program was undertaken.

Phase 1: qualitative study with virtual semi-structured interviews with international key informants (KIs) representing peak global or international organisations. Verbatim transcripts were analyzed using grounded theory approach.

Phase 2: scoping review of national MSK-specific health policies, evaluated with content analysis, to identify MSK policy trends and foci across the 30 most populated nations.

Phase 3: informed by phases 1–2, a global two-round eDelphi where panelists rated and iterated a framework of priorities and detailed components/actions, including identification of essential actions. Round 1 collected feedback on the logic model and components through quantitative ratings (analysed using the RAND UCLA approach) and free text fields. Round 2 collected feedback

on the revised framework, assessed value and credibility using a Likert scale (1-5) and identified elements that were 'essential, desirable, or unsure'.

#### Results:

Phase 1: 31 KIs representing 25 organisations sampled from 20 countries (40% low- and middle-income (LMIC)). Inductively-derived themes used to construct a Logic Model consisting of 5 guiding principles, 8 strategic priority areas and 7 accelerators for action.

Phase 2: Of 165 documents identified, 41 (24.8%) from 22 countries (88% high-income countries) and 2 regions met the inclusion criteria. 8 overarching policy themes, supported by 47 subthemes, were derived, aligning closely with the Logic Model.

Phase 3: 674 panelists from 72 countries (46% LMICs) participated in Round 1 and 439 (65%) in Round 2. 59 components were retained with 10 (17%) identified as essential for health systems globally. 97.6% and 94.8% of panelists agreed or strongly agreed the framework was valuable and credible for health systems strengthening. Ultimately, a framework of 8 pillars and 59 components was proposed.

**Conclusion:** An empirically derived framework, co-designed and strongly supported by multi-sectoral stakeholders, can now be used as a blueprint for global and country-level responses to strengthen health systems for MSK health.

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## P689

### A CONCORDANCE STUDY OF CT DENSITOMETRY WITH DXA DENSITOMETRY

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**Objective:** To assess the concordance of spinal CT densitometry with current standard of assessment through DXA-derived densitometry.

**Methods:** 50 patients who had had both a DXA scan of the lumbar spine and CT lumbar spine/thorax/abdomen performed within 18 months of each other were included.

The CT images were analysed to attain a mean Hounsfield score of the lumbar vertebrae and this was compared to DXA derived T-scores. A Hounsfield score of 131 was used as the threshold for diagnosing osteoporosis akin to a DXA-derived T-score of -2.5. The final data was analysed to find correlation values of Hounsfield score with T-score using Pearson correlation coefficient.

**Results:** The mean Hounsfield score was 108.4 (osteoporotic) compared to a mean T-score of -1.22 (osteopenic) with a statistically significant correlation coefficient of 0.447, ( $p < 0.01$ ).

Using T-score  $< -2.5$ , 15 (30%) of the patients included on our study would have a diagnosis of osteoporosis whereas this would be 36 patients (72%) if using the threshold of Hounsfield score  $< 131$ . Out of the 50 patients included, 15 had vertebral fragility fractures. The mean T-score for these patients was -1.2 (indicating osteopenia) and mean Hounsfield score was 108 (indicating osteoporosis).

**Conclusion:** Our study showed a moderate positive correlation between the DXA-derived T-scores and CT Hounsfield scores. This further validates previous studies that suggest CT scans can be used to identify patients with osteoporosis. 93% of patients with vertebral fragility were identified as having osteoporosis using CT densitometry whereas only 40% were identified via DXA. These findings highlight the limitations of DXA, particularly in terms of overestimation of BMD related to degenerative changes. CT images of the thorax, abdomen or lumbar spine that have already been performed for other indications can be used to opportunistically screen for osteoporosis without additional radiation exposure, waiting time or cost. This may allow for more accurate diagnosis and subsequent treatment and fracture risk reduction.

## P690

### WHAT FACTORS ARE INVOLVED IN THE DEVELOPMENT OF CHRONIC POSTOPERATIVE PAIN?

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**Objective:** One of the most common complications after total hip (HJ) and knee (KJ) total arthroplasty (TA) is chronic postoperative pain (CPOP). The search for the factors that determine this pathology is an urgent scientific and practical task. We aimed to determine the factors that are associated with the development of POP in patients undergoing TA KJ or HJ.

**Methods:** The study involved 124 patients with osteoarthritis (OA) KJ or HJ, 63% women and 37% men, age  $63.6 \pm 9.9$  y, who underwent TA KJ or HJ. The evaluation was carried out after 3 and 6 months, by telephone survey. CPOP was diagnosed in the presence of moderate/severe pain ( $\geq 40$  mm VAS) that persisted for at least 3 months. and requiring continuous use of analgesics. Groups of patients with CPOP and no CPOP were compared according to a number of factors determined in the preoperative period.

**Results:** The incidence of CPOP was 27.4%. In patients undergoing TA KJ and HJ, there was no difference in the incidence of CPOP: 28.1% and 26.9% ( $p = 0.88$ ). The presence of CPOP was significantly associated with the following parameters: higher BMI, higher pain intensity at rest, higher WOMAC pain index,

WOMAC stiffness and WOMAC total, severity of symptoms of neuropathic pain (PainDetect questionnaire), signs of depression and anxiety (HADS questionnaire). The risk of developing CPOP was significantly higher ( $p < 0.05$ ) in patients with BMI  $> 30 \text{ kg/m}^2$  - odds ratio (OR) 2.755 (95%CI 1.053-7.206), with pain at rest  $\geq 40 \text{ mm VAS}$  - OR 1.349 (95%CI 0.478-3.803), Pain Detect score  $\geq 13$  - OR 3.598 (95%CI 1.048-12.36), HADS depression score  $\geq 8$  - OR 2.193 (95%CI 0.745-6.454), number of sources of pain  $\geq 2$  - OR 6.996 (95%CI 2.358-20.756). **Conclusion:** The risk of developing CPOP after TA KJ and HJ is higher in patients with overweight, high preoperative pain, evidence of neuropathic pain and depression, multiple sources of musculoskeletal pain (other than the affected joint planned for TA).

## P691

### COMPLEX REHABILITATION PROGRAM IN PATIENTS WITH LATERAL EPICONDYLITIS

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**Objective:** To assess the usefulness of a complex rehabilitation program in patients with lateral epicondylitis.

**Methods:** 27 patients diagnosed clinically and imagistic, using ultrasonography, with lateral epicondylitis were included in our study. The studied group included 15 patients that received medication (oral and topical NSAIDs) for analgesic properties and followed a complex rehabilitation program: RICE protocol (rest, ice, compression, elevation), braces such as forearm straps, and physical therapy- transverse friction, stretching, strengthening exercises, extracorporeal shock wave therapy, therapeutic ultrasound and low laser therapy. The control group received medical treatment- topical or oral NSAIDs for pain control, RICE protocol and braces. All the patients included in the 2 groups were advised on how to properly carry out daily activities in order to avoid pain and increase functionality. For the assessment we used 3 parameters: physical impairment by using a hand grip dynamometer, pain by using VAS and functionality using Tennis Elbow Function Scale (TEFS). These were measured at the beginning at the study (T1), after the rehabilitation program which lasted 1 month (T2) and 3 months after the end of the rehabilitation program (T3).

**Results:** We included 27 patients in our observational study, ages between 27-65 years old, with a mean age of 47.3 y. 19 of the patients were men and 8 women. In all patients included in the first group, we found that the mean values of pain free grip strength test, VAS scale and TEFS scores highly improved in T2 evaluation comparing to T1 assessment. After 3 months (T3), improved physical and functional status and also pain level were maintained. As

for patients in the control group the mean values in T2 comparing to T1 have improved, but they have not been maintained to T3 evaluation, in almost half of the patients the symptoms recurred.

**Conclusion:** A complex rehabilitation program is very useful for reducing pain and improving physical and functional status in patients with lateral epicondylitis.

## P692

### EFFECTIVENESS OF PHYSICAL THERAPY IN PATIENTS WITH KNEE OSTEOARTHRITIS AND PES ANSERINE BURSTITIS

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**Objective:** To highlight the usefulness of physical therapy in reducing pain and increasing functionality in patients with knee arthritis and pes anserine bursitis.

**Methods:** 31 patients diagnosed with 2nd or 3rd radiological grade knee osteoarthritis according to the Kellgren-Lawrence scale and pes anserine bursitis were included in the study. Patients with any knee surgery history, inflammatory arthritis, or trauma to the knee were excluded from the study. The studied group included 17 patients that received medication (oral and topical NSAIDs) for analgesic properties and followed a complex rehabilitation program: rest, ice, braces, and physical therapy- massage, stretching, strengthening exercises, therapeutic ultrasound and low laser therapy. The control group received medical treatment- topical or oral NSAIDs for pain control, rest, ice and braces. All the patients included in the study were advised on how to properly carry out daily activities in order to avoid pain and maintain/increase functionality. For the assessment we used 2 parameters: pain by using VAS scale and functionality using WOMAC index, measured at the beginning at the study (T1), after the rehabilitation program which lasted 1 month (T2) and 3 months after the end of the rehabilitation program (T3). We also correlated these parameters with the age, gender and BMI.

**Results:** The patients were between 53-75 years old, with a mean age of 63.7 y. The sex ratio female:male was 3:1. The mean BMI was 31.4 in women and 30.7 in men. In all patients included in the first group, we found that the mean values of VAS scale and WOMAC scores highly improved in T2 evaluation comparing to T1 assessment. After 3 months (T3), improved functional status and also pain level were maintained. As for patients in the control group the mean values in T2 comparing to T1 have improved, but they have not been maintained to T3 evaluation in all the patients. BMI was the most important factor associated with pain severity and decrease functionality, in both groups.

**Conclusion:** Physical therapy has positive effects such as reducing pain and improving functional status in patients with knee osteoarthritis and pes anserine bursitis.

### P693

#### HOW EFFECTIVE ARE GLUCOCORTICOID IN PATIENTS WITH RHEUMATIC DISEASES?

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**Objective:** Intraarticular injections of glucocorticoids (IAI GC) are widely used in the treatment of rheumatic diseases (RD). However, there are relatively few current data on their efficacy and safety in clinical practice. We aimed to evaluate the effectiveness of IAI GC in RD in clinical practice.

**Methods:** The study was conducted with the participation of 290 patients with RD, mainly osteoarthritis (OA) and rheumatoid arthritis (RA) (69.0% of women and 31.0% of men, mean age 55.6±12.6 y), who underwent IAI GC in the knee joint. Indications for IAI were determined by the attending physicians. The control group consisted of 112 patients with OA (71.4% of women and 28.6% of men, mean age 59.3±14.6 y), who underwent a course of hyaluronic acid (HA) IVI. The result of treatment was evaluated after 2 weeks, 1 and 3 months according to a telephone survey.

**Results:** After 2 weeks, 1 month and 3 months. after IAI GC, pain intensity on movement 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 the number of patients with no/mild pain (<4 according to NRS) was 63.8%, with complete/almost complete absence of pain (≤1 according to NRS) - 30.3%. The effect of IAI GC was higher in RA than in OA: pain dynamics after 3 months -4.0 [-2.0; -6.0] and -2.0 [-1.0; -5.0], p=0.003. In OA, the effect of IAI GC and HA did not differ: the dynamics of pain after 3 months was -2.0 [-1.0; -5.0] and -3.0 [-1.0; -5.0] p=0.869. Serious adverse reactions were not observed during IAI.

**Conclusion:** IAI GC are an effective and fairly safe method of short-term treatment of patients with RD.

### P694

#### GENETIC MARKERS ARE MESSENGERS OF THE DEVELOPMENT OF POSTOPERATIVE PAIN AFTER TOTAL KNEE AND HIP ARTHROPLASTY

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**Objective:** One of the most common complications after total knee (KJ) and hip (HJ) total arthroplasty (TA) is postoperative pain (POP). The current direction of studying this problem is the search for the genetic features of POP. We aimed to determine the relationship between polymorphisms of the KCNS1, COMT and OPRM1 genes and the development of POP in patients with KJ and HJ osteoarthritis who underwent TA.

**Methods:** 95 patients with OA KJ and/or HJ (64.6% women; age 65.4±9.0), all patients underwent TA KJ (47.8%) or TA HJ (52.2%). POP was determined at persistence or appearance after 3 and 6 months. VAS ≥40 mm in the TA area. All of them underwent genotyping of polymorphisms of the KCNS1 (rs734784), COMT (rs6269, rs4633) and OPRM1 (rs1799971) genes by real-time polymerase chain reaction using original sequence-specific primers and samples labeled with various fluorescent labels. Registration and interpretation of the obtained results were carried out on a DT-96 amplifier.

**Results:** POP occurred in 32.6% of patients who underwent TA KJ or HJ. The incidence of POP after TA KJ and HJ was 30.2% and 34.0% (p=0.882). There were no differences in the genotype frequencies of the studied genes (p=0.05). The presence of the homozygous GG genotype of the KCNS1 gene polymorphism (rs734784) was associated with the presence of POP in accordance with the recessive genetic model (GG vs. AA+AG; odds ratio (OR) – 3.96 [95%CI: 1, 51; 10.37]; p=0.005). The presence of the mutant allele T (TT+mCT) of the COMT (rs4633) polymorphism in the genotype reduced the risk of developing POP compared with the carriage of the CC genotype (OR=0.32 [95%CI: 0.12; 0.83]; p=0, 02) in accordance with the dominant genetic model. There was no statistically significant correlation between the development of POP and the carriage of various genotypes and alleles of the COMT (rs6269) and OPRM1 (rs1799971) genes

**Conclusion:** There is a statistically significant association between the KCNS1 (rs734784) and COMT (rs4633) gene polymorphisms and the development of chronic POP in patients undergoing TA KJ and HJ. Further research into the genetic predisposition to POP is required.



P695

**REACTIVE ARTHRITIS AFTER COVID-19 DISEASE**A. Bumbea<sup>1</sup>, R. Marcu<sup>2</sup>, R. Traistaru<sup>1</sup>, G. Ciorioanu<sup>1</sup>, V. D. Caimac<sup>1</sup>, O. Rogoveanu<sup>1</sup><sup>1</sup>University of Medicine & Pharmacy, <sup>2</sup>University of Medicine and Pharmacy, Craiova, Romania**Objective:** To demonstrate that there is a link between infection with SARS-CoV-2 and possibility to develop reactive arthritis.**Methods:** We examined 25 patients with arthritis during last year. We perform a specific screening for every patient, consist in: biological inflammatory tests-CRP, ESR, rheumatoid factor, CCP antibody, HLG, uric acid, and history of COVID-19. All patients with arthritis and inflammatory biological syndrome received non-steroidal drugs at first moment, than the therapy was modified if it was necessary, according to the biological tests.**Results:** Our results show that the 9 patient out of 25, had a history of COVID-19 and develop a moderate inflammatory syndrome, especially in small joints, asymmetrical and inconstant, but persistent in time. The response was very prompt at small doses of steroidal drugs for a period of 2-3 months, and doses were adapted at every week. After this episode of flair the patients were in good conditions, without other symptoms.**Conclusion:** The reactive arthritis after COVID-19 is a moderate and limitative form of rheumatoid syndrome with a good therapeutic response to steroidal drugs in small doses.

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**WEEKLY VITAMIN D SUPPLEMENTATION IMPROVES INSULIN RESISTANCE AND BONE METABOLISM INDICES IN ELDERLY GREEK PEOPLE WITH PREDIABETES: AN OPEN-LABEL 12-MONTH RANDOMIZED CONTROLLED STUDY**M. Grammatiki<sup>1</sup>, E. Zaromitidou<sup>2</sup>, T. Koufakis<sup>3</sup>, G. Dimakopoulos<sup>4</sup>, G. Karaliolios<sup>3</sup>, E. Melidou<sup>3</sup>, P. Rakitzi<sup>3</sup>, I. Chrisogonidis<sup>5</sup>, I. Iakovou<sup>6</sup>, A. Gotzamani-Psarakou<sup>7</sup>, K. Kotsa<sup>3</sup><sup>1</sup>Division of Endocrinology and Metabolism, First Dept. of Internal Medicine, Medical School, Aristotle University of Thessaloniki, AHEPA University Hospital, Thessaloniki, <sup>2</sup>Nuclear Medicine Dept., Hippokration General Hospital., Thessaloniki, <sup>3</sup>Division of Endocrinology and Metabolism, First Dept. of Internal Medicine, Medical School, Aristotle University of Thessaloniki, AHEPA University Hospital, Thessaloniki, <sup>4</sup>Medical Statistics, Epirus Science and Technology Park Campus of the University of Ioannina., Ioannina, <sup>5</sup>Dept. of Radiology, AHEPA University Hospital of Thessaloniki, Faculty of Medicine, School of Health Sciences, Aristoteleion University of Thessaloniki., Thessaloniki, <sup>6</sup>Second Academic Nuclear Medicine Dept., Academic General Hospital of Thessaloniki "AHEPA", Aristotle University of Thessaloniki., Thessaloniki, <sup>7</sup>Medical School, Aristotle University of Thessaloniki, Thessaloniki, Greece**Objective:** Both vitamin D deficiency and prediabetes are common worldwide. The known consequences of vitamin D deficiency include osteoporosis and fractures. Osteoporosis has been recently found to be more common in people with prediabetes than in normoglycemic ones, although data regarding prediabetes and skeletal health are limited. We aim to study the effect of vitamin D supplementation on bone metabolism among elderly Greek people with prediabetes and vitamin D deficiency.**Methods:** 77 elderly women and men with prediabetes and vitamin D deficiency were included in the study and were randomly assigned to a weekly dose of vitamin D 3 of 25,000 IU (n=42) or nothing (n=35), in addition to lifestyle measures. Anthropometric measurements were obtained. Blood samples were collected from all participants at the beginning of the study to measure the levels of glucose and bone metabolism biomarkers along with 25-hydroxyvitamin D. BMD at lumbar spine, femoral necks and hips was assessed using the DXA method at baseline and at 52 weeks. All statistical analysis were performed using IBM SPSS v.26.**Results:** Participants in the intervention and control group presented comparable baseline characteristics in terms of age, BMI, fasting glucose, fasting insulin, HbA1c, HOMA-IR index, serum 25-hydroxyvitamin D levels, BMD of the left femoral neck, lumbar spine TBS and all rest biochemical parameters. In the supplemented group, 25-hydroxyvitamin D concentration increased significantly at 52 weeks compared to baseline (31.97±7.557 ng/

ml vs.  $19.98 \pm 6.73$  ng/ml,  $p < 0.000$ ) while it did not change significantly in the control group. Insulin resistance improved in supplemented individuals compared to control group at 52 weeks, as it was reflected from both fasting insulin levels ( $9.85 \pm 5.687$  vs.  $13.75 \pm 12.803$  mU/L, respectively,  $p = 0.046$ ) and HOMA-IR index ( $2.49 \pm 1.603$  vs.  $3.64 \pm 3.690$ , respectively,  $p = 0.048$ ). BMD of the left femoral neck was higher in supplemented individuals than the control group at 52 weeks ( $0.987 \pm 0.197$  vs.  $0.895 \pm 0.146$  g/cm<sup>3</sup> respectively,  $p = 0.027$ ). The same trend was evident for the lumbar spine TBS at 52 weeks, although not statistically significant ( $1.314 \pm 0.101$  vs.  $1.272 \pm 0.091$  respectively,  $p = 0.068$ ).

**Conclusion:** In elderly people with prediabetes, long-term vitamin D supplementation on a weekly scheme led to the improvement of both insulin resistance (HOMA-IR) and bone metabolism (BMD of the left femoral neck and lumbar spine TBS) indices. Further studies are needed to confirm the abovementioned observations in larger populations and to elucidate the relevant mechanisms.

## P697

### SUBCLINICAL MYOSITIS SYNDROME IN PATIENTS AFTER MODERATE AND SEVERE DISEASE OF COVID-19

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**Objective:** To establish if is any connection between myositis syndrome in patients after COVID-19, moderate and severe respiratory forms.

**Methods:** We examined 10 patients which came in recovery department for respiratory problems after COVID-19, moderate and severe clinical forms. All patients were clinical evaluated and 6 patients still declare muscle pain. We start to perform biological inflammatory test and myositis profile. All patients received a specific program of respiratory kinetotherapy.

**Results:** Our research shown us that only 4 patients out of 6 with muscle pain have a modified myositis profile, with moderate values, and also the inflammatory test were mild modified.

**Conclusion:** After moderate and severe form of COVID-19 could be noticed a mild modified myositis profile, but is necessary more studies of large cohort of patients to declare a real connection between this two medical conditions.

## P698

### ETIOLOGY OF FOCAL BONE LESIONS IN CHILDREN: A RETROSPECTIVE MONOCENTER FIVE-YEAR COHORT STUDY

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**Objective:** Focal bone lesions in children are heterogenous group, caused by different reasons, such as infection (bacteria, fungi, mycobacteria), non-bacterial osteomyelitis, neoplastic diseases (malignant and benign) and non-inflammatory conditions, such as endocrine disorders, cysts, etc. The study aim is to analyze the structure of focal bone lesions with a clinical findings of disease more than 2 months in pediatric patients.

**Methods:** In the retrospective cohort study we included data of 829 children with nonmalignant focal bone lesions, who underwent a surgery at the St. Petersburg Research Institute of Phthiopolmonology between 2016-2020. Clinical data, radiographic images, histological and bacteriological findings were analyzed.

**Results:** There were 383 male and 446 female patients with a mean age of 8.0 y. The etiological structure was presented by four groups: I) tuberculosis osteomyelitis (TBO) – 287 (34.6%) patients; II) nontuberculosis infectious osteomyelitis, including bacterial, fungal and parasitic infections (IO) – 284 (34.3%), III) nonbacterial osteomyelitis (NBO) – 57 (6.9%), IV) NID – noninflammatory diseases (bone cysts, benign tumors, Langerhans's cell histiocytosis, aseptic necrosis, avascular necrosis) – 201 (24.2%). No differences in gender distribution between groups was observed ( $p = 0.261$ ). Monofocal lesions were detected in 749 (90.3%) patients, multifocal lesions were predominantly in NBO (42.1%,  $p = 0.000001$ ). There were differences between affected bones, compare to studied groups: spine (TBO – 60 (20.4%), IO – 138 (46.9%), NBO – 18 (6.1%), NID – 78 (26.6%);  $p = 0.0000001$ ); sternum (TBO – 29 (65.9%), IO – 9 (20.5%), NBO – 3 (6.8%), NID – 3 (6.8%);  $p = 0.00008$ ); ribs (TBO – 27 (60%), IO – 5 (11.1%), NBO – 3 (6.7%), NID – 10 (22.2%);  $p = 0.001$ ); tibia (TBO – 48 (42.1%), IO – 35 (30.7%), NBO – 12 (10.5%), NID – 19 (16.7%);  $p = 0.004$ ); foot (TBO – 17 (23.3%), IO – 26 (35.6%), NBO – 20 (27.4%), NID – 10 (13.7%);  $p = 0.0000001$ ).

**Conclusion:** The study demonstrates a wide range of diseases characterized by focal bone destruction. The most frequent localization of foci in the spine and lower extremities. The etiological structure is dominated by inflammatory processes. The frequency of TBO and nontuberculosis etiology is comparable. TBO bone lesions are characteristic of young children.

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**PSYCHOSOMATIC ASPECTS OF PAIN IN PATIENTS WITH FIBROMYALGIA**R. Grekhov<sup>1</sup><sup>1</sup>Zborovsky' Research Institute For Clinical and Experimental Rheumatology, Volgograd, Russia

**Objective:** Fibromyalgia is a special form of extraarticular soft tissue disease characterized by diffuse pain and fatigue of the skeletal muscles, and a decrease in the pain threshold on palpation in some areas. Aim of the study was to investigate the influence of pain syndrome on the formation of some psychological characteristics of the personality of fibromyalgia patients.

**Methods:** 100 women with fibromyalgia, aged 24-51 y, were examined. The diagnosis was made in accordance with ACR 2010 fibromyalgia diagnostic criteria. Clinical parameters of pain were assessed using a visual analogue scale and expressed in points (from 0 to 10). The individual standardized test methods were used in order to investigate the psychological status of the patients: NL [1] and LSI [2].

**Results:** The manifestations of pain in patients with fibromyalgia was  $7.25 \pm 0.17$  points in average, which can be regarded as pronounced as revealed the data of our study. Pain scores significantly correlated with patient age ( $r=0.30$ ,  $p=0.002$ ) and disease duration ( $r=0.30$ ,  $p=0.002$ ). When examining the psychological status of patients with fibromyalgia, a high level of anxiety was noted ( $7.8 \pm 0.98$  points). Indices of the scales of asthenia ( $6.72 \pm 0.17$ ), depression ( $6.46 \pm 0.15$ ), hypochondria ( $5.53 \pm 0.18$ ) were regarded as moderate. It was also revealed that the manifestation of musculoskeletal pain significantly correlated with asthenia ( $r=0.30$  at  $p=0.032$ ), depression ( $r=0.25$  at  $p=0.011$ ) and hypochondria ( $r=0.32$  at  $p=0.001$ ). It can be assumed that the intensity of pain causes the growth of the examined neurotic features. On the other hand, due to an increase in the level of depression, asthenia, hypochondria, there is an increase in musculoskeletal pain.

**Conclusion:** Taking into account the peculiarities of the course of fibromyalgia, the lack of clear ideas about the pathogenetic mechanisms and methods of treatment, the clinical and psychological characteristics of patients we revealed can provide some assistance for the selection and timely activation of appropriate psychotherapeutic correction programs in order to increase the effectiveness of the treatment.

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P700

**ANALYSIS OF ADVERSE REACTIONS OF LOCAL NSAIDS THERAPY IN PATIENTS WITH MUSCULOSKELETAL DISEASES**A. Useinova<sup>1</sup>, E. Egorova<sup>1</sup>, E. Gerashenko<sup>2</sup>, S. Mar'yanenko<sup>2</sup>, S. Kulanthaivel<sup>3</sup>, V. Kaliberdenko<sup>4</sup>

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**Objective:** WHO data of Global Burden of Disease study (2019) indicates that 1.71 billion people worldwide suffer from disorders and diseases of the musculoskeletal system. In arthrological diseases, pain is most often chronic in nature, mainly of inflammatory origin which requires continuous therapy to improve the quality of life. Even with balanced and reasonable prescribing of a drug, the risk of adverse reactions (AR) persists. Topical administration of drugs is widely used to avoid systemic adverse drug reactions. Purpose of the study is to study the AR that occur with the local use of NSAIDs in the treatment of musculoskeletal diseases.

**Methods:** The object of the study is the notification cards about the AR of drugs registered in the database of Crimean region from 2019-2021.

**Results:** During this period, 310 cases developed AR from the use of NSAIDs (for musculoskeletal diseases) were registered in the regional database, which accounted for 14% of the total number of registered AR cases during 2019-2021. AR were more observed in patients aged from 45-60 y (74%), it's more often in women (55%) than in men. With long-term resorptive use of NSAIDs, patients have an increased risk of developing obesity by 2.25 times, gastritis by 2 times, phlebitis by 1.8 times, CAD by 1.73 times. So, physicians tend to avoid the resorptive effect of NSAIDs and often use them locally. But in our observation, topical NSAIDs can also cause significant ARs. These adverse events include skin reactions, including urticaria 61.3%, Quincke's edema 4.5%, no effect in 11.1%, cardiovascular manifestations 10.3%, dyspepsia in 6.4%, hemodynamic disorders 2.9%, from the respiratory system 0.6%, Lyell's syndrome (0.3%), anaphylactic shock (2.6%). Life-threatening conditions have been observed with the use of piroxicam (Quincke's edema), ketoprofen (anaphylactic shock), diclofenac (Lyell's syndrome).

**Conclusion:** The analysis of the notification cards registered in the database made it possible to identify a high frequency of serious adverse reactions requiring the withdrawal of the suspected drug and urgent pharmacological correction. Ketoprofen was the "leader" drug in terms of the incidence of such adverse events. Drugs of the NSAID group should be prescribed carefully,

taking into account the risks of developing adverse reactions not only with resorptive, but also with their local use, since they have a fairly high risk of adverse reactions from various organ systems.

P701

### STRUCTURAL AND FUNCTIONAL STATE OF BONE TISSUE IN ADOLESCENTS WITH IDIOPATHIC SCOLIOSIS AND GENERALIZED PERIODONTITIS

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**Objective:** Treatment of generalized periodontitis (GP) is a complex and lengthy procedure, voluminous in interventions, even quite costlier. Therefore, early diagnosis and prevention of GP seems to be relevant. These measures are most effective in adolescence, when the formation of periodontal tissues is not yet fully completed. This age stage is also interesting in that it is characterized by another "surge" of metabolic processes in the body, a peak in bone mass growth, as well as a sharp increase in the incidence of pathology of the musculoskeletal system, including idiopathic scoliosis (IS). Today, the point of view on the indirect influence of pathological changes in the bones of the supporting skeleton on the maxillofacial region is generally recognized. This allows us to consider dorsopathy and orofacial disorders as comorbid conditions. We aimed to study the structural and functional state of bone tissue in adolescents with GP and IS.

**Methods:** We observed 152 adolescents aged 15-16 y (62 boys and 90 girls) with varying degrees of curvature of the spine and mild GP. They made up the main group (MG). Comparison group (CG) - 27 adolescents with IS without GP. The control group (Cont.G) consisted of 20 practically healthy adolescents. The bone tissue strength index (BMSi,%) was determined using an "Achilles+" ultrasonic osteodensitometer (Lunar-General Electric Medical Systems, USA) on the calcaneus. According to the WHO recommendation, the severity of osteopenia or osteoporosis was assessed by the T-test in SD values from the peak bone mass of persons of the corresponding age and sex. SD up to -1 was interpreted as normal, from -1 to -2.5 as osteopenia, from -2.5 or more as osteoporosis.

**Results:** BMSi in the groups was defined as: in the Cont.G - 86.15±8.33%, CG - 79.69±11.54%, MG - 71.55±10.53%. In the MG, the bone tissue strength index was within the normal range in 70 people (46.05%), osteopenia was determined in 76 people (50%),

osteoporosis in 6 people (3.95%). The mean SD corresponded to osteopenia. With an increase in the degree of spinal deformity, the BMSi values decreased.

**Conclusion:** Studies have shown a more significant decrease of index in adolescents with IS and GP, when compared with those who suffered only from IS. So adolescents with IS need timely dental care to prevent such serious complications.

P702

### PREVALENCE OF DENTAL PATHOLOGY IN PATIENTS WITH JUVENILE RHEUMATOID ARTHRITIS

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**Objective:** Nowadays it's known that pathological changes in the supporting skeleton in childhood lead to the formation of comorbid pathologies, including dental ones. Drug therapy for diseases of the musculoskeletal system can also have side effects that manifest themselves in the oral cavity. Stably high and progressive growth is characterized by such a disease as juvenile rheumatoid arthritis (JRA). As a basic therapy for JRA in many countries of the world, the cytostatic drug methotrexate is used. It is quite aggressive and has a number of side effects. In this regard, it is of interest to study the dental status in JRA patients taking methotrexate. We aimed to study the prevalence of dental diseases in patients with JRA under methotrexate therapy.

**Methods:** 285 people aged 7-16 y with a diagnosis of JRA were examined. We studied the prevalence of dental caries, enamel hypoplasia, gingivitis, pathology of the lips, tongue and oral mucosa.

**Results:** From the research results, it was found that the prevalence of dental caries in children with mixed dentition (n=144) was 90.97%, in children with permanent dentition (n=141) - 92.91%. Enamel hypoplasia of permanent teeth - 13.19% and 30.5%, respectively. Gingivitis in children with mixed dentition was noted in 40.28% of cases, in children with permanent dentition in 58.87% of cases. The frequency of detection of changes in the mucous membrane of the mouth and lips in the observation group (n=285) was: exfoliative cheilitis - 34.04%, angular cheilitis (lip adhesion crack) - 23.51%, folded tongue - 32.63%, desquamative glossitis ("geographical" tongue) - 35.79%, median rhomboid glossitis - 0.35%, anomalies in the shape of the tongue - 0.7%, herpetic gingivostomatitis - 13.33%, recurrent aphthae of the oral cavity - 15.44%, candidal stomatitis - 12.63%.



**Conclusion:** The conducted studies have shown a high prevalence of dental diseases in patients with JRA under methotrexate therapy. When providing dental care to this contingent, an integrated approach is needed, taking into account the pathogenetic mechanisms of the development of background pathology. In order to improve the quality of life of patients with JRA, therapeutic and preventive measures should be carried out by dentists of various specializations and in the early stages.

## P703

### PTH STATUS IN HF PATIENTS: TIME TRENDS OVER 20 YEARS AND ASSOCIATION WITH IN-HOSPITAL OUTCOMES

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**Objective:** To investigate in hip fracture (HF) patients time trends (over 20 y) of hyperparathyroidism (HPT) and its influence on hospital outcomes.

**Methods:** In 3719 consecutive HF patients (mean age 82.8±8.1 y; 76.4% females) admitted between 1999-2019, clinical and laboratory parameters, including PTH, 25(OH) vitamin D [25(OH)D] and in-hospital outcomes (mortality, length of stay [LOS]) were analysed. Elevated PTH (>6.8 pmol/L) indicated HPT. Trends were assessed in four 5-y periods using Poisson regression; the models were adjusted for age, gender, HF type, lifestyle factors and various pre-fracture chronic conditions, including vitamin D deficiency (<25 mmol/L), chronic kidney disease (CKD, eGFR >60 ml/min/1.73m<sup>2</sup>), anaemia, coronary artery disease (CAD), type 2 diabetes mellitus, chronic obstructive respiratory disease, dementia.

**Results:** The prevalence of HPT in the entire cohort was 48.7%. Comparing the first and the last 5-y period, the prevalence of HPT increased by 14.3% (from 44.0% to 50.3%), while prevalence of vitamin D deficiency decreased by 78.1% (from 34.2% to 7.5%), CKD by 26.8% (from 47.3% to 34.6%) and the all-cause mortality rates by 23.9% (from 6.7% to 5.1%). In patients with HPT mortality declined from 9.0% to 4.9% (- 45.6%), in patients without HPT from 4.4% to 3.1% (- 29.5%). Every 5-y the prevalence of HPT increased on average by 9.8% (incidence rate ratio [IRR] 1.098, 95%CI 1.04-1.16, p<0.001), whereas prevalence of vitamin D deficiency decreased by 26% (IRR 0.74, 0.84-0.66, p<0.001), CKD by 34% (IRR 0.66, 0.60-0.73, p<0.001) and the mortality rate by 15% (IRR 0.85, 0.75-0.97, p=0.021). The independent determinants of HPT were CKD (IRR 1.51), vitamin D deficiency (IRR1.35), and age (IRR 1.01) (all p<0.001). Fatal outcomes were significantly and independently associated with HPT (IRR 2.06), CKD (IRR 1.74), CAD (IRR 1.52), vitamin D deficiency (IRR 1.51) and age (IRR 1.05) (all p<0.01). HPT was not associated with LOS>10 days (IRR 1.04, p=0.371).

**Conclusion:** In HF patients, prevalence of HPT, an independent significant determinant of postoperative mortality, over 20 y remained relatively steady, despite decreasing prevalence of vitamin D deficiency and/or CKD. Future research should address causes for HPT and therapies for this disorder.

## P704

### BISPHOSPHONATE THERAPY FOR OSTEOPOROSIS IN WOMEN WITH BREAST CANCER: A 6-YEAR FOLLOW UP

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**Objective:** Osteoporosis (OP) resulting from breast cancer treatment may cause fractures and affect patient's quality of life, however, bisphosphonates including alendronate, risedronate and zoledronic seem to be beneficial for bone status in this population. This study was designed to explore the efficacy of bisphosphonates to enhance the BMD in postmenopausal women with osteoporosis and treated for breast cancer.

**Methods:** Between April 2016 and June 2021, were enrolled all postmenopausal women with breast cancer and a BMD T-score ≤-2.0. Participants received bisphosphonates for a maximum of 5 years or until disease progression. BMD at the lumbar spine and femoral neck was recorded at the start of the study then every 2 y for 6 y. Vitamin D and phosphocalcic evaluation were performed.

**Results:** 215 patients were included, the average age was 58.7 y (37-85 y) with an average age of discovery of the cancer at 56.2 y. 98% of patients were postmenopausal and 29% of them had menopause after treatment. The mean time from starting adjuvant therapy and diagnosing OP was 23.4 months. lumbar spine was affected in 79% of cases with a mean T-score of -2.85 and mean BMD at 0.863. Osteoporotic patients were treated with bisphosphonates, 57% of which received alendronate, 22% risedronate and 21% zoledronate in addition to dietary measures and correction of phosphocalcic abnormalities. After 5 y, mean BMD increased significantly by 10.3% at the lumbar spine and by 7.4% at the femoral neck. No case of fracture was reported during the treatment.

**Conclusion:** Breast cancer patients under treatment are at risk of OP, because of the age of onset of cancer, menopause secondary to chemotherapy, corticosteroid therapy and estrogen depletion induced by hormone therapy. Whatever the class of bisphosphonate used, it appears to prevent further bone loss in postmenopausal breast cancer patients with osteoporosis starting adjuvant treatment. These findings were maintained at 6 y and support the benefits of bisphosphonate therapy in this high-risk population.

## P705

**EFFECTS OF ZOLEDRONIC ACID ON BONE MINERAL DENSITY IN MOROCCAN PATIENTS WITH OSTEOPOROSIS TREATED FOR BREAST CANCER**R. Assadi<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Dept. of Rheumatology/CHU Ibn Rochd, Casablanca, Morocco

**Objective:** Hormone therapy used for breast cancer can be responsible for deleterious effects on the bone leading to secondary osteoporosis (OP) and fractures. Zoledronic acid, as a class of bisphosphonates, has been proven to protect against hormone therapy induced bone loss. We aimed to determine whether intravenous zoledronic acid is effective in postmenopausal Moroccan patients with osteoporosis (OP), treated with hormone therapy for breast cancer.

**Methods:** We conducted a retrospective study in the rheumatology department over 6 y (2016-2021). Inclusion criteria: Patients followed for breast cancer in the oncology department, treated with hormone therapy and referred to the rheumatology department for bone evaluation and treatment. OP was considered when the T-score at the 3 sites (lumbar spine, femoral neck and total hip) is <-2. The phosphocalcic abnormalities were corrected before the measurement of BMD. All these patients underwent BMD evaluation.

**Results:** We included, 187 patients, the average age was 61.25 y (37-82 y) with an average age of discovery of the cancer was 58.12 y. All patients were postmenopausal and 30% of them had menopause after treatment. All of them were treated by hormone therapy, 85% were treated with anti-aromatase and 15% with tamoxifen. 136 patients (68%) had OP, lumbar spine was affected in 86% of cases with a mean T-score of -2.98 and mean BMD at 0.854. Osteoporotic patients were treated with bisphosphonates, 22 patients received annual intra venous perfusion of zoledronate in addition to dietary measures and correction of phosphocalcic anomalies. The BMD of the lumbar spine increased by 3.2 and 5.7% at 24 and 36 months, respectively. An increase in BMD was observed at the femoral neck, bilaterally.

Characteristics	n=136
Age (y)	
mean	61.25
range	37 - 82
Type of hormone therapy	
Anti aromatase	85%
Tamoxifen	15%
History of fracture	0

Sites of OP	
Lumbar spine	86%
Femoral neck	17%
Total hip	14%
Mean BMD	
1 <sup>st</sup> year	0.854
24 months later	0.881 (+ 3.2%)
36 months later	0.902 (+5.7%)

**Conclusion:** Annual treatment with intra venous zoledronic acid is associated with a great increase of BMD among Moroccan patients receiving adjuvant hormone therapy for breast cancer and would be a practical alternative to treat the bone loss in these patients.

## P706

**SEVERELY DESTRUCTIVE UNILATERAL HAND ARTHRITIS: AN UNUSUAL PRESENTATION OF RHEUMATOID ARTHRITIS**R. Assadi<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Dept. of Rheumatology/CHU Ibn Rochd, Casablanca, Morocco

Rheumatoid arthritis (RA) is the most common chronic inflammatory rheumatism. It is classically characterized by simultaneous and symmetrical joint damage of the extremities, in particular the joints of the hands. Unilateral involvement with advanced deformities of the hand is unusual. We report the case of a 45-year-old female patient followed for seropositive RA, diagnosed according to the criteria of the 1987 ACR for 22 y. She has been treated with methotrexate for 18 y. She presented a gradual installation over 11 years of unilateral deformities of the right hand. It was an irreducible metacarpophalangeal (MCP) flexum with ulnar deviation, boutonniere deformity of the thumb, and a swan-neck aspect of 5th finger, achieving the typical appearance of a rheumatoid hand. The right wrist was mobile and painless. The left hand did not show any deformities. The other joints were free and painless. Radiologically, the MCP lines presented subluxations, the proximal and distal interphalangeal joints were pinched, with destruction of the head of the proximal phalanx of the 5th finger. Intercarpal joints were normal. The contralateral hand did not present with advanced radiological lesions. Her disease activity had been in remission for the past 5 y on methotrexate. This observation is singular by the asymmetric character of this rheumatoid hand. To our knowledge, this is the first observation reported in the literature.

P707

**CHRONIC HAND EDEMA: RARE EXTRAARTICULAR MANIFESTATION IN RHEUMATOID ARTHRITIS**R. Assadi<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Dept. of Rheumatology/CHU Ibn Rochd, Casablanca, Morocco

Rheumatoid arthritis (RA) is the most common chronic inflammatory rheumatism. Patients usually present painful swelling of the hands and feet due to synovitis of joints. Chronic edema limited to the extremities is exceptionally reported in RA. We report the case of a 55-year-old female patient, whose seropositive and deforming RA had diagnosed 37 y previously, initially treated with corticosteroids for 17 y, currently on leflunomide for 20 years. Her disease has been in remission for 1 y. For over 30 y, she presents progressive, symmetrical and persistent edema in both hands, and clumsy as far as to the wrist, while the forearm was not swollen. It was a significant, painless and elastic infiltration of the dorsal face of both hands and all of the fingers. The skin was tight but normal looking with positive Stemmer's signs. The patient flexed her fingers with difficulty. There was no infiltration of the rest of the upper limbs or the lower limbs. Assessment of the other causes of peripheral edema was normal. Among the extraarticular manifestations of RA, chronic oedema of the limbs remains unusual and often unrecognized. The pathophysiological mechanism of edema in RA is not well understood. Treatment is poorly codified and the prognosis is primarily functional.

P708

**SERUM VITAMIN D LEVELS IN PATIENTS WITH OSTEOPOROSIS BEFORE AND AFTER COVID-19 PANDEMIC**D. Ruci<sup>1</sup>, M. Jordhani<sup>2</sup>, J. Petromilo<sup>1</sup>, N. Ajasllari<sup>1</sup>, S. Selhanej<sup>1</sup><sup>1</sup>UHC Mother Teresa, Tirana, <sup>2</sup>Korça Regional Hospital, Korça, Albania

**Objective:** The COVID-19 pandemic regenerated the immune-modulatory role of vitamin D and various data showed that people with normal values of serum vitamin D, had fewer chances of having a severe SARS-CoV-2 infection. This fact impelled medical staff to advise their patients to increase their daily dose of vitamin D. This study aimed to evaluate the levels of serum vitamin D in patients with osteoporosis before and after the COVID-19 pandemic.

**Methods:** This is a prospective study. 222 osteoporosis patients were evaluated for their vitamin D levels before the beginning of the COVID-19 pandemic and 2 y later. They were also asked if there was another reason other than osteoporosis for them, to take vitamin D supplementation more regularly. All patients were

part of a two-centered study to evaluate the level of vitamin D and consciousness for their primary disease and SARS-CoV-2 infection prophylaxis.

**Results:** Of 222 patients with osteoporosis, 156 (70.3%) had their vitamin D level increased compared to 2 y ago. The average increase of vitamin D levels in these patients was 35.2%. According to 121 patients (54.5%), the pandemic was a strong reason to ameliorate their therapy with vitamin D supplementation.

**Conclusion:** From our study, it was seen that there existed a strong increase in vitamin D levels in patients with osteoporosis in 2 y during the COVID-19 pandemic. It existed a greater awareness for the protection that vitamin D levels offer regarding immunity, following medical advice. COVID-19 awareness maybe was stronger than osteoporosis awareness.

P709

**ROLE OF PREGABALIN IN PAIN TREATMENT IN PATIENTS WITH OSTEOARTHRITIS**M. Jordhani<sup>1</sup>, D. Ruci<sup>2</sup>, J. Petromilo<sup>2</sup>, N. Ajasllari<sup>2</sup>, S. Selhanej<sup>2</sup><sup>1</sup>Korça Regional Hospital, Korça, <sup>2</sup>UHC Mother Teresa, Tirana, Albania

**Objective:** Treating pain in osteoarthritis may be very challenging in some cases due to the patient's comorbidities, drug adverse effects, and the patient's reluctance to chronic therapy. Due to its good tolerability at moderate doses, pregabalin could be a good add-on candidate in patients with a poor effect of analgesics, NSAIDs, or codeine. Our aim was to evaluate the Universal Pain Scale in patients with osteoarthritic pain before and after Pregabalin administration.

**Methods:** This was a prospective study that included 125 patients with generalized osteoarthritis. They were treated according to pain treatment recommendations (acetaminophen, codeine, NSAIDs) but the results were not satisfactory. It was decided to add pregabalin (75-150 mg/d) for a period of 20-30 d and then reevaluate the Universal Pain Scale.

**Results:** One month after commencing pregabalin, there was a reduction of pain in 112 patients (89.6%). The average pain score before adding pregabalin was 8.6/10. After 1 month of pregabalin, the average pain scale was 4.9/10. The average reduction of pain according to the Universal Pain Scale was 3.7 units. Seven patients (5.6%) complained of vertigo and light headedness while taking pregabalin, but this was temporary and not a reason for stopping the drug.

**Conclusion:** From our study it was observed an important reduction of pain after adding pregabalin to standard therapy, in patients with drug-resistant osteoarthritic pain. The pain scale reduction and the good tolerability could be of great benefit in the challenging cases of generalized osteoarthritis.

P710

### PREVALENCE OF OSTEOPOROSIS AND FRACTURES IN A COHORT OF PATIENTS WITH ACROMEGALY

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**Objective:** We describe the prevalence of fractures and low BMD in a cohort of patients with acromegaly.

**Methods:** Cross-sectional study, 14 patients with acromegaly were included. We did a review of medical records, in search for fractures and diagnosis of osteoporosis, we included other risks factors for osteoporosis and fractures such as diabetes mellitus and hypogonadism. Patients with traumatic fractures were excluded.

**Results:** 14 patients (9 men and 5 women) were studied, with a mean age at diagnosis of acromegaly of 48.64 y; Median serum IGF-1 at diagnosis was 462.81 ng/dl and median growth hormone after a glucose load was 10.60 ng/dl. During data analysis, osteoporosis was found in 2 of 14 patients (14.28%) by BMD criteria; 3 of 14 had hypogonadism (21.42%) and 3 of 14 had type 2 diabetes mellitus (21.42%). Within the population with osteoporosis, one patient (50%) had hypogonadism and diabetes mellitus. None of the patients that were included in this cohort had fragility fractures and 2 of the patients had findings in the spine MRI compatible with vertebral deformity due to osteoarthritis.

**Conclusion:** We found a low prevalence of osteoporosis and no fractures in the studied population despite having independent risk factors such as diabetes mellitus and hypogonadism. Several studies have found a higher prevalence of vertebral fractures with normal or low BMD in patients with acromegaly. This increased risk of vertebral fracture does not seem to be related to decreased BMD, apparently due to increased cortical thickness and reduced trabecular thickness in acromegaly patients. Other studies have considered this prevalence is overestimated due to the presence of vertebral deformities. Due to the high prevalence of vertebral fractures described in the literature, a frequent search for fractures is necessary to allow an early diagnosis and avoid misdiagnosis of vertebral fractures.

P711

### BONE DENSITY EVALUATION IN PRIMARY SJOGREN SYNDROME: SINGLE CENTRE RETROSPECTIVE ANALYSIS

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**Objective:** Determine the prevalence of reduced BMD in patients diagnosed with primary Sjögren's syndrome (PSS) followed in a rheumatology department and investigate whether there is an association between patient's clinical features with known risk factors for osteopenia and osteoporosis.

**Methods:** This observational and retrospective investigation studied all patients diagnosed with PSS followed in a rheumatology department. BMD assessment was obtained by osteodensitometry and the diagnosis of osteopenia and osteoporosis was defined according to the WHO criteria. Patient's clinical profile was analyzed, and it was investigated the influence of age, years of disease duration, BMI and use of corticosteroids in bone loss, by logistic regression.

**Results:** A total of 38 patients were enrolled in the study. Women to men ratio was 9:1. The mean age was 60.82 y. The mean duration of PSS was 4.76 y. Corticosteroids are used with a frequency of 70.3%. 57.9% of individuals are overweight or obese. The prevalence of reduced BMD was 34.3%. No statistically significant association was found (p-value>0.05) between the considered variables and BMD, meaning that it is not influenced by age, years of disease duration, BMI or use of corticosteroids.

**Conclusion:** Approximately one-third of patients with PSS have reduced BMD. This was not associated with age, years of duration of the primary Sjögren's syndrome, BMI or use of corticosteroids.

P712

### ASSESSMENT OF ENVIRONMENTAL SMOKING AND EFFECTS OF SMOKING ON OSTEOARTHRITIS IN ENUGU STATE, NIGERIA

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**Objective:** Osteoarthritis is one of the leading causes of disability in elderly people, with a prevalence of 13% in Nigerian women. Smoking of cigarette has been associated with chronic musculoskeletal conditions like low-back ache and degenerative disc diseases. In recent times, there has been a n increase in smoking especially the young ones and there are inventions of trendy ways to smoke for example shisha. However, the effect of smoking on



the causes and progression of osteoarthritis has been unclear. There is a research gap on the effect of smoking and osteoarthritis. The findings of this study should help educate smokers on the consequences of their lifestyle.

**Methods:** This study is a descriptive study based on the review of literature. No primary data was collected. The search was limited to a time frame between 1 January 2011 and 31 December 2021. Search words: Smoking, Nicotine, Tobacco, Osteoarthritis. Reference listings of identified articles were also independently sought out for. Search Engines: Google Scholar, PubMed, EMBASE, Cochrane Review and African Journal Online, PsycINFO. Of all the works were reviewed, 50 were selected for inclusion.

**Results:** There was an inverse relationship between smoking and osteoarthritis (odds ratio=0.87; 95%CI, 0.80-0.94). There was a protective of smoking and osteoarthritis especially knee osteoarthritis, stronger in hospital-based than community-based studies.

**Conclusion:** Smokers had a lower rate of osteoarthritis than non-smokers. Some researchers attributed the protective effect to be as a result of nicotine on the chondrocytes in articular cartilage. Also, some researchers proved that smokers are thinner than nonsmokers, and obesity is a major risk factor for osteoarthritis. However, smoking leads to increase of osteoporosis as well as other life threatening diseases. Recommendations: health education, limiting exposure to tobacco.

## P713

### ASSOCIATION BETWEEN KNEE MR IMAGING MARKERS AND KNEE SYMPTOMS OVER 7 YEARS IN YOUNG ADULTS

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**Objectives:** Knee MRI-based morphological markers (quantitative biomarkers) and structural abnormalities (semiquantitative biomarkers) are known to be associated with the progression of knee osteoarthritis (OA). However, there is conflicting evidence on the association between knee MRI-based morphological markers and knee symptoms. Besides, there is a lack of evidence on the clinical significance of MR imaging markers in the general population-based young adults. Hence, our aim was to describe the associations of cartilage volume, cartilage thickness, subchondral bone area, cartilage defects, and bone marrow lesions (BML) with knee symptoms in young adults followed up over 6-9 y.

**Methods:** Knee symptoms (pain, stiffness, and dysfunction) were assessed using the WOMAC scale during Childhood Determinants of Adult Health (CDAH)-knee study at baseline (year: 2008-10, age: 30-40 y) and 6-9 year follow-up (CDAH-3; year: 2014-2019, age: 36-49 y). Knee MRI scans were obtained at baseline and were assessed quantitatively for morphological markers such as cartilage volume, cartilage thickness, subchondral bone area using semi-automated segmentation (Chondrometrics, Germany). Cartilage defects and BMLs were assessed using semiquantitative scoring systems. Univariable and multivariable (adjusted for age, sex, and BMI) zero-inflated Poisson (ZIP) regression model with random effects were used to describe the cross-sectional and longitudinal associations.

**Results:** The prevalence of knee pain at baseline (mean age (SD): 34 (2.7); female 49%) was 34% that increased to 50% over 6-9 year follow-up (mean age (SD): 43 (3.2)). Cross-sectionally, there was a weak but statistically significant negative association between medial femorotibial compartment (MFTC) [ratio of mean (RoM)=0.99971084; 95%CI: (0.9995525, 0.99986921; p<0.001], lateral femorotibial compartment (LFTC) [RoM=0.99982602; 95%CI: 0.99969915, 0.9999529; p=0.007], and patellar cartilage volume [RoM=0.99981722; 95%CI: 0.99965326, 0.9999811; p=0.029] with knee symptoms. Similarly, there was a negative association between patellar cartilage volume (RoM=0.99975523; 95%CI: 0.99961427, 0.99989621; p=0.014), MFTC cartilage thickness (RoM=0.72090775; 95%CI: 0.59481806, 0.87372596; p=0.001) and knee symptoms assessed after 7 y. The total bone area was consistently and negatively associated with knee symptoms at baseline [RoM=0.9210485; 95%CI: 0.8939677, 0.9489496; p<0.001] and over 7 y (RoM=0.9588811; 95%CI: 0.9313379, 0.9872388; p=0.005). Presence of any cartilage defect or BML was associated with higher knee symptoms at baseline and after 7 y.

**Conclusion:** In the middle-aged adult population, BML and cartilage defects were positively associated with knee symptoms, whereas cartilage volume and thickness at MFTC and total bone area were weakly and negatively associated with knee symptoms. These results suggest that the quantitative and semiquantitative MR imaging biomarkers can be explored as a marker of the clinical progression of OA in a young adult population.

P714

**RECURRENT FALLS AND FALL-RELATED FRACTURE MANAGEMENT IN NEUROLOGIC PATIENTS**M. R. Păcurar<sup>1</sup>, D. Păcurar<sup>1</sup>, M. I. Popescu<sup>1</sup>, L. Lazăr<sup>1</sup>, K. Babes<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine and Pharmacy, Oradea, Romania

**Objective:** Syncope, presyncope and fall-related injures represent a major concern for public health, especially in elderly. However, falls and falls risk assessment are not been included in FRAX.

**Methods:** A 60-year-old female patient presents to our Clinic for walking deficit, gonalgia and refractory LS spine pain. She reports recurrent falls with and without injures on the last 2 years. Her medical records revealed left spastic hemiparesis (ischemic stroke), systemic hypertension, permanent atrial fibrillation, dyslipidemia and impaired fasting glucose. She denies alcohol consumption, smoking or substance abuse.

**Results:** At presentation-BMI=40, BP=120/70 mmHg, HR=82 bpm, RR=17 breaths/min, T=36.5°C. Cardiac examination- irregular rhythm, holosystolic murmur in the mitral area. Musculoskeletal examination-bilateral knee pain/crepitus, negative bilateral patellar tap, right + Patrick, painful anterior lumbar flexion, bilateral - Lasegue, bilateral paravertebral DL muscular contracture, + paresis tests on the left side. Lab work revealed hyperglycemia, dyslipidemia. ECG at rest: atrial fibrillation, left ventricular hypertrophy. Transthoracic echocardiography- left ventricular hypertrophy, diastolic dysfunction, mild systolic dysfunction, left atrial enlargement, no visible thrombus, moderate mitral regurgitation, mild tricuspid regurgitation, mild aortic stenosis and regurgitation. X-rays: moderate discarthrosis, bilateral grade II/III gonarthrosis. DXA: lumbar spine T-score -3.6; left femur: -3.0; right femur: -2.3; FRAX: >7.5. Holter ECG- symptomatic intermittent severe bradycardia. After this findings we decided to postpone the rehabilitation program, to adjust her medical treatment (cardiovascular therapy, ibandronicum acid initiation, antialgic and chondroprotective therapy, calcium and vitamin D supplements) and to investigate the viability of coronary vasculature. There was no significant stenosis of coronary artery tree so the patient was prepared for permanent pacemaker implantation.

**Conclusion:** In patients with clear connection between falls and a cardiovascular condition, pacemaker implantation significantly reduces the risk of falls, the risk of osteoporotic fractures and improves quality of life.

P715

**CHEMICALLY SYNTHESIZED BMP2 SECRETAGOGUE PREVENTS GLUCOCORTICOID INDUCED OSTEOPENIA BY ACTIVATING OSTEOGENIC WNT/ $\beta$ -CATENIN SIGNALING AND PROMOTING NRF2 DEPENDENT OSTEOBLAST SURVIVAL**D. Rai<sup>1</sup>, R. Trivedi<sup>1</sup><sup>1</sup>CSIR- Central Drug Research Institute, Lucknow, India

**Objective:** Glucocorticoids (GC) are potent anti-inflammatory, immunosuppressive steroids, an unavoidable drug for numerous systemic diseases. Long exposure of GC affects bone remodeling process and increases skeletal fragility, leading to increased fracture risk. Excess GC also disturb the balance between the free radical generation and the scavenging activities of intracellular antioxidants which results in oxidative stress. We aim to identify compound 5e (chemically synthesized BMP2 secretagogue) as bone sparing molecule in GC induced osteopenic condition.

**Methods:** The effect of dexamethasone and novel BMP2 secretagogue on primary osteoblasts was assessed by alkaline phosphatase (ALP) activity, osteogenic gene expression assays and immunofluorescence. For in vivo studies we coadministered methylprednisolone and 5e (galloyl conjugate of flavanone) in male Balb/c mice for 28 d and then evaluated the effect on bone microarchitecture by microCT, dynamic bone formation, histology along with bone markers.

**Results:** We identify that screening of 20 compounds led us to compound 5e that increases ALP and mineralization activity and prevents GC mediated viability loss in osteoblast and promotes osteoblast differentiation by activating WNT/ $\beta$ -catenin signaling in a BMP2 dependent manner. We validate our results by measuring WNT3a, SOST, GSK3- $\beta$  expression and  $\beta$ -catenin nuclear translocation. 5e decreased the expression of SOST and GSK3- $\beta$  whereas the expression of WNT3a that was downregulated due to administration of GC was restored and nuclear translocation of  $\beta$ -catenin was significantly increased at 1 pM and 100 pM concentrations. 5e also prevents GC mediated ROS production and apoptosis of osteoblast by activating Nrf2 signaling, assessed by western blot, and further validated by immunohistochemistry. In male Balb/c mice, 5e (5 mg/kg) prevents GC induced trabecular and cortical bone loss, promotes bone formation and osteocyte survival. Bone strength and histology data validate 5e as bone sparing molecule. The osteogenic potential of the compound against glucocorticoid induced osteopenia was also authenticated by bone turn over markers as 5e significantly increased serum PINP (# p<0.05) and decreased serum CTX1 (### p<0.001)

**Conclusion:** 5e shows protective effect for GC induced osteopenia and could be a potential drug candidate to counter GC induced bone loss.

P716

### DIETARY MIRNA TARGETS INTER-KINGDOM SCLEROSTIN FOR EFFECTIVE THERAPEUTIC IMPLICATION IN AGING BONE

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**Objective:** Bioactive compounds are found in plants; likewise, our diet also contains different small RNAs, including microRNAs. The fate of orally assimilated miRNAs in the alimentary canal of humans is a topic of debate as plant miRNAs have been found in human sera and other organs and are resistant to degradation due to methyl modification. This leaves scope for investigation and understanding the cross-kingdom gene regulation and how these miRNAs shape the transcriptome and/or inhibit translation. We aim to screen plant miRNAs targeting functionally established protein in aging, sclerostin and validate its therapeutic potential in vitro and ex vivo.

**Methods:** The effect of plant-based miRNA on primary osteoblasts was assessed by alkaline phosphatase (ALP) activity and osteogenic gene expression assays. For ex vivo studies young (4 months) and aged animals (18 months) were sacrificed and osteoblasts were harvested from bone marrow cells. Bone loss in aged animal was confirmed by microCT. Osteogenic potential of plant miRNA ex vivo was evaluated by ALP staining.

**Results:** Our results indicate that out of 5 miRNAs screened gma-miR-4352b from soybean (glycine max) increases ALP and mineralization activity in osteoblasts and promotes osteoblast differentiation by regulating sclerostin (SOST) expression. We validate our results by measuring SOST expression and  $\beta$ -catenin nuclear translocation via immunoblotting. Gene expression of downstream GSK3- $\beta$  and cyclin D1 was also evaluated. gma-miR-4352b significantly decreases the expression of its target SOST to 0.2-fold thus increasing the expression of  $\beta$ -catenin and LRP6 by 2-fold and 2.2-fold, respectively. Cyclin D1 was significantly increased by 2.4-fold whereas GSK3- $\beta$  was decreased to 0.6-fold. gma-miR-4352b also increases the expression of osteo-imperative Runx2 and BMP2 at 50nM by approx. 3-fold. The treatment of dietary miRNA from soybean increases osteoblast differentiation ex vivo (osteoblasts procured from 18-month-old rats and treated with 50 nM gma-miRNA4352b) as assessed by ALP staining. We found that gma-miR-4352b lower the expression of WNT antagonist SOST and increases the osteogenic efficiency in osteoblast by switching on WNT/ $\beta$ -catenin signaling and ultimately increasing the nuclear translocation of  $\beta$ -catenin.

**Conclusion:** Plant derived gma-mir-4352b targets mammalian SOST and regulates WNT/ $\beta$ -catenin pathway thus making inter-kingdom gene regulation an effective therapeutic tool against bone loss.

P717

### DISCORDANCE BETWEEN THE FRAX RISK SCORES WITH AND WITHOUT BMD IN IDENTIFYING HIGH RISK POPULATIONS IN IRAN: THE POCOSTEO STUDY

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**Objective:** Osteoporosis with a high prevalence in elderly population, will impose a significant burden on aging countries. Risk estimation tools can estimate the overall risk based on the individual profiles of risk factors. The FRAX<sup>®</sup> tool provide an estimation using the clinical risk factors (without-BMD) as well as BMD at the femoral neck (with-BMD). We aim to evaluate the frequency of discordance between these two versions.

**Methods:** The subjects were men and women aged  $\geq 50$  y, participating in the first stage of the PoCOsteo study. This study is a population-based cohort to develop a multidimensional fracture assessment tool. The 10-y probability of hip fracture (with and without-BMD) were estimated by the specific FRAX algorithms of Iran. Subjects were categorized based on risk scores to low and high risk, considering the risk-threshold of 3%. Concordance was defined as either low-risk/low-risk or high-risk/high-risk. Discordance was defined as being high-risk and low-risk based on the FRAX/BMD and FRAX/without-BMD, respectively. The stepwise logistic regression model was used to investigate the determinants of discordance.

**Results:** In all, 2000 (1138 women) participants with the mean age of 62.1 ( $\pm 8.1$ ) y were included. The FRAX risk scores were concordant in 1717 individuals, while the discordance was reported in 187 (124 women) participants. The results of regression model showed that adjusting by the potential covariates, discordance was positively associated with age in both sexes (Table). Waist circumference was also positively associated in women [1.02 (1.003-1.04)], while a negative association was detected in men [0.96 (0.94-0.99)]. The odds of discordance in current smokers were increased by 2.83 fold compared to the nonsmokers in men.

	Men		Women	
	OR (95%CI)	P-value	OR (95%CI)	P-value
age	1.07 (1.04-1.10)	<0.001	1.08 (1.05-1.11)	<0.001
Waist circumference	0.96 (0.94-0.99)	0.004	1.02 (1.003-1.04)	0.023
Current smoking	2.83 (1.62-4.9)	<0.001	-	-

**Conclusion:** The results showed that discordance between the two models can be modified by age, waist circumference and smoking.

## P718

### IMPACT OF BREASTFEEDING ON BONE MINERAL DENSITY IN JUVENILE IDIOPATHIC ARTHRITIS

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**Objective:** Juvenile idiopathic arthritis (JIA) is the most common pediatric rheumatic disease [1]. Various factors have been suggested to negatively influence the BMD of JIA patients, such as chronic inflammation, delayed pubertal maturation, malnutrition, muscle weakness, physical inactivity, and glucocorticoid therapy. Even though past breastfeeding was considered by some authors as a protective factor from developing JIA [1], there are no studies investigating the effect of breastfeeding on BMD in this population. Our study aimed to evaluate the influence of breastfeeding on the BMD of JIA patients.

**Methods:** We conducted a cross-sectional monocentric study including JIA patients according to the International League of Associations for Rheumatology (ILAR). Sociodemographic data, as well as disease characteristics, were collected from medical records. Data regarding breastfeeding modalities (mixed or exclusive, duration) were collected by interviewing the mothers. BMD was performed for all the children using the same machine of DXA. The results were expressed as Z-scores. A low bone mass (LBM) was defined as a Z-score of - 2 or more according to the International Society for Clinical Densitometry [2].

**Results:** 27 patients were included in the study. There was a female predominance with a gender ratio of 0.68. The mean age at disease onset was 9.12±2.6 y [4-15]. The mean present age was 12.7±3.2 y [8-19]. The distribution of JIA subtypes was as follows: enthesitis-related arthritis (n=13), oligoarticular (n=8), polyarticular rheumatoid factor RF- (n=2), polyarticular RF+ (n=1), systemic (n=1) and psoriatic arthritis (n=2). The mean bone

mass expressed in Z-score and g/cm<sup>3</sup> was estimated at -0.3±0.9 [-2.6,1.5] and 0.9±0.1 [0.7-1.1], respectively. Osteoporosis and osteopenia were found in one (4%) and four children (15%), respectively. Overall, 92.3% of children were breastfed. Breastfeeding was exclusive in 48.1% of cases. The mean breastfeeding duration was 10.2 months [0.5-48]. Nearly half of the patients (51%) were breastfed for >6 months. Children, whether they were breastfed exclusively or not had similar bone mass in g/cm<sup>3</sup> and Z-score (p=0.9) and (p=0.8). They was no statistically significant correlation between prolonged breastfeeding and BMD (p=0.3). Similarly, no association was noted between breastfeeding and age at onset (p=0.3), present age (p=0.7), the presence of coxitis (p=0.341), and the JIA subtype (p=0.6).

**Conclusion:** Our study showed a high prevalence of breastfeeding and a low prevalence of osteoporosis in our set of patients. However, neither the duration nor the exclusivity of breastfeeding influenced bone mass in children with JIA. Further studies with larger sample sizes are needed to delineate the role of breastfeeding on bone mass in this population.

#### References:

1. Rocha FAC, et al. Clin Rheumatol 2019;38:2227
2. Bordbar M, et al. Arch Osteoporos 2020;15:148

## P719

### UNCOMMON MELORHEOSTOSIS: A RARE CASE SCENARIO

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**Objective:** Melorheostosis (MR) is a rare sclerosing bone dysplasia affecting both cortical bone and adjacent soft tissue structures, with only 400 cases reported in the literature [1]. This condition is grouped with other rare skeletal disorders characterized by disruptions along the bone development pathway and usually affects long bones in a sclerotomal distribution. MR is uncommon in the axial skeleton and is very rare in the ribs. Herein we report a rare case of a polyostotic MR affecting a rib and a tibia.

**Methods:** We report the case of a 37-year-old man with a history of peptic ulcer, left varicocele, and a benign anal canal tumor operated and complicated with persistent postoperative neuropathic pain. He presented with a swelling of the left rib and bone pain on the left tibia. There was no history of remote thoracic trauma, which could have produced callous formation around rib fractures or have resulted in myositis ossificans. The physical examination was normal except for pain on pressure of the left tibia. The white blood count, phosphocalcic balance, PTH, renal function, inflammatory markers were within the normal ranges, except for a low vitamin D level (13.96 ng/ml).



**Results:** The chest CT showed a lacunar aspect of the left rib measuring 2 mm that was not consistent with a fractured callus. The X-ray of the left tibia revealed well limited and eccentric hyperostosis of both the periosteal and endosteal surfaces of the cortex of the proximal and middle third of the left tibia (Figure). There was a distinct demarcation between the affected and normal bone. In order to rule out malignancies, a bone biopsy of the rib was performed. The histologic features common to melorheostotic lesions in conjunction with the patient's clinical presentation and radiographic findings, allowed us to make the diagnosis of MR. The BMD revealed a T-score of -2.6 at the vertebral site. A technetium-99m scintigraphy revealed moderate activity in the left tibia. The patient was treated with oral pamidronate. The evolution was marked by an improvement of the pain on the tibia. Follow-up scintigraphy did not show any uptake.



**Figure.** Front and side X-ray of the left tibia showing eccentric hyperostosis of the cortex of the proximal and middle third of the left tibia.

**Conclusion:** We report a rare case of polyostotic MR located in the rib and tibia. With this unusual anatomical location and the absence of the typical “dripping candle wax” sign, MR may be misinterpreted as an aggressive lesion as was the case of our patient. Further research is needed regarding treatment for better management.

**Reference:** 1. Fratzi-Zelman N, et al. J Bone Miner Res 2019;34:883

P720

## EFFECT OF BODY COMPOSITION ON BONE MINERAL DENSITY AND JUVENILE IDIOPATHIC ARTHRITIS OUTCOMES

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**Objective:** Rheumatic diseases (RD) are prone to metabolism disturbance and osteoporosis as a result of the chronic state of inflammation and treatments. Apart from low BMD, a lower lean mass with loss of strength was reported in adults with RD, also known as rheumatoid cachexia [1]. Childhood and adolescence are the most crucial periods for bone mass acquisition, yet, only few works on body mass composition (BMC) were performed on children with juvenile idiopathic arthritis (JIA). The aim of our study was to investigate the effect of BMC on BMD and disease outcomes in Tunisian patients with JIA.

**Methods:** We conducted a cross-sectional study including children with JIA aged <18 years old according to the ILAR (the International League of Association of Rheumatology) criteria. Sociodemographic data, as well as disease characteristics, were collected from records. BMI was calculated from the ratio of weight/height<sup>2</sup> (kg/m<sup>2</sup>). BMD and body mass composition were analyzed by using DXA. Total body fat tissue mass and lean tissue mass were expressed in percentage. BMD was measured over the whole body. The results were expressed as Z-scores. A low bone mass (LBM) was defined as a Z-score of -2 or more according to the International Society for Clinical Densitometry [2].

**Results:** Overall, 24 children were included in the study. There was a female predominance with a gender ratio of 0.7. The mean age at diagnosis was 9.1±2.4 [4-13]. The mean actual age was 13.5±4.4 [8-25]. The distribution of subtypes of JIA was as follows: enthesitis-related arthritis (n=10), oligoarticular (n=7), Polyarticular RF- (n=3), Polyarticular RF+ (n=1), systemic (n=1) and psoriatic arthritis (n=2). The mean BMI was 19±5 [13.8-35.2]. The mean bone mass expressed in g/cm<sup>3</sup> and Z-score was 1.2±0.5 [1-3] and -0.3±0.9 [-2.6, 1.5] respectively. Only one patient had osteoporosis and 4 patients had osteopenia. A higher BMI was correlated with a higher BMD (p=0.04). Similarly, there was a positive correlation between BMD and total fat mass as well as fat android mass ((r=0.35, p=0.04), (r=0.4, p=0.012) respectively). In contrast, total lean mass and lean android mass were negatively correlated with BMD ((r=-0.359, p=0.04), (r=-0.439, p=0.012). Regarding disease characteristics, there was no association between BMD and BMC with age (p>0.06), age at onset of the disease (p>0.5), sex (p>0.4), ESR and CRP levels (p>0.1), and the presence of coxitis (p>0.07). However, BMD showed a statistically significant association with arthritis course (ERA course had a higher Z-score) (p=0.026).

**Conclusion:** Higher fat mass and the ERA subtype were associated with higher BMD and seem to protect the bone against osteoporosis among JIA population. Other studies with a broader sample would be useful to substantiate these findings.

**References:**

1. El Badri D, et al. Pan Afr Med J 2014;17:115
2. Bordbar M, et al. Arch Osteoporos 2020;15:148

P721

**POST-INFUSION ECG CHANGES IN PATIENTS RECEIVING INTRAVENOUS BISPHOSPHONATES: A SYSTEMATIC REVIEW AND META-ANALYSIS**

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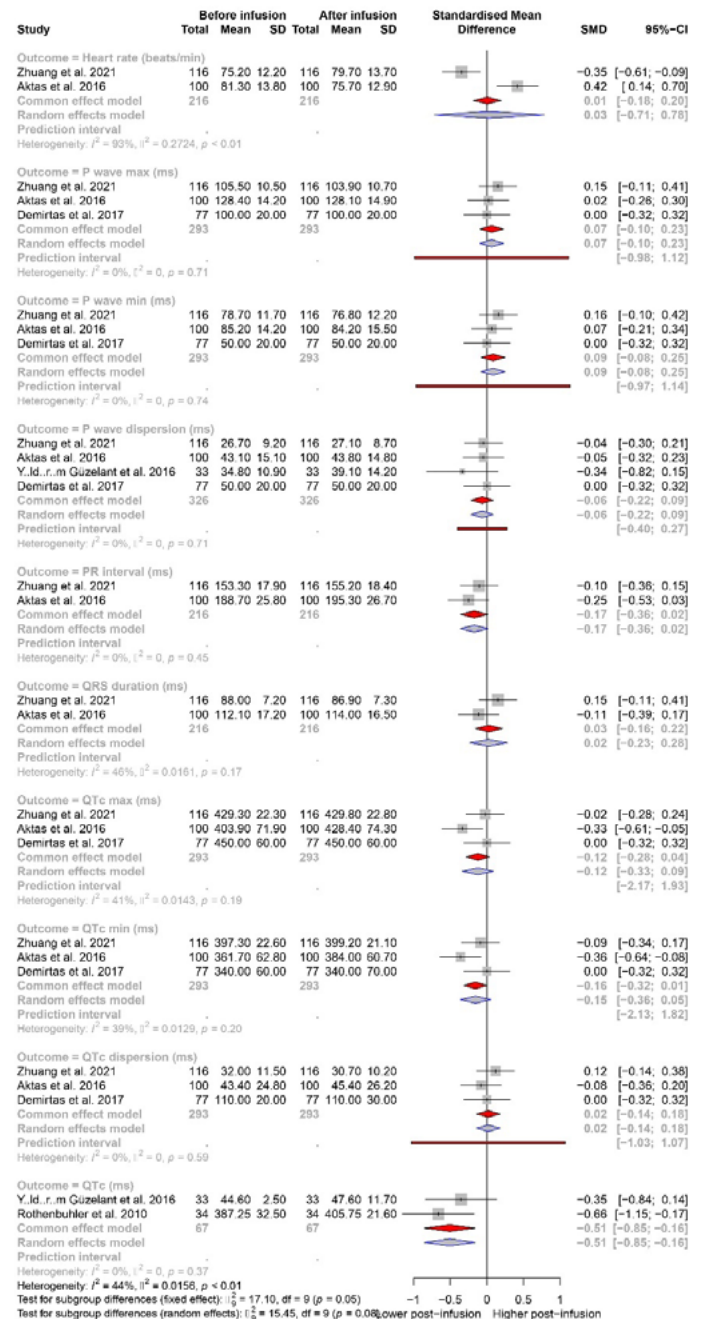
**Objective:** Bisphosphonates are the first-line treatment for several bone and mineral disorders. Randomized trials and cohort studies have reported increased rates of atrial fibrillation in patients receiving bisphosphonates, however, uncertainty remains as to whether other electrical disturbances are precipitated by bisphosphonates. We aim to review the literature for studies reporting ECG findings in patients receiving intravenous bisphosphonates for any indication.

**Methods:** We searched MEDLINE and EMBASE on 06/01/2022 for studies reporting ECG parameters following administration of intravenous bisphosphonates. We excluded studies that only reported atrial fibrillation, case reports and animal or cell-based studies. Study quality was assessed using the Newcastle-Ottawa Scale. Continuous data were meta-analysed if reported in at least two studies. Random-effects models were fitted and reported as standardized mean difference (SMD) with 95%CI. Heterogeneity was determined by the I2 statistic. All data were computed using R (4.1.1).

**Results:** We found 1123 records of which six met our inclusion and exclusion criteria, of which five had data for meta-analysis. Studies were of low to moderate quality. Five studies used zoledronic acid while one study used pamidronate. Most studies [n=4] were conducted in postmenopausal women with osteoporosis, one study was conducted in patients with bone metastases and one study was conducted in children with cerebral palsy and osteoporosis. Most studies [n=4] reported outcomes in the subacute (>24 h) phase. Study populations ranged from n=15 to n=116. There was a significant difference in QTc dispersion (SMD=-0.456 milliseconds [95%CI: -0.800 to -0.113]; I2=0%; n=67 patients; k=2 studies) but no differences in heart rate, P wave (maximum), P wave (minimum), P wave dispersion, PR interval, QRS duration,

QTc (maximum), QTc (minimum), or QTc. The correlation between pre- and post-infusion QTc dispersion was rho=0.981 (p=0.866). Results were unchanged when analysing studies reporting acute or subacute phase ECG changes.

**Conclusion:** Overall, there is insufficient and low quality evidence to support an association between intravenous bisphosphonate administration and acute phase dysrhythmias. These data underscore the importance of performing a pre-infusion ECG to evaluate potentially unreported conduction abnormalities.



P722

### A NEW BICYCLE DESIGNED WITH SPECIAL SUPPORT AT THE BICYCLIST CHEST IMPROVES SARCOPENIA IN PATIENTS WITH SPINAL STENOSIS

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**Objective:** Narrowing of the spinal canal is a common finding in spine imaging of the elderly. Symptoms such as back pain, radiating pain, and neurogenic claudication are very often and have as result severe sarcopenia of these patients. A new bicycle design has as result, relief of the pain help the exercise of these patients, and improve sarcopenia.

**Methods:** By adding this support (Figure) at the bicyclist chest is necessary because the bicycle rider is currently supported mainly at a single support point (the saddle), which results in stresses that reach up to 10 MPa, a number which can cause a chronic strain in spine on a regular bicycle user (1). On the other hand, this bicycle can be used for rehabilitation purposes, by patients who have lost their muscular mass due to a long term inactivity after spinal stenosis pathology, by helping them to regain this mass through exercise as it is safer and less painful to use compared to the classical bike designs. The objective of this study was to investigate the effects of a three-month special bicycle design-based exercise vs. home-based exercise program on muscular (2), (3), functional/physical performance and quality of life (QoL) across elderly with sarcopenia. Twelve elderly (10 women, 2 men aged 74.23±5 y) were randomly assigned to one of three interventions: supervised group (n=12), individualized home-based exercise (n=11) and control group (n=14). Body composition was determined by bioelectrical impedance analysis, calf measurement with inelastic tape and strength assessments (grip and knee muscle strength) via hand-held and isokinetic dynamometers (2,3). Functional assessments included 4-m, Timed-Up and Go (TUG) and chair stand (CS) tests. QoL was assessed with Greek Sarcopenia Quality of Life (SarQoL\_GR) questionnaire (2,3). Outcomes were assessed at baseline, immediately postintervention (week 12), and 3 months postintervention (week 24).

**Figure.** The special designed bicycle by Matzaroglou C. and Kouzoudis D. with the bicyclist chest support

**Results:** Bicycle-based exercise, compared to home-based exercise, yielded significant improvements ( $p < 0.05$ ) in muscle mass index, CS and 4-m tests, calf circumference, muscle strength at 12 weeks. Most improvements at 24 weeks were reported with "bicycle exercise". No changes were found across the control group.

**Conclusion:** Results suggest that bicycle-based exercise with the special bicycle designed by Matzaroglou C and Kouzoudis D, with this bicyclist chest support, was more effective than home-based exercise for improving functional performance and sarcopenia in elderly patients with spinal stenosis

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P723

### ESTABLISHMENT OF THE FIRST IN VITRO MODEL OF MESENCHYMAL PHOSPHATURIC TUMOR FROM A TROCHANTERIC LESION TO STUDY THE ROLE OF PHOSPHATONINS AND OF PHOSPHORUS HOMEOSTASIS IN TUMOR PROGRESSION: PRELIMINARY RESULTS

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**Objective:** Phosphaturic mesenchymal tumor (PMT) is a rare type of tumor characterized by a high secretion of FGF23. Since most of the present studies on PMT are clinical studies and case reports, the principal aim of this research study is to establish an in vitro model of PMT, to characterize the PMT phenotype and to evaluate FGF23 secretion and the gene expression of all the molecules involved in the phosphate homeostasis. The establishment of this cellular model will permit studying in details for the first time which are the cellular and molecular bases of PMT and of the bone lesions which characterized this rare disorder.



**Methods:** We have established a primary cell culture of PMT from a trochanteric lesion. Hence, the PMT phenotype has been evaluated by immunofluorescence staining for FGF23, SATB2, desmin, CD34, CD56, etc. We have also evaluated the mesenchymal phenotype by immunofluorescence staining for CD44, CD105 and CD90. In addition to this, a preliminary analysis has been done on the expression profile of the molecules involved in the phosphate homeostasis (i.e., MEPE, KLOTHO, FGF7, PIT1, PIT2, SLC34A1, SLC34A2, SLC34A3 and of SFRP4).

**Results:** We have established a primary cell line of PMT, marked as Phosph-MT-1, which showed the presence of CD44, CD105 and CD90 as mesenchymal markers, the presence of SATB2, FGF23, CD56 and the absence of CD34 and desmin, confirming the immunohistochemical profile revealed by the immunohistochemical analysis of PMT tissues. Our first preliminary expression gene analyses revealed the expression of KLOTHO, MEPE, PIT1, PIT2, SLC34A2, SLC34A3, and the absence of SLC34A1. The gene expression analysis for FGF7 and for SFRP4 is ongoing.

**Conclusion:** We have established and characterized for the first time a primary cell line of PMT directly from a bone lesion. This will permit to study the cellular and the molecular bases of this rare disorder. Nowadays, study on the altered mineralization process and the role of the phosphatonins are ongoing.

**Acknowledgement:** This study was supported by FIRMO Onlus

## P724

### FREQUENCY OF RS1544410 VITAMIN D RECEPTOR GENE POLYMORPHISMS IN YEKATERINBURG POSTMENOPAUSAL WOMEN SAMPLING

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**Objective:** More than 50 vitamin D metabolites influence the vitamin D receptor gene (VDR) determines D-hormone effects on bone and other tissues. Currently, numerous VDR gene mutations have been reported to alter gene activity. Bsm1 (nucleotide substitution G>A in the 3-UTR region, known as rs1544410) has been found to be a functionally significant polymorphism of the VDR gene. Numerous studies of bone mineralization in women have shown associations of the Bsm1 genetic profile with BMD. The minor A-allele is recognized as a marker of BMD loss while the G-allele has a protective effect against osteoporosis. The aim of this study was to assess the frequency of the Bsm1 (rs1544410) polymorphisms and in a sampling of late postmenopausal female residents of Yekaterinburg.

**Methods:** Real-time mode polymerase chain reaction in venous blood-derived DNA has been used to detect the rs1544410 polymorphisms in a sampling of 100 late postmenopausal residents

of the city of Yekaterinburg. DXA was used to detect osteoporosis (OP) according to the IOF criteria. VAS was used to assess pain. Mann-Whitney and Pearson's  $\chi^2$  criteria in the Statistica 13.0 software package (license no. JPZ9041805602ARCN25ACD-6) were used for data processing.

**Results:** The median age was 67(65-70), the age of menopause was 50.0 (46.5-52.0), the postmenopause duration was 18 (15-21) y. VDR gene rs1544410 polymorphisms distribution was found to be 40% for GG, 47% for and 13% for AA, the share of the G allele being 63.5%, and the minor A allele being 36.5%. The ratio of the polymorphisms corresponded to the Hardy-Weinberg law ( $\chi^2=0.019$ ;  $p>0.05$ ). OP was diagnosed in 34 patients and excluded in 66 subjects. In OP group genotype AA:AG:GG distribution was 5:15:14. In non-OP group it was 8: 32: 26 ( $p=0.864$ ). A-allele positive subjects reported more joint pain during exercise (7 points (4-8) vs. 4 points (2-5) ( $p=0.031$ ) and morning back pain (5 points (3-7) vs. 2 points (0-4),  $p=0.015$ ). There were no differences in the severity of joint pain at rest, and the evening back pain between the groups.

**Conclusion:** VDR Bsm1 gene (rs1544410) AG and GG genotypes predominated in a sampling of late postmenopausal Yekaterinburg residents, while the AA genotype occurred only in 13% of cases and was not associated with OP. GG Bsm1 genotype was associated with a lower level of joint and back pain.

## P725

### ESTABLISHMENT AND CHARACTERIZATION OF A TUMORAL CALCINOSIS STEM CELL LINE FROM A PATIENT WITH A NOVEL GALNT3 MUTATION

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**Objective:** Tumoral calcinosis (TC) is an extremely rare condition characterized by lobular, densely ectopic calcified mass, generally located in the periarticular spaces of soft tissues. We have previously established a primary cell line (TC1) from a TC patient harboring a novel *GALNT3* mutation and observed its ability to form a spherical colony from which a putative stem cell (SC) culture has been isolated (TC1-SCs). The aim was to evaluate the alterations of bone mineralization process, to confirm the properties related to stem cell phenotype and to evaluate the expression levels of FGF23 pathway associated genes.



**Methods:** After establishing a primary cell line from a biopsy of TC patient with *GALNT3* mutation, we proceeded to the isolation and characterization of TC1-SCs by using several methods (i.e., the evaluation of their differentiation capacity, the expression profiling of embryonic stem cells (ESCs) marker genes, the immunofluorescence staining of the mesenchymal stem cells (MSCs) surface markers, and the study of a single cell to grow into a colony).

**Results:** The multidifferentiation induction assays revealed the capacity of the isolated TC1-SCs line to differentiate both into adipocytes and chondrocytes. Results obtained from colony-forming unit assay showed a good rate of clonogenic efficiency. We also detected the expression of genes that feature ESCs (i.e., *Oct3/4*, *Nanog*, *Klf4*, and *Sox2*). In addition, we observed the expression of MSC surface markers (i.e., CD44 and CD105). All these results confirmed the presence of a SCs subset into TC lesions.

**Conclusion:** We have established and characterized for the first time a stem cell line from a primary cell culture obtained directly from the calcified mass of a TC patient carrying a novel *GALNT3* mutation. Nowadays, we are profiling a study of expression of those genes associated with FGF23 pathway and studying the alterations of the mineralization process, which could be related to the novel *GALNT3* mutation. Furthermore, demonstrating the existence of a stem cell subpopulation inside these lesions could aid understanding the cellular and molecular underlying TC progression, to find new molecular diagnostic and therapeutic targets.

**Acknowledgment:** Supported by FIRMO Onlus.

## P726

### ESTABLISHMENT OF A MANDIBULAR FIBROUS BONE DYSPLASIA IN VITRO MODEL TO STUDY THE ALTERED MINERALIZATION PROCESS AND THE ROLE OF FGF23 IN THIS RARE BONE DISEASE

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**Objective:** Fibrous bone dysplasia (FBD) is a rare bone disorder characterized in which there is a progressive replacement of bone marrow with fibrous connective tissue. In this study, we have established a primary cell line from a sample of mandibular FBD to evaluate the alteration of the mineralization process, to evaluate the basal levels of FGF23 and the possible correlation between FGF23 expression levels and progression of FBD.

**Methods:** The human sample of mandibular FBD have been treated with 0.3 mg/mL collagenase to establish a primary FBD cell line. Through gene expression analysis we have evaluated the expression of bone mineralization marker genes (i.e., RANXL,

OPG, OCN, etc.) and the expression of ADAMTS2, a marker gene of FBD. In addition to this, we have also performed immunofluorescence assays to evaluate the possible preosteoblastic phenotype of the established cell line. We have also performed an osteogenic differentiation assay to evaluate the alteration of the mineralization process.

**Results:** We have established a primary FBD cell line, marked as FD-1. FD-1 cell line resulted to be positive for the expression of osteoblastogenesis marker genes and for ADAMTS2 gene, confirming the FBD phenotype. We have also evaluated the expression of CD44 and CD105, which characterized the pre-osteoblasts progenitors. At the moment, the study of assessing the presence of a molecular microenvironment in which FGF23 production could increase is ongoing.

**Conclusion:** In this study, for the first time, we have described the establishment of a primary cell line of one extremely rare bone disorder, such as FBD. In addition, we have observed as the established FBD line has a pre-osteoblasts phenotype. This represent an important step to study the alterations of the mineralization process and to understand the molecular bases of the high levels of FGF23 which characterized FBD.

**Acknowledgment:** Supported by FIRMO Onlus.

## P727

### EVALUATION OF LONG-TERM RESULTS OF A MULTICOMPONENT REHABILITATION PROGRAM IN PATIENTS WITH OSTEOARTHRITIS AND RHEUMATOID ARTHRITIS

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**Objective:** To evaluate the long-term results of a multicomponent rehabilitation program (RP) in patients with osteoarthritis (OA) and rheumatoid arthritis (RA).

**Methods:** 83 patients with OA and 64 patients with RA with lesions of major joints of the lower extremities were examined. RP (kinesotherapy, low frequency magnetic therapy and biofeedback therapy) was used during 3 weeks at the stage of post-hospital rehabilitation in the 1st group of patients (40 patients with OA and 31 patients with RA). RP was not performed in group II (43 patients with OA and 33 patients with RA). Health-related quality of life (HRQoL) was studied using the Short Form 36-item Health Status Questionnaire (SF-36). The intensity of pain in the involved joints (when walking) was assessed using VAS Huskisson. The VAS<sub>0-100</sub> screening scale was used to assess fatigue. We also eval-

uated data on the frequency of inflammatory recurrence and the frequency of nonsteroidal anti-inflammatory drugs (NSAIDs) use over the entire follow-up period.

**Results:** The groups of patients did not differ much statistically from each other in all studied parameters at the beginning of the study. Rehabilitation results were analyzed after 11-12 months. The combined mean HRQoL score for the physical and mental components of the SF-36 in group I was significantly higher than in group II ( $p=0.012$ ), with the most noticeable changes in the mental health ( $p=0.003$ ). The use of RP led to a decrease in the number of painful joints ( $p=0.038$ ), but not in VAS pain intensity ( $p=0.08$ ). A reduction in chronic fatigue on VAS<sub>0-100</sub> was observed in group I only in RA patients ( $p=0.02$ ). 45.9% of group I patients and 23.7% of group II patients were able to significantly reduce the frequency of taking NSAIDs ( $p=0.006$ ). Recurrences of the inflammatory process in the affected joints during 11 months of observation in group II were noted in 75% of cases, and in Group I - in 59% ( $p=0.046$ ).

**Conclusion:** The combined use of different technologies of non-medicamental influence during medical rehabilitation of patients with joint pathology allows to improve the long-term results of therapy of RA and OA patients.

## P728

### INCIDENCE RATE OF AND RISK FACTORS FOR SARCOPENIA IN JAPANESE MEN AND WOMEN: THE RESEARCH ON OSTEOARTHRITIS/OSTEOPOROSIS AGAINST DISABILITY STUDY 2007-2018

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**Objective:** To investigate the incidence rate of and risk factors for sarcopenia in Japanese men and women using data from a population-based cohort study entitled the Research on Osteoarthritis/Osteoporosis Against Disability (ROAD) study.

**Methods:** From the second survey (2007-2008) of the ROAD study, 1550 participants (522 men and 1028 women; mean age, 65.8 y) were followed up at 3, 7, and 10 y. Skeletal muscle mass, handgrip strength, and gait speed of the participants were assessed. Sarcopenia was defined according to the definition in the Asian Working Group for Sarcopenia 2019 recommendations.

**Results:** The incidence rates of sarcopenia were 17.8/1000 and 14.5/1000 person-years in men and women, respectively. Additionally, the incidence rates of severe sarcopenia were 6.4/1000 and 4.2/1000 person-years in men and women, respectively. The significant risk factors for the incidence of sarcopenia were age (+1 y, hazard ratio [HR] 1.10, 95%CI 1.09-1.13) and BMI (-1 kg/m<sup>2</sup>, HR 1.25, 95%CI 1.19-1.32). The significant risk factors for the incidence of severe sarcopenia were age (+1 y, HR 1.18, 95%CI 1.14-1.22) and BMI (-1 kg/m<sup>2</sup>, HR 1.20, 95%CI 1.10-1.32).

**Conclusion:** The incidence rate of and risk factors for sarcopenia in Japan were clarified.

## P729

### FRACTURE LIAISON SERVICE, BONE DOCTOR AND BONE CARE NURSE: A MULTIDISCIPLINARY AND INTEGRATED CARE MODEL FOR PATIENTS WITH FRAGILITY FRACTURE

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The progressive aging of the Italian population and the constant increase in the incidence of osteoporosis lead to an increased risk of fragility fractures, which represent a constantly growing health and economic problem. It is well known that a fractured osteoporotic patient has a higher risk of suffering further fragility fractures. The lack of integrated organizational models for the clinical management of patients with fragility fractures and the prevention of further fractures represents one of the main public health problems in the field of osteoporosis, both reducing the quality of life and life expectancy of patients and representing an extremely high cost for the healthcare systems. In this scenario, it is necessary to develop an interdisciplinary and integrated model to facilitate the care pathway, the management, and the follow-up of the fractured patient, by developing and implementing the fracture liaison service (FLS) model both in public hospitals and private bone clinics.

The FLS is a multidisciplinary care pathway of secondary prevention, aimed to reduce the risk of fracture recurrence in a patient with a previously occurred fragility fracture. FLS includes specialist professional skills, such as endocrinologists, orthopedists,

radiologists, rheumatologists, physiatrists and pain doctors, within a single health facility, integrated with instruments for bone health assessment and specific digital technologies.

In addition, to this conventional FLS structure, we suggest the institution of two additional healthcare professionals: The Bone Doctor and the Bone Care Nurse.

The Bone Doctor is a clinical specialist in the management of patients with osteoporosis and diseases of bone and mineral metabolism. The role of the Bone Doctor within the FLS is to coordinate the clinical management of the fractured patient, during hospitalization and follow-up, by creating a personalized therapeutic pathway (including bone medical therapies, modification of life style and dietary habits for bone health, postfracturative rehabilitation path), aimed to prevent the occurrence of future fragility fracture and reduce the aspects that follow fracture occurrence, such as morbidity and disability.

The Bone Care Nurse is a fundamental paramedic professional figure, specifically trained and specialized in the field of bone diseases, who will directly support the Bone Doctor in patient management and in the coordination of the various professional figures of the FLS, as well as follow the patient in all his/her clinical and rehabilitative path by referring him/her to the different FLS experts.

This project represents a unique international care model, capable of guaranteeing a significant improvement in the management of the patient with fragility fracture, surely improving the quality of life of the fractured patient, by leading to a greater adherence to treatment and, thus, to a reduction of fragility fracture recurrence and of fracture-related overall costs.

## P730

### REHABILITATION OF A SECONDARY POSTTRAUMATIC HUMERUS FRACTURE IN A PATIENT WITH COMPLEX PATHOLOGY: CASE REPORT

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**Objective:** To detect the importance of a specific rehabilitation program after a humerus fracture in a patient with different comorbidities.

**Methods:** We present the case of an in-patient, 64 years old, female, accusing 5/10 pain in her right elbow, paralysis in the radial territory of the right forearm, wrist and hand and dynamic balance disorders with the impossibility to take care of herself during all the aspects of her daily life. She suffered a distal humerus comin-

utive fracture initially treated by immobilization for 5 weeks. After reevaluation, she had a surgical intervention with osteosynthesis and afterwards she wore a radial splint for one month. 3 months after the accident she is referred to rehabilitation. DXA examination showed spinal osteoporosis (-3.1) and femoral osteoporosis (-3.3). The medical history also includes rheumatoid arthritis (immunosuppressive drugs and corticotherapy in low doses in the past 5 y), Parkinson disease, essential hypertension, hypothyroidism (with substitution), left wrist fracture 10 y ago. On local examination: Right upper limb: irreducible elbow flexum (20°), palmar flexum of the wrist at 90°, 1/5 motor deficit in the radial territory, important limitation in the passive range of motion of the wrist and fingers, hypotrophy of the dorsal flexors of the wrist and hand; Left upper limb: limited range of motion and muscle force of the wrist, hand and fingers; Knees examination: pain 5/10 while walking, flexum 10° (left), hypotrophy of the quadriceps, dynamic instability; bradykinesia; Berg scale 19/56 and needs help from another person for all the activities of daily living, including gait. The rehabilitation program included: medication, analgetic myorelaxant electrotherapy, sedative massage and kinetotherapy.

**Results:** After the treatment, pain was reduced from 5/10 to 2/10, Berg scale was at 24/56, the elbow flexum was eliminated and the wrist flexum improved (45°).

**Conclusion:** The rehabilitation program improved dynamic balance, passive mobility and pain, but the radial paralysis and the whole dysfunctional picture of the patient are still issues to be treated in a long-term care program.

## P731

### EXERCISING DAILY WITH DR BAJAJ STUMP STICK [DBSS] IS AN EXCELLENT AID TO PREVENT SECONDARY FRACTURES IN BOTH FEMALES AND MALES ABOVE FOURTY YEARS OF AGE

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**Objective:** Daily exercising and physical activities play the major role in arresting the progression of bone and muscle loss. If females above the age of 40 and males above the age of 50 daily exercise and do regularly all types of recommend physical activities then they can easily prevent the fractures after the age of 50 y. The attention here is particularly given to bone and muscles involving pectoral girdle and vertebral column, i.e., cervical region, upper limbs, wrists, shoulder joints, vertebral column, etc. The approach is to "Catch Them Young".

**Methods:** The principal author has modified the cricket stump into an aid for exercising. Cricket is known world over and the stumps are easily available everywhere. The stump can be modified into a stump stick just by cutting the sharp edge length: 3 ft, diameter: 3.5 cm, circumference: 1 cm, weight: around 300 g. For exercising the beneficiaries are advised to lie on flat surface

or on floor. Then by holding the stick firmly in both hands, resting it on both thighs, they are trained to make movements of the hands from the thighs upwards till it touches the floor behind the head. They are asked to count 1,2,3,4,5 till it touches the floor. It is recommended to do the movements for a least 20 times on one occasion for two times a day. The author has distributed more than 2000 sticks to the patents visiting to the institution in last 2 y. The beneficiaries are from the age of 40 y to 101 y. It is popularly known as DBSS in Central India. One of the Falls Enthusiasts has given this name to the stick. The stick is very economical, portable, light weighted, available and acceptable. It adds to the hand grip strength and significantly addresses the issues related with the above mentioned joints, muscles. It also takes care of the hand arthritis as the grip on stump is big enough to hold with open hands. It is observed that after the age of 60 years most of the older adults find difficulty in lying down on the flat floor. This regular exercising for life time after the age of 40 y in females and after the age of 50 y in males will help them to lie down straight on the floor touching the back on it.

**Results:** Exercising daily after the age of 40 y by females and after the age of 50 y by males, with the help of the cricket stump stick helps in prevention of osteoporotic fractures in later life. Most of the issues related with the pectoral girdle of older adults like chronic suffering due to pain in the neck, shoulder, both upper limbs including hands, back[both upper and lower], posture [vertebral fractures] etc. are addressed strongly if the exercises are done daily, regularly for life time as advised.

**Conclusion:** Exercising daily after the age of 40 y by females and after the age of 50 y by males with the help of DBSS aids in prevention of fragility fracture in later life. The goal here is to "Catch Them Young". If at early age the exercises are started as advised and if are done daily for life time then fragility fractures due to secondary reasons can be prevented.

P732

### CHRONIC IRON DEFICIENCY ANAEMIA (IDA) IS AN INDEPENDENT RISK FACTOR TO BE CONSIDERED IN THE MANAGEMENT OF FALLS DISEASE (FD), FEAR OF FALL (FOF) AND FRAGILITY FRACTURES OF OLDER ADULTS

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**Objective:** Various factors are considered in the prevention of FD, FOF and fragility fractures. The significance of calcium, vitamins D3 and B12 is well established. The serum iron is an important but ignored constituent that leads to IDA. Anemia is a global health problem especially in children of low- income areas, women of childbearing age, and the elderly. It is estimated that anemia affects more than two billion people worldwide, which accounts for more than one third of total world population.

**Methods:** The principal investigator is a consultant orthogeriatrician. While registering any new beneficiary in our Falls Institute of India (FII), it is mandatory to do Comprehensive Geriatric Assessment (CGA). The CGA includes blood work, DXA scan, HGS, SPPB and ECG etc. Blood work includes estimations of CBC, PS, ESR, fasting and post meal sugar, KFT, LFT, lipid profile, vitamins D3, B12, calcium, iron, etc. The retrospective data of last 3 y between 2019-2022 is considered here. The age group chosen is between 50-93 y. Out of total 100 beneficiaries, 85 females and 15 males are chosen on the basis of their Sr iron readings and responses to intravenous iron therapy. The reference range of Sr iron is 50-170 ug/dl in female and 65-175 ug/dl in males. The lowest value was 2 ug/dl and highest was 65 ug/dl. By looking at the adversities of oral iron therapy, initially all the beneficiaries were given IV iron therapy by trained nursing staff under supervision of principal investigator.

Initially, 100 mg, 5 ml of iron sucrose, with 100 ml normal saline over 30 min with all prophylactic precautions to attend any kind of anaphylactic adverse events was given. Such 10 doses, 1 dose/d were given. After 10 doses, with the gap of 48 h, serum iron was reestimated. The response to IV iron therapy was significant. On an average, 10 doses increases the value of Sr iron by 50-70 ug/dl. Depending upon the deficiency another set of 5-10 doses were given, that took the value to 120-130 ug/dl. The iron doses to be given were calculated by all given traditional formulas.

**Results:** The IV iron therapy improved the symptoms of fatigue or tiredness, loss of appetite, chest pain, shortness of breath, strength in lower limbs, ability to walk few more steps, etc. significantly. After acceptable improvements in the Sr iron values, oral iron therapy was advocated with detailed dietary advice.

**Conclusion:** Chronic IDA is an independent risk factor to be considered while managing the treatment to prevent FD, FOF and fragility fractures in older adults.

P733

### LOW TBS AND ACROMEGALY-RELATED DIABETES MELLITUS

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**Objective:** BMD of acromegalic patients may be increased, normal, or decreased in different skeletal sites. The excess of GH and IGF-1 may cause an imbalance between bone formation and resorption, through the impact on osteoblastic and osteoclastic cells, increasing the risk of osteoporosis. (1-5) We aim to introduce a female patient with acromegaly-related diabetes mellitus and low TBS.



**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 60-year-old patient who is admitted for bone pain without a specific pattern. She was diagnosed with GH-secreting pituitary adenoma, for which she underwent surgery and radiotherapy 10 y ago, as well as secondary diabetes mellitus which was treated with daily metformin 1000 mg. The patient's medical history includes multinodular goiter with hypothyroidism due to autoimmune thyroiditis, arterial hypertension, ischemic heart disease, gallstones, and kidney stones. 4 y since neurosurgery, DXA scan was normal (menopause by the age of 50): lumbar L1-4: BMD(g/cm<sup>2</sup>)=1.007, T-score(SD)=-0.9, Z-score(SD)=-0.5; femoral neck BMD(g/cm<sup>2</sup>)=0.938, T-score (SD)=-0.7, Z-score (SD)=0; total hip BMD (g/cm<sup>2</sup>)=0.879, T-score (SD)=-1, Z-score (SD)=-0.7. While the acromegaly was controlled under monthly octreotide LAR 30 mg, she experienced bone and joint pain with non-specific pattern. On current admission, thyroid function is controlled under levothyroxine: TSH=3.8  $\mu$  UI/mL (N:0.5-4.5), FT4=12.64 pmol/L (N:9-19) with positive antithyroid antibodies ATPO=498.44 UI/mL (N:0-5.61). She has a mild vitamin D deficiency 25OHD=22 ng/mL (N:30-100), normal bone formation markers osteocalcin=12.12 ng/mL (N:15-46), P1NP=25.86 ng/mL (N: 20.25-76.31) and reduced bone resorption marker CrossLaps=0.17 ng/mL (N: 0.33-0.782) without primary hyperparathyroidism. PTH=29.82 pg/mL (N: 15-65). She has control acromegaly on terms of IGF1=244.5 ng/mL (48-235) and suppressed prolactin under 1 mg weekly cabergoline: prolactin=0.30 ng/mL (N: 4.79-23.3). At X-ray, one incidental lumbar L2 fracture was diagnosed, while DXA-BMD remained within normal limits, TBS was of 1.200. DXA: lumbar L1-4 BMD(g/cm<sup>2</sup>)=1.067, T-score(SD)=-0.9, Z-score(SD)=-0.4; femoral neck BMD(g/cm<sup>2</sup>)=0.923, T-score (SD)=-0.8, Z-score (SD)=0; total hip BMD (g/cm<sup>2</sup>)=0.875, T-score (SD)=-1.1, Z-score (SD)=-0.6; 1/3 distal radius BMD(g/cm<sup>2</sup>)=0.664, T-score (SD)=-0.7, Z-score (SD)=0.2.

**Conclusion:** In this case, reduced TBS correlates with the status of menopausal female with type 2 diabetes mellitus, rather acromegaly. However, both diabetes and somatotropinoma related arthrosis might increase DXA-BMD.

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## P734

### ULTRASONOGRAPHY OF SCIATIC NERVE IN PATIENTS WITH LOW BACK PAIN AND UNILATERAL RADICULOPATHY: OUR RESULTS IN ULTRASONOGRAPHY MORPHOLOGICAL CHARACTERISTICS

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**Objective:** Patients suffering from chronic low back pain with associated sciatica, experience neurological symptoms in the lower back and leg. Ultrasonography (US) has been used recently to characterize median and ulnar nerves but is seldom used to characterize the lower extremity nerves. The reference standard for normal and pathologic lower extremity nerves has not been established. The reliability aspect of measuring sciatic nerves and echo intensity of the sciatic nerve with ultrasound in patients with LBP and unilateral radiculopathy (sciatica) has received little attention in the literature. We evaluate the possible changes of nerve structure in patients with low back pain with unilateral sciatica due to lumbar disc herniation by ultrasound imaging.

**Methods:** 20 healthy volunteers with 40 sciatic nerves, aged 25-84 years old, were studied with US and compared with 27 volunteers patients with 54 sciatic nerves. aged 26-77 years old, which complained for sciatica and they identified with lumbar disc prolapse in MRI. Age, sex, height, weight were recorded and the size and morphology of sciatic nerve were obtained.

**Results:** The mean size of sciatic nerves were 0.578 $\pm$ 0.034 cm<sup>2</sup> in males and 0.488 $\pm$ 0.03 cm<sup>2</sup> females respectively. Pearson's correlation analysis showed that the mean size were correlated with height and weight. There was no difference in mean size among the different age. Women had smaller size of the sciatic nerves than men. Also the "pathologic sciatic nerves they have morphology of "edema" and the size were smaller in patients with recently diagnosed for disc prolapse in MRI, and in contrast enlargement sciatic nerves in patients with chronic sciatica, radiculopathy and positive MRI for disc prolapse more than 3 y ago (difference=0.054 cm<sup>2</sup>).

**Conclusion:** Peripheral nerve ultrasonography is a reliable and reproducible diagnostic method in the hands of experienced examiners. The reliability aspect of measuring sciatic nerves and echo intensity of the sciatic nerve with ultrasound in patients with LBP with unilateral radiculopathy has received little attention in

the literature. Normal values for the sciatic nerve nerves are provided by our study but with not enough statistical power. Also the relative magnitude of fat/fibrosis infiltration were observed in all our cases of chronic sciatica and radiculopathy. Thus, reference values of Sciatic nerve of the lower extremity can facilitate the analysis of abnormal nerve conditions and give useful information and prognostic parameters in patients with sciatica and established disc herniation.

## P735

### EFFECTIVENESS OF ADDING ELECTROMAGNETIC FIELD THERAPY TO STANDARD TREATMENT FOR ACUTE AND SUBACUTE NONSPECIFIC LOW BACK PAIN

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**Objective:** To evaluate the effectiveness of electromagnetic field (EMF) therapy in combination with standard treatment of patients with acute/subacute nonspecific low back pain (LBP).

**Methods:** The study included 339 patients, 62.9% women, mean age 56.2±12.7 y, with severe acute/subacute LBP (≥5 cm on a numerical rating scale, NRS 0-10 cm). 206 patients (Group 1) received nonsteroidal anti-inflammatory drugs (NSAIDs) and (EMF) therapy (pulsed magnetic fields at low intensity and frequency, up to 20 sessions), 133 patients (Group 2) received only NSAIDs. The follow-up period was 1 month. The dynamics of pain, patient global assessment (PGA), functional disorders, sleep disturbance and the need for NSAIDs were assessed.

**Results:** The difference in pain dynamics between Groups 1 and 2 was statistically significant (p<0.001). Number of patients with pain reduction ≥50% of baseline after 1 month was 99% in Group 1 and 84% in Group 2 (p<0.001). A significant difference between Groups 1 and 2 was noted in the dynamics of PGA, function and sleep disorders (p<0.001). The mean duration of NSAID use in Group 1 was 8.8±3.9 d, in Group 2 it was 11.8±5.7 d (p<0.001). No serious side effects were noted in the study groups.

**Conclusion:** The use of EMF therapy increases the effectiveness of acute/subacute LBP treatment and reduces the need for the use of NSAIDs.

## P736

### IN VITRO EFFECTS OF PTH(1-84) ON HUMAN SATELLITE CELLS FROM SKELETAL MUSCLE TISSUE

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**Objective:** PTH is a single-chain peptide hormone consisting of 84 amino acids, secreted by the parathyroids. Its main role is to maintain a constant concentration of Ca<sup>2+</sup> in the bloodstream. PTH is a key effector in bone homeostasis but very few studies evaluate the effect of PTH on skeletal muscle [1]. Therefore, in order to elucidate the mechanism of action of this hormone on skeletal muscle tissue, we aim to investigate the in vitro effect of PTH(1-84) on human satellite cells (hSCs).

**Methods:** hSCs were isolated by skeletal muscle tissue biopsies, as previously reported [2]. Cells were exposed for 30' to different concentrations of PTH(1-84), from 10<sup>-6</sup> M to 10<sup>-12</sup> M. Levels of cAMP were assayed by ELISA kit; cell proliferation process was assayed by BrDU while cell differentiation was evaluated by realtime-qPCR analysing specific genes [MyoD-1, myogenin and myosin heavy chain (MHC)]. Statistical analysis was performed by ANOVA followed by Bonferroni's test.

**Results:** The ELISA assay has shown no significant variation in cAMP levels in hSCs in proliferation treated with several PTH concentrations. On the other hand, treatment on myotubes has shown a significant increase (+107%) in cAMP levels in cells treated with 10<sup>-7</sup> M PTH vs. control group (\*p<0.01). Proliferation process of hSCs has highlighted no significant differences between cells treated with different concentrations of PTH vs. control group. Treatment with 10<sup>-7</sup> M PTH for 30' has showed, after 24 h, significant increases in the expression of myogenic differentiation genes, MyoD-1 (\*p<0.01), myogenin (\*p<0.01) and MHC (\*p<0.01) vs. differentiation control group.

**Conclusion:** This work has shown preliminary data on the in vitro effects of PTH(1-84) on cAMP levels in proliferating and differentiated hSCs, identifying the 10<sup>-7</sup> M as the responsive concentration on myotubes. Despite such treatment has no effect on the hSC proliferation, myogenic gene analysis during hSC differentiation has shown that PTH increases their expression during that process. Studies are in progress in order to evaluate the effect of 10<sup>-7</sup> M PTH on MHC protein during hSCs myogenesis.

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P737

### OSTEOPENIA IN A PATIENT WITH BASEDOW-GRAVES DISEASE, GLUCOCORTICOID THERAPY FOR EYE INVOLVEMENT AND MULTIFOCAL BILATERAL PAPILLARY CARCINOMA

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**Objective:** Due to the excess of thyroid hormones in Basedow-Graves' disease, there can be loss of bone mass leading to an increased risk of fragility fractures. In addition, treatment with glucocorticoids for Graves ophthalmopathy can lead to disruptions in bone architecture. (1-5). We aim to introduce a female patient with Basedow-Graves' disease with exophthalmia, surgically treated papillary carcinoma, and osteopenia.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 58-year patient who is admitted for endocrine evaluation for thyroid concerns. She has postoperative hypothyroidism for multifocal bilateral papillary carcinoma which was treated with radioiodine therapy 100 mCi; currently being under treatment with suppressive levothyroxine 125 µg daily. She initially was diagnosed with Basedow Graves' disease without exophthalmia. After thyroid surgery and receiving radioiodine therapy, Graves' eye involvement aggravated and pulse therapy with methylprednisolone was started for a few months (a total dose of 4.5 g). The patient's medical history also includes arterial hypertension, and hypercholesterolemia (menopause at 50 y). On current admission, the endocrine panel showed: TSH=0.12 µUI/mL (N:0.5-4.5), FT4=18.18 pmol/L (N:9-19) under daily levothyroxine, TRAb (anti-TSH receptor antibodies)=0.97 UI/L (N:0-1.75), ATPO (anti-thyroperoxidase antibodies)=2.25 UI/mL (N:0-5.61). Bone assessments show normal 25-hydroxyvitamin D under daily 1000 UI cholecalciferol 31.7 ng/mL (N:30-100), normal bone turnover markers like osteocalcin=14.94 ng/mL (N:15-46), CrossLaps=0.37 ng/mL (N: 0.33-0.782), P1NP=39.53 ng/mL (N: 20.25-76.31), PTH=29.72 pg/mL (N: 15-65). Central DXA showed osteopenia lumbar L1-4 BMD(g/cm<sup>2</sup>)=1.037, T-score(SD)=-1.1, Z-score(SD)=-1.4; femoral neck BMD(g/cm<sup>2</sup>)=0.918, T-score (SD)=-0.9, Z-score (SD)=-0.6; total hip BMD (g/cm<sup>2</sup>)=1.056, T-score (SD)=0.4, Z-score (SD)=0.3 and a TBS value of 1.109. She continued vitamin D therapy in addition to levothyroxine suppressive therapy. Serial follow-up is necessary.

**Conclusion:** This case highlights two conditions of the thyroid that might affect bone status on a menopausal female: levothyroxine therapy after a confirmation of a differentiated thyroid carcinoma and glucocorticoid therapy for Graves' eye disease.

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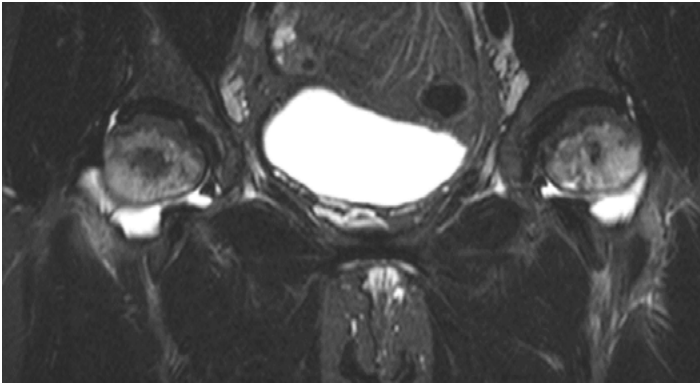
### MULTIFOCAL ASEPTIC BONE NECROSIS AFTER COVID-19: A CLINICAL CASE

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SAR-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 necrosis (AVN) of bones.

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. Symptoms of COVID-19 were fever (39°C for 4 d, then up to 37.5° C for 14 d), dizziness, weakness, low saturation (91%). CT revealed pneumonia, affecting up to 38% of the lungs. Therapy was carried out with antibiotics (ceftriaxone, 10 d, and then levofloxacin 10 d), glucocorticoids (up to 30 mg/d in the equivalent of prednisolone for 3 weeks), antiviral drugs, anticoagulants (low molecular weight heparin, then rivaroxaban 15 mg/d for 3 months). She was discharged from the hospital after cessation of fever, saturation normalization and a negative SAR-CoV-2 PCR test after 21 d of inpatient treatment. Within 8 months did not show any symptoms of the disease. In October 2021, pain appeared in both hip joints. Patient used nonsteroidal anti-inflammatory drugs (NSAIDs) with little effect. In mid-December 2021, she noted the appearance of pain in the left ankle and right shoulder joint. On examination: pain and limitation of movement in both hip joints, pain severity in Visual Analogue Scale (VAS, 100 mm) – 75mm on the left, and 60 mm on the right, dysfunction on Harris Hip Score (HHS) - 34 on the left, and 38 on the right; pain and dysfunction in the left ankle (VAS 50 mm, The American Orthopedic Foot and Ankle Score (AOFAS) - 61) and right shoulder (VAS 40 mm, American Shoulder and Elbow Score (ASES) - 53) joints.





AVN femoral heads

AVN of talus

AVN humerus head



MRI of the affected joints revealed AVN of the heads of both femurs, stage 3 according to Ficat-Arlet, AVN of the head of the right humerus and left talus, stage 2 according to Ficat-Arlet. Therapy was carried out: zoledronic acid 5 mg intravenously once, alfacalcidol+calcium 1000 mg/d, dipyridamole 75 mg/d, unloading of both lower extremities through the use of crutches, 9 sessions of nuclear magnetic resonance therapy, NSAIDs on demand. After the treatment, there was a decrease in pain in both hip joints up to 30 mm VAS, an improvement in function (HHS - 53 on the left and 55 on the right), a decrease in pain in the left ankle joint up to 10 mm VAS and an improvement in function (AOFAS 83). However, in the right shoulder joint, pain increased to 60 mm VAS, and deterioration in function was noted (ASES 38). Currently, the patient continues to receive conservative therapy.

This case shows the possibility of developing multifocal AVN (4 localizations) after suffering COVID-19 and using glucocorticoids for its treatment.

### P739

#### THE HOLLOWED TRABECULAR PHENOMENON: DEMYSTIFYING THE TRABECULAR AGING PROCESS IN HEALTHY OLDER ADULTS USING MULTIDIMENSIONAL APPROACHES

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**Objective:** To characterize the vertebral trabecular microarchitecture using 2D and 3D approaches in healthy older adults.

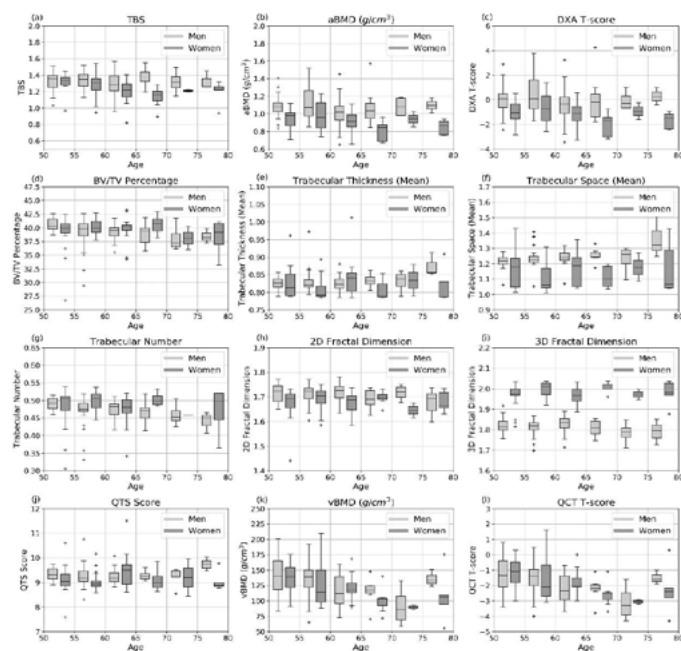
**Methods:** The abdominopelvic CT and DXA scans that were obtained during health examinations from 2013-2018 of 172 healthy patients were reviewed. DXA and CT scans were performed within three months of each other. The L1 vertebrae were reconstructed into 0.6mm thick slices for trabecular microarchitecture (TM) analysis using QUIBIM software. Patients were divided into two groups by age: younger (50-65) and older (over 65). The 3D spine function QCT pro software (Mindways Software Inc., TX) was used to perform L1-L4 BMD analysis using the asynchronous calibration module, and TBS was analyzed using iNsign software (Med-Imaps, Pessac, France). We assessed the differences in DXA, QCT, and TM between the two groups by sex using the independent t-test.





**Results:** The participants included 100 men and 74 women, with a mean age of 59.47 ( $\pm 6.4$  y). TBS and aBMD as measured by DXA were significantly higher in younger women compared to older women, with P values of 0.011 and 0.004, respectively. Meanwhile, TBS and aBMD did not significantly differ between younger and older men ( $P > 0.050$ ). Most TM parameters (i.e., bone volume percentage, trabecular thickness, trabecular space, 2D and 3D fractal dimensions) did not significantly differ by age in both sexes (all  $P > 0.050$ ). Only trabecular number was significantly higher in younger men compared to older men ( $P = 0.034$ ). vBMD as measured by QCT differed significantly between the two age groups in both sexes, with P values of 0.044 and 0.003, respectively.

**Conclusion:** In healthy older adults of either sex, vBMD values are most significantly affected by age, though this is especially true in women. We propose that it is bone mineral loss and not TM loss that accompanies normal aging. This explains the hollowed trabecular phenomenon, where BMD loss during the natural aging process weakens the bone but maintains the trabecular structure. Despite an intact trabecular structure, once bone mineral loss breaches the threshold required to support external forces, fragility fractures result.



**Figure.** The BMD and trabecular microarchitecture change at L1 during normal aging older adults.

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## HYPERPARATHYROIDISM-JAW TUMOR (HPT-JT) SYNDROME: A CASE REPORT

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**Objective:** HPT-JT syndrome is a rare autosomal dominant disorder, that caused by germline mutations of the cell division cycle 73 (CDC73) gene.

**Methods:** We present a case of the patient with HPT-JT syndrome.

**Results:** In 2019 a 31-y.o. woman started experiencing pain in the lower jaw, toothache, edema and hyperemia at the area of 38, 42-45 teeth. This condition was misdiagnosed as an odontogenic cyst and these teeth were extracted without significant effect. CT of the skull revealed multiple tumors 20x30 mm and 30x40 mm in the projection of 42-45 teeth. 18F-FDG PET/CT revealed metabolically active tissue in the solid areas of upper and low jaw and in the multiple osteolytic lesions of sternum, shoulder blades, Th7, Th12, L1, L5 vertebrae and ribs. The laboratory examination revealed severe hypercalcemia (3.9 mmol/l), elevated PTH (1791 pg/ml), alkaline phosphatase (514 IU/l) and hypophosphatemia (0.3 mmol/l), consistent with primary hyperparathyroidism (PHPT). Besides multiple brown tumors and osteolytic lesions the patient had severe complications of PHPT: nephrolithiasis and low BMD level (L1-L4 -3.4, neck -3.1, total hip -2.6, radius 33% -4.3 according to Z-score). The patient underwent right superior parathyroidectomy and histopathological examination confirmed parathyroid adenoma. The follow-up CT showed a soft tissue tumor in the low jaw (28x12x19 mm) and frontal bone (5x6 mm). Due to the patient's young age at diagnosis, tumor in the jaw and high levels of serum calcium and PTH genetic testing was performed. We used next generation sequencing with a custom-designed panel, which included MEN1, CASR, CDC73, CDKN1A, CDKN1B, CDKN1C, CDKN2A, CDKN2C and CDKN2D genes. No pathologically significant changes in the nucleotide sequence were detected, but gross CDC73 deletion was suspected due to read depth decrease. We performed multiplex ligation-dependent probe amplification which revealed the heterozygous deletion of the CDC73 gene and three neighboring genes (TROVE2-8, GLRX2-3 and LINC01031-4). **Conclusion:** Our clinical case shows that the rarity of this syndrome can lead to misdiagnosis and reduce the patient's quality of life. Establishing a definitive diagnosis may also require a more thorough molecular genetic analysis.

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**PITUITARY GIGANTISM AND CARDIOVASCULAR IMPLICATIONS**M. R. Păcurar<sup>1</sup>, D. Păcurar<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:** Gigantism is a rare disorder characterized by abnormally high linear growth due to excessive growth hormone and the action of insulin like growth factor I, before the fusion of the growth plate. Gigantism related cardiovascular pathology is the most important predictor for decreased quality of life and reduced life expectancy. Growth hormone and insulin like growth factor I have direct and indirect effects on cardiovascular system: enhanced contractility and myocytes growth with heart remodeling, systemic hypertension and insulin resistance, valvular defects, coronary artery disease, arrhythmias associated to structural heart disease and heart failure.

**Methods:** We present the case of a 16-year-old male, known with pituitary gigantism. He has no family history of a similar presentation. He denies smoking, alcohol or substance abuse. The patient experiences inconstant anterior and posterior thoracic pain.

**Results:** Upon physical examination: H=217 cm, W=166 kg; BMI=35.25 kg/m<sup>2</sup>, T=37°C, HR=110 bpm, BP=120/85 mmHg, RR=18 breaths/min. ECG-at rest: sinus rhythm, slight left ventricular hypertrophy. Lab work: hyperglycemia a jeun (normal HbA1c), hypertriglyceridemia, hepatocytolysis, mild hyperprolactinemia, hyperinsulinemia (100mIU/L) with elevated HOMA index (29.63). Transthoracic echocardiography: mild left ventricular hypertrophy with normal sized right ventricle and atrium when indexed to body surface area. Holter ECG/24h: asymptomatic isolated ventricular extrasystoles. Stress ECG: was negative for ischemic heart disease and malignant arrhythmia. At this point we considered necessary for this patient only lifestyle changes with no need for medical treatment, but close monitoring and follow up.

**Conclusion:** There is scarce literature regarding pituitary gigantism and cardiovascular risk stratification. Probably because large randomized controlled trials are missing we don't have specific guidelines on short/long term outcomes, prognosis and the safety and efficacy follow up intervals. Given their young age, particularly careful attention should be given to early cardiovascular complications and prompt medical therapy initiation.

P742

**BONE MICROARCHITECTURAL PARAMETERS IN POSTMENOPAUSAL WOMEN WITH PREVALENT FRACTURE: A HR-pQCT CHARACTERIZATION**O. Malle<sup>1</sup>, C. Haudum<sup>1</sup>, P. Khashayar<sup>2</sup>, B. Luegger<sup>1</sup>, A. Berger<sup>1</sup>, E. Weiß<sup>1</sup>, H. P. Dimai<sup>1</sup><sup>1</sup>Medical University of Graz, Dpt. of Internal Medicine, Div. of Endocrinology and Diabetology, Graz, Austria, <sup>2</sup>Center for microsystems Technology (CMST), Ghent University, Ghent, Belgium

**Objective:** HR-pQCT is an increasingly available imaging technique providing quantitative three-dimensional parameters of both bone structure and density. Currently, no international consensus exists on its clinical implication, and compared to the original version of this technique, data on second generation HR-pQCT are scarce. However, a few studies support the evidence that in regard to fracture prediction, HR-pQCT could be superior to areal BMD. This study investigates structural differences in bone microarchitecture in postmenopausal women with or without prevalent fracture.

**Methods:** We used data of the PoCOsteo Study (1), a prospective cohort study of postmenopausal women and men >50 years, performed at two study sites (Graz, Austria and Tehran, Iran) to develop and validate a Point-of-Care tool for bone diseases. Bone microarchitecture was assessed in 50 consecutive female patients at the Austrian study center, using HR-pQCT (Scanco Medical AG, XTremeCT, II. Generation; Brüttisellen, Switzerland) at the distal tibia. Patients were stratified into two arms (n=25 per arm), depending on whether fracture history was negative (Group 1) or positive (Group 2). Blood samples were drawn in parallel to assess serum routine parameters, bone turnover markers (BTMs) and bone metabolism related hormones. HR-pQCT variables comprise two- and three-dimensional parameters illustrated in Table 1, representing both cortical and trabecular density and structure. Clinical fractures were ascertained from questionnaires and medical records, whereas vertebral fractures were diagnosed either by conventional radiograph or DXA-based vertebral fracture assessment (VFA). To assess differences between the two groups, we performed a two-sample t-test in normally distributed variables and a Mann-Whitney U test in non-normally distributed variables. P-values < 0.05 were considered statistically significant. The statistical software package used was IBM® SPSS® Statistics Version 28 (IBM Corporation, Armonk, NY, USA).

**Results:** Mean age between the group 1 and 2 was comparable (p=0.53). HR-pQCT measurements at both sites were available in all 50 participants. The following parameters were significantly lower in Group 2 compared to Group 1: Tt.vBMD (234.1 vs. 292.8, p<0.0001), Ct.Ar (103.2 vs. 124.7, p<0.001), Ct.Th (1.21 vs. 1.50, p<0.001), Tb.N (1.03 vs. 1.21, p<0.001), Tb.vBMD (130.1 vs. 158.0, p<0.01), Tb.Inn.vBMD (78.2 vs. 104.7, p<0.01), BV/TV (0.199 vs. 0.231, p<0.01), Tb.Sp (0.977 vs. 0.825, p=0.02), Ct.vB-

MD (807.2 vs. 852.5,  $p=0.03$ ). No significant difference was found in Tb.Meta.vBMD, Tb.Th, Tb.1/N.SD, Ct.Po, Ct.Po.Dm, Tt.Ar, Ct.Ar. Significant differences in BTMs were found only for N-terminal Procollagen 1 (65.0 vs. 30.6 ng/ml,  $p<0.01$ ) and osteocalcin (24.6 vs. 30.6 ng/ml,  $p=0.05$ ) (group X vs. group X, respectively), while differences in bone specific alkaline phosphatase (20.1 vs. 30.6  $\mu\text{g/l}$ ,  $p=0.06$ ), CrossLaps, TRAP and other bone relevant parameters such as PTH, thyroid hormone, testosterone and estradiol levels did not reach significance.

**Conclusion:** We found significant differences among the majority of HR-pQCT parameters in women  $>50$  y depending on their fracture history. Tt.vBMD, Ct.Ar, and Ct.Th. appeared to have the strongest association with prior clinical fracture. These results are supportive of the evidence, that HR-pQCT may provide relevant information on bone quality and bone strength by capturing the complex cortical and trabecular microarchitecture. To explore the full potential of HR-pQCT technology, particularly in terms of fracture prediction, high-quality prospective clinical studies are warranted. Moreover, the authors favour international standardization of HR-pQCT imaging techniques, procedure of measurement and terminology, to make studies and their results better comparable.

**Reference:** 1. Khashayar P, et al. BMJ Open 2020;10:e035363

## P743

### TBS AND BMD MEASUREMENTS PREDICT FRAGILITY FRACTURES IN OLDER ADULTS WITH OSTEOPENIA: A COHORT STUDY

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**Objective:** Previous studies have shown that the majority of fragility fractures occur in non-osteoporotic patients (BMD T-score  $-2.5$  or higher). We aim to determine the predictive value of the vertebral trabecular bone score (TBS) in combination with the BMD T-score for fracture risk.

**Methods:** We reviewed medical records from January 2011 to December 2018 at one institution in Taipei, Taiwan. We excluded those patients with known vertebral compression fractures or hip fractures as well as those who had received treatment for osteoporosis. Only those with low bone mass (T-score  $-1$  to  $-2.5$ ) were included. 754 patients (524 postmenopausal women; aged 50 y or older) who underwent repeat BMD testing with a mean follow-up duration of  $2.5 \pm 1.2$  y were ultimately included. Both vertebral TBS and BMD (lumbar spine, right, and left femurs) measurements were obtained DXA records. Subjects were divided into three groups by degree of low bone mass (LBM) according to T-score: mild ( $-1.00$  to  $-1.49$ ), moderate ( $-1.50$  to  $-1.99$ ), and severe ( $-2.00$

to  $-2.49$ ). TBS values were classified as: low ( $<-1.23$ ), medium ( $1.24-1.31$ ), and high ( $\geq 1.31$ ). Outcome measures included newly developed vertebral or hip fractures on follow-up exams.

**Results:** 81 participants (10%) had vertebral or hip fractures at follow-up. No significant differences in the rates of fractures were observed between women (10.7%) and men (10.9%). In each LBM group, there was no significant difference in TBS at baseline in either sex. Among those with fractures TBS values only significantly differed in the moderate and severe LBM groups in women and in the severe LBM group in men ( $p<0.05$ ). In women with low TBS, the fracture rates were 10.3%, 19.4%, and 19.2% for the mild, moderate, and severe LBM groups, respectively. In men with low TBS, the rates for each group were 20.0%, 16.7%, and 33.3%, respectively.

**Conclusion:** TBS indirectly reflects microarchitectural deterioration and therefore can improve the predictive value of BMD measurements for fracture risk in osteopenia patients.

	T-score categories		
	Mild LBM	Moderate LBM	Severe LBM
<b>Women</b>			
High_TBS	4/56(7.1%)	2/69(2.9%)	5/86(5.8%)
Medium_TBS	2/44(4.5%)	2/55(3.6%)	12/50(24%)
Low_TBS	3/29(10.3%)	12/62(19.4%)	14/73(19.2%)
<i>p-value</i> <sup>a</sup>	0.698	0.001	0.015
<b>Men</b>			
High_TBS	4/49(8.2%)	4/53(7.5%)	4/47(8.5%)
Medium_TBS	0/9(0%)	0/17(0%)	4/15(26.7%)
Low_TBS	2/10(20%)	3/18(16.7%)	4/12(33.3%)
<i>p-value</i> <sup>a</sup>	0.405	0.386	0.019

*a. Cochran-Armitage test for trend*

## P744

### EFFECT OF AGEING ON FAT INFILTRATION OF THIGH AND PARASPINAL MUSCLES IN MEN

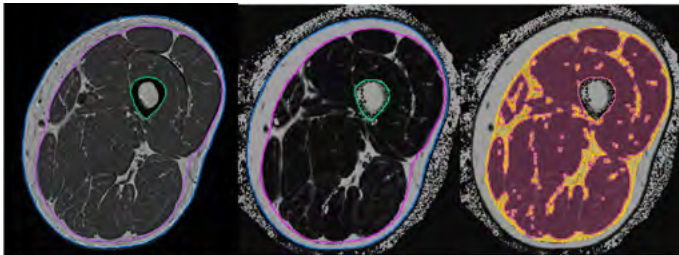
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**Objective:** Myosteatorsis, skeletal muscle fat infiltration, is associated with inflammation and fibrosis. The age related increase of myosteatorsis is an important characteristic of sarcopenia and contributes to fragility. Here we investigated the impact of healthy aging on intermuscular adipose tissue (IMAT) and muscle fat fraction (FF) in the thigh and the paraspinal muscles in males.



**Methods:** In 54 healthy males (age 20-70), all active hobby golfers, MRI of the thigh and paraspinal muscles was performed. The protocol included a T1-weighted Turbo Spin Echo and a 6-point Dixon Gradient Echo sequence to determine volume of IMAT and muscle tissue (MT) and of FF. IMAT and muscle tissue were segmented in the T1 images. Segmentation masks were subsequently registered to the corresponding Dixon images to determine FF of muscle tissue (Figure).



MRI of the thigh. Left: T1 weighted sequence with segmented fascia lata; center: Dixon fat fraction image; right: separation of IMAT (yellow) and muscle tissue (red).

**Results:** Between ages 20-70, at the thigh, IMAT/MT volume and MT FF increased annually by 2.9% and 1.3%, respectively, At the psoas IMAT/Psoas volume did not change with age. MT FF increased by 1.5% annually. At the erector spinae IMAT/Erector volume decreased by 0.3% and MT FF increased by 2.8% annually.

**Conclusion:** With increasing age, in males, thigh muscle atrophied, muscle tissue was partly replaced by adipose tissue and remaining muscle tissue contained more fat. Similar effects were observed in the erector spinae. The psoas muscle did not atrophy, although MT FF also increased with age. Overall correlations with age were weak to moderate with higher correlations observed in the paraspinal muscles.

## P745

### PERMANENT PACEMAKER AND ION HOMEOSTASIS IN ELDERLY

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**Objective:** Permanent pacemaker implantation it has been widespread used in our clinics for specific conditions. All modern pacemaker devices work on demand and their feasibility largely depends on patient functional status.

**Methods:** We present the case of a 82-year-old female patient transferred to our department for rehabilitation program after total hip arthroplasty (on the left side). Her medical history is positive for permanent pacemaker (implanted for

sick sinus syndrome) and systemic hypertension (with good BP control on chronic therapy). She reports occasional alcohol consumption and denies smoking/substance abuse.

**Results:** Her vitals are stable, including T=36.7°C, BP=130/85 mmHg and HR=80 bpm. Cardiac examination- regular rhythm with no significant murmurs or gallops. Musculoskeletal examination: normal appearance of the skin in her left hip area, left thigh and gluteal hypotrophy, restricted hip mobility on the left, walking frame usage. Laboratory investigative blood work revealed anemia, thrombocythemia, hyperuricemia, dyslipidemia, hypocalcemia, hypomagnesemia. ECG at rest: normal sinus rhythm, left ventricular hypertrophy, minimal changes of ST segment. Beside echocardiography: left ventricular hypertrophy with diastolic dysfunction, estimated ejection fraction by Simpson method ~45%, slight left atrium enlargement, good position of pacemaker leads, moderate tricuspid and mitral regurgitation, mild aortic regurgitation. The pacemaker device was working properly and the settings did not need to be adjusted. After this findings we considered the patient not prepared for rehabilitation program initiation and we adjusted her medical therapy to correct her risk factors first (anemia, calcium, magnesium, vitamin D) with close follow up.

**Conclusion:** Randomized controlled clinical trials have clearly established the benefits of pacemaker implantation regardless of age. Still special group populations, like elderly, have specific considerations that must be taken into account because of their comorbidities and frailty. Permanent pacemaker therapy mainly relieves symptoms and improves quality of life, rather than survival rates in this specific group population.

## P746

### COMBINED EFFECT OF INSULIN AND NARINGIN TREATMENTS ON THE HISTOLOGICAL AND BIOMECHANICAL PROPERTIES OF BONE IN A RAT MODEL OF DIABETES MELLITUS

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**Objective:** Diabetes mellitus (DM) alters the bones increasing the risk of fractures and/or delays the fracture healing. The aim of the present work was to study the histological and biomechanical characteristics of bone in rats with type 1 DM and to evaluate the possible osteoprotective effect of insulin (I) and naringin (NAR), individually or combined.

**Methods:** Male Wistar rats were treated for 30 d: 1) controls, 2) DM1, 3) DM1+I, 4) DM1+NAR 80 mg/kg, 5) DM1+I+NAR. Bone histomorphometry, BMD, histology and TRAP staining were evaluated in femur. Biomechanical studies were done in cortical bone (3-point bending test) and trabecular bone (compression test). ANOVA and Bonferroni test were used for statistical analysis.



**Results:** Serum OCN levels and BMD were lower in DM1 rats, but treatments with NAR or I+NAR normalized these values. All groups presented lower bone volume as compared to those from the control group and lower trabecular thickness except that of the I + NAR group. TRAP (+) cells increased in DM1 rats, an effect that decreased with all treatments. DM rats presented lower values of fracture and ultimate loads, which was avoided with I+NAR treatment. Individual and combined exposure to the drugs prevented the decrease in stiffness and absorbed energy induced by DM1.

**Conclusion:** The normalization of serum OCN levels and the decrease in the number of osteoclasts suggest that NAR promotes osteoblastogenesis and inhibits osteoclastogenesis. STZ reduces the resistance to fracture by decreasing the moment of inertia. Only I+NAR restores the resistance to control values. The mechanisms of action of NAR in bone will continue to be studied.

## P747

### OSTEOPOROSIS AND SKELETAL FRAGILITY ASSOCIATED WITH ADRENAL INSUFFICIENCY

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**Objective:** Glucocorticoids are the main cause of low BMD and secondary osteoporosis. Their negative impact on BMD and bone quality can't be fully understand and quantified.

**Methods:** A 70-year-old female patient presents to our hospital with intense mixed pain in thoracic and lumbar spine, bilateral coxalgia and gonalgia and antalgic gait, associated with vertigo. Patient's medical history revealed: chronic adrenal insufficiency (chronic glucocorticoid replacement) and secondary osteoporosis (treated with ibandronicum acid). She denies smoking, alcohol or substance abuse.

**Results:** Upon physical examination, the patient is afebrile and hemodynamically stable. She is oriented with extraocular movements intact. Neurologic examination- no focal deficit. Musculoskeletal examination-bilateral knee pain/crepitus, left + Patrick, painful lumbar flexion, bilateral paravertebral DL muscular contracture, local tenderness at the site of the spinal apophysis. Lab work was unremarkable except mild hypercholesterolemia. ECG (at rest): normal sinus rhythm with mild nonspecific T wave abnormality in the inferior leads, but normal ST segment. Transthoracic echocardiography: only left ventricle diastolic dysfunction with normal chamber volume and good ejection fraction. Stress ECG: submaximal, negative for ischemic heart disease. X-ray exam: dorso lumbar spondylosis, bilateral grade II gonarthrosis and coxarthrosis. DXA: T-score L spine: -3.9; right femur: -1.8; left femur: -3.1; Considering the long evolution of her endocrinologic condition (~35 y) and chronic glucocorticoid replacement thera-

py, the patient functional status was quite good at her age and we could start the rehabilitation program: physical therapy exercises, antalgic electrotherapy, thermotherapy, therapeutic massage and medical therapy (antalgic and chondroprotective medication).

**Conclusion:** Evidence based medicine highlights that in postmenopausal patients with chronic adrenal insufficiency there a massive bone loss in addition to the physiological postmenopausal changes. Also the available data indicates that the adrenal cortex has a high impact in the maintenance of BMD. Some authors even suggested dose-dependent bone mass changes.

## P748

### EFFECT OF THE ANTICOAGULANT WARFARIN AND DIRECT ACTING ORAL ANTICOAGULANTS (DOACS) ON CORTICAL AND TRABECULAR BONE IN THE FEMUR USING DXA-BASED 3D MODELING

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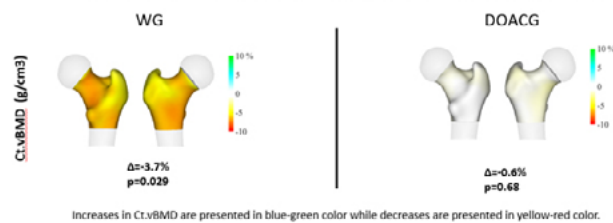
**Objective:** Previous data showed that anticoagulants can affect bone density and quality. These effects are more pronounced with warfarin than with DOACS, such as rivaroxaban, apixaban, edoxaban, or dabigatran. The aim of this study was to evaluate the effects of the two groups of anticoagulants on areal BMD (aBMD), bone geometry and volumetric BMD determined by advanced DXA-based methods compared to a control group.

**Methods:** Cross-sectional, observational study in patients using oral anticoagulants for >1 y grouped into a DOAC (DOACG) or warfarin (WG) groups, and a paired control group (CG). All patients filled out a questionnaire and underwent a hip densitometry exam (DXA) with the evaluation of total areal BMD (aBMD, mg/cm<sup>2</sup>). DXA-based 3D modeling (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 94 individuals were included, 32 in CG, 20 in WG and 42 in DOACG. Mean age was 61.79±7.00 y, mean BMI was 30.63±5.59 kg/m<sup>2</sup> with no differences in sex between groups. aBMD was lower in WG (0.922±0.153) compared to DOACG (1.017±0.171) and CG (1.011±0.107), p=0.048. The 3D analysis showed that WG had a lower total hip Int.VBMD (p=0.036), Tb.VBMD (p=0.020), and Ct.VBMD (p=0.029) when compared to CG. The anatomical distribution of the differences between WG and CG groups showed a strong homogeneous impairment (Figure 1,

WG) of the Ct.vBMD over the proximal femur (-3.7%,  $p=0.03$ ) while a slightly non-significant decrease was observed under DOACS (-0.6%,  $p=0.68$ ) when compared to CG (Figure 1, DOACG).

**Figure 1:** Differences between treatment and control groups in %, per treatment group



**Conclusion:** Warfarin has a strong negative impact on both cortical and trabecular bone densities while DOACS has only a limited negative impact. Further studies are needed to confirm these initial results and possible compensation options for induced bone impairment.

P749

## PARATHYROID CARCINOMA: INSTITUTION OF AN ITALIAN MULTICENTER PATIENT DATABASE

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**Objective:** Parathyroid carcinoma (PC) is an extremely rare malignancy, accounting <1% of all parathyroid neoplasms. In the context of rare diseases, collection of clinical and genetic characteristics of unselected patients in multicentre nationwide databases is an useful approach to increase knowledge of translational aspects, natural course, and prognosis of the disease. We aim to create, manage and analyze a nationwide database of PC patients to establish behavior and features of this malignancy in a general setting, both as sporadic disease and in the context of inherited rare tumors.

**Methods:** We established a clinical database of PC patients including family history, clinical, biochemical and genetic data, and surgical and pharmacological treatments. Currently, it includes 137 cases (54 males and 83 females) from 15 different endocrine centers, in 12 cities located in 9 Italian regions.

**Results:** 127 cases (92.7%) are classified as sporadic and 10 (7.3%) as familial cases. Seven of the 10 familial cases (70%) are carriers of a germinal heterozygote mutation of the *CDC73* gene, one (10%) bears a germline heterozygote mutation of the *MEN1* gene, and two (20%) have not been genetically screened for any of the genes known to be associated with PC. Global mean age at PC diagnosis was  $56.4 \pm 15.5$  y (range 15-81); mean age at PC diagnosis was  $58.0 \pm 14.4$  y (range 22-81) in sporadic cases, and  $35.6 \pm 15.2$  y (range 15-60) in familial cases. Lymph node metastases were identified in 4 cases (2.9%), while distant metastases were identified in 6 cases (4.4%), with one sporadic PC and one familial PC (1.5%) manifesting both the two type of metastases. Out of the 8 metastatic patients, two were familial cases (one with a *CDC73* mutation and one missing the genetic testing) and 6 were sporadic PCs.

**Conclusion:** Genetic analysis confirmed the *CDC73* gene as the most common genetic defect in inherited forms of PC and inactivating mutation of the *MEN1* gene as a possible rare cause of PC. Our data confirmed the precocity of onset of PC in familial and inherited forms of the disease, when compared to the sporadic counterpart.

P750

**RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY (REMS) TECHNOLOGY AND DXA FOR BMD ASSESSMENT IN KIDNEY TRANSPLANT RECIPIENTS**

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**Objective:** REMS is a novel ultrasound-based technique that has shown good reliability in the assessment of BMD in women affected by post-menopausal osteoporosis. Data on special populations with secondary osteoporosis are needed. The aim of this study was to compare the performance of the REMS BMD assessment with DXA in a cohort of kidney transplant recipients (KTR).

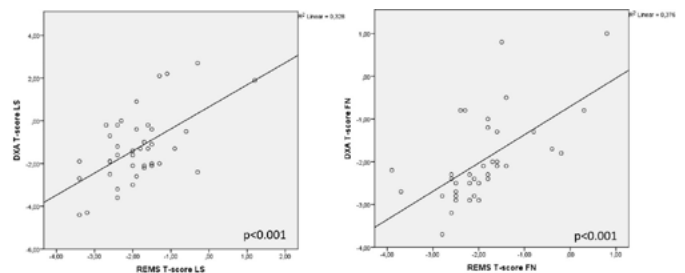
**Methods:** Consecutive patients referring to our KTR clinic were enrolled. All subjects fulfilled the following inclusion criteria: Caucasian population, both genders, age between 40-80 y, BMI <40 kg/m<sup>2</sup>. The enrolled patients underwent a lumbar spine (LS) and femoral neck (FN) examination with DXA and REMS. Differences in DXA vs. REMS T-scores were analyzed through Student's t-test for independent samples, correlations were tested through Pearson's correlation. Differences in prevalence were tested through chi-squared test. Written informed consent was obtained from all participants (protocol 1483CESC).

**Results:** 40 patients were enrolled (Table). At the LS, BMD was significantly lower when assessed through REMS. The correlation between the T-scores obtained with DXA and REMS are depicted in Figure. When adopting the worst site, the prevalence of subjects with T-score<-2.5 was 40.5% with DXA and 37.8% with REMS (p=NS) and of subjects with T-score<-1 was 89% with DXA and 97.5% with REMS (p=0.003).

**Table.** Characteristics of the cohort and differences in T-scores acquired through DXA or REMS.

Sample size (M)	40 (22)
Age (y)	
Median [IQR]	60 [53-68]
Body weight (kg)	
Median [IQR]	67 [59-73]

BMI (kg/m <sup>2</sup> )		23.5 [21.9-25.7]
Median [IQR]		
Corticosteroid treatment %		95%
History of fragility fracture(s) %		23%
Lumbar spine		
DXA T-score (mean±SD)	REMS T-score (mean±SD)	Student's t-test
-1.28±1.64	-1.88±0.90	P=0.049
DXA T-score<-2.5 prevalence	REMS T-score<-2.5 prevalence	χ <sup>2</sup> p-value
17.5%	22.5%	P=NS
DXA T-score<-1 prevalence	REMS T-score<-1 prevalence	χ <sup>2</sup> p-value
65%	89%	P=NS
Femoral neck		
DXA T-score (mean±SD)	REMS T-score (mean±SD)	Student's t-test
-1.97±1.01	-1.90±0.94	P=NS
DXA T-score<-2.5 prevalence	REMS T-score<-2.5 prevalence	χ <sup>2</sup> p-value
27%	19%	P=NS
DXA T-score<-1 prevalence	REMS T-score<-1 prevalence	χ <sup>2</sup> p-value
81%	86%	P=NS



**Figure.** Scatter dot depicting the correlation between the T-scores obtained with DXA and REMS at the lumbar spine and femoral neck.

**Conclusion:** These results showed a good reliability of the REMS technology with respect to DXA in the classification of KTR patients as having low bone mass and/or osteoporosis. Furthermore, REMS might be more sensitive than DXA in the detection of early bone impairment and in the classification of KTR patients with low bone mass.

P751

**BILATERAL ADRENAL TUMORS AND LONG-TERM ANTIOSTEOPOROTIC MEDICATION**A. Dumitrascu<sup>1</sup>, D. E. Rentea<sup>1</sup>, G. Voicu<sup>1</sup>, N. M. Bugăla<sup>2</sup>, M. J. Tuculina<sup>3</sup>

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**Objective:** The majority of bilateral adrenal tumours (BAT) are non-secreting adenomas. However, it is important to assess the influence on bone mass considering that even nonsecreting tumours can have autonomous cortisol secretion. (1-5) We aim to introduce a female patient with bilateral adrenal tumours and specific considerations in terms of osteoporosis therapy.

**Methods:** This is a case report. The patient agreed for anonymously use of her medical records.

**Results:** This is a 70-y patient who is admitted for adrenal and bone status follow-up. She was diagnosed with bilateral nonsecreting adrenal tumours 5 y ago when she also was recognized with osteoporosis (other diagnostics are gallstones, liver hemangioma, dyslipidemia, 2 episodes of kidney stones, hyperuricemia, chronic venous insufficiency). At first presentation, when BAT were detected, a part form low-normal values of CrossLaps and osteocalcin, bone metabolism assays were normal: 25OHD=35 ng/mL (N:30-100), CrossLaps=0.3 ng/mL (N: 0.33-0.782), P1NP=37 ng/mL (N: 20.25-76.31), osteocalcin=15 ng/mL (N:15-46), PTH=39 pg/mL (N: 15-65). Due to prevalent vertebral fractures, she had severe osteoporosis with DXA showing: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.909, T-score(SD)=-2.5, Z-score(SD)=-1.2; femoral neck BMD(g/cm<sup>2</sup>)=0.794, T-score (SD)=-1.8, Z-score (SD)=-0.6; total hip BMD (g/cm<sup>2</sup>)=0.818, T-score (SD)=-1.5, Z-score (SD)=-0.7; 1/3 distal radius BMD(g/cm<sup>2</sup>)=0.560, T-score (SD)=-2.1, Z-score (SD)=-0.8. She started teriparatide treatment (2-y protocol). After 2 y, there was no incidental fracture and DXA showed a BMD improvement: lumbar L1-4: BMD(g/cm<sup>2</sup>)=0.984, T-score(SD)=-1.6, Z-score(SD)=-0.1; femoral neck BMD(g/cm<sup>2</sup>)=0.797, T-score (SD)=-1.7, Z-score (SD)=-0.3; total hip BMD (g/cm<sup>2</sup>)=0.848, T-score (SD)=-1.3, Z-score (SD)=-0.1. She continued for 3 y with ibandronate every 3 months, with continuing the increase of BMD-DXA: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.959, T-score(SD)=-1.8, Z-score(SD)=-0.5; femoral neck BMD(g/cm<sup>2</sup>)=0.807, T-score (SD)=-1.7, Z-score (SD)=-0.3; total hip: BMD (g/cm<sup>2</sup>)=0.833, T-score (SD)=-1.4, Z-score (SD)=-0.3; 1/3 distal radius BMD(g/cm<sup>2</sup>)=0.494, T-score (SD)=-3.1, Z-score (SD)=-1.4. The same antiosteoporotic regime was recommended.

**Conclusion:** In this case, we mention: BAT might have a mild intermittent cortisol excess without clear diagnostic of Cushing syndrome (as we found in this patient over the years), thus it is

essential to pay attention to bone status in menopausal women, unless bilateral adrenalectomy is decided. TPT might be the first option of therapy under these specific circumstances.

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P752

**PREVALENCE OF METABOLIC DISORDERS IN PATIENTS WITH RHEUMATOID ARTHRITIS AND PSORIATIC ARTHRITIS**V. A. Aleksandrov<sup>1</sup>, L. N. Shilova<sup>1</sup>, A. V. Aleksandrov<sup>2</sup>, N. B. Golovina<sup>1</sup>, N. V. Aleksandrova<sup>2</sup>

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**Objective:** To study associated metabolic disorders in patients with inflammatory rheumatic diseases (IRD).

**Methods:** The study included 100 patients with rheumatoid arthritis (RA) aged 18-69 years old (91% women; mean duration of disease 9 [3.5;15] y) and 60 patients with psoriatic arthritis (PsA) aged 26-67 years old (85% women; mean duration of disease 10.2 [4;17] y). The presence of metabolic syndrome (MS) was diagnosed using the National Cholesterol Education Program / Adult Treatment Panel III (NCEP/ATPIII; 2004) criteria. Thyroid dysfunction (TD) was determined by biochemical and ultrasound examinations. Osteodensitometry (Lunar DPX, GE, USA) with estimation of BMD was used to diagnose osteoporosis (OP).

**Results:** Data from the cross-sectional study showed a high percentage of detectable MS signs in patients with both RA (46%) and PsA (70%) (p=0.003). The prevalence of OP in patients with RA was significantly higher than in patients with PsA (32% and 15%, respectively, p=0.017). There were no differences in the prevalence of TD in patients with different IRD (18% in RA vs. 26.7% in PsA). Signs of subclinical hypothyroidism (SH) occurred in both RA and PsA (6/18; 30.3% and 8/16; 50%, respectively). Subclinical hypothyroidism was more common in women with PsA than with RA (p<0.001). Recently, there has been an increased incidence of new cases of hypothyroidism as a manifestation of thyroid dysfunction in patients with RA and PsA, especially in women with metabolic disorders. The combination of SH and low BMD was determined more frequently in RA patients with MS than in PsA



patients (9/46; 19.6% vs. 2/42; 4.8%,  $p=0.036$ ). The possible benefits of therapeutic effects on MS components in such patients remain to be evaluated.

**Conclusion:** The high incidence of comorbidities (MS, OS, SH) in patients with IRD requires following the existing recommendations for their timely detection and treatment, as well as endocrinologist consultation. The frequent combination of hypothyroidism with RA and PsA characterizes it predominantly as a concomitant pathology rather than as an isolated chronic thyroid disease.

## P753

### ASSESSMENT OF QUALITY OF LIFE IN PATIENTS WITH LOW-ENERGY FRACTURES USING THE RUSSIAN NATIONAL REGISTRY FOR THE PATIENTS ENROLLED INTO FRACTURE LIAISON SERVICES

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**Objective:** The results of many studies show that fragility fractures cause the significant loss of quality of life and prolonged recovery from injury. We aimed to assess quality of life in patients before osteoporotic fracture and 4-6 months after trauma.

**Methods:** Russian Association on Osteoporosis (RAOP) developed of a registry PROMETHEUS of the patients recruited into fracture liaison services. We used the EQ-5D questionnaire to assess patients' quality of life before the fracture and 4-6 months after injury, using the data from the registry. We used Fisher exact test, analysis of variance (ANOVA) and Student t-test.

**Results:** As of 29.12.2021, data on 521 patients were introduced in the registry, mean age is  $72.6 \pm 10.00$  y. Prefracture quality of life score was significantly lower in women compared with men (0.71 vs. 0.79,  $p<0.05$ ). Depending on the patient's age, no significant differences were obtained. Patients with hip fracture had an EQ-5D score 0.70, it was lower than in patients with humerus (0.78,  $p<0.01$ ) and distal forearm (0.77,  $p<0.05$ ) fractures. Patients with

vertebral fracture had an EQ-5D score 0.72, it was lower than in patients with humerus fracture,  $p<0.05$ . In the presence of 3 or more chronic diseases, quality of life was significantly lower than in patients without any other diseases or in presence of 1-2 diseases,  $p<0.05$ . 196 patients were interviewed in the period 4-6 months after fracture. We revealed significantly decreased quality of life in men comparing with the data before the fracture (0.61 vs. 0.77,  $p<0.05$ ). Also it was significantly reduced in patients with hip fracture (0.60 vs. 0.69,  $p<0.05$ ) and in patients over 80 years old (0.53 vs. 0.61,  $p<0.05$ ). In women, patients in younger groups, in those who fractured vertebrae or bones of upper extremity, EQ5D score in 4-6 months after the fracture was similar to the data before the fracture.

**Conclusion:** In patients with low-energy fractures quality of life measured by EQ-5D before the fracture was significantly lower in women, in patients who had more chronic diseases and who got hip and vertebrae fractures. During the period of 4-6 months after fracture, quality of life remained significantly lower than it had been marked before injury in men, patients aged 80 years and over, and those who suffered from hip fracture.

**Acknowledgement:** The PROMETHEUS Registry has received support from Amgen Grant for Russian Association on Osteoporosis

## P754

### SEASONALITY OF HIP FRACTURES BEFORE AND DURING COVID-19 PANDEMIC: A RETROSPECTIVE STUDY

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**Objective:** Osteoporotic fractures are prevalent worldwide. Regarding hip fractures, some studies suggest a seasonal pattern, namely higher rates in the Winter, probably attributed to adverse climacteric conditions. With the advent of the pandemic, people were forced to stay at home, which theoretically decreased their susceptibility to those adverse conditions.

The purpose of our study is to evaluate whether there is a seasonal pattern in hip fractures occurrence before the COVID-19 pandemic and whether that pattern remains present in the first year post-COVID-19.

**Methods:** Retrospective study of patients with hip fractures between January 2019 to March 2021. Patients were divided into two groups according to fracture timing: pre-pandemic (January-December 2019) and pandemic (April 2020-March 2021). Fractures happening between January-March 2020 were excluded. Number of fractures, demographic data, comorbidities, and clinical results were collected. Descriptive analysis was performed, using medians and interquartile range for continuous data and frequencies

and percentages for qualitative variables. The number of fractures per season was compared within each group using nonparametric tests with  $p\text{-values} \leq 0.05$ , with SPSS® software.

**Results:** We selected a total of 126 patients (77 patients in the pre-pandemic group and 49 patients in the pandemic group). The median age of the patients was 80 y (range 34-96 y) and 78,3% of patients were women. There were no statistically significant differences between groups. Comorbidities as diabetes, thyroid diseases, smoking and alcohol abuse were not statistically different between groups or seasons. The incidence of fractures in the pre-pandemic group was significantly higher in winter and spring ( $p < 0.001$ ). In the pandemic group, we found a higher incidence of fractures in the winter when compared with spring and summer ( $p < 0.001$ ).

**Conclusion:** Our findings suggest a seasonality in hip fractures, with higher incidences in more rainy seasons in Portugal (winter and spring), before COVID-19. We did not find the same pattern in the pandemic group. The fact that we found a higher incidence of fractures in Winter in this group may in part be justified by the progressive return to routines and adjust to normality, compared with the first lockdown months.

## P755

### INFLUENCE OF CORTICOSTEROID TREATMENT ON THE PROGRESSION OF OSTEOPOROSIS IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** Rheumatoid arthritis is an inflammatory joint disease with symmetrical involvement of the joints that can lead to disabling deformities if not treated sufficiently and in time. Generalized bone loss is one of the main extraarticular complications of this disease, which can lead to osteoporosis and an increased risk of fracture. Regarding the occurrence of osteoporosis, a risk factor present in rheumatoid arthritis is represented by inflammation.

**Methods:** The study included 20 patients diagnosed with rheumatoid arthritis as well as osteopenia or osteoporosis. The patients were divided into two equal groups. Patients in the study group received 4 mg of methylprednisolone for 6 months, while patients in the control group received corticosteroid treatment only during periods of disease exacerbation. At the beginning of the study, all patients were evaluated by osteodensitometry (DXA) of the femoral head of the nondominant lower limb. The study group had a mean T-score of -2.5, with a minimum value of -3 and a maximum value of -1.6 while the control group had a mean T-score of -2.4 with a minimum value of -2.9 and a maximum value of -1.7.

**Results:** After 6 months, patients were reevaluated by DXA of the same site as at the initial evaluation. The mean T-score of the patients in the study group was -2.2, with a minimum value of -2.9 and a maximum value of -1.4. The mean T-score for patients in the control group was -2.4 with a minimum value of -3 and a maximum value of -1.6.

**Conclusion:** Although in the long term and in large quantities glucocorticoids present a bone loss effect, in small and short term quantities they can help in the treatment and prevention of osteoporosis due to their strong anti-inflammatory effect. The risk must be assessed on a case-by-case basis and correlated with the severity of the disease and the association of extraarticular systemic manifestations.

## P756

### IMPROVING THE CARDIOVASCULAR RISK PROFILE IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** The treatment of rheumatoid arthritis (RA) aims at better quality and optimal life expectancy of patients. Cardiovascular causes of death are a significant part of the overall mortality of these patients. High serum glucose is a risk factor for cardiovascular events. The aim of the study was to determine serum glucose levels during treatment with biological agents and their relationship to residual activity in patients with RA.

**Methods:** Nondiabetic patients with RA (according ACR 1987), over 18 y of age, on long-term treatment with biologics were included. Steroid use, methotrexate combination therapy (MTX) and the type of anticytokine therapy were analyzed. Fasting blood sugar was tested, RA activity was measured by SDAI and assessed according to a generally accepted threshold for a 12-month period. Descriptive statistics and nonparametric analysis, t-test and multinomial regression were used. Significance level for  $p < 0.05$

**Results:** 141 nondiabetes patients were studied, with a mean age of 57.5 y, mostly women (85.8%), with established RA ( $12.6 \pm 9.6$  y) on long-term treatment with biological ( $4.8 \pm 2.2$  y). 57.4% were treated with TNFi, 42.6% IL6i. 67.4% receive MTX, 57.3% take steroids. There is no difference in the intake of MTX and steroids according to TNFi or IL-6. Serum glucose values were similar in treatment with TNFi and IL6i ( $MD = 0.09$ ,  $p > 0.05$ ). 56.9% were in sustained LDA during the 12 months studied (36.5% in 12 months, 20.4% in 6 months), 15.6% were only once in LDA, in 27.5% no LDA has been established at all. Patients with above-normal glucose are more likely to have an LDA only once than a sustained 12-month LDA ( $OR = 14.4$  95%CI 1.3-159.5) during IL6i treatment. No such association has been established with TNFi treatment.

**Conclusion:** Improvement of the cardiovascular risk profile can be achieved by long-term reduction of RA activity and glucose monitoring in all RA patients. TNFi appears to be more appropriate in patients with higher blood sugar. More in depth research is needed.

## P757

### MIDLIFE RISK OF OSTEOSARCOPENIC OBESITY IN MEXICAN WOMEN

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**Objective:** To evaluate the risk of osteosarcopenic obesity (OSO) in middle-aged women and its association with android adipose tissue.

**Methods:** We measured total lean body mass (LBM), fat mass (FM) and BMD using iDXA, and bone sonometry (SoS) among 101 Mexican women from the ELEMENT cohort study. Sarcopenia was defined as LBM<-2 SD (Mexican population reference tables), "Low LBM" was defined as <P10<sup>th</sup>. The percentage of total body fat was calculated using FM (kg/weight\*100); obesity was classified as ≥35% fat. Trabecular and cortical bone balance was calculated as the absolute z-scores difference between radius SoS vs. spine DXA for trabecular, and of tibia SoS vs. femur DXA for cortical bone; "balance": <±0.5 and "imbalance" otherwise. Risk of OSO was defined by the presence (yes/no) of obesity, bone balance and sarcopenia: "lower risk" when having none or one indicator, and "higher risk" having two or three indicators. We calculated the ratio of android/gynoid adipose tissue using android and gynoid fat (kg) measured by iDXA. Abdominal obesity was classified as a waist circumference >88 cm. We analyzed the association between the ratio of android/gynoid adipose tissue and OSO risk with separate logistic regression models for each bone type (i.e., trabecular and cortical) adjusted by age, menopausal status, socioeconomic status, smoking and sedentarism.

**Results:** Mean age was 45.6±6.5 y, 93.1% had a fat percentage ≥35%, 57.4% and 60.4% had trabecular and cortical bone imbalance, respectively. No women were classified as sarcopenic; however, median LBM was higher for women with abdominal obesity 39.2 kg (Q1=37.0, Q3=42.2) compared to those without abdominal obesity (36.4 kg, Q1=37.0, Q3=42.2, p=0.05). 52% of women had obesity and trabecular bone imbalance, of whom

70.6% had abdominal obesity. The odds between android/gynoid ratio and the risk of OSO for trabecular bone were OR=1.21, CI95% 1.07,1.36 and null for cortical bone.

**Conclusion:** These results suggest that a higher android fat ratio may be influencing risk of OSO by infiltration of LBM.

## P758

### PREVALENCE OF VITAMIN D INADEQUACY IN A PORTUGUESE FLS

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**Objective:** Vitamin D inadequacy is a major public health problem worldwide. The purpose of our study is to evaluate the prevalence of vitamin D inadequacy in a Portuguese FLS from Aveiro, Portugal.

**Methods:** We conducted a retrospective study involving patients with hip fragility fractures admitted to our hospital over 38 months (November 2018-January 2022). Patient records were searched for vitamin D analysis, carried out within one week of hospital admission. Vitamin D levels were considered sufficient (>30 ng/ml), deficient (<20 ng/mL), or insufficient (20-30 ng/mL). Sociodemographic and clinical data were also collected. Vitamin D levels were compared between genders and seasons. Descriptive analysis was performed, using means, minimum, and maximum values for continuous data, and frequencies and percentages for categorical variables. Nonparametric and parametric tests were used for statistical analysis with SPSS® software, with a p-value ≤0.05.

**Results:** 106 patients were included (81.1% of the patients were women). The mean age at the time of fracture was 81 y. The mean vitamin D level was 14.04 ng/ml. Only 4.7% of patients (n=5) presented vitamin D levels considered sufficient. 77.4% (n=82) and 1.9% (n=2) of patients had deficient and insufficient vitamin D levels, respectively. There were no significant differences in vitamin D levels in female vs. male patients, as in autumn-winter vs. spring-summer admissions (p> 0.05).

**Conclusion:** This study confirms a global tendency for vitamin D inadequacy in patients with hip fragility fractures in our FLS, with most patients showing alarmingly low levels. Therefore, it suggests the importance of proper vitamin supplementation in similar populations. These results are in line with other studies in literature.

P759

## WHAT EFFECT HAVE CLINICAL COMMISSIONING GROUP POLICIES FOR THRESHOLDS OF WEIGHT LOSS AND BODY MASS INDEX HAD ON ACCESS TO KNEE REPLACEMENT SURGERY IN ENGLAND? AN ANALYSIS FROM THE NATIONAL JOINT REGISTRY FOR ENGLAND

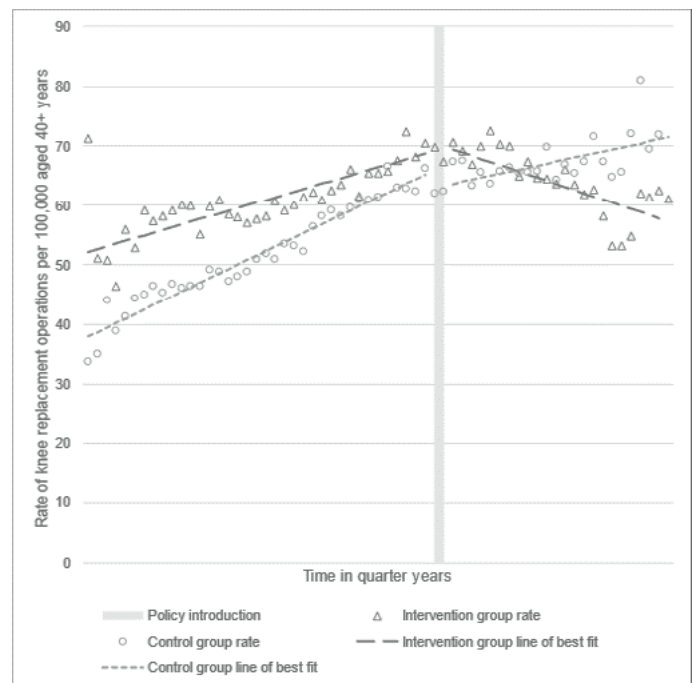
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**Objective:** To assess the impact of policies for thresholds of weight loss and BMI on access to knee replacement surgery in England

**Methods:** Natural experimental study to compare the rate of primary knee replacement surgery and patient characteristics over time, between intervention policy clinical commissioning groups (CCGs) which introduced health optimisation policies for patients with overweight or obesity, and control group CCGs which had no policy introduction. Data from the National Joint Registry (NJR) for 481,555 patients who had primary knee replacement between Jan 2009 and Dec 2019 in England were analysed using interrupted time series analysis. Control and intervention CCGs were randomly matched. CCG level data were pooled relative to the policy introduction date.

**Results:** A sustained fall in rates of surgery after policy introduction was observed (trend change -0.98 operations per quarter per 100,000 aged 40+ y, 95%CI -1.156 to -0.803, P<0.001), whereas rates increased in control regions (Figure). Rates of surgery fell in all patient groups, including non-obese patients. The proportion of independently funded operations and patients living in the most affluent areas increased after policy introduction.



**Figure.** Interrupted time series analysis of rate of knee replacement surgery per 100,000 population aged 40+ from pooled data for all intervention and control CCGs (n=130).

**Conclusion:** Weight loss and BMI policy introduction was associated with significant decreases in the rates of primary knee replacement surgery. This affected all patient groups, not just the obese patients policies were targeted at. Changes in patient demographics seen after policy introduction suggest these policies have increased health inequalities and need urgent reconsideration.

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P760

### OPTIMISATION OF THE K-POSTN IMMUNOASSAY FOR THE IDENTIFICATION OF INDIVIDUALS AT HIGH RISK OF OSTEOPOROTIC FRACTURES

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**Objective:** K-Postn is produced from the degradation of periostin by Cathepsin K<sup>1</sup>, a highly bone specific interaction<sup>2</sup>. The levels of circulating K-Postn have been used to predict incident fractures independently of BMD and fracture risk assessment tool (FRAX) in postmenopausal women<sup>2</sup>. The competitive ELISA utilised in this study provides a new approach in identifying subjects at high risk of osteoporotic fractures. To ensure the production of a highly sensitive and accurate assay for K-Postn, ProAxis Ltd have been working on the optimisation and commercial manufacturing of this highly novel K-Postn assay. The two major objectives of optimisation are increased assay sensitivity and reduced overall assay run time.

**Methods:** K-Postn was measured using the competitive K-Postn ELISA developed by the laboratory of bone diseases at Geneva University Hospital<sup>1</sup>. Incubation conditions and optimum working concentrations of the assay components were investigated to achieve the objectives of increased assay sensitivity and reduced assay run time. Furthermore, to maintain high assay accuracy and precision, background signal to noise ratio and intra assay CVs were continuously monitored throughout investigations.

**Results:** The sensitivity of the original assay was increased 6-fold to produce a new standard curve range of 25-1600 ng/ml. Additionally, overall assay completion time was reduced from 19 to 3 h, thus increasing assay throughput for the end user.

**Conclusion:** The development and further optimisation of the new K-Postn competitive ELISA with improved sensitivity, provides the market with an enhanced product which may facilitate the quick noninvasive detection/monitoring of individuals at high risk of osteoporotic fractures and potentially other metabolic bone diseases.

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**Disclosures:** P. Weir, T. Ferguson, and D. McCafferty are employees of ProAxis Ltd.

P761

### LONGITUDINAL ASSOCIATION BETWEEN SPEED OF SOUND, TRABECULAR BONE SCORE AND DUAL-ENERGY X-RAY ABSORPTIOMETRY

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**Objective:** To compare repeated measures of speed of sound attenuation in bone (SoS), TBS and DXA in a longitudinal follow-up of women to define their correlation as measurements of different bone structure components, of predominantly trabecular tissue architecture.

**Methods:** SoS was measured at the distal third of the radius on the non-dominant arm, total BMD was assessed using DXA and TBS was measured at the lumbar spine (from L1 to L4). Measurements obtained by these methods were assessed every year over three years. Mixed-effects models were used for the analysis of z-scores for each method predicting another one (i.e., TBS predicting SoS, DXA predicting TBS and DXA predicting SoS) adjusted by age, BMI and previous bone treatment.

**Results:** On average, women (n=60) had 3 measurements of each method and their age ranged between 35-85 y (mean=60.4±10 y). We found that TBS predicted SoS ( $\beta=0.36$ ,  $p=0.01$ , CI 95% 0.07,0.64), DXA predicted TBS ( $\beta=0.44$ ,  $p<0.001$ , IC95% 0.29, 0.58) and DXA predicted SoS ( $\beta=0.30$ ,  $p=0.02$ , CI 95% 0.03,0.57).

**Conclusion:** Our preliminary results suggest that SoS, TBS and DXA can be used in a clinical setting and highlight the importance of using different methods for bone quality measurement. Work continues to expand the sample size to ~200 participants in the following months.

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### HISTORY OF PANDEMICS FROM THE ERA OF ANCIENT GREECE TO MODERN TIMES AND COVID-19: PANDEMICS DEMAND SOCIAL ISOLATION AND MOBILITY LIMITATIONS AND AFFECT HUMAN HEALTH

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During the 19<sup>th</sup> century and as antibiotics and potent vaccines were discovered the science of infectious diseases seemed to fade off. Even the discovery of new antibiotics seemed to come to a difficult end as research in infectious diseases came to a stop. However, things proved that infectious diseases were not finished. The HIV epidemic, the Ebola epidemic, the SARS epidemic proved that infectious diseases are more than alive. The new pandemic which is due to the new SARS-CoV-2, a virus belonging to the family of coronaviridae swept all over the globe. Societies remembered old policies, which were in use since the remote years of ancient Athens. Social isolation and severe restrictions on mobility at personal, national and international levels were inflicted. These measures had health implications. The aim was to study health implications of social isolation and mobility limitations on human health, with an emphasis on musculoskeletal health.

The effects on health indices of social isolation and mobility limitations were investigated. In particular, the effects of social isolation on mental health parameters, such as depression and sleep quality as well as the effects of mobility limitations on physical health, in particular, musculoskeletal health and falls was studied.

It was found that social isolation had a major impact on depression and sleep quality. Depression levels increased and sleep quality deteriorated in the population. Mobility limitations at the level of the individual had major implications in musculoskeletal health. It seemed to compromise skeletal health and increased the risk of falls.

Thus, it appears that despite that the COVID-19 pandemic is a novel one due to a novel coronavirus, old measures had to be inflicted on the population, which had a major impact on human health. Mental health was severely inflicted, with a special emphasis on depression and sleep quality. Physical health, in particular musculoskeletal health was severely affected due to the mobility limitations on personal level. Parameters of musculoskeletal health deteriorated and the risk for falls increased. It appears that new research is in need to combat new emerging infections, so that restrictions of social contact and mobility are not needed in the future.

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### DIFFICULTIES IN TOPICAL DIAGNOSIS OF PRIMARY HYPERPARATHYROIDISM

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**Objective:** Primary hyperparathyroidism (PHPT) is the third by prevalence endocrine pathology originating from the hypersecretion of the PTH by the parathyroid tumor (PT). The treatment success and complication prevention directly depend on the accurate topical diagnosis of the disease which in some cases is a challenge.

**Methods:** Case description

**Results:** An 84 y.o. female was referred to our tertiary care centre to rule out a parathyroid cancer (PC). An increased PTH was noted 10 years ago, but the diagnosis of PHPT was established only 4 years ago with Ca 3.3 mmol/l (2.15-2.55), PTH 29.5 pmol/l (1.7-6.4), osteoporosis (BMD L1-L4 -2.9SD) and compression fractures of the spine. Since US and 99mTc-MIBI scintigraphy were negative, the patient was initiated with denosumab therapy 60 mg sc every 6 months. During the last year her PTH started to increase which became the basis for additional cinacalcet therapy of 60 mg a day which was discontinued due to significant gastrointestinal side effects. After that her PTH started to rise rapidly (137 pmol/ml) which prompted the referral. Our evaluation yielded: PTH -169 pmol/ml, Ca-2.4 mmol/l, P-0.67 mmol/l, CaU -0.65 mmol/24, vitD-16 ng/ml, osteocalcin 83.47 ng/ml, CTX 0.245 ng/ml, DXA L1-L4-4.8SD, femur -3.5SD, radius -4.8SD. 99mTc-MIBI scintigraphy + SPECT/CT with afterward confirmation with US and contrast enhanced CT showed that the patient has an atypically located PT (2.2x1.8x1.1cm) on the right, lateral to the internal jugular vein, slightly above the bifurcation of the common carotid artery which was nearly shielded by salivary glands, and was the explanation why previous attempts to establish topical diagnosis were unsuccessful. The patient was prescribed cholecalciferol 7000 IU/d with a prompt decrease of PTH to 38 pmol/l. Non-suspicious structural data of the adenoma, denosumab-controlled blood calcium levels, reversal of PTH surge after by vitD, made it possible to exclude suspicions of a malignant process. Due to multiple comorbidities, she was continued on denosumab and vitD.

**Conclusion:** In the topical search for a PT, it is important to remember the rare possibility of its ectopia at the level of the right submandibular salivary gland. PTH surge might be due to vitD deficiency and in this case it well responsive to cholecalciferol treatment.

P764

### EFFECTIVENESS OF LEE SILVERMAN VOICE TREATMENT (LSVT): BIG PROGRAM IN BALANCE AND GAIT OF PATIENTS WITH MULTIPLE SCLEROSIS COMPARED TO PATIENTS WITH PARKINSON DISEASE

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**Objective:** To examine whether the Lee Silverman Voice Treatment (LSVT-BIG) is effective on balance and gait for patients with multiple sclerosis (MS) as much as for patients with Parkinson's disease (PD).

**Methods:** This pilot study compares two population of patients (MS and PD), with repetitive measures before-middle-after the intervention. The LSVT-BIG intervention lasted 4 weeks, with frequency of 4 consecutive days, for one hour/d. Balance and gait were evaluated with the mini-BESTest, one leg stance timing, TUG and Functional Gait Assessment (FGA) scales respectively. Differences from baseline between groups were assessed via Mixed ANOVA, SPSS vs. 24.

**Results:** Six men with PD (68±3 age) and six patients with MS (5 women & 1 man, 45±8 age) completed the study. After LSVT-BIG intervention both groups demonstrated a significant increase in mini-BESTest ( $F_{(2,20)}=325.1$ ,  $p<0.001$ ) in FGA ( $F_{(2,20)}=280.6$ ,  $p<0.001$ ) and in time standing on left leg ( $F_{(1,46,14,6)}=43.3$ ,  $p<0.001$ ) and on right leg ( $F_{(2,20)}=124$ ,  $p<0.001$ ). TUG time decreased ( $F_{(2,20)}=35.7$ ,  $p<0.001$ ). No differences revealed between groups for any measurement outcome ( $p>0.5$ ).

**Conclusion:** The comparative improvements in balance and gait between groups indicate that the LSVT-BIG may be beneficial for the MS patients as for the PD patients. More research is needed before conclusions are exported for the use of LSVT-BIG protocol in MS population.

P765

### DIOSMIN, A CITRUS FRUIT-DERIVED PHLEBOTONIC BIOFLAVONOID PROTECTS RATS FROM CHRONIC KIDNEY DISEASE-INDUCED LOSS OF BONE MASS AND STRENGTH WITHOUT DETERIORATING RENAL FUNCTION

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Kidney Disease: Improving Global Outcomes (KDIGO) 2017 Clinical Practice Guideline recommended treatment decisions for patients with chronic kidney disease (CKD) with osteoporosis and/or high risk of fracture. Bisphosphonates, the first-line anti-osteoporosis drugs have the concern of worsening kidney function. Moreover, despite impaired bone formation in CKD patients, teriparatide, the formation-stimulating drug is not recommended. Thus, there is an urgent need for safe and effective treatment of osteoporosis in CKD patients. Here, in CKD rats, we tested the osteoprotective effect of diosmin; a citrus-derived bioflavonoid used as a phlebotonic in chronic venous insufficiency, and has renoprotective effect. CKD was developed by 5/6<sup>th</sup> nephrectomy and diosmin at the human equivalent dose (100mg/kg) did not advance renal failure (creatinine, urea and BUN) but reduced blood pressure to the level of sham control. Fibroblast growth factor-23 and PTH were increased in CKD and diosmin suppressed both. CKD reduced bone mass and deteriorated microarchitecture of trabecular bones, and diosmin maintained both to control levels. Bone formation and strength were impaired in the CKD and diosmin maintained these to control levels. Femur 3-point bending test revealed that elastic limit, yielding strength, Young modulus, modulus of toughness and ultimate stress were decreased in the CKD group and diosmin maintained these values to the control levels. Nanoindentation of bone showed that diosmin significantly increased tissue hardness over the control. Diosmetin, the metabolic surrogate of diosmin had comparable pharmacokinetic profiles between the control and CKD groups. Furthermore, diosmetin (50mg/kg) protected against CKD-induced bone loss. These data suggests that diosmin and its metabolic surrogate, diosmetin protect against CKD-induced osteopenia. Since renal functions are not further impaired and diosmin is already in clinical use, we propose assessing its efficacy in increasing bone mass and reducing fracture risk in CKD patients with low bone mass.

P766

### OSTEOPOROSIS THERAPEUTIC COMPLIANCE AT A FRACTURE LIAISON SERVICE

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**Objective:** Assess therapeutic compliance in osteoporosis patients followed at Local Health Unit of Guarda Fracture Liaison Service.

**Methods:** Prospective study of adults with fragility fracture managed at our FLS, between September 2019 and December 2021, with at least one appointment and more than one year of follow-up. Sociodemographic features were reviewed and therapeutic compliance after the first year of prescription was assessed.

**Results:** In all, 190 patients were referred to our FLS and 162 were seen (88.3% female; mean age 76.8±10.4 years). In these, 190 major fractures were found, as follows: hip (59%), vertebra (21%), wrist (17%), and pelvis (3%). Osteoporosis treatment was prescribed in 141 (87.0%) patients: zoledronic acid (n=41, 29.1%), oral bisphosphonates (n=41, 29.1%), denosumab (n=23, 16.3%) and teriparatide (n=6, 4.3%). 68% of patients were taking their medication as prescribed, after 1 y.

**Conclusion:** In comparison with other works, we had a lower 1-y retention rate. This can be explained by the negative impact of the COVID-19 pandemic in this cohort, as these are elderly patients.

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### NATURAL HISTORY OF ERROR IN OSTEOSYNTHESIS? CASE OF SUBTROCHANTERIC FRACTURE

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Atypical femoral fracture is a dreadful complication of prolonged intake of bisphosphonates drug for osteoporosis treatment. When these fractures occur, they need to be correctly managed.

Case Presentation: 63 years old, female, independent for activities of daily living, presenting with anterior thigh pain, inability to walk after fall from own height. She was diagnosed atypical right subtrochanteric fracture. The patient has past medical history of dyslipidaemia, depression, total right knee replacement and prolonged intake of alendronic acid for treatment of osteoporosis. After diagnosis, the fracture was fixed with long intramedullary nail, cerclage cables in varus malalignment. At 2 y of follow-up, the implant fails with cut-out of cephalic screw. The osteosynthesis was revised four days following the failure using long intramedullary nail and additional cerclage cables with varus malreduction. One week ensuing second surgery, there is new failure of osteosynthesis with new cut-out of cephalic screw. Ten days later, it's been removed the material of osteosynthesis, resection of proximal femur and right hip hemiarthroplasty with bipolar head and tumoral stem. The patient kept annual follow-up as outpatient for 5 y. In this period, the patient develops aseptic loosening of femoral component with ectasia of diaphyseal femur segment. Bone scanning shows no sign of increased activity in any area. The surgery was revised. The femoral component was removed along with femoral resection of diaphyseal segment. In this setting, the diaphyseal defect was filled femoral allograft of cadaver and femoral component was replaced with an intramedullary stem locked by a distal screw. One-year after last surgery, the femoral component fractures and it is necessaire another revision procedure. The femoral component was replaced by another femoral component locked by a distal screw and additional cerclage cable to make the assembly more robust. One-year ensuing the last procedure there is a new femoral component fracture.

The surgery was revised with replacement of femoral stem for total femur prosthesis and substitution of tibial component of total knee replacement.

Outcome: Currently, with 3 months of postoperative, the patient was readmitted to an hospital institution with superficial wound surgery infection with necessity of antibiotics. The patient has no pain and she is capable to walk.

Discussion: Fracture in subtrochanteric region account for approximately 10-30% of all hip fractures. This segment of femur is manly composed of cortical bone, consequently less blood supply and potential for healing in comparison with intertrochanteric area. There is high stress concentration in this anatomic segment because of weight bearing and action of powerful muscles. This type of fracture could occur as result of high energy trauma in young patients or as result low energy trauma in elderly patients and with frailty due medical condition or use of some drugs. It's well established the relationship between bisphosphonates use for more than five years and atypical femur fracture. These drugs act suppressing bone turnover and their prolonged use in use in theory could increase bone weakness and make it more prone to fracture. Because of alterations in bone turnover, atypical fractures have less potential for consolidation. In our case, the fracture was fixed with intramedullary rod in varus malreduction. Varus malalignment results in increase of bending force in medial subtrochanteric cortex and may partially explain the failure of implant. Additionally, others factor such anatomy of the patient may also contribute for the implant failure. To avoid complications related to the surgical technique, first the fracture must be reduced before insertion of the nail. Second it's crucial to make a correct entry point to avoid varus malalignment. The failure of successive arthroplasties can be explained by the poor bone quality the quality of the patient and alterations in biomechanics between bone and implant.

We advise correct fracture reduction and construction of correct entry point before inserting the nail, taking in account the anatomy of the patient in order to avoid complications.

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### THE RISK OF OSTEOPOROSIS IN ELDERLY RELATIVES OF STUDENTS OF THE PEDIATRIC DEPARTMENT

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**Objective:** Osteoporosis is currently recognized as one of the most common diseases of bone tissue in the world. In Russia, 34% of women and 27% of men aged 50 y and older have osteoporosis. Osteoporotic fractures are one of the main causes of disability and mortality. Hip neck fracture is the most dangerous. A third of older people over the age of 65 have one case of a fall



per year, while the probability of a second fall increases two to three times over the next year. Every fifth of them has hip fracture, vertebral fractures. Early diagnosis of osteoporosis is difficult due to the absence of specific clinical signs of this disease. Bone fractures associated with osteoporosis are the late clinical manifestations of the disease. We aimed to calculate the 10-y risk of major fractures and hip neck fracture, to determine the risk of falls in elderly relatives of students of the pediatric department.

**Methods:** The study was completed on the basis of the Ural State Medical University during the period from October to December 2021. A total of 58 people participated in the study, including 44 women (76%) and 14 men (24%). All patients had not been examined before and had not received treatment for osteoporosis. The 10-y risk of major fractures and hip fracture was assessed using the FRAX® model, patients answered questions from a self-assessment questionnaire for the risk of falls.

**Results:** The average age of the respondents was 65.2±4.5, of which the average age in women was 65.0±4.4, in men 65.9±4.9. BMI averaged 26.4±4.7, which corresponds to overweight, in women 26.2±4.7, in men 27.3±4.7. 7 survey participants smoke, of which 4 men and 3 women. 7 people have a history of hip fracture in their parents (6 women and 1 man). Among the most common chronic diseases in the subjects - bronchial asthma, arterial hypertension, hypothyroidism, diabetes mellitus. 10 women had fractures with a minimal level of trauma, men had no history of fractures. Out of 10 women who had a low-traumatic fracture, have been smoking for many years, two of the tested have a history of hip fracture in their parents. When comparing women with low-traumatic fractures and without fractures in the anamnesis, statistically significant differences in age were established. The age of women who have suffered a fracture is higher than without a fracture ( $p=0.038$ ). There were no significant differences in BMI, smoking, hip fracture in parents, risk of falling. When comparing the 10-year risk of major fractures and hip fracture in these women, statistically significant differences were found. The 10-y risk of major fractures and hip fracture is higher in patients with fractures ( $p<0.001$  and  $p<0.001$ , respectively). The 10-y risk of major fractures and hip fracture in women is statistically significantly higher than in men ( $p<0.001$  and  $p=0.04$ , respectively). When assessing the risk of falling, high risk of falling was observed in 2 men and 12 women. When comparing women with a high risk of falling and a low one, statistically significant differences in age were found. The age of women with a high risk of falling is higher than with a low one ( $p=0.033$ ). There were no significant differences in BMI, 10-y risk of major fractures and hip fracture. However, the BMI, 10-y risk of major fractures and hip fracture in patients with a high risk of falling is higher than without risk. No statistically significant differences were found in men when assessing the risk of falls.

**Conclusion:** 1. Osteoporosis is a serious problem, its early diagnostics is an essential prerequisite for preventive and curative arrangements. 2. The use of the FRAX method in everyday practice makes it possible to assess the risk of osteoporotic fractures in

patients based on an assessment of clinical risk factors. 3. The 10-y risk of major fractures and hip neck fractures in women is statistically significantly higher than in men of the same age.

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### ONE-YEAR MORTALITY IN PATIENTS WITH MINOR TRAUMA HIP FRACTURE IN IRAN

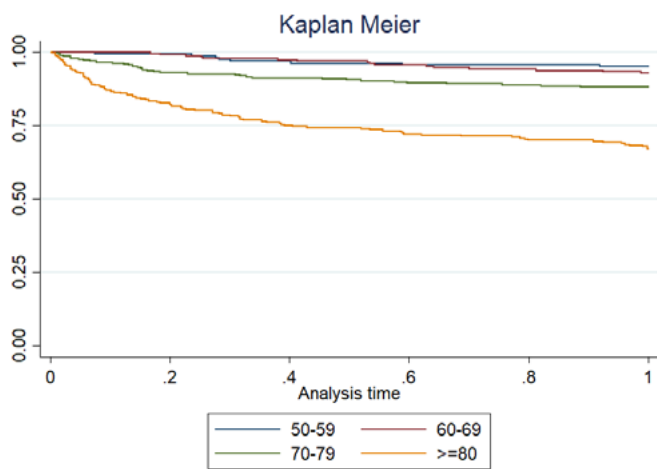
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**Objective:** Osteoporotic hip fractures impose a high burden on the health system and are a major cause of mortality in the elderly population worldwide. This study aimed to estimate the 1-y incidence rate of mortality in patients with hip fractures.

**Methods:** This study is a retrospective cohort in patients aged  $\geq 50$  y who were admitted to a referral hospital (Shafa-yahyaieian) in Tehran, due to minor-trauma hip fractures. All patients hospitalized during 2013-2019 were included. To ascertain death outcome during a year (365 d) following the fracture, we contacted the patients or their relatives through phone call. In addition, we crosslinked the hospital database with the national death registry, using a unique national identification number. Survival analysis was used to calculate the one-year mortality incidence rates, in men and women.

**Results:** A total of 945 patients with the hip fracture were recorded according to the hospital information system. The mean age of participants was 71 ( $\pm 11.2$ ) and 59% ( $n=553$ ) were women. In all, 288 deaths were occurred during the first year after the hip fracture. In general, the 1-y mortality rate was 17% (95%CI: 15.1-20.8). However, a higher rate of mortality was detected in men [20%, 95%CI: 15.9%-25.2%] compared to the women [15.8%, 95%CI: 12.6%-19.8%]. Figure shows the Kaplan-Meier survival curve in age categories. The mortality rate increased by age, as expected.



**Figure.** The Kaplan-Meier survival curve of minor-trauma hip fractures by age categories

**Conclusion:** The results showed a high mortality in patients with hip fractures. Considering the rapidly ageing population in Iran, resulting in a higher incidence of osteoporotic hip fractures, comprehensive strategies are needed to prevent fragility fractures in elderly populations.

## P770

### EFFECTS OF MIRROR THERAPY IN COMPLEX REGIONAL PAIN SYNDROME TYPE 1: A RANDOMIZED CONTROLLED STUDY

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**Objective:** Mirror therapy, a neurorehabilitative exercise performed by using a mirror, is used as complementary to other rehabilitation methods. In recent studies, positive effects of mirror therapy have been shown in patients with Complex Regional Pain Syndrome (CRPS) Type 1 secondary to stroke. Studies examining the effects of mirror therapy in CRPS-Type 1 developed secondary to traumatic factors are limited. This study aimed to investigate whether mirror therapy prescribed in addition to a conventional physical therapy and rehabilitation (PTR) program was effective on clinical outcomes in patients with CRPS-Type 1.

**Methods:** This randomized controlled single-blind study included 40 patients with CRPS-Type 1 of the hand according to Budapest diagnostic criteria, who were referred to the Dept. of Physical Medicine and Rehabilitation, Hand Rehabilitation Unit at the Medical Faculty of Ankara University. Participants were allocated ran-

domly into two groups. All patients received routine PTR program (contrast bath, hot pack, TENS, desensitization, exercises, occupational therapy) for 4 weeks, 5 sessions/week, 45-60 min/d. The mirror group received additional mirror therapy to the affected hand for 30 min/d. All patients were assessed before and after the therapy as well as at the first-month follow-up. The primary outcome measure was pain intensity by 0-10 Numeric Rating Scale. Secondary outcome measures were grip strength, lateral pinch strength, hand/wrist circumference, hand dexterity (Moberg pickup test), hand functioning in activities of daily living (Duruöz Hand Index) and health-related quality of life (Nottingham Health Profile).

**Results:** Both groups showed significant improvements in terms of pain severity, grip strength, lateral pinch strength, wrist circumference, hand dexterity, hand functioning and health-related quality of life ( $p < 0.0167$ ). When groups were compared regarding the improvements in assessment parameters, no statistically significant difference was found between the two groups in any of the outcomes ( $p > 0.0167$ ).

**Conclusion:** Mirror therapy applied in addition to routine PTR program did not provide extra benefit for the improvement of clinical outcomes in patients with acute CRPS-Type 1 of the hand due to traumatic causes.

## P771

### MORPHOLOGICAL DYNAMICS OF RHEUMATOID SYNOVIUM: SEEKING FOR SPECIFICITY

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**Objective:** To characterize histological and immunohistochemical patterns of rheumatoid arthritis in relation to period from disease onset using previously published data.

**Methods:** Databases of scientific publications (Scopus, Web of Science, PubMed, eLibrary Russian scientific database) were included in the search using appropriate search terms and period of publication 1990-2021. Assessment of publication quality and relevance as well as data interpretation was performed by consensus of the authors.

**Results:** Focal synovial and subintimal necrosis as well as proliferation signs have been found as first morphological features of RA. Earlier stages of the disease were characterized primarily by morphological features of angiogenesis, synovial oedema together with foci of lymphoid infiltration. Conversely, synovial proliferation pattern (hyperplastic villi, increased layer number, mucoid degeneration) along with both fibrinoid necrosis and lymphocytic extension with formation of lymphoid nodules as well as pannus expansion with destruction of synovium and cartilage have been

observed in rheumatoid synovia at the late disease phase. Silent synovial chondromatosis, amyloidosis, hyalinosis, perivascular sclerosis could also be found in some RA cases with long disease history. CD45 positive cells were usually localized in the outer layer while inner cells are usually CD45 negative. CD20 positive B lymphocytes in rheumatoid synovia are localized in subintimal follicles and, in a lesser extent, within perivascular areas. CD138 positive plasmacytes are also abundant but they can be found diffusely out of the follicles and outer synovial layer. CD 68 positivity of the synovial specimens is generally higher than CD20 positivity demonstrating presence of macrophageal cells both in outer synovial layer and subintima.

**Conclusion:** There is a sequence of morphological and immunohistochemical patterns in synovium that is more frequent in rheumatoid arthritis comparing to other similar joint diseases. These early immunohistochemical features in synovial tissue could be a fundamental basis of RA diagnosis in very early stage of disease or in obscure arthritis cases.

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### LONG-TERM FOLLOW OF DXA SCANS ON A BREAST CANCER SURVIVOR FEMALE

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**Objective:** Breast cancer treatment, either surgical or hormonal, induces loss of ovarian function leading to a decrease in oestrogen levels. This, in turn, causes bone mass loss and increases the risk of osteoporosis and fracture. (1-5) We aim to introduce a female breast cancer survivor patient and the long-term follow of DXA.

**Methods:** This is a case report.

**Results:** This is an 80-year female patient, who survived breast cancer, for which she underwent surgery, received radiotherapy, and received treatment with tamoxifen in 2017 and anastrozole until 2019. The patient's medical history includes osteoporosis treated (only) with zoledronic acid (since 2013) multiple fractures, vitamin D deficiency, stroke, secondary hyperparathyroidism, thrombophlebitis (while being treated with Tamoxifen), dyslipidemia, multinodular goiter. In 2013 the endocrine panel showed vitamin D deficiency: 25OHD=10.4 ng/mL (N:30-100) and normal BTM (bone turnover markers) in terms of CrossLaps=0.603 ng/mL (N: 0.33-0.782), osteocalcin=34 ng/mL (N:15-46), PTH=48 pg/mL (N: 15-65). DXA confirmed osteoporosis: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.623, T-score (SD)=-3, Z-score (SD)=-1.4; femoral neck(right) BMD(g/cm<sup>2</sup>)=0.646, T-score(SD)=-2.8, Z-score(SD)=-1.2; femoral neck BMD(g/cm<sup>2</sup>)=0.600, T-score(SD)=-3.2, Z-score(SD)=-1.6; total hip(right)

BMD(g/cm<sup>2</sup>)=0.699, T-score(SD)=-2.5, Z-score(SD)=-1.1; total hip(left) BMD(g/cm<sup>2</sup>)=0.665, T-score(SD)=-2.8, Z-score(SD)=-1.4. She received 5 mg IV zoledronate. After 1 y (in 2014): DXA improved (the same prevalent vertebral fractures): lumbar L2-3 BMD(g/cm<sup>2</sup>)=0.862, T-score(SD)=-2.9, Z-score(SD)=-1.2; femoral neck BMD(g/cm<sup>2</sup>)=0.602, T-score (SD)=-3.1, Z-score (SD)=-1.5; total hip BMD (g/cm<sup>2</sup>)=0.686, T-score (SD)=-2.6, Z-score (SD)=-1.2. Zoledronate 5 mg IV was administered and 2 y later, DXA continued to improve: lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.882, T-score(SD)=-2.5, Z-score(SD)=-0.1; femoral neck BMD(g/cm<sup>2</sup>)=0.626, T-score (SD)=-3, Z-score (SD)=-1.2; total hip BMD (g/cm<sup>2</sup>)=0.692, T-score (SD)=-2.5, Z-score (SD)=-0.9. In 2019 (at the end of anastrozol regime) DXA showed increased BMD: lumbar L1-3 BMD(g/cm<sup>2</sup>)=0.899, T-score(SD)=-2.3, Z-score(SD)=-0.6; femoral neck BMD(g/cm<sup>2</sup>)=0.617, T-score (SD)=-3, Z-score (SD)=-1.1; total hip BMD (g/cm<sup>2</sup>)=0.628, T-score (SD)=-3, Z-score (SD)=-1.2. After another 5 mg of zoledronate, she came for most recent evaluation (18 months later) which showed: low 25OHD=20.3 ng/mL (N:30-100), normal bone turnover markers: osteocalcin=35.31 ng/mL (N:15-46), CrossLaps=0.43 ng/mL (N: 0.33-0.782), P1NP=57.51ng/mL (N: 20.25-76.31) and mildly increase PTH=92.38 pg/mL (N: 15-65) with normal calcium levels and DXA showing good results at lumbar spine (no incidental fracture): lumbar L1-4 BMD(g/cm<sup>2</sup>)=0.972, T-score(SD)=-1.7, Z-score(SD)=0.1; femoral neck BMD(g/cm<sup>2</sup>)=0.578, T-score (SD)=-3.3, Z-score (SD)=-1.3. Supplements with cholecalciferol 2000 UI/d in addition to 5 mg zoledronate were once again recommended.

**Conclusion:** Due to the increased risk of osteoporosis and fractures in patients receiving breast cancer treatment, long-term follow of DXA and treatment are crucial. Our patient came for anti-osteoporotic medication a few years later since management for mammary cancer was initiated. Despite late initiation, anastrozole concomitant medication and aging on a background of severe osteoporosis therapy, BMD improved over the years.

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P773

**ASSESSMENT OF THE LIPID SPECTRUM IN PATIENTS WITH PSORIATIC ARTHRITIS**S. Spitsina<sup>1</sup>

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**Objective:** To study lipid profile, apolipoprotein A1 (ApoA1) and apolipoprotein B (ApoB) concentrations determination in patients with psoriatic arthritis (PsA); to reveal abnormalities and their relation with basic predisposing factors.

**Methods:** 15 PsA patients (men) receiving basic anti-inflammatory therapy with methotrexate from 10 to 20 mg/week for at least 6 months. The exclusion criterion was the presence of a concomitant disease that could affect lipid metabolism. Total cholesterol (TC), HDL, triglycerides (TG), ApoA1, ApoB were determined in blood plasma in all patients. Atherogenicity index (ratio (TC-HDL)/LDL), and ApoB/ApoA1 ratio were taken into account.

**Results:** The mean age of the patients was 48.2±10.56 y, duration of the disease was from 9-42 y. All patients had moderate or high disease activity. Elevation of TC level was registered in 80% of cases. Mean value of TC was 6.04±1.55 mmol/l. No changes in TG and HDL were registered. Correlation analysis showed a direct correlation of TC with age, excess body weight, and duration of PsA. Atherogenicity index in all patients did not exceed 3.5. The mean level of apoA1 was 1.56±0.36 g/l, in 3 patients (20%) the concentration was below the reference values (<1.2 g/l). In 9 patients (60%) we detected increased concentration of apoB (>1.0 g/l), mean level of apoB was 1.24±0.36 g/l. ApoB/ApoA1 ratio was >0.9 in 3 patients (20%), which corresponds to high risk of cardiovascular diseases.

**Conclusion:** Lipid metabolism disorders are common in patients with PsA and are associated with a high risk of early atherosclerosis development. Lipid profile indices are interconnected with traditional and disease-associated (PsA duration) factors. The most pronounced were increases in TC, apoB, and a decrease in apoA1 in 20% of cases. Each 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.

P774

**TRENDS IN LOW BONE MINERAL DENSITY EXPOSURE IN DIFFERENT WHO REGIONS: RESULTS FROM THE GBD STUDY 2019**

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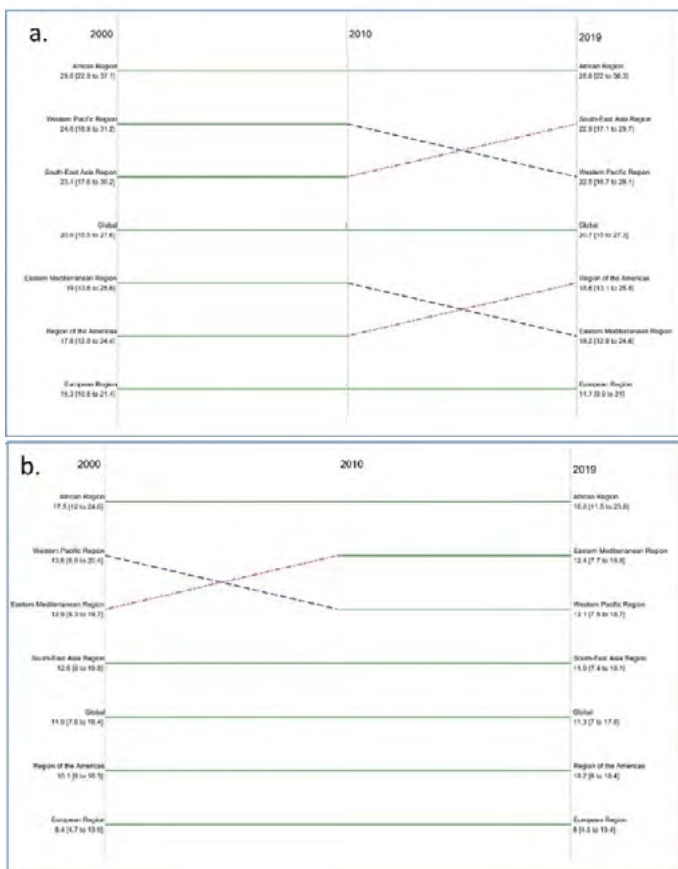
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**Objective:** The rate of fractures is increasing in parallel to the population aging affecting developing countries particularly (1). This study aims to focus on the changes in the exposure to low BMD in different WHO regions and globally.

**Methods:** We reviewed the sex-region-specific point prevalence of low BMD as summary exposure values (SEV), globally and by the regions of the WHO and compared the Eastern Mediterranean Region (EMR) with the global state, and other states according to the statistics of the Global Burden of Diseases (GBD) 2019 report (2).

**Results:** Compared with the global average, the exposure to low BMD in women was lower in the EMR since 2000. The highest SEV of low BMD was detected in the African, and Western Pacific regions in women. However, the state of low BMD in men in the EMR was worse than the figures of the global state, reaching the highest SEV and remaining so after the African region since 2010. In all, the European region showed the lowest SEV of low BMD in both sexes (Figure).





**Figure.** Trends in exposure to low BMD in a. women and b. men; by different regions of WHO.

**Conclusion:** The results of this study reflect that the current state of low BMD in men is critical in the EMR, which requires urgent attention and appropriate actions. Since the burden of osteoporosis will increase in the Middle Eastern countries due to the steady growth of the aging population (1), appropriate actions are needed for elderly men as well as women.

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1. Maalouf G, et al. J Musculoskelet Neuronal Interact 2007;7:131
2. Collaborators GB, Ärnlöv J. Lancet 2020;396:1223

#### P775

### MANDIBULAR INTERRADICULAR ALVEOLAR BONE STRUCTURE AFTER IMPLANTATION OF CERAMIC HYDROXYAPATITE OC-015 INTO THE TIBIA

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**Objective:** To track and analyze changes in structure of mandibular interradicular alveolar bone after implantation of ceramic hydroxyapatite OC-015 into the tibia.

**Methods:** 90 male rats with body weight of 190-225 g were used. Animals were distributed into three groups. Group 1 consisted of the intact animals. Group 2 consisted of the animals with tibia fracture modeled as 2-mm round openings in both tibia. In animals of the group 3 the same openings were filled with hydroxyapatite material OK-015. Hematoxylin-eosin stained sections of the mandibular interradicular behind the first molar tooth were photographed under the light microscope and images were used for histomorphometry. Bone volume fraction (BV), trabecular thickness (TrT), and intertrabecular spaces (ISp) were calculated using standard methods. Measurements were performed at the interradicular septum next to the first molar. The data obtained were analyzed with the use of variation statistics methods.

**Results:** After tibia fracture, BV at the interradicular septum of M1 was lower than that of the group 1 by 6.46%, 7.67%, 8.19%, and 4.95% in the period from the 7<sup>th</sup> to the 60<sup>th</sup> day after surgery, and TrT – by 5.82%, 6.51%, 7.92% и 5.78% respectively. ISp in the same period widened in comparison with those of the group 2 by 5.32%, 6.06%, 5.13%, and 5.62%.

After implantation of OK-015 into the tibia BV values at the interradicular septum of M1 decreased in comparison with the group 2 by 5.88% on the 7<sup>th</sup> and TrT decreased by 5.99% и 6.78% by the 7<sup>th</sup> and the 15<sup>th</sup> day respectively. ISp in the same period increased by 4.40% and 5.49%. By the 60<sup>th</sup> day BV values exceeded those of the group 2 by 5.06% and TrT – by 5.02%. ISp on the 90<sup>th</sup> day decreased by 4.52% in comparison with the group 2.

**Conclusion:** Implantation of OK-015 into the tibia reduces adverse effects of intervention on mandibular interradicular alveolar bone structure beginning from the 60<sup>th</sup> day after intervention.

#### P776

### HIGH INTENSITY LASER TREATMENT OF OSTEOARTHRITIS KNEE

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**Objective:** In addition to pharmacological therapy, low-intensity laser (LILT), high-intensity laser (HILT) and exercise are used to treat osteoarthritis (OA) of the knee. HILT is a new modality in our country and the experience from its application is small, especially in the treatment of OA of the knee. We aimed to compare the effect of HILT with LILT in the treatment of OA of the knee.

**Methods:** This was a randomized comparative unilateral blind study involving 72 patients divided into two groups. The first group was treated with HILT, the second group treated with LILT.

Outcome measure was VAS for pain, which was made on the first and tenth day of treatment. Statistical significance was defined as  $p < 0.05$ .

**Results:** We found a significant difference between the two groups in terms of VAS score after 10 therapies in favor to a significantly lower score, that is, less pain in the HILT group ( $p = 0.0035$ ). The comparison of the VAS score between the two times in the two groups separately showed that in both, the HILT and the LILT groups, the VAS score after 10 d of therapy was significantly lower compared to that at 0 time, for consequently  $p = 0.00001$  vs.  $p = 0.00001$ .

**Conclusion:** Treatment with HILT and LILT significantly reduces pain and stiffness in patients with OA. Patients treated with HILT had better results, i.e., had a significant reduction in pain than patients treated with LILT.

## P777

### MAXILLAE ALVEOLAR BONE LOSS AFTER IMPLANTATION OF CERAMIC HYDROXYAPATITE OC-015 INTO THE TIBIA

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**Objective:** To investigate dynamic changes of maxillary alveolar bone loss after implantation ceramic hydroxyapatite OC-015 into the tibia.

**Methods:** 90 male rats with body weight of 190-225 g were used. Animals were distributed into three groups. Group 1 consisted of the controls. Group 2 - the animals with tibia fracture modeled as 2 mm round opening in the tibia. In animals of the group 3 the same 2 mm opening was filled with hydroxyapatite material OC-015. Measurements were performed on the buccal and the palatal surfaces: 1) linear distance (mm) between the cement-enamel junction (CEJ) and the alveolar bone crest (ABC) of the mesial root of the first molar, and 2) the area (mm<sup>2</sup>) of bone loss between CEJ and ABC of the three molars.

**Results:** In group 2 the buccal CEJ-ABC exceeded that of the group 1 by 6.23%, 9.59%, 10.54%, and 5.16% in the period from the 15<sup>th</sup> to the 90<sup>th</sup> day and the palatal CEJ-ABC – by 5.80%, 6.21%, 12.17%, 9.72%, and 6.60% in the period from the 7<sup>th</sup> to the 90<sup>th</sup> day. The area of bone loss on the buccal side was wider than that of the group 1 by 4.69%, 8.65%, 9.67%, 10.01%, and 6.01% in the period from the 7<sup>th</sup> to the 90<sup>th</sup> day, and on the palatal side – by 6.85%, 8.99%, 10.12%, 9.89%, and 5.58%. In group 3 the buccal and the palatal CEJ-ABC in comparison with the group 2 increased by 5.81% and 4.79% and the palatal area of bone loss – на 4.63% (all on the 15<sup>th</sup> day). The buccal area of bone loss was wider than that of the group 2 by 4.42% and 7.58% on the 7<sup>th</sup> and the 15<sup>th</sup> days. In the period from the 30<sup>th</sup> to the 90<sup>th</sup> day the palatal CEJ-ABC was

shorter than that of the group 2 by 5.07%, 5.28% and 6.06%, a the buccal CEJ-ABC by the 60<sup>th</sup> day – by 4.71%. The palatal area by the 60<sup>th</sup> and the 90<sup>th</sup> day narrowed by 4.24% and 5.18%, and the buccal area by the 90<sup>th</sup> day – на 4.28%.

**Conclusion:** Implantation of OK-015 into the tibia reduces adverse effects of intervention on maxillae alveolar bone beginning from the 30<sup>th</sup> day after surgery.

## P778

### PREVALENCE OF EXERCISE RELATED SYNDROMES IN ADOLESCENT ATHLETES: THE PARADIGM OF SHIN SPLINTS

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**Objective:** Shin splint is an over use syndrome with various grades of intensity resulting in inflammation of the muscle, tendons and periosteum in anterior tibia. In order to describe the syndrome's severity we are using the Frederickson classification (Grades 0-4) based on MRI findings. [1] Our aim was to investigate the prevalence of this exercise related syndrome analyzing the incidence and characteristics of shin splints in adolescent athletes.

**Methods:** In our study initially we included a total of 20 track and field athletes (14 females) aged 12-18 years old who were clinically diagnosed with shin splints by the same team of Orthopaedic doctors from January 2019 until December 2021. In order to be included in the study the athletes had training in athletics at least 4 times per week of 2 h minimum duration and also presented symptoms of anterior medial tibial pain during or post exercise. All athletes diagnosed with shin splints had an MRI of the tibia within 3 weeks post diagnosis. The results were based on the clinical and imaging findings. Out of 20 track and field athletes, 13 athletes (5 males) were practicing short and long distance running and 7 athletes practiced long jump.

**Results:** Based on the MRI images a total of 11 adolescent athletes (4 males) had positive findings for shin splint. Eight athletes were diagnosed with the syndrome with Frederickson severity grade 1, two athletes with grade 2 and one athlete with grade 3. All athletes followed the same therapeutic protocol which included the RICE management, Non-Steroidal Anti-inflammatory medication p.o. for 10-14 days and physiotherapy up to 5 months. No athlete stopped practicing athletics and all returned back to normal athletic activity between 2-7 months.

**Conclusion:** Shin splints in a common overuse syndrome in adolescent athletes and the treating doctor should have awareness of its entity. According to our results the syndrome could produce debilitating symptoms which could produce the discontinuation of the athlete's training for a big period of time but importantly no athlete stopped the athletics regardless of its severity.

**Reference:** 1. Winters M, et al. S Afr J Sports Med 2016;28:11

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## GLOBAL BURDEN ATTRIBUTABLE TO LOW BONE MINERAL DENSITY IN DIFFERENT WHO REGIONS: 2000 AND BEYOND, RESULTS FROM THE GBD STUDY 2019

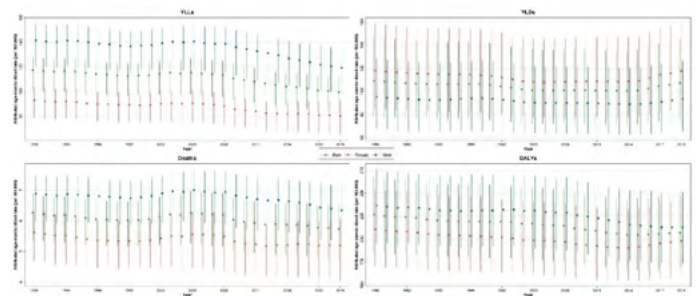
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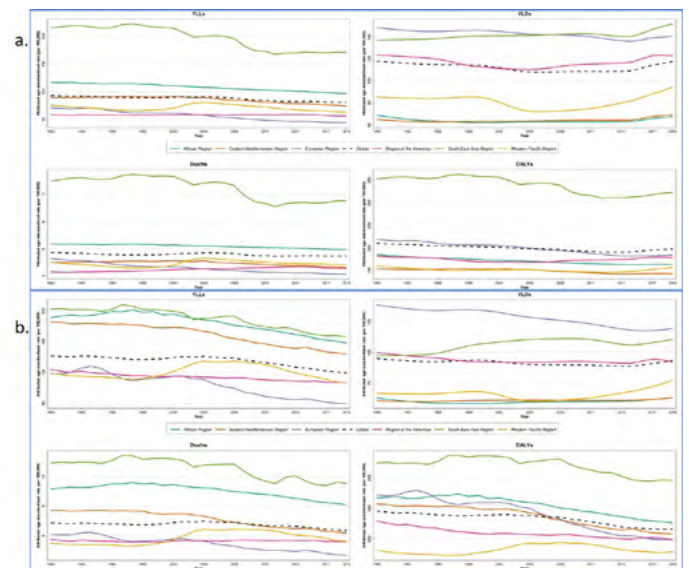
**Objective:** Low BMD is a risk factor for osteoporotic fractures defined as fractures caused by low-impact trauma with the consequent morbidity and mortality. The rate of fractures and the consequent burden is increasing in parallel to the population aging, which will affect developing countries more than developed ones (1). We aim to document trends in attributable burdens between 2000 and 2019 globally and in different WHO regions with a focus on the Eastern Mediterranean Region (EMR) using the results of the GBD study 2019 (2).

**Methods:** We reviewed the age-standardized rates of disability-adjusted life years (DALY), years lived with disability (YLD), years of life lost (YLL), and deaths attributed to low BMD by sex and region. We compared the EMR with the global state according to the statistics of the Global Burden of Diseases (GBD) 2019 report.

**Results:** While global YLDs were higher in women compared to men; attributed YLLs, DALYs, and deaths were higher in men (Fig. 1). In the EMR, YLLs attributed to low BMD were almost similar to the global average in women. However, attributed YLDs, DALYs, and deaths were lower. The highest burdens were observed in women of the Southeast Asia Region (Fig. 2a). Regarding EMR men, YLLs were higher, YLDs were lower, and deaths and DALYs showed a lowering trend since the recent decade compared to the global state (Fig. 2b).



**Figure 1.** Trends in the age-standardized burden attributed to low BMD in the global state by sex (Error bar). (YLLs=years of life lost; YLDs=years lived with disability; DALYs=disability-adjusted life years)



**Figure 2.** Trends in age-standardized burden attributed to low BMD in a. women and b. men; by different WHO regions (YLLs=years of life lost; YLDs=years lived with disability; DALYs=disability-adjusted life year)

**Conclusion:** The results of this study reflect that the current burden of low BMD in men is serious globally and in the EMR, which requires urgent attention and appropriate actions. Since the burden of osteoporosis will increase in the Middle Eastern countries due to the steady growth of the aging population (1), appropriate actions are needed for elderly men as well as women.

### References:

1. Maalouf G, et al. J Musculoskelet Neuronal Interact 2007;7:131
2. Collaborators GB, Ärnlöv J. Lancet 2020;396:1223



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### EFFECTS OF A 1-YEAR RECREATIONAL FOOTBALL PROTOCOL ON BONE MINERAL DENSITY AND PHYSICAL PERFORMANCE PARAMETERS IN A GROUP OF HEALTHY INACTIVE 50-YEAR-OLD MEN

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**Objective:** To explore the effects of a 1-y recreational football protocol on BMD and physical performance parameters in a group of healthy inactive 50-year-old men.

**Methods:** 51 middle-aged men participated in this study. Subjects were divided into two major categories: inactive (n=37) and active men (former football players; FF; n=14). Inactive middle-aged men were randomly assigned into 3 groups: Recreational football 60; 2x60 min/week (RF60; n=13), Recreational football 30; 2x30 min/week (RF30; n=14) and control group (C; n=10). Body composition and bone variables were evaluated by DXA. BMD was measured at the whole body (WB), total radius (TR), lumbar spine (L1-L4), total hip (TH) and femoral neck (FN). Geometric indices of femoral neck (FN) strength and the composite indices of femoral neck strength ((compression strength index [CSI], bending strength index [BSI], and impact strength index [ISI]) were calculated. Handgrip strength, vertical jump, maximum power of the lower limbs (CMJ), maximal half-squat strength, maximal bench-press strength, sprint performance (10 m) and maximum oxygen consumption  $VO_2$  max (L/min and ml/min/kg) were evaluated using validated tests in all 4 groups before and after the training period.

**Results:** WB bone mineral content (BMC), FN BMD, CSMI, CSI, BSI, ISI and  $VO_2$  max increased in both experimental groups (RF30 and RF60) but not in the control and the FF group. The percentages of variations in bone health parameters and in physical performance variables were not significantly different in both experimental groups.

**Conclusion:** It appears that both recreational football groups (RF60 and RF30) are effective in increasing WB BMC, FN BMD and absolute and relative  $VO_2$  max in middle-aged healthy inactive Lebanese men. Most benefits may occur in response to 2\*30 min of recreational football per week. Recreational football is an effective method to improve bone health in middle-aged men.

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### PREDICTORS OF RAPID STRUCTURAL KNEE OSTEOARTHRITIS PROGRESSION

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**Objective:** To outline rapid knee OA progression predictors in a multicenter prospective trial.

**Methods:** This prospective trial included 185 female patients from 4 federal subjects of Russian Federation aged 40-75 y, with knee OA (via ACR criteria) stages ranging from I to III (Kellgren-Lawrence), all of which signed an informed consent. Mean patient age was 59.6±6.8 y (42-75), BMI was 27.7±4.4 kg/m<sup>2</sup>, mean disease duration was 12±6.1 y. Designated physicians filled out individual case report forms yearly, which included anthropometric parameters, history of disease and physical assessment data, VAS knee pain, WOMAC, comorbidities and history of previous treatment. All patients underwent standard knee X-ray, knee ultrasound, knee MRI with WOMMS evaluation.

**Results:** 15 patients (8.1%) showed structural progression via X-ray (stage progression from II to III) in 1-2 y of follow up. When comparing progressors (n=15) and patients without structural progression (n=170), there were no differences in age, age of onset of knee OA and its duration (Table). However, in the progression group patients had higher bodyweight and BMI, had higher VAS knee pain, much more frequently showed VAS knee pain >70 mm (53.3% (n=8) vs. 14.7% (n=25), respectively (p=0.001)). WOMAC index also had significant differences. Patients from the progression group had statistically significant higher level of knee varus (RR=1.89, 95%CI 1.25-2.85, p=0.02) and hallux valgus (RR=1.4, 95%CI 1.11-1.77, p=0.04). Moreover, most progression group patients had metabolic syndrome (86.7% vs. 40.6%, p<0.05), hypertension (93.3% vs. 71.8%, p=0.05) and type 2 diabetes (33.3% vs. 12.9%, p=0.04). MRI showed that the progression group had more frequent cartilage defects in both medial and lateral tibial compartments (respectively, 57.2% vs. 18.6%, RR=3.06, 95%CI 1.74 – 5.38, p<0.003; 57.2% vs. 14%, RR=4.08, 95%CI 2.23 – 7.46 p<0.0006); bone marrow lesions (BML) in medial (71.4% vs. 12.2%, RR=5.83, 95%CI 3.38-10.1, p<0.000004) and lateral tibial compartments (21.4% vs. 4.1%, RR=5.25, 95%CI 1.47- 18.7, p=0.03); subchondral bone cysts (SBC), taking up more than 25% of the region, in the medial compartments of femur and tibia (respectively, 28.6% vs. 7.4%, RR=3.84, 95%CI 1.4- 10.5, p<0.03; 35.7% vs. 8.8%, RR=4.06, 95% CI 1.7-9.7, p=0.01). 100% of progression group patients had synovitis on MRI vs. only 58.4% patients from the second group (RR=1.71, 95%CI 1.5-2.0, p=0.002). Ultrasound characteristics also differed: synovium thickness was



higher ( $3.3 \pm 0.37$  mm vs.  $3 \pm 0.44$  mm,  $p=0.002$ ) in the progression group. Intraarticular glucocorticoid injections were also more frequent in the first group (57.1% vs. 30.8%,  $RR=1.85$ ,  $95\%CI$  1.09-3.14,  $p=0.05$ ). Spearman correlation analysis showed significant associations ( $p<0.05$  for all cases) between progression and several factors: bodyweight ( $r=0.37$ ), BMI ( $r=0.22$ ), VAS knee pain ( $r=0.28$ ), WOMAC pain ( $r=0.28$ ), WOMAC functional limitation ( $r=0.23$ ), type 2 diabetes ( $r=0.16$ ), hypertension ( $r=0.13$ ), metabolic syndrome (0.29), synovium thickness by US ( $r=0.23$ ) and many MRI parameters: BMLs in medial ( $r=0.32$ ) and lateral (0.23) tibial regions, medial tibial ( $r=0.26$ ) and femoral ( $r=0.25$ ) cartilage defects, presence of SBC in the medial regions of tibia ( $r=0.26$ ) and femur ( $r=0.25$ ), synovitis ( $r=0.24$ ), intraarticular glucocorticoid injections ( $r=0.2$ ).

**Table.** Comparative characteristics of patients with and without progression of knee OA

Factors	Progression group (n=15)	Without progression (n=170)	p
Age, y, M $\pm$ SD	60.6 $\pm$ 5.2	59.1 $\pm$ 7.6	Insignif.
Age of pain onset, y, M $\pm$ SD	47.3 $\pm$ 5.6	48.7 $\pm$ 8.1	Insignif.
Disease duration, y, M $\pm$ SD	14.5 $\pm$ 5.4	11 $\pm$ 8.3	Insignif.
BMI, kg/m <sup>2</sup> , M $\pm$ SD	31.9 $\pm$ 5.8	27.3 $\pm$ 4.1	<0.0001
Knee pain when walking, mm, M $\pm$ SD	65.8 $\pm$ 11.8	47.5 $\pm$ 18.7	<0.0003
WOMAC pain, mm, M $\pm$ SD	330.5 $\pm$ 66.0	237.8 $\pm$ 85.4	<0.0001
WOMAC stiffness, mm, M $\pm$ SD	100.2 $\pm$ 31.4	86.7 $\pm$ 34.1	Insignif.
WOMAC functional limitation, mm, M $\pm$ SD	1044 $\pm$ 190.4	859.8 $\pm$ 243.8	<0.007
WOMAC total, mm, M $\pm$ SD	1479.6 $\pm$ 227.8	1164.2 $\pm$ 357.7	<0.002
Hallux valgus, %, (n)	86.7% (13)	61.8% (105)	<0.04
Knee varus, %, (n)	66.7% (10)	35.3% (60)	<0.02

**Conclusion:** This prospective multicenter trial showed factors, associated with rapid structural progression of knee OA. Consideration of these factors may help slow the disease progression.

## P782

### ROLE OF ADIPONECTIN IN DESTRUCTIVE JOINT CHANGES IN PATIENTS WITH EARLY RHEUMATOID ARTHRITIS PRIOR TO THE APPOINTMENT OF ANTIRHEUMATOID THERAPY

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**Objective:** Adipose tissue is an active endocrine organ that synthesizes adipokines (adiponectin, leptin, etc.). Their relationship with activity markers and inflammation in RA is discussed. It is assumed that they induce the action of interleukin 6, tumor necrosis factor  $\alpha$ , and metalloproteinases in synovial membrane cells and cartilage tissue, which further leads to joint destruction. We aimed to clarify destructive joint disorders (modified total Sharpe/van der Heijde score: erosion score, narrowing of the joint gap, total score), depending on the level of adiponectin in serum in patients with early RA before prescribing anti-rheumatic therapy.

**Methods:** The study included 22 patients with early RA (ACR/EULAR criteria, 2010), 57 [47.0-61.0] y, duration of the disease 7.0 [6.0-10.0] months, seropositive for IgM RF and ADC, with high RA activity (DAS28 5.6 [5.1-6.5], SDAI 36.9 [26.5-45.3], CDAI 32.5 [22.0-43.5]) without experience in receiving anti-rheumatic therapy. Adiponectin concentration was determined by ELISA enzyme immunoassay (Human Adiponectin, BioVendor, Brno, Czech Republic; Diagnostics Biochem Canada Inc.). X-rays of the hands and feet were evaluated before taking anti-inflammatory therapy using a modified Sharpe score (erosion score, narrowing of the joint gap, total score). The control group consisted of 30 healthy donors without rheumatic diseases, comparable in gender and age to the examined patients.

**Results:** The average concentration of adiponectin in the serum of RA patients was higher than in the control group:  $39.8 \pm 36.2$  ng/ml and  $8.7 \pm 4.6$  ng/ml, respectively ( $p=0.001$ ). Patients with early RA, depending on the level of adiponectin (M+3SD), were divided into 2 groups: I (n=13) - RA patients with adiponectin level  $\leq 26$  ng/ml; II (n=9) - with adiponectin level  $>26$  ng/ml. When comparing the group, they significantly differed in activity: DAS28 6.1 vs. 5.04; acute phase indicators: ESR 53.3 vs. 19.7 mm/h; CRP 54.3 vs. 9.9 mg/l; the number of erosions is 0.9 vs. 4.3 ( $p<0.05$  in all cases).

**Conclusion:** patients with early RA without experience of basic anti-inflammatory therapy with an increase in adiponectin level above 26 ng/ml have more pronounced destructive disorders (due to erosions) than those with RA patients with a lower level of this adipokine.

P783

### IN-BONE INJECTION OF NANODIAMONDS LOADED SMART HYDROGEL BLOCK SCLEROSTIN IN THE EXPERIMENTAL MODEL OF OSTEOPOROSIS

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**Objective:** Population aging is a growing problem leading to osteoporosis and osteoporosis-related fractures. The glycoprotein sclerostin (SCL), expressed mainly by mature osteocytes, is one of the main regulators of bone formation. It is clear that the therapeutic effects of SCL's inhibitors are becoming attractive to science and the pharmaceutical industry. The objective of this study was to analyze the response of bone tissue and sclerostin to the "intelligent" hydrogel PLGA<sub>1000</sub>-PEG<sub>1000</sub>-PLGA<sub>1000</sub> containing nanodiamonds (NDs) following in-bone injection at the animal model of osteoporosis.

**Methods:** 21 female Wistar rats (2 months old) were divided into 3 groups G1: ovariectomized group (7) subjected to bilateral ovariectomy and treated with ND@PLGA<sub>1000</sub>-PEG<sub>1000</sub>-PLGA<sub>1000</sub> for 30 days; G2: Control group (7) OVX animals (a group with osteoporosis); G3: sham-operated animals (7, SHAM). Each sample was subjected to routine histological examination with hematoxylin & eosin and immunohistochemical analysis with antisclerostin antibody (ab63097), according to the manufacturer's instructions (Abcam).

**Results:** The histomorphological analysis of femur from rat's G2 group indicated reduced mineralized tissue areas, increased SCL combined with increased bone resorption compared to the sham-operated G3 group, and ND@PLGA<sub>1000</sub>-PEG<sub>1000</sub>-PLGA<sub>1000</sub> treated G1 group.

We found that SCL was lowered in the G1 group than in G2 ( $p < 0.05$ ) after bone injection of ND@PLGA<sub>1000</sub>-PEG<sub>1000</sub>-PLGA<sub>1000</sub>. These results confirm that estrogen deficiency leads to increased SCL expression by blocking the WNT/ $\beta$ -catenin signaling pathway in G2. Administration of ND@PLGA<sub>1000</sub>-PEG<sub>1000</sub>-PLGA<sub>1000</sub> to G1 reduces sclerostin in osteocytes and probably unlocks the Wnt/ $\beta$ -catenin signaling pathway promoting osteogenesis.

**Conclusion:** The in-bone injection of ND@PLGA<sub>1000</sub>-PEG<sub>1000</sub>-PLGA<sub>1000</sub> significantly decreases sclerostin's presence in osteocytes of an animal model of osteoporosis.

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P784

### INTERRELATION OF METABOLIC SYNDROME AND CLINICAL MANIFESTATIONS OF OSTEOARTHRITIS

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**Objective:** To assess the effect of metabolic syndrome (MS) on clinical manifestations of knee osteoarthritis (OA).

**Methods:** 284 female patients with knee OA (according to the ACR criteria) were enrolled in this prospective trial. OA stages in the trial group varied from I to III (Kellgren & Lawrence) and all the participants signed an informed consent. Mean age was 58.5±9.5 y, disease duration was 5 (2-10) y. Average BMI values matched the «overweight» grade (29.6±5.6 kg/m<sup>2</sup>), with following hip (HC) – 109.3±10.4 cm and waist circumference (WC) – 92.5±12.5 cm. Physicians filled out individual case report forms, which included anthropometric information, history and physical assessment data, VAS knee pain, WOMAC, KOOS, DN4, self-reported health status (SRHS) and comorbidities.

**Results:** MS was diagnosed in 52.4% of patients. Participants were divided in two groups based on the presence of metabolic syndrome. MS-positive patients were older, had higher body-weight, BMI, HC, WC and longer menopause duration (Table). Patients with metabolic syndrome had statistically significant differences in terms of OA course severity: MS-positive participants showed higher VAS pain, total WOMAC as well as all its subscales, worse KOOS and SRHS parameters. OA was also more frequently generalized in this group (OR=2.7, 95%CI 1.3-6,  $p=0.01$ ), knee synovitis was registered more often both during the physical examination and anamnesticly (OR=3.6, 95%CI 1.8-7.5,  $p=0.0004$ ; OR=4.1 95%CI 1.8-9.4,  $p=0.0008$ ), respectively. Limitation of knee motion range (OR=4.2, 95%CI 2-9.2,  $p=0.0002$ ) and quadriceps femoris hypotrophy (OR=2.8, 95%CI 1.3-6,  $p=0.009$ ) were also more common in the MS group. Taking history, it was found that type 2 diabetes, hypertension (AH) and fatty liver disease (FLD) were also significantly more frequent in the MS group, SCORE scale-estimated cardiovascular risks were also higher. Spearman correlation analysis confirmed positive correlations between metabolic syndrome and VAS knee pain ( $r=0.35$ ), WOMAC total ( $r=0.4$ ) and its subscales (pain ( $r=0.4$ ), stiffness ( $r=0.31$ ), functional limitation ( $r=0.43$ )), DN4 ( $r=0.17$ ), SRHS ( $r=0.34$ ), generalized OA ( $r=0.21$ ), synovitis ( $r=0.33$ ) (including previous episodes of synovitis ( $r=0.29$ )), limitation of knee flexion ( $r=0.31$ ), quadriceps femoris hypotrophy ( $r=0.22$ ). Moreover, a positive correlation has been established between metabolic syndrome and

the duration of OA ( $r=0.44$ ), patient age ( $r=0.45$ ), BMI ( $r=0.48$ ), WC ( $r=0.44$ ), HC ( $r=0.44$ ), hypertension ( $r=0.27$ ), type 2 diabetes ( $r=0.25$ ) and the number of metabolic syndrome components ( $r=0.75$ ). Negatively correlated indices included KOOS total ( $r=-0.32$ ), level of education (patients without higher education had higher risks of metabolic phenotype of osteoarthritis, whereas participants with higher education had lower risk ( $r=-0.2$ )), sporting exercises ( $r=-0.24$ ) or physiotherapy ( $r=-0.3$ ). People with hypermobility also were less likely to encounter the combination of osteoarthritis and metabolic syndrome ( $r=-0.3$ ).

**Table.** Comparison of patients with and without metabolic syndrome (MS)

Index	MS-positive (n=149)	MS-negative (n=135)	p
Age, y, Me	61 (57 - 68)	52 (43-58)	<0.0001
Duration of OA, y, Me	8.5 (3.5-15)	3 (1-6)	<0.0001
BMI, kg/m <sup>2</sup> , Me	31.64 (28.63-35.42)	26.4 (23.39-30.32)	<0.0001
Waist circumference, cm, Me	95 (90-105.5)	87 (79-93)	<0.0001
Hip circumference, cm, Me	114 (105.5-119.9)	102 (98-110)	<0.0001
WC/HC, cm, Me	0.85 (0.8-0.91)	0.82 (0.77-0.87)	0.0063
Knee pain, mm, Me	50 (40-60)	35 (10-50)	<0.0001
WOMAC pain, mm, Me	195 (147-260)	130 (40-175)	<0.0001
WOMAC stiffness, mm, Me	80 (46-105)	50 (20-80)	0.0003
WOMAC functional limitation, mm, Me	675 (572-970)	370 (80-630)	<0.0001
WOMAC total, mm	966 (707-1340)	560 (140-894)	<0.0001
KOOS total, Me	50 (36- 63)	60 (48-83)	0.0002
SRHS, mm, Me	46 (34-60)	33.5 (15-47)	<0.0001
Generalized osteoarthritis, %	37%	17.6%	0.01
Current synovitis, %	52.8%	23.5%	0.0004
Previous synovitis, %	84%	58.8%	0.0008
Limitation of knee motion range, %	48%	17.9%	0.0002
Quadriceps femoris hypotrophy, %	39.4%	18.8%	0.009
Menopause duration, years, Me	13.5 (7-18)	8 (4.5-13.5)	0.008
Type 2 diabetes, %	22.7%	2.9%	<0.001
SCORE scale, Me	2 (2-3)	2 (1-2)	<0.0001
Arterial hypertension, %	88.3	43.1	<0.0001
Fatty liver disease, %	54.5	11.1	0.0001

**Conclusion:** It has been demonstrated that patients with OA have a high incidence of metabolic syndrome (more than 50% in the studied group) which causes a significantly more severe clinical course of the disease, with much more frequent comorbidities. This underlines importance of both non-pharmacologic and pharmacologic approaches in the treatment regimen, which aims not only for OA, but for all of the MS components.

## P785

### IS CALCIUM INTAKE IN CENTRAL AMERICA ADEQUATE? DIETARY EVALUATION IN COSTA RICA AND PANAMA THROUGH THE IOF CALCIUM CALCULATOR

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**Objective:** To evaluate daily calcium intake in the adult population in Costa Rica and Panama.

**Methods:** An adult's population (>18) survey was conducted in both countries. The sample was driven from centers of high socioeconomic activity, geographically dispersed and with different points of affluence to fulfill and age and sex quota. A questionnaire specifically design for the study was applied to subjects that were willing to participate after they signed of the informed consent form. The IOF Calcium calculator was used to quantify their calcium intake.

**Results:** The study included 1189 participants, 50% were men. The age groups were: 18-24 years old (24%), 25-49 years old (28%), 50-64 years old (24%), and 65 years old and above (24%). The median calcium intake was 862 mg/d (650.5-1115) in Costa Rica and 825.5 mg/d (579.75-1029.25) in Panama ( $p=0.003$ ). Near 70% of the population in both countries did not reach the recommended dietary allowance 1000 mg/d of calcium. The Costa Rican population >65 y/o consumed twice as much calcium as the Panamanian population of the same age group. Other age groups showed no significant differences. Significant differences were found between calcium intake and age group in Costa Ricans, while in Panamanian population differences in calcium intake were found based on education level.

**Conclusion:** This study is the first conducted in Central America using the IOF calcium intake calculator. The study shows that calcium intake is deficient in Costa Rica and Panama. It is necessary to establish educational campaigns in both countries to correct this deficiency.

## P786

### SCREENING FOR OSTEOPOROSIS/HIGH RISK OF FRACTURES IN PRIMARY HEALTH CARE

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The aim of our study was to study the effectiveness of screening for osteoporosis (high risk of fractures) in postmenopausal men and women 40 y and older.

Screening was performed by outpatient doctors for all people aged 40 y and older who applied for various reasons. The doctor asked standard questions included in the FRAX questionnaire. In our study, patients were considered to have a high risk of fractures, and they were diagnosed with osteoporosis, not only with a 10-y risk of fracture according to FRAX above the threshold of therapeutic intervention, but also if there was an indication in the anamnesis of a low-energy fracture suffered at the age of 40 y and older. In 2017-2020, 11,013 people were screened by outpatient doctors, which amounted to 31.7% of the total attached population aged 40 years and older. Among those screened, the proportion of women was higher and amounted to 72.2% ( $p=0.0002$ ). According to the screening results, 2416 people were identified with a high risk of fractures, which amounted to 21.9% of the number of screened. The average 10-year probability of major osteoporotic fractures in these patients ( $19.0\pm 7.9\%$ ) was statistically significantly higher compared to the rest of the screened ( $7.6\pm 3.3\%$ ),  $p=0.0001$ . 60% (1,450 people) of the group of individuals with an identified high risk of fractures were patients with FRAX in the area of therapeutic intervention. Among them were patients with indications of a fracture and without a history of fractures. In the remaining 40%, the high risk was determined only on the basis of the fact of a previously suffered fracture (their FRAX index was below the intervention threshold). In general, patients with fractures (2097 people) made up 86.8% of the group with a high risk of fractures and 19.0% of the total group of screened. In general, using only the FRAX calculator, 40 men and 1410 women were identified as having a high risk of fractures, which accounted for 1.3% of the male and 17.7% of the female screened population, respectively. With the simultaneous use of FRAX and anamnestic data on a previous fracture, 13.3% of men and 25.3% of women in the screening population had a high risk of fractures.

## P787

### PREDICTORS OF 1-YEAR READMISSION IN PATIENTS WITH HIP FRACTURE IN A MONOCENTRIC COHORT

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**Objective:** To evaluate possible predictors of hospital readmission in patients with hip fractures.

**Methods:** Retrospective study that included patients admitted to our hospital with hip fracture for 3 consecutive months. Data collected were hospitalization in the past 6 months, hemoglobin (Hb), calcium and vitamin D upon admission, length of stay, and surgery within 48 h. To assess comorbidities, the Charlson Comorbidity Index (CCI) score was used. Anemia was defined as Hb less than 12 g/dl in women and 13 g/dl in men. Readmission was evaluated at 1 y. Comparison between groups was performed using the chi-square test, t-test and Mann-Whitney U test. Linear regression analysis was performed.

**Results:** 80 patients were included, 69 (86.3%) females, aged  $81.2\pm 6.5$  y; 11 patients (14.9%) had previous hospitalization; mean hemoglobin level was  $12.5\pm 1.2$  g/dl, with anemia seen in 34 (42.5%) patients, mean serum calcium was  $9.8\pm 1.2$  mg/dl, and mean vitamin D was  $28.5\pm 14.3$  ng/ml. The median length of hospital stay was 7 (5-9.5) d and surgery was performed within 48 h in 54 (67.5%) patients. Mean CCI score was  $5.0\pm 1.2$ . Twenty-nine patients (36.3%) were readmitted within 1 y. Patients who were readmitted were found to have more frequent anemia (62.1 vs. 31.4%,  $p=0.008$ ), age over 85 y (55.2 vs. 31.4%,  $p=0.037$ ) and hospitalization in the past 6 months (26.9 vs. 8.3%,  $p=0.043$ ). Although without statistically significant differences, there were lower levels of Hb ( $11.9\pm 0.8$  vs.  $12.6\pm 1.3$ ) and vitamin D ( $26.5\pm 14.3$  vs.  $29.0\pm 14.6$ ), higher CCI score ( $6.3\pm 2.3$  vs.  $4.6\pm 1.4$ ) and lower percentage of surgery performed in the first 48 h (65.5% vs. 68.7%) in patients who were readmitted. When adjusted for comorbidities, age, gender, length of stay and timing of surgery, anemia (OR 6.805, 95%CI 1.769-26.175,  $p=0.005$ ) and hospitalization in the past 6 months (OR 6.321, 95%CI 1.177-33.940,  $p=0.032$ ) were independent predictors of readmission.

**Conclusion:** Anemia and previous hospitalization within 6 months were associated with 1-y readmission after hip fracture, while other factors such as comorbidities, length of stay and timing of surgery have not been shown to be predictors of readmission in this study.



P788

### ASSOCIATION OF OSTEOARTHRITIS AND OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN

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**Objective:** Both osteoarthritis and osteoporosis represent health problems with increasing incidence. Both conditions are associated with increased morbidity if left untreated. Although there are common risk factors, their association has been less frequently studied.

**Methods:** The study involved 13 women diagnosed with osteoporosis, with a mean age of 65.4 y and 12 women diagnosed with osteoarthritis, half of which had knee location while the other half had hip location, with a mean age of 62.5 y, all 25 in the postmenopausal period. The women in the osteoporotic group were investigated imagistically by soft tissue ultrasound of the hands, knees, hips and ankles and those in the osteoarthritis group were investigated by Osteodensitometry (DXA) of the lumbar spine.

**Results:** We found that 6 (46.15%) of the women initially diagnosed with osteoporosis were also diagnosed with osteoarthritis, with location in 4 cases (66.6%) at knee joint and in 2 cases (33.4%) at the hip joint, with a mean age of 70.3 years, and that 4 (33.33%) of the women initially diagnosed with osteoarthritis, half of which presented location at the knee joint and half at the hip joint, were also diagnosed with osteoporosis, with a mean age of 71.4 y.

**Conclusion:** Although each condition has individual but also common risk factors, such as age, sex, genetic predisposition, the presence of inflammation or chronic inflammatory diseases, and the use of certain medications, the two can be associated quite frequently, especially in the case of the elderly.

P789

### WHAT TYPE OF PHYSICAL ACTIVITY CAN BETTER SLOW THE PROGRESSION OF DECLINING BONE MINERAL DENSITY?

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**Objective:** Prolonged immobilization, a low BMI, and lack of regular physical activity are known to be risk factors or factors that may contribute in the process of bone loss. In an aging population we are looking for what types of exercises represent the best solutions in reducing the progression.

**Methods:** We present a study that included 16 patients aged between 49-64 y, diagnosed with vertebral osteopenia, which were divided into two equal groups. Patients in the first group had a

mean T-score of -1.9, with a minimum T-score of -2.4 and a maximum T-score of -1.2, while patients in the second group had a mean T-score of -2.1, with a minimum T-score of -2.4 and a maximum T-score of -1.4. Patients in the first group received as treatment muscle strengthening and consolidation exercises as well as weight-bearing aerobic activities such as power walking and climbing stairs for 45 minutes a day while patients in the second group received as treatment non-weight-bearing exercises such as swimming and cycling for 45 minutes a day. Patients received no other treatment than vitamin D supplements in both groups.

**Results:** After 4 months of physical activity, the patients were reevaluated by osteodensitometry (DXA) of the lumbar spine. Patients in the first group had a mean T-score of -1.5 with a minimum value of -2.2 and a maximum value of -1 while patients in the second group had a mean T-score of -2.2 with a minimum value of -2.6 and a maximum value of -1.3.

**Conclusion:** Weight-bearing exercises work much better when it comes to reducing the progression of bone loss; they could even be performed preventively by women who have just entered menopause or who are at risk. The sooner regular and correct physical activity is established in the early stages of the disease, the better the results.

P790

### PREVALENCE AND RISK FACTORS OF OSTEOPOROSIS IN PATIENTS WITH ANKYLOSING SPONDYLITIS

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**Objective:** Osteoporosis is considered to be a muscular skeletal disease identified by a decreased BMD. It is relatively common in Ankylosing Spondylitis (AS) patients. The aim of this study was to assess the prevalence and the risk factors of osteoporosis in patients with AS.

**Methods:** We conducted a cross-sectional study in the Rheumatology Dept. of Monastir over a period from January to July 2021. BMD of the lumbar spine and femoral neck of AS patients was measured using DXA. Clinical, biological and radiological characteristics were recorded and analyzed. Univariate and multivariable logistic regression analysis were used.

**Results:** 89 patients with AS were enrolled in this study. There were 66 males (74.2%) and 23 females (25.8%). The mean age of the study population was 46.09±12.75 y. The mean BMI was 25.83±5.14 kg/m<sup>2</sup> and the mean disease duration was 15.97±9 y. Prevalence of osteoporosis was 29.2%. Factors associated with osteoporosis were peripheral arthritis (p=0.035), uveitis (p=0.002), and vertebral fracture (p=0.023). Multiple logistic re-

gression analysis showed that peripheral arthritis (OR 1.417, 95% IC 1.079-1.913,  $p=0.04$ ) was the risk factors associated with osteoporosis.

**Conclusion:** Patients with AS had a higher risk of developing osteoporosis, especially those with peripheral arthritis.

## P791

### COMPARATIVE STUDY OF OSTEOPOROSIS IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE

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**Objective:** Inflammatory bowel disease (IBD) represent conditions that are not yet fully understood and include ulcerative colitis and Crohn's disease. Due to their chronic evolution, often expanding over decades, the association with maldigestion and malabsorption syndromes and the long-term treatments that patients must follow, these diseases can be complicated by osteoporosis of varying degrees.

**Methods:** Our study included two groups of 20 patients each, with ages between 20-45 y. The patients in the first group were diagnosed with Crohn's disease, while the patients in the second group with ulcerative colitis based on endoscopic examination with biopsy and anatomopathological examination of the detected lesions. We selected young patients without other associated pathologies or treatments for other conditions, so that the analysis of osteoporosis would not be affected by other factors.

**Results:** The study was retrospective and was conducted on a period of 5 y since the diagnosis and was based on the diagnosis of IBD, complications and assessment of bone density through DXA test in all patients. The results showed that in group I, composed of patients with Crohn's disease, osteoporosis was found in 16 cases (80%) while in group II, composed of patients with ulcerative colitis, it was found in 12 cases (60%). Possible causes of these quite large differences may be related to the location of Crohn's disease (more commonly located in the small intestine), the onset of malabsorption (including calcium and vitamin D), treatments with cortisone medication that required higher doses and longer periods of administration in patients with Crohn's disease, and fistulas that appeared as complications in Crohn's disease which aggravated malabsorption by intestinal bypass and reduction of the absorption surface of the intestinal lining.

**Conclusion:** The incidence of osteoporosis is significant in patients with long-standing IBD, higher in Crohn's disease due to the topography of the intestinal lesions and the particularity of complications that favor calcium and vitamin D malabsorption syndrome.

## P792

### ARE GLUCOCORTICOIDS AND SYMPTOMATIC TREATMENT ENOUGH FOR MAINTAINING THE RESPIRATORY FUNCTION IN DUCHENNE MUSCULAR DYSTROPHY? A CASE REPORT

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**Objective:** Duchenne muscular dystrophy (DMD) is an X-linked neuromuscular debilitating condition characterized by the loss of function and wasting of the cardiac and skeletal muscle. DMD management requires a multidisciplinary approach aiming to prevent complications such as weight gain, respiratory deficit, cardiomyopathy, and motor impairment.

**Methods:** Case report

**Results:** This case report investigates the benefits of a 6-month physical therapy program, spanning from September 2021 to February 2022, primarily focused on maintaining the respiratory function of a 15-year-old male diagnosed with DMD. The patient's medical background reveals a diagnosis of DMD in 2015, which was managed only with Prednisone 25 mg/d and symptomatic treatment without any physical therapy (PT). In 2019 the patient performed a routine spirometry test showing a percent predicted forced vital capacity (FVC) of 89% and percent predicted forced end-expiratory flow (FEF75) of 149% with an oxygen saturation by pulse oximetry (SapO<sub>2</sub>) of 96%. In early 2021 the patient's status started slowly declining resulting in an admission to the Paediatric Clinic in September 2021 where another spirometry test was performed showing a percent predicted FVC of 50% and a percent predicted FEF75 of 59% with a SapO<sub>2</sub> of 94%. The patient received an increase in daily cortisone dose of 5mg and started PT 3 times a week. The physical therapy was focused mainly on preserving respiratory function, preventing joint contractures, and weight gain. A routine spirometry test performed in early February 2022 resulted in a percent predicted FVC of 50%, a percent predicted FEF75 of 75% with a SapO<sub>2</sub> of 96%.

**Conclusion:** Cortisone and symptomatic treatment are not enough for managing a DMD patient, physical therapy is also being needed for slowing down the progression of the disease. A 6-month physical therapy program associated with pharmacological treatment resulted in stagnation or slight improvement of the condition. The patient also reported an improvement in quality of life by being assured a higher level of independence and social engagement with children his age after starting PT.

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### PREGNANCY THROUGH ASSISTED REPRODUCTIVE TECHNOLOGIES IN A PATIENT WITH OSTEOGENESIS IMPERFECTA

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**Objective:** Osteogenesis imperfecta (OI) is a skeletal dysplasia characterized by bone fragility and extraskeletal manifestations. OI patients typically suffer from numerous fractures, skeletal deformities, shortness of stature and hearing loss. The disease significantly alters the reproductive confidence to have a child with OI, women also fear for BMD deterioration and fractures during pregnancy. Thus, bone sparing strategies and the use of assisted reproductive technologies (ART) and the use of the latest reproductive approaches may be suitable for prospective parents faced with a risk of OI born child.

**Methods:** Case report

**Results:** A 32-yo woman with OI diagnosed at the age of 3 y due to multiple leg fractures in early childhood with no fractures beyond the age of 3 y. According to family medical history, her father had some fractures, but no genetic testing was done. Physical examination didn't show any specific findings (normal height, teeth, no bone deformities). At 16 y.o. DXA confirmed lower than expected bone density (Z-score L1-L4 -2.61SD). Treatment with calcium (1000 mg/d) and vitamin D (2000-2500 IU/d) was administered with a good response over the entire observation period (Z-score of neck after fifteen years of treatment -1.6SD, L1-L4 -1.7SD). The laboratory data indicated normal calcium and phosphorus metabolism.

Genetic testing revealed heterozygous pathogenic mutation c.1009G> A (p.Gly337Ser) in exon 19 of COL1A2 gene. As she was concerned about her options for future maternity and informed of the dominant inheritance and the risk of transmission of the disease (50% in each pregnancy), she decided to become pregnant through ART using preimplantation genetic testing that is used to scan embryos for harboring the monogenic pathogenic variants. At 30 yo she gave birth to a healthy baby and breastfeeding continued for 2.5 y. There was no influence on BMD (Z-score L1-L4 -1.7SD, femoral neck -1.2SD) and no new fractures.

**Conclusion:** Our case shows that planning pregnancy through ART with the latest approaches is a good reproductive option, which has considerable benefits for families with a risk of a genetic disorder such as OI. Ca and vitamin D supplementation has shown to be beneficial to maintain BMD through pregnancy and lactation.

P794

### PREFERENCES OF TUNISIAN PATIENTS FOR THE TREATMENT OF RHEUMATOID ARTHRITIS

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**Objective:** Rheumatoid arthritis (RA) is the most common chronic inflammatory arthritis. However, current knowledge about the reasons for patient preference for RA treatment modalities is limited. The objective of our study is to assess the treatment preferences of patients with RA.

**Methods:** A prospective descriptive study was conducted among patients with RA followed in the rheumatology department of Mongi Slim Hospital. A questionnaire was conducted to collect demographic, disease, treatment and preference data.

**Results:** 30 patients were selected for the study, with a sex ratio (M/F) of 0.25. The mean age was 59 y [39-77] with a median disease duration of 14 y [6-28]. RA was erosive in 20 cases and immunopositive in 19 cases. Eight patients presented with dry eye syndrome and 4 with pulmonary involvement. Three patients presented with coxitis and 3 others with atlantoaxial dislocation. No patient was a smoker. The mean disease activity score (DAS28vs) was 3.5 [2.08-5.88]. 5 patients were judged in remission according to the DAS28. Most (25 patients) received oral treatments, 19 a subcutaneous injection and 7 intravenous biotherapy. Nearly two-thirds of patients (20 patients) expressed a preference for oral treatments, followed by selfinjection: the subcutaneous route (18 patients) and only 6 patients had a preference for the intravenous route. More than half ranked doctor's advice as the most influential factor in choosing treatment. For the oral or subcutaneous route, the reasons for the choice reported were the ease and speed of administration of the treatment. The occurrence of adverse effects under treatment such as digestive intolerance, liver toxicity, allergy, hair loss, etc. was a crucial criterion for the choice of treatment.

**Conclusion:** The data reported here describe patient preferences toward various modes of RA treatment delivery and provide detailed insights into individual perceptions associated with these preferences. Understanding patient preferences can help inform provider and physician decisions in treatment selection, which can improve patient adherence to treatment.

P795

**IMPACT OF THE COVID-19 PANDEMIC ON CHRONIC INFLAMMATORY RHEUMATISM**

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**Objective:** The COVID-19 infection emerged in December 2019 in Wuhan, China, and is quickly become a pandemic and an important public health problem. In addition to its significant impact on public health, the pandemic has had an influence major on social interactions and global economies. The patients followed for chronic inflammatory rheumatism require a further consideration with respect to this pandemic. During this pandemic, rheumatology care has been severely disrupted. The aim of this study was to assess the impact of the COVID-19 pandemic on access to rheumatology care for patients with chronic inflammatory rheumatism.

**Methods:** A prospective descriptive study was conducted in patients with chronic inflammatory rheumatism followed in the rheumatology department of Mongi Slim Hospital. A questionnaire was conducted to identify demographic data, nature of disease, treatments received and access to care.

**Results:** 55 patients were selected for the study, with a sex ratio (M/F) of 0.57. The average age was 49 y [33-71]. Patients were followed for a rheumatoid arthritis (RA) in 54% of cases and spondyloarthritis (AS) in 45% of cases (12 ankylosing spondyloarthritis, 8 IBD rheumatism, 5 psoriatic arthritis). The average duration of evolution of RA was 14 y [6-28] and that of AS was 10 y [1-27]. Thirty-seven patients were under disease-modifying antirheumatic drugs (csDMARDs) and forty patients were receiving biotherapy. Twenty-two patients were taking parallel to corticosteroids or NSAIDs. The pandemic has had a negative impact significant on rheumatology visits in 52% of cases and on access to treatment in 27% of cases for fear of infection (10 patients) and by fault to have a prescription (5 patients). Furthermore, most patients reported increased stress and anxiety during this pandemic. Physical activity was reduced in half of the patients. Which led to a outbreak of the disease in the latter. Twelve patients said they were infected with COVID-19 and twenty reported that a close contact was infected. Regarding precautions when visiting healthcare facilities in rheumatology, 80% of patients reported wearing masks.

**Conclusion:** Our study highlights the deleterious consequences of the COVID-19 pandemic on continuity of care in rheumatology. Therefore, education therapy and the establishment of a telemedicine platform seem to be necessary to maintain adherence to care.

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**EFFECTS OF A MULTICOMPONENT EXERCISE TRAINING PROGRAM AFTER BARIATRIC SURGERY ON BODY WEIGHT, BODY COMPOSITION, FOOD INTAKE AND ENERGY EXPENDITURE**

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**Objective:** To investigate: (i) if a multicomponent exercise training (MExT) after bariatric surgery (BS), might enhance body weight (BW), excess weight (%EWL), total fat mass (TFM), and appendicular fat mass (AFM) loss and to mitigate total lean mass (TLM) and appendicular lean mass (ALM) loss, and (ii) the influence of exercise on dietary intake and energy expenditure (EE).

**Methods:** 66 (43.3±9.8 y) patients (BMI=44.6±5.5 kg/m<sup>2</sup>) were allocated to either a control (CG, n=20) or an exercise group (MExT, n=46; 11-months, 3d/week, 75-min, starting 1-month post-BS). BW and body composition were assessed by DXA, physical activity EE (PAEE) was assessed by accelerometer and resting EE was measured by indirect calorimetry. Dietary intake was assessed through 4-d food diary. MExT effects were tested by linear mixed models. Data was reported as estimated mean difference, 95%CI, and p<0.05 was considered statistically significant.

**Results:** MExT significantly attenuated TLM (1.5 kg; 95%CI: 0.1 to 2.9; p=0.043) and ALM loss (1.5 kg; 95%CI: 0.1 to 2.9; p=0.043). However, MExT had no significant effect on BW (3.2 kg; 95%CI: -0.8 to 7.2; p=0.120), %EWL (5.9%; 95%CI: -1.2 to 13; p=0.106), TFM (-0.7 kg; 95%CI: -2.6 to 4.1; p=0.677) and AFM (-0.7 kg; 95%CI: -2.6 to 4.1; p=0.677) 1-y post-BS. Total energy intake (-47.0 kcal/d; 95%CI: -302.9 to 209.0; p=0.720), carbohydrate (-26.0 g; 95%CI: -64.6 to 12.5; p=0.188), and protein intake (-2.9 g; 95%CI: -17.7 to 12; p=0.703) were not different between groups. However, the CG consumed superior amount of fat (14.6 g; 95%CI: 0.5 to 28.7; p=0.045). Total EE (-102.6 kcal/d; 95%CI: -323.4 to 118.2; p=0.363), resting EE (-56.9 kcal/d; 95%CI: -235.0 to 121.2; p=0.532) and PAEE (-29.2 kcal/d; 95%CI: -113.0 to 54.5; p=0.495) were not different between groups. PAEE during the exercise days was higher compared to non-training days (229.5 kcal/d; 95%CI: 99.13 to 359.91; p=0.002). There were no differences between ex-



ercise days vs. CG (134.0 kcal/d; 95%CI: 3.02 to 264.88; p=0.136), and non-exercise days vs. CG (-95.57 kcal/d; 95%CI: -192.42 to 1.29; p=0.161).

**Conclusion:** 1-y post-BS MExT was sufficient to reduce TLM and ALM losses, but no further improvements were observed on the remaining body composition parameters, dietary intake, and EE.

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### IDENTIFICATION OF SARCOPENIA RISK GENES THROUGH GENOMEWIDE ASSOCIATION STUDIES (GWAS): BUSHEHR ELDERLY HEALTH (BEH) PROGRAMME

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**Objective:** Sarcopenia is associated with aging and is a common disorder among Iranians. The study aimed to identify single nucleotide polymorphisms (SNPs) associated with sarcopenia by a genomewide association study (GWAS) using data from the BEH Program.

**Methods:** BEH program is a cohort study of 3000 individuals 60 y and older. DXA (Discovery WI, Hologic Inc, USA) was used to measure muscle mass. SMI was calculated by dividing the total weight of the skeletal muscle of four limbs by the squared height. In addition, A digital dynamometer was used to measure handgrip strength. Finally, EWGSOP-2 was used to define sarcopenia. We

conducted GWAS on Skeletal Muscle Index (SMI), and handgrip strength using linear regression (n=2225), and sarcopenia (N cases=545) using a logistic regression model.

**Results:** We identified 11 genomewide significant associations with SMI, 4 associations with hand grip, and 9 genome-wide significant associations with sarcopenia. The strongest associations were observed with rs10490661 (P-value=6.0E-6 with handgrip, nearest gene: MACF1) and rs6692656 (1.7E-6 with SMI, VIT).

**Conclusion:** This study was the first GWAS conducted in the Iranian population, focusing on the elderly population. We reported two genetic loci associated with muscle strength in an Iranian population.

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### THREE YEARS OF BONE HEALTH TELEECHO MOSCOW TO IMPROVE THE CARE OF OSTEOPOROSIS AND OTHER METABOLIC SKELETAL DISEASES IN RUSSIA

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**Objective:** Bone Health TeleECHO Moscow is the first Russian speaking ECHO project that replicates the original Bone Health TeleECHO and mentors participants in the care of patients with skeletal disorders. We aimed to evaluate the impact of 3-y Bone Health TeleECHO Moscow on physicians' knowledge in management of bone disease.

**Methods:** Bone Health TeleECHO Moscow outcomes were assessed through an electronic blinded self-efficacy questionnaire focusing on competence and skills in 20 domains of osteoporosis care before and after each year of participation in the Bone Health TeleECHO Moscow project. Demographic data such as age, gender, specialization, degree and main employment were also collected through the questionnaire.

**Results:** Over the 3 y, a total of 296 participants completed the questionnaire. Average attendance for each session increased from 64 in 2019 to 73 in 2020 and to 96 in 2021. Participants were from all regions of Russia and Russian speaking countries. The mean age of respondents was 43 y with the youngest being 23 and eldest 74. The most common participants' primary specialties were endocrinology (n=263), gynecology (n=20), orthopedics

(n=3) and other (n=10). All of our participants were MD, in addition to this there were 73 MD, PhD. According to the results of the questionnaire, statistically significant improvement was observed in all evaluated fields with an effect size of 0.87 ( $p < 0.001$ ).

**Conclusion:** Bone Health TeleECHO replication in Russia has proven to be effective at improving clinicians' skills in the management of osteoporosis and other metabolic bone diseases based on self-evaluation over 3 y.

P799

### IS A SCREENING TEST ENOUGH TO PREDICT THE PROGNOSTIC ROLE OF COGNITIVE IMPAIRMENT IN WOMEN WITH SUBACUTE HIP FRACTURE? A SHORT-TERM PROSPECTIVE STUDY

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**Objective:** Cognitive assessment is usually performed by a single screening test in older people with hip fracture. Our aim was to investigate the capability of a further assessment to discriminate cognitive impairment with prognostic relevance in the patents defined "cognitively intact" at the screening test.

**Methods:** We studied women with subacute hip fracture. All the women underwent a screening evaluation by the Short Portable Mental Status Questionnaire (SPMSQ) at rehabilitation admission. The women who made  $\leq 1$  error at the 10-item screening test were classified as "cognitively intact" and underwent a further assessment by 4 tests: Montreal Cognitive Assessment (MoCA), Rey's Auditory Verbal Learning Test (immediate and delayed recall) and Frontal Assessment Battery (FAB). The ability in activities of daily living was measured by the Barthel index. Successful rehabilitation was defined with a Barthel index score  $\geq 85$  at discharge from rehabilitation.

**Results:** 84 women made  $\leq 1$  error at the SPMSQ. In the 84 women, the MoCA score showed a significant ability to predict the functional outcome: the unadjusted odds ratio to achieve successful rehabilitation for a 6-point change in MoCA score was 2.97 (95%CI from 1.33 to 6.64;  $P=0.008$ ). After adjustment for age, Barthel index scores before rehabilitation, hip fracture type, 25-hydroxyvitamin D, infections and prevalent neurologic impairment the odds ratio to achieve successful rehabilitation for a 6-point change in MoCA score became 3.49 (95%CI from 1.21 to 10.11;  $P=0.021$ ). For an 11-point change in immediate Rey's score, a 4-point change in delayed Rey's score and a 4-point

change in FAB score the adjusted odds ratio to achieve successful rehabilitation were 2.65 (95%CI from 1.15 to 6.08;  $P=0.021$ ), 2.14 (95%CI from 1.12 to 4.11;  $P=0.022$ ) and 1.76 (95%CI from 0.91 to 3.38;  $P=0.092$ ), respectively.

**Conclusion:** The women with subacute hip fracture who were classified as cognitively intact at a screening test could have cognitive impairment at further examination, with a significant prognostic disadvantage in activities of daily living. A screening test seems not enough to exclude a clinically relevant cognitive impairment.

P800

### THE VALUE OF TIMELY BIOLOGIC OR TARGETED SYNTHETIC DISEASE-MODIFYING ANTIRHEUMATIC DRUGS THERAPY IN THE DEVELOPMENT OF OSTEOPOROSIS IN PATIENTS WITH RHEUMATOID ARTHRITIS IN CLINICAL PRACTICE

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**Objective:** To assess the contribution of treatment tactics in patients with rheumatoid arthritis (RA) who need to take biologic or targeted synthetic disease-modifying antirheumatic drugs (b/tsDMARDs) to the development of osteoporosis.

**Methods:** From the register of patients appropriate the 2010 EULAR criteria for RA who received b/tsDMARDs in the V.A. Nasonova Research Institute of Rheumatology in 2021 (n=505), patients aged 60-80 y (inclusive) with a disease duration of 10 y or more (n=95) were identified. Patients with osteoporosis (according to X-ray densitometry) were group A (n=32 out of 95/33.7%). The remaining 63 (66.3%) patients were in group C (Control). Age, gender ratio and RA duration in the groups were comparable ( $p > 0.05$ ).

**Results:** In groups A and C: the frequency of positivity for RF (30/93.8% vs. 59/93.7%) and ACCP (24/75% vs. 56/88.9%), duration of glucocorticoid therapy (Me=96[29;145] vs. 57[14;127] months) and dose of prednisolone at the time of examination ( $7.2 \pm 2.6$  vs.  $6 \pm 2.4$  mg/d), number of DMARDs ( $3 \pm 1$  vs.  $2.8 \pm 1$ ) and b/tsDMARDs (Me=1[1;1.5] vs. 1[1;2]) in the anamnesis, as well as signs of RA activity at the time of examination (DAS28:  $4.8 \pm 0.9$  vs.  $4.9 \pm 1$ ) did not differ statistically significantly in the groups ( $p > 0.05$ ). The mean age at the start of biological therapy in group A was greater than in group C (A:  $65.5 \pm 6.3$  vs. C:  $61.8 \pm 5.5$ ;  $p=0.004$ ). The mean duration of RA by the time of initiation of biological therapy in A was longer (A:  $20.5 \pm 9.1$  y vs. C:  $15.1 \pm 10$  y;  $p=0.01$ ). The median duration of b/tsDMARDs therapy in A was shorter than in C (A: 1[0;2.5] y vs. C: 2[0;7] y;  $p=0.04$ ).

**Conclusion:** In RA patients with osteoporosis who needed to take b/tsDMARDs, their initiation was carried out later than in RA patients without clinically significant osteoporosis ( $p < 0.05$ ). Late appointment of b/tsDMARDs in RA patients contributes to the development of osteoporosis.

## P801

### LONG TERM FOLLOW UP OF PATIENTS WITH PREGNANCY AND LACTATION-ASSOCIATED OSTEOPOROSIS (PLO)

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**Objective:** PLO is a rare condition, characterized by the occurrence of fragility fractures, most commonly vertebral, during late pregnancy or early postpartum. We aimed to evaluate clinical features of a group of women with PLO during medium/long-term follow-up.

**Methods:** We reviewed medical records of 7 women with PLO evaluated between November 2007 and May 2021. Clinical baseline characteristics, treatment, time of follow up (TFU) and occurrence of new fractures were consigned. We evaluated laboratory parameters: serum calcium, phosphorus, creatinine, 25-OH vitamin D (VD),  $\beta$ -CrossLaps (CTX), osteocalcin, parathormone, and urine calcium. BMD was assessed by DXA of lumbar spine (LS) and femoral neck (FN).

**Results:** Mean age at time of fracture was  $28.4 \pm 3.4$  years old (yo). Mean age at menarche was  $12.6 \pm 1.02$  yo; all had regular menstrual cycles. Mean BMI was  $20.8 \pm 2.0$  kg/m<sup>2</sup>. All patients suffered multiple vertebral fractures in thoracic and lumbar spine between 8<sup>th</sup> month of pregnancy and 120 days postpartum. At baseline, mean VD level was  $37.5 \pm 14.6$  ng/ml -2 patients with VD insufficiency. Median CTX value was 780 pg/ml ( $n=5$ ; 292-1480 pg/ml). Mean BMD was  $0.780 \pm 0.8$  g/cm<sup>2</sup> with Z-score (Zsc)  $-3.2 \pm 0.7$  at LS and  $0.707 \pm 0.1$  with Zsc  $-2.1 \pm 0.8$  at FN. Mean TFU was 72 months (2 patients followed <12 months). All patients received calcium and VD supplementation. After 12-18 months of follow up, VD reached normal levels and CTX decreased to a median value 198.5 pg/ml. After 12-14 months, mean BMD increased by 9.2% at LS and by 8.6% at FN ( $0.852 \pm 0.09$  g/cm<sup>2</sup>, Zsc  $-2.8 \pm 0.8$  at LS and  $0.768 \pm 0.08$ , Zsc  $-1.5 \pm 0.7$  at FN). Two women suffered new fractures in the long term (1 had a fibula and cuboid bone fracture, one had a wrist fracture).

**Conclusion:** Two patients (28.5%) suffered new fractures during a mean of 6 y of follow up. BMD increased significantly, but persisted to be lower than age-expected in LS. Long term follow up of patients with PLO is mandatory.

## P802

### OSTEOPOROSIS MAY BE A REVERSIBLE DIAGNOSIS AS BONE HEALTH MAY BE RESTORED

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**Objective:** Osteoporosis is a disorder affecting bone health and inducing bone fragility and fracture susceptibility. It is considered a degenerative disorder, which is treated with antiosteoporotic agents with the aim to reduce fracture susceptibility and fracture incidence. The aim was to present a cohort of female patients with osteoporosis who were treated with alendronate and had their BMD restored.

**Methods:** In a cohort of 15 patients, aged 52-68 y, who came for evaluation of osteoporosis in the Osteoporosis Unit, BMD was assessed by DXA and 25(OH)D<sub>3</sub>, PTH and Ca blood levels were measured.

**Results:** BMD was found to be low, in the osteoporotic range, as T-score was  $-2.68 \pm 0.031$ . Alendronate was administered once weekly along with calcium and cholecalciferol. The patients were followed up on a 6-month basis. BMD was measured 2 y later and T-score was  $-2.29 \pm 0.027$ . Alendronate was discontinued in some of the patients. Patients were followed up yearly thereafter. The incidence of fractures was noted.

**Conclusion:** Postmenopausal osteoporosis is a multifactorial disorder, its pathogenesis remaining under investigation. The disease is considered a degenerative disorder. However, it appears that it may be a reversible disorder, if existing medications such as bisphosphonates are used. Bisphosphonates are among the first agents which were applied in osteoporosis treatment. New pharmaceutical agents are now discovered for the treatment of osteoporosis. However, these data show that bisphosphonates, and in particular, alendronate, are effective and may restore BMD to normal levels. These findings show the road for the discovery and clinical application of new drugs, which will ultimately solve the problem of osteoporosis treatment.

P803

### ASSESSMENT OF BONE MINERAL DENSITY IN ANKYLOSING SPONDYLITIS WITH RADIOLOGICAL HIP INVOLVEMENT

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**Objective:** Decreased BMD has been recognized as a common complication of AS, which can lead to osteoporosis. Limited clinical data are available on bone loss in ankylosing spondylitis (AS) patients with hip involvement. The aim of this study was to analyze BMD in AS patients with hip involvement.

**Methods:** A cross-sectional comparative study of 89 patients was performed. Hip involvement was defined as hip pain considered related to AS inflammation and confirmed radiographically. The patients were classified into two categories: (1) no hip involvement, (2) hip involvement according to a Bath Ankylosing Spondylitis Radiology Index (BASRI)-hip score  $\geq 2$ . BMD was assessed by DXA of the femoral neck and lumbar spine in anteroposterior (AP) and lateral projections. Clinical characteristics of the patients were recorded and compared between the two groups.

**Results:** 43 (48.3%) patients had radiographic evidence of hip involvement (BASRI-hip $\geq 2$ ). The mean age was  $46.09 \pm 12.74$  y and disease duration was  $15.9 \pm 9$  y. According to WHO criteria, AS patients with hip involvement had the higher proportions of osteopenia (53.7%) and osteoporosis (57.7%) compared to those without hip involvement ( $p=0.04$ ). Mean BMD at the femoral neck was significantly lower in AS patients with hip involvement compared with those without hip involvement ( $-1.87 \pm 0.9$  vs.  $-1.15 \pm 1.02$  g/cm<sup>2</sup>,  $p=0.01$ ).

**Conclusion:** AS patients have lower BMD once the disease progresses to include radiographic hip involvement.

P804

### BONE METABOLISM CHANGES ASSOCIATED WITH PROTON PUMP INHIBITORS CHRONIC USE IN OSTEOPOROSTIC POSTMENOPAUSAL WOMEN WITH CONCOMITANT BIPHOSPHONATE THERAPY

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**Objective:** To evaluate the effect of PPIs on bone metabolism and fracture risk in post-menopausal women with osteoporosis taking BP therapy using a cross-sectional study design. Several studies suggest a deleterious effect on bone metabolism and fracture risk

associated with chronic proton pump inhibitors (PPIs) use due to multifactorial mechanisms such as increased PTH secretion and hypocalcemia, which could impair bisphosphonate (BP)'s effectiveness. In contrast PPIs are also reported to help increase the bioavailability of BP and decrease bone resorption. It is unclear if concomitant PPI and BP use affects negatively or positively calcium metabolism.

**Methods:** 169 postmenopausal women with fragility fracture from a Portuguese Fracture Liaison Service between 2019-2021 were included. Data collected included age, previous osteoporosis diagnosis, number of previous fractures, serum calcium, PTH and vitamin D levels. Use of chronic BP or PPI therapy for at least 6 months was also registered. Patients with secondary osteoporosis causes were excluded. Patients were divided in two groups according to BP therapy (+PPI/+BP; +PPI/-BP). Statistical analysis was realized using the Mann-Whitney U Test to establish statistical significance ( $p < 0.05$ ) between groups.

**Results:** No statistically significant differences were found in vitamin D, serum calcium and PTH levels between the two groups. Despite the normal values of vitamin D and serum calcium, PTH levels were above the normal range ( $>55$  pg/ml) independently of BP use. The +PPI/+BP group showed a statistically higher number of fragility fractures.

Feature ( $\bar{x} \pm SD$ )	+PPI/+BP (n=42)	+PPI/-BP (n=127)	p-value
Age	74 $\pm$ 8.6	77.6 $\pm$ 9.3	0.18
Vitamin D	30.6 $\pm$ 7.4 ng/ml	29.8 $\pm$ 6.6 ng/ml	0.44
Calcium	8.9 $\pm$ 0.6 mg/dl	9.2 $\pm$ 1.1 mg/dl	0.12
PTH	55.2 $\pm$ 26.2 pg/ml	56.5 $\pm$ 36.3 pg/ml	0.41
Number fragility fractures	1.78 $\pm$ 0.9	1.22 $\pm$ 0.81	0.04

**Conclusion:** BP therapy may have little effect on the potential PPI associated changes in bone metabolism. Chronic PPI exposure may be associated with hyperparathyroidism regardless of concurrent oral BP administration. Previous history of fractures may have prompted earlier introduction of BP therapy and no casual associations can be made due to the transversal nature of the study.



P805

### OSTEOARTHRITIS OF THE STERNOCLAVICULAR JOINT: IS SHORTER CLAVICULAR LENGTH A RISK FACTOR?

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**Objective:** Osteoarthritis (OA) is the most common disorder of the Sternoclavicular Joint (SCJ). In our case-control study, we evaluated the relationship between clavicular length and OA at the SCJ.

**Methods:** CT scans of adults presenting to the Emergency Dept. of our hospital were examined to look for OA, defined as the presence of osteophytes, subchondral cysts, or cortical sclerosis at the SCJ. Medial-most and lateral-most points of the clavicle were marked on the slices passing through the SC and AC joints respectively. Using x-, y-, and z-axis coordinates from the DICOM metadata, clavicular length was calculated as the distance between these two points with 3D geometry.

**Results:** Preliminary data of 334 SCJs from 167 patients (64% males, 36% females) with a mean age of 48.5±20.5 y were analysed. Multivariate regression models revealed that age and clavicular length were independent risk factors for OA while gender did not reach statistical significance. Results are summarised below in the table. A 1 mm increase in length was associated with a 9% and 7% reduction in the odds of developing OA on the left and the right respectively. Comparing the mean clavicular length using t-test showed a significantly shorter clavicle in the group with OA (145.8 vs. 152.7, p=0.0001, left and 144.2 vs. 150.3, p=0.0007, right)

	Left	Right
1) Clavicular Length	149.8±11.65 mm	147.2±11.76 mm
2) Prevalence of OA	41.91%	50.89%
3) Age****		
• aOR	1.11	1.11
• 95%CI	1.08-1.15	1.08-1.14
• p	<0.0001	<0.0001
4) Clavicular Length***		
• aOR	0.91	0.93
• 95%CI	0.86-0.96	0.89-0.97
• p	0.0005	0.004
6) Gender		
• OR	1.917	2.03
• 95%CI	0.59-6.24	0.67-6.44
• p	0.27	0.21

7) ROC Curve		
• Area	0.91	0.89
• 95%CI	0.86-0.96	0.85-0.95
• p	<0.0001	<0.0001
• R <sup>2</sup>	0.53	0.50

**Conclusion:** Our data suggest that the risk of developing OA at the SCJ is higher for shorter clavicles. This could be of clinical relevance in cases of clavicular fracture where clavicular shortening might lead to a higher risk of developing OA. Biomechanical studies are needed to find out the mechanism of this effect.

P806

### ASSESSMENT OF OSTEOPOROTIC FRACTURES IN POSTMENOPAUSAL SUDANESE WOMEN: DOES FRAX SCORE OF GREAT BENEFIT?

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**Objective:** Osteoporosis is the most common metabolic bone disease, and it affects up to 40% of postmenopausal women. Osteoporosis not only increases minimal trauma bone fracture risk but also affects survival in postmenopausal women. Although osteoporosis is diagnosed based on low BMD determined by DXA, BMD measurement is sometimes difficult because DXA is not widely available in the community. The Fracture Risk Assessment tool (FRAX) can predict 10-year major osteoporotic fracture risk and hip fracture risk with or without femoral neck BMD. We aimed to evaluate the FRAX tool in predicting osteoporotic fractures by study of clinical risk factors that contribute to decrease bone strength such as: advancing age, previous hip fracture, rheumatoid arthritis, oral glucocorticoid use and other factors.

**Methods:** A cross-sectional community based study was conducted in north Sudan from January 2019 – June 2020. The questionnaire is composed of demographic data and clinical risk factors of fragility fracture to ascertain whether these factors are risk of developing osteoporotic fractures using the WHO FRAX criteria. Statistical analysis was performed using SPSS, Version 23.

**Results:** A study of (350) postmenopausal women has shown that, from age (71-80) years (100%) at risk of hip fracture, and (90.0%) from age 81-90(years) were at risk of major osteoporotic fracture. Risk is found to be (16.3%) for hip fracture and (6.9%) of major osteoporotic fracture, after fragility fracture. Risk is (16.3%) for hip fracture and (6.9%) for major osteoporotic fracture, after oral glucocorticoid use. Rheumatoid arthritis is associated with (16.3%) risk of hip fracture and (6.9%) to (18.6%) of major osteoporotic fracture. There is also risk of major osteoporotic fractures that is about (6.9%-18.6%) following parent hip fracture.

**Conclusion:** The study definitively revealed correlation between the clinical risk factors of fracture and osteoporosis through us-

ing the FRAX. The FRAX score provides an advance in fracture risk assessment in low and middle income countries. Recommendations: The ministries of health in developing countries should adopt the FRAX as routine tool at the primary care settings.

## P807

### BENEFIT OF A MULTIFACTORIAL APPROACH WITH TELEREHABILITATION IN OLDER ADULTS AFTER HIP FRACTURE: THE ACTIVE FLS PRAGMATIC RANDOMIZED CLINICAL TRIAL PROTOCOL

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**Objective:** Due to the clinical, functional, cognitive and social complexity of older adults diagnosed with fragility hip fracture, an intervention through a multidisciplinary and multicomponent program consisting of physical exercise with tele-rehabilitation, nutritional assessment and other variables related to geriatric assessment integral can improve the functional situation, quality of life and prevent new fractures.

**Methods:** In this pragmatic clinical trials, 174 older adults ( $\geq 75$  years old) who meet the inclusion criteria (Prior independence for wandering measured as FAC  $\geq 6$ ; Capability/Support for using Active HIP app) and not meet the exclusion criteria (living in nursing home; cognitive impairment considered as a Goldberg Global Deterioration Scale score  $\geq 5$ ) will be randomized in two groups. The intervention group will a comprehensive geriatric assessment will be carried out with a multicomponent physical exercise program guideline based on ActiveHip+ for 3 months. In subsequent revisions, exercises from the Vivifrail program will be given. To this will be added a specific nutritional assessment and intervention with special emphasis on correct protein intake. If supplementation is required, supplements enriched in  $\beta$ -hydroxy- $\beta$ -methylbutyrate (HMB) will be selected. Calcium and vitamin D supplementation will be carried out according to the protocol to achieve vitamin D levels  $>30$  ng/ml. Also the will receive a pharmacological, psychological and, mental review. The follow-up will be 1 y.

The main outcome will be change in the SPPB score. Secondary outcome will be time to appearance of the first fragility fracture, Number of visits to emergency services, Number of hospitalizations, Functional gain/loss measured by Barthel, Lawton, 6-m gait speed and FAC Mobility Scale, FRIED, Frail, sarcopenia and osteosarcopenia, Cognitive modification / delirium (MEC, 4AT), Affective modification (Geriatric Depression Scale), Nutritional assessment (Mini Nutritional Assessment), Quality of life (Euroqol, SarQol), Pain control (PAS) and Adherence to treatment (Morisky Green test).

**Results:** Early rehabilitation in hospital and postdischarge can improve older adults' functional recovery. There are many studies highlighting the benefits of tele-rehabilitation in other clinical areas. However, there is a gap in evidence and practice for home-rehabilitation or tele-rehabilitation for older adults with hip fracture with limited number of studies and differ in the results. @ctivehip is one of the valuable treatment option in the recovery process for older adults with hip fracture. Nevertheless, many geriatric syndromes (like fear of falling, polypharmacy, malnutrition, etc.) after hip fracture are not evaluate yet. With this study we intend to fill a gap in the current evidence.

**Conclusion:** The purpose of our intervention is improve of functional capacity in patients with fragility hip fracture through a multidisciplinary program that includes nutrition, exercise with tele-rehabilitation, and adjustment of polypharmacy, among others.

## P808

### BILATERAL ISCHIUM CONDRICALCINOSIS ON PATIENT WITH WALDENSTROM'S MACROGLOBULINEMIA WALDENSTROM: A CASE REPORT

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**Objective:** Waldenstrom's macroglobulinemia is a rare B-cell lymphoproliferative neoplasm, in which lymphoplasmacytic cells infiltrate the bone marrow, along with an IgM monoclonal gammopathy in the serum. Hypercalcemia affects 4% due to either calcium-IgM binding or induced by parathormone-related peptide (PTHrP). The high local concentration of calcium can facilitate the calcium phosphate dihydrate crystal deposition disease development.

**Methods:** Based on clinical observation of 81 years old male with acute polyarthritis and previous diagnosis of Waldenstrom's macroglobulinemia.

**Results:** A 81-year-old male, with a previous diagnosis of Waldenstrom's macroglobulinemia, was referred to the rheumatology department due to polyarthritis. The patient described inflammatory arthralgias of the wrist, knees, elbows, and metacarpophalangeal and proximal interphalangeal joints. The physical exam of these joints demonstrated arthritis with the absence of erythema. Previous medical records showed an increased calcium level (10.8 mg/dL, with normal albumin) and normal phosphate levels. These facts lead to clinical suspicion of calcium pyrophosphate dihydrate crystal deposition disease, which was confirmed by X-ray with the presence of chondrocalcinosis at the right knee and both ischium (Figure 1). A great clinical improvement was obtained with colchicine, with patient complaints resolution.

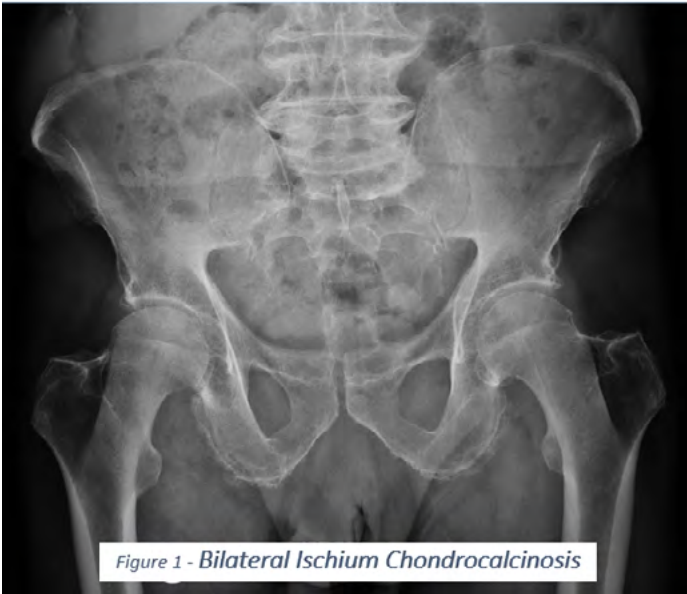


Figure 1 - Bilateral Ischium Chondrocalcinosis

**Conclusion:** Lymphoproliferative diseases, such as Waldenström's macroglobulinemia, should be considered in the hypercalcemia etiologic diagnosis approach. In patients with acute polyarthritis, calcium pyrophosphate dihydrate crystal deposition disease should be excluded.

## P809

### VITAMIN D AS A REVERSE INDEX OF SEVERITY IN SARS-COV-2 INFECTION

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**Objective:** Severe infection from the SARS-CoV-2 virus is associated with various manifestations, including hematological manifestations. Thrombotic events or a tendency to develop thrombotic events also characterize severe COVID-19 disease and may be related to fatalities. Vitamin D is known to have immunomodulating properties and to enhance the body defense system against invading pathogens and to have immunostimulatory properties as far as the innate immune response is concerned. Vitamin D is also thought to prevent thrombosis in susceptible patients. The aim of the study was to measure 25(OH)D<sub>3</sub> levels in patients hospitalized for severe COVID-19 infection and to investigate the relationship between 25(OH)D<sub>3</sub> levels and ferritin levels and d-dimer levels in this cohort.

**Methods:** In a cohort of 42 patients hospitalized for severe infection from the SARS-CoV-2 virus 25(OH)D<sub>3</sub> levels were measured. In the same cohort ferritin levels and d-dimer levels were also measured. Observations were also performed in a control group.

**Results:** 25(OH)D<sub>3</sub> levels were 8.08±1.48 ng/ml (mean±SEM) and they were inversely related to ferritin levels, correlation coefficient -0.15, p=0.001, linear regression analysis and to d-dimer levels, correlation coefficient -0.34, p<0.001, linear regression analysis.

**Conclusion:** Severe infection from the SARS-CoV-2 virus is related to a tendency for the development of thrombotic events. D-dimer levels are measured and followed up in these patients. Ferritin levels are also increased in severe SARS-CoV-2 infection and may be related to adverse outcome. We showed that vitamin D levels are low in hospitalized patients with severe SARS-CoV-2 infection and are inversely related to ferritin and d-dimer levels. It may thus be proposed that vitamin D is an inverse index of severity in the context of SARS-CoV-2 infection.

## P810

### ASSOCIATIONS BETWEEN GRAVITATIONAL LOADING INTENSITY AND BONE MASS IN PATIENTS WITH CLASS III OBESITY

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**Objective:** To characterize the gravitational loading intensity profile in patients with class III obesity and verify its association with bone mass.

**Methods:** 47 patients with class III obesity (38 female; 44.0±10.3 y; 45.0±3.4 kg·m<sup>-2</sup>) were assessed for BMD at femoral neck, total hip, and lumbar spine. Physical activity was objectively measured for 7 d using triaxial accelerometers. Gravitational loading was represented by the peak acceleration (pACC) values, that were extracted and summarised as the daily average number of peaks in 9 intensity ranges using the impactR package. Partial least squares regression was used to examine the multivariate associations across the pACC intensity spectrum with BMD values from each skeletal site. Models were adjusted for age and sex.

**Results:** The daily number of pACC was, by far, clustered at the lower intensities (<3 g), with higher intensities only accounting for a residual number of peaks. However, for all skeletal sites, the intensity ranges more associated with higher BMD values were



between 5-8 g, with  $r$  values ranging between 0.30-0.48. The entire pACC intensity spectrum was able to explain 6.2% of BMD variance at femoral neck and total hip, and 6.6% at lumbar spine.

**Conclusion:** The performance of activities eliciting high-impact gravitational loading (above 5 g), even in a very low volume, seems to be more relevant for bone mass in patients with class III obesity.

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## P811

### ASSOCIATION BETWEEN ISOKINETIC MUSCLE STRENGTH AND BODY MASS INDEX FROM NORMAL WEIGHT TO OBESE CLASS III

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**Objective:** To investigate the relationship between BMI and muscle strength function.

**Methods:** A total of 148 subjects [41% males, 35.4±12.4 y, 34.9±10.4 kg·m<sup>-2</sup> BMI] were assessed for anthropometry, and both trunk and knee muscle strength. Peak torque of extension and flexion were measured through an isokinetic dynamometer (Biodex System 4). Data was analyzed in absolute terms (Nm) and relative to body weight (Nm·kg<sup>-1</sup>). Pearson partial correlation, adjusted for sex and age, was used to examine the relationship between BMI and muscle strength. Prediction models of muscle strength were also developed through linear regression analyses.

**Results:** The association between BMI and absolute muscle strength was significant at knee extension ( $r=0.34$ ,  $p<0.001$ ), but not at knee flexion ( $r=-0.05$ ,  $p=0.591$ ), neither both trunk extension ( $r=0.03$ ,  $p=0.725$ ) and flexion ( $r=-0.02$ ,  $p=0.853$ ). BMI was

strongly and inversely associated with relative muscle strength of knee extension ( $r=-0.61$ ,  $p<0.001$ ) and flexion ( $r=-0.70$ ,  $p<0.001$ ), as well as trunk extension ( $r=-0.56$ ,  $p<0.001$ ) and flexion ( $r=-0.60$ ,  $p<0.001$ ). The prediction models in which BMI was a significant predictor were absolute knee extension [40.853 + 76.821 (sex) - 1.681 (age) + 7.031 (BMI) - 0.074 (BMI<sup>2</sup>)], relative knee extension [3.238 + 0.609 (sex) - 0.016 (age) - 0.030 (BMI)], relative knee flexion [3.314 + 0.366 (sex) - 0.010 (age) - 0.084 (BMI) + 0.001 (BMI<sup>2</sup>)], relative trunk extension [9.555 + 1.210 (sex) - 0.016 (age) - 0.261 (BMI) + 0.002 (BMI<sup>2</sup>)] and relative trunk flexion [3.266 + 0.699 (sex) - 0.012 (age) - 0.040 (BMI)].

**Conclusion:** BMI was demonstrated to be positively correlated with absolute knee extension strength, probably due to the mechanical loading stimuli exerted over antigravitational muscles. Despite this apparent advantage, when normalized to body weight, extension and flexion of both knee and trunk muscle strength seem to be hampered by the increase of BMI.

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## P812

### FEATURES OF TOTAL KNEE REPLACEMENT IN PATIENTS WITH SECONDARY OSTEOARTHRITIS AND RHEUMATOID ARTHRITIS: A 20-YEAR TREND ANALYSIS

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**Objective:** Currently, the treatment of patients with osteoarthritis (OA) and rheumatoid arthritis (RA) is highly effective, but the need for total joint replacement remains high. We aimed to examine time trends in the characteristics of patients with secondary OA and RA undergoing total knee replacement (TKR).

**Methods:** A total of 181 patients with secondary gonarthrosis and RA underwent TKR at Republican Clinical Hospital, Kazan between 2002-2021. Of these, 75 patients were retrospectively examined between 2002-2011; 106 patients were observed prospectively in the perioperative period by a rheumatologist and orthopedist from 2012-2021. Of the 106 patients, 82,1% underwent



one joint replacement, 17.9% underwent two knee replacements during the study period. Median [interquartile range (IQR)] age at surgery was 57 (54, 64), the time from the onset of joint diseases to TKR was 11 (7, 18) y. Joint pain (VAS), disease activity - DAS28, functionality of the HAQ index, WOMAC were assessed before the operation, after 6 and 12 months in the active observation group.

**Results:** In patients in 2002-2011, TKR were performed earlier from the time of the onset of joint diseases compared to the 2012-2021 group [median (IQR), 10 (7-17) vs. 12 (8-19) y,  $p=0.01$ ], and there were more complications of surgery (16.0% vs. 6.6%,  $p<0.001$ ). In the later period (2012-2021), there was a decrease in blood loss and operation time,  $p<0.05$ .

In the prospective observation group ( $n=106$ ) many patients had high body weight (BMI), median (IQR) 27 (23, 32), several comorbidities from 0 to 5, median 2. Among the significant comorbidities were cardiovascular diseases 60.4%, anemia 86.8%, osteoporosis 26.4% patients. The patients were significantly older at the time of TKR with low and moderate activity RA ( $n=75$ ) compared with high activity ( $n=31$ ) [median (IQR), 58 (52, 64) vs. 56 (48, 62),  $p=0.036$ ]. A significantly less time from RA onset to TKR was observed in patients with intense pain syndrome, VAS ( $p=0.007$ ) and high activity, DAS28 ( $p=0.02$ ). There was no significant difference in time from the onset of RA to TKR, stratified by gender and the use of MTX, glucocorticoids, biological drugs. At the same time, there was no significant difference in dependence on the activity RA to reduce pain syndrome (VAS), improve function (HAQ) after surgery and presence of postoperative complications.

**Conclusion:** Over a 20-y period changes were observed in the characteristics of patients with secondary OA and RA undergoing TKR with an increase in the time before surgery. Perioperative management of patients by a rheumatologist and orthopedist can reduce blood loss, the number of complications after surgery. Patients with intense pain syndrome and high RA activity need TKR at an earlier time. Arthroplasty in patients with highly active RA is also effective in improving functional ability.

## P813

### TRABECULAR BONE SCORE IS ASSOCIATED WITH PROSPECTIVE FRACTURE AND REFRACTURE RISK IN AUSTRALIAN ADULTS

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**Objective:** TBS applies an algorithm to lumbar spine (LS) DXA scans to assess trabecular microarchitecture. TBS may improve the assessment of fracture risk, complementary to BMD, and

may be useful for identifying those likely to refracture. This study aimed to investigate associations between TBS and incident fracture, including after a prior fracture.

**Methods:** Men ( $n=894$ ) and women ( $n=681$ ) aged 24-98 y from the Geelong Osteoporosis Study were included. LSBMD L2-L4 (Lunar Prodigy) and TBS L1-L4 (TBS iNsight V2.2) were calculated and incident fractures identified radiologically (any low trauma fracture; major osteoporotic fracture [MOF; hip, spine, proximal humerus, wrist]). Cox-proportional hazards modelling (from date of DXA scan to first fracture, death, or 31/12/2016) were used to explore associations between lower TBS and fracture in the whole cohort and in a subset of participants with prior fracture ( $<10$  y before TBS measurement), adjusting for age, height, weight, smoking, mobility, alcohol consumption, falls and medication use.

**Results:** 55 participants reported an incident fracture (17 clinical spine, 4 wrist, 9 hip, 2 proximal humerus, 7 distal tibia/fibula, 6 tarsals/metatarsals, 6 rib, 3 metacarpal, 2 pelvis and femur, 1 each proximal tibia/fibula, elbow, carpal, scapula, patella), at a rate of 5.8/1000 person-years (95%CI:4.4-7.5). Of 151 participants with a prior fracture, 13 reported an incident fracture (9 MOFs), incidence 16.4/1000 person-years (95%CI:9.5-28.2).

Lower TBS was associated with increased risk of fracture (unadjusted HR=1.30, 95%CI:1.09-1.56) and MOF (HR=1.56, 95%CI:1.24-1.97); adjustment for confounders and LSBMD attenuated results (HR=1.04, 95%CI:0.86-1.27 and HR=1.21, 95%CI:0.93-1.57 respectively). Among participants with prior fracture, results for refracture (HR=1.59, 95%CI:1.11-2.27) were attenuated with adjustment (HR=1.39, 95%CI:0.91-2.12); results for MOFs were sustained (unadjusted HR=1.73, 95%CI:1.15-2.59, adjusted HR=2.42, 95%CI:1.09-5.36).

**Conclusion:** Lower TBS was associated with incident fracture and refracture. The relationship between TBS and MOF refractures was independent of LSBMD.

## P814

### THE BURDEN OF OSTEOARTHRITIS ACROSS THE STATES OF INDIA, 1990–2019: FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY 2019

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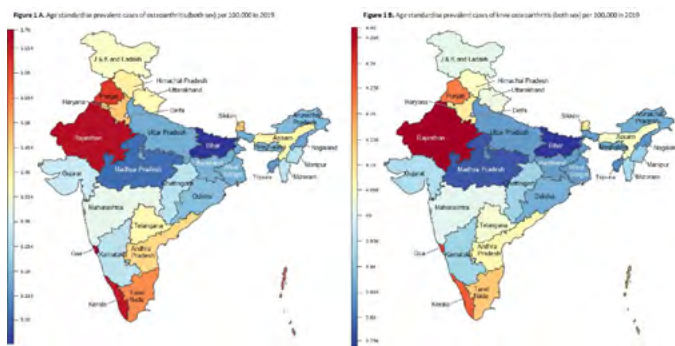
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**Objective:** Few studies have reported the burden of osteoarthritis (OA) in different parts of India. However, no study has reported the detailed estimates of incidence, prevalence, and years lived with disability (YLDs) and its trends for OA (and its various sites) across the states of India over a long period of time. We aim to

describe the state-wise prevalence, incidence, and YLDs for osteoarthritis (OA) in India from 1990-2019 according to age and sex.

**Methods:** Data from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019 were used. The burden of OA –including knee OA, hip OA, hand OA, and other OA– was estimated for India and its states from 1990-2019 through a systematic analysis of prevalence, incidence, and YLDs modelled data using the methods reported in the GBD 2019 Study. All estimates are presented as counts and age-standardised rates per 100,000 population, with uncertainty intervals (UIs).

**Results:** Around 23.46 million individuals in India had OA in 1990; this increased to 62.35 million in 2019. The age-standardised prevalence of OA increased from 4895 (95% uncertainty interval (UI): 4420–5447) in 1990 to 5313 (95%UI: 4799–5898) in 2019, per 100,000. OA was the 20th most common cause of YLDs in India in 2019, accounting for 1.48% (95%UI: 0.88–2.78) of all YLDs; increasing from 23rd most common cause in 1990 (1.25% (95%UI: 0.74–2.34)). Knee OA was the most common form of OA, followed by hand OA. The prevalence, incidence, and YLDs for OA and knee OA were consistently higher in females than males. Uttar Pradesh (8.53 million (95%UI: 7.63–9.53)), Maharashtra (6.37 million (95%UI: 5.75–7.06)), and West Bengal (4.90 million (95%UI: 4.39–5.46)) had the three highest levels of OA prevalence. Goa (5689 (95%UI: 5,125–6,282)), Rajasthan (5667 (95%UI: 5,097–6,305)), and Kerala (5658 (95%UI: 5,107–6,263)) had the highest age-standardised prevalence of OA in 2019, per 100,000 (Figure 1 A and B).



**Conclusion:** The burden and impact of OA in India are substantial and is increasing; however, it varied among states. Females were affected more commonly than males. Knee OA was the most prevalent site. With improvement in life expectancy and population ageing, greater increases are expected. Adopting suitable control and preventive community measures to reduce modifiable risk factors (such as obesity, injuries, occupational stress) are needed now to reduce the current and future burden of OA in India.

P815

## RELATIONSHIP BETWEEN SELF-REPORTED VISUAL IMPAIRMENT AND FALLS IN OLDER ADULTS PARTICIPATING IN THE SABE COLOMBIA 2015 SURVEY

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**Objective:** To analyze the relationship between self-reported visual impairment and the presence of falls among older adults participating in the 2015 SABE Colombia Survey.

**Methods:** Secondary analysis of the SABE Colombia 2015 Survey, observational, cross-sectional. Dependent variable: fall in the last year; independent variables: self-reported visual impairment, sociodemographic determinants, physical environment, personal factors, and health conditions. Bivariate analysis was initially performed, followed by a multivariate analysis with a logistic regression model to calculate the ORs. Confidence level set at  $p < 0.05$ .

**Results:** 52% of the participants self-reported visual impairment, of which 32% fell in the previous year. The average age was 69.6 y, the majority were women and lived in urban areas. More than half fell 2 or more times. A higher proportion of those who fell were dependent on basic and instrumental activities of daily living, and 76.8% could move around the city or further afield. The most frequently reported pathologies were hypertension, dyslipidemia and joint alterations. The architectural risks reported in the houses were: absence of elevators and ramps, stairs without railings or handrails, smooth floors in the shower or bathroom, poor lighting, walking between obstacles, requiring supports in the bathrooms. In multivariate analysis, adequate exterior lighting and stairs with railings were associated with 30% and 14% fewer falls. Similarly, leaving the house, either to the neighborhood or beyond, was associated with 30% and 25% less chance of falling. The variables that were significantly associated with a greater chance of falling ( $p < 0.05$ ) were: unevenness at the entrance of the house, walking between the furniture, mild and moderate dependence on basic activities of daily living, cerebral thrombosis, joint alterations, hypercholesterolemia, osteoporosis, and fear of falling.

**Conclusion:** Among people with self-reported visual impairment, having a higher level of living space, adequate outdoor lighting, and stairs with railings were associated with less risk of falling, while, the presence of unevenness or obstacles, as well as functional dependency, pathologies that affect mobility and fear of falling were associated with a greater chance of falling.

P816

### PREVALENCE OF LOW BONE MASS IN A NURSING HOME POPULATION IN TUNJA AND RELATED CLINICAL FACTORS

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**Objective:** Osteoporosis and sarcopenia are two pathologies that share their relationship with aging and low physical activity, increasing the risk of secondary dependence. The present study aims to determine the prevalence of low bone mass and possible related clinical factors in a nursing home in the city of Tunja, Colombia.

**Methods:** Cross-sectional, descriptive observational study, in which 31 adults with mild to moderate cognitive disability residing in a nursing home participated. Bone mass was determined by means of bioimpedanciometry with Tanita BC-602 portable equipment, and the criteria for sarcopenia were those proposed in EWGSOP2. The information was analyzed by univariate statistical measurement and Fisher's exact test (chi-squared) to determine possible associations between variables.

**Results:** The participants had an average age of 63.23±13.99 y, the average length of stay in the nursing home was 14.97±6.1 y. 96.7% were women. The prevalence of low bone mass was 77%, 25% met criteria for sarcopenia. Mild cognitive impairment was present in 70% and moderate cognitive impairment in 30%. Low grip strength present in 87.1% was a clinical factor associated with the occurrence of low bone mass (p<0.05).

**Conclusion:** In the population evaluated we found a high prevalence of low bone mass and a prevalence of sarcopenia of 25% according to the description in the literature. Likewise, a statistically significant association was found between the sarcopenia diagnostic criterion of low grip strength and the appearance of low bone mass. The findings allow associating low handgrip strength as a predictor of low bone mass, being a quick and accessible test that could be used as screening for early identification of the risk of osteoporosis, allowing a more timely clinical approach to reduce the morbidity associated with this condition.

P817

### DOES COMPLEX REGIONAL PAIN SYNDROME HAVE IMPACT ON BONE MICROARCHITECTURE?

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**Objective:** Complex regional pain syndrome (CPRS) describes a pathology that includes pain, sweating and trophic changes. It's usually a limb-confined disease. Several studies have shown bone compromise with lower BMD, although there are no specific data on bone microarchitecture (BM). The aim of this study was to describe the impact of CPRS on the affected limb comparing it to the contralateral.

**Methods:** We included 14 patients with CPRS who had been referred to our institution from June 2009 to January 2022. BM of the affected limb and its contralateral were evaluated by HR-pQCT.

**Results:** We included 13 patients, 61.5% were women. Mean age was 47.7±16.1 years old. Most patients (n=11) had lower limb involvement. Only 1 patient did not recollect a history of trauma. A lower total density (-10%) was observed in the limbs affected by CPRS, at the expense of the cortical component (-8.6%), the difference being statistically significant when compared to the healthy contralateral limb. Lower trabecular bone volume (-5.8%) was observed, with lower number of trabeculae (-7.38%) and cortical thickness (-13.7%). However, these differences did not reach statistical significance.

**Conclusion:** In our cohort, CPRS mainly affected the lower limbs. We found a significant loss of the total volumetric density, with greater impact on the cortical component compared to the contralateral healthy limb. There is a clear deterioration of the trabecular bone microarchitecture, with no statistical difference probably due to the small number of patients.

	Affected Limb	Contralateral Limb	p
D100	240 ± 77.6	266.4 ± 76.3	<b>0.008<sup>a</sup></b>
Dcomp	778.9 ± 127.2	851.8 ± 58.5	<b>0.021<sup>a</sup></b>
Ct.Th	0.838 ± 0.347	0.971 ± 0.295	0.074 <sup>a</sup>
Dtrab	136.4 ± 66.1	145.4 ± 53.5	0.289 <sup>a</sup>
BV/TV (%)	11.4 ± 5.5	12.1 ± 4.5	0.289 <sup>a</sup>
Tb.N1	1.681 ± 0.681	1.815 ± 0.495	0.255 <sup>a</sup>
Tb.Th	0.067 ± 0.015	0.067 ± 0.013	0.763 <sup>a</sup>
Tb.Sp	0.634 ± 0.304	0.534 ± 0.206	0.094 <sup>a</sup>
Tb.1/N.SD1	0.411 ± 0.322	0.298 ± 0.225	0.075 <sup>b</sup>

<sup>a</sup> Paired Student's t-test; <sup>b</sup> Wilcoxon Signed Rank Test

P818

### AGE RELATED TRENDS IN STRUCTURAL INDICES OF PROXIMAL FEMUR IN COMMUNITY DWELLING ADULT WOMEN AGED 20-70: A STUDY FROM SRI LANKA

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**Objective:** This study analysed the age related changes of the indices of hip structure in community-dwelling women in Southern Sri Lanka.

**Methods:** Community-dwelling women aged 20-70 y (n=419) were selected by age-stratified random sampling method and divided into age categories; 20-29 y (n=69), 30-39 y (n=60), 40-49 y (n=72), 50-59 y (n=107) and 60-70 y (n=114). Indices of hip structure such as cross-sectional area (CSA), cross sectional moment of inertia (CSMI), section modulus (SM), cortical thickness (CT), buckling ratio (BR) of three regions of interest (ROI) namely narrow neck (NN), intertrochanteric (IT) region and femoral shaft (FS), were also measured with DXA (Hologic Inc, Bedford, USA). Age related trends of the indices were studied with Locally Weighted Scatterplot Smoothing lines (Loess) and ANOVA.

**Results:** CSA, CSMI, SM and CT of three ROIs showed curvilinear relationships with age. These indices gradually increased with age between 20-50 y and the maximum values were seen in the 40-49 y age category and they declined afterwards (p<0.01) (Table). The decline of these indices was more rapid in the NN and IT region when compared with FS. The lowest mean CSA, CSMI, SM and CT in NN and IT regions were seen in the 60-70 age category. BR in all regions showed a gradual decrease with age between 20-50 y and the lowest mean values were seen in the 40-49 age category. BR increased afterwards and the maximum mean value was seen in the 60-70 age category (p<0.01).

**Table:** Mean (SD) of the indices of hip structure in three different regions in the proximal femur in community-dwelling women aged 20-70years

Variable	20-29 y (n=69)	30-39 y (n=60)	40-49 y (n=72)	50-59 y (n=112)	60-70 y (n=120)	P value
NN CSA (cm <sup>2</sup> )	2.53(0.347)	2.68(0.414)	2.78(0.361)	2.52(0.403)	2.30(0.394)	<0.001
NN CSMI (cm <sup>3</sup> )	1.77(0.412)	1.89(0.487)	1.93(0.521)	1.75(0.434)	1.67(0.468)	<0.001
NN SM (cm <sup>2</sup> )	1.06(0.193)	1.13(0.206)	1.15(0.216)	1.04(0.213)	0.94(0.204)	0.002
NN CT (cm)	0.17(0.027)	0.18(0.273)	0.19(0.030)	0.17(0.032)	0.15(0.028)	<0.001
NN BR	10.38(2.811)	9.64(2.163)	9.47(2.756)	10.56(2.876)	12.84(3.784)	<0.001

IT CSA (cm <sup>2</sup> )	4.47(0.793)	4.57(0.741)	4.85(0.663)	4.41(0.837)	4.00(0.781)	<0.001
IT CSMI (cm <sup>3</sup> )	10.20(2.669)	10.53(2.832)	11.11(2.226)	10.13(2.722)	9.41(2.747)	0.001
IT SM (cm <sup>2</sup> )	3.32(0.699)	3.48(0.740)	3.72(0.627)	3.41(0.745)	3.13(0.747)	<0.001
IT CT (cm)	0.42(0.078)	0.42(0.072)	0.45(0.089)	0.40(0.083)	0.35(0.071)	<0.001
IT BR	7.56(1.693)	7.31(1.640)	6.86(1.391)	7.87(1.866)	8.73(2.053)	<0.001
FS CSA (cm <sup>2</sup> )	3.36(0.449)	3.53(0.492)	3.70(0.460)	3.61(0.564)	3.39(0.518)	<0.001
FS CSMI (cm <sup>3</sup> )	2.09(0.583)	2.24(0.588)	2.38(0.607)	2.40(0.620)	2.35(0.594)	0.010
FS SM (cm <sup>2</sup> )	1.55(0.291)	1.65(0.307)	1.72(0.288)	1.72(0.314)	1.68(0.306)	0.004
FS CT (cm)	0.53(0.107)	0.56(0.123)	0.57(0.109)	0.54(0.124)	0.50(0.116)	<0.001
FS BR	2.65(0.775)	2.56(0.776)	2.51(0.751)	2.70(0.808)	2.94(0.894)	0.004

NN=narrow neck of the femoral neck, IT=intertrochanteric area, FS=femoral shaft, CSA=cross sectional area, CSMI=cross sectional moment of inertia, SM=section modulus, CT=cortical thickness, BR=buckling ratio, NSA=neck-shaft angle, HAL=hip axis length

**Conclusion:** This study demonstrates the dynamics of structural properties of proximal femur in the three selected cross sections of community-dwelling women aged 20-70 y and the increased bone fragility in old age.

P819

### METABOLOMICS SIGNATURE FOR SARCOPENIA: A SYSTEMATIC REVIEW

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**Objective:** Sarcopenia is the main feature of the clinical frailty phenotype, characterized as progressive loss of skeletal muscle mass, strength and function. It is responsible for reduced quality of life and increased risk of disability, falls, and mortality. A large number of elderly population suffer from sarcopenia worldwide, turning it into a global health concern. Despite recent advancements in the field, the etiology of the disease is still unknown. The present study, therefore, aims at identifying metabolomic studies investigating the metabolic profile of sarcopenia and muscle loss.



**Methods:** A comprehensive systematic literature search was conducted through PubMed and Web of Science for related articles using “metabolomic, metabolome, metabolite profile, lipidomic, sarcopenia” and their equivalents based on MeSH term. The study was conducted according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines.

**Results:** 12 targeted and 11 untargeted metabolomic studies using mass spectrometry or nuclear magnetic resonance platforms in different biofluids (1 muscle, 21 blood samples) were included. Except for two, the others were conducted on post-menopausal women and elderly men. Asian Working Group for Sarcopenia (AWGS)/EWGSOP, Fried Criteria, hand grip and gait analysis were among the main criteria used for sarcopenia diagnosis. Candidate metabolites of different categories including amino acids followed by lipids were linked with sarcopenia. Reduced levels of essential amino acids (either as a group or separately) explained the majority of muscle loss cases, whereas increased levels of glycine and proline were also considered as biomarkers of sarcopenia in a couple of other studies.

**Conclusion:** This systematic review showed that metabolic profiling could help improve the diagnosis/treatment of sarcopenia. However, great heterogeneity was observed not only in the diagnostic criteria but also the metabolomic approach, and the age and ethnicity of the studied population. Minimizing the heterogeneity in future studies is therefore necessary to define a signature for the condition.

## P820

### A QUALITY ANALYSIS OF INFORMATION ON CALCIUM SUPPLEMENTATION READILY AVAILABLE ONLINE IN CANADA

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**Objective:** To evaluate the quality of information available to Canadians on calcium supplementation for osteoporosis using popular search engines.

**Methods:** Google, Bing, and Yahoo searches were conducted using the search terms “osteoporosis”, “calcium”, and “supplement” in January 2022 in Vancouver, Canada. Personalization settings were turned off. We excluded non-English, video only, paid advertising sites, and those sites requiring payment to access. The first 7 website results displayed for each search engine were captured. Four specialists in osteoporosis (2 endocrinologists, 1 rheumatologist, and 1 generalist physician) assessed the quality and content of information on each website using the DISCERN instrument, a validated tool used to evaluate the quality of written health information. Websites were also assessed for HONcode certification.

**Results:** 13 unique websites were identified from the top 7 results from each search engine and were included for assessment. Results from Google contained the most content from scientific and lay society websites, and least commercial. Most websites (11; 85%) were rated to contain good (7; 54%) to excellent (4; 31%) quality of information. The remainder were deemed fair (2; 16%). Inter-rate reliability was fair, with a Fleiss’ Kappa score of 0.26. Six websites (46%) had HONcode certification. Scientific and lay society websites were the highest quality with 100% deemed good to excellent; commercial websites had lower ratings with none deemed good to excellent.

**Conclusion:** Our study suggests that the quality of osteoporosis-related calcium supplement information readily available by internet search to Canadian patients is “good to excellent.” There is, however, variability in quality of information provided. Some search engines are more likely to present commercial websites which we found contain lower quality information. Furthermore, since paid advertising websites are portrayed first, patients may click on websites that may provide less reliable information. Higher quality information is available through peer reviewed literature but this may be less accessible for patients. Further studies are required to investigate the impact on patient decision-making and adherence to current recommendations.

## P821

### TRENDS IN THE PREVALENCE OF OSTEOPOROSIS OVER 10 YEARS IN JAPAN: THE ROAD STUDY 2005-2015

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**Objective:** To clarify the difference in the prevalence of osteoporosis between baseline and the 4th survey data points with a 10-y interval in a population-based cohort entitled Research on Osteoarthritis/Osteoporosis Against Disability (ROAD).

**Methods:** A baseline survey of the ROAD study was conducted in 2005–2007; 1690 participants (596 men and 1094 women, mean age: 65.2 y) completed osteoporosis examinations, including BMD measurement using DXA. The fourth survey was conducted in 2015–2016; 1906 individuals (637 men and 1269 women, mean age: 65.0 y) completed assessments identical to those in

the baseline survey. No significant differences were found in the age-sex distribution of subjects. Osteoporosis was defined using the WHO criteria.

**Results:** The prevalence of lumbar spine (L2-L4) osteoporosis at the baseline survey was 13.6% (3.4% in men; 19.2% in women) and at the fourth survey was 9.7% (1.4% in men; 13.9% in women), which decreased significantly over 10 y ( $p < 0.01$ ). While the prevalence of osteoporosis at the femoral neck did not decrease, the prevalence of osteoporosis at the L2-L4 or femoral neck in women aged  $\geq 70$  was 48.9% at the baseline study and 38.8% at the fourth survey; thus, the prevalence at the fourth survey was significantly lower than that at the baseline survey ( $p < 0.01$ ).

**Conclusion:** According to the population-based survey, the prevalence of osteoporosis at the lumbar spine has decreased significantly over the past 10 y. This preferable change in osteoporosis would contribute to the decrease in the occurrence of osteoporotic fracture in the future.

## P822

### THE LANDSCAPE OF METABOLOMICS-BASED RESEARCH IN METABOLIC BONE DISORDERS: A SCIENTOMETRICS AND NETWORK ANALYSIS

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**Objective:** Despite numerous experimental and clinical studies conducted on metabolomics and metabolic bone disorders, no scientometrics' study has been conducted so far. This scientometrics study aimed to analyze these documents to provide a scientific overview.

**Methods:** Scopus web database was searched for relevant English language articles on metabolomics and osteoporosis/ osteopenia/ bone fracture/ BMD published till 22 January 2022. Collected data were analyzed for publication year, document type, geographical distribution, subject area, main source, citation number, authors' and institutes' collaboration network using SPSS and VOSviewer analytic softwares.

**Results:** From among 224 global publications in this field, most of the papers (77.7%) were original articles. A significant time trend was shown in the number of papers ( $P < 0.001$ ) with the highest number being published in 2020 (44 papers). The subject areas of more than 28% of the papers were "Biochemistry, Genetics and Molecular Biology" followed by "Medicine" and "Pharmacology, Toxicology and Pharmaceutics". The top three publishing coun-

tries were China (90), the US (63) and the UK (18). The documents were cited 3398 times totally with an average of 15.2 citation/article, and h-index of 29. Two top highest cited papers (163 and 160) were original articles from the UK entitled "Cohort profile: Twinsuk and healthy ageing twin study", and "Metabolomic markers reveal novel pathways of ageing and early development in human populations". The top author was "Zhang Q." from China. "Frontiers In Pharmacology", "Plos One" and "Scientific Reports" were the top sources. The most used keywords were "metabolomics", "osteoporosis", and "biomarkers". Top authors and institutes in the coauthorship network assessment were from US. **Conclusion:** The current study could help researchers identify potentially highly cited studies as well as active authors and scientific institutes to collaborate with to produce better research in the field.

## P823

### PREDICTIVE MODELS FOR OSTEOARTHRITIS OF VARIOUS LOCALIZATIONS

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**Objective.** Osteoarthritis (OA) is a multifactorial disease with still unclear pathogenesis. Connective tissue dysplasia (CTD) is a condition in which the structure and metabolism of the intercellular substance are disturbed, affecting the structure and functional characteristics. CTD may be a risk factor for the development of early OA due to changes in target genes of connective tissue metabolism.

**Material and methods.** 417 women ( $51.67 \pm 11.5$  y.o.) were examined, OA was diagnosed in 356 patients (generalized OA - 23.83%, knee OA - 54.30%, hip OA - 21.87%). 161 healthy women made up the control group. The presence of CTD was determined by assessing phenotypic characteristics according to the methods of the authors. Functionally significant loci of ACAN, ADAMTS5, CHST11, SOX9, COL1A1 genes were genotyped using kompetitive allele-specific PCR (KASP). Statistical processing was performed using multivariate regression and ROC analysis with calculation of the area under the curve (AUC).

**Results.** Statistically significant models of the risk of developing OA of various localizations were obtained. The predictors are presented in Table 1. All models had a high predictive value.

Table 1 - risk models for the various localizations OA development in combination with CTD

OA of the knee	OA of the hip	Generalized OA
CTD <i>rs13317 (FGFR1)</i> <i>rs229069 (ADAMTS5)</i> <i>rs7217932 (SOX9)</i>	<i>rs1061237 (COL1A1)</i> <i>rs1107946 (COL1A1)</i> <i>rs835487 (CHST11)</i>	CTD 27/27 (VNTR, ACAN)
AUC=0,880	AUC=0,866	AUC=0,806

Conclusion. Clinical and genetic models of the risk of developing OA have been obtained, CTD is a predictor in OA of the knee joints and generalized OA

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## P824

### COMPARING THE EFFECTS OF SARCOPENIA ON MORBIDITY AND FUNCTIONAL OUTCOMES IN DIFFERENT TYPES OF HIP FRACTURES: INVESTIGATING ITS EFFECTS ON BIOCHEMICAL MARKERS

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**Objective:** Sarcopenia is known as a muscle dysfunction and a progressive decrease in muscle mass. The coexistence of sarcopenia and osteoporosis in elderly individuals increases the risk of fragility. In this study, We aim to show the effects of the fracture type, on the patient's morbidity and hip functions, and the effects of sarcopenia on the patient's clinic outcome and biochemical markers whom underwent surgical treatment after hip fracture.

**Methods:** Between January 1, 2020 – March 1, 2021, 26 patients with intertrochanteric femur fracture and 26 patients with femoral neck fracture, who were evaluated as sarcopenic according to EWGSOP criteria (skeletal muscle index (SMI) <7.0 kg/m<sup>2</sup> in men and <5.5 kg/m<sup>2</sup> in women) were included in our study. Differences between biochemical parameters, functional and clinical results after routine surgical treatment were compared.

**Results:** There was no significant difference between the two groups in terms of gender, age, comorbidity, American Society of Anesthesiologists (ASA) score; indicating that the groups were homogeneously distributed in terms of these factors and had no effect on the factors investigated. Skeletal muscle index ratio and total psoas area index ratio were significantly different in the intertrochanteric femur fracture group compared to the femoral neck fracture group in favor of excess muscle mass. As a result, we noticed that there was a statistically significant decrease in SMI and the total psoas area index values in the patient group with femoral neck fracture.

**Conclusion:** These results showed that the patient group with femoral neck fracture had similar muscle mass together with achieved better functional results. We could also suggest the increased value of DKK1 and SOST as a parameter that can be used in demonstrating sarcopenic hip fractures.

## P825

### DO NOT FORGET! DON'T DELAY DIAGNOSIS! OSTEOPOROSIS & IDIOPATHIC HYPERCALCIURIA

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**Objective:** Patient data on idiopathic hypercalciuria, one of the rare causes of secondary osteoporosis, are limited. In this study, patients with idiopathic hypercalciuria and osteoporosis will be examined.

**Methods:** The last 10-y data of patients with secondary osteoporosis followed in a tertiary endocrine center were retrospectively reviewed. For the definition of idiopathic hypercalciuria, patients with normocalcemia, normohypophosphatemia, normal parathormone level, 25(OH)vitamin D level >20 ng/dl, patients with osteoporosis with calcinuria >4 mg/kg/d and other secondary causes excluded were included in the study. The time to diagnosis was determined in years. Bone parameters were recorded before and after treatment. The drugs used in the treatment were recorded. Statistical analysis of the data was made.

**Results:** A total of eight patients (M/F: 5/3) were included in the study. Mean age: 50.3(37-65), calcinuria 654.8(384-1112) mg/d, Ca: 9.5(8.5-10.1) mg/dl, P: 3.3(2,5-4) mg/dl, 25(OH)vitamin D: 33.5(27.8-37.5) ng/dl, diagnosis delay: 5.2 (2-10) y, diagnosis mostly physical therapy outpatient clinics (84%), the most commonly used drug was hydrochlorothiazide 25 mg/d. Due to the shortage of the other drug, the frequency of

use of indapamide 1.25 mg/d has increased in recent years. The mean calcinuria level after treatment was found to be 336(69-502) mg/d. Significant improvement in femoral BMD after treatment ( $p<0.01$ ); A significant ( $p<0.05$ ) improvement was observed in lumbar BMD. In addition, significant improvement was observed in lumbar T-score and Z-score ( $p<0.05$ ). **Conclusion:** Idiopathic hypercalciuria is one of the often forgotten causes of secondary osteoporosis. It is frequently seen in men. Diagnosis delay is up to 5 y, and this is often seen in physical therapy outpatient clinics. Hydrochlorothiazide is often used for treatment. With treatment, BMD increases significantly both in the femur and in the lumbar region; The improvement in T/Z score is significant only in the lumbar region.

## P826

### SCREENING SEDENTARY BEHAVIOUR AS A MODIFIABLE RISK FACTOR FOR FUNCTIONING AND RISK OF FRACTURES DURING ONGOING PANDEMIC.

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**Objective:** Physical Inactivity is the fourth leading cause of death worldwide and is increasingly being recognised as a major problem in global health presently, it can be estimated using international physical activity questionnaire (IPAQ -SF). Lockdowns and movement restriction of ongoing COVID-19 pandemic has added to it. Sedentary behaviour can lead to poor functioning and disease risk, incident fracture is a common risk too. International classification of functioning (ICF) based framework is a WHO recommended tool to assess functioning. FRAX estimates the fracture risk, screening may help to reduce the fracture risk and improving functioning of sedentary individuals.

**Methods:** In the present study the data was collected from general population (N=120) about physical activity, ICF based functioning and fracture risk (FRAX). Coronaphobia was assessed using corona anxiety scale. Sedentary individuals who exhibited poor functioning and high risk of fracture were identified successfully and were advised physiotherapy exercises.

**Results:** 80% reported some coronaphobia during outdoor activities. 70% reported breathing difficulty in moderate to strenuous ADLs. 60% participants reported that they involved in exercises "very rarely". 60% reported back stiffness and 30% lower limb stiffness. Pain prevalence was 40% for shoulder, 30% for neck, 30% lower back and 30% reported knee pain. Increased fracture risk (FRAX score) was mainly seen for postmenopausal women only.

In Phase 1, we carry out a survey including IPAQ during before COVID-19, during lockdown phase and the current status

Age (y)	21.29±2.53
Gender (M/F)	35/90
IPAQ Before COVID-19	2.02±1.86
IPAQ- During Lockdown	1.97±1.87
IPAQ- Current Status	1.78±1.98

Presently, we are carrying out another survey to find the association between fracture risk and physical inactivity in the COVID-19 scenario, wave -II.

	Mean±SD
Age (y)	22.43±4.13
Gender(M/F)	19/31
Coranophobia	0.36±0.07
FRAX	80±19

Body structure	% pain prevalence	Mean±SD
Current pain	29.4%	2.73±2.64
Sleep	5.9%	7.86±2.78
Anxious level	19.6%	4.13±3.10
Depression	21.6%	3.92±3.17
Working at home	36%	7.07±3.14
Increase in pain	27.5%	6.18±3.27

**Conclusion:** Sedentary behaviour is affecting the general population adversely during the ongoing pandemic. ICF based scoring and FRAX can be used effectively for screening advising for counteractive measures.

## P827

### TRIPHALA EXHIBITS ANTIOSTEOPOROTIC EFFECT BY AMELIORATING BONE MICROARCHITECTURE IN OVARIECTOMIZED SD RATS

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**Objective:** This study was undertaken to investigate the effects of Triphala ethanolic extract (TEE) in the prevention of pathological bone loss resulting from estrogen deficiency in ovariectomized (Ovx) rats.

**Methods:** TEE (25, 50 and 100mg/kg/d) was administered orally for 12 weeks in adult osteopenic Sprague Dawley. Anabolic agent, PTH (20 µg/kg of body weight for 5 d/week subcutaneously) was the reference standard. After 12 weeks, animals were autopsied and an assessment of microarchitectural analysis of long bones, histomorphometric analysis, biomechanical strength and bone turnover markers were made.



**Results:** TEE administration to the osteopenic rats exhibited better microarchitectural parameters, bone biomechanical strength, trabeculae network at 50 and 100 mg/kg of dose. Dynamic histomorphometry of bone showed that the TEE treatment increased mineralization apposition rate and bone formation rate in treatment groups compared with the vehicle group. High bone turnover rate is a characteristic of Ovx-induced bone loss which is represented by lower levels of serum P1NP and higher levels of serum CTx (collagen breakdown product). TEE suppressed Ovx-induced CTx levels at all doses while PTH had no effect on CTx levels. PTH exhibits its bone anabolic response by elevation of serum P1NP levels. TEE treatment also increased serum P1NP in osteopenic rats at 50 and 100 mg/kg of doses which confirmed its bone anabolic efficacy.

**Conclusion:** Triphala is an ayurvedic preparation composed of three equal proportions of herbal fruits native to the Indian subcontinent: viz. *Terminalia chebula*, *Phyllanthus emblica* and *Terminalia bellerica*. For the first time, this study reveals that daily oral administration of phyto-preparation (Ethanol extract) from Triphala prevents Ovx-induced bone loss in rats and therefore raises the chances of its use in postmenopausal osteoporosis. Both the doses of TEE (50 and 100 mg/kg/d) might be suitable for the treatment of postmenopausal osteoporosis.

P828

### CURRENT ISSUES OF THE FRACTURE LIAISON SERVICE IMPLEMENTATION IN THE URALS REGION

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**Objective:** The frequency of registration of vertebral and peripheral bone fractures typical for osteoporosis (OP) in the Sverdlovsk region is many times higher than the frequency of registration of new cases of OP. The registration of fractures is carried out on the basis of data provided by the traumatology service, and the registration of OP is performed by rheumatologists. The current situation reflects the lack of continuity between traumatologists and rheumatologists in the management of patients who have suffered fractures.

**Methods:** A cross-sectional survey enrolled 53 patients (51 females, 2 males) over 60 years old who applied for the fracture liaison service (FLS) in Yekaterinburg, City Hospital №7. The average age was 68.4±6.8 y.

**Results:** At the outpatient stage of trauma care, osteoporosis was not registered. Therapeutic and diagnostic measures were aimed only at fracture verification and immobilization. There were only 2 cases of patients with low-energy fractures referral to FLS, while 51 persons were neither given OP treatment recommendations nor referred to FLS. Only 11 of 53 patients had been advised by traumatologists to take vitamin D3 and calcium supplements for 1 month. 6 patients noted traumatologist's assessment of calci-

um and vitamin D3 supplements as useless, and 36 patients had received no prescription. In this FLS setting, patients were identified by the medical records data and primarily contacted by FLS coordinator. All contacted by phone subjects eagerly agreed to FLS consultation and follow-up.

**Conclusion:** 1. In the Middle Urals region, the number of registered typical osteoporosis-related bone fractures significantly exceeds the number of newly registered cases of osteoporosis. 2. The attempt to implement FLS into the current primary health care practice has revealed a significant gap and lack of continuity between orthopedic care and rheumatology service. 3. The data received confirms the urgent need to broaden FLS implementation in the Middle Urals Region.

P829

### RANDOMIZED CONTROL STUDY COMPARING THE FUNCTIONAL OUTCOME OF SUPRASCAPULAR NERVE BLOCK AND HYDRODISTENSION IN THE TREATMENT OF FROZEN SHOULDER

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**Objective:** Frozen shoulder or adhesive capsulitis (AC) is a common musculoskeletal disease that imposes significant morbidity and affects the quality of life. The present study was done to compare the effectiveness of the suprascapular nerve block (SSNB) under ultrasound guidance and hydrodistension in the management of AC.

**Methods:** This prospective randomized control study was conducted in 60 patients visiting the Dept. of Orthopaedic Surgery, BARC Hospital, Mumbai, with AC not improving with physiotherapy. Patients were divided into Group A (n=30) who received SSNB under ultrasound guidance in addition to physiotherapy and Group B (n=30) who underwent hydrodistension of the shoulder in addition to physiotherapy. Values for the ROM, Quick DASH score and visual analog scale (VAS) score were obtained for each patient at the baseline and at 4, 8, and 12 weeks.

**Results:** Female preponderance was observed in both the groups and overall 22% were diabetics. The difference in improvement in flexion, abduction, external rotation, and internal rotation from baseline to 12 weeks, 4-8 weeks, 4-12 weeks, and 8-12 weeks was higher in the hydrodistension group as compared to the SSNB group (p<0.05). The decrease in the VAS and Quick DASH scores from baseline to 12 weeks was higher in the hydrodistension group as compared to the SSNB group (p<0.05).

**Conclusion:** Both SSNB and hydrodistension are useful in the management of AC. However, hydrodistension displayed better outcomes as compared to SSNB in improving the functional outcome of patients.

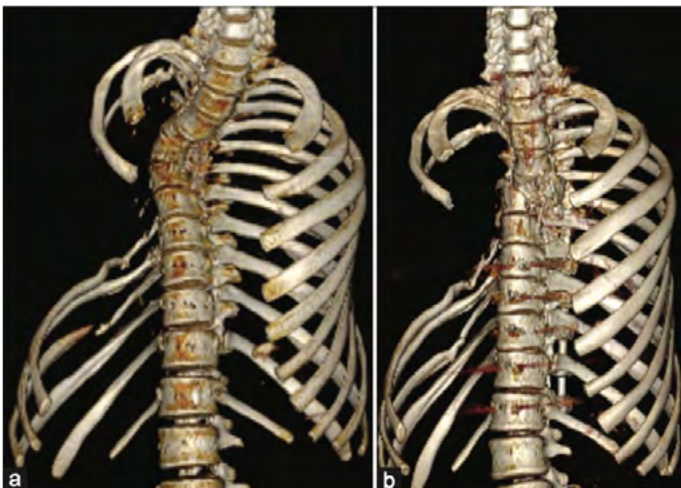
P830

### GORHAM-STOUT DISEASE OF SPINAL KYPHOSCOLIOSIS WITH NEUROLOGICAL DEFICIT: CASE REPORT

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Gorham's disease (GD) popularly known as Vanishing bone disease is an extremely rare disorder of unknown etiology characterized by idiopathic osteolysis of bone. We describe a case of vanishing bone disease of the chest wall and spine with kyphoscoliosis and neurological deficit. A 17-year-old male presented with gradually progressive deformity of back and dorsal compressive myelopathy with nonambulatory power in lower limbs. Radiographs revealed absent 4th–7th ribs on the right side with dorsal kyphoscoliosis and severe canal narrowing at the apex. The patient was given localized radiotherapy and started on a monthly infusion of 4 mg zoledronic acid. Posterior instrumented fusion with anterior reconstruction via posterolateral approach was performed. The patient had complete neurological recovery at 5 weeks following surgery. At 1 year, anterior non-union was noted for which transthoracic tricortical bone grafting was done. Bone graft from the patient's mother was used both times. At 7 months following anterior grafting, the alignment was maintained and the patient was asymptomatic; however, fusion at the graft-host interface was not achieved. Bisphosphonates and radiotherapy were successful in halting the progress of osteolysis. Achieving union in such patients is difficult and multiple surgeries may be needed to achieve union.



P831

### PROSPECTIVE EVALUATION OF QUALITY OF LIFE AND FUNCTION AFTER SURGICAL MANAGEMENT OF FEMORAL NECK FRACTURES IN ELDERLY PATIENTS

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**Objective:** The surgical management of femoral neck fractures is primarily done using internal fixation (IF), hemiarthroplasty (HA), or total hip replacement (THR). These surgical procedures effectively improve health-related quality of life (HRQOL) and function in these patients. The present study was conducted to determine QOL and function in elderly patients following operative treatment of fracture of the neck of the femur using known indicators.

**Methods:** This was a prospective, longitudinal study conducted on 60 consecutive patients treated surgically for the fracture with either of the procedures IF, HA and THR. The telephonic interview was conducted at 1, 3 and, 6 months postoperative to evaluate the quality of life using patient-rated outcome measures namely short form-12 (SF-12) Health Survey and Health-related quality of life (HRQOL-14).

**Results:** The mean age of the study participants was  $75.8 \pm 7.1$  y. In this study the physical ( $p=0.001$ ), mental component ( $p=0.003$ ) and, q-value ( $p=0.001$ ) of SF-12 scores were significantly improved at 3 and 6 months postoperative as compared to 1 month postoperative. Further, there was significant improvement of HRQOL-14 outcome scores 3 and 6 months postoperative as compared to 1 month postoperative.

**Conclusion:** The present study concludes with compelling evidence that patients with femoral neck fractures experienced a significant deterioration in HRQOL one month postsurgery and there was a marked improvement in the subsequent follow-up months.

P832

### HIP FRAGILITY FRACTURE AND THE OSTEOPOROTIC TREATMENT GAP IN THE MALAYSIAN POPULATION

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**Objective:** Osteoporosis is a common disorder where bone mass is depleted and bone structure is destroyed resulting in fragile bones that is prone to fractures. Fragility fracture is a fracture resulting from low-level trauma and is often the first sign of osteoporosis. We aimed to evaluate the management of hip fragility fracture among Malaysian patients.

**Method:** This is a retrospective analysis of 167 patients admitted with hip fragility fracture in year 2018 to a Malaysian Hospital. Risk factors, patterns of management of osteoporosis and 1-y mortality post fragility fracture were analysed.

**Results:** The majority of patients admitted with hip fragility fracture in 2018 were females (74.3%) and of Chinese ethnicity (51.5%). Patient characteristics are summarised in Table 1. Our study found that only 5(3.0%) patients had a BMD done and 13(7.8%) were treated with osteoporotic medications following their fragility fracture. Sixteen (9.6%) of these patients had presented with recurrent fragility fracture and among them only 3(18.8%) were on osteoporosis treatment. More than half were treated with calcium(54.5%) and vitamin D(52.7%) prior to discharge. 59.9% of patients admitted with hip fragility fracture had undergone surgery. Mortality rate at one year following hip fragility fracture was 23.3% (n=39) and all these patients had underlying comorbidities. 23 (13.8%) patients were lost to follow up at the one year period. There was no difference in the 1-y mortality rate among patients who had undergone surgery compared to those who were managed conservatively.

Table 1: Characteristics of patients admitted with hip fragility fracture to a Malaysian Hospital

Demographic and clinical details	No of patients (%) or mean(±SD)	
Mean age, years	77(±11.3)	
Gender	Female	124 (74.3)
	Male	43 (25.7)
Race	Malay	57 (34.1)
	Chinese	86 (51.5)
	Indian	24 (14.4)
Co-existing factors	Post-menopausal	123(99.2)
	Endocrine and metabolic	141(84.4)
	Drugs inducing osteoporosis	10(5.4)
	Malignancy	3(1.8)

**Conclusion:** Despite advancement in osteoporosis treatment, majority of individuals who sustained a hip fragility fracture did not receive adequate management. Almost a quarter of these patients had died one year post fracture. A well coordinated mul-

tidisciplinary team approach is essential to close the osteoporotic management gap among patients admitted with hip fragility fracture.

P833

### ACCURACY OF PEDICLE SCREW FIXATION IN LUMBAR SPINE BY FREE HAND TECHNIQUE STUDIED POST OPERATIVELY BY COMPUTED TOMOGRAPHY

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**Objective:** The use of pedicle screw systems for spinal stabilization has become increasingly common in spine surgery for various pathologies. We aim to assess the accuracy of pedicle screw fixation in the lumbar spine by freehand technique studied by postoperative computed tomography (CT) scan.

**Methods:** This was a prospective observational study carried out in a tertiary healthcare facility specialized in the management of spine deformities. A total of 55 patients with 253 pedicle screws were studied. Accuracy of pedicle screws measured in terms of the breaches in the cortex calculated on the postoperative CT scan done on 3 weeks follow up (on suture removal) and reconfirmed by index surgeon. Postoperative CT was performed in all cases to evaluate implant position within the first month after surgery. Chi-squared test was used to find the statistical significance.

**RESULTS:** In this study, the accuracy of the pedicle screw in the fixation of the lumbar spine was 95.25% and the incidence of pedicle breaches was 4.75%. The left breach was comparatively higher as compared to the right breach (5.51 vs. 3.96%). Among 12 breaches of the pedicle trajectory, 7 (58.33%) breaches on the left side as compared to the 5 (41.66%) on the right side (p=0.99).

**Conclusion:** CT scans is a reliable and effective method for post-operative assessment of spinal pedicle screw placement.

P834

### SURGICAL MANAGEMENT OF INTERTROCHANTERIC FRACTURE FEMUR BY SLIDING HIP SCREW AND ITS ASSESSMENT USING SALAVATI-WILSON CRITERIA

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**Objective:** Intertrochanteric (IT) fractures constitute a huge threat to life, the untreated conditions may cause a considerable change in the quality of life, the existing disease gets worsen, and may result in mortality. Considering the complexities of treating these fractures, the present study primarily focuses on the management of trochanteric fracture by sliding hip screw. This study attempts to highlight the outcome of this procedure using Salvati-Wilson criterion and does not intend to compare it with any other modality of fixation.

**Methods:** A prospective observational study was conducted on 50 patients which were followed up at intervals of 2, 6, 12, and 24 weeks postoperatively. Clinico-radiological and functional outcomes at 24 weeks postoperatively were analyzed using Salvati-Wilson Criteria.

**Results:** The majority of the patients were females (68%). The mean age of patients was  $70.8 \pm 9.19$  y. No statistically significant difference was found between the Salvati-Wilson score among the age group, sex, side of the fracture, screw length, and the number of holes. However, a significant difference was seen between tip Apex Distance (TAD), intra- and post-operative complications, partial and full bearing walk, radiological union days, and AO class ( $p$ -value $<0.05$ ). In the present study, TAD was recorded with a range of 19-28 mm with a mean of 22.78 mm. Using Salvati-Wilson score at 6 months based on pain, walking, muscle power & motion, and function there were 26% excellent, 52% good, 20% fair, and 2% poor cases were identified in our follow up of the fractures treated with Sliding Hip Screw and Barrel Plate assembly Osteosynthesis.

**Conclusion:** Complex intertrochanteric fractures can be treated with SHS construct with good functional outcomes as measured by Salvati-Wilson criterion.

## P835

### ASSESSMENT OF THE RISK OF DEVELOPING DIABETES MELLITUS IN PATIENTS WITH GOUT USING THE FINDRISC QUESTIONNAIRE

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**Objective:** Gout is associated with the high incidence of diabetes mellitus (DM), but methods of risk stratification of DM in patients with gout remains unexplored. We aimed to calculate the risk of DM development using the FINDRISC (Finnish Diabetes Risk Score) questionnaire to analyze the sensitivity and specificity of the FINDRISC in patients with gout.

**Methods:** The prospective study included 444 pts (49 female, 365 male) aged  $\geq 18$  y with a crystal-verified diagnosis of gout without DM. All pts were initially calculated the risk of developing DM according to the Russian version of the FINDRISC. A complete clin-

ical examination including information about the affected joints and the time of onset of symptoms, the presence and number of subcutaneous tophi, the number of arthritis attacks over the past year, was performed at study entry. Laboratory tests (serum creatinine and uric acid (UA) levels, hs-CRP, HbA1c) were collected. Mean duration of follow-up was 5.66 [2.69; 7.64] y. Variables are scored according to the risk that pts may confer, resulting in a range of 0–21 total points, divided into five risk categories, i.e., low ( $<7$  points), slightly elevated (7–11 points), moderate (11–14 points), high (15–20 points), and very high ( $>20$ ). To assess the validity of the FINDRISC questionnaire sensitivity and specificity were analysis was performed, as well as the ROC-curve construction with determination of the area under the curve.

**Results:** According to the FINDRISC questionnaire, low risk was found in 16 (4%) pts, slightly elevated one - in 187 (42%) pts, moderate - in 98 (22%) pts, high - in 80 (18%) pts, and very high - in 63 (14%) pts. The most common risk factors for DM were BMI  $>25$  kg/m<sup>2</sup> – 85.6% of pts, taking antihypertensive drugs – 81.3% of pts, age  $\geq 45$  y – 70.5% of pts. Patients at moderate/high/very high risk ( $n=228$ ) were significantly more likely than pts at low/slightly elevated risk ( $n=177$ ) to have subcutaneous tophi (42.9% vs. 31.1% ( $p=0.014$ )) and serum UA  $\geq 300$   $\mu$ mol/l (28.2% vs. 18.4%, ( $p=0.019$ )). Mean duration of follow-up was 5.66 [2.69; 7.64] y. DM developed in 108 of 444 pts (24.3%). DM was diagnosed in 76 of 228 pts (33.3%) at moderate/high/very high risk and in 32 pts (18.1%) at a low or slightly elevated risk of DM ( $p=0.0002$ ). The area under the curve was  $0.626 \pm 0.032$  (95%CI: 0.562–0.690). The resulting model was statistically significant ( $p<0.001$ ). The threshold value of the function at the cutoff point was 13 points: function values equal to or greater than this number corresponded to the prediction of a high risk of DM. The sensitivity of the FINDRISC was 52.8%, the specificity was 66.3%. According to these data, the quality of the model was rated as medium.

**Conclusion:** The FINDRISC questionnaire allows forecasting the risk of development of DM and may be recommended for use in patients with gout. In patients with gout, the possibility of the influence of disease and associated factors (hyperuricemia, subcutaneous tophi) on the carbohydrate metabolism disorders development should be considered.

**Disclosures:** Olga Sheliabina: Berlin Chemie Menarini Group, Maxim Eliseev: Berlin Chemie Menarini Group, Sobi, EGIS, CSC, MosFarma, Alium Group.



P836

### IMB SKILLS MODEL EXAMINATION OF SNACKING AVOIDANCE BEHAVIOR AMONG ELEMENTARY SCHOOLCHILDREN

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Overweight often originates to poor eating habit such as snacking intake, such behavior usually is transited from childhood but which influent factor is unknown. This study aims to evaluate the influent factors about snacking avoiding behavior in school-children using information-motivation-behavioral skills model. A cross-sectional study was conducted with a randomly-selected sample of 940 students. A questionnaire was used to collect data. In the result, highly impact of nutrition knowledge and motivation (equally contributed by significant other support and attitude to refuse snack) in self-efficacy skill of snacking avoiding behavior which impact was independent from gender, family affluence, and cost of snacking. In conclusion, support from significant others with attitudes and nutrition knowledge greatly benefits to school-children forming the snacking avoiding behaviors.

P837

### DIAGNOSTICS AND TREATMENT OF PATIENTS WITH OSTEOPOROSIS UNDER THE CONDITIONS OF THE COVID-19 PANDEMIC OF THE EAST SIBERIA (RUSSIAN FEDERATION)

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**Objective:** To evaluate the possibilities of diagnosing and treating OP in the context of the COVID-19 pandemic.

**Methods:** We analyzed the incidence and morbidity of patients with OP, the possibility of DXA and the availability of treatment from 2018-2021 in the Irkutsk region (Eastern Siberia) with an adult population of about 2 million people and an area of 767.9 km<sup>2</sup>.

**Results:** There was a decrease in morbidity and incidence of OP in the context of the COVID-19 pandemic. For example, in Irkutsk in 2018, the morbidity rates were 561.5/100,000, in 2021 - 383.5/100,000, and the incidence rate was 126.7 vs. 101.85/100,000, respectively, which is due to the restriction of visits to medical institutions. The Regional OP Center of the Ir-

kutsk Regional Clinical Diagnostic Center noted a decrease in the number of DXA sessions in 2021, amounting to 65.7% compared to 2018. Therefore, in a pandemic, the role of determining individuals in need of treatment using FRAX without determining BMD or TBS, taking into account risk factors, is increasing. Increased number of people receiving treatment intravenous bisphosphonates - zoledronic acid and denosumab. Low adherence was noted in the treatment of oral bisphosphonates, which after 3 y of observation is about 30%. Vaccination for patients with OP is carried out taking into account the intervals of intravenous administration bisphosphonates and denosumab.

**Conclusion:** Thus, the large territory of the region, the restriction of admission of patients and DXA makes the use of the FRAX method and the rare administration of antiresorptive drugs in the context of the COVID-19 pandemic more in demand.

P838

### DEFICIENCY AND INSUFFICIENCY OF VITAMIN D AMONG RESIDENTS OF THE IRKUTSK REGION (EAST SIBERIA, RUSSIAN FEDERATION)

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**Objective:** To assess the level of vitamin D deficiency and insufficiency among residents of the Irkutsk region.

**Methods:** In the regional Center for Osteoporosis on the basis of the Irkutsk Regional Clinical Diagnostic Center, 14810 people (65% of women and 35% of men) were examined from 2012-2018. There were 51% of persons over 50 years old, the average age was 50.1±14.8 y. Determination of the level of 25(OH)D was carried out using CX 4 Delta (Beckman/Coulter, USA). The normal level was determined at rates of >30 ng/ml, deficiency from 20-30 ng/ml, deficiency of <20 ng/ml.

**Results:** Among the examined individuals, the average level of 25(OH) D was 22.1 ng/ml [5.4; 53.7]. In the autumn-winter period (October-March), vitamin D deficiency was detected in 28%, deficiency in 50%, normal values in 22%. In the spring-summer period (April-September), there is a decrease in vitamin D deficiency to 15.8%, with an increase in deficiency to 60.2%. Normal indicators remain at the same level of 24%. In postmenopausal women, the mean 25(OH)D level was below 18.8±1.2 ng/ml and varied from 7.17 ng/ml to 33.83 ng/ml. Deficiency and insufficiency of vitamin D were detected in 88.9%, only 11.1% of women had a normal level of vitamin D.

**Conclusion:** The high incidence of vitamin D deficiency and insufficiency requires medical correction.

P839

### A RARE AND COMPLETE FORM OF PACHYDERMOPERIOSTOSIS (TOURAINÉ-SOLENTE-GOLÉ SYNDROME): CAN BISPHOSPHONATES BE A SOLUTION?

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**Objective:** Pachydermoperiostosis, also known as Touraine-Solente-Golé syndrome, is an autosomal-dominant/autosomal recessive inherited disorder with variable expression. In its complete form, it is characterized by pachyderma (thickening of the facial skin), skeletal changes (periostosis), excessive sweating (hyperhidrosis) and acropachia (digital clubbing).

**Methods:** We present the case of a 19-year-old man, admitted in April 2021 in our Clinic for polyarticular painless swellings, especially in the knees. In 2018 he was diagnosed with Juvenile idiopathic arthritis (JIA) and treatment with Methotrexate started (15 mg/wk), stopped because of nausea by the patient after 6 months.

**Results:** At the time of evaluation we found multiple skin lesions - facial seborrhea, acne, highly marked skin creases in the forehead, thickened eyelids, skin ankles sweating. Osteoarticular system with clubbing of the fingers and toes, enlargement of bilateral forearm and legs, effusion of bilateral knee joints. Biologically mild anemia with biologic inflammatory syndrome. Immunology RF, anti-CCP, ANA negative, normal levels of IgA,M,G. X-rays of the hands and forearms showed enlargement of distal ulna and radius with cortical thickening, carpalis. Pelvis x-rays with cortical thickening of the femur. Knee x-rays decreased joints space. Diagnostic and therapeutic arthrocentesis was performed with intra-articular betamethasone administration. Results showed negative cultures, exudates characteristics, cytology negative for the presence of ragocytes. At that time were considered the following diagnoses: pachydermoperiostosis, SAPHO syndrome, acromegaly, thyroid acropachy, secondary hypertrophic osteoarthropathy. The patient is discharged with the following treatment: methylprednisolone 16mg/d, potassium and vitamin D3 supplements colchicine 1 mg/d, sulfasalazine 3 mg/d. Endocrinological evaluation was performed with somatomedin C (IGF-I), thyroid hormone within normal limits. CT scan was performed with pericardic fluid blade, gynecomastia. He returns to our clinic after 6 months, and at the time of the evaluation we find in addition to the previous evaluation the appearance of a typical skin manifestation - tick transversely folded skin of the scalp-cutis verticis gyrate. Also he had significant effusion of bilateral knee joints and pronounced biological inflammatory syndrome. The imaging investigations are completed with skull x ray-skull. The final diagnosis was established: pachydermoperiostosis -complete form.

**Conclusion:** What therapeutic options should we take into consideration for this rare case, considering only few cases reported using NSAIDs, cortisone, colchicine and bisphosphonates? If bisphosphonates, which of them and what doses might be useful?

P840

### A MISSED CAUSE OF THE METABOLIC BONE DISEASE: CELIAC DISEASE

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**Objective:** Celiac disease (CD) is a highly prevalent autoimmune disease. The symptoms of CD are varied and atypical, with many patients having no gastrointestinal symptoms. Metabolic bone disease (MBD) is a less recognized manifestation of CD associated with a spectrum of musculoskeletal signs and symptoms, viz. bone pains, proximal muscle weakness, osteopenia, osteoporosis, and fracture. We here report five patients who presented with severe MBD as the only manifestation of CD.

**Methods:** Records of 825 patients of CD diagnosed during 2015-2020 were retrospectively analyzed for clinical features, risk factors, signs, biochemical, and radiological parameters.

**Results:** We were able to identify five patients (0.6%) of CD who had a monosymptomatic presentation with musculoskeletal symptoms and signs in the form of bone pains, proximal myopathy, and fragility fractures without any gastrointestinal manifestation. All five patients had severe MBD in the form of osteopenia, osteoporosis, and fragility fractures. Four of the five patients had additional risk factors such as antiepileptic drugs, chronic alcohol consumption, malnutrition, and associated vitamin D deficiency which might have contributed to the severity of MBD.

**Conclusion:** Severe metabolic disease as the only presentation of CD is rare. Patients show significant improvement in clinical, biochemical, and radiological parameters with a gluten-free diet, calcium, and vitamin D supplementation. CD should be looked for routinely in patients presenting with unexplained MBD.

P841

**IMPACT OF INCREASED SUNLIGHT EXPOSURE VS. VITAMIN D SUPPLEMENTATION ON LIPID PROFILE IN VITAMIN D DEFICIENT MEN POPULATION**P. G. Gadhiya<sup>1</sup>, G. C. Kakadiya<sup>1</sup><sup>1</sup>Topiwala National Medical College & BYL Nair Hospital, Mumbai, India

**Objective:** Despite the abundance of sunshine in India, vitamin D deficiency is common, and therefore there is an increasing trend toward taking vitamin D supplements either as prescription medicine or as a nutritional supplement. Studies have suggested that the duration of sun exposure may influence serum lipid profile. The study aim was to assess the effect of increased sunlight exposure vs. Vitamin D supplementation on vitamin D status and lipid profile in individuals with vitamin D deficiency (25OHD <50 nmol/L).

**Methods:** A prospective, randomized open-label trial was carried out in apparently healthy Indian men (40–60 y). Based on 25OHD concentrations, individuals were divided into control (>50 nmol/L, n=50) and intervention (<50 nmol/L, n=100) groups. Individuals from the intervention group were randomly allocated to two groups; either “increased sunlight exposure group” (n=50, received at least 20 min sunlight exposure to forearms and face between 11 a.m. and 3 p.m. over and above their current exposure) or “cholecalciferol supplement group” (n=50, received oral cholecalciferol 1000 IU/d).

**Results:** Significant increase in 25OHD concentrations were seen in both intervention groups (P<0.01). A significant decrease in total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C) was seen in individuals with increased sunlight exposure (P<0.05). Cholecalciferol supplement group showed a significant increase in TC and HDL-C (P<0.05) and an insignificant increase in LDL-C.

**Conclusion:** Increase in Vitamin D concentrations through sunlight exposure significantly reduced TC, LDL-C, and HDL-C concentrations, and cholecalciferol supplementation increased TC and HDL-C concentrations.

P842

**15-YEAR FOLLOW-UP OF THERAPY AGAINST OSTEOPOROSIS**G. Voicu<sup>1</sup>, D. E. Rentea<sup>1</sup>, A. Ghemigian<sup>1</sup>, N. M. Bugălă<sup>2</sup>, M. J. Tuculina<sup>3</sup><sup>1</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, <sup>2</sup>Faculty of Medicine, University of Medicine & Pharmacy, Craiova, <sup>3</sup>Faculty of Dentistry, University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Osteoporosis is a chronic disease that requires long-term monitoring and treatment. There should be a constant follow-up to determine improvement or decrease in bone mass during treatment and also eventual adverse reactions which require a new therapeutic approach. (1-5) We aim to introduce a female patient with a longstanding history of osteoporosis.

**Methods:** This is a case report.

**Results:** This is an 82-year patient who is followed for severe osteoporosis. She is diagnosed with osteoporosis since 2007, initially treated with alendronate (2007-2012, starting from a lumbar T-score of -2.9SD), then in drug holiday (2013-2014). In 2014 treatment with alendronate (2014-2016) was reinitiated, but the patient was unresponsive in terms of incidental vertebral fractures and decreased BMD-DXA, so treatment with teriparatide was initiated until 2018 (2-y protocol). From 2018 to 2020 the patient was treated with IV ibandronate, and after that, she was on a drug holiday (2020-2021) (she did not present for another bone evaluation amid pandemic). In 2021 she received indications to continue treatment with ibandronate. The personal medical history also includes arterial hypertension, multinodular goiter with euthyroidism, cholecystectomy, and irritable gut syndrome.

DXA showed at the begging of first drug holiday (after 6 y of alendronate): lumbar L1-4: BMD(g/cm<sup>2</sup>)=0.951, T-score(SD)=-2.1, Z-score(SD)=-0.5; femoral neck BMD(g/cm<sup>2</sup>)=0.688, T-score(SD)=-2.4, Z-score(SD)=-0.9; total hip BMD(g/cm<sup>2</sup>)=0.813, T-score(SD)=-1.6, Z-score(SD)=-0.2. After 2 y of drug holiday, BMD decreased to: lumbar L1-2 BMD(g/cm<sup>2</sup>)=0.748, T-score(SD)=-3.5, Z-score(SD)=-1.9; femoral neck BMD(g/cm<sup>2</sup>)=0.764, T-score(SD)=-2, Z-score(SD)=-0.2; total hip BMD(g/cm<sup>2</sup>)=0.775, T-score(SD)=-1.8, Z-score(SD)=-0.3. After 2 more years of alendronate, when therapy was switched to TPT: DXA lumbar L1-2 BMD(g/cm<sup>2</sup>)=0.750, T-score(SD)=-3.5, Z-score(SD)=-1.9; femoral neck BMD(g/cm<sup>2</sup>)=0.735, T-score(SD)=-2.2, Z-score(SD)=-0.3; total hip BMD(g/cm<sup>2</sup>)=0.789, T-score(SD)=-1.7, Z-score(SD)=-0.1. By the end of 2-y TPT protocol: DXA lumbar L1-2 BMD(g/cm<sup>2</sup>)=0.942, T-score(SD)=-1.9, Z-score(SD)=0; femoral neck BMD(g/cm<sup>2</sup>)=0.829, T-score(SD)=-1.5, Z-score(SD)=0.6; total hip BMD(g/cm<sup>2</sup>)=0.867, T-score(SD)=-1.1, Z-score(SD)=0.8. Prepandemic data (after 3 y of ibandronate): DXA lumbar L1-2 BMD(g/cm<sup>2</sup>)=0.917, T-score(SD)=-2.1, Z-score(SD)=0.2; femoral neck BMD(g/cm<sup>2</sup>)=0.814, T-score(SD)=-1.6, Z-score(SD)=0.5; total hip BMD(g/cm<sup>2</sup>)=0.878, T-score(SD)=-1, Z-score(SD)=0.9.

After self-decided second drug holiday amid pandemic: VD was relatively low with suppressed osteocalcin and normal other BTM: 25OHD 24.2 ng/mL (N:30-100), osteocalcin=18.37 ng/mL (N:15-46), alkaline phosphatase=67 U/L (N:38-105), CrossLaps=0.37 ng/mL (N: 0.33-0.782), P1NP=28.21 ng/mL (N: 20.25-76.31), PTH=49.05 pg/mL (N: 15-65). DXA showed she did not loss any BMD: DXA lumbar L1-2 BMD(g/cm<sup>2</sup>)=0.932, T-score(SD)=-1.9, Z-score(SD)=0; femoral neck BMD(g/cm<sup>2</sup>)=0.761, T-score (SD)=-2, Z-score (SD)=0.3; total hip=BMD (g/cm<sup>2</sup>)=0.802, T-score (SD)=-1.6, Z-score (SD)=0.5. A reintroduction of ibandronate was decided

**Conclusion:** Long standing history of medication against osteoporosis showed in this case 2 drug holidays, the latest amid pandemic (not recommended by current physician); however, we registered good results but life long follow-up is mandatory.

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### P843

#### METABOLIC FRAGILITY HIP FRACTURE AND ITS HISTOMORPHOMETRIC AND BIOCHEMICAL CORRELATION

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**Objective:** There is a high prevalence of hypovitaminosis D is being reported in Indian patients with fragility hip fractures. Bone histomorphometry is the gold standard to diagnose osteoporosis and osteomalacia. The study aim was to evaluate fragility hip fracture patients for histopathological osteomalacia and osteoporosis by histomorphometry and to correlate histopathological findings with biochemical hypovitaminosis D.

**Methods:** A total of 110 patients with fragility hip fractures were recruited for a prospective cross-sectional study. During definitive fracture fixation of these fragility hip fractures, a bone biopsy was taken from the neck region of the femur by a novel approach for histomorphometry. Histomorphometric analysis was based on three indices, namely osteoid seam width, osteoblast surface, and osteoid surface. Blood bone biochemistry was analyzed and correlated with bone histomorphometry.

**Results:** In fragility hip fracture patients, the prevalence of histomorphometric osteoporosis and osteomalacia were very low (only 9.4% had osteoporosis and none had osteomalacia) however in blood bone biochemistry, we found a high prevalence

(85.5%) of hypovitaminosis D. We also noted significant changes when correlated bone histomorphometry with different blood bone biochemistry.

**Conclusion:** There is a high prevalence of Fragility hip fracture in India due to biochemical hypovitaminosis D and low prevalence of histomorphometric osteoporosis with no evidence of histomorphometric osteomalacia. Correct knowledge about the metabolic status of fragility hip fracture is required to improve outcome, decrease complications, and optimize the cost of the treatment.

### P844

#### TERIPARATIDE REDUCES INCIDENCE OF NEW VERTEBRAL FRACTURES AND BACK PAIN ON POSTMENOPAUSAL WOMEN FOLLOWING VERTEBROPLASTY: A CASE SERIES

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**Objective:** To underline the effect of teriparatide (TPTD) treatment on postmenopausal women, following vertebroplasty for osteoporotic vertebral fractures.

**Methods:** We report 6 cases of postmenopausal women with severe osteoporosis under a 24-month teriparatide treatment, vitamin D and calcium supplements. All patients underwent surgery for symptomatic osteoporotic vertebral fractures prior to teriparatide therapy. BMD of the hip and spine and back pain (VAS) were assessed in order to determine the effectiveness of teriparatide, compared to the baseline investigations. (1) Calcium metabolism and bone turnover parameters were measured before, during and after treatment. (2)

**Results:** Decreasing the incidence of new osteoporotic fractures and improvement of bone quality were the main targets of the treatment after undergoing surgery for the preexistent fractures in all 6 cases. Preoperative, all patients accused lower back pain and had a low BMD. (3) At the end of the treatment, an increase in the BMD value of the hip was observed, compared to the baseline investigation. Furthermore, alleviation of pain was obtained and persisted throughout the duration of therapy. Serum osteocalcin increased and bone resorption markers either decreased or remained at the same levels. To ensure any asymptomatic fractures are identified, radiologic follow-up has been performed, but none have been found.

**Conclusion:** This paper supports the argument that teriparatide is an attractive postoperative treatment option for patients with osteoporotic vertebral fracture history, having significant clinical outcomes, protective potential against new osteoporotic fractures, increasing BMD and bringing considerable pain relief.



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**P845**

**EXTRACT AND FRACTION OF MUSA PARADISIACA FLOWER HAVE OSTEOGENIC EFFECT AND PREVENT OVARECTOMY INDUCED OSTEOPENIA**

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**Objective:** Osteoporosis is an asymptomatic bone disorder leading to altered bone microarchitecture, mineralization and strength. *Musa paradisiaca* has been reported to have antioxidant and anti-inflammatory effects in various diseases. Its impact on postmenopausal osteoporosis has not been investigated yet. The intention of the current study was to evaluate the bone regeneration and osteoprotective potential of extract and fraction of *M. paradisiaca* flower in ovariectomized (Ovx) Sprague Dawley (SD) rats, a model of postmenopausal bone loss. The study also aims to identify osteogenic compounds from active fraction.

**Methods:** Ethanolic extract (MFE) and butanolic fraction (MFE-Bu) from flower of *M. paradisiaca* were prepared and their efficacy was tested in rat femur osteotomy model at different doses. Effective dose from both extract (250 mg/kg) and fraction (50 mg/kg) were taken for study in osteopenic bone loss model. PTH was taken as reference standard (20 µg/kg/twice a week). Bones were harvested at autopsy for dynamic and static histomorphometry. Serum was collected for ELISA. Pure compounds were isolated from butanolic fraction (MFE-Bu), and were assessed for their osteogenic effect.

**Results:** MFE and MFE-Bu were observed for their potential in bone healing and prevention of bone loss. Both MFE and MFE-Bu promoted new bone regeneration at injury site as assessed by microCT and calcein dye labeling studies. These also led to restoration of bone microarchitecture deteriorated as a result of osteopenia and improved bone biomechanical properties. Extract as well as the fraction exhibited dual bone anabolic and antiresorptive properties where they elevated serum P1NP, a bone formation marker and suppressed serum CTX-1, a bone resorption marker. As many as four osteogenic compounds were isolated from MFE-Bu. Oleracein-E was found to be the most potent osteogenic agent based on osteoblast differentiation, mineralization assays, qPCR and protein expression studies.

**Conclusion:** Our studies demonstrates that ethanolic extract from the flower of *M. paradisiaca* and its butanolic fraction exhibit dual osteogenic and anti-resorptive potential, and have an advantage over PTH which though promotes bone formation but is also bone catabolic in nature.

**P846**

**NONMETASTASTIC, UNOPERATED BREAST CANCER THERAPY WITH AROMATASE INHIBITOR AND BONE STATUS ON A MENOPAUSAL WOMAN**

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**Objective:** Women on adjuvant aromatase inhibitor therapy have an accelerated bone loss, and they are at increased risk of fracture. There should be a periodical assessment of bone turnover markers and BMD on every patient receiving treatment with aromatase inhibitors. (1-5) We aim to introduce a female patient with breast neoplasm who refused surgery and she was treated only with aromatase inhibitors for 5 years with secondary osteoporosis.

**Methods:** This is a case report.

**Results:** This is an 82-year patient with breast cancer in treatment with aromatase inhibitors since 2016. Her personal medical history includes post - radioiodine (15 mCi) hypothyroidism for toxic multinodular goiter in substitutive treatment with levothyroxine, osteoporosis treated with alendronate for 10 y followed by selfdecided drug holiday for 2 y (2016-2017), then treatment with risedronate (2017-present). The endocrine in 2016 panel showed normal vitamin D, PTH and bone turnover makers (BTM): 25OHD=33 ng/mL (N:30-100), osteocalcin=34.57 ng/mL (N:15-46), CrossLaps=0.51 ng/mL (n: 0.33-0.782), P1NP=54.53 ng/M (N: 20.25-76.31), PTH=53.44 pg/mL (N: 15-65). DXA showed osteopenia range based on T-score with degraded microarchitecture: lumbar L1-4: BMD(g/cm<sup>2</sup>)=1.042, T-score(SD)=-1.3, Z-score(SD)=0.7, TBS=1.168; femoral neck BMD(g/cm<sup>2</sup>)=0.771, T-score (SD)=-1.9, Z-score (SD)=0.2; total hip BMD (g/cm<sup>2</sup>)=0.835, T-score (SD)=-1.4, Z-score (SD)=0.6. By the end of 5-y protocol with anastrozole and 4-y therapy with risedronate after drug holiday, 25OHD was high 45 ng/mL (N:30-100) -under daily 1000 UI cholecalciferol and normal BTM and PTH: osteocalcin=23 ng/mL (N:15-46), CrossLaps=0.33 ng/mL (N: 0.33-0.782), P1NP=31 ng/mL (N: 20.25-76.31), PTH=45 pg/mL (N: 15-65) with stationary BMD-DXA and no incidental fracture: lumbar L1-4: BMD(g/cm<sup>2</sup>)=1.056, T-score(SD)=-1.2, Z-score(SD)=0.7; femoral neck BMD(g/cm<sup>2</sup>)=0.752, T-score (SD)=-2.1, Z-score (SD)=0; total hip BMD (g/cm<sup>2</sup>)=0.831, T-score (SD)=-1.4, Z-score (SD)=0.5.

**Conclusion:** In this elderly woman case, pre-treatment with alendronate before anastrozole probably helped BMD conservation over the years despite 2-y drug holiday. Interestingly, the patient decided not to have surgery for breast cancer due to advanced age, despite recommendations.

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## P847

### CALCITRIOL SUPPRESSES OSTEOBLAST FERROPTOSIS INDUCED BY D-GALACTOSE VIA ACTIVATION OF NRF2 SIGNALING PATHWAY IN SENILE OSTEOPOROSIS

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**Objective:** An aging-induced decrease in bone formation is mainly attributed to the elevated levels of free radicals resulting from the inactivation of nuclear factor erythroid 2-related factor 2 (Nrf2) signaling [1-3]. Ferroptosis is characterized by the overgeneration of reactive oxidative stress in response to the downregulation of glutathione peroxidase 4 (GPX4). Nrf2 is an established transcription factor of GPX4. Calcitriol could correct the osteoporotic phenotype during aging through activation of many intracellular events. However, it remains unknown whether calcitriol can improve SOP via inhibiting osteoblast ferroptosis.

**Methods:** The SOP model was established in mice by injection with D-galactose (D-gal). The mice were treated with calcitriol at different dosages. The bone phenotype was examined by micro-computed tomography scanning. Transmission electron microscopy was used to observe morphological changes of osteoblasts. Immunohistochemistry and western blotting analysis were carried out to investigate the anti-ferroptosis effect of calcitriol. Lipid peroxidation was measured using malondialdehyde kits and flow cytometry.

**Results:** The D-gal-induced increased in cell senescence, lipid peroxide production and mitochondrial ultrastructural changes were reversed by calcitriol treatment. In addition to these observations, Nrf2/GPX4 was suppressed during D-gal-induced ferroptosis. The expressions of these proteins were significantly upregulated by calcitriol treatment. Knockdown of Nrf2 or cotreatment with fer-

roptosis inducer abolished all the protective changes of calcitriol, suggesting that activation of Nrf2 pathway was an essential prerequisite for the ferroptosis inhibition by calcitriol.

**Conclusion:** D-gal induced ferroptosis in osteoblasts in senile osteoporosis. More importantly, calcitriol significantly attenuated ferroptosis through activating Nrf2 pathway.

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## P848

### RELATIONSHIP OF SYSTEMIC INFLAMMATION AND OSTEOPOROSIS IN IMMUNE-MEDIATED AND METABOLIC COMORBIDITY

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**Objective:** The development of systemic osteoporosis (OP) is typical for metabolic disorders and autoimmune rheumatic processes, predominantly rheumatoid arthritis (RA). Relationship between the OP development and RA activity has been discussed recently. The aim of this work was to analyze the frequency and severity of systemic OP in RA individuals depending on the presence of diabetes mellitus (DM), obesity (O), and metabolic syndrome (MS) with an assessment of the relationship between systemic inflammation markers (pro-inflammatory cytokines) and bone density parameters.

**Methods:** The study included 96 patients with RA: 74 women and 22 men aged 28-69 y, the average age was 52.18±2.36 y, average duration of RA was 9.22±4.91 y. 64 patients with RA had metabolic comorbidity: type 2 DM, O or/and MS. Along with the conventional examination pro-inflammatory cytokines and osteodensitometry were investigated. Differences in the frequency and severity of bone density loss in subgroups of patients with and without comorbidity were assessed by the  $\chi^2$  test, the relationship between inflammation markers and BMD was assessed using linear correlation method (r).

**Results:** The demographic parameters in subgroups of patients with and without metabolic comorbidity were similar. BMI was insignificantly higher in RA+O/MS subgroup than in RA without such comorbidity (p>0.05), but the differences in waist circumference

were significant ( $p < 0.05$ ). The cumulative dose of glucocorticoids (GC) in terms of prednisolone was higher in the group with comorbidity ( $7926 \pm 321$  mg and  $3184 \pm 146$  mg, respectively,  $p < 0.01$ ). A decrease in BMD was detected in 61 patients with comorbidity (95.3%) and in 23 without it (65.6%). Although in comorbidity subgroup OP was recorded significantly oftener ( $p < 0.05$  according to the  $\chi^2$  criterion), the difference in the prevalence of osteopenia in the investigated subgroups was not significant ( $p > 0.05$  according to the  $\chi^2$  criterion). When analyzing the relationship between markers of RA activity and indicators of the vertebral bone density moderate negative correlation in terms of IL-1 and IL-6 levels ( $r = 0.43$ ,  $r = 0.38$ ,  $p < 0.05$ ) and mild in terms of the level of TNF $\alpha$  ( $r = 0.29$ ,  $p < 0.05$ ) were revealed.

**Conclusion:** Metabolic comorbidity in RA is associated with a higher cumulative dose of GC. In patients with RA and concomitant DM2, O and/or MS, OP is more often detected according to osteodensitometry data compared to patients without these associated conditions. The decrease in BMD in patients with RA depended on an increase in the level of key pro-inflammatory cytokines.

## P849

### A COMPARISON OF OSTEOPOROSIS INTERVENTION THRESHOLDS IN IRELAND: PRELIMINARY RESULTS OF THE DXA-HIP STUDY

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**Objective:** Ireland has one of the highest illness burdens related to osteoporotic fractures in Europe, and may experience the greatest increase by 2034. Patients who suffer a major osteoporotic fracture need osteoporosis treatment. Early diagnosis and effective treatment, as well as managing those deemed high risk, can reduce this burden. Guidelines differ in how to assess people and recommendations for when and how to intervene. Many use a combination of specific intervention thresholds such as the presence of a fragility fractures, a BMD level, fracture risk assessments, and sometimes corticosteroid use. The most appropriate algorithm and threshold for our population has not been established. We aimed to compare the appropriateness and agreement between different osteoporosis intervention thresholds for Irish adults using the DXA-HIP Cohort.

**Methods:** A DXA registry of >38,000 Irish adults has previously been established: The DXA-HIP Cohort. A subgroup includes >2000 men and women whose data, DXA and VFA scans, and FRAX<sup>®</sup> calculations have been validated and completed. In this study we compared the agreement between 4 different intervention thresholds for men and women aged between 40-90 y: the presence of a major osteoporotic fracture (MOF); a DXA T-score < -2.5; chronic glucocorticoid therapy; and FRAX intervention threshold of either 20% for MOF or 3% for HF.

**Results:** We included men and women, with a mean age of 68.9 ys. Men were taller and heavier than women, and had lower FRAX scores for MOF and HF. 777 (38%) had at least 1 major osteoporotic fracture, including vertebral 145 (19%), hip 80 (10%), forearm and wrist 266 (34%), Humerus 58 (7%), and other 228 (29%), while 314 (15%) had 2 or more major osteoporotic fractures. When we used prevalent 'major osteoporotic fracture' as the 'gold standard' requiring osteoporosis intervention, the proportion of men and women respectively who qualified based on the other thresholds was 33 (18%) and 297 (33%) for a T-score < -2.5, 40 (21%) and 102 (11%) taking glucocorticoid therapy, 10 (5%) and 313 (34%) with a FRAX MOF > 20% and 85 (45%) and 496 (54%) with a FRAX HF > 3%.

Table 1. The Number of Men and Women Meeting Each Intervention Thresholds

Intervention Threshold	Men	Women	All
Number	376	1651	2027
<b>Threshold 1</b>			
T-score < -2.5 (%)	51 (13.6)	475 (28.8)	526 (25.9)
<b>Threshold 2</b>			
Previous Major Osteoporotic Fracture (%)	187 (49.7)	912 (55.2)	1099 (54.2)
<b>Threshold 3</b>			
Glucocorticoid Therapy (%)	148 (39.4)	242 (14.7)	390 (19.2)
<b>Threshold 4</b>			
FRAX MOF 20% (%)	11 (2.9)	380 (23.0)	391 (19.3)
FRAX HF 3% (%)	143 (38.0)	715 (43.3)	858 (42.3)

**Conclusion:** Considerable variation exists between the number of, and the specific, individuals qualifying for osteoporosis therapy using different intervention thresholds. This requires further exploration and validation in the context of our population to ensure the most accurate and effective use of such intervention.

## P850

### FEATURES OF BONE FRACTURE FORMATION IN CHILDREN WITH CONSEQUENCES OF SPINAL DYSRAPHISM OPEN FORMS

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**Objective:** To establish features of lower extremities bones fractures formation at children with consequences of spinal dysraphism depending on neurosegmental lesion level of a spinal cord.

**Methods:** The study is based on a 107 patients' survey results analysis. All patients were divided into functional clinical groups according to the level of neurosegmental lesions of the spinal cord according to the classification of Sharrard's (1964) in the modification of Bartonek et al. (1999). Femoral fractures were diagnosed in 31 patients, namely: I clinical group - 0 patients, II - in 3 of 20 patients, III - in 11 of 46 patients, IV - in 8 of 12 patients, V - in 2 of 2 patients. All children were examined radiologically and 11 patients underwent X-ray densitometric examination to determine the Z-criterion.

**Results:** According to the results of clinical and radiological examination it was established that: there were fractures of only the femurs; by localization - the overgrowth of the femur predominates; prolonged asymptomatic period due to reduced or absent sensitivity in the lower extremities; and formation of excessive callus in the fracture area. There was a significant increase in the incidence of the lower extremities fractures in patients with the consequences of open spinal dysraphism with increasing depth of the lower extremities paresis, determined by the level of neurosegmental spinal cord injury ( $\chi^2=18.9$ ;  $p<0.05$ ). Using pairwise Pearson correlation coefficients, a strong direct linear relationship was found between the presence of fractures and the decrease in the Z-criterion index on X-ray densitometric examination ( $r=0.97$ ;  $p<0.05$ ).

**Conclusion:** Fractures of the lower extremities bones in patients with consequences of spinal dysraphism are the difficult complication arising against secondary osteoporosis which arises owing to a paresis of muscles of the lower extremities and limited loading. The frequency of bone fractures directly depends on the depth of paresis of the lower extremities, which is determined by the level of neurosegmental lesions of the spinal cord.

## P851

### THE RESULTS OF PHARMACEUTICAL THERAPY AND SURGICAL CORRECTION OF BONE DEFORMITY IN CHILDREN WITH JAFFE-CAMPANACCI DISEASE

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**Objective:** To evaluate the results of combined treatment in patients with Jaffe-Campanacci disease.

**Methods:** Orthopaedic treatment was conducted in 9 patients with Campanacci disease. Patients included 6 males and 3 females age 5-14 years with 8 tibia lesions and 1 ulna lesion. Eight patients received medical therapy, divided into two groups. Group I (4 patients) consisted of patients with minor pain without bony deformity. They were prescribed basic therapy with calcium and vitamin D. Group II (4 patients) with severe pain and deformity of

the tibia received basic therapy (calcium and vitamin D) in combination pamidronic acid ( $\beta$ -CTx from 1.5 ng/ml and above, bone density Z-score from -1.5 SD and lower). Bisphosphonates were used at a dose of 0.5 mg/kg/d in 1-3 infusions at 3-4 month intervals. All 9 patients underwent surgical treatment (14 operations). Surgery was performed in four patients with risk of pathological fracture (3 plate fixation, 1 locking telescopic nail). In 5 patients (4 tibia, 1 ulna) with bony deformity, a corrective osteotomy was performed with plate fixation. Four had recurrent deformity and underwent repeat surgery (2 patients with plate fixation and 2 patients with intramedullary telescopic nail). Results of surgical treatment were assessed by the timing of bony healing and the absence of deformity and pathological fractures. Pain severity was assessed by the VAS scale. The effectiveness of therapy was evaluated by changes of  $\beta$ -CTx and bone density Z-score.

**Results:** Clinically all patients had reduced pain intensity. In group I, the average pain intensity by VAS scale was 1.5 points before treatment and 0 points after treatment; in group II was 2.3 points before treatment and 1.25 points after treatment. In group I patients,  $\beta$ -CTx was unchanged. In group II patients, initial  $\beta$ -CTx was elevated at  $2.4\pm 0.80$  ng/ml; median (25-75%)=2.3 (1.75-3.0). After therapy,  $\beta$ -CTx declined to  $1.92\pm 0.48$  ng/ml; median (25-75%)=1.94 (1.60-2.24 ng/ml),  $p=0.144$ . Changes in the Z-test before treatment were noted in 2 patients. Improvement after therapy was marked in 1 patient (from -3.5 to -1.8 SD). In all cases of surgical treatment a good result was achieved. The use of intramedullary telescopic nail prevented recurrence of bone deformity and reduce the number of surgical interventions.

**Conclusion:** The results of drug therapy in combination with surgical techniques showed their effectiveness in children with Jaffe-Campanacci disease. The use of intramedullary telescopic nail has an advantage over plates in allowing correction and preventing bone deformation and pathological fractures.

## P852

### 25OHD IN NOT SUPPLEMENTED WOMEN: RELATION WITH AGE, BMI AND SEASONS

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**Objective:** To determine total 25OHD levels in not supplemented women (2020-2021) and analyze the relationship between 25OHD with age, BMI and season.

**Methods:** Total 25OHD was dosed in 421 women. Statistical analysis with Pearson correlation coefficient; two-way ANOVA with post hoc Tukey test.

**Results:** Age:  $52.8\pm 15.3$  y. BMI:  $26.33 + 8.52$ . 25OHD:  $21.23 + 8.5$  ng/mL

Age: <50:  $20.45 + 8$ ; 50-65:  $21.88 + 8$ ; >65:  $21.57 + 9$  (n.s.)



BMI: <20: 21.57 +8; 20-25: 22.38 +8; 25-30: 22.29 +9; >30:17.14 +7 (p)

Season: winter: 18.43 + 7; spring: 20.02 +8; summer: 27.48 +10; fall: 23.82 +8

1) 25OHD was not associated with age: Pearson r coefficient=0.05; p=0,1914.

2) A negative correlation was found between BMI and 25OHD (Pearson r coefficient=-0.20; p<0.0001).

3) Women with obesity had lower 25OHD than those normal and overweight (Student t-test (df=137)=5.525; p<0.0001)

4) 25OHD values were lower in winter and spring than fall and summer, and were lower in fall than summer (Tukey post ANOVA;  $F_{3;4,14}=21.01$ ; p<0.0001).

5) A negative correlation was found between BMI and 25OHD in winter (Pearson r coefficient=-0.16; p=0.0416) and in spring (=0.32; p:0.0005)

6) Obese women have lower 25OHD than no obese in winter, spring and summer.

7)

25OHD	Total	Obese women	No obese women
<20 ng/mL	46.7%	68.3%	41.5%
20-30 ng/mL	40.2%	26.5%	43.0%
>30 ng/mL	13.1%	5.1%	15.4%

**Conclusion:** Age is not a factor for 25OHD levels (maybe because older people have a lower level only when exposed to sun in summer). BMI has negative correlation with 25OHD and obese women have lower levels. 25OHD in seasons: winter and spring<fall<summer. In winter and spring BMI has negative correlation with 25OHD. 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 nonobese people.

## P853

### PERSISTENT MILD HYPERCALCEMIA AND NORMAL PTH IN A CASE OF NONMETASTATIC BREAST CANCER

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**Objective:** There is a correlation between hypercalcemia and malignancy. This further suggests that a high blood calcium value in a cancer patient could be a marker of relapse or metastases. A normal PTH value indicates an extra-parathyroid origin of hypercalcemia, so a secondary neoplastic cause could be involved. (1-5) We aim to introduce a female patient with persistent hypercalcemia with a history of breast malignancy.

**Methods:** This is a case report.

**Results:** This is a 72-year patient with surgically treated mammary cancer, and then treated with Tamoxifen and subsequently with an aromatase inhibitor. She is admitted for persistent hypercalcemia. While she was under anastrozole, she was detected (in 2016) with a mild hypercalcemia total serum calcium=10.9 mg/dL (N:8.5-10.2) with normal PTH values, negative whole body bone scintigram. Pre-anastrozole she was known with osteopenia thus at the start of aromatase inhibitor therapy denosumab was added (X2/y). After 1 y of both anastrozol and denosumab: total serum calcium=10.8 mg/dL (N:8.4-10.2), 24-h urinary calcium=0.38g/24h (N:0.07-0.3g/24h) with normal 25OHD=28 ng/mL (N:30-100) and suppressed bone turnover markers: osteocalcin=12 ng/mL (N:15-46), CrossLaps=0.06 ng/mL (N: 0.33-0.782). DXA showed stationary BMD: lumbar L1-4 BMD(g/cm<sup>2</sup>)=1.136, T-score(SD)=-0.3, Z-score(SD)=1.1; femoral neck BMD(g/cm<sup>2</sup>)=0.814, T-score (SD)=-1.6, Z-score (SD)=-0.2; total hip BMD (g/cm<sup>2</sup>)=0.916, T-score (SD)=-0.7, Z-score (SD)=0.5. By the end of anastrozole therapy, total calcium was stationary. Accidentally, the patient stopped denosumab by the same time (pandemic has started and she did not come for medical care for a year). The evaluation after 1 y of drug holiday after denosumab and after 5-y protocol of anastrozol she still have remission and nonmetastatic status of breast carcinoma with further mild hypercalcemia (normal PTHrP, intact kidney function, no calcium supplements: total serum calcium=10.4mg/dL (N:8.4-10.3), 25OHD=37 ng/mL (N:30-100) and stationary BTM: osteocalcin=32 ng/mL (N:15-46), CrossLaps=0.75 ng/mL (N: 0.33-0.782), P1NP=58 ng/mL (N: 20.25-76.31), and normal PTH=60 pg/mL (N: 15-65). DXA did not reveal any bone loss, no incidental vertebral fracture was found at X-ray: lumbar L1-3 BMD(g/cm<sup>2</sup>)=1.142, T-score(SD)=-0.2, Z-score(SD)=1.2; femoral neck BMD(g/cm<sup>2</sup>)=0.800, T-score (SD)=-1.7, Z-score (SD)=-0.1; total hip BMD (g/cm<sup>2</sup>)=0.899, T-score (SD)=-0.9, Z-score (SD)=0.5 with low TBS of 1,190.

**Conclusion:** Particular aspects of the case are: persistent, mild hypercalcemia of unknown cause; stationary aspects in terms of BTM, DXA, incidental fractures after sudden stop of denosumab; the effect of pandemic in terms of compliance to periodical check-ups.

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P854

**OVERWEIGHT AND OBESITY INFLUENCE IN FRAGILITY FRACTURES**I. Genrinho<sup>1</sup>, S. P. Silva<sup>1</sup>, C. Mazedo<sup>1</sup>, P. Vilas Boas<sup>1</sup>, B. Figueiredo<sup>1</sup>, A. Barcelos<sup>1</sup><sup>1</sup>Rheumatology Dept., Centro Hospitalar do Baixo Vouga, Aveiro, Portugal

**Objective:** Despite lower BMI has been classically associated with fragility fractures, particularly with hip fractures, recently obesity has been considered a potential risk factor for non-hip and non-vertebral - fragility fractures (NHNV-FF). We aimed to determine BMI difference between patients with hip and vertebral fragility fracture (HV-FF) and NHNV-FF.

**Methods:** We retrospectively identified all fragility fractures admitted at our hospital between 2017-2020. Patients with a total dependence status before fracture and patients who died in orthopaedic ward after surgery were excluded. Lifestyle behaviours and demographic data were collected. 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, according to WHO definition. NHNV-FF included wrist, humerus, malleolar and other less common locations (pelvis, ribs, olecranon and tibia). Data was analysed using SPSS version 25.

**Results:** A total of 356 patients were included, 269 with HV-FF and 87 NHNV-FF. The mean age was 78.5 (SD 9.3) years old and the majority of patients were women (89%). Malleolar fractures were the most prevalent (34.5%), followed by humerus (21.8%) and wrist (10.3%). Other fragility fractures accounted for 33% of cases of NHNV-FF. The majority of patients were overweight (37.5% vs. 43.7%, HV-FF and NHNV-FF respectively). One third (35.6%) of NHNV-FF patients were obese, compared to a quarter (25.7%) of HV-FF. NHNV-FF group presented higher proportion of overweight and obese patients relatively to HV-FF group (p=0.04). Only 7 patients were underweight (2.6% vs. 1.1% HV-FF and NHNV-FF, respectively). This could be explained by exclusion of totally dependent patient that usually present sarcopenia and lower BMI. No statistically significant differences were found regarding gender, age, smoking and alcoholism.

**Conclusion:** More than 60% of patients with fragility fracture were overweight and obese, being the proportion of both BMI categories higher in NHNV-FF group.

P855

**THE ROLE OF INTELEYKIN-6 IN THE RELATIONSHIP BETWEEN OSTEOPOROSIS AND CARDIOVASCULAR PATHOLOGY**S. Y. U. Tsarenok<sup>1</sup>, V. V. Gorbunov<sup>1</sup>, T. A. Aksenova<sup>1</sup><sup>1</sup>Chita State Medical Academy, Chita, Russia

**Objective:** In recent years, the relationship between a decrease in BMD and the pathology of the cardiovascular system has been discussed. Molecules of intercellular interaction - cytokines claim to be the link. We aimed to establish the role of IL-6 in the relationship between cardiovascular pathology and osteoporosis in postmenopausal women.

**Methods:** The study involved 98 women over the age of 50 with a verified diagnosis of coronary heart disease (CHD), all participants were divided into 2 groups depending on the presence of osteoporosis. The first group consisted of 48 women with a combination of CHD and osteoporosis, the average age was 68.7±8.8, the second group included 50 patients with CHD, the average age was 69.4±8.1 (p=0.8). Patients underwent a clinical examination, assessment of the risk of fractures by FRAX, X-ray densitometry of the hip and lumbar vertebrae, applanation tonometry with measurement of pulse wave velocity in the carotid-femoral segment (PWV). The clinical characteristics of the patients are presented in the Table. Statistical analysis was carried out using the program Statistics 10.0, nonparametric methods were used: the Wald-Wolfowitz test, Spearman's correlation, regression analysis.

**Table.** Clinical characteristics of patients

Data	Women with CHD and osteoporosis, n=48	Women with CHD, n=50
Age, y	68.7±8.8	69.4±8.1 p=0.8
Height, cm	156.4±6.1	159.1±5.3 p=0.01
Weight, kg	73.1±11.8	72.7±12.6 p=0.008
BMI, kg/m <sup>2</sup>	29.5±4.6	27.9±3.5 p=0.48
Major osteoporotic, %	16.9±6.2	9.8±3.5 p=0.0001
Hip fracture, %	4.2±5.7	2.1±1.5 p=0.0001
CHD duration, y	12.5±10.0	13.2±10.6 p=0.18
Total cholesterol, mmol/l	4.76±1.31	4.95±1.08 p=0.001
Low density lipoproteins, mmol/l	2.79±1.07	2.87±1.04 p=0.1
BMD, L <sub>1</sub> -L <sub>5</sub> , g/cm <sup>2</sup>	0.955±0.233	0.996±0.212 p=0.00003
BMD Neck, g/cm <sup>2</sup>	0.712±0.215	0.756±0.163 p=0.0001
T-score, L <sub>1</sub> -L <sub>5</sub> , SD	-0.93±1.88	-0.38±1.21 p=0.008
T-score neck, SD	-0.8±1.8	-0.3±1.6 p=0.000017

**Results:** It was found that in women with a combination of CHD and osteoporosis, the level of IL-6 in the blood serum was higher (11.4±11.9 vs. 7.0±9.4 pg/ml, p=0.002). When assessing the pulse wave velocity in the carotid-femoral segment, it was found to increase in the group of patients with comorbid pathology compared to women with CHD (9.7±2.3 vs. 9.0±2.1 m/s, p=0.00004). As expected, BMD in the femoral neck and lumbar vertebrae was lower in the first group (Table). To clarify the role of interleukin-6 in reducing BMD and increasing arterial wall stiffness (in terms of PWV), a correlation analysis was performed between the IL-6 concentration, a history of osteoporotic fractures, BMD, the absolute risk of fractures according to FRAX, and the PWV. Correlation relationships were established between the level of IL-6 and BMD of the femoral neck (r=-0.4, p=0.03), the presence of a history of osteoporotic fractures (r=-0.31 p=0.029), the velocity of the pulse wave (r=0.34 p=0.002). Further, to establish independent predictors of osteoporotic fractures, low BMD and high rigidity, a multivariate regression analysis was performed, which established the role of IL-6 as an independent predictor of osteoporotic fractures (β=0.28, p=0.026), low BMD of the femoral neck (β=0.93, p=0.025) and increased pulse wave velocity in the carotid-femoral segment (β=0.34, p=0.04).

**Conclusion:** In patients with comorbid pathology, an increase in the level of interleukin-6 in the blood serum was revealed, while it was found that an increase of IL-6 is an independent predictor of an increase in pulse wave velocity, low BMD of the femoral neck, and the development of osteoporotic fractures.

## P856

**SECONDARY PREVENTION AFTER HIP FRACTURE: WHERE DO WE STAND?**

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**Objective:** Hip fracture is an important risk factor for subsequent osteoporotic fractures. There is a well-known global shortage of implemented effective secondary prevention services. Data regarding secondary prevention after hip fracture in Romania is lacking. To date there are no implemented delivery services available in our country for hip fracture patients. We aim to assess what happens with hip fracture patients after the acute orthopedic treatment.

**Methods:** We retrospectively assessed all hip fractures admitted during 12 months in all the hospitals with an Orthopedic 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). Diagnoses, treatment and recommendations at discharge were recorded from the patient's charts. For comparison we assessed the number of patients with hip fracture who refer to an endocrinology tertiary center in the same area.

**Results:** We included a total of 2742 of patients with a fragility hip fracture. The diagnosis of osteoporosis was present in 17.04% of patients with an endocrine pathology (other than osteoporosis) and in 9.04% of patients without, p<0.001. History of prevalent fractures was found in 12.5% and 9.57% in patients with an associated endocrine pathology and without one, respectively, p<0.001. 3.95% of patients received calcium and vitamin D at discharge and only 0.35% received Denosumab and less than 0.5% were referred to an endocrinologist or rheumatology specialist. None of the patients had an osteodensitometric assessment with DXA scan effectuated during admittance. Although we have primary prevention services with a high number of osteoporotic patients treated in our tertiary center, a negligible number (<0.5%, p<0.001) had a history of hip fracture.

**Conclusion:** Data presented in this study emphasized an important gap between orthopedic specialists and osteoporosis specialists as part of an interdisciplinary approach in hip fracture management in our country. Future implementations of services like "Capture the Fracture" can definitely improve care for these patients by creating a linkage between specialists with important benefits regarding mortality and refracture risk after hip fracture.

P857

### TARGET POPULATION TREATED WITH DENOSUMAB IN A RHEUMATOLOGY DEPARTMENT

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**Objective:** To describe the population treated with denosumab in a rheumatology department. The secondary objective was to compare the features of primary (PO) and secondary osteoporosis (SO) subpopulations eligible for biological treatment.

**Methods:** This prospective study included 15 postmenopausal females with osteoporosis qualified for denosumab therapy according to the national protocol, in a rheumatology department in Romania, from June to December 2021. 11 patients had a history of vertebral fracture on bisphosphonates therapies, 2 had an intolerance to this medication and two had both entities. We divided them into two subgroups, depending on the type of diagnosis: 8(53.3%) had PO and 7(46.7%) had SO.

**Results:** The median age at diagnosis was 61(41-79) years old, slightly higher for PO patients (64 y vs. 57 y). The age of the last menstruation had a median of 46(40-52) years old. In the SO subgroup, the main cause was premature menopause, with one exception, a case of chronic malabsorption syndrome due to subtotal gastrectomy. 12 subjects had been treated with bisphosphonates before biologic treatment, with longer duration of treatment in the SO subgroup (mean 7.03 vs. 4.33 y). In PO there were 2 patients with rheumatoid arthritis (RA), and in SO one with systemic sclerosis and one with RA. All the patients with RA were using biological therapy and in each subgroup, one was under corticotherapy for >3 months. Most patients had a normal BMI, with a lower average score for PO (mean 21.37 vs. 24.05 kg/m<sup>2</sup>). The BMD was analyzed based on femoral neck T-score, with an average of -2.33 for the entire group and a higher value for SO subgroup (mean -2.65 vs. -1.96, p=0.203). Regarding the 10-y probability of a major osteoporotic fracture, the study population had an average of 25.5%, with an increased value for SO (27.75% vs. 22.97%, p=0.385). For hip fracture, the 10-y probability was 9.21%, without a statistically significant difference between the two subpopulations (10.86% SO vs. 7.33% PO, p=0.417).

**Conclusion:** Strong dynamic monitoring is required to validate the response to denosumab in osteoporosis treatment.

P858

### PATIENT FACTORS IN OPTIMISATION OF PRP

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**Objective:** Platelet-rich plasma (PRP) is a form of therapy prepared from autologous blood samples. It's applications so far as a form of therapy have been across many specialties including orthopaedics. It's use in regenerative medicine is based on the release of multiple growth factors from platelets harnessed in PRP in super natural concentrations to promote tissue repair. Evidence is scarce in the following domains: patient pre-optimisation; optimal platelet counts for therapeutic effect; whether measures of platelet counts, growth factors or platelet aggregation are clinically useful. The purpose of this review was to summarise the current knowledge on these factors and highlight areas where there remains a need for robust pilot and clinical trials.

**Methods:** Two literature searches were conducted on Wednesday 26th May 2021 on both Medline and Google Scholar using the keywords:

["PRP" OR "Platelet-rich Plasma" OR "Platelet Rich Plasma"] AND Diet

["PRP" OR "Platelet-rich Plasma" OR "Platelet Rich Plasma"] AND "Platelet Function" AND "Randomised Control Trial" OR "Trial" OR "Clinical Trial"

All relevant papers were reviewed in full and results where available are summarised.

**Results:** The majority of papers examining patient factors and their effect on platelet function look at diet. Changes in platelet aggregation significantly different from control were found in 5 studies. Dietary factors found to be significant were: dark chocolate; energy drinks; dietary nitrate; aged garlic extract; high saturated fat diet; flavanoid rich diet. Of these, only energy drink consumption was associated with an increase in platelet aggregation, this was statistically significant for the low dose ADP induction (P<0.003). Through this literature search ketorolac, propacetamol and magnesium have been shown to reduce platelet activation. Cyclosporin A has been shown in one study by Grace et. al. to increase platelet aggregation among healthy volunteers compared with baseline with ADP, adrenaline and collagen as aggregating agents. Overall the evidence surrounding exercise and platelet function appears to suggest an increase in platelet aggregation/activation in the short term following moderate to high intensity exercise, with a reduction in platelet aggregation with longer term moderate intensity exercise.

**Conclusion:** This review found some evidence regarding platelet aggregation/activation and patient factors, with the majority examining dietary effect on platelet function. Most of the evidence found foods which reduced platelet activity. From this there are some foods which should be advised to be reduced in diet prior



to PRP collection and therapy in order to give the greatest chance for maximum platelet activation. Only energy drink consumption was found to significantly increase platelet aggregation. Although the causative ingredient cannot be specified, further pilot studies may be necessary to examine this effect using individual constituents of energy drinks. The evidence surrounding exercise and platelet function is inconclusive. Although, it would suggest that in the short term exercise can increase platelet counts and platelet aggregation. Again we suggest that this effect be studied in further updated pilot studies where platelet count, aggregation and growth factors are measured. We suggest that ketorolac, propacetamol and magnesium be added to drugs which are advised against prior to PRP collection due to anti-platelet activity. Whether cyclosporin A can be used to increase platelet activity will have to be considered in clinical trials where safety outcomes are thoroughly assessed.

## P859

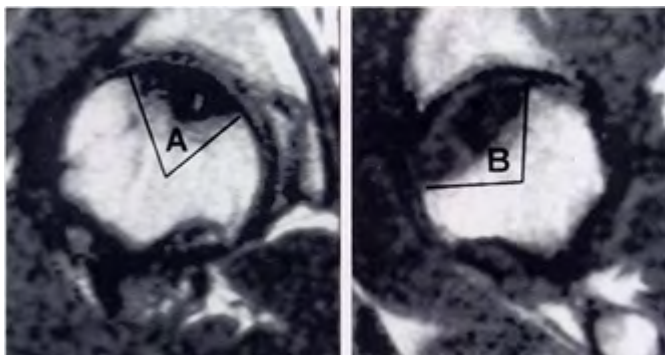
### MRI PREDICTORS OF PROGRESSION OF AVASCULAR NECROSIS OF THE FEMORAL HEAD

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**Objective:** To investigate whether MRI characteristics of a necrotic lesion can influence progression of ANFH.

**Methods:** We investigated 34 femoral heads of 17 patients with ANFH. ANFH cases were divided into THA (n=11) and conservative treatment (n=23) groups. The size of the necrotic lesion was evaluated by several methods: angle, according to Ha et al (2006) method, the largest size of necrotic lesion on the median scan, largest size of necrotic lesion on any scan. Then, we analyzed four-field tables and counted odds ratios to discover risk factors for progression of ANFH and, therefore, THA.



**Results:** Here we show that the odds of having a THA operation were higher in patients with larger necrotic lesion: angle, according to Ha et al (2006) method,  $>250^\circ$  (OR 9.0 (1.03-78.78),  $p=0.05$ ); the largest size of necrotic lesion on the median scan more than 15 mm (OR 10.67 (1.12-101.34),  $p=0.04$ ); the largest size of necrotic lesion on any scan more than 25 mm (OR 5.7 (1.15-28.33),  $p=0.05$ ). We consider these three parameters as risk factors risk factors for progression of ANFH.

**Conclusion:** The results of this study would be a tool for developing management strategies for AN patients. It would be reasonable to refer the patient to an orthopedic surgeon in case of the large size of the necrotic lesion. The possible treatment option in case of one or more aforementioned risk factors of progression of ANFH and the early stages (ARCO 1-2) would be decompression.

**Reference:** Ha YC et al. J Bone Joint Surg 2006;88-A(Suppl 3):35

## P860

### ASSOCIATION BETWEEN HANDGRIP STRENGTH AND BERG BALANCE SCALE AS FALL RISK INDICATORS IN THE ELDERLY: A PILOT STUDY OF THE ASHE PROGRAM

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**Objective:** To verify the association between handgrip strength and the Berg Balance Scale (BBS) as risk indicators for falls in elderly women involved in a regular exercise routine.

**Methods:** A total of 52 Brazilian women ( $72.0 \pm 5.6$  y) were included in this study. The sample was obtained from participants of a specific exercise program promoted by the Curitiba City Hall. Balance assessment was performed using the BBS, handgrip strength (HGS) was measured through a manual dynamometer. The sample was divided in study group (with history of falls,  $n=14$ ) and control group (without history of falls,  $n=38$ ).

**Results:** BBS showed that 35 participants did not achieve the maximum score on at least 1 of the 14 protocol tests and the worse results were observed on test 5 (transfer), 8 (lean forward with arms outstretched), 13 (stand with one foot in front of the other) and 14 (stand with on one foot only). Self-reported falls in the last 12 months represented 26.9% of the total sample, and of these, 57% resulted in fractures. We found a weak but significant correlation between HGS and history of falls was observed ( $\tau=0,243^*$ ). The correlation between the analyzed variables showed that HGS had an influence of 61.9% on falls.

**Conclusion:** In general, the BBS was important to assess balance, however its protocol total values did not seem to be reliable in terms of classification of specific balance. In our study, it became evident that, by looking at the tests separately, they not only rated the balance deficit more effectively, but also showed the conditions in which such deficit occurs. As for the HGS, a statistical relationship with history of falls was observed, with 61.9% of influence on it. Thus, we conclude that separately both tests obtained associated values with balance deficit, presenting lower scores in the group with a history of falls, but also that when associated these tests showed no statistical difference. Nevertheless, we are aware of the importance of using more than one tool for a more accurate qualitative analysis of motor balance.

## P861

### INFLAMMATORY MUSCULOSKELETAL ABNORMALITIES BY CONTRAST ENHANCED MRI IN SLE PATIENTS

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**Objective:** Joint involvement in SLE is the most frequent manifestation and shows a wide heterogeneity. Despite this, it has not a valid classification and it is often underestimated. Subclinical inflammatory musculoskeletal involvement is not well known.<sup>1</sup> We aim to describe the prevalence of joint and tendon involvement in hand and wrist of SLE patients, either with clinical arthritis, arthralgia or asymptomatic and compare it with healthy subjects using contrasted MRI.

**Methods:** SLE patients fulfilling SLICC criteria were recruited and classified as follows: group (G) 1: hand/wrist arthritis, G2: hand/wrist arthralgia, G3: no hand/wrist symptoms. Jaccoud arthropathy, CCPa and RF positivity, hand OA or surgery were excluded. Healthy subjects (HS) were recruited as controls: G4. Contrast MRI of non-dominant hand/wrist was performed. Images were evaluated following RAMRIS criteria extended to PIP, Tenosynovitis score for RA and peritendonitis from PsAMRIS. Groups were statistically compared.

**Results:** 107 subjects were recruited (G1: 31, G2:31, G3:21, G4:24). Any lesion: SLE patients 74.7%, HS 41.67%; p 0.002. Synovitis: G1: 64.52%, G2: 51.61%, G3: 45%, G4: 20.83%; p 0.013. Erosions: G1: 29.03%; G2: 54.84%, G3: 47.62%; G4: 25%; p 0.066. Bone marrow edema: G1: 29.03%, G2: 22.58%, G3: 19.05%, G4: 0.0%; p 0.046. Tenosynovitis: G1: 38.71%; G2: 25.81%, G3: 14.29%, G4: 0.0%; p 0.005. Peritendonitis: G1: 12.90%; G2: 3.23%, G3: 0.0%, G4: 0.0%; p 0.07.

**Conclusion:** SLE patients have a high prevalence of inflammatory musculoskeletal alterations by contrasted MRI, even if asymptomatic. Not only tenosynovitis but peritendonitis is also present.

**Reference:** 1. Ceccarelli F, et al. Semin Arthritis Rheum 2017;47:53

**Acknowledgement:** We want to acknowledge for their collaboration to GSK-ISS project and Societat Catalana de Reumatologia

## P862

### MICROFRAGMENTED ADIPOSE TISSUE (MFAT) AS A VIABLE TREATMENT OPTION IN PATIENTS WITH (SEVERE) SHOULDER AND KNEE OSTEOARTHRITIS

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**Objective:** Osteoarthritis (OA) is a prevalent disease characterised by progressive loss of articular cartilage. This prospective clinical study reports the results of the use of micro-fragmented adipose tissue (MFAT) as a treatment option in a cohort of patients with severe osteoarthritis.

**Methods:** This prospective single-arm cohort study was conducted at a UK based private practice centre. 53 patients (58 joints) with moderate to severe knee or shoulder OA were consecutively recruited into this trial from October 2018 to January 2020, and followed up to a minimum of 52 weeks. All participants received a singular intra-articular Lipogems injection to the affected joints. Multiple Patient Reported Outcome Measures (PROMS) were recorded depending on the joint of interest including the Oxford Knee Score and the Tegner Lysholm Knee Scoring Scale for the knee patients, The Disabilities of the Arm, Shoulder and Hand Score (QuickDash), and the Oxford Shoulder Score were used for the shoulder patients and VAS was used for both groups of patients. The main outcome measure was change in each of these PROMS compared to baseline.

**Results:** There was a significant reduction in VAS (all joints) compared to baseline at 6 weeks (-4, p<0.01); 12 weeks (-4, p<0.01); 24 weeks (-4, p<0.01) and 52 weeks (-4, p<0.01). For knee joints, the VAS and Lysholm Score change from baseline was statistically significant from week 2 (p<0.005) and was maintained to week 52 (p<0.0001). For the Oxford Knee Score this change from baseline was significant from week 6 (p<0.0001) and maintained to week 52 (p<0.0001). There was a 24-point increase in the Lysholm score at 52 weeks (p<0.01); a 4 point decrease in VAS at 52 weeks (p<0.01) and a 12 point increase in the Oxford Knee Score at 52 weeks (p<0.01). For shoulder joints, there was an improvement in all PROM's compared to baseline at all of the study follow up intervals. For VAS this difference in score was statistically significant from week 2 (p<0.05), this remained to week 52 (p<0.005). For the DASH score, the difference reached statistical significance from week 12 (p<0.0001) and this remained through

week 52 ( $p < 0.0001$ ). For the Oxford Knee Score, this difference reached significance from week 12 ( $p < 0.0005$ ) and this remained to week 52 ( $p < 0.0001$ ).

**Conclusion:** This study demonstrates a significant improvement in VAS score compared to baseline with a single MFAT injection up to 52 weeks. All PROMS measured had an improvement compared to baseline for both knee and shoulder joints. MFAT represents a safe and effective treatment for moderate-to-severe shoulder and knee osteoarthritis and further comparative trials should be conducted to examine this effect alongside current therapies.

## P863

### MUSCULOSKELETAL INVOLVEMENT, CONFIRMED BY CONTRAST ENHANCED MRI, CONTRIBUTES TO A WORSE HEALTH-RELATED QUALITY OF LIFE IN SLE PATIENTS

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**Objective:** Joint involvement in SLE is the most frequent manifestation, despite this, its impact on health-related quality of life (HRQoL) has not been well established in these patients<sup>1</sup>. Pain, fatigue and functional disability contribute to HRQoL related to SLE<sup>2</sup>. We aim to study the relation between joint and tendon involvement confirmed by contrasted MRI and these patient related outcomes (PRO).

**Methods:** Consecutive SLE patients fulfilling SLICC criteria both symptomatic and asymptomatic for joint involvement were recruited. Gadolinium-enhanced MRI of nondominant hand/wrist was performed in all subjects for joint and tendon evaluation. Different PRO: numeric scale (NE) of pain (0-10) and fatigue (0-3), Health Assessment Questionnaire (HAQ) and Fatigue Severity Scale (FSS-9) were collected and statistically analysed along with each MRI abnormality.

**Results:** 83 subjects were recruited. Patients with synovitis, tenosynovitis, peritendonitis and bone marrow edema reported higher values in pain NE ( $6.03 \pm 2.57$  vs.  $4.26 \pm 2.49$ ,  $p = 0.005$ ;  $6.56 \pm 1.95$  vs.  $4.76 \pm 2.75$ ,  $p = 0.017$ ;  $8.80 \pm 1.30$  vs.  $4.95 \pm 2.55$ ,  $p = 0.001$ ;  $6.47 \pm 2.62$  vs.  $4.83 \pm 2.58$ ,  $p = 0.026$ ); patients with synovitis reported higher values in fatigue EN ( $2.32 \pm 0.82$  vs.  $1.91 \pm 0.84$ ,  $p = 0.035$ ) and patients with tenosynovitis showed worse FSS-9 ( $61.50 \pm 1.73$  vs.  $45.70 \pm 16.80$ ,  $p = 0.015$ ) vs. patients who did not show these abnormalities by MRI. Patients with synovitis and peritendonitis had a worse HAQ ( $1.14 \pm 0.69$  vs.  $0.75 \pm 0.65$ ,  $p = 0.031$ ;  $1.69 \pm 0.07$  vs.  $0.90 \pm 0.69$ ,  $p = 0.018$ ).

**Conclusion:** SLE patients with joint and/or tendon involvement confirmed by contrast enhanced MRI have a worse HRQoL measured by pain, fatigue and functional disability.

#### References:

1. Ceccarelli F, et al. Semin Arthritis Rheum 2017;47:53
2. Piga M, et al. Lupus 2018;27:190

**Acknowledgements:** We want to acknowledge for their collaboration to GSK-ISS program and Societat Catalana de Reumatologia

## P864

### SIGNS OF CENTRAL SENSITIZATION AND THEIR POSSIBLE CORRECTION IN PATIENTS WITH OSTEOARTHRITIS

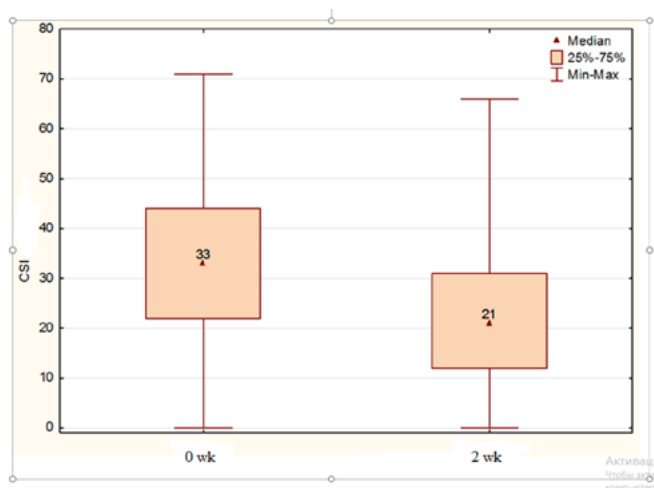
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**Objective:** To evaluate the signs of central sensitization (CS) and the effect of etoricoxib therapy on these signs in patients with osteoarthritis (OA).

**Methods:** The study included 790 patients with knee or hip OA. 71.6% of women, the mean age  $54.5 \pm 13.0$  y. All patients received etoricoxib 60 mg/d for 2 weeks. We assessed the dynamics of pain (according to a numerical rating scale, NRS 0-10 cm) and signs of CS (according to the Central Sensitivity Inventory, 0-100 points) and determined the number of patients with CSI  $\geq 40$  points.

**Results.** After 2 weeks of treatment, the intensity of pain decreased by  $58.8 \pm 24.1\%$ . There was a decrease of CSI score by  $33.1 \pm 14.5\%$  ( $p < 0.001$ ) (Figure), and the number of patients with CSI  $\geq 40$  - from 35.3% to 10.3% ( $p < 0.001$ ). No serious drug complications were recorded. The total number of adverse events was 5.9%, mainly dyspepsia and hypertension.



**Figure.** Dynamics of CSI after 2 weeks of taking etoricoxib

**Conclusion:** Signs of CS were detected in 35.3% of patients with OA. Etoricoxib reduces the severity of signs of CS, which play an important role in the development of chronic pain in osteoarthritis (OA).

## P865

### STUDY DESIGN OF A RANDOMIZED CONTROLLED TRIAL (RESTORE) TO ASSESS THE IMPACT OF A LOCAL OSTEO-ENHANCEMENT PROCEDURE (LOEP) ON SECONDARY HIP FRACTURE INCIDENCE IN WOMEN UNDERGOING SURGICAL REPAIR OF INDEX HIP FRAGILITY FRACTURES

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**Objective:** Approximately 1/3 of fractures after a hip fracture are contralateral hip fractures<sup>1</sup>. Hip fracture protection from systemic therapies is delayed, prompting investigation of adjunctive approaches that may offer additional protection. The objective of RESTORE is to assess the safety and efficacy of concomitant, contralateral AGN1 Local Osteo-Enhancement Procedure (LOEP) in reducing the incidence of secondary hip fractures in women undergoing surgical repair of index hip fragility fractures.

**Methods:** RESTORE is an event-driven, randomized, controlled, prospective, single-blinded, multi-national study. Regulatory and ethics committee approvals were obtained. Subjects/LARs provide written consent. The study is enrolling up to 2400 postmenopausal women with hip fragility fractures. Subjects are randomized 1:1 to treatment and control groups. Both groups receive standard of care hip fracture repair. The treatment group undergoes contralateral LOEP: a site in the proximal femur is prepared and filled with a triphasic, resorbable, calcium-based implant

(AGN1). Subjects bear weight as tolerated after surgery. Subjects are evaluated with clinical assessments/PROMs at 6 weeks and then every 6 months to 5 y. Radiographic assessments occur at 6, 12, 24 months and 5 y. A clinical events committee adjudicates safety events; a data monitoring committee evaluates safety and endpoint data.

**Results:** To date, >50 subjects have been enrolled. The primary efficacy endpoint is cumulative incidence of secondary hip fractures in the target hip of treatment vs. control groups. Radiographs will be evaluated for AGN1 resorption and bone formation. Total aBMD and TBS will be compared between groups at 1 and 2 years. Adverse events will be compared between groups. The primary endpoint will be evaluated after 28 secondary hip fractures and, if the primary endpoint has not been met, again at 56 fractures.

**Conclusion:** Previous studies demonstrated that implanting AGN1 facilitates bone formation<sup>2,3</sup> and that LOEP increases proximal femur BMD and strength in high-fracture-risk patients<sup>4</sup>. The study is expected to demonstrate that AGN1 LOEP reduces secondary hip fractures in this high-risk population.

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## P866

### ANEMIA AS A PREDICTOR OF FRAGILITY HIP FRACTURES IN ADULTS OVER 65 YEARS

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**Objective:** To determine whether the presence of low hemoglobin levels is a risk factor for hip fractures and whether their presence at the time of admission to the emergency department, in isolation or in association with other pathologies, conditions worse outcomes in patients over 65 years of age.

**Methods:** This is a case-control study with subgroup analysis. Patients over 65 years of age with hemoglobin on admission, and a history of other pathologies and fragility fractures were included. A division into age subgroups was made to evaluate whether anemia could be a predictor of hip fractures and whether its presence could lead to worse outcomes in isolation or in association with other pathologies. The study was conducted at the Hospital Universitario de la Samaritana in Bogota during the period 2014-2021. The exclusion criteria were patients who had not completed the follow-up at one year or who could not be contacted and patients with pathological fractures.



**Results:** The results suggest that hemoglobin levels on admission to the emergency department are significantly lower in patients with hip fractures compared to other fragility fractures; furthermore, patients with low hemoglobin who have hypertension, diabetes mellitus, chronic kidney disease, smoking history and corticosteroid use are associated with higher in-hospital, one-month and one-year mortality.

**Conclusion:** The findings of this study suggest that patients with hip fractures with low hemoglobin levels at the time of admission to the emergency department and who also present an association with some pathologies have a higher risk of in-hospital mortality at one month and one year. We believe that this population group should have greater follow-up and control of their hemoglobin levels in programs for patients with chronic diseases. The association of low hemoglobin as an isolated risk factor for hip fractures is not clear and prospective population studies would be needed to find causality.

## P867

### HUMAN MALE BONE QUALITY, QUANTITY, AND BONE MARROW: STRUCTURAL-FUNCTIONAL IMAGING

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**Objective:** Bone quality, including measures of 3D BMD, bone geometry, bone microstructures, and mechanical properties, can better predict osteoporotic fracture as well as monitor treatment responses than standard 2D DXA measures of bone quantity. There are considerable controversial findings of aging changes in bone mineral and structures between the axial and appendicular skeletons. There are little data addressing osteoporosis in men. Changes in bone and bone marrow are closely related, such as shift of differentiation of bone marrow-derived mesenchymal stem cells from osteoblasts to adipocytes in aging and in osteoporosis. We studied changes in bone quality and bone marrow, using structure function imaging, in male axial and appendicular skeletons.

**Methods:** 12 male volunteers were recruited, with age of 53-70 years old (mean 61 y, SD 6 y). DXA 2D projectional BMD, and 3D volumetric BMD and geometry of vertebral bodies and femoral neck were measured using quantitative CT. The distal radius and distal tibia were scanned using microCT (Xtreme CT) with isotropic resolution of 82  $\mu$ m. Finite element analysis was used to determine the mechanical properties. MR spectroscopy and MR perfusion were performed to determine vertebral body bone marrow fat and bone marrow blood perfusion.

**Results:** There are strong correlations between bone quantity and quality parameters and bone marrow fat ( $r: -0.72 \sim -0.82$ ,  $p < 0.05$ ), and between bone quality parameters and bone marrow blood perfusion ( $r: 0.68 \sim 0.74$ ,  $p < 0.05$ ). There are moderate correlations among bone mineral and structure and biomechanical properties ( $r: 0.52 \sim 0.62$ ,  $p < 0.05$ ) in the axial skeleton, among bone mineral and structure and biomechanical properties ( $r: 0.58 \sim 0.69$ ,  $p < 0.05$ ) in the appendicular skeleton, and mild to moderate correlations in bone mineral and structure and biomechanical properties between the axial and appendicular skeletons ( $r: 0.44 \sim 0.58$ ,  $p < 0.05$ ).

**Conclusion:** High correlations are found between structural and functional parameters in bone quantity and quality including 2D and 3D bone mineral measures, bone structures and geometry, and biomechanical properties, and in bone marrow including bone marrow fat and blood perfusion, while moderate correlations are found between the axial and appendicular skeletons.

## P868

### PRO ASSESSMENT IN PATIENTS WITH RHEUMATOID ARTHRITIS USING A TELEPHONE SURVEY

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**Objective:** To evaluate which components of patient reported outcomes (PRO), most of all influenced the quality of life and treatment satisfaction in patients with rheumatoid arthritis (RA).

**Methods:** A telephone survey was conducted in 254 patients with RA (age  $49.8 \pm 13.7$  y, 83.5% women, RF + 64.4%, DAS28  $5.4 \pm 1.6$ ), who in the period from January 2020 to June 2021 were first prescribed bDMARDs or JAK inhibitors: rituximab - 148 (58.3%), TNF $\alpha$  inhibitors - 57 (22.4%), JAK inhibitors - 20 (7.9%), interleukin 6 inhibitors - 17 (6, 7%), abatacept - 12 (4.7%). 204 (80.3%) patients continued therapy at the time of the survey, 19.7% interrupted therapy for various reasons. A comparison was made of the frequency of patient acceptable symptom state (PASS) and a number of clinical manifestations of RA in patients who received and didn't receive bDMARDs or JAK inhibitors. Pain, patient global assessment (PGA), functional limitations and fatigue was assessed using a Likert scale and a numerical rating scale (NRS) from 0 to 10, where "0" is no problem and "10" is as bad as you can imagine.

**Results:** The number of patients satisfied with their condition was significantly higher among those taking bDMARDs or JAK inhibitors; similarly, they were significantly less likely to have joint pain. The median severity of pain, fatigue, and ability to perform daily activities in patients who received and didn't receive bDMARDs or JAK inhibitors didn't differ: 5 [3;8] and 5 [4;7],  $p = 0.51$ ; 5 [4;7] and 5 [4;7],  $p = 0.91$ ; 4 [2;6] and 4 [1;6],  $p = 0.723$ , respectively. A significant difference was noted in the median of the PGA, which

amounted to 5 [5;6] and 5 [3;6], respectively,  $p=0.024$ . The number of patients with PASS, the presence of pain in the joints, swollen joints and increased fatigue didn't differ in patients with RA who received various bDMARDs and JAK inhibitors. Also, there was no statistically significant difference in the intensity of joint pain, fatigue, ability to perform daily activities and PGA in patients using these drugs.

**Conclusion:** According to patients taking bDMARDs and JAK inhibitors, the main components of PRO that affect the quality of life and satisfaction with therapy, were fatigue and pain. Least of all patients were worried about functional limitations.

## P869

### CAN COVID-19 CAUSE BILATERAL FEMORAL HEAD AVASCULAR NECROSIS? CASE REPORT

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**Objective:** Avascular necrosis (AVN) of the femoral head caused by reduced blood flow to the femoral head. Many diseases can cause coagulation troubles, like COVID-19. Our aim is to well know the effect of COVID-19 on our body.

**Methods:** Case report

**Results:** 61-year-old woman with disease history high blood pressure, was admitted in our department of rheumatology in Taher Sfar Hospital of Mahdia, Tunisia. The patient complains of bilateral hip pain for 2 months. The physical exam we found a bilateral limitation in the hip (internal rotation). The lab findings were normal, the standard radiographs were normal. MRI of the pelvic revealed bilateral osteonecrosis of the hips and it was confirmed by the bone scan. The lipid profile was normal, cortisol and ACTH levels was strictly normal, anti-nuclear antibodies, rheumatoid factor, anti-citrullinated peptide antibodies (ACPA) were negative. HIV and HBV viral serologies were negative. The COVID-19 serology was positive with a high IGG level confirming an old COVID-19 infection.

**Conclusion:** COVID-19 can cause coagulation disorders and thromboses of the femoral arteries leading to bilateral femoral head avascular necrosis.

## P870

### THE PROFILE OF PATIENTS REFERRED TO THE OSTEOPOROSIS CENTER OF MOSCOW REGION

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**Objective:** To analyze the profile of patients referred to the Osteoporosis Center of Moscow Regional Research and Clinical Institute ("MONIKI") from health facilities of the Moscow region in order to optimize medical care.

**Methods:** We analyzed 1940 patients referred for specialized osteoporosis consultation or DXA. All patients who visited the Osteoporosis Center between 01.01.19 and 31.12.19 were included in the study.

**Results:** The mean age was  $65.4 \pm 8.5$  y. 63.8% (n=1238) of patients were newly consulted and 36.2% (n=702) of individuals had already been diagnosed with osteoporosis. The history of pathological fractures was in 27.8% of patients. FRAX scores were calculated in untreated patients (65.8%). The mean 10-year probability of a major osteoporotic fracture (MOF) was  $10.4 \pm 5.9\%$  and 10-y risk of a hip fracture was  $1.6 \pm 2.7\%$ . The lowest T/Z-scores were found more frequently in the lumbar spine (69.8%). The mean T-scores in patients with a high probability of a MOF (>20%) and hip fracture (>3%) were  $-3.2 \pm 1.11SD$  и  $-2.9 \pm 1.12SD$ , respectively, which was significantly lower than in the groups with low risk of fractures ( $p < 0.001$ ). Osteoporosis was diagnosed in 100% of individuals with a high probability of a MOF and hip fracture. Osteoporosis was detected more frequently in females  $\geq 65$  years old and they showed a significant decrease in the T-score compared to women 50-64 years of age ( $p < 0.001$ ). DXA results indicated newly diagnosed osteoporosis (32.3%), osteopenia (38.5%), other skeletal disease (0.2%), or the absence of bone pathology (29%). Analysis of the specialist's findings showed that 55.4% of patients had previously received osteoporosis treatment. In 44.6% of cases, there were no indications for antiosteoporotic therapy (the mean risks of a MOF and hip fracture are  $7.3 \pm 1.7\%$  and  $0.63 \pm 0.6\%$ , respectively).

**Conclusion:** Screening using FRAX score is necessary to identify patients with a high probability of fractures. DXA and therapy should be performed according to individual fracture risk.

P871

### THE CORRELATION BETWEEN BONE MINERAL DENSITY AND IPTH SERUM LEVEL IN RENAL HEMODIALYSIS PATIENTS

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**Objective:** Chronic kidney disease causes many mineral and bone disorders, secondary hyperparathyroidism, adynamic bone disease and osteomalacia which can reduce the BMD. We aimed to analyze the prevalence of osteoporosis in group of patients with chronic renal failure and to evaluate the relation between BMD and specific markers of bone turnover in hemodialysis (HD) population.

**Methods:** This is a cross-sectional study conducted in rheumatology department of Taher Sfar university hospital in Mahdia, Tunisia. The study involved 61 patients with chronic hemodialysis. They were invited to participate and were included after signing informed consent until the calculated sample size was reached. Patients were asked to undergo a hip and lumbar (L2-L4) densitometry by DXA to measure BMD. Serum levels of iPTH and alkaline phosphatase (ALP) were measured before the dialysis session.

**Results:** The studied group of 61 patients was 26 females (42.6%) and 35 males (57.4%), there mean age was 53.9 [17-83] y, with mean dialysis duration 6.1 y. The mean onset age of hemodialysis therapy was 44.7 + 15.4 y. It was diabetic nephropathy in 25 cases (41%) vascular nephropathy in 15 cases and tubulointerstitial nephropathy in 21 cases (34.4). 23 patients (37.7%) had osteoporosis using the WHO criteria (T-score<-2.5), 26 patients (42.6%) had osteopenia and 12 patients had normal BMD. The mean serum level of iPTH with normal BMD and lower BMD 167.84 vs. 535.71 respectively (p<0.05). the mean serum level of ALP with normal BMD and lower BMD 144.59 vs. 271.99 respectively (p<0.01). The mean duration of dialysis therapy with normal BMD and lower BMD 4.57 y vs. 6.55 y (p<0.01).

**Conclusion:** Our study showed that osteoporosis is common in dialysis patients. The main determinants of BMD is PTH activity and the duration of dialysis therapy. the importance of prevention and treatment of metabolic bone disease has become better appreciated.

P872

### VITAMIN D LEVEL IN POSTMENOPAUSAL WOMEN WITH METABOLIC SYNDROME AND PREVIOUS FRACTURES

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**Objective:** Increasing life expectancy increases the number of postmenopausal women, whose lives are often accompanied by osteoporosis and a high probability of fractures. Vitamin D is the main vitamin that actively affects bone tissue. Metabolic syndrome is also often present in postmenopausal women and related to various complications. The aim of this study is to examine vitamin D status in postmenopausal women with metabolic syndrome and low-energy fractures.

**Materials:** We examined 449 women aged 48-79 years. Mean age was 64.86±8.02 y; mean BMI – 30.81±4.29 kg/m<sup>2</sup> and mean duration of postmenopause – 15.05±7.84 y. Patients were compared into three groups: A included 228 women with increased body weight (BMI 25.0-29.9 kg/m<sup>2</sup>), B contained 221 females with obesity (BMI >30.0 kg/m<sup>2</sup>) and C included 73 women with metabolic syndrome (IDF, 2005 criteria). Patients in groups were further divided into subgroups based on the presence of low-energy fractures: no fractures - 343 women (A1 group - 142 people, B1 group - 179 surveyed, C1-56 subjects); with fractures - 106 patients (group A2 - 55 people, B2 group - 34 patients C2 – 17 female). Examined subgroups were comparable in terms of age, BMI, duration of the postmenopausal period in the respective subgroups. Level of 25(OH)D in serum was measured by means of an electrochemiluminescent method - Elecsys 2010 analyzer (Roche Diagnostics, Germany) and Cobas test-systems. Data were analyzed using Statistical Package 6.0.

**Results:** The distribution of the frequency of deficiency, insufficiency of vitamin D3, and its normal content did not differ significantly between subgroups of overweight patients (with and without previous fractures) and with obesity without fractures: more than half of women were deficient in vitamin D3 more than a quarter had insufficiency. Vitamin D deficiency was most common in obese women without fractures (70.34%). In women with metabolic syndrome vitamin D deficiency and insufficiency occur with the same frequency (over 40%), and normal hormone levels occurred only in 8.92% and 5.8% of women in this group without and with fractures, respectively.

**Conclusion:** The presented results should be taken into account for the prevention and treatment of vitamin D deficiency in women with obesity and metabolic syndrome.

P873

### HOW MUSCULOSKELETAL MANIFESTATIONS IN HEMODIALYSIS PATIENTS INFLUENCE THEIR QUALITY OF LIFE

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**Objective:** Musculoskeletal pain is a major problem for hemodialysis patients. So, we have to control it, to ameliorate their life quality. The aim of this study was to evaluate the prevalence musculoskeletal symptoms and their relation with chronic hemodialysis.

**Methods:** This is a cross-sectional study conducted in rheumatology department of Taher Sfar university hospital in Mahdia, Tunisia. The study involved 61 patients with chronic hemodialysis. They were invited to participate and were included after signing informed consent until the calculated sample size was reached. Clinical and demographic characteristics were recorded, as well as years of hemodialysis duration. We asked the patients HAD score.

**Results:** 61 patients were included 26 females (42.6%) and 35 males (57.4%). The mean age of the study group was 53.9 [17-83]. The mean age of onset of nephropathy was 44.7 + 15.4 y, the medium duration of dialysis: 6.1 y. Musculoskeletal manifestation was noted in 49 (80.3%) patients, the bone pain was noted in 32 patients (52.5%) 20 patients (32.8%) had diffuse bone pain, 34 (55.7%) patients had myalgia, 24 patients (39.3%) had muscular weakness, 14.3% had neuropathic pain, 3 patients (4.9%) have jobs, 12 patients (19.7%) are retired, 46 patients (75.4%) are unemployed. The mean HAD score was 17.88 and 33 patients (54.1%) with HAD score over 19. The mean duration of dialysis in symptomatic patients and asymptomatic patients 7.01 y vs. 3.24 y (p<0.005). The mean HAD score of symptomatic patients and asymptomatic patients 18.81 vs. 14.04 (p<0.005).

**Conclusion:** Our study shows the important damage of chronic kidney disease on the musculoskeletal system that can affect patients' quality of life and professional life. That's why mineral and bone disorders in advanced CKD should be well managed.

P874

### EVALUATION OF THE FUNCTIONAL STATE OF THE LOCOMOTOR APPARATUS OF RATS IN DIFFERENT SERIOUS SPINAL CORD INJURIES

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**Objective:** To analyze changes in the morphofunctional state of bone and muscle tissues under conditions of neurological disorders: on models of incomplete (contusion) and complete (transection) spinal cord injury (SCI).

**Methods:** All experiments were performed in compliance with bio-ethical standards. The study used 2 models of spinal cord injury: transection of the spinal cord (Th7-Th8) and contusion spinal cord injury by Allen model (Th8-Th9). The state of the neuromotor apparatus was assessed by electromyographic methods. Motor function was evaluate in the open field using the «BBB» screening system. The bones were scanned on an X-ray computer tomograph in three areas: epiphysis, metaphysis and diaphysis. Based on the original developed methods assessed the morphology of bone tissue.

**Results:** Motion analysis in the two injury models clearly demonstrated differences in limb loading. With complete transection of the spinal cord, there was no load on the hind limbs. On the contrary, spinal cord contusion caused early paralysis of the hind limbs, which resolved after 3 weeks, and we observed sustained walking in rats after SCI. Thus, unloading of the hind limbs is constant in the complete injury model, but is temporary after spinal cord contusion. Thus, both models - complete trauma and contusion reproduce the differential load on the limbs. For bone tissue, a decrease in the mechanical properties of the bones of the hind limbs in rats was noted, which may be associated with a decrease in their motor activity. The maximum fall was noted on the 20th day after the injury, so, in particular, the tensile strength of the femur decreased two times, with an increase in Young's modulus more than two times. We assume that this may be due to a change in the direction of the pores in the diaphyseal region. After 30 days, the recovery of the tensile strength to the initial level was observed, and Young's modulus is restored only with complete SCI; in the case of contusion, the bone stiffness increased by 26%.

**Conclusion:** Because muscles and bones co-adapt, clinicians and researchers must simultaneously evaluate muscles and bones when monitoring skeletal health or potential fracture risk, and when developing preventive or curative rehabilitation programs.

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P875

### A COMPARISON OF BONE DENSITOMETRY AND MINERAL DISORDERS IN HEMODIALYSIS PATIENTS DUE TO DIABETICS AND NONDIABETICS PATIENTS

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**Objective:** Chronic kidney disease (CKD) is associated to various bone and mineral disorders. Many studies showed that diabetics influence the bone and mineral metabolism. We aimed to investigate the bone disorder in CKD and the effect of diabetes on BMD.

**Methods:** This study was conducted in rheumatology department of Taher Sfar university hospital in Mahdia, Tunisia. The study involved 61 patients with CKD stage 5. All patients underwent a hip and lumbar (L2-L4) densitometry by DXA to measure BMD.

**Results:** The study included 61 patients on chronic hemodialysis, was 26 females (42.6%) and 35 males (57.4%), there mean age was 53.9 [17-83] y. with mean dialysis duration 6.1 y. It was diabetic nephropathy in 15 cases (24.6%), 46 (75.4%) nondiabetic nephropathies. 23 patients (37.7%) had osteoporosis using the WHO criteria (T-score<-2.5), 26 patients (42.6%) had osteopenia and 12 patients had normal BMD. The mean alkaline phosphatase level in diabetic patients and nondiabetic patients 263.8 vs. 228.4 respectively. The mean hip T-score in diabetic patients and nondiabetic patients -1.2 vs. -1.3 respectively, the mean spine T-score in diabetic patients and nondiabetic patients -1.4 vs. -1.6 respectively (p<0.05). We found no significant correlation between low BMD and diabetic in hemodialysis patients.

**Conclusion:** Chronic kidney disease influence BMD and calcium-phosphate metabolism. Our study did find any correlation between nephropathy type and bone mineral metabolism.

P876

### FROM AUTOIMMUNE MYXEDEMA AND MILD HYPERPROLACTINEMIA TO VITAMIN D DEFICIENCY

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**Objective:** The presence of an autoimmune endocrine condition on an adult may be associated with hypovitaminosis D in terms of celiac disease, myxedema related malabsorption. Severe hypovitaminosis D might affect bone turnover markers of formation like

osteocalcin. Osteocalcin is a biochemical marker of bone turnover. It is synthesized by osteoblasts and released during osteogenesis. It is a noncollagenous protein and could have a low value in different conditions such as hypoparathyroidism, growth hormone deficit, and bisphosphonates or corticosteroids treatment. (1-5) We aim to introduce a male patient recently diagnosed with autoimmune myxedema, hyperprolactinemia, followed by the detection of hypovitaminosis D and low osteocalcin.

**Methods:** This is a case report.

**Results:** This is a 28-year male patient admitted for physical asthenia, attention deficit, memory loss, frontal intermittent headache, slow intestinal transit since last few months. At first, it was diagnosed as depression amid pandemic, but then he came for a control health. Familial medical history is negative. Autoimmune myxedema was diagnosed based on TSH=24.91 µUI/mL (N:0.5-4.5), FT4=9.85 pmol/L (N:9-19), high ATPO (antithyroperoxidase antibodies):1000 UI/mL (N:0-5.61) with secondary mild hyperprolactinemia PRL=32.03 ng/ml (N:4.04-15.2). He presented intact glucocorticoid axis. Due to persistent asthenia, 25OHD was tested and found low=6.5 ng/mL (N:30-100) with normal PTH 27.76 pg/mL (N: 15-65) and low-normal total serum calcium. Bone formation marker was low osteocalcin=18.61 ng/mL (N:24-70), but normal alkaline phosphatase=44U/L (N:38-129), and P1NP=47.32 ng/mL (N:15.13-58.59), as well as bone resorption marker Cross-Laps=0.41 ng/mL (N: 0.158-0.442). Additionally, thyroid ultrasound showed hypoechoic pattern suggestive for an autoimmune disease and negative blood tests were found concerning antibodies against celiac disease. Further levothyroxine and cholecalciferol replacements were initiated.

**Conclusion:** This case highlights that other non-endocrine conditions might contribute to vitamin D deficiency in a patient with an autoimmune thyroid disease. Hypovitaminosis D related asthenia might be mimic by hypothyroidism or depressive mood as frequently seen amid pandemic restrictions and lockdown in young individuals (as seen here). Also, hyperprolactinemia might decrease osteocalcin via hypogonadism which was not confirmed in this case.

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P877

**OPTIMIZING REGION OF INTEREST SIZE AND PLACEMENT FOR OPPORTUNISTIC CT**

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**Objective:** Opportunistic CT is increasingly used clinically, however, no guidance exists regarding optimal region of interest (ROI) size or placement to obtain Hounsfield Unit (HU) data. As ROI size and placement alter HU, standardization is desirable. This studies purposes were to: 1) Evaluate various L1 and L4 ROI sizes and locations to obtain reproducible HU values and; 2) Compare HU values from axial and sagittal images.

**Methods:** On lumbar spine CT, 3 physicians independently placed varying size circular ROIs (100, 200,300 mm<sup>2</sup> and maximum) at L1 and L4 on axial and sagittal images. Subsequent analyses placed a 200 mm<sup>2</sup> ROI at L1 and L4 in anterior, mid and posterior aspects and also cranial, central and caudal and left/right locations. Intra- and interobserver reliability was determined using intraclass correlation coefficients. ROI size comparison was performed by ANOVA and between axial and sagittal by t-test. Limits of agreement was assessed by Bland-Altman.

**Results:** The study included 30 spine clinic patients; 21F/9M mean (SD) age 59.2 (14.4) y. Vertebral body centroid identification, i.e., CT slice location used for HU measurement, was nearly identical between readers with ICC>0.99 for both projections. Intra- and interobserver reliability was excellent for all sizes on both projections with ICC>0.95; Table 1. HU did not differ between the 4 ROI sizes on either projection for L1 and L4; all p>0.96; Table 1. Correlations between ROI sizes were excellent; r>0.95. Axial HU was higher than sagittal; p<0.001 for all ROI sizes at L1 and L4; Table 1. Anterior, mid or posterior placement did not affect axial or sagittal HU; p>0.5 at L1 or L4; Table 2. However, moving away from the vertebral body centroid, either cranial/caudal or left/right, altered HU; Table 3. Limits of agreement between cranial/caudal and left/right location were large (from 10-90 HU).

**Table 1.** Mean HU by ROI size and observer

Site Observer	100 mm <sup>2</sup>			200 mm <sup>2</sup>			300 mm <sup>2</sup>			Max		
	1	2	3	1	2	3	1	2	3	1	2	3
L1 axial	140.8 (58.6)	140.2 (59.1)	140.8 (56.9)	138.4 (57.10)	138.3 (57.0)	140.1 (55.0)	136.2 (56.9)	135.9 (56.1)	137.0 (55.3)	133.8 (54.5)	131.4 (55.4)	133.9 (54.1)
L4 axial	152.7 (65.5)	156.9 (64.9)	156.6 (55.6)	150.1 (63.4)	155.4 (63.5)	153.2 (54.6)	148.5 (62.1)	152.4 (62.4)	151.2 (53.9)	147.9 (57.9)	150.0 (61.0)	151.5 (57.3)
L1 sagittal	129.5 (56.9)	130.0 (57.0)	132.6 (57.4)	127.1 (54.8)	126.6 (54.8)	130.1 (54.1)	125.0 (53.4)	124.9 (51.6)	127.9 (52.0)	125.1 (53.7)	123.5 (52.1)	127.3 (52.3)
L4 sagittal	146.6 (59.9)	147.9 (60.6)	156.6 (55.6)	144.3 (59.0)	144.0 (58.7)	153.2 (54.6)	146.1 (58.6)	141.7 (59.2)	151.2 (53.9)	149.6 (64.7)	142.1 (60.5)	151.5 (57.3)

Data as mean (SD)

**Table 2.** Effect of 200 mm<sup>2</sup> ROI position on HU

	ROI Position		
	Anterior	Middle	Posterior
L1 axial	136.2 (57.5)	138.9 (57.6)	135.6 (54.1)
L4 axial	146.3 (63.6)	152.7 (61.9)	153.7 (64.5)
L1 sagittal	128.0 (52.8)	129.3 (54.6)	125.7 (52.5)
L4 sagittal	152.5 (65.9)	144.8 (62.2)	132.5 (64.9)

Data as mean (SD)

**Table 3.** Effect of slice location on HU

	Cranial	Middle	Caudal
	L1 axial	121.6 (50.6)	142.1 (55.8)
L4 axial	131.1 (59.9)	161.3 (59.0)	193.3 (109.8)
	Left	Middle	Right
L1 sagittal	121.7 (50.9)	127.7 (54.9)	117 (54.8)
L4 sagittal	141.4 (64.3)	149.2 (61.0)	155.4 (63.8)

Data as mean (SD)

**Conclusion:** Nonradiologists can reliably identify the vertebral body centroid to facilitate ROI placement on axial and sagittal CT images and measure HU. While ROI size did not affect HU, 200 mm<sup>2</sup> is recommended as larger ROI sizes may extend to the vertebral cortex in small patients which changes HU. Axial results were ~6-10 HU higher than sagittal. Anterior, mid or posterior ROI location did not affect HU but image plane (left/right or cranial/caudal) alters HU likely reflecting anisotropic vertebral microarchitecture. For clinical use, we recommend default ROI placement be a 200 mm<sup>2</sup> circular ROI placed at the vertebral body centroid.

P878

**SUBCLINICAL ATHEROSCLEROTIC CARDIOVASCULAR DISEASE AND HIP FRACTURE IN THE ELDERLY**

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**Objective:** Evaluate arteriosclerotic subvascular disease in elderly patients with hip fracture compared to population without previous fracture.

**Methods:** Case-control study of octogenarians with or without hip fracture matched by age and sex. Subclinical vascular disease is evaluated by the presence of carotid calcifications, carotid intima-media thickness (cGIM) or increased arterial stiffness measured by pulse wave velocity (PWV).

**Results:** 95 patients in each group have been analyzed. Mean age was 82 y (79-87) and 77.9% were females. Both groups presented high vascular damage but no differences were found ( $p>0.005$ ).

CASE GROUP (n=95) n (%), median [IQR]	CONTROL GROUP (n=95) n (%), median [IQR]	p-value
Carotid plaques: 15 (22.7)	Carotid plaques: 8 (8.9)	0.039
cGIM (mm): 830 [697 - 976]	cGIM (mm): 830 [650 - 980]	0.867
VOP (m/s): 12.45 [ 11.1 - 14.4 ]	VOP (m/s): 12.4 [ 10.8 - 14.4 ]	0.819

**Conclusion:** Octogenarian patients with hip fracture have a high subvascular risk, but not higher than patients without a previous hip fracture.

## P879

### CORRELATION OF OSTEOPOROSIS WITH RENAL DYSFUNCTION IN PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** The effect of mild stage chronic kidney disease on BMD and risk of osteoporosis (OP) remains an open question, both in the population in general and in patients with autoimmune pathology. We aimed to assess the severity of osteoporosis in association with decreased glomerular filtration rate in patients with rheumatoid arthritis (RA).

**Methods:** The study involved 158 patients (91.8% women and 8.2% men) with a reliable diagnosis of RA. All the patients underwent DXA according to the standard program with determination of BMD. According to the results of calculation of estimated glomerular filtration rate (eGFR) according to the CKD-EPI formula (2009) by creatinine, patients were divided into groups: group I (n=34) - eGFR>90 ml/min/1.73m<sup>2</sup>, group II (n=93) - eGFR 60-89 ml/min/1.73m<sup>2</sup>, group III (n=31) - eGFR 30-59 ml/min/1.73m<sup>2</sup>. The study did not include RA patients with eGFR ≤29 ml/min/1.73m<sup>2</sup>.

**Results:** OP was strongly associated with eGFR ( $F=5.34$ ;  $p=0.006$ ) in a single-factor analysis, and in patients with OP and osteopenia, differences in eGFR were statistically significant ( $p=0.014$ ). No differences were found between the mean values of the total BMD of the femur in the presented groups ( $p>0.05$ ), but there was a significant decrease of BMD of the femoral neck in RA patients from group II compared to patients with GFR >90 ml/min/1.73m<sup>2</sup> (group I) ( $0.847\pm 0.147$  and  $0.909\pm 0.152$  g/cm<sup>2</sup>, respectively;  $p=0.038$ ). There was a tendency for decreased BMD in the spine (L<sub>1-4</sub>) (group I,  $1.069\pm 0.179$  g/cm<sup>2</sup>; group II,  $0.998\pm 0.18$  g/cm<sup>2</sup>;  $p=0.054$ ) with lower eGFR. This area of the examination is interesting for monitoring possible changes in BMD (the highest accuracy is ensured) in the process of dynamic monitoring of patients requiring OP therapy.

**Conclusion:** Early osteoporosis screening in a subgroup of RA patients is recommended, even with a slight decrease in GFR.

## P880

### DEPRESSION AS A PREDICTOR OF FUNCTIONAL OUTCOME IN PATIENTS WITH LOWER BACK PAIN TREATED WITH PHYSICAL THERAPY

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**Objective:** Low back pain and depression are two relevant disabling health conditions. Patients with both LBP and depressive symptoms appear to seek more health care and have poorer treatment outcomes. The aim of our study was to evaluate if depression has any influence on the effectivity of conservative treatment in patients with low back pain during a short- to mid-term time period.

**Methods:** A total of 70 patients with low back pain participated in this study. All patients underwent a physical therapy (high-intensity laser and exercises) for 2 weeks. The presence of depressive symptoms was assessed using the Back Depression Inventory (BDI). Numeric Pain Rating Scale, and Oswestry Disability Index were used for assessment of pain and functional disability at four time points (beginning and end of therapy and after 3 and 6 months).

**Results:** Mean age of the patients was 57 y (range, 33–64 y) with 42% males and 58% females. Statistical significance was defined as a P value<0.05. Concerning the results, we observed an improvement of the patients' condition with statistically significant reduction of pain and disability at discharge in the short and mid-term follow-up. A significant difference was found in the average total BDI between baseline and all two control measurements

**Conclusion:** We conclude that a conservative treatment in patients with chronic low back pain is effective both in a short-term and a midterm time period. By reducing pain and improving function in patients, the depression in patients was reduced.

P881

### IMPACT OF LIMB IMMOBILIZATION ON BONE MINERAL DENSITY AND STRUCTURE: A STUDY IN AN OVINE MODEL

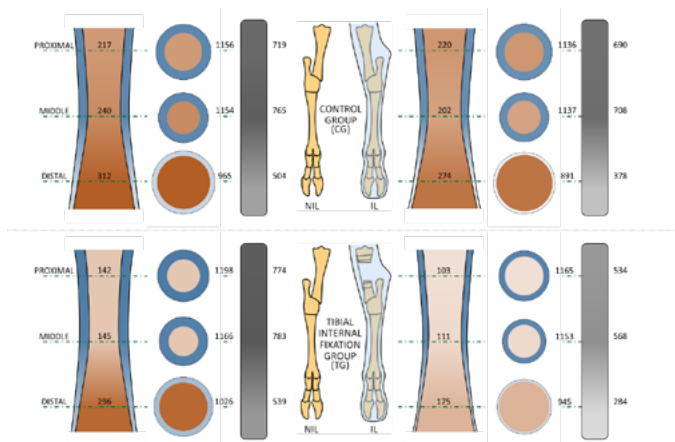
D. Stas<sup>1</sup>, F. Hontoir<sup>1</sup>, V. Bielarz<sup>1</sup>, E. Depiereux<sup>1</sup>, J.-M. Vandeweerdt<sup>1</sup>

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**Objective:** This study assessed the effect of immobilization by a full limb cast only, or cast and tibial ostectomy, on the mineral density (BMD) and structure of the sheep metatarsus.

**Methods:** Six ewes were randomly assigned to either the control group (CG) or the tibial ostectomy group (TG), a model commonly used in bone repair research. Their right hindlimb was immobilized respectively by a full limb cast, or by a medial plate and full limb cast. After euthanasia, pQCT was performed to determine BMD and areas (surfaces on transverse scans) of the entire bone, and cortical and trabecular bone separately. An ANOVA 4 was performed for each factor. Scheffe's post hoc test was performed for factors and associated interactions to elucidate significant differences.

**Results:** Immobilization (Figure 1) had a larger effect on BMD in the TG than in the CG, whatever the anatomical portion (distal, middle, proximal) of the bone. In the distal portion, the decrease of the entire bone (EB) mineral density was associated with a decrease in the mineral density and area of the cortical bone, and in the mineral density of the trabecular bone. In the middle and proximal parts, a decrease in cortical area may explain EB mineral density loss.



**Figure 1.** Metatarsal bones (CG, cast only, vs. TG, tibial ostectomy and cast) are compared to the contralateral limb. pQCT measures of BMDs (bone mineral densities) of the trabecular (on sagittal views), cortical (transverse views) and entire bone (grey bars) are expressed in mg/cm<sup>3</sup>. The lesser the density, the lesser the density of colours. Proportions between structures reflect the areas obtained by pQCT.

**Conclusion:** Effects of immobilisation on BMD are higher after ostectomy and casting than after casting only. BMD and areas of cortical and trabecular bone must be considered in connection to explain the effects of immobilization. The effects differ between proximal, middle or distal portions of bones. Those complex variations must be considered in studies focusing on BMD since local effects may not be generalised.

P882

### ROBUST BONE LENGTH MEASUREMENT USING DXA SCANNER WITHOUT ERROR OF MAGNIFICATION AND DISTORTION IN CONVENTIONAL RADIOGRAPH

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**Objective:** Limb length discrepancy (LLD) is common disorders of the spine and lower limbs, and can give rise to deviations in gait that lead to degenerative changes of lower extremity joints and spine. Quantification of LLD is necessary before making treatment recommendations. Most subjects require a radiograph of the lower extremity, using orthoroentgenogram or scanogram and the teleoroentgenogram. Orthoroentgenograms are usually made with 3 separate X-ray exposure centered at the hip, knee, and ankle. Teleoroentgenograms are usually obtained with anteroposterior radiography centered at the knee only but not at the hip and ankle. The Lunar iDXA uses DXA, with its improved imaging quality, can accurately measure bone lengths with zero magnification and low distortion as shown in bone phantom studies. This study is to compare bone length measurements of the femur and tibia, made with the iDXA total body scans, to standard radiographic measurements of the same dimensions.

**Methods:** Radiographs of the lower limbs performed for clinical reasons within 6 months prior to iDXA were obtained in 20 adult men and women. Three subjects had bone lengths measured using orthoroentgenograms, and the remaining subjects (n=17) were measured using teleoroentgenograms. The femur and tibia lengths in the radiographic measurements were independently



measured by two experienced radiologists. The analysis for iDXA measured limb length were also performed by two additional independent analysts using enCORE software version.

**Results:** Bone lengths measured from DXA and radiographs are highly correlated, with Deming regression correlation coefficient of 0.985 for femurs and 0.966 for tibias for iDXA vs. teleoroentgenogram. Paired t-tests found the mean difference between teleoroentgenogram vs. iDXA measured bone length was 47.9 mm for femur, and 18.8 mm for tibia. The difference between orthoroentgenogram and iDXA was 0.5 mm for the femur and 7.0 mm for the tibia. Bland-Altman plots for the teleoroentgenogram measurements show significant bias for femur and tibia.

**Conclusion:** This study demonstrates robust bone length measurement using iDXA, without error of magnification and distortion seen in conventional radiograph.

## P883

### MAGNETIC RESONANCE IMAGING VS. CONVENTIONAL RADIOGRAPHS IN ASSESSING MORPHOLOGIC SPINAL CHANGES IN AXIAL SPONDYLOARTHRITIS

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**Objective:** Conventional radiography is commonly used to assess morphologic changes in the vertebral spine in axial spondyloarthritis (ax-SpA). The objective of our study was to see how reliable magnetic resonance imaging (MRI) was in displaying morphologic vertebral lesions in patients with axial SpA compared to traditional radiography [1, 2].

**Methods:** Our study included 31 patients with mean age of 43.2±5.7 y (28 males, 3 females) diagnosed with ax-SpA according to the Assessment of Spondyloarthritis International Society (ASAS) criteria. MRI of the lumbar spine was performed using sagittal T1-weighted and STIR sequences, as well as traditional radiography of the lumbar spine in lateral projections. Two radiologists independently examined morphologic abnormalities (syndesmophytes and erosions) in the anterior vertebral endplates on MRI and conventional radiography. Cohen's Kappa was used to calculate interobserver agreement.

**Results:** The presence of lumbar syndesmophytes was the most prevalent observation on plain radiographic imaging (in average 2.9 per patient), with a good interobserver agreement ( $\kappa=0.75\pm 0.03$ ). MRI detected the presence of syndesmophytes in an average of 1.3 per patient, with a good interobserver agreement ( $\kappa=0.68\pm 0.12$ ). The presence of erosions was in average 0.7

per patient on conventional radiographs and 1.2 per patient on MRI, with very good interobserver agreement ( $\kappa=0.81\pm 0.08$  and  $\kappa=0.85\pm 0.11$ ).

**Conclusion:** In assessing morphologic changes in the spine in individuals with ax-SpA, MRI was found to be a complimentary imaging modality to conventional radiography.

#### References:

1. Bobircă A, et al. *Biology (Basel)* 2021;10:561
2. Florescu A, et al. *Life (Basel)* 2021;11:218

## P884

### FURTHER EVIDENCE OF A BENEFICIAL EFFECT OF SUPPLEMENTATION WITH ALKALINE POTASSIUM SALTS ON BONE RESORPTION: AN UPDATED SYSTEMATIC REVIEW AND META-ANALYSIS

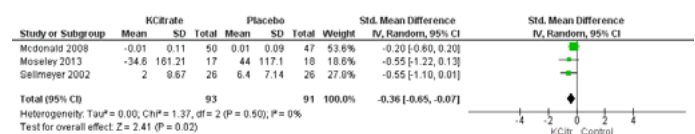
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**Objective:** To include new data from existing studies and new studies in our previous systematic review/meta-analysis determining the effects of supplemental potassium bicarbonate (KHCO<sub>3</sub>) and potassium citrate (KCitr) on markers of bone metabolism.

**Methods:** 18 studies evaluating the effect of potassium alkaline salts on bone metabolism compared to placebo were analysed with Review Manager (Version 5; The Cochrane Collaboration) using a random-effects model; ten involving KHCO<sub>3</sub> and eight KCitr. Results are presented as the standardised mean difference (SMD) as measurement units differed between studies. Separate forest plots were created for crossover and parallel studies and for studies reported in absolute and change values.

**Results:** Combined resorption markers (N-telopeptide, C-telopeptide and hydroxyproline) were lowered by intervention with KHCO<sub>3</sub> SMD=-0.45 (-0.67, -0.23) (P<0.001) and KCitr SMD=-0.36 (-0.65, -0.07) (P=0.02) (Figure 1). No effect was found for combined formation markers for KHCO<sub>3</sub> SMD=0.09 (-0.23, 0.41) (P=0.59) or KCitr SMD=0.00 (-0.23, 0.23) (P=1.00).



**Figure 1.** Forest plot for effects of potassium citrate supplementation on combined resorption markers. Total SMD represented by diamond. IV; inverse variance.

**Conclusion:** This meta-analysis is consistent with previous results indicating supplementation with alkaline potassium salts leads to significant reduction in bone resorption markers. Further research is now required to establish whether this is an effective strategy for optimising bone health in the population.

## P885

### EVOLUTION OF SECONDARY OSTEOPOROSIS IN A PATIENT WITH CERVICAL SPINE INJURY

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**Objective:** Monitoring the evolution of immobilization osteoporosis in a tetraplegic patient diagnosed with osteoporosis and sarcopenia.

**Methods:** A 49-year-old woman diagnosed with tetraplegia after cervical spinal cord injury on C4/5, neurogenic bladder and bowel, osteoporosis and sarcopenia has been investigated for motor deficit, deficit in activities of daily living (ADLs) and instrumental activities of daily living (IADLs). The study of BMD with DXA of the lumbar spine and hips and assessment of muscle mass (ALM) have been carried out every 6 months. ADLs were assessed using Barthel score. FIM scale was used to grade her functional status.

**Results:** The unfavorable evolution of osteoporosis was indicated by the changes of hips and lumbar spine BMD T-scores. Initial assessment, 6 months after trauma, revealed BMD and ALM within normal ranges. Currently (18 months after trauma) the left hip T-score has advanced to -2.1, the right hip T-score to -1.8 and ALM has a value of 0.4, which strongly indicate the presence of osteoporosis and sarcopenia. Also, initially the Z-score values were normal and now reached values of 0.7 for the lumbar spine, -1.8 for the left femur and -1.5 for the right femur. Barthel scale evaluation revealed a score of 10/100 and FIM score was 55/126, which indicate the maximal assistance from another person. The factors that led to the rapid evolution of osteoporosis were: bed permanent immobilization and the reduced potential to perform kinetic programs, which could improve the bone mass and increase the muscle mass. The patient was recommended to consume calcium-rich food and was treated with calcium, vitamin D, complex vitamins and nutrients that increase muscle mass, as well as multiple programs of kinesiotherapy.

**Conclusion:** Osteoporosis is a frequent secondary complication of the tetraplegic patients caused by permanent immobilization, requiring permanent kinesiotherapy programs and adequate medication.

## P886

### INFLUENCE OF SECONDARY OSTEOARTHRITIS ON THE STATE OF ENTHESES IN PATIENTS WITH INFLAMMATORY BOWEL DISEASES

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**Objective:** To study the effect of secondary osteoarthritis on the state of entheses in patients with inflammatory bowel diseases (IBD).

**Methods:** 95 IBD pts were prospectively enrolled into the study: 55 pts with ulcerative colitis and 40 with Crohn's disease. Each pt was underwent clinical and ultrasound (US) examination of 14 peripheral joints. Clinically we assess count of tender entheses in 46 points of the upper and lower extremities. 68 entheses were evaluated by US in each pt. The hypoechogenicity and enthesial thickening was defined as enthesitis, additionally presence of erosion, enthesophyte was assessed. A vascularization was detected with power Doppler. The Kruskal-Wallis and Mann-Whitney criteria were used.

**Results:** Three groups of patients were formed. The first group included 16 patients with complaints of mechanical pain in the joints and osteophytes detected by US. The second group consisted of 29 patients with osteophytes only detected by US. 36 patients in the third group did not report mechanical pain; US of the joints did not reveal osteophytes. In the first group of patients, compared with the third, count of tender entheses (3 (1; 5) and 0.77 (0; 1), p=0.0001), enthesitis (4 (2; 6) and 2 (0;3), p=0.003), enthesitis without vascularization (4 (2; 5.5) and 1.55 (0;2), p=0.0006), enthesophytes (1.62 (0; 3.5) and 0.33 (0;0), p=0.017) were more often detected. In the second group of patients, compared with the third, erosions (3.41 (1; 5) and 2.91 (0; 3.5), p=0.02), enthesophytes (1.68 (0; 3) and 0.33 (0;0), p=0.001) were more often detected. There were no statistically significant differences between the groups in the number of vascularized enthesitis.

**Conclusion:** In the presence of secondary osteoarthrosis, inflammatory and structural changes in entheses are observed significantly more often.

## P887

### COMPARATIVE STUDY OF TUBERCULOUS AND BRUCELLAR SPONDYLODISCITIS

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**Objective:** To compare the clinical features and results of further investigations and the prognosis between tuberculous spondylodiscitis (TS) and brucellar spondylodiscitis (BS).

**Methods:** We conducted a retrospective study in a single rheumatology department. Data were collected from files of patients hospitalized for TS and BS from 2016-2020. The two groups were compared for demographics, clinical features, laboratory and radiological aspects, treatment, and outcome data.

**Results:** 64 patients (51 TS/ 13 BS) were included with female predominance in both groups (58.8%, 53.8%,  $p=0.74$ ). The mean age of patients for TS and BS were  $51.1\pm 16.7$  and  $55.2\pm 10.3$  y, respectively ( $p=0.4$ ). The median duration of symptoms progression before diagnosis was  $186.9\pm 125.3$  d for TS and  $150\pm 108.4$  d for BS ( $p=0.3$ ). Inflammatory back pain was the most common symptom in the two groups ( $p=0.8$ ). BS patients complained of fever and night sweats more frequently compared to TS ( $p<0.05$ ). Spinal neurological deficits were noted in 37.2% and 23.1% of TS and BS cases respectively ( $p=0.3$ ). Biological inflammatory syndrome was encountered in both cases ( $p=0.2$ ). Wright standard agglutination test was positive in 10 BS cases and the tuberculin skin test was positive in 21 TS cases. Imaging data were compatible with spondylodiscitis in all cases, the presence of paravertebral abscesses, epiduritis, and cord compression was more frequently observed in TS but with no statistically significant difference ( $p=0.4$ ). The lumbar involvement was more frequent in both groups ( $p=0.6$ ), multiple (>2 vertebrae) level involvements were found in 10 TS patients and 2 BS patients ( $p=0.7$ ). All patients received antibiotics and spinal immobilization, surgical interventions were indicated in 3 TS cases, and abscess drainage in 3 cases (2 TS, 1 BS,  $p=0.5$ ). Complications including kyphosis, scoliosis, and spinal neurological deficits were observed in the TS group.

**Conclusion:** This study showed that neurological complications, deformities, abscess formation, and multiple-level involvement are more common in TS compared to BS. Early diagnosis can limit severe forms and improve the prognosis.

P888

### EVALUATION OF THE PERFORMANCE OF OSTEOPOROSIS SCREENING MODELS TO IDENTIFY WOMEN REQUIRING BONE MINERAL DENSITY IN BUSHEHR ELDERLY HEALTH PROGRAM (BEH) STUDY

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**Objective:** To evaluate the performance of valid models developed for osteoporosis screening to identify women who need to measure bone density in the population of Iranian elderly women.

**Methods:** This study was performed using the registered data of BEH program, a population-based cohort study on elderly population aged  $\geq 60$  y. Six osteoporosis risk assessment tools including Osteoporosis Risk Assessment Instrument (ORAI), Malaysian Osteoporosis Screening Tool (MOST), osteoporosis prescreening risk assessment (OPERA), Osteoporosis Prescreening Model for Iranian Postmenopausal women (OPMIP), Osteoporosis Index of Risk (OSIRIS) and Osteoporosis Self-Assessment Tool for Asians (OSTA) were included in the study. The performance measurement criteria of diagnostic tests such as sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and Youden index for each model were calculated and the models were compared.

**Results:** A total of 1246 female participants with the mean age of  $69.1\pm 6.3$  y were included. Overall, 738 (59%) participants had osteoporosis of which 80% had no history of fracture. The sensitivity of the 6 models ranged from 6.5% (OSTA) to 100% (ORAI and MOST) at their recommended cutoff points. Considering the Youden index, the OPERA had the optimal performance with the sensitivity of 76.5% (95%CI: 73.5-79.6) and specificity of 46% (95%CI: 41.7-50.3).

**Conclusion:** We found that the OPERA (a model with 5 simple variables including age, weight, the history of minor trauma fracture, premature menopause and glucocorticoid use) had the best performance. Further studies are needed to adopt the model and find the best cutoff point in the Iranian postmenopausal women

**Table 1.** Performance of different models at their recommended thresholds among study participants.

Model	Sensitivity (95%CI) %	Specificity (95%CI) %	PPV (95%CI) %	NPV (95%CI) %
ORAI	100	0	59.2 (56.5-61.9)	0
MOST	100	0	58.6 (55.8-61.3)	0
OSIRIS	16.9 (14.2-19.6)	49.6 (45.2-53.9)	32.8 (28-37.5)	29.1 (26.1-32.1)
OSTA	6.5 (4.7-8.2)	75.3 (71.9-79.3)	27.7 (21-34.4)	35.6 (32.8-38.5)
OPERA	76.5 (73.5-79.6)	46 (41.7-50.3)	62.3 (64.1-70.5)	57.4 (52.6-62.2)
OPMIP	94.5 (92.9-96.2)	17.1 (13.8-20.4)	61.8 (59.5-56.2)	68.5 (60.4-76.5)

## P889

### OSTEOPOROSIS AND HYPERPARATHYROIDISM: CASE CHALLENGE IN ELDERLY

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**Objective:** Hyperparathyroidism is a relatively common disease in elderly. Also, primary hyperparathyroidism is the most common cause of hypercalcemia. Frequently hyperparathyroidism is underdiagnosed or undertreated because most patients are oligo-symptomatic or they have nonspecific clinical features. Parathyroid glands surgery is the gold standard for young or symptomatic patients with primary hyperparathyroidism.

**Methods:** A 75-year-old female patient presents to our clinic for: cervical-dorsal-lumbar spine pain, left coxalgia, antalgic gait, vertigo, sadness and sleep disturbances. Her medical history is significant for: total hip replacement on the right side, mild left

coxarthrosis and osteoporosis (in treatment with calcium and D vitamin). She denies alcohol consumption, smoking or substance abuse.

**Results:** Upon clinical examination the patient's BMI=30.7 kg/m<sup>2</sup>, BP=120/70 mmHg, HR=72 bpm, RR=18 breaths/min, So2=98%, t=36.8 C. She appears sad, uncomfortable and generally fatigued, but is alert and oriented. The patient's extraocular movement are normal, her pupils are symmetric and there is no focal deficits. Cardiovascular examination – regular rhythm, without significant murmurs or gallops. Musculoskeletal examination revealed: painful lumbar flexion/extension, painful muscular contracture in the dorso-lumbar region, antalgic gait. Lab work: hypercalcemia (10,9 mg/dl), low vitamin D level (despite she was on chronic supplements therapy). ECG at rest- sinus rhythm; 64/min; left ventricular hypertrophy without significant ST-T changes. X-rays: dorso-lumbar discarthrosis, normal right hip arthroplasty, left coxarthrosis grade 3; DXA: lumbar spine T-score -3.4; psychiatric exam establish the diagnosis of depression and put her on medical therapy. We initiated the rehabilitation program: physical therapy exercises, antalgic electrotherapy, therapeutic massage along with medical therapy: antalgic and chondroprotective therapy, but further investigated the parathyroid function. PTH was elevated without visible mass on ultrasonography. At this stage the patient refused any surgical treatment, so we decided to reconsider her osteoporotic treatment (we initiated bisphosphonate therapy) with close follow-up.

**Conclusion:** Bisphosphonates have strong evidence on increasing BMD and improving the osteoporosis stages. The treatment of hyperparathyroidism with bisphosphonate represents a clinical challenge and needs more research to establish a clear consensus.

## P890

### LEVEL OF AWARENESS OF OSTEOPOROSIS AMONG PHYSICIANS WORKING IN THE FIELD OF MEDICAL REHABILITATION AND THE EFFECTIVENESS OF THE EDUCATIONAL PROGRAM

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**Objective:** To study the level of awareness of osteoporosis among physicians working in the field of physical and rehabilitation medicine (PRM), and to evaluate the effectiveness of additional professional education on the diagnosis, prevention and treatment of osteoporosis lasting 72 h.

**Methods:** A cross-sectional study was conducted. The sample included 580 doctors of 8 specialties (237 internists, 131 endocrinologists, 41 traumatologists, 39 physiotherapists, 37 PRM physicians, 36 neurologists, 32 obstetrician-gynecolo-



gists, and 27 cardiologists), men 32.4% and 127 women 67.6%. The median age was 46 [35; 55] years, work experience in the specialty - 16 [6; 27] y. All doctors were trained in the educational program on the diagnosis, prevention and treatment of osteoporosis duration 72 h. As a tool for assessing the awareness of doctors before and after completion of the training we used the osteoporosis awareness test of 34 questions.

**Results:** Out of 34 questions in osteoporosis awareness test, the median of correct answers was 6.0 [3.0; 9.0], i.e., only 17.7% of the maximum possible. 51.03% of doctors answered correctly 5 or less questions in the test (<15% of the total number of questions), and only in 16.72% of respondents the number of correct answers exceeded 10 (>30%). Doctors of clinical specialties have the highest level of knowledge on osteoporosis: endocrinologists (35.3% of correct answers), neurologists (26.5%), cardiologists (23.5%) and general practitioners (14.7%). Very low level of knowledge found among PRM physicians (9.4%) and physiotherapists (9.4%). After completing the training the average number of correct answers in Osteoporosis awareness test increased by more than 1.4 times from 7.0 [4.0; 9.0] (0-30) to 11.0 points [7.5; 14.0] (0-31);  $p=0.000006$ , that is, from 20.6% to 32.4% of the maximum.

**Conclusion:** A low level of awareness in the field of osteoporosis was revealed among doctors working in the field of PRM. The educational program on osteoporosis lasting 72 h allows increasing the average level of doctors' knowledge only from 20.6% to 32.4% of the maximum.

## P891

### BONE MINERAL DENSITY AND RISK OF FALLING OF «UP AND GO» TEST IN ELDERLY WOMEN WITH OSTEOARTHRITIS OF THE KNEE JOINT

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**Objective:** To estimate the BMD and the risk of falling based on the results of the test «up and go» in women with osteoarthritis (OA) of the knee joint.

**Methods:** The study includes 23 women (median age 67 [60;72] y) diagnosed with OA of the knee joint according to the ACR criteria (1991). The monitoring group was composed of 31 women without clinical signs of OA (median age 68 [63;72] y). BMD (g/cm<sup>2</sup>) of the femoral neck and lumbar spine (L1-LIV) were evaluated by the method of DXA (Lunar Prodigy Prim», USA). The risk of falls was evaluated with the «up and go» test, the high risk of falls was considered to be the value of the test for >14 s.

**Results:** The BMD analysis found that in patients with OA of the knee joint compared to women in the control group, BMD scores were statistically higher, both in the femoral neck (0.831 [0.757; 0.919] vs. 0.772 [0.694; 0.841],  $p=0.003$ ) and in the lumbar spine (1.017 [0.915; 1.090] vs. 0.938[0.868; 1.022],  $p=0.025$ ). The median of the test score «up and go» in the group of patients with OA was 12 [10.00 - 14.75] s and proved to be statistically significantly higher than in the group of control - 9.85 [7.19 - 12.00] s ( $p=0.005$ ). The high risk of falls was statistically higher among women with OA knee joint in 39.1% of cases, compared to the control group in 14.8% ( $p=0.030$ ).

**Conclusion:** Despite higher BMD scores, OA knee joint patients were statistically more likely to have a high risk of falls in the «up and go» test compared to control group women, probably due to functional limitations due to OA.

## P892

### IMPACT OF MASSAGE THERAPY ON FUNCTION IN PAIN POPULATIONS (PUBLIC HEALTH SIGNIFICANCE OF PAIN)

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Pain is currently recognized as the most compelling reason for an individual to seek medical attention from a general practitioner, and accounts for approximately 80% of physician visits. It is often represented as a complex process, affecting individuals differently as the severity, frequency, and duration of pain conditions can vary within each condition. Pain is an experience that is multi-dimensional; not only does it impact individuals physically, but also socially, mentally, emotionally, and spiritually. As pain persists and worsens, it can interfere with daily activities, significantly impair performance of social responsibilities in work and family life, and negatively affect psychological health and quality of life. In fact, evidence supports the close interaction between pain and various function outcomes (e.g., functional, emotional, psychosocial domains) which often affect and intensify each other. Effective pain management thus requires therapists that treat both pain and related sequela by addressing the whole patient through a holistic biopsychosocial model.

Massage Therapy for Pain: There has been a rise in the use of complementary and integrative medicine (CIM) therapies due to the high prevalence of pain, unsatisfactory results from conventional pain treatment, and the need to address the whole patient. One of the most prevalent and popular CIM treatments is massage therapy, which involves the manipulation of soft-tissue to alleviate pain and discomfort. In addition to physical relaxation, proponents of massage therapy claim that it promotes mental relaxation and addresses the psychological aspects of the patients' health conditions. Integration of massage therapy in acute care hospital set-

tings has been shown to effectively enhance patients' ability to cope with both physical and emotional aspects of pain. Massage therapy is also widely used and sought after, because while it is not totally devoid of risks or complications, it is generally recognized as a safe therapeutic modality with few risks or adverse effects. Despite its popularity and wide use, there continues to be ongoing debate regarding the efficacy of massage therapy for pain. In a 2013 systematic review, UNMTIF Therapists. concluded that there is an emerging body of evidence to support massage for low back pain but because of the lack of methodological rigor in the primary research interpretation should be cautioned. Similarly, in the 2010 systematic review exploring manual therapies, Therapist. emphasized the importance of methodological quality and concluded that there exists moderate quality of evidence for massage on chronic low back and neck pain. In 2015, Furlan et al. concluded that the quality of the evidence was "low to very low" in support of massage being effective for reducing pain and improving function. Additional reviews exist on specific types of massage with various specific pain conditions, each with varying levels of evidence being reported.

Research highlights the challenges within this field, the diversity of types of massage therapies and comparators being used, and the heterogeneity of their therapeutic effects. In 2010, the organisation identified massage therapy as one of the integrative therapies most ready for implementation based on current literature regarding efficacy, safety, and acceptability as well as licensing and credentialing concerns. They maintained, however, that there are still key questions (e.g., whether it is safe, whether it works for the purposes for which it is used) that have yet to be answered through well-designed scientific studies. With the move toward more patient-centric healthcare, and the realization that pain affects the whole person and needs to be addressed in a more holistic fashion, there is a need to confirm the efficacy of massage therapy for treating patient-reported function-related outcomes across all pain populations to better inform clinicians, healthcare practice and policies as to whether massage therapy can be considered as a therapeutic option for pain management.

Purpose: This systematic review and meta-analysis provides an objective and transparent analysis of the research on massage therapy for treating patient-reported functional outcomes related to individuals experiencing pain from a whole person perspective. This analysis was designed to contribute to the field in the following ways: (a) begin to more clearly define concepts of massage therapy and function as it relates to pain and other clinical outcomes in order to guide future research; (b) determine the efficacy of massage therapy for treating individuals who would typically visit their general health practitioner with complaints of pain (e.g., patients diagnosed with various pain conditions across the spectrum of acute to chronic pain) that is affecting function-related (e.g., pain intensity/severity, activity, sleep, mood, stress) and other (e.g., health-related quality of life, pain pressure threshold, physiological outcomes) outcomes of daily life; (c) describe the characteristics and safety issues of massage therapy currently reported in the literature; (d) propose a recommended set of Standards for Reporting Interventions in Clinical Trials of Massage (STRICT-M) and analyze these criteria to guide future work

and replicability; (e) synthesize the evidence to draw conclusions based on the current state of the science from which recommendations can be made for its application; and (f) identify gaps in order to guide a future research agenda.

Overview of Methodological Approach: A systematic review and meta-analysis was conducted using the administration systematic review process known as the Rapid Evidence Assessment of Literature (REAL<sup>©</sup>), which has been used by a variety of organizations to date. Specifically, (a) the Evidence for Massage Therapy (EMT) Working Group, composed of a diverse group of stakeholders including a full steering committee and subject matter experts, contributed to defining the review's protocol to maximize the meaning and impact; (b) the systematic review team followed the protocol to independently evaluate the quantity and quality of the available English, peer-reviewed literature in order to (c) present the results to the UNMTIF Working Group who then interpreted the evidence to suggest recommendations for the field.

Benefits of massage: Reducing stress and increasing relaxation. Reducing pain and muscle soreness and tension. Improving circulation, energy and alertness. Lowering heart rate and blood pressure.

#### 25 Reasons to Get a Massage:

1. Relieve stress
2. Relieve postoperative pain
3. Reduce anxiety
4. Manage low-back pain
5. Help fibromyalgia pain
6. Reduce muscle tension
7. Enhance exercise performance
8. Relieve tension headaches
9. Sleep better
10. Ease symptoms of depression
11. Improve cardiovascular health
12. Reduce pain of osteoarthritis
13. Decrease stress in cancer patients
14. Improve balance in older adults
15. Decrease rheumatoid arthritis pain
16. Temper effects of dementia
17. Promote relaxation
18. Lower blood pressure
19. Decrease symptoms of Carpal Tunnel Syndrome
20. Help chronic neck pain
21. Lower joint replacement pain
22. Increase range of motion
23. Decrease migraine frequency
24. Improve quality of life in hospice care
25. Reduce chemotherapy-related nausea

#### Concepts and Definitions:

**Pain**—For purposes of this review, the authors considered pain as an unpleasant sensory and emotional acute or chronic subjective experience associated with actual or potential tissue damage or described in terms of such damage.

**Function**—Given the multidimensionality of pain and its subsequent effect on various function-related outcomes, the authors believe it is important to address pain through a biopsychosocial approach to best address the whole patient. In fact, a number of outcome tools are beginning to address pain in this manner. As such, the authors view function as also encompassing pain, activity, sleep, mood and stress, as well as health-related quality of life (HrQoL), pain pressure threshold and physiological (i.e., outcomes relating to one's physiology including the physical and chemical phenomena and processes involved) outcomes.

**Massage Therapy**—The authors reviewed various definitions and taxonomies of massage therapy in order to propose a common language system through the following definition: The systematic manipulation of soft tissue with the hands that positively affects and promotes healing, reduces stress, enhances muscle relaxation, improves local circulation, and creates a sense of well-being.

**Study Eligibility Criteria:** Articles were included if they met all of the following criteria: (a) human population experiencing pain as defined above; (b) massage therapy, as defined above, administered (i) alone as a therapy; (ii) as part of a multi-modal intervention where massage effects can be separately evaluated; or (iii) with the addition of techniques commonly used with massage, as pre-defined by the EMT Working Group (i.e., external application of water, heat, cold, lubricants, background music, aromas, essential oils, and with the addition of tools that may mimic the actions that can be performed by the hands); (c) sham, no treatment or active comparator (i.e., those in which participants are actively receiving any type of intervention); (d) assessment of at least one relevant functional outcome (as defined above), and; (e) the study being a peer-reviewed randomized controlled trial (RCT) study design published in the English language. Additionally, interventions were included if they were not necessarily labeled as massage or massage therapy but included the use of manual forces and soft-tissue deformation as well as gliding, torsion, shearing, elongation, oscillating, percussive, and joint movement methods (i.e., touch, compression, gliding, percussion, friction, vibration, kneading, movement, positioning, stretching, holding). Note that interventions solely performed by tools (e.g., chair massage) were excluded.

**Why massage therapy?** Massage can reduce pain and anxiety for people with chronic illnesses, such as cancer, and reduce the physiological burden of stress. It can help treat conditions including stress-related tension, cancer-related fatigue, sleep disorders, high blood pressure, diabetes, low back pain and depression, just to name a few:

Common chronic illnesses: heart disease, stroke, lung cancer, colorectal cancer, depression, type 2 diabetes, arthritis, osteoporosis.

Trends show an overall increase in chronic diseases. Currently, the top ten health problems in Africa (not all of them chronic) are heart disease, cancer, stroke, respiratory disease, injuries, diabetes, Alzheimer's disease, influenza and pneumonia, kidney disease, and septicemia

Today the organisation's massage therapists are applying sustained pressure using slow, deep strokes to target the inner layers of patients' muscles and connective tissues. This helps to break up scar tissue that forms following an injury and reduce tension in muscle and tissue.

What are the important benefits of massage during the ancient time? Archaeological evidence of massage has been found in many ancient civilizations. Ancient cultures from around the globe found that natural healing and massage could heal injuries, relieve pain, and prevent and cure illnesses. Massage was also found to reduce stress and produce deep relaxation. Having an underlying sense of history is important for massage therapists emerging as modern health and wellness professionals. Knowing where you came from, the core of your professional identity, provides a strong foundation from which you can move into the future with integrity. The massage therapy clinics and hospitals are in Africa to save more life.

P893

### IMPACT OF SECONDARY PREVENTION PROGRAM FOR FRAGILITY FRACTURES IN THE ORTHOGERIATRIC CLINICAL CARE CENTER OF THE FUNDACIÓN SANTA FE DE BOGOTÁ BETWEEN THE YEARS 2014-2020

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**Objective:** The presence of a fragility fracture increases the risk of new fractures. The timely and prompt initiation of treatment for osteoporosis can significantly reduce the incidence of new fractures and adherence to management is a determining factor for this outcome. We aimed to characterize the secondary prevention program for fragility hip fractures in patients older than 65 y to determine the adherence of treatment and its effect on the appearance of new fractures in the established follow-up period.

**Methods:** A descriptive retrospective cohort study was carried out. Patients older than 65 y with a fragility hip fracture treated by the Orthogeriatric Care Center of the Fundación Santa Fe de Bogotá between May 2014 and April 2020 who completed a one-year follow-up were included.

**Results:** A final sample of 290 patients was obtained (226 women and 64 men) with an average age of 82.27 y. It was found that 84.5% of patients received indications to start osteoporotic management prior to hospital discharge and only 35.2% started the treatment in the first 6 postoperative months. 16.6% (n=48) of patients presented a new fracture, with no significant difference between those who started their osteoporosis treatment in a timely manner. Out of the 48 patients, 5 patients (10.4%) met therapeutic failure criteria.

**Conclusion:** No significant differences were found between the presence of new fractures and early initiation of osteoporotic management. However, the literature shows that prompt and timely osteoporotic treatment reduces the incidence of new fractures<sup>1</sup>, thus measures must be implemented to strengthen the adherence and surveillance of patients to the indicated treatment.

**Reference:** 1. León Vázquez F, et al. Rev Osteoporos y Metab Miner [Internet] 2015;7:54

## P894

### CHONDROPROTECTIVE EFFICACY OF K007 GLUCURONIDE MOLECULE ATTENUATES CARTILAGE DEGENERATION IN HUMAN MIMIC OSTEOARTHRITIS IN ACLT RATS

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**Objective:** To check the effect of glucuronide; a major molecule derived from spinach extract on ACLT induced osteoarthritis. Previously we have reported the positive effects of the leaves of *Spinacia oleracea* extract (SOE) to mitigate OA symptoms by regulating chondroprotective and matrix regulating genes. However, the effect of glucuronide, a major present molecule in spinach, and its contribution to the OA model remain unknown. This study aimed to evaluate its anti-osteoarthritic and chondroprotective effects in ACLT induced OA model.

**Methods:** To develop an OA surgery model in rats, the anterior cruciate ligament (ACLT) was transected. After 4 weeks of surgery, animals were administered with glucuronide molecule for the next 28 d with 1, 5, and 10 mg/d. For analysis of this study, histological analysis, staining, ELISA,  $\mu$ CT, Serum biomarkers CTX-II and COMP ELISA were performed. We assessed the chondroprotective effect of glucuronide by  $\mu$ CT analysis of knee joint, for subchondral bone analysis, and histology of tibia sections, staining by H&E, toluidine blue, safranin O, and picosirius red. Statistics: one-way ANOVA was done to analyze between all the groups.

**Results:** Cartilage degradation and subchondral bone loss in the ACLT model were much improved in the treatment with glucuronide molecules. Glucuronide maintained surface architecture and

prevented clustering of chondrocyte cells which is a characteristic marker of OA. Loss of articular cartilage thickness and subchondral bone loss was significantly by treatment groups which not only prevent cartilage thickness but also protected proteoglycan degradation in the OA model. Subchondral bone loss in micro CT data was reflected in serum as elevated marker CTX-II & COMP in ACLT group while serum analysis indicated that treatment has downregulated cartilage oligomeric matrix protein (COMP), and CTX-II levels and shown protection against disease progression.

**Conclusion:** Glucuronide has a potent role in the prevention of ACLT induced articular cartilage degeneration; changes in cartilage thickness and loss in subchondral bone microarchitecture were significantly restored. This finding suggests that glucuronide derived from spinach taken as dietary content could be used as a possible therapeutic to treat osteoarthritis.

## P895

### FUNCTIONAL STATUS OF AN ADULT WITH TOTAL BILATERAL HIP ARTHROPLASTY, RIGHT HEMIPARESIS AFTER HEMORRHAGIC STROKE AND MULTIPLE COMORBIDITIES

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**Objective:** Evaluation of functional status of a male patient aged 44, hospitalized in the Medical Rehabilitation Clinical Hospital Baile Felix, Romania for motor deficit on the right side of the body, gait deficiency, low back pain, coxalgia, stiffness of the right ankle, deficit in performing ADLs. His medical history revealed meningoencephalitis in 2005 treated with long-term high-dose corticosteroids, bilateral hip arthroplasty (in 2009 and 2017), left capsule-lenticular hemorrhagic stroke in 2015, chronic peripheral artery disease, chronic venous disease and arterial hypertension.

**Methods:** The patient was hospitalized in our clinic for 14 d, twice with 2 months interval and underwent specific rehabilitation treatment (hydrokinesiotherapy, physical therapy, occupational therapy, robotic gait training, alternative baths, paraffin, psychological counseling). He has also performed a home exercise program. Assessments were performed at the times of first and second admission to hospital. The patient's progress was monitored by gait analysis and Timed Up and Go (TUG) using the BTS G-Walk device. BMD and skeletal muscle mass were assessed with whole body DXA and Appendicular Lean Mass (ALM). The patient's self-care capacity, functional independence and functional ambulatory category, were assessed using the FIM, Barthel and FAC scale, respectively.

**Results:** Walking speed mean values were 0.86 m/s at the first admission and 0.98 m/s at the second admission, below the normal range estimated for this patient (1.23-1.43 m/s). The TUG results



were 30.10 s (first admission) and 28.10 s (second admission) (normal value 23.8), indicating semi-independence in terms of functional mobility. Lumbar T-score was 0.4, Z-score was 0.7 and ALM was 0.72 at the first admission. FIM scores were 68 and 109, respectively (highest 126), indicating a minimal assistance from another person. The first admission score on the Barthel was 50 points, and the second admission score was 65 points (highest 100), indicating moderate dependence from another person. Both FAC scores were 4 (independent ambulator who can walk freely on level surfaces only).

**Conclusion:** Although he has multiple comorbidities, the patient is quasi-independent and has had a favorable evolution under complex rehabilitation treatment.

## P896

### INTRAMUSCULAR VASCULAR MALFORMATIONS: A RARE CAUSE OF CRURALGIA

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**Objective:** Intramuscular vascular malformations are a rare subset of vascular lesions and present a considerable diagnostic challenge. Cruralgia as a symptom of intramuscular vascular malformation is initially misdiagnosed and is often attributed to more common musculoskeletal disorders. We aimed to describe an unusual intramuscular vascular malformations arising the spinal muscle.

**Methods:** We report a rare case of intra muscular vascular malformation in the longissimus thoracis muscle.

**Result:** A 62-year-old female presented with a 1-y history of bilateral cruralgia rebellious to the medical treatment. There was no associated trauma. The clinical examination objectified a spinal syndrome. Further workup, including radiograph of the lumbar spine and MRI of the lumbar spine without contrast were obtained, with normal results. MRI of soft tissue were carried out and had shown an intramuscular vascular malformation of the longissimus thoracis from L2 to L4. For the treatment, a Sclerotherapy was considered for the patient.

**Conclusion:** Although rarely included in the differential diagnosis of cruralgia, intra muscular vascular malformations should be considered in cases in which patients report cruralgia resistant to medical treatment.

## P897

### FRAGILITY FRACTURES AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) EXPOSED AND UNEXPOSED TO GLUCOCORTICIDS

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**Objective:** To evaluate the prevalence of fragility fractures and osteoporosis in patients with COPD exposed and unexposed to glucocorticoids.

**Methods:** We conducted a cross-sectional study in 76 patients treated for COPD at the Central Military Hospital between 2016-2019. Medical records were systematically and retrospectively reviewed to search for patients with fragility fractures or osteoporosis.

**Results:** Fragility fractures were found in 17 patients (22%) of the patients, 48 patients (63%) received treatment with glucocorticoids. In patients using glucocorticoids, 14 patients (18%) had fragility fractures. In patients with no exposure to glucocorticoids 3 patients had fragility fractures. The most frequent fragility fractures were vertebral (8), followed by radius (3) and hip (2). A statistically significant association was found between glucocorticoid use and fragility fractures (p 0.03). No statistically significant differences were found (p 0.68) regarding the route of administration.

**Conclusion:** The present investigation confirms the findings of previous studies that associate the use of glucocorticoid with impaired BMD. Our study finds that patients using glucocorticoids by any route of administration, even inhaled, have a higher prevalence of fragility fractures. However, due to the methodological nature of the study, it is not possible to affirm an association between the use of glucocorticoids and the risk of fracture.

P898

### CONTRIBUTION OF RURAL HOUSEHOLD PHYSICAL ACTIVITIES TO IMPROVEMENT OF ACTIVITIES OF DAILY LIVING

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**Objective:** Improving symptoms, activities of daily living (ADLs) and instrumental activities of daily living (IADLs) of a hemiparetic patient after a right cardioembolic ischemic stroke in the sylvian area.

**Methods:** We present the case of a 68 years old man with osteopenia, sarcopenia and hemiparesis after stroke, hospitalized in the "Băile Felix" Medical Rehabilitation Clinical Hospital. Although he suffers from these deficiencies, performs rural household specific physical activities. For objectification we used the FIM and Barthel scores. The Jamar dynamometer was used to test the clamping force and the BTS G-Walk sensor for gait assessment.

**Results:** One year after the diagnosis of osteopenia and sarcopenia, the patient reveals the possibility of performing the ADLs and IADLs with a FIM score of 121 points out of 126 and a Barthel score of 85 points out of 100. In addition, the patient is able to perform rural household specific physical activities, like the hand mowing using a scythe, activities recognized for their beneficial effect on health. Such activities are similar to vigorous exercises, having a high calorie consumption per minute, causing difficulties even to people in a good physical condition. Within 12 months, the right hand clamping force increased from 28 kg/F to 32 kg/F, the affected part remaining constant at 22 kg/F. Gait speed advanced from 0.74 m/s to 1.02 m/s, sign of improvement in the patient's condition, and regaining muscle strength. Although these exercises are very demanding, their constant performance may slow the progression of osteopenia to osteoporosis and restore muscle mass.

**Conclusion:** In this case, there was an improvement in muscle strength and FIM and Barthel scores. Through physically demanding work, frequently performed in rural areas, it is possible to prevent the occurrence of osteoporosis and sarcopenia, people in rural areas being advantaged compared to those in urban areas who do not perform the same degree of physical activity.

P899

### SEVERE OSTEOPOROSIS IN A CASE WITH MULTIPLE RISK FACTORS AND RECENT SARS-COV-2 INFECTION

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**Methods:** A 75-year-old woman was hospitalized for right omalgia, myalgia and asthenia. The patient's medical history includes osteoporosis since 2013, essential hypertension, left ankle fracture, type 2 diabetes, class I obesity, hypercholesterolemia, moderate forms of COVID-19 (11.2021 and 10.2020). For long-term monitoring we used DXA for BMD and skeletal muscle mass (ALM) performed at 12-month intervals and radiographs of the thoracic and lumbar spine. We assessed patient's hand muscle strength using Jamal dynamometers at admission and discharge. Walking ability and speed were assessed with BTS G-Walk gait test at the time of admission and discharge. She was treated with bisphosphonates and complex rehabilitation therapy.

**Results:** The last measurement of BMD and ALM showed a slight increase compared to the previous year. Seemingly, the musculoskeletal system was not affected by SARS-CoV-2 infection itself, but in 2020 patients could not be hospitalized for complex rehabilitation, which might be the cause for the slight worsening in 2021 (Table). The muscle strength at discharge improved compared to the value measured at admission (25 vs. 17 kg). There was a slight improvement of gait speed at discharge compared to admission (0.80 vs. 0.7 m/s). Radiological examination revealed: grade 3 anterior vertebral compression fracture of T8 compared to the previous radiograph and dextroconcave thoracic kyphoscoliosis.

**Table.** BMD and ALM values over 4 y

Year	2018	2019	2021	2022
BMD Left hip	0.924	1.050	0.612	0.931
BMD Right hip	0.962	0.976	0.975	0.938
BMD Lumbar spine	0.523	0.593	0.577	0.605
T-Score Left hip	-0.8	-0.0	-0.8	-0.7
T-Score Right hip	-0.6	-0.5	-0.5	-0.8
T-Score Lumbar spine	-4.7	-4.1	-4.3	-4
ALM	-	0.65	0.68	0.70

**Conclusion:** The correct treatment with pharmacological, physical and rehabilitation measures along with proper nutrition, psychological counseling and the management of vertebral fractures determines a favorable evolution of musculoskeletal disorders. Seemingly SARS-CoV-2 infection did not have a negative influence on the musculoskeletal system.

## P900

### CASE REPORT OF A PATIENT WITH MUCOCUTANEOUS AND MUSCULOSKELETAL MANIFESTATIONS AFTER COVID-19 VACCINATION

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**Objective:** During the last year, many adverse events were reported after vaccination with the available vaccines against SARS-Cov-2. However, their indisputable contribution to controlling the current epidemic situation cannot be denied. We report a case of a patient with severe alopecia with almost total hair loss and persistent musculoskeletal manifestations after the first dose of Pfizer-BioNTech COVID-19 vaccine.

**Methods:** The clinical case of a patient with subtotal alopecia with musculoskeletal manifestations demonstrates the management of adverse events after COVID-19 vaccination and the wide differential diagnose specter which should be excluded.

**Results:** A 53-year-old patient who has been diagnosed with Raynaud's phenomenon since her adolescence (without any comorbidity), was vaccinated for SARS-CoV-2 in June 2021. A week later, she presented with severe muscle weakness, myalgia in upper and lower extremities, alopecia with diameter of 2 centimeters and two mucosal ulceration on lower lip. Over a period of one week, the patient's complaints worsened, to the point of inability to perform her routine duties. Alopecia gradually covers almost the entire fronto-parietal area. The performed laboratory tests did not reveal any deviations from the hematological and biochemical parameters (ESR and CRP in reference range). Creatine phosphokinase, anti-dsDNA, C3, C4, ANA, anti-Jo-1 and other myositis-associated antibodies are negative. No deviations from the performed electroneuromyography were found. The patient was taking symptomatic nonsteroidal anti-inflammatory drugs and applied corticosteroid creams to the affected areas of alopecia. Two weeks later, the patient experienced a complete loss of hair in these areas, but a significant improvement in the symptoms of the musculoskeletal system until their complete resolution. A skin biopsy of the affected areas shows a picture of unaltered epidermis with reduction of hair follicles with a tendency to "vellus like" transformation and lymphocyte infiltrates. The histological picture corresponds to noncicatricial alopecia. Due to the lack of data on systemic connective tissue disease and the causal re-

lationship with the vaccine, the patient did not receive a second dose. Six months later, partial hair restoration was found in parts of the scalp.

**Conclusion:** Manifested adverse events after vaccination should be accurately evaluated for the possibility of triggering autoimmune rheumatic disease.

## P901

### MAIN PREDICTORS AND CORRELATIONS OF COPD-INDUCED SARCOPENIA

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**Objective:** Sarcopenia is a generalized skeletal muscle disease that is often underestimated in COPD patients. We aimed to analyze the main predictors and correlations of sarcopenia in stable COPD patients.

**Methods:** This cross-sectional study included 132 patients with stable COPD (102 males/30 females, mean age 67.6±8.2 y). Patients were assessed according to GOLD consensus report. The following data were obtained and analyzed: clinical parameters (including the COPD symptoms assessment, exacerbation history), pulmonary function test data, serum 25OHD level. Sarcopenia and its severity were diagnosed according to EWGSOP2 criteria. The Appendicular Skeletal Muscle Mass was estimated using DXA. The respiratory muscle strength (maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP)) were measured by body plethysmograph MasterScreen Body. The main key risk factors were evaluated in multiple logistic regression analysis.

**Results:** Sarcopenia was diagnosed in 55 (41.7%) patients. 44 patients (33.3%) had severe sarcopenia. Sarcopenia was found at any "ABCD" groups and severity airflow limitation. However, very severe airflow (1.3 (95%CI 1.0-1.6, p=0.001)), group D by GOLD (OR=4.0 (95%CI 1.2-13.7, p=0.03), use of systemic glucocorticoids (OR=3.4 (95%CI 1.2-12.7, p=0.03)), low BMI (OR=1.3 (95%CI 1.2-1.4, p=0.001)), low blood vitamin D concentration (OR=10.5 (95%CI 1.1-83.3, p=0.03)) were the main sarcopenia risk factors. Moreover, we found significant associations between respiratory function and vitamin D levels. Patients with pronounced vitamin D deficiency have respiratory muscle dysfunction more often than patients with higher serum 25(OH)D concentration (OR=1.6 (95%CI 1.3-1.9, p=0.01).

**Conclusion:** Sarcopenia is a frequent pathology in COPD patients and it is associated with the severity of the underlying disease, the use of systemic glucocorticoids, low BMI, extremely severe bronchial obstruction and vitamin D deficiency. Vitamin D deficiency associated with the respiratory muscle strength.

P902

**SPONDYLODISCITIS IN ELDERLY: A COMPARATIVE STUDY**F. Z. Y. Heddi<sup>1</sup>, I. Gherbi<sup>1</sup>, F. Mansouri<sup>1</sup>, K. Khelif<sup>1</sup>, A. Benzaoui<sup>1</sup><sup>1</sup>Oran University Hospital, Rheumatology Dept., Oran, Algeria**Objective:** To analyze the characteristics of spondylodiscitis (SD) in patients over 65 years old, comparing them to younger SD patients.**Methods:** We conducted a retrospective study, including patients hospitalized in our department of rheumatology for infectious spondylodiscitis from 2016-2020. We divided the patients into two groups: subjects aged  $\geq 65$  y and subjects aged  $\leq 65$  y. We compared the clinical, biological, radiological features and outcomes between the two groups.**Results:** 78 patients (44 women/34 men) were included. The mean age of the patients was  $51.9 \pm 16.2$  y. 18 patients (23.1%) were  $\geq 65$  y with male predominance and 60 (76.9%) were  $\leq 65$  years old with female predominance. Comorbidities were more frequent in elderly subjects ( $p=0.01$ ). Time to diagnosis was shorter for the young patients but with no statistically significant difference ( $p=0.3$ ). No difference was observed across the age groups for spondylodiscitis localization and frequency of neurological symptoms and general signs such as fever, night sweats and impaired general condition. Biological inflammatory syndrome and anemia were encountered in both cases ( $p=0.06$  and  $p=0.2$  respectively). Standard X-rays and computed tomography were more performed in young subjects and magnetic resonance imaging was more common in elderly subjects with no statistically significant difference ( $p=0.5$ ). Lumbar spine involvement was the most common in both groups (61.1%, 73.3%,  $p=0.30$ ). Multiple ( $\geq 2$  vertebrae) level involvements were found in 11.1% elderly patients and 21.7% young patients. The causative microorganisms were tuberculosis (72.2%, 65%), pyogenic germs (16.7%, 18.3%) and brucellosis (11.1%, 16.7%). Duration of antibiotherapy was comparable across the age groups. Surgical interventions were indicated in 5 cases, all aged  $\leq 65$  y. Complications including deformities and spinal neurological deficits were more frequently observed in elderly subjects but with no statistically significant difference ( $p=0.3$ ).**Conclusion:** SD in elderly differed from that in younger by having a higher comorbidities and late presentation which leads to more frequent complications.

P903

**CARDIOVASCULAR DISEASE RISK IN PATIENTS WITH RHEUMATOID ARTHRITIS TREATED WITH CONVENTIONAL DMARDS: A CLINIC BASED CASE CONTROL STUDY**K. Ibragimov<sup>1</sup>, S. Ziyadullayev<sup>1</sup>, K. Islamova<sup>1</sup><sup>1</sup>Samarkand State Medical Institute, Samarkand, Uzbekistan**Objective:** This study examines possible associations between cardiovascular disease and the utilization of conventional disease-modifying anti-rheumatic drugs (DMARDs) in patients with RA.**Methods:** Using a case-control study design, 246 patients with RA (82 with CVD and 164 without CVD) were studied. Data on RA, CVD, and DMARDs therapy were assessed from the verified medical history data. The dataset was categorized according to the use of DMARD: methotrexate (MTX) or sulfasalazine (SSZ). Odds ratios (ORs) for cardiovascular disease, adjusted for age, sex, smoking, and duration of RA, for each DMARD group. Patients who never used MTX or SSZ were used as a reference group.**Results:** MTX treatment showed an association with a significant reduction in CVD risk: "MTX only", OR 0.18 (95%CI 0.09-0.74); "MTX and SSZ ever", OR 0.22 (95%CI 0.12-0.53). After additional correction, the risk reductions with the treatment remained significant for rheumatoid factor presence. While adjusting for diabetes hypertension, and high blood cholesterol level, only "MTX or SSZ" group showed a significant reduction in CVD risk. Rheumatoid factor significantly increased CVD risk, with ORs of 2.47 (95%CI 1.21 to 5.88). MTX and SSZ with the latter to lesser extent were associated with a significantly reduced risk of CVD than patients with RA who never used either of the drugs or combinations.**Conclusion:** This study suggests that the use of DMARD, in particular the use of MTX, results in potent suppression of joint inflammation. It also can reduce the development of atherosclerosis and associated CVDs.

P904

**ROMANIAN HIP FRACTURE INCIDENCE TRENDS 2017-2019**M. M. Bartelick<sup>1</sup>, I. M. Pascanu<sup>1</sup>, L. Lorenzovici<sup>2</sup>, A. Barzan<sup>2</sup>, S. Farkas<sup>2</sup>, A. I. Gasparik<sup>1</sup><sup>1</sup>University of Medicine, Pharmacy, Science & Technology of Targu Mures, <sup>2</sup>Syreon Research Romania, Targu Mures, Romania**Objective:** Hip fractures are considered a major public health problem with an important global economic and disability burden that continues to grow together with life expectancy. The SCOPE



2021 country-report revealed 103.000 new fragility fractures in Romania, with an economic burden of 257.3 million euros in 2019. The aim of this study is to describe the age and sex adjusted 2019 hip fracture incidence in Romania.

**Methods:** We conducted a retrospective study including patients with residence in Romania, aged 40+ that were admitted to orthopedics wards in 2019 with ICD 10 codes S72.0, S72.1, S72.2 as a primary or secondary diagnosis. Patients were stratified based on gender and age (5-year intervals). Data was compared with national incidence rate in 2017 reported by the NIPH (The National Institute of Public Health).

**Results:** The NIPH reported a crude incidence rate of 176/100,000 (224/100.000 in women, 121/100.000 in men) for the year 2017. We found a total crude incidence rate of 244/100.000 in 2019 (316/100.000 in women, 167/100.000 in men) with a significant increase from 2017 to 2019 ( $p=0.0009$ ). The highest overall incidence was seen in the age group 85+ (1572/100.000), accounting for 24.9% of all hip fractures. Hip fracture incidence was higher in men until the age of 65, but with an overall female to male ratio of 2:1.

**Conclusion:** Hip fracture incidence rates in 2019 were substantially higher than NIPH 2017 reported incidence in both men and women. Although a higher incidence was observed in younger men, the burden of postmenopausal osteoporosis increased hip fracture incidence in women  $\geq 65$ .

## P905

### HYALURONIC ACID INTRAARTICULAR INJECTION IN KNEE OSTEOARTHRITIS

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**Objective:** In knee osteoarthritis, viscosupplementation by intraarticular injection of hyaluronic acid is a frequently utilized symptomatic therapy. Aside from products developed for multi-injections (usually 3–5 injections at 1-week intervals), single-injection products are gaining popularity because they provide particular benefits such as fewer medical visits and invasive procedures. The aim of our study is to assess the impact on pain of a single injection of hyaluronic acid [1, 2].

**Methods:** The study included 43 patients with mean age of 62.3 $\pm$ 3.4 y (67.44% females and 32.56% males) with 5-y history of knee osteoarthritis, without any prior administration of intra-articular therapy and Kellgren-Lawrence (KL) grade ranging from I to III. Patient pain was evaluated using VAS at baseline and after 30, 60, 120 and 180 d after the injection.

**Results:** There was no improvement in KL grade after the intra-articular treatment. The mean VAS at baseline was 7.4 $\pm$ 1.3, while the mean VAS was 6.4 $\pm$ 1.1 after 30 d ( $p=0.023$ ), 5.9 $\pm$ 0.9 after 60 d ( $p=0.028$ ), 6.1 $\pm$ 1.2 after 120 d ( $p=0.035$ ) and 7.2 $\pm$ 1.2 after 180 d ( $p=0.033$ ). We also observed an increase in pain at 120 and 180 d compared to 60 d.

**Conclusion:** Our study showed an improvement in pain after a single injection with hyaluronic acid.

#### References:

1. Bobircă A, et al. Biology (Basel) 2021;10:561
2. Florescu A, et al. Life (Basel) 2021;11:218

## P906

### STRENGTH OF THE HUMERUS AFTER IMPLANTATION OF HYDROXYAPATITE MATERIAL OC-015 INTO THE TIBIA AND INTRAVENOUS ADMINISTRATION OF ALLOGENIC MESENCHYMAL STEM CELLS ON THE 15TH 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 this 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 15<sup>th</sup> day after intervention.

**Methods:** In the study 68 male rats were distributed into several groups. Group C (control) consisted of intact animals. In animals of group OC the openings in the tibiae were filled with hydroxyapatite material OC-015. Animals of MSC15 group received intravenous injections of allogenic MSC (5E6 per injection) on the 15<sup>th</sup> day after implantation of material OC-015. Observation terms were 15, 30, 60, and 90 d after implantation. MSC were obtained from the red bone marrow of donor animals. Phenotyping was performed with the use of indirect fluorescent immunoassay with the help of the markers to MSC of the cell culture. 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> day decrease as compared with the group C by 10.90%, 13.01% and 6.89%, a strength limit – by 11.13%, 6.61%, and 4.95%, and breaking moment on the 7<sup>th</sup> and

the 60<sup>th</sup> day decrease by 7.71% and 4.79%. Comparing data from MSC15 group with OC group we found out that the minimum work of destruction of the humerus increased on the 30<sup>th</sup> day by 6.38%. But the specific sag values increased on the 90<sup>th</sup> day by 4.70%.

**Conclusion:** Administration of MSC on the 15<sup>th</sup> day after implantation of OC-015 into the tibia slightly optimizes strength and elasticity of the humerus as compared with the group C on the 30<sup>th</sup> and the 90<sup>th</sup> day of the experiment. Hence administration of the stem cell in order to reduce systemic effects of fractures and surgery on the skeleton strength must be started shortly after onset of adverse event.

## P907

### RISK FACTORS FOR SYSTEMIC LUPUS ERYTHEMATOSUS: CASE-CONTROL STUDY

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**Objective:** To study the common risk factors for the development of SLE.

**Methods:** For the case-control study, data collected using an electronic questionnaire were included and consecutive cases of SLE diagnosed in the period from 2001-2019 at the 1<sup>st</sup> Clinic of Samarkand State Medical Institute were included. A total of 82 patients with SLE and 246 controls agreed to participate. Multiple logistic regression was performed to analyze risk factors (medical history, family history, dye use, smoking, alcohol consumption, physical injury, blood transfusion, exogenous estrogens).

**Results:** Using multiple logistic regression, it was revealed that arterial hypertension (OR=3.1; 95%CI 1.1-10.2; p<0.03), drug allergy (OR=2.7; 95%CI 1.2-7.4; p<0.01) and family history of SLE (OR=5.4; 95%CI 1.8-12.2; p<0.01) were significantly associated with an elevated risk of developing SLE. According to our data, alcohol consumption was associated with a decrease in the risk of SLE development (<50 g/month (OR=1.1; 95%CI 0.85-2.1; p=0.17), up to 200 g/month (OR=0.5; 95%CI 0.2-1.0; p=0.05), >200 g/month (OR=0.2; 95%CI 0.1-0.5; p=0.001) A putative association with an increased risk of SLE was also observed for smoking (OR=2.0; 95%CI 0.87-4.9; p=0.24) and blood transfusions (OR=1.9; 95%CI 0.79-4.9; p=0.11) although they were not statistically. Exposure to exogenous estrogen and dyes was not associated with SLE.

**Conclusion:** In this population of SLE patients, both exogenous and endogenous risk factors have been identified. Our data show that patients with hypertension, drug allergies, and a family history of SLE are at risk of developing SLE. Alcohol consumption (over 200 g/month) was associated with a reduced risk of SLE in our group of patients.

## P908

### EFFECTS OF STREPTOZOTOCIN-INDUCED DIABETES ON MICROELEMENTAL COMPOSITION OF THE HUMERUS IN RATS OF DIFFERENT AGES

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**Objective:** To investigate changes of microelemental composition of the humerus in streptozotocin-induced diabetic rats of different ages.

**Methods:** 210 male rats were selected for the experiment and three age groups were formed as follows: infantile animals (aged 1 month, body weight 45-50 g), juvenile (aged 3 months, body weight 135-150 g), and of presenile age (aged 17-18 months, body weight 290-310 g). Streptozotocin-induced diabetes was caused by a single intraperitoneal injection of streptozotocin in dosage 55 mg/kg (35 animals in each age group). The controls for each group were the intact animals (35 animals in each age group). Upon expiration of observation terms right humeri were prepared for chemical analysis.

**Results:** Streptozotocin-induced diabetes led to destabilization of the microelemental composition of humeri. In infantile rats copper and zinc shares decreased as compared to the 1st group values from the 15th to the 90th day by 7.65%, 9.40%, 9.40% and 10.26%, and by 6.07%, 6.85%, 5.59% and 7.47% respectively and manganese share from the 7th to the 90th day by 7.46%, 10.76%, 7.51%, 7.95% and 10.12%. In juvenile rats decreased as compared to the 1st group from the 7th to the 90th day by 7.46%, 10.76%, 7.51%, 7.95% and 10.12%, and copper and manganese shares from the 15th to the 90th day – by 7.65%, 9.40%, 9.40% and 10.26%, and by 6.07%, 6.85%, 5.59% и 7.47% respectively. In presenile rats copper, zinc and manganese shares decreased as compared to the 1st group values from the 7th to the 90th day by 6.97%, 9.53%, 11.50%, 11.06% and 10.90%, by 7.79%, 5.59%, 10.05%, 11.40% and 16.96%, and by 10.11%, 8.81%, 14.91%, 11.88% and 13.33% respectively (p<0.05 in all cases).

**Conclusion:** Streptozotocin-induced diabetes led to destabilization of the microelemental composition of humeri in rats of different ages. In infantile and juvenile rats alterations observed in the period from the 7<sup>th</sup> to the 90<sup>th</sup> day of observation yet beginning from the 60<sup>th</sup> day restoration signs appeared. In older animals, especially in ones alterations only grew with time.

P909

### ADHERENCE TO TREATMENT IN PATIENTS WITH OSTEOARTHRITIS DURING THE COVID-19 PANDEMIC

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**Objective:** Supplementation with products based on collagen, chondroitin, glucosamine and plant-based products is an important means of osteoarthritis (OA) treatment. The aim of our study was to assess the adherence to treatment with supplements in patients with OA during the COVID-19 pandemic [1, 2].

**Methods:** Our study included 127 patients with mean age of 65.8±8.2 y diagnosed with lower limb OA over the last 10 y. A questionnaire was given to the patients during the visit to the general practitioner which included the medication used over the last year and the number of visits to the specialist during the last year. All the patients had been prescribed supplements for the OA.

**Results:** Regarding the number of visits to the specialist doctor, the individuals stated that only 23.62% had an appointment with the specialist in the last year. The other 76.38% stated that they had followed the recommendations received at the last appointment. The majority of patients (77.16%) used either analgesics or nonsteroidal anti-inflammatory drugs (NSAIDs) over the last year, compared to only 44.09% who used supplements in order to manage the symptoms.

**Conclusion:** The majority of patients were more adherent to analgesics and NSAIDs rather than supplements, preferring a faster relief of their symptoms.

#### References:

1. Bobircă A, et al. *Biology (Basel)* 2021;10:561
2. Bobircă A, et al. *Life (Basel)* 2022;12:77

P910

### ACHILLES TENDON INVOLVEMENT IN SPONDYLOARTHRITIS: AN ULTRASOUND STUDY

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**Objective:** Axial spondyloarthritis (ax-SpA) are characterized by axial skeleton (spine, sacroiliac joints) and enthesal involvement, which frequently associate extra-articular manifestations in the presence of HLA-B27 antigen [1, 2]. The purpose of our study is to identify the frequency of Achilles tendon enthesitis in a group of patients with ax-SpA using musculoskeletal ultrasound (MSUS).

**Methods:** The study group included 38 patients diagnosed with ax-SpA according to Assessment of Spondyloarthritis International Society (ASAS) criteria, 31 males and 7 females, with mean age of 39.7±4.7 y. All the patients were evaluated clinically, biologically, but also ultrasonographically using a MyLabSix ultrasound machine equipped with a linear probe with frequencies between 6-18 MHz.

**Results:** ESR mean values were 32.5±2.5 mm/h, while C-reactive protein (CRP) mean values were 13.7±3.2 mg/L. The majority of patients (71.05%) had high disease activity calculated using Ankylosing Spondylitis Disease Activity Score (ASDAS)-CRP. From the clinical point of view, 30 Achilles tendons were tender at palpation. From the ultrasound point of view, out of the 76 Achilles tendons examined, 42 enthesal sites showed inflammatory changes, as follows: thickening - 38 tendons, hypoechogenicity - 38 tendons, loss of fibrillary appearance - 38 tendons, enthesophytes - 32 tendons, calcifications - 28 tendons, erosions - 28 bone cortices, power Doppler signal - 12 tendon, retrocalcaneal bursitis - 12 bursae and retro-Achilles bursitis - 10 bursae.

**Conclusion:** Using MSUS we were able to detect subclinical involvement of the Achilles tendon in ax-SpA patients.

#### References:

1. Bobircă A, et al. *Life (Basel)* 2022;12:77
2. Florescu A, et al. *Life (Basel)* 2021;11:218

P911

### PREMATURE MENOPAUSE: RISK FOR EARLY ONSET OSTEOPOROSIS?

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**Objective:** Skeletal mass increased rapidly during childhood and adolescence. Many chronic diseases of young adulthood can lead with low BMD such as inflammatory, endocrine, neurological, renal diseases or several types of cancer and also premature menopause. Premature menopause is related with menopause that occurs before age of 40 years and can be spontaneous or induce by surgical interventions. The aim of this study was to assess the prevalence of early onset osteoporosis in a group of 35 premature menopause women compared to control group of 40 natural postmenopause women.

**Methods:** We performed a retrospective study over 2 y and we made comparisons between two groups: first with premature menopause (n=35) and second with natural menopause (n=40). Hip and lumbar spine BMD was performed by DXA in the two groups.

**Results:** The mean age of premature menopause patients was  $37.6 \pm 1.5$  y and the median age of natural menopause was  $53.2 \pm 1.6$  y. Femoral T-score was significant lower in the study group with range between -1.67 and -2 compared with control group who range T-score between -0.43 and -1.7. When measure T-score at lumbar spine in the two groups, we observed similar results with hip T-score: in premature menopause group T-score range between -1.72 and -2.76 compared with control group where T-score range between -1.49 and -2.63. In addition, in the study group we had 51.42% (n=18) patients with osteoporosis compared with 37.5% (n=15) patients from control group.

**Conclusion:** Both, femoral and lumbar spine BMD, were lower in the study group and early onset of osteoporosis is more frequent in women with premature menopause compared with women with natural menopause.

## P912

### PERTROCHANTERIC FRACTURES: TREATMENT AND REHABILITATION IN ELDERLY PATIENTS

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**Objective:** The incidence of hip fractures is increasing and the annual number worldwide is estimated to rise from 1.7 million in 1990 to 6.3 million by the year 2050. This will be a major challenge to the health care system and society. Most hip fractures are related to osteoporosis. We aimed to evaluate the effects of treatment and physical rehabilitation with kinesiotherapy and magnetotherapy vs. kinesiotherapy and therapy with interference currents of patients with surgically treated pertrochanteric fracture with DHS, according to the protocol results monitoring.

**Methods:** The study represents a prospective randomized clinical trial. Include two groups, with 90 participants with surgically treated pertrochanteric fracture with DHS. Respondents are divided in two groups: Examined cohort - 45 patients is treated with kinesiotherapy and magnetotherapy and control group - which has 45 patients treated with kinesiotherapy and therapy with interference currents. Patients were followed for one year, during which were performed three examinations, from the first review which is input for selected patients who meet the criteria for inclusion in research.

**Results:** It is recognized that, kinesiotherapy and magnetotherapy for  $p < 0.05$ , increase Harris hip score (improve the condition of patients) in three time combinations. It is recognized that, kinesiotherapy and interference currents, for  $p < 0.05$ , increase Harris hip score (improve the condition of patients) in three time combinations.

**Conclusion:** In the postoperative rehabilitation of pertrochanteric fractures with dynamic fixation implant-DHS, therapy of choice is kinesiotherapy and magnetotherapy it resulted with improvement in the functional status, the stimulation of osteogenesis and quality of life in elderly patients.

## P913

### EFFICACY OF SCHROTH THERAPY AND SCOLIOSIS SLC BRACE IN THE TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS: A RETROSPECTIVE STUDY

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**Objective:** To determine the effectiveness of Schroth therapy combined with Scoliosis SLC brace in the treatment of adolescent idiopathic scoliosis.

**Methods:** Patients with adolescent idiopathic scoliosis were recruited from Scoliosis Spine Laser Center in Athens, between September 2020 and January 2022. They were instructed to wear the Scoliosis SLC brace for 18 h/d. In addition they were attending a supervised Schroth exercise program according to their Schroth scoliosis classification twice per week. The duration of the supervised program was 1 h for 4 weeks and once per week for the next 5 months. The patients have been instructed to repeat their exercises at home 5 times a week for 30 min. Evaluation and comparison of the results for the Cobb Angle and Angle of trunk rotation took place at 6 months' time.

**Results:** The sample comprised ten (10) patients with adolescent idiopathic scoliosis with a mean age  $13.7 \pm 1.61$  y. Mean Cobb angle of the main curve at baseline was  $31.9 \pm 12.35^\circ$  and ATR  $12.2 \pm 3.81^\circ$ . After 6 months the mean Cobb angle dropped to  $26.3 \pm 10.57^\circ$  ( $p < 0.05$ ) degrees and the angle of trunk rotation dropped to  $8 \pm 2.36^\circ$  ( $p < 0.05$ ).

**Conclusion:** Schroth exercise treatment combined with a 3D orthosis positively influenced the Cobb angle and angle of trunk rotation in outpatient adolescents.



P914

**SMOKING: THE SILENT KILLER OF THE BONES TOO?**C. S. Ciofu<sup>1</sup>, B. I. Gavrilă<sup>2</sup>

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**Objective:** We present the case of an elder female patient, 76 years old, diagnosed with postmenopausal osteoporosis (T-score lumbar spine -3.1), for which, in 2019, treatment is initiated with vitamin D 2000 IU and 1200 mg of calcium daily. She is also known with high blood pressure stage III, ischemic heart disease, aortic atherosclerosis, chronic bronchitis due to smoking (10-15 cigarettes per day for about 50 y).

**Methods:** After 1 year, in January 2020, she repeats DXA exam that shows the progression of the T-score in the lumbar spine (-3.4) and osteopenia at the hips (mean T-score -1). In this context, in association with vitamin D/calcium we add risedronic acid 35 mg weekly. Also, the patient is encouraged to perform daily physical activity within tolerance and quit smoking.

**Results:** In February 2021, the patient presented for re-evaluation, complaining of pain in the thoracic spine. At the physical examination we note kyphosis, and x-rays of the spine shows thoracic vertebral fractures. The DXA exam indicates a T-score progression (-3.6 vs. -3.4) compared to the last 1 year assessment. The FRAX score is also achieved: 10-y probability of fractures 8.8% for major osteoporotic fracture and 1.9% for hip fracture. Calcium and vitamin D are dosed with normal values. We add to the basic treatment for osteoporosis denosumab 60 mg subcutaneously at 6 months. Several laboratory investigations are also being performed to rule out the secondary cause of osteoporosis as thyroid function tests including thyroid stimulating hormone, free T4, cortisol levels, parathormone, glycated hemoglobin-normal values, no inflammatory tests present. The evaluation from February 2022, we find again the progression of the T-score (-4). The patient tells us that due to the psychological stress of the last year, the number of cigarettes smoked daily has been increased to 20.

**Conclusion:** Given the progression of T-score values, in terms of identifying a secondary cause of osteoporosis, is smoking the real candidate for progression of osteoporosis?

P915

**ANGIOPOIETIN-LIKE PROTEIN TYPE 4 AS AN INDICATOR OF SPINAL OSTEOPOROSIS IN RHEUMATOID ARTHRITIS PATIENTS**V. A. Aleksandrov<sup>1</sup>, G. Y. A. Osmanova<sup>1</sup>, A. V. Aleksandrov<sup>1</sup>, L. N. Shilova<sup>2</sup>

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**Objective:** To evaluate the role of angiopoietin-like protein type 4 (ANGPTL4) in the progression of osteoporotic processes in rheumatoid arthritis (RA).

**Methods:** The study included 86 patients with reliable RA who underwent radiography of the lumbar spine and DXA with assessment of BMD twice (at admission and 24 months later). The Ray-Bio Human ANGPTL4 ELISA Kit (RayBiotech, USA) was used to detect ANGPTL4 in blood serum.

**Results:** A strong association of ANGPTL4 and osteoporotic changes in the lumbar spine (BMD L<sub>1-4</sub>, r=-0.37, p=0.026) was found. Also the level of ANGPTL4 in RA patients correlated significantly with the Sharp score of radiological changes (r<sub>s</sub>=0.39), the number of fractures at L<sub>1-4</sub> at baseline (r<sub>s</sub>=0.32) and after 24 months (r<sub>s</sub>=0.51). Patients with high ANGPTL4 levels (>6.8 ng/mL) had a significantly higher risk of spinal fracture at the L<sub>1-4</sub> level than patients with normal ANGPTL4 levels (OR: 2.88; 95%CI 0.81-10.2). The previously found correlation of ANGPTL4 with elevated levels of circulating RANKL, a serum marker of bone resorption, confirms the role of ANGPTL4 in osteoclast-mediated bone resorption. It is believed that ANGPTL4 can also regulate osteoclast activity through the hypoxia/HIF (hypoxia-inducible factor) system, increasing osteoclastic bone resorption.

According to the anamnestic data, 13 (15%) people initially had a fracture in the lumbar spine. During the 2 y of follow-up, new vertebral fractures were noted in 7 (53.8%) people with a history of fractures and in 20 (27.4%) patients without previous fractures. The presence of low-energy fractures in RA patients in the lumbar spine was associated with a higher risk of fractures within 2 y (OR: 3.09; 95%CI 0.93-10.3).

**Conclusion:** ANGPTL4 can act as an indicator of osteoporotic processes in the spine in RA. RA patients with baseline vertebral fractures at the L<sub>1-4</sub> level and high serum ANGPTL4 concentrations are at high risk for low-energy fractures at follow-up.

P916

## NOVEL BODY COMPOSITION APPROACHES WITH DXA: COMPARISON WITH CLASSICAL TOTAL BODY SCANS

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**Objective:** Traditionally, total body (TB) DXA scans to assess body composition include the entire body, however novel abbreviated scan acquisition methods are available in new software. For example, total body less head (TBLH) is recommended given the head contains lean mass that cannot be altered by intervention. Recently, a neck to knee (N-K) acquisition option is available, and potentially, lower extremity scans might be useful to evaluate regional mass change. The purpose of this study was to evaluate comparability of measured and estimated body composition results using TBLH, N-K and lower extremity (LE; pelvis to toes) acquisition techniques. We hypothesized that body composition data with the 3 novel methods would not differ from traditional TB method.

**Methods:** Each subject had TB, TBLH, N-K and LE scans. A subset of 30 had repeat N-K and LE scans with repositioning between. A Lunar iDXA (GE, USA) with enCORE v18.0 was used to acquire and analyze scans. TB scans were acquired per ISCD guidance, TBLH and N-K scans using automated software features that limited the anatomy scanned; N-K estimates non-scanned leg mass. LE scans started at L3 and auto stopped past the toes. Automated analysis, with manual correction, was used for all but LE scans which were analyzed manually by compressing all upper body ROIs above the pelvis then placing lower body ROIs per manufacturer recommendation. Pearson Correlation and Bias plots were used to compare regional lean, fat and BMC measurements from the 3 novel scans to TB. Precision determined by the ISCD Precision Calculator was compared to TB historical control by F-test.

**Results:** The study sample included 82 subjects, 41F/41M mean (SD) age 51.0 (18.4) y and BMI 25.5 (3.7) kg/m<sup>2</sup>. Mean lean, fat and bone mass were very similar among all approaches with some statistical, but likely not clinical, differences (Tables 1&3). Composition from all regions with the 3 novel methods was highly correlated with TB measurement,  $r=0.99-1.0$ , ( $p<0.001$ ) with mean bias of 14-237g lean, 7-121g fat and 0.3-13.3g BMC (Table 2). Correlations were similar in men, women, age<50 and>50y with  $r=0.96-1.0$  ( $p<0.001$ ). N-K and LE precision was excellent ranging from 0.45-2.31 %CV (Table 3).

Table 1: Mean Body Composition Measurement of 4 Scan Methods

Scan Type	Lean Mass (g)				Fat Mass (g)				BMC (g)			
	TBLH	Arms	Legs	Trunk	TBLH	Arms	Legs	Trunk	TBLH	Arms	Legs	Trunk
TB	46,854 (11,206)	5752 (2050)	17,081 (4027)	24,021 (5435)	20,878 (8701)	2294 (989)	7126 (3076)	11,458 (5564)	2211 (586)	380 (115)	1020 (264)	813 (225)
TBLH	46,840 (11,252)	5791 (2066)	17,093 (4019)	23,957 (5476)	20,871 (8729)	2276 (1002)	7116 (3089)	11,479 (5571)	2219 (584)	379 (115)	1020 (263)	819 (224)
N-K	46,639 (11,306)	5806 (2085)	16,844 (4134)	23,989 (5445)	20,759 (8680)	2275 (994)	7006 (3005)	11,479 (5560)	2215 (577)	379 (115)	1010 (254)	826 (225)
LE	NA	NA	17,019 (4023)	NA	NA	NA	7067 (3083)	NA	NA	NA	1016 (259)	NA

Data presented as mean (SD). Colored cells different than standard total body  $p < 0.05$

Table 2: Body Composition Bias Compared to Classic Total Body Acquisition Method

Scan Type	Lean Mass (g)				Fat Mass (g)				BMC (g)			
	TBLH	Arm	Legs	Trunk	TBLH	Arms	Legs	Trunk	TBLH	Arms	Legs	Trunk
TBLH	-14	38	12	-64	-7	-18	-10	21	7.2	-0.5	0.6	7.1
N-K	-215	54	-237	-32	-119	-19	-121	21	3.3	-0.3	-9.6	13.3
LE	NA	NA	-61	NA	NA	NA	-59	NA	NA	NA	-0.9	NA

$R \geq 0.99$  and  $p < 0.001$  for all correlations

Table 3: Body Composition Precision by Acquisition Technique and Region

% CV	Least Significant Change (g)			
	Arms	Legs	Trunk	TBLH
NTK BMC	1.01	0.75	1.55	0.82
NTK Fat	2.31	1.05*	2.28	1.21
NTK Lean	1.25*	0.85	1.07	0.53
LE BMC	NA	0.45*	NA	NA
LE Fat	NA	0.93*	NA	NA
LE Lean	NA	0.49*	NA	NA

\*Different (improved) from historical TB precision

**Conclusion:** These 3 novel approaches to measure or estimate regional body composition are consistent with traditional TB measurement and may be considered as substitutes when appropriate.

P917

## CONSOLIDATION OF A LOWER JAW FRACTURE UNDER THE INFLUENCE OF THE DRUG OSTEOGENON

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**Objective:** In the complex treatment of patients with a fracture of the lower jaw, it is necessary to take into account the nature of dysregeneration and the degree of functional suitability of the bone. The inclusion in the rehabilitation complex of Osteogenon, which is mainly used for the prevention and treatment of systemic osteoporosis, helps to prevent many complications of injury and undesirable consequences of prolonged immobilization, ensures the restoration of masticatory activity after removing the splints

in the optimal time. The aim of our study was to determine the nature of the effect of Osteogenon on the processes of bone regenerate mineralization in patients with mandibular fracture.

**Methods:** Under observation were 80 patients, all males with a unilateral fracture of the lower jaw in the area of the molars and angle, aged 20-48 y. All the victims were divided into two groups, each - 40 patients. To study the nature of bone tissue damage, including the entire skeleton, we used the Achilles ultrasonic densitometer (Lunar).

**Results:** A comparative comparison of the initial data on bone metabolism in patients with mandibular fractures made it possible to establish that 60.83% of them had osteopenic syndrome, which manifested itself in a decrease in the levels of phosphorus and calcium in the blood serum. These changes had a high degree of reliability in comparison with the norm.

**Conclusion:** The results of the study of the levels of calcium and phosphorus in the blood plasma show that in patients with a fracture of the lower jaw, before the start of treatment, there are pronounced changes in the structural and functional state of the bone tissue, which make it possible to identify the osteopenia syndrome in 60.83% of patients. After treatment, these indicators increase towards the norm, most pronounced in the representatives of group I against the background of the use of Osteogenon.

## P918

### HUMANISTIC BURDEN OF JUVENILE IDIOPATHIC ARTHRITIS IN THE ERA OF BIOLOGIC MEDICATION

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**Objective:** Juvenile idiopathic arthritis (JIA) is a heterogeneous, incurable, inflammatory syndrome in children which mainly affects the joints. The long-term outcomes remain unclear and it is associated with a substantial humanistic burden with extensive socio-economic impact. Therefore, the objective of this study was to systematically summarize the landscape in terms of the current available evidence assessing the humanistic burden of JIA in the era of biologic medication.

**Methods:** A systematic search on MEDLINE and Cochrane Central Register of Controlled Trials, was performed with pairing relevant keywords to identify the English language articles published in the last 10 years. The eligible studies measuring the humanistic burden of disease in JIA. The Health related quality of life (HRQoL) captured with generic measures or patients reported outcomes instrument.

**Results:** Out of 8 studies (n=1348), 3 studies were cross-sectional, 4 studies were cohort and one study was controlled trial. HRQoL assessed using child health questionnaire (CHQ), Kidscreen-52,

and pediatric quality of life inventory (Peds QL). HRQoL measures were completed by children (n=3), parents (n=1), children and proxy reports from their parents (n=3). One study not reported, who had completed the questionnaire. A study reported, total mean of Peds QL increased from 72.2 at baseline to 88.8 after 6 months of prescribed etanercept. Peds QL score ranged from (0-100), higher scores indicating a better HRQoL. Mean score of CHQ, psychosocial outcomes and physical outcomes improving from 43.6 to 49.2 and from 49.6 to 51.7 respectively for patients receiving abatacept. Some studies reported, economic burden, social acceptance, pain and poor sleep associated with diminished HRQoL.

**Conclusion:** Patients with JIA experience significant impairment in HRQoL, and the current evidence suggested that this improved while on biologic medication. Further randomized controlled trials and real-world studies are required to capture treatment associated HRQoL outcomes.

## P919

### EVALUATION OF OSTEOPOROSIS FREQUENCY AND RISK FACTORS IN HIDRADENITIS SUPPURATIVA PATIENTS

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**Objective:** Hidradenitis suppurativa (HS) is a chronic, progressive, debilitating, recurrent, and inflammatory skin disease characterized by painful, deep-seated, highly inflamed nodules and draining tunnels in the intertriginous areas of the body. HS and psoriasis have overlapping immunopathogenic pathways as well as inflammation-related comorbidity patterns. Type 1 and 3 cytokines such as TNF $\alpha$ , interferon-c, IL-1a/b, IL-6, IL-8 and IL-17 are increased in both HS and psoriasis. Recent studies have shown that patients with psoriasis may be at increased risk of pathological fractures and osteoporosis (OP). Some cytokines and pro-inflammatory molecules (for example, IL-1, IL-6, IL-11, IL-15, IL-17, RANKL and TNF $\alpha$ ) have a direct effect on bone and can accelerate bone loss. Since HS and psoriasis have overlapping immunopathogenic pathways and inflammation-related comorbidity patterns, HS patients may be at increased risk of pathological fractures and OP, similar to those in patients with psoriasis. This study aimed to evaluate the frequency and risk factors of OP in patients with HS.

**Methods:** Patients aged  $\geq 18$  y with a diagnosis of HS, whose BMD was evaluated by bone mineral densitometry, were included in our retrospective study. Patients under the age of 18, pregnant patients, patients with liver failure, kidney failure, heart failure and those with a history of cancer were excluded. Demographic and clinical features, BMD results (L1-L4 total, Femur neck and Femur

total T-score, Z-score, BMD), exercise habits and fracture history of the patients were recorded. 25 OH vitamin D, calcium, phosphorus, parathormone, hemoglobin level, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) as well as thyroid, liver and kidney function tests were recorded.

**Results:** A total of 57 HS patients (20 female, 37 male; mean age 34.8 y, and BMI 28.8 kg/m<sup>2</sup>) were included. Most of the participants had no systemic disease (63%) and were smokers (68.4%). The mean disease duration of the patients was 7.3 y and most were Hurley stage 3. Mean ESR, CRP and 25 OH vitamin D were 23 mm/h, 15 mg/L and 17.7 ng/mL respectively. When demographic and clinical data were compared between female and male patient groups, there was a statistically significant difference in age, smoking and duration. While there was no comorbidity in 63% of the patients; diabetes and hypertension were the most common comorbidities. When the bone densitometry results of all patients were examined, the mean L1-L4 total T-score was -0.8 (min-max: -3.5/1.1), Z-score was -0.7 (min-max: -3.3/1.2). In the bone densitometry results, the frequency of patients with a value of -1 and below in the femoral neck, femur total and L1-L4 total T and Z-scores was 59.6%. When the bone densitometry results of female and male patients were compared, it was determined that the L1-L4 total T-scores of the men were significantly lower. Moreover, when the bone densitometry results of under the age of 40 and over age groups were compared, no statistically significant difference between the bone densitometry results of the age groups under 40 and over in women were detected. On the contrary, it was observed that there was a statistically significant difference in the femoral neck T-scores and femoral neck BMD values between the age groups below the age of 40 and over in men. While bone densitometry results were correlated with age, BMI, and duration of smoking, they were not correlated with HS disease stage, disease duration, sedimentation, CRP, and vitamin D. In addition, 6 patients had a history of fractures, 5 of these fractures were due to low-energy trauma, and 3 of those (distal radius) were major osteoporotic fractures.

**Conclusion:** Increased smoking in HS patients is noteworthy and smoking is a risk factor for osteoporosis. This study draws attention to the frequency of decreased BMD at an early age in HS patients. Considering the fact that most of the fragility fractures due to osteoporosis are seen before the bone densitometry results reach -2.5 and below; accurate evaluation of risky patients, early diagnosis and treatment as well as prevention of fractures and related mortality, morbidity and deterioration in quality of life are very important. Collaboration of dermatology and physiatry is very important in the management of accompanying medical comorbidities.

P920

## IMPACT OF ROMOSUZUMAB ON BONE MINERAL DENSITY IN POSTMENOPAUSAL OSTEOPOROSIS

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**Objective:** Worldwide, osteoporosis in postmenopausal women remains a substantial public health burden. In postmenopausal women, normal bone turnover cycles are impaired, resulting in reduced BMD and increased risk of vertebral and nonvertebral fracture. Romosozumab has been indicated to be effective treatment and associated with increased BMD in postmenopausal women. However, the evidence of efficacy and safety of this new drug is not well documented. Therefore, we estimated the effect of romosozumab on changes in BMD and incidence of new adverse events using a meta-analytic approach.

**Methods:** A systematic search on MEDLINE, Cochrane Library, Web of Science, and Clinical trial.gov was performed to identify English language articles. The outcome measures were changes in lumbar spine, total hip and femoral neck BMD, incidence of adverse events, and fractures. A random-effect model was used to calculate the weighted mean difference (WMD) and relative risks (RR) with 95%CI.

**Results:** A total of 10 RCTs were included in this metanalytic synthesis. Results from meta-analysis showed that BMD was significantly increased at the lumbar spine (WMD=12.61, 95%CI 8.52-16.70, p<0.00001), total hip (WMD=3.71, 95%CI 2.42-5.01, p<0.00001) and femoral neck (WMD=3.21, 95%CI 1.75-4.68, p<0.00001). There was also significant difference in increasing BMD at lumbar spine (WMD=6.19, 95%CI 4.23-8.14, p<0.00001), total hip (WMD=3.15, 95%CI 2.66-3.64, p<0.00001) and femoral neck (WMD=3.08, 95%CI 2.59-3.57, p<0.00001) in patients with romosozumab compared to other therapies (teriparatide/alendronate). Romosozumab significantly lowers the risk of new vertebral and non-vertebral fracture compared with control group. Additionally, there was no significant difference in the incidence of overall adverse events in patients with romosozumab compared to placebo and other active treatment (RR 1.00, 95%CI 0.98-1.02, p<0.94) and (RR 0.98, 95%CI 0.89-1.07, p<0.64).

**Conclusion:** The current evidence suggests, romosozumab showed higher gains in BMD, and significantly lower the risk of fracture in postmenopausal women with osteoporosis. Further, RCTs are required to confirm the present findings.



P921

### MECHANISM OF MUSCULOSKELETAL DISORDERS IN COVID-19 PATIENTS

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**Objective:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is taxonomically pathogenic strain of SARS-CoV (severe acute respiratory syndrome coronavirus). Most common musculoskeletal disorders as tiredness and muscle pain are often indicate in clinical symptoms of COVID-19. The study is to investigate the view on scientific literature about musculoskeletal disease and its connection with the coronavirus infection by indicating the mechanism of damage of musculoskeletal tissue.

**Methods:** Analysis and review of recent scientific literature about mechanism and variety of MS disorders in COVID-19 patients.

**Results:** Mechanism of MS disorders takes place in the COVID-19 pathogenesis and consists of the factors such as: the tropism of SARS-COV-2 virus to ACE-2 (angiotensin convertase enzyme) receptors on mucosal epithelium, the existence of TMPRSS2 (transmembrane protease serine 2) and activation of inflammation process as response to immunity to SARS-COV-2 virus invasion into host cells. ACE-2 is an enzyme with N-glycosylated N-terminal and carboxypeptidase sites, that replicates in smooth muscle and pericytes. The virus- binding protein TMPRSS2, like ACE-2 enzyme, promotes the penetration of SARS-COV-2 into host cells. In compare to ACE-2 enzyme TMPRSS2 produces by endothelial cells, smooth muscle cells, pericytes, muscle stem cells, macrophages, muscle fibers and B-, T-lymphocytes, natural killers. The immune cells like T-lymphocytes activate proliferation of fibroblasts and osteoclasts also, the cells activate synthesis of cytokines and signaling molecules such as IL- (1, 6, 8, 17), IFN (interferon gamma) and TNF. The activation of T-lymphocytes cause the damage of bones and cartilages. The TNF- and IL-1 can trigger tendinopathy by activity of tenocytes, while TNF-, IL-1, and IL-6 induce chondrolysis leading to arthralgia or the progression of osteoarthritis. Therefore, these inflammatory molecules may be involved in the decreased muscle strength and endurance and increased bone fragility associated with COVID-19 infection.

**Conclusion:** In accordance with the realities, as we can understand, COVID-19 has caused a pandemic situation in the world. Despite the fact that COVID-19 is a respiratory disease, it

often affects other vital organs and systems, including skeletal-muscular. Moreover, symptoms like tiredness and muscle pain are often recognize as a clinical of patients with COVID-19.

P922

### USE OF TERIPARATIDE IN PATIENT WITH TYPE 1 DIABETES MELLITUS AFTER RECONSTRUCTIVE SURGERY OF CHARCOT FOOT USING EXTERNAL FIXATION: CASE REPORT

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**Objective:** Charcot foot is a severe complication of DM and is a progressive lesion of bone tissue, manifested by inflammation and bone resorption, leading to foot deformity. The results of surgical treatment using an external fixation device depend on the ability of the bone tissue to repair. Patients with diabetes mellitus have a low regenerative potential. The purpose of this study was to investigate the potential of teriparatide as a safe and feasible option in the treatment of Charcot neuroarthropathy after reconstructive surgeon.

**Methods:** A 34-year-old female with DM 1 type presented to clinic with chief concern of a painful right foot. The focused lower extremity exam was significant for hindfoot edema, rocker bottom deformity, notable plantar prominences along the tarsometatarsal joints with corresponding preulcerative lesions, and severe forefoot abduction. The operation was performed: calcaneo-tibial arthrodesis on the right, fixation in the Ilizarov AVF, after 6 months dismantling external fixation. In connection with the shortening of the limb, a corrective osteotomy of the bones of the right leg was performed, an Ilizarov external fixation apparatus was installed on 4 modules. In the postoperative period, a crack in the regenerate was formed. According to the DXA result, BMD in the proximal femur decreased to -2 SD by Z-score, to -1.7 SD in the lumbar spine and to -3.0 SD in the radius. For 4 months, taking teriparatide 20 µg/d, a monthly administration of 50,000 IU vitamin D3.

**Results:** Osteocalcin level was 133.1 ng/ml (11-43), Crosslinked N-telopeptide of type I collagen - 1.69 ng/ml 9 (0.3-0.57), 25OH vitamin D - 58.6 ng/ml (30-100). DXA + 9.7% increase in BMD in the radius, + 5% in the femur. According to X-ray data, positive dynamics in relation to the formation of bone regenerate of the bones of the lower leg, the process of formation of cortical plates, increased bone density in the posterior-outer quadrant of loose callus against the background of visible elongation of the tibial shaft.

**Conclusion:** The Charcot foot leads to irreversible disability and increases the direct and indirect costs of providing care to this category of patients. Pharmacological options for the condition are currently limited. The treatment of local osteoporosis is the main determinant of the success of orthopedic surgeries.

P923

### COGNITIVE IMPAIRMENT FEATURES OF ELDERLY PATIENTS WITH UNDERGOING HIP FRACTURE SURGERY

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**Objective:** To study the cognitive status and incidence of late postoperative complications in the treatment of a fracture of the proximal femur in the elderly.

**Methods:** 86 patients (mean age 65.2±6.3 y) operated within 48 hours from the moment of injury. Metal osteosynthesis of the femur was performed in 15 patients (17.4%), total hip arthroplasty with a cement option for installing the endoprosthesis was performed in 71 patients (82.6%). Cognitive function was assessed using the MoCA test on days 2-4 after surgery.

**Results:** According to the results of the MoCA test, 2 groups of patients were formed: 40 people with mild or moderate cognitive impairments - who scored <26 points (21.7 + 0.49 points) and 46 patients without cognitive impairments (27.4 + 0.58 points). Mild and moderate cognitive dysfunction in the postoperative period was reflected 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 direct and reverse order, subtraction by 7) and speech (repetition of sentences). It is these mental processes that underlie the assessment of the patient's rehabilitation potential, which involves the determination of somato-personal abilities to predict the level of recovery possibility. A negative contribution to the difficulties in performing tasks to test the visual-constructive and executive skills of the scale is also made by a forced position associated with trauma.

**Conclusion:** Assessment of the cognitive status of elderly trauma patients is a simple and informative tool in predicting late postoperative complications associated with the migration of metal structures, slowing down consolidation, and the development of contractures. We consider it necessary to focus the attention of medical personnel and family members caring for patients on strict adherence to the rehabilitation treatment plan. We believe that the strengthening of external control, even with insufficient efforts of the patient himself, due to a decrease in cognitive functions, will lead to a smoother course of the late postoperative period.

P924

### PRIMARY HYPERPARATHYROIDISM IN THE SETTING OF RHEUMATOID ARTHRITIS AND OSTEOPOROSIS

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**Objective:** Rheumatoid arthritis is a systemic autoimmune inflammatory disease characterized by severe pain, if left untreated. Primary hyperparathyroidism is a systemic disorder characterized by disordered calcium metabolism leading to increased serum calcium and PTH levels. Primary hyperparathyroidism may be due to the presence of a parathyroid adenoma or parathyroid hyperplasia. The aim was to present a cohort of patients with rheumatoid arthritis who presented with primary hyperparathyroidism and osteoporosis.

**Methods:** A cohort of patients with rheumatoid arthritis is presented. Three patients with active rheumatoid arthritis are described.

**Results:** Patients were female, aged 58, 65 and 67 years old. They had seropositive rheumatoid arthritis, anti-CCP positive, RF positive and had severe pain on treatment with methotrexate and corticosteroids. During laboratory evaluation increased calcium levels were observed along with increased PTH levels and osteoporosis was diagnosed by a DXA scan. In further evaluation an ultrasonogram revealed the presence of a parathyroid adenoma adjacent to the thyroid in two of the patients, while in the other scintigraphy with <sup>99m</sup>Tc-SESTAMIBI was performed which revealed an adenoma beneath the left lobe of the thyroid gland. Surgical removal of the parathyroid adenomas was planned. For the management of rheumatoid arthritis biologic therapy was introduced. Bisphosphonates were administered for osteoporosis.

**Conclusion:** Primary hyperparathyroidism in the context of rheumatoid arthritis is rare. If diagnosed it may require surgical removal of the parathyroid adenoma as increased calcium levels may aggravate pain in the setting of systemic inflammation. The diagnosis of primary hyperparathyroidism in the setting of rheumatoid arthritis may be due to routine screening for calcium levels on biochemical evaluation. Osteoporosis in the context of rheumatoid arthritis and primary hyperparathyroidism may have multifactorial pathogenesis. Removal of the parathyroid adenoma may lead to improvement in BMD.

P925

## A COMPARISON OF IRELAND DXA FRAX AND WEB FRAX: PRELIMINARY RESULTS OF THE DXA-HIP STUDY

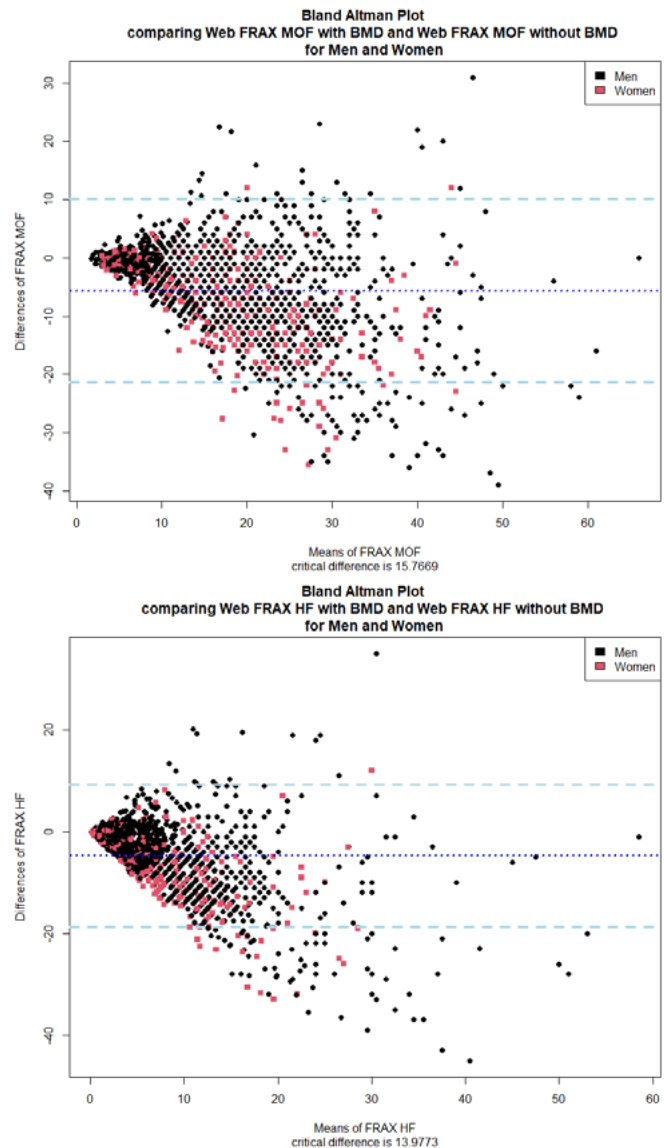
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**Objective:** Osteoporosis and its associated fractures are one of the most prevalent diseases in Ireland. A number of algorithms have been developed to estimate fracture risk whose performance varies considerably between populations. FRAX has emerged as the dominant fracture risk assessment tool worldwide, calculating the average 10-y risk of major osteoporotic fracture (MOF) risk and hip fracture (HF) in people aged 40-90. FRAX has the option to include multiple risk factors such as glucocorticoids and a parental history of hip fracture, and is the recommended tool by The International Society for Clinical Densitometry and the International Osteoporosis Foundation. A particularly appealing aspect of FRAX is the ability to calculate MOF and HF using the web version, with or without DXA availability. We aimed to compare the 10-y MOF and HF risk obtained from the FRAX website for Ireland with and without a BMD measurement (hereinafter referred to as Web-FRAX), with results of the DXA FRAX tool embedded in the GE machine (hereinafter referred to as DXA-FRAX).

**Methods:** We used the DXA-FRAX tool for Ireland and FRAX website tool for Ireland to calculate 10-year fracture estimates of MOF and HF amongst a subgroup of individuals aged 40 to 90 years in the DXA-HIP cohort. DXA protocols, including calculation of femoral neck (FN) T-scores were performed as recommended by the International Society for Clinical Densitometry. A cross-sectional comparison was performed of the difference between Web-FRAX and DXA-FRAX with and without BMD.

**Results:** Data on 1758 adults were available for this study, including 317 (18%) men and 1441 (82%) women, with a mean age of 69.1 y and 68.8 y, respectively. Men were taller and heavier than women, and have a higher FN T-score. Reassuringly, we found good agreement between the different FRAX estimates for the majority of men and women for MOF and HF. However, at times there are considerable differences, >2 times limits of agreement, particularly for those with higher risk estimates as shown in the Bland Altman Plots.



**Figure.** Bland-Altman Plots comparing Web-FRAX with BMD to Web-FRAX without BMD for Men and Women for (A) MOF and (B) HF.

**Conclusion:** While use of Web-FRAX without BMD results is an attractive option, significant differences are sometimes obtained. These results must be interpreted cautiously, particularly for men and those deemed at greater risk.

P926

### EFFECTIVENESS OF A DIGITAL MOVEMENT EXERCISE ON SELF-REPORTED PAIN SCORES AND CONCOMITANT PAIN MEDICATION USE: A RETROSPECTIVE OBSERVATIONAL STUDY

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**Objective:** Musculoskeletal conditions are among the drivers of the global burden of disease<sup>1</sup>. As such, the demand for adequate modes of health care delivery has risen, but access to and availability of care have remained limited<sup>2</sup>. To address this issue, Germany introduced a regulatory framework for the approval and consecutive reimbursement of digital therapeutics in 2019. This study presents post-marketing observational data and examines the effect of a digital home exercise program for back, hip and knee pain on the reduction of pain intensity (PI) and the concomitant use of pain medication (PM).

**Methods:** This study is based on self-reported user data. Outcome data were collected after consent from participants who were prescribed the home exercise program for a musculoskeletal condition from its approved spectrum of indications. A total of 1,081 participants could be included. Different pain durations, i.e., acute (ap), subacute (sp), and chronic (cp), were used to stratify the data for a matched comparison. Pain scores were assessed with a VNRS and analyzed with a Wilcoxon signed-rank test. The outcome of PM use was assessed binarily; proportions were compared. Bonferroni-corrections for familywise errors were conducted.

**Results:** Across all pain durations and over the entire study duration of 32 d, reductions in PI could be observed (ap: -1.5; sp: -2; cp: -1; medians,  $p < 0.0001$ ). PM use was assessed after the 5. follow-up; reductions in PM could be observed for patients with ap and sp (ap:  $t_1=31.25\%$ ,  $t_5=18.75\%$ ,  $p=0.0308$ ; sp:  $t_1=22.48\%$ ,  $t_5=12.92\%$ ,  $p=0.0140$ ).

**Conclusion:** The results suggest that the use of a digital home exercise program can lead to a significant reduction of the patient-centric outcome of PI. Furthermore, the concomitant use of PM could be significantly reduced for ap and sp after a prolonged use of the exercise program. This indicates a secondary benefit of the use of a digital therapeutic mean for unspecific and degenerative musculoskeletal conditions.

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P927

### OSTEOARTHRITIS. PHARMACOECONOMICS ASPECTS OF SYMPTOM-MODIFYING THERAPY IN REAL CLINICAL PRACTICE

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**Objective:** A wide variety of symptomatic slow-acting drugs for osteoarthritis (OA) and their usage dictate the necessity for a clinical and economic analysis to select the most economically feasible treatment regimen for OA. The purpose of our study was to conduct a clinical and economic assessment of OA therapy using drugs of the SYSADOA group.

**Methods:** The search for publications for the period 2011-2022 on the clinical efficacy and safety of SYSADOA (bioactive concentrate of small marine fish containing chondroitin sulfate, amino acids, peptides, sodium, potassium, calcium, magnesium, iron, copper and zinc ions) was conducted using available sources (Medline, eLIBRARY.ru). To collect data on the costs for managing patients in real clinical practice, a survey of 15 rheumatology experts. The direct medical costs were assessed. Cost minimization analysis was carried out for 10 SYSADOA drugs; the average course cost of treatment was calculated according to the dosage regimens and duration of admission, as well as the cost of providing medical services.

**Results:** Analysis of the literature data showed that bioactive concentrate of small marine fish, produced by Biotehnos S.A. is a modern original SYSADOA for the initial therapy of knee joint OA. The median amount of direct costs for injectable SYSADOA was 388,012 euros. Cost minimization analysis showed that the use of an alternating mode of administration of the drug in patients with knee joint OA is the most cost-effective method for the treatment of OA and allows to reduce direct costs up to 64% per patient by reducing the number of medical services provided.

**Conclusion:** The analysis proved rationality of the established medical practice in prescribing of the injectable SYSADOA. Choosing the most economically feasible drug for the treatment of patients with OA will reduce the costs of the healthcare system and reduce the overall economic burden of OA.



P928

### FEATURES OF TRAUMATOLOGICAL CARE DURING THE THIRD WAVE OF COVID-19

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**Objective:** To analyze the organization of trauma care in the third wave of COVID-19

**Methods:** analysis of the PubMed database, own indicators of operational activity and patterns of traumatological morbidity in the region.

**Results:** The experience of 2020-2021 has shown that coronavirus can be controlled primarily through effective public health measures. We had to learn to live with the virus while mobilizing beds, medical and nursing staff to treat patients with complications of COVID-19. At the same time, traumatological interventions continued and continue to be performed, including for infected patients.

Proven clinical and economic effect have:

1. a) correct routing of patients, taking into account COVID status and the presence / absence of pneumonia
2. b) examination of the patient by a therapist and / or pulmonologist upon admission to the hospital, assessment of age, senile asthenia, comorbid status, risk of complications and malnutrition
3. c) taking into account the increased risk of bacterial and thromboembolic complications in trauma on the background of COVID-19 and viral pneumonia due to developing systemic inflammation, prothrombotic state, hypoxia
4. d) an individual rehabilitation program for traumatological patients, including those with COVID-19/LONG-COVID at all stages, including increasing exercise tolerance, muscle strength, self-control and learning new movement conditions, correction of the psycho-emotional state, cognitive functions, nutritional deficiency, regain independence in everyday life
5. e) preventing the spread of infection in the hospital - catering and bandaging patients in the wards, wearing protective masks by patients outside the wards, the presence of dispensers with alcohol-containing disinfectants and soap in the wards, toilets, regular processing of plaster casts, orthoses, skeletal traction systems

and external devices fixing with a disinfectant solution from a spray bottle to ensure its penetration into all nodes and openings.

**Conclusion:** A well thought out organization of planned and emergency specialized and high tech trauma care, a competent approach to the comprehensive rehabilitation of our patients, including those with COVID-19, pneumonia, post-COVID syndrome, will improve the quality of life of patients and the outcomes of diseases and injuries.

P929

### MANAGEMENT OF OSTEOPOROSIS IN NEUROLOGICAL DISORDERS

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**Objective:** Osteoporosis and fragility fractures are common complications in neurological disorders (ND) that have a profound impact on patients' functionality and quality of life. This study aims to describe the pathophysiology of bone loss in these patients, to assess the applicability of existing diagnostic tools and analyze the efficacy of pharmacological and non-pharmacological interventions in this population.

**Methods:** A literature search was conducted using PubMed, Cochrane Library and Google Scholar databases using the following search terms in various combinations: "osteoporosis", "bone", "spinal cord injury", "paraplegia", "quadriplegia", "stroke", "hemiplegia", "multiple sclerosis", "neuromuscular disease" and "motor neuron disease". Animal model studies, isolated clinical cases, opinion articles and articles with no access to the full-text were excluded.

**Results:** This comprehensive research retrieved 2746 articles, from which 294 were selected. In ND several factors contribute to bone loss including, immobility/mechanical unloading, overactive inflammatory response (T cell activation and cytokine release), endocrine imbalance (parathormone, vitamin D, estrogen/testosterone, leptin/adiponectin interplay), loss of muscle-bone interaction and the use of drugs that affect bone metabolism (e.g., glucocorticoids, anticoagulants and antiepileptics). In contrast to the general population, screening tools such as FRAX<sup>®</sup> are unreliable as they underestimate osteoporosis and fracture risk. In addition, bone densitometry (DXA) protocols should be adapted or interpreted with caution, since classical locations may be spared in some ND (e.g., vertebrae in spinal cord injuries). Non-pharmacological treatment such as weight-bearing interventions and functional electrical stimulation show moderate efficacy in a dose-dependent mode and should be applied if possible. Pharmacological treatment shows an acceptable safety profile and

the main reason for discontinuation is related to gastrointestinal intolerance. The risk of dysphagia and esophageal reflux should be considered when prescribing. Serious adverse effects such as mandibular osteonecrosis or atypical fractures are rare. In general, the efficacy of calcium/vitamin D supplements, antiresorptive and anabolic agents is lower than in general population, however long-term studies are lacking.

**Conclusion:** Despite being common in this population, osteoporosis remains underdiagnosed and undertreated. Multispecialty teams including Neurology, Internal Medicine and Physical Medicine and Rehabilitation should be more aware for osteoporosis screening and prevention. A combined effort should be made to assess these topics in international guidelines.

## P930

### FRACTURE PREVENTION IN LOWER LIMB PERIPROSTHETIC FRACTURES: A RETROSPECTIVE ANALYSIS OF PRACTICE

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**Objective:** Periprosthetic fractures are defined as fractures occurring around an implant, most commonly hip or knee replacements. These fracture types have recently been included in the National Hip fracture Database in England. We reviewed the assessment and management of bone health and fracture prevention in these patients to ensure risk of future fracture was adequately addressed.

**Methods:** We identified patients admitted to our department, who had sustained a periprosthetic fracture of the femur or pelvis associated with a previous hip or knee replacement, using the national hip fracture database from January 2020 to December 2021. A medical notes review was conducted by the authors for a diagnosis of osteoporosis, bone density (DXA) scanning, or medication for management of osteoporosis.

**Results:** 153 patients were identified and underwent notes review (2020 – 69, 2021 – 84), the mean age was 82 (47 – 103), 65% (99/153) were female. 21% (33/153) had a previous recorded diagnosis of osteoporosis. DXA scanning results were available (prior or post injury) in 35% (53/153), of which evidence of osteoporosis (T score < -2.5 in any site) was found in 15% (8/53). Management of fracture in these patients was variable and inconsistent. 22% (34/153) were on bone health medication prior to injury with 53% (81/153) on treatment post injury.

**Conclusion:** Patients with periprosthetic fractures are very similar clinically and demographically to hip fracture patients however the mechanism of fracture is more unclear. The effect of reduced bone density and interactions at the bone-cement or bone-prosthesis interface in these patients is poorly understood. The introduction of a specific pathway for management of periprosthetic patients incorporating orthopaedic and medical assessment and management will aid diagnosis and secondary prevention. Further research into this topic is urgently required.

## P931

### FEATURES OF THE OPERATING TECHNIQUE FOR COMPLEX HIP ENDOPROSTHETICS

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**Objective:** To identify the features of the operating technique for complex hip arthroplasty.

**Methods:** A retrospective study of 267 case histories of patients after complex hip arthroplasty.

**Results:** Nonstandard clinical situation in 73 cases was associated with dysplastic coxarthrosis, in 137 cases with operations on the hip joint, proximal femur and pelvic bones in history, deformities of the proximal femur, in 57 cases with wall defects and deformities of the acetabulum. During surgery in patients with dysplastic coxarthrosis, the most common finding was a flat "saucer-shaped" acetabulum with different thicknesses of its walls, a decrease in the anteroposterior size compared to the upper-lower one. In this group of patients, as well as in the detection of wall defects and deformities of the acetabulum of post-traumatic origin, we used the technique of bed formation due to the upper and posterior parts of the walls of the acetabulum and cement implantation of a small size acetabular component (43-47) with maximum preservation of bone tissue. The undercoverage of the upper edge of the acetabular component up to 20–25% was considered quite acceptable and was usually filled with bone grafting. We also used bone autoplasty with the femoral head in the posterior-upper sector, reinforcing Muller rings with cement fixation of the low-profile cup, cement plasty with cement reinforcement with 2-4 spongy screws, implantation of the acetabular component due to its planned medialization using preliminary circular osteotomy of the acetabular floor. We performed corrective osteotomy of the femur at the apex of the deformity, osteotomy of the

femoral neck, continued in the medial direction, while depending on the angle of deformity of the medullary canal, the stem was placed with hypervarus or hypervalgus correction.

**Conclusion:** In case of hip arthroplasty in difficult situations, it is necessary to provide for various options for fixing the acetabular and femoral components, the possibility of using reinforcing structures, bone grafting, and not excluding intraoperative decision-making to change the course of the operation.

P932

### PRINCIPLES OF AN INDIVIDUALIZED APPROACH TO LARGE JOINT REENDOPROSTHETICS

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**Objective:** To develop the principles of an individualized approach to re-endoprosthetics of large joints.

**Methods:** A retrospective study of 191 medical records of patients after knee and hip replacements.

**Results:** Against the background of a stable trend towards a decrease in aseptic instability (up to 0.5%) and periprosthetic infection (up to 4.2%), there is an increase in mechanical complications of endoprosthesis replacement (breakage of the endoprosthesis node - 62.8%, fracture of the endoprosthesis stem - 32.5%). In all patients, the root cause of the instability/breakage of the endoprosthesis, its maintainability (the need for partial/complete replacement) was determined, the condition of the bone segments in the projection of the fixation of the legs of the endoprosthesis was assessed (the presence of osteopenia/osteoporosis, osteolysis, osteosclerosis, deformation of the medullary canal, support ability), the limb length deficit was determined. In the presence of signs of an infectious-inflammatory process, a microbiological study was performed. All patients in the perioperative period underwent antibacterial and antiresorptive therapy (against the background of taking calcium preparations). At the stage of preoperative planning, an accurate calculation of the diameter, length and shape of the endoprosthesis stem was carried out, as much as possible corresponding to the anatomical configuration of the bone marrow canal; additional fixation of the endoprosthesis stem (screw/plate). At the stage of the operation, the principle of minimal traumatization of the bone and surrounding soft tissues, adequate preparation of the bone marrow canal, technology for the formation of a cement mantle and cement plug, optimal fixation of a cementless endo-

prosthesis stem (at least 3 cm), replacement of osteolytic defects in the bone wall with biocomposite materials were observed. In the case of periprosthetic infection, a two-stage revision arthroplasty was used with a temporary installation of an articulating spacer, which made it possible to maintain the support ability and mobility of the limb in all patients and to successfully eradicate the pathogen.

**Conclusion:** The main principles of re-endoprosthetics are the exact selection of the diameter, length and shape of the endoprosthesis stem and precision installation of the endoprosthesis, optimal antibacterial and antiresorptive therapy.

P933

### EFFECT OF SGLT-2 INHIBITORS ON CALCIUM-PHOSPHORUS METABOLISM: CLINICAL AND EXPERIMENTAL STUDY

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**Objective:** Type 2 diabetes mellitus (DM2) is characterized by bone structure impairment. Glucose-lowering drugs influence on bone varies. Bone effects of SGLT-2i with different level of selectivity remains ambiguous. The aim of study was to investigate calcium-phosphorus metabolism in diabetic rats under treatment (Tx) with low-selective SGLT-2i canagliflozin (CANA) or high-selective SGLT-2i empagliflozin (EMPA) and evaluate one in patients with DM2 during EMPA Tx.

**Methods:** DM2 was modelled in male Wistar rats by high-fat diet and streptozotocin+nicotinamide. 4 weeks after the following groups were formed: "DM" (n=4), "CANA" (n=4) (25 mg/kg for 8 weeks) and "EMPA" (n=4) (2 mg/kg 8 weeks), "CRL" (n=4). Blood samples for total calcium (Ca), phosphorus (P) and fibroblast growth factor-23 (FGF-23) were obtained at the end of 8-week Tx. 39 DM2 patients were receiving EMPA for 12 weeks (10 mg per day). P, Ca, and FGF23 were obtained at the beginning and at the end of Tx.

**Results:** EMPA Tx led to moderate increase in Ca level compared to CRL (2.82 (2.69; 2.83) and 2.65 (2.53; 2.7) mmol/L in "EMPA" and "CRL" respectively, p=0.038). P level was the highest in "EMPA" group (4.71 (4.33; 4.8) mmol/L) compared to "CRL" (3.98 (3.42; 4.07) mmol/L, p=0.01), "DM" (3.1 (2.35; 3.95) mmol/L, p=0.002) and "CANA" (3.61 (3.24; 4.09) mmol/L, p=0.001). FGF-23 level was lower in "DM" group (0.24 (0.11; 0.31) pmol/L) compared to "CRL" (1.14 (0.84; 2.26) pmol/L), p=0.01. EMPA (0.62 (0.37; 1.1) pmol/L, p=0.002) but not CANA (0.33 (0.16; 0.6) pmol/L, p=0.345) increased FGF-23 level compared to "DM" (0.24 (0.11; 0.31) pmol/L). As for patients, fracture (F) risk according to FRAX was 0.7 (0.3; 1.5)% for hip F and 7.9 (4.8; 10.0)% for major F. Os-



teoporosis was diagnosed in 2 patients. There was no significant shifts in Ca and P during EMPA Tx. FGF23 level was higher at the end of EMPA Tx (2.21 (1,37; 2,87) pmol/L) compared to baseline (1.85 (1.15; 2.64),  $p=0.015$ )

**Conclusion:** EMPA Tx increases FGF-23 level both in animals and patients with DM2, as well as P. level in experimental DM2. It might form the basis for future BMD decrease.

## P394

### REMOTE MANAGEMENT OF OSTEOPOROSIS IN THE FIRST WAVE OF THE COVID-19 PANDEMIC

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**Objective:** We conducted a survey during the first pandemic wave of coronavirus disease 2019 (COVID-19) on a large group of osteoporotic patients to evaluate the general conditions of osteoporotic patients and the impact of the pandemic on the management of osteoporosis, finding high compliance to treatments and low COVID-19 lethality.

**Methods:** In a telephone survey conducted from April to May 2020, patients from the Osteoporosis Center, Clinic of Endocrinology and Metabolic Diseases of Umberto I Hospital (Ancona, Italy) were interviewed.

**Results:** Of a total of 910 interview subjects, 892 provided consent to participate in the survey (response rate 98%), including 785 women (88%) and 107 men (12%). Among the 892 patients interviewed, 77.9% were taking osteoporosis treatment and 94.6% vitamin D supplementation as prescribed at the last visit. COVID-19-like symptoms were reported by 5.1% (44 subjects), whereas confirmed cases were 1.2% (10 patients). A total number of 33 patients had been in hospital and the hospitalization rate of those who had not discontinued vitamin D supplementation was less than 4%. There were eight deaths, two with a concomitant COVID-19 diagnosis. The COVID-19 patients (10, all female) were significantly older than non-COVID-19 subjects (79.9±8.1 vs. 70.8±11.4 y,  $p=0.01$ ) but showed no significant differences in terms of comorbidities. The 2 patients who died of COVID-19 infection were both female; their family members said they were taking vitamin D, although dosing just before the lock down indicated vitamin D deficiency. The prevalence of severe osteoporosis was 50% in total COVID-19 patients and 87.5% in deceased COVID-19 patients. The overall COVID-19 mortality was 0.2%; lethality was 20%, lower than the national rate of the same age group. According to the logistic regression model considering only vitamin D supplementation, the supplement had a protective effect against the risk of hospitalization (OR 0.31, CI 0.11-0.84,  $p=0.02$ ).

**Conclusion:** Our frail patients followed up by phone felt reassured, they showed high treatment compliance, and experienced a lower COVID-19 lethality rate than patients of the same age; those who had not discontinued their vitamin D supplement also had a reduced hospitalization rate. The results of our survey, support a possible protective role of vitamin D against severity of COVID-19. The study moreover highlighted the critical value of telemedicine in the context of the pandemic as well as in the routine monitoring and care of old and frail patients and of those with chronic disease.

## P935

### ASSOCIATIONS OF POLYPHENOL-RICH FOODS WITH CHRONIC INFLAMMATION AND BONE QUALITY DETERMINED BY SECOND GENERATION HR-PQCT AND BONE TURNOVER MARKERS IN OLDER ADULTS WITH OBESITY

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**Objective:** Obesity and diet may influence bone health but associations of polyphenol-rich foods with fracture-related risk factors in older adults with obesity are unclear. This study aimed to determine associations between polyphenol-rich foods, with chronic inflammation, bone microarchitecture and bone turnover markers in older adults with obesity.

**Methods:** 50 older adults with obesity (mean±SD age 70.8±6.7 y; 60% women) were included in the cross-sectional analysis. Consumption of polyphenol-rich foods such as vegetables, fruits and olive oil was assessed using a 3-d food record. Bone quality was determined by bone turnover markers, distal tibial volumetric BMD (vBMD) and microarchitecture, which were assessed using HR-pQCT. Serum samples were analyzed for high sensitivity C-reactive protein (hs-CRP), C-terminal telopeptide of type 1 collagen (CTX), and procollagen type 1 N-terminal propeptide (P1NP) levels.

**Results:** Higher consumption of vegetables was associated with greater total vBMD ( $\beta$ : 41.114 mg HA/cm<sup>3</sup>; 95%CI: 1.896, 80.332), cortical vBMD ( $\beta$ : 51.489 mg HA/cm<sup>3</sup>; 95%CI: 1.845, 101.133), trabecular vBMD ( $\beta$ : 35.309 mg HA/cm<sup>3</sup>; 95%CI: 3.634, 66.983), trabecular bone volume ratio ( $\beta$ : 0.047%; 95%CI: 0.005, 0.090), and lower CTX levels ( $\beta$ : -134.264 ng/L; 95%CI: -265.625, -2.903). Higher intake of fruits was associated with greater total vBMD ( $\beta$ : 57.346 mg HA/cm<sup>3</sup>; 95%CI: 9.046, 105.647), cortical cross-sectional area ( $\beta$ : 19.365mm<sup>2</sup>; 95%CI: 7.308, 31.422), cortical thickness ( $\beta$ : 0.261 mm; 95%CI: 0.060, 0.462), and lower trabecular separation ( $\beta$ : -0.238 mm; 95%CI: -0.453, -0.022) and hs-CRP ( $\beta$ : -1.42 mg/L; 95%CI: -2.71, -0.13). Regular consumption of olive



oil was associated with greater total vBMD (48.523 mg HA/cm<sup>3</sup>; 95%CI: 3.862, 93.183), cortical thickness ( $\beta$ : 0.253 mm; 95%CI: 0.071, 0.435), as well as trabecular thickness ( $\beta$ : 0.019 mm; 95%CI: 0.008, 0.030) after adjusting for covariates. None of the polyphenol-rich foods were associated with P1NP, cortical porosity and trabecular number.

**Conclusion:** Higher consumption of polyphenol-rich foods, specifically vegetables, fruits and olive oil, was associated with favorable bone microarchitecture, reduce bone resorption and inflammation in older adults with obesity. This study substantiates the protective role of these foods on bone health and supports the need to develop interventions and nutrition education strategies to enhance adherence especially in older adults with obesity.

### P936

#### MUSCLE MASS AND STRENGTH IN POSTMENOPAUSAL WOMEN BEFORE AND AFTER HMB SUPPLEMENTATION

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**Objective:** Sarcopenia, the loss of muscle mass and function related to aging, is very prevalent but strategies to prevent or treat it are limited.  $\beta$ -hydroxymethylbutyrate (HMB) appears to have beneficial effects by stimulating protein synthesis and inhibiting protein catabolism. Our aim was to compare the results in muscle mass and muscle strength after 16 weeks (w) of HMB supplementation and multicomponent physical training (MPT).

**Methods:** Women aged 60 y and older were invited to participate in a randomized control trial. HMB Group received an Oral Nutritional Supplement with HMB 3 g + Mg 410 mg and vitamin D 800 IU plus MPT (3 times/w). A control group received the same MPT and vitamin D supplementation. Body composition by DXA, handgrip strength (JAMAR dynamometer) and lower limbs isometric strength (Fisiomove<sup>®</sup>) were assessed at baseline and after 16 weeks. The samples related with normal distribution were evaluated using ANOVA. The repeated measures without normal distribution were evaluated using Friedman test. Statistical significance was considered at  $p < 0.05$ .

**Results:** 92 women were included, 46 in each group, mean age was 67.15 y. After 8 w, 30 and 24 women returned for follow up in the HMB and control group, respectively. After 16 w, 16 patients returned in both groups. BMI, BMD and body composition were similar between groups. After 16 w, we found significant positive changes in legs muscle mass (10.833 to 11.158 kg,  $p < 0.05$ ) and lean mass (34.190 to 35.534,  $p < 0.05$ ) assessed by DXA and iso-

metric leg strength (27.2 to 38.1 kg,  $p < 0.05$ ) (+40 %) in the HMB group. In the control group, improvement in isometric leg strength (25 to 31.15 kg,  $p < 0.05$ ) (+24.6%) was observed after 16 w.

**Conclusion:** Preliminary results showed an increase in isometric leg strength in both groups, although higher in the HMB group. Muscle mass only changed significantly in the HMB group. HMB may have an additional effect to physical activity. This study highlights the importance of physical activity in postmenopausal women

### P937

#### MULTIPOTENT ACTIONS OF VITAMIN D. PSORIASIS AND OSTEOPENIA: CONCURRENT MANAGEMENT OF DERMATOLOGIC MANIFESTATIONS AND OSTEOPENIA BY A VITAMIN D ANALOG

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Psoriasis is a systemic autoimmune disease, which may or may not be accompanied by spondylarthritis. The disease is characterized by multiple comorbidities such as depression and metabolic syndrome. Psoriasis affects deeply and severely quality of life, as it affects patient appearance. The disease is also characterized by disordered bone metabolism. Thus, patients may present with osteopenia or osteoporosis. The aim was to describe the case of a patient with psoriasis and osteopenia who was treated with alphacalcidol, a vitamin D analog.

The case of a 52-year old patient with psoriasis is presented. The patient had psoriasis since the age of 22. Depression was a major problem, as psoriasis was prevalent in the hands and feet, however fortunately not on the face. The patient presented for BMD evaluation and osteopenia was diagnosed, T-score -2.1.

For the treatment of osteopenia alphacalcidol 1  $\mu$ g/d was administered along with calcium. For the management of psoriasis alphacalcidol cream was administered in combination with corticosteroids.

Psoriasis is a systemic autoimmune disease characterized by depression and disordered BMD. Vitamin D is a hormone involved in bone metabolism and immune regulation and may induce immune tolerance. Alphacalcidol, a vitamin D analog is used successfully for the management of psoriasis, due to its immune modulating properties. Alphacalcidol is also administered orally for the treatment of osteoporosis and osteopenia. In the case described

herein alphacalcidol was applied successfully systemically for the management of osteopenia and locally for the management of psoriasis.

### P938

#### ASSOCIATION BETWEEN MULTIMORBIDITY AND SARCOPENIA IN OLDER ADULTS

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**Objective:** To investigate the relationship between multimorbidity, polypharmacy and sarcopenia in community-dwelling elderly people.

**Methods:** A cross-sectional study was performed in community-dwelling older adults. Inclusion criteria were age  $\geq 60$  y, unrestricted mobility, MMSE score  $\geq 21$ . Sarcopenia was defined according to European Working Group on Sarcopenia in Older People criteria made in 2018. Muscle mass was measured by iDXA (GE Lunar, USA), muscle strength was evaluated measuring handgrip strength (JAMAR, Patterson Medical, UK), and physical performance was evaluated by the Short Physical Performance Battery (SPPB) test. Multimorbidity was defined as 2 or more comorbidities. Correlation between multimorbidity and sarcopenia was analysed using Pearson correlation. The correlation was considered statistically significant when  $p < 0.05$ .

**Results:** The study was performed on 246 subjects: 87 (35.4%) men and 159 (64.6%) women. Sarcopenia was diagnosed in 79 (32.1%) subjects. The mean age increased with the severity of sarcopenia: it was  $78.17 \pm 6.14$  y with no sarcopenia,  $80.97 \pm 6.25$  y with probable sarcopenia,  $81.25 \pm 6.60$  y with sarcopenia and  $82.69 \pm 7.8$  y with severe sarcopenia. Multimorbidity was present in 177 (71.9%) subjects. The bivariate analysis revealed a statistically significant correlation between multimorbidity and no sarcopenia (Pearson  $r = 0.330$ ,  $p < 0.001$ ) and probable sarcopenia (Pearson  $r = 0.137$ ,  $p = 0.032$ ). There was no statistically significant correlation between multimorbidity and sarcopenia.

**Conclusion:** There are no statistically significant correlations between multimorbidity and sarcopenia.

### P939

#### EFFECT OF CHOLECALCIFEROL ON ENDOTHELIAL FUNCTION IN WOMEN WITH ARTERIAL HYPERTENSION IN PREMENOPAUSAL AND EARLY POSTMENOPAUSAL PERIODS

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**Objective:** To assess effect of cholecalciferol on endothelial function in women with arterial hypertension (AH) in premenopausal and early postmenopausal periods who received 25(OH)D supplementation.

**Methods:** We investigated 102 women with AH stage II risk 3 aged 50 (48; 53) y: 50 females in premenopausal period – group I and 52 females in early postmenopausal period – group II. Serum level of 25(OH)D was determined by the immunoenzymatic assay. In groups I and II we identified subgroups with the level of 25(OH)D  $< 30$  ng/ml: subgroup IB (n=25) and subgroup IIB (n=21), respectively, in which antihypertensive therapy was supplemented with cholecalciferol 2000 IU/d for 3 months. In subgroups IA (n=25) and IIA (n=31) cholecalciferol was not administered. Vascular endothelial function was determined by assessing endothelium-dependent vasodilation (EDV) using computer impedance rheography. Statistical analysis was performed by means of Statistica 10.0.

**Results:** At baseline the level of 25(OH)D was lower ( $p < 0.05$ ) in subgroups IB ( $19.3 \pm 8.5$  ng/ml) and IIB ( $18.2 \pm 9.5$  ng/ml) than in the comparable subgroups IA ( $26.7 \pm 11.5$  ng/ml) and IIA ( $27.4 \pm 10.5$  ng/ml). After supplementation the level of 25(OH)D increased ( $p < 0.001$ ) in subgroup IB ( $37.28 \pm 11.97$  ng/ml) and in subgroup IIB ( $36.4 \pm 10.0$  ng/ml), and became higher ( $p < 0.001$ ) than in the comparable subgroups IA and IIA. At baseline subgroups IA and IB, IIA and IIB did not differ ( $p > 0.05$ ) by EDV. Following the therapy EDV increased ( $p < 0.01$ ) in all groups. Moreover, in subgroup IIB EDV increased ( $p = 0.04$ ) as compared with subgroup IIA, while the prevalence of EDV impairments decreased ( $p = 0.05$ ) (14.3 vs. 35.5%, correspondingly).

**Conclusion:** Correction of 25(OH)D level by intake of cholecalciferol 2000 IU/d for 3 months improves endothelial function in women with AH.

### P940

#### VASCULAR ENDOTHELIAL GROWTH FACTOR IN CORRELATION WITH DISEASE ACTIVITY AND MUSCULOSKELETAL ULTRASOUND FINDINGS IN RHEUMATOID ARTHRITIS

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**Objective:** VEGF is potent pro-angiogenic cytokine released by macrophages, fibroblasts and T cells, which is associated with inflammatory pannus formation in rheumatoid arthritis (RA) patient synovial joints, so increased VEGF expression correlates with destructive changes and disease severity. Our aim was mea-

surement of VEGF levels in sera of RA patients and to evaluate the correlation between this cytokine levels with clinical, laboratory parameters, disease activity scores and ultrasonographic (US) findings susceptibility and severity.

**Methods:** VEGF levels were assessed in sera of 30 RA patients and 30 healthy volunteers using an ELISA technique and synovial joints were assessed with musculoskeletal ultrasound machine depending upon 6-joint US score.

**Results:** VEGF levels were high in RA patients group (mean±SD 195±66.94) compared to controls (mean±SD 735.84±316.77) p-value (<0.001). It was observed also that there were highly significant positive correlations between VEGF levels and different disease parameters.

**Conclusion:** VEGF as proangiogenic cytokine represents an important variant in pathogenesis of RA and shows significant association with destructive changes detected by musculoskeletal ultrasound encouraging its use as a valuable tool in judging on disease activity and severity.

## P941

### PATIENT EDUCATION IN OSTEOPOROSIS: WHAT THE PATIENTS PREFER

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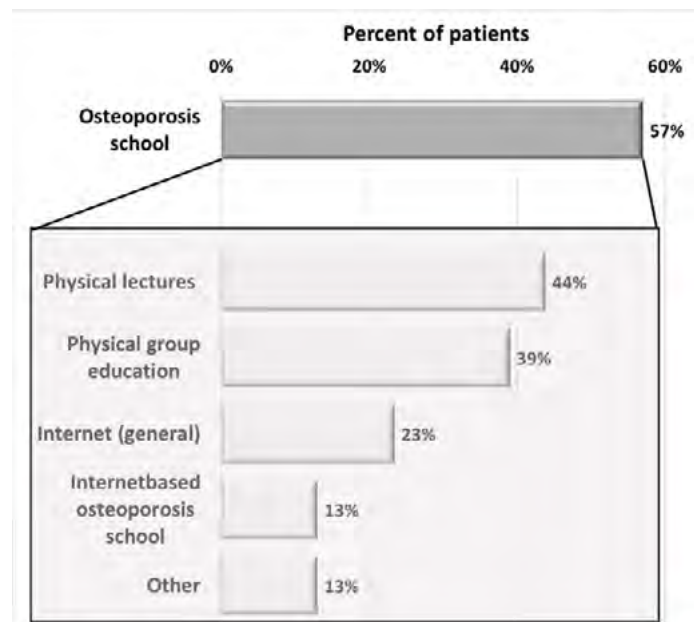
**Objective:** Patient education is part of fracture liaison services in many organizations and has been shown to have positive effects on several important patient outcomes. The present study aimed to assess the patients' preferences when seeking disease specific information on osteoporosis.

**Methods:** Patients with denosumab (Den) or zoledronic acid (ZA) treatment administrated at our endocrinology clinic July 2017 – December 2017 were sent a postal questionnaire with questions on preferences on how to obtain information about osteoporosis. One reminder was sent to nonresponders. Participants were mainly patients followed by primary healthcare, but with help from specialized hospital care to administrate injections/infusions. No osteoporosis school was arranged by the health organization in the catchment area.

**Results:** A total number of 155 patients (84% females, mean age±SD 75±9 y) participated in the study. Dropout rate was 26%. A total of 67% of patients actively searched for disease specific information on osteoporosis. No difference in search behavior was seen regarding type of treatment (Den or ZA) or age. More women than men searched for information as did patients experiencing any adverse event (both p<0.01). The most used source

of information was brochure (46%), internet sites from healthcare providers (27%), internet in general (15%) and weekly magazines (8%). In total, 57% of participants stated they would like to attend a school for osteoporosis. Of these 44% preferred general lectures, 39% group education with physical meet-ups, 23% internet (general information) and 13% internet osteoporosis schools.

**Conclusion:** Disease specific information is prompted by a majority of osteoporosis patients. Type of education and sources varies. Internet sources, preferentially from the healthcare organization, was used by a third of patients. The study was done pre-pandemic and it is possible that the use of internet resources might have changed.



## P942

### SARCOPENIA AND RHEUMATOID ARTHRITIS: RELATIONSHIPS WITH INFLAMMATORY ACTIVITY, FALLS AND FATIGUE

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**Objective:** To examine the prevalence of sarcopenia and fatigue in rheumatoid arthritis (RA), determine the relationships of sarcopenia, fatigue, falls, and RA inflammatory activity.

**Methods:** The study included 62 women (median age 56 [50;63] y) with confirmed RA according to the ACR/EULAR criteria (2010). RA activity was determined using DAS28, ESR and CRP. The median DAS28 was 4.6 [3.61; 5.4]: 28 (45.16%) patients had a moderate (DAS28=3.2-5.1), and 18 (29.03%) - a high degree of



RA inflammatory activity (DAS28  $\geq 5.1$ ). We analyzed body composition by DXA. Sarcopenia was classified by calculating the appendicular muscle index (AMI), defined as the total appendicular muscle mass adjusted for BMI (weight/height<sup>2</sup>). According to the EWGSOP2 criteria, a low muscle mass was recorded at an AMI value of  $\leq 5.5$  kg/m<sup>2</sup>. Fatigue was determined on the FACIT-Fatigue scale:  $>40$  points - no fatigue, 30-40 points - moderate,  $<30$  points - severe fatigue. A history of falls for the last 12 months was collected.

**Results:** A low muscle mass according to the EWGSOP2 criteria (AMI) $<5.5$  kg/m<sup>2</sup> was stated in 18 (28.57%) patients with RA. AMI was negatively associated with DAS28 ( $r=-0.46$ ;  $p<0.05$ ), ESR ( $r=-0.46$ ;  $p<0.05$ ) and CRP ( $r=-0.35$ ;  $p<0.05$ ). Fatigue was detected in 60 (96.8%) RA patients: severe fatigue - in 47 (75.8%) and moderate fatigue - in 13 (21.0%) people. Fatigue was negatively associated with DAS28 ( $r=-0.37$ ,  $p<0.05$ ), ESR ( $r=-0.36$ ,  $p<0.05$ ). In the past 12 months, 12 women (19.4%) had at least 1 fall and 9 women (14.5%) had at least 1 clinical fracture. Patients with a history of falls had more pronounced fatigue and RA activity compared to patients without falls ( $p<0.05$ ). No relationship was found between sarcopenia, fatigue and falls.

**Conclusion:** The results demonstrated a high prevalence of sarcopenia (28.57%) and fatigue (96.76%) in RA patients. Low muscle mass and fatigue are associated with RA inflammatory activity.

## P943

### INFLAMMATORY OSTEOARTHRITIS

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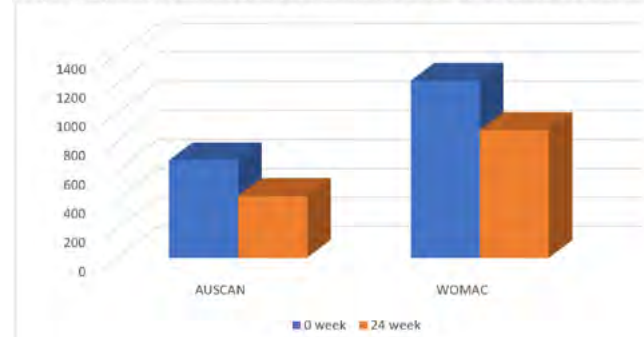
**Objective:** To examine the efficacy and safety of MTX use in pts with inflammatory knee OA and hand EOA.

**Methods:** The study included 40 pts (women) with knee OA (Kellgren-Lawrence II-III grades) (47.5%), hand EOA (25%) and a combination of these 2 localizations (27.5%). Median age was 62.5 [58;69] y.o. For 24 weeks, pts received MTX subcutaneously with a dose escalation of 10 mg to 15 mg per week. The efficacy of MTX therapy was assessed by WOMAC and AUSCAN, by the OMERACT-OARSI criteria. During the study, laboratory indicators were monitored (clinical, biochemical, immunological blood tests, general urine test).

**Results:** As a result of 24 weeks of MTX therapy, there was a statistically significant decrease in pain, stiffness and functional insufficiency (FI) in the small joints of the hand on the AUSCAN and in the knee joints on the WOMAC (Graph 1). In hand EOA, there was a decrease in pain by 40.21%, stiffness by 48.21%, FI by 23.72%. In knee OA, there was a reduction in pain by 50.45%, stiffness by 49%, and FI by 42.7%. 85.5% of pts with knee OA and 72.5% of pts with hand EOA became responders to therapy ac-

ording to the OMERACT-OARSI criteria. The best clinical effect was achieved in knee OA (89.9% of pts). As a result of MTX therapy, the need for NSAID decreased: initially, 85% of pts took NSAID daily or more than 3 times a week, and after 6 months of MTX therapy, only 15% of pts took NSAID daily. There were no serious adverse events.

Graph 1. Dynamics of the total AUSCAN and total WOMAC as a result of MTX therapy



**Conclusion:** The results demonstrated a good symptomatic effect of MTX in pts with knee OA and hand EOA. There was a statistically significant decrease in pain, stiffness and functional FI in knee joints and small joints of the hands, a decrease in the need for NSAID. Thus, the study showed that MTX has a good clinical effect in OA and a satisfactory safety profile.

## P944

### CONSUMPTION OF HIGH-BIOLOGICAL VALUE PROTEIN AND ITS ASSOCIATIONS WITH CHRONIC INFLAMMATION, BONE TURNOVER MARKERS AND BONE MICROARCHITECTURE IN OBESE OLDER ADULTS

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**Objective:** Protein plays a significant role in optimizing musculoskeletal health. However, studies on the different protein sources and bone health in older adults with obesity are inconsistent. We aim to determine the associations between consumption of high biological value proteins and chronic inflammation, bone microarchitecture and bone turnover markers in older adults with obesity.

**Methods:** This cross-sectional study included fifty older adults with obesity (mean $\pm$ SD age 70.8 $\pm$ 6.7 y; 60% women). Consumption of high biological value protein sources such as meat and products, fish and products, as well as dairy, was determined using a three-day food record. Distal tibial volumetric BMD (vBMD)



and microarchitecture were assessed using HR-pQCT. Bone turnover markers (CTX, P1NP); as well as high-sensitivity C-reactive protein (hs-CRP) were also determined.

**Results:** Moderate consumption of dairy (180-270 g/d) was associated with greater trabecular vBMD ( $\beta$ : 35.139 mg HA/cm<sup>3</sup>; 95%CI: 6.119, 64.158), trabecular bone volume ratio ( $\beta$ : 0.046%; 95%CI: 0.006, 0.085), trabecular number ( $\beta$ : 0.271; 95%CI: 0.060, 0.481) and lower trabecular separation ( $\beta$ : -0.173 mm; 95%CI: -0.323, -0.023) and CTX levels ( $\beta$ : -158.876 ng/L; 95%CI: -271.554, -46.198) after adjusting for confounders. Higher intake of fish and products (>100 g/d) was associated with greater trabecular thickness ( $\beta$ : 0.012 mm; 95%CI: 0.001, 0.024) and P1NP levels ( $\beta$ : 25.24 ug/L; 95%CI: 10.89, 39.58), as well as lower CTX levels ( $\beta$ : -213.02 ng/L; 95%CI: -308.40, -117.63), and cortical porosity ( $\beta$ : -0.010%; 95%CI: -0.018, -0.003). High consumption of meat and products (>120 g/d) was associated with lower cortical cross-sectional area ( $\beta$ : -16.187 mm<sup>2</sup>; 95%CI: -28.591, -3.783) and cortical thickness ( $\beta$ : -0.232 mm; 95%CI: -0.361, -0.104). Among the HBV protein sources, only dairy products were inversely associated with hs-CRP ( $\beta$ : -1.30 mg/L; 95%CI: -2.28, -0.32). No significant associations were observed between HBV protein sources and total vBMD and cortical vBMD in older adults with obesity.

**Conclusion:** Higher consumption of fish, moderate consumption of dairy as well as low consumption of meat were associated with better bone microarchitecture, bone turnover markers, and inflammatory state, suggesting its potential in fracture and chronic inflammation prevention strategies in older adults with obesity.

## P945

### WHICH ARE THE FACTORS THAT INFLUENCE AT HIP BONE 3D-DXA VOLUMETRIC PARAMETERS?

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**Objective:** To study the relationship between different factors (age; sex; weight -by BMI-menopause -Mp-; Parity -P-) to volumetric bone components evaluated using 3D-DXA technology (3D-Shaper.Galgo Medical SL, Barcelona, Spain). As an independent assessment we analyzed the relationship to muscle mass with 3D parameters.

**Methods:** CETIR Cohort: 1438 women (20-97 years old); 776 Men: (20-94 y). BMD (total area of the femur -ATF-) and whole body, body composition for assessment of muscle mass (MM) (Appendicular Lean Mass Index, IMMA) by DXA. 3D analysis. The population was stratified by sex and age (Decades -D-Ref. -20;30; 40; 50; 60; 70; 80); according to pregnancies (nulliparous; P: 1-3; and P>3), according to the time of the Mp (<5 y and > 5 y); by BMI- normal weight (NP) and obese (Obs). These factors were studied on

the 3D parameter variables by mean difference analysis (T-Test; p<0.05). The relationship between MM and 3D parameters was performed by logistic regression.

**Results:** Age: Significant decrease, compared to respect to the young population, of all parameters from 40 y of age, except for the sDens in women of D40 and D50. The effect of Mp in the first 5 y showed a significant decrease in the trabecular component (177.43 vs. 159.91 mg/cm<sup>3</sup>). On one hand, women with Mp beyond 5 y already showed a significant decrease in both components (sDens: 158.52 vs. 148.19 mg/mm<sup>2</sup>; Work vBMD: 177.43 vs. 142.92 mg/cm<sup>3</sup>). Parity: <3 pregnancies had a significant decrease in working vBMD: 154.5 vs. 143.5. In contrast, in multiparous women, both components were significantly lower (sDens 148.6 vs. 139.4 mg/cm<sup>2</sup>; vBMDTrab. 154.5 vs. 122.8 mg/cm<sup>3</sup>). In obese patients, both parameters were significantly higher. Muscle mass showed a significant correlation in the cortical component with MM in the legs (r: 0.622; r<sup>2</sup>: 0.387;) and with IMMA (r: 0.629; r<sup>2</sup>: 0.396).

**Conclusion:** Each of the parameters responds differently to various factors. The vBMDTrab would be related to early and hormonal changes. The sDens responds to the mechanotactic effect and could be decisive in the bone muscle unit.

## P946

### EVALUATION OF INFLAMMATION IN POST MENOPAUSAL WOMEN WITH LOW BONE MINERAL DENSITY

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**Objective:** Osteoporosis is a bone disorder that increases a person's risk of fracture due to low BMD. Cytokines, chemokines and C-reactive protein are known inflammatory markers. This study evaluates the levels of inflammatory biomarkers IL-6, TNF $\alpha$  and hs C-reactive protein in postmenopausal women and their association to increased risks of osteoporosis in these subjects. We aimed to evaluate the association of IL-6, TNF $\alpha$ , hs CRP levels with bone minerals density test results in post-menopausal women.

**Methods:** This study was conducted in a tertiary care hospital and included 100 postmenopausal females, with age ranging from 45-75 y. These patients attended the Bone clinic and were classified in the Osteoporosis Group and Control Group on the basis of BMD Study. IL-6, TNF $\alpha$  were measured by ELISA and CRP was measured by chemiluminescence assay, and the BMD was measured by DXA for all the participants.

**Results:** Among the study participants, 56 % reported normal results of BMD measurement (Control Group) and the incidence of osteoporosis was 44 %. (Osteoporosis Group). IL-6 levels

in the Osteoporosis Group was  $5.9 \pm 1.1$  pg/mL and the Control group was  $3.1 \pm 0.5$  pg/mL. TNF $\alpha$  in the Osteoporosis Group was  $6.45 \pm 2.15$  pg/mL and the Control group was  $2.87 \pm 0.63$  pg/mL. hs CRP levels in the Osteoporosis Group was  $2.90 \pm 0.46$  mg/L and the Control Group was  $0.98 \pm 0.31$  mg/L. A significant positive correlation ( $r=0.79$ ,  $p<0.05$ ) was observed between higher serum levels of IL-6 and hs CRP ( $r=83$ ,  $p<0.05$ ) in the participants with decreased BMD results (osteoporosis patients).

**Conclusion:** High levels of IL-6 and CRP levels correlate significantly with decreased BMD in postmenopausal females. These results suggest that evaluating inflammation markers is essential in post-menopausal women to estimate the risk of osteoporosis.

## P947

### OSTEOARTHRITIS AND METABOLIC SYNDROME

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**Objective:** To examine the role of MS component count and gene expression associated with cartilage tissue destruction in metabolic OA.

**Methods:** The study included women ( $n=117$ ) 45-75 y.o with knee OA I-III X-ray stage by Kellgren-Lawrence with different count of MS components. The duration of the study was 2 years. We analyzed anthropometric parameters, VAS, WOMAC, blood examination (biochemical, gene expression (m-TOR, cathepsin K) associated with cartilage tissue destruction, X-ray of knee joints 1 once a year.

**Results:** All patients (pts) ( $n=117$ ) had an abdominal obesity ( $WC>80$  cm). 1 component of MS was detected in 5.5% OA pts, 2 in 13.5%, 3 in 70.2% and 4 in 10.8% pt. Median duration of knee OA was greater in pts with 2 or more MS components and was 7.3 y (6.0-8.0) compared to pts with 1 MS component - 5.4 y (2.0-11.0)  $p<0.05$ , respectively. We found significant relationships between MS component count and OA duration, X-ray stage, age, VAS, WOMAC (Table). Pts showed high expression of m-TOR (11.08 (4.27-15.5)) and cathepsin K (9.34 (3.66-12.5)). We found direct positive correlations between gene expression associated with cartilage tissue destruction and VAS ( $p<0.00$ ), WOMAC pain ( $p<0.001$ ), count of MS components ( $p<0.00$ ), body weight ( $p<0.001$ ).

**Table.** Analysis of the relationship between the count of MS components and OA by Spearman.

Parameters	Count of MS components	p
Age	$r=0,57$	$<0,05$

Duration of knee OA	$r=0,56$	$<0,05$
X-ray stage by Kellgren-Lawrence of knee OA	$r=0,24$	$<0,05$
VAS for knee pain	$r=0,36$	$<0,05$
WOMAC pain	$r=0,47$	$<0,05$
Total WOMAC	$r=0,46$	$<0,05$

**Conclusion:** In our work, it has been demonstrated that 3 or more components of MS in pts with knee OA are observed at pronounced X-ray stages of OA with longer disease duration and a long history of obesity. There are positive correlations between the count of MS components and the clinical course of OA, X-ray severity of OA, hyperexpression of cell proliferation and cartilage destruction genes.

## P948

### DEEP LEARNING BASED ON X-RAY IMAGING IMPROVES COXARTHROSIS DETECTION

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**Objective:** The purpose of the study was to create an Artificial Neural Network (ANN) based on X-ray images of the pelvis, as an additional tool to automate and improve the diagnosis of coxarthrosis. The research is focused on joint space narrowing, which is a radiological symptom showing the thinning of the articular cartilage layer, which is translucent to X-rays. It is the first and the most important of the radiological signs of degenerative changes.

**Methods:** As part of the study, 13374 pelvis cases with 26748 X-ray images of the hip joints were collected. All images were cropped and added to the database with the associated annotations created by the team of three orthopaedists. For the test dataset, 20% of random cases were chosen to correspond to statistical degenerative changes types distribution. The classification task was performed in a two-stage process using Convolutional Neural Networks (CNNs). First, the localization model was trained to locate the bounding boxes (width, height, center coordinates) containing the hip joint with its immediate surroundings, which reduced the size of data and hence the computational power needed for classification. Then, cropped images were classified using another CNN, loosely based on CheXNet architecture.

**Results:** The accuracy of the localization model, measured by the intersection over union metric, was more than 94%. Trained ANN correctly classified 87.4% of cases with a 95%CI equals 85.6-89.1%. Results of precision of 91.7% (95CI 90.6-92.7%), sensitivity of 93.5% (95%CI 92.0-94.8%), and F1 score of 92.6% (95%CI 91.5-93.6%) were achieved.

**Conclusion:** Created ANN reached promising accuracy. Combined with the good automated detection of the hip joints, it could potentially aid the fast differentiation of stable and urgently required medical intervention patients.

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## P949

### ASSESSMENT OF SERUM IRON AS AN EMERGING MARKER OF OSTEOPOROSIS IN GERIATRIC SUBJECTS

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**Objective:** Osteoporosis is a bone disorder, that is presently a major global health issue. Iron is an essential mineral that participates in oxygen transport and participates in various enzymatic processes in the body. Iron has an important role in collagen synthesis and vitamin D metabolism. . This study was designed to investigate the role of serum iron in the screening of osteoporosis in geriatric male subjects. We aimed to evaluate the role of serum Iron and Ferritin as biomarkers of osteoporosis in geriatric male subjects.

**Methods:** This study was conducted in the Bone Clinic and the biochemistry department of a tertiary care hospital. 150 male participants were included in the study belonging to the age group of 60-80 y. Participants in the group were divided into two groups, group I: comprising of patients with osteoporosis, and group II: which consisted of patients without osteoporosis (n=75) (control group) (n=75). Patients were classified into the two groups on the basis of BMD measurements using DXA scanning. Serum iron was analyzed in blood samples by immunoturbidimetry and serum ferritin was analyzed by chemiluminescence.

**Results:** Serum Iron levels were significantly higher in Osteoporosis patients as compared to the control group. A significant positive correlation ( $r=0.85$ ,  $p<0.05$ ) was observed between higher serum levels of Iron and higher levels of ferritin in the osteoporosis patients. There was a significant difference in the serum iron levels of the osteoporosis group ( $143.6\pm 48.2$  ng/ml) and the control group ( $97.2\pm 28.7$  ng/ml) ( $p<0.05$ ). Ferritin levels also differed significantly among the osteoporosis patients ( $316.70\pm 123.39$  µg/L) and the control participants ( $137.52\pm 53.64$  µg/L) ( $p<0.05$ ).

**Conclusion:** Our study demonstrates that measurement of serum iron has potential as an emerging marker in geriatric patients with osteoporosis.

## P950

### EFFECT OF BARIATRIC SURGERY ON SERUM 25-HYDROXYVITAMIN D, ADIPONECTIN AND P1NP IN OBESE PATIENTS

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**Objective:** Obesity is associated with increased BMD, but the quality of bone is decreased. Bariatric surgery, which is performed for the treatment of obesity, may increase fracture risk. Malabsorption following bariatric surgery may increase PTH and bone resorption. On the other hand, the change in body composition will influence the cross talk between adipose tissue and bone. Adiponectin is an adipocytokine capable to modulate bone metabolism. Therefore, we investigated the influence of bariatric surgery on serum adiponectin levels and on osteoblast function.

**Methods:** We studied 51 obese patients before and 40 patients after bariatric surgery. 25-OH-vitamin D was used as an estimate for vitamin status. 25-OH-vitamin D, PTH and P1NP (representing osteoblast function and bone formation) were measured by the automated methods of Roche Diagnostics (Mannheim) using a COBAS e411 platform. Clinical chemistry (calcium, phosphate, alk. phosphatase, creatinine) were measured by routine laboratory standard methods. Adiponectin (total) was measured by ELISA (Immundiagnostic, Bensheim, Germany). HbA1c was determined using the Afineon 2 platform (Abbott). Group differences were evaluated with t-test for dependent variables, and Pearson correlation and linear regression analyses were done.

**Results:** The BMI in the group before surgery was  $48.8\pm 7.5$  kg/m<sup>2</sup>, and after surgery  $35.0\pm 7.5$  kg/m<sup>2</sup> (mean±SD),  $p<0.001$ . The age of the patients was  $41.1\pm 10.6$  y. 25-OH-vitamin D serum concentrations were  $48.6\pm 21.3$  nmol/l before and  $76.4\pm 37.2$  nmol/l after surgery ( $p<0.001$ ). PTH was  $28.6\pm 20.5$  ng/l before surgery and  $37.0\pm 18.3$  ng/l after surgery ( $p=0.07$ ). Adiponectin (total) serum concentrations were  $7.4\pm 3.0$  µg/ml before and  $10.1\pm 3.5$  µg/ml after surgery ( $p<0.001$ ). HbA1c was  $5.9\pm 1.0\%$  before and  $5.3\pm 0.4\%$  after surgery ( $p<0.001$ ). Serum P1NP was  $53.3\pm 20.9$  ng/ml before and  $83.1\pm 30.1$  ng/ml after surgery ( $p<0.001$ ). Adiponectin was significantly negatively correlated with BMI ( $r=-0.37$ ;  $p<0.001$ ). There was no significant correlation between HbA1c and adiponectin, and no correlation between 25-OH-vitamin D and adiponectin. 25-OH-vitamin D was negatively correlated with BMI ( $r=-0.5$ ;  $p<0.001$ ). P1NP was negatively correlated with BMI ( $r=-0.39$ ,  $p<0.001$ ) and with HbA1c ( $r=-0.23$ ,  $p<0.05$ ) and was positively correlated with adiponectin ( $r=0.29$ ,  $p=0.01$ ). Linear regression analyses showed that BMI was the most important factor modulating P1NP.



**Conclusion:** Obese patients displayed vitamin D insufficiency, as has been described in former studies. The vitamin D status was significantly improved after bariatric surgery, which resulted also in a substantial weight loss. Bariatric surgery resulted in an increase in adiponectin, which will improve glucose metabolism and was also associated with increased bone formation. The increase in adiponectin and P1NP may counteract the negative effects of bariatric surgery on bone.

P951

### IS THE EVALUATION OF 3D-DXA PARAMETERS USEFUL IN CLINICAL PRACTICE?

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**Objective:** To evaluate clinical applicability of volumetric bone mass parameter in different treatments. Follow-up changes in total hip BMD (by DXA) and, 3D-DXA parameters, cortical sDens (mg/cm<sup>2</sup>) and trabecular TrbVBMD (mg/cm<sup>3</sup>) (by 3D-Shapper. Galgo Medical) in patients under different therapeutic schemes (bisphosphonates -ALD-, teriparatide -PTH- and denosumab -DNB-) patients without treatment -NoTTO.

**Methods:** We included 328 women (67.9±11.6 y) and 45 men (69.2±10.5 y). They were categorized as follow-up; 135 patients without treatment - NoTTO -20 of them received pulsed electromagnetic field-PEMF-; 80 patients treated to alendronate -ALD-; 41 patients treated to teriparatide -PTH-; 100 treated with denosumab (DNB). T-Test were used to establish the statistical significant difference (p<0.05).

**Results:** NoTTO: Follow-up: 38 months, (LBMD: 37%; OTP: 4.7%). Fracture prevalence 27.5%. Evolution: Significant decrease were found in BMD (0.879 vs. 0.846 g/cm<sup>2</sup>; Δ: -4.7%); sDens (146.9 vs. 142.8 mg/cm<sup>2</sup>; Δ-3.4%), TrabVBMD (136.7 vs. 127.0 mg/cm<sup>3</sup>; Δ: -10.7%). ALD Follow-up: 36 months; (LBMD: 59,5%; OTP: 27.0%). Fracture prevalence: 35%. Evolution: significant increase in BMD (0.784 vs. 0.799 g/cm<sup>2</sup>; Δ: 1.8%); cortical parameter (130.7 vs. 134.2 mg/cm<sup>2</sup>; Δ: 2.2%) and trabecular parameter (110.5 vs. 114.5 mg/cm<sup>3</sup>; Δ: 2.3%). PTH: 20-month follow-up (LBMD: 52.6%; OTP: 39.5%); Fracture prevalence: 97% (vertebral fractures). Evolution of significant increases in BMD (0.744 vs. 0.769 g/cm<sup>2</sup>; Δ: 3.3%); sDens (125.6 vs. 127.9 mg/cm<sup>2</sup>; 1.6%; NS) and trabecular parameter (95.2 vs. 107.1 mg/cm<sup>3</sup>; Δ: +10.8%). The results showed a significant impact in trabecular bone, but not in cortical. DNB Follow-up: 35 months (DMOB: 59,2%; OTP: 31,5%). Fracture prevalence 43%. Evolution of significant increases in BMD (0.765 vs. 0.800 g/cm<sup>2</sup>; Δ: 4.4%); cortical parameter (128.2 vs. 134.2 mg/cm<sup>2</sup>; Δ: 4.4%) and trabecular parameter (110.5 vs. 114.5 mg/cm<sup>3</sup>; Δ: 7.1%). All parameters evaluated improvements significantly

**Conclusion:** The 3D parameters of the hip allows a precise evaluation in the follow-up, assessing the specific impact on each component of BMD (trabecular and cortical).

P952

### REHABILITATION INTERVENTIONS FOR FUNCTIONAL RECOVERY OF FRAGILITY HIP FRACTURES: AN OVERVIEW OF SYSTEMATIC REVIEWS OF INTERVENTION

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**Objective:** This overview of systematic reviews (OoSR) of interventions aims to summarize the available body of evidence in systematic reviews (SRs) that evaluate the efficacy of rehabilitation interventions for functional recovery in patients with a fragility hip fracture after standard care.

**Methods:** We searched eleven electronic databases with no restrictions for publication date or language. We independently reviewed and included all Cochrane and non-Cochrane systematic reviews that evaluate rehabilitation interventions intending to achieve functional recovery after a fragility hip fracture after standard care. Selected reviews for inclusion were considered to assess the degree of overlapping of primary studies by doing a reference matrix and calculating the corrected area. We evaluated the risk of bias and the therapeutic quality of the SRs with the ROBIS tool and the i-CONTENT tool, respectively. The OoSR is currently under review for registration in PROSPERO (307649 provisional ID).

**Results:** Of 5461 identified references, 18 SRs were included with 100 primary publications. Overlapping in the OoSR was slight. All the included SRs were published in English, and six of them belong to the Cochrane Collaboration. The quality of the studies included in the SRs was assessed mainly by the Cochrane Risk of Bias (RoBs) tool, PEDro scale, and some by domain without a specific tool reported with results varying from low to high risk of bias, especially regarding blinding of the interventions. Interventions more frequently reported are related to physiotherapy, occupational therapy, or multi-disciplinary rehabilitation approaches. Specific interventions varied, but strength, resistance, gait, and activities of daily living (ADL) or functional training were the most used. Regarding the interventions' setting, evidence exists for



in-patient, home-based, and community programs usually compared to usual care. Just one of the SRs evaluated the therapeutic validity of their included studies.

**Conclusion:** Evidence on rehabilitation interventions is still conflicting given the varied therapeutic approaches and settings used in the primary publications. Most SRs report low to moderate certainty of the evidence, mainly due to the incompleteness of reports of the interventions and insufficient data reports.

## P953

### SYSTEMIC RHEUMATIC DISORDERS AFFECT THE SKELETON AND DECREASE HEALTH RELATED QUALITY OF LIFE

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Health Related Quality of Life (HRQoL) aims to study the effect of health status on quality of life, ignoring other factors such as social and environmental conditions. SF-36 questionnaire is the most common tool in use to calculate the HRQoL and assess it in 8 domains. Rheumatic diseases are multisystemic conditions which multiply affect health and quality of life.

The aim was to determine the effect of rheumatoid arthritis (RA) and spondyloarthropathies (SpA) on HRQoL, to compare HRQoL between RA and SpA and to identify possible risk factors which lead to decreased HRQoL.

A cross-sectional study was performed in patients with rheumatic diseases followed up in the department of rheumatology. Patients completed SF-36 questionnaires at their last visit to the hospital and patient characteristics (age, BMI, smoking status) were recorded at the same time-point. Descriptive statistics, one-way ANOVA and Spearman's correlation were used for statistical analysis.

A cohort of 220 patients (mean age 58y) participated in the study – 107 with RA and 113 with SpA. By contrast to patients with Ankylosing Spondylitis (AS), patients with RA and Psoriatic Arthritis (PsA) were mainly females. The majority were overweight and 1/3 were active smokers. The total cohort presented low scores, in all SF-36 domains. In patients with RA, age was negatively correlated with 2/8 domains and BMI with 6/8 domains of the SF-36 questionnaire. Male sex was positively correlated with 7/8 domains. A further analysis revealed that patients with RA presented significantly worse HRQoL compared to AS patients. Finally, the comparison between SpA subgroups did not reveal any significant differences in all domains.

Patients with rheumatic diseases exhibited significantly lower HRQoL compared to controls. Patients with RA exhibited lower scores than patients with SpA in the physical and mental domains of SF-36, while no differences were noticed within the SpA subgroups.

## P954

### RISK FACTORS OF SYNDESMOPHYTES FORMATION AND LOSS OF BONE MINERAL DENSITY IN UKRAINIAN POPULATION WITH AXIAL SPONDYLOARTHRITIS

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**Objective:** To assess risk factors of syndesmophytes (SDPH) formation and loss of BMD (LBMD) in Ukrainian population with axial spondyloarthritis (AxSpA).

**Methods:** A retrospective study of Ukrainian patients with axial spondyloarthritis (AxSpA) (according to the ASAS Criteria) was conducted at a single center from 2019-2021. The correlation between risk factors (age, disease duration (DD), disease activity (DA), use of glucocorticoids (uGC), smoking) and SDPH formation and LBMD were studied. Statistic analysis:  $\chi^2$  criterion, significance level 0.05

**Results:** 115 (75 male and 40 female) diagnosed with AxSpA were identified. The overall incidence of SDPH and LBMD was 57.4% and 44.35%, respectively. LBMD includes osteopenia (Ope) - 52.9%, osteoporosis (OP) - 43.2%, fractures (FT) - 3.9%. In male population with AxSpA the risk factors of Ope, OP, SDPH were DA ( $\chi^2_{\text{calc}}=17.75 / 14.28 / 12.88 > \chi^2_{\text{crit}}=6.2 / 5.99 / 5.99$ ), DD ( $\chi^2_{\text{calc}}=6.2 / 5.57 / 4.87 > \chi^2_{\text{crit}}=3.84$ ), smoking ( $\chi^2_{\text{calc}}=6.2 / 6.14 / 4.87 > \chi^2_{\text{crit}}=3.84$ ), uGC ( $\chi^2_{\text{calc}}=5.3 / 4.18 / 5.87 > \chi^2_{\text{crit}}=3.84$ ). In female population development of Ope, OP, were associated with: DA ( $\chi^2_{\text{calc}}=6.73 / 8.1 / 6.94 > \chi^2_{\text{crit}}=5.99 / 5.99 / 5.99$ ), smoking ( $\chi^2_{\text{calc}}=4.92 / 4.66 / 5.21 > \chi^2_{\text{crit}}=3.84$ ), uGC ( $\chi^2_{\text{calc}}=5.52 / 4.48 / 4.33 > \chi^2_{\text{crit}}=3.84$ ). Contrary to SDPH, only Ope and OP were associated with DD ( $\chi^2_{\text{calc}}=4.73 / 4.48 > \chi^2_{\text{crit}}=3.84$ )

**Conclusion:** Sufficient number of patients with AxSpA are at risk of development of SDPH and LBMD. AxSpA activity and duration, use of glucocorticoids, smoking are among the risk factors of syndesmophytes formation and loss of BMD in Ukrainian population. Further investigations are mandatory to verify target population and optimal algorithm of SDPH and LBMD prophylaxis.

P955

### DISEASE ACTIVITY, PHYSICAL DISABILITY AND BONE MINERAL DENSITY IN MENOPAUSE PATIENTS WITH RHEUMATOID ARTHRITIS

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**Objective:** To assess the correlation between the disease activity, physical disability and BMD in menopause patients diagnosed with rheumatoid arthritis (RA).

**Methods:** The study included 75 females diagnosed with RA with mean age 57.7±10.9 y, (range 51-67 y) and disease duration of 9.5±8.5 who were in menopause. Demographic and clinical data were collected like age, weight, height, BMI, environment (urban, rural), smoker/non-smoker, onset age and duration of RA, the presence of rheumatoid factor, anti-cyclic citrullinated peptide, erythrocyte sedimentation rate, C reactive protein, disease activity score 28, VAS and physical disability (measured with disease activity score-DAS28), modified health assessment questionnaire (HAQ) was used to evaluate RA activity. BMD was measured at the lumbar spine level and femur with osteodensitometry with DXA (Stratos800).

**Results:** The mean BMI was 23.44±3.97 kg/m<sup>2</sup>, the mean duration of menopause was 13.42±6.15 y. About 38.85% of the patients had osteoporosis. About 61% of the patients received low dose of prednisone treatment. Independent risk factors for osteoporosis were: age, environment, BMI, rheumatoid factor and anticyclic citrullinated peptide presence duration of RA, DAS28, HAQ, erythrocyte sedimentation rate and C reactive protein.

**Conclusion:** The prevalence of osteoporosis in RA patients was higher than expected. The main risk of osteoporosis in RA patients was physical disability, disease activity, age, menopause, low BMI and seropositivity.

P956

### MULTIDIMENSIONAL APPROACH APPLIED TO AN OCCUPATIONAL THERAPY PROGRAMME FOLLOWING POST-FEMUR-FRACTURE-DUE-TO-BONE-FRAGILITY REHABILITATION IN ELDERLY PATIENTS

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**Objective:** Femoral fractures, frailty related to ageing, is a health issue needing strong guidelines to follow in clinical management.

**Methods:** The Dept. of Geriatrics has recently created an integrated service of Orthogeriatrics where patients with femoral fractures are monitored from admittance to E.R. through Orthopedics, Geriatrics and Long-term-care Unit. During a 12-month time span (January - December 2021) 43 elderly patients with femoral fractures have accessed the service of Orthogeriatrics in the Long-term-care Unit. They have been assessed through a multifaceted (orthopedic-geriatric-rehabilitative) approach applying a multi-dimensional examination including MMSE, BADL, IADL, Barthel Index. Prior to the femoral fracture the Barthel Index showed an average score ±70/100.

**Results:** In 16 patients standing position recovery started 5 d after prosthesis due to femoral medial fracture, and they were dismissed after a 15/25-d hospitalization. 27 elderly subjects recovering from osteosynthesis have regained the sitting position in 4 d, while load tests were made between 7 and 14 d and left the unit 30/45 d after admittance. At discharge 23 subjects were redirected to integrated home care for 30-d period of rehabilitation. An Occupational Therapy (OT) programme followed in order to recover autonomy: 1) teach how to shift while in bed; 2) teach how to leave the bed using the healthy side of one's body; 3) prescribe aids to improve ambulation; 4) teach how to take steps; 5) perform lower limbs mobilization through specific exercises in a joined team with the physiotherapist. The sample including patients following the programme was then compared to another sample formed by 18 subjects who were not included in the same programme. A 2-month OT programme showed improvement of motor skills detected through scales scores (BADL 3.5/6>4.3/6 - IADL 2.6/8>5.3/8 - Barthel Index 50/100>90/100) while control group scores were worse (BADL 3.4/6>4.0/6 - IADL 2.8/8>4-8/8 - Barthel Index 50/100>80/100).

**Conclusion:** Effectiveness of an OT programme in patients recovering from femoral fractures and osteosynthesis was evaluated. Starting with the BADL - IADL - Barthel Index scores at discharge after hospitalization, the aim of the integrated rehabilitative OT programme was to reestablish the functional condition prior to fracture.

P957

### AGE, SEX AND BMI-RELATED DIFFERENCES IN PRESENTATION OF PRIMARY HYPERPARATHYROIDISM

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**Objective:** The incidence of primary hyperparathyroidism (PHPT) increases with age and the disease most commonly affects postmenopausal women. Higher BMI was shown to alter the manifestations of PHPT. We aim to explore how the clinical phenotype of PHPT changes with age, sex, and BMI.

**Methods:** We retrospectively analyzed the baseline biochemical status and BMD measured by DXA (Discovery, Hologic, USA) at three recommended sites of patients who were diagnosed with PHPT at our endocrine clinic from 2004-2016. The effects of sex, menopausal status, and age were assessed using regression models (linear for numeric outcomes, logistic with Firth bias correction for binary outcomes).

**Results:** We included 415 patients (332 women) with PHPT, aged 64 y on average (SD 13, range 19-89 y), with an average BMI of 28.4 (SD 6.0, range 11.2-51.1 kg/m<sup>2</sup>). Among the women, 41 (12%) were premenopausal and 292 (88%) were postmenopausal. The mean duration of menopause was 16 y (range 0-60 y). After adjustment for sex, age was statistically significantly negatively associated with total calcium (standardized regression coefficient  $\beta=-0.17$ ,  $p<0.001$ ), corrected calcium ( $\beta=-0.12$ ,  $p=0.018$ ), urinary calcium ( $\beta=-0.32$ ,  $p<0.001$ ) and estimated glomerular filtration rate ( $\beta=-0.14$ ,  $p=0.004$ ), and positively associated with phosphate ( $\beta=0.15$ ,  $p=0.002$ ). In comparison with premenopausal women, postmenopausal women (estimated odds ratio OR=8.5,  $p<0.001$ ) and men (OR=5.9,  $p<0.001$ ) were more likely to suffer from skeletal manifestations of PHPT (defined as osteoporosis as diagnosed by DXA or clinical fractures). The frequency of symptomatic presentation (as opposed to asymptomatic) was not statistically significantly different between those three groups ( $p=0.180$ ). BMI was negatively associated with skeletal manifestations (OR=0.94 per unit change,  $p=0.002$ ) and symptomatic presentation (OR=0.96 per unit change,  $p=0.012$ ).

**Conclusion:** In general, older patients with PHPT presented with a biochemically less florid disease, but with more severe bone impairment than younger patients. Postmenopausal women and men with PHPT were much more likely affected by skeletal manifestations of PHPT than premenopausal women. Higher BMI was protective against bone involvement.

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### OBESITY AND KNEE OSTEOARTHRITIS: RELATIONSHIPS AND TREATMENT

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**Objective:** To determine features of clinical manifestations of OA in obesity and evaluate the effectiveness of obesity therapy in OA.

**Methods:** The study included 73 pts (women) with knee OA (according to the ACR criteria) II-III X-ray grade by Kellgren-Lawrence: obese 50 (BMI) $>30$  kg/m<sup>2</sup>) and nonobese 23 (control group). Obese pts were divided into 2 groups: 1 group (n=25) - received orlistat for 6 months and 2 group (n=25) - diet and exercises for 6 months. Monthly visits evaluated anthropometric parameters, WOMAC. Initially and after 6 months, laboratory scores were evaluated in obese pts (leptin, IL-6 in blood).

**Results:** In pts with OA and obesity, a more severe course of OA is determined compared to the control group (Table). After 6 months of orlistat therapy in pts of group 1 was achieved a significant decrease in body weight by 10.07% ( $p<0.05$ ). In pts of group 2 weight decreased by 0.84% ( $p>0.05$ ). In pts of group 1, the indicators of the WOMAC improved: pain decreased by 52.5% ( $p<0.05$ ), stiffness by 47.98% ( $p<0.05$ ), functional insufficiency by 51.55% ( $p<0.05$ ), compared to pts of 2 group. We determined significant decrease leptin ( $p=0.05$ ) and IL-6 ( $p<0.05$ ) in pts of 1 group. We founded a direct relationships between a decrease of leptin and a decrease in body weight ( $p=0.02$ ), WOMAC ( $p<0.05$ ).

**Table.** Comparative characteristics of obese and non-obese knee OA pts

Parameters	Obese pts	Non-obese pts	p
The mean age, y.o., (M $\pm$ $\delta$ )	56.5 $\pm$ 5.86	58.69 $\pm$ 5.43	0.13
The mean age of OA onset, y.o., (M $\pm$ $\delta$ )	49.33 $\pm$ 6.14	55.17 $\pm$ 4.88	$<0.001$
Average duration of OA, y, (M $\pm$ $\delta$ )	7.43 $\pm$ 3.93	3.52 $\pm$ 1.47	$<0.001$
Total WOMAC, mm, (M $\pm$ $\delta$ )	1170.28 $\pm$ 437.85	932.61 $\pm$ 159.09	0.014

**Conclusion:** The results of our study demonstrated a more severe clinical course of OA in obese pts. Orlistat therapy reduces clinical symptoms of OA and affects meta-inflammation.

P959

### DIFFERENCES IN BONE METABOLISM AND PHARMACOLOGICAL MANAGEMENT IN OSTEOPOROTIC PATIENTS IN NURSING HOME RESIDENTS VS. OSTEOPOROTIC COMMUNITY DWELLERS

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**Objective:** Differences in bone metabolism and pharmacological management in osteoporotic patients in nursing home residents vs. osteoporotic community dwellers. Older people living in nursing home residents are at a higher risk of suffering fractures than the community-dwelling older population. We aimed to evaluate the bone metabolism and antiosteoporotic pharmacological treatment in osteoporotic nursing home residents compared to osteoporotic patients living in the community.

**Methods:** A cross-sectional study design was performed. Data from 486 patients with a recent vertebral or hip fracture was collected from a single Portuguese center between 2017-2021. Patients were divided in two groups: nursing home residents and community dwellers. Age, BMI, BMD, Katz index of independence, previous fragility fractures, vitamin D, serum calcium and PTH levels were recorded. Patients were questioned about previous antiosteoporotic treatment and medical decision to start pharmacological treatment with bisphosphonate (BP) was registered. The most adequate statistical methods were used to compare data between groups. The level of significance was chosen as  $p < 0.05$ .

#### Results:

Feature	Nursing home (n=69)	Community (n=417)	p-value
Age	$\bar{x}$ 85,42±SD 9,69	$\bar{x}$ 78,54±SD 5,79	0,001
BMI	$\bar{x}$ 28,27±SD 4,62	$\bar{x}$ 27,37±SD 4,37	0,857
Katz	$\bar{x}$ 3,98±SD 1,9	$\bar{x}$ 5,33±SD 0,9	0,033
Number fragility fractures	$\bar{x}$ 1,32±SD 0,69	$\bar{x}$ 1,22±SD 0,61	0,142
T-score femoral neck	$\bar{x}$ -2,35±SD 2,1	$\bar{x}$ -2,11±SD 3,3	0,148
T-score lumbar spine	$\bar{x}$ -2,84±SD 0,9	$\bar{x}$ -2,60±SD 1,65	0,236
Vitamin D (µg)	$\bar{x}$ 10,63±SD 7,44	$\bar{x}$ 17,82±SD 11,01	0,011
Calcium (mg/dl)	$\bar{x}$ 9,6±SD 1,10	$\bar{x}$ 9,77±SD 2,74	0,175
PTH (pg/mL)	$\bar{x}$ 49±SD 12,93	$\bar{x}$ 42±SD 18,38	0,241
Previous BP	8,69% (n=6)	13,19% (n=55)	0,187
BP initiation	34,78% (n=24)	66,19% (n=276)	0,004

**Conclusion:** Regarding bone metabolism, BMD, the mean serum calcium, PTH and vitamin D levels were all lower in the osteoporotic patients in the nursing home group compared with the community group. Only vitamin D levels showed a significant statistical difference. Pharmacological under-treatment was found in both groups. Patients from nursing homes were less likely to receive pharmacological anti-osteoporotic treatment after suffering a fracture, this may be due their worse functional status, which mandates a careful decision considering the risks and benefits.

P960

### IS THERE A SPECIFIC PROFILE OF WOMEN WITH HUMERAL FRACTURE VISITING A FRACTURE LIAISON SERVICE?

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**Objective:** Fracture of the proximal humerus (HF) is the third most common peripheral location of fragility fracture in postmenopausal women. Specific epidemiologic data and characteristics of women with HF remain scarce and no data exist on those visiting a Fracture Liaison Service (FLS). We assessed whether women with HF had specific features compared with those visiting our FLS following proximal femur fracture (FF) or wrist fracture (WF).

**Methods:** We retrospectively included 502 postmenopausal osteoporotic women visiting our FLS with the following distribution: HF, n=113; FF, n=192 and WF, n=197. R software was used and normality of data tested with Shapiro-Wilks test. Data were expressed in median and interquartile range.

**Results:** Women in HF group were younger than those in FF group (66 [60;75] vs. 82 [68;87] respectively;  $p < 0.0001$ ) but no different from those in WF group (65 [59;74]). In contrast, the BMI (kg/m<sup>2</sup>) was higher in HF group compared to FF group (27.2 [23.1;30.8] vs. 25.1 [22.2;28.7] respectively;  $p < 0.023$ ) but not different from the WF group (25.4 [22.1;29.4]).

Hip BMD (g/cm<sup>2</sup>) was similar in both HF and WF groups (0,818 [0.716;0.903] vs. 0,801 [0.696;0.904]), and higher than in FF group, (0,667 [0.594;0.774];  $p < 0.0001$ ). There were no differences in terms of spine BMD as well as TBS values. Both vitamin D (nmol/L) and PTH (ng/L) values were lower in HF group (34.2 [17.8;65.3] and 34 [23;53], respectively) compared to FF group (53.5 [24;75] and 41 [29;53],  $p = 0.02$  and  $0.047$  respectively). Correlations were positive between BMI, and spine and hip BMD, and PTH level, but negative with TBS. After multiple regression and multivariate adjustments, HF group was characterized by younger



age and higher hip BMD compared to FF group, in one hand, and by older age and higher hip BMD compared to WF group in another hand.

**Conclusion:** Among postmenopausal women visiting our FLS following different fracture locations, we observed significant differences in both age and hip BMD in those with HF fracture, with intermediate mean values between those with a FF and those with a WF.

## P961

### RHEUMATOID ARTHRITIS IN THE ELDERLY AFFECTS THE SKELETON, CAUSES OSTEOPOROSIS AND NEEDS INDIVIDUALIZED THERAPEUTIC APPROACH

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Rheumatoid arthritis is a chronic inflammatory disorder which causes erosive arthritis, affects multiple organs and is related to osteoporosis. Its global prevalence is around 1%, it usually occurs in the fourth and fifth decade of life and most often affects women. Increased life expectancy led to the description of a new medical entity, late onset rheumatoid arthritis. Late onset rheumatoid arthritis manifests in the age of >60 y and is characterized mainly by systemic symptoms and arthritis with a global incidence of 2%. The aim of the present study was to describe rheumatoid arthritis in the elderly, to determine clinical symptoms of the disease and to assess disease severity and treatment. Patients were divided into two subgroups according to the age at diagnosis, 40-59 y and >60 y. Results show that men have a higher rate of rheumatoid arthritis at older age as compared to younger patients. At the same time, patients with late onset rheumatoid arthritis present with comorbidities, such as osteoporosis, cardiovascular disease and diabetes. The disease manifests itself with systemic symptoms and arthritis. The presence of autoantibodies is lower in late onset rheumatoid arthritis. In conclusion, late onset rheumatoid arthritis has specific clinical manifestations and needs individualized treatment. Taking into consideration that the disease affects the elderly who are a population group with increased vulnerability, the need for further research into diagnosis and determination of the best therapeutic approach is urgent.

## P962

### ANTI-INFLAMMATORY ROLE OF L-PLASTIN IN THE PATHOGENESIS OF OSTEOARTHRITIS

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**Objective:** To study the anti-inflammatory properties L-plastin (LPL) mediates in chondrocytes by modulating signaling pathways which suggest new therapeutics for osteoarthritis.

**Methods:** Cell and femoral head culture: TC28 cells or femoral head were cultured and treated with either IL-1 $\beta$  or IL-1 $\beta$  with and without LPL inhibitor. qRT-PCR analysis: Total RNA was extracted from cultured chondrocytes, and was then subjected to qPCR analysis

**DMM surgery:** Right knee joint was subjected to microsurgery via transecting the medial menisci tibial ligament to induce osteoarthritis (OA). The left knee joint was subjected to a sham-operation to serve as a control. Tissue harvesting and histological assessment: Mice were sacrificed 10 weeks post-DMM surgery, decalcified, embedded, sectioned, stained, and imaged. Histological evaluation was performed according to the Osteoarthritis Research Society International OARSI scoring.

**Results:** LPL mRNA expression level was elevated post-IL-1 $\beta$  treatment: mRNA expression level was elevated post-IL-1 $\beta$  treatment in primary chondrocytes, human primary chondrocytes and TC28 cell, respectively. I-LPL treatment and LPL KO mice have less MMP-13 expression post-IL-1 $\beta$  treatment in the mouse femoral head explant culture: Our data showed that the proteoglycan breakdown and MMP-13 positive cells in articular cartilage in LPL KO treated group was reduced. LPL KO display less cartilage damage in DMM-induced OA compared to WT.: Both WT and LPL-/- mice developed arthritis characterized by loss of the joint's articular cartilage. WT mice displayed OARSI scores of 2.359 $\pm$ 0.1093 for the medial tibial plateau. The OARSI scores of LPL-/- mice were significantly lower at 1.043 $\pm$ 0.235 for the medial tibial plateau.

**Conclusion:** I-LPL and LPL KO mice showed less MMP-13 expression post-IL-1 $\beta$ -treatment and LPL KO mice display less cartilage damage in DMM-induced OA compared to WT. I-LPL treatment significantly reduced the mRNA expression of MMP-1, MMP-13, IL-6 and TNF $\alpha$ . The number of cells stained positive for MMP-13 was reduced significantly in both I-LPL and LPL KO group post-IL-1 $\beta$  treatment. Taken together, these data indicate that inhibiting LPL might act as an anti-inflammatory effect by reducing the loss of proteoglycans in articular cartilage post-IL-1 $\beta$  induced inflammation.

P963

**SEVERE OSTEOPOROSIS AND CHRONIC PAIN: MANAGEMENT AND QUALITY OF LIFE IMPACT**D. Păcurar<sup>1</sup>, M. R. Păcurar<sup>1</sup>, M. I. Popescu<sup>1</sup>, L. Lazăr<sup>1</sup>, K. Babes<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine and Pharmacy, Oradea, Romania

**Objective:** In the last 5 decades there has been an increase in the percentage of elderly people in the total population, especially in developed countries. This demographic situation leads to an increase in the frequency of diseases, including osteoporosis. The prevention of osteoporosis and the proper treatment of osteoporotic vertebral fractures is of great interest for patient's quality of life. The biophysical and postural features of the spine are directly and indirectly determined by BMD and osteoporosis, over time there are stiffness and pain in the spine, osteoporotic fractures, reduced lung capacity and other severe complications.

**Methods:** We will present the case of a 69-year-old patient with the following symptoms: mixed, severe low back pain. Patient's medical history revealed: hypertension, class3 obesity, type 2 diabetes, osteoporosis. She denies smoking, alcohol or substance abuse.

**Results:** Upon physical examination, the patient is afebrile and hemodynamically stable. She is oriented with extraocular movements intact. Musculoskeletal examination - painful tenderness on palpation of the lumbar region, painful lumbar mobility in all axes, negative bilateral Lassegue, no motor deficit. Lab work was unremarkable except mild hyperglycemia, nonspecific inflammatory syndrome. ECG (at rest): normal sinus rhythm, left ventricular hypertrophy with ST depression less than 1 mm. Transthoracic echocardiography: left ventricular hypertrophy with diastolic dysfunction, good ejection fraction, normal sized right ventricle and atrium, wall motion abnormalities were absent. X-ray examination: severely compressed L3 vertebral body, L5/S1 discopathy, sinister-convex lumbar scoliosis. DXA: T-score L spines: -4.5; right femur: -1.8; left femur: -1.9. Considering the lingering and accentuated pain after the administration of analgesics and the performance of physiotherapy as well as the severe radiological aspect of the L3 vertebra, the surgical intervention in the neurosurgery department was decided for transpedicular vertebroplasty with cement. The evolution was favorable, with the remission of pain.

**Conclusion:** Physical therapy and analgesics are very important parts of any pain rehabilitation program along with surgical intervention in particular cases. Research suggests significantly less pain, better psychosomatic health and improvement of quality of life after surgical treatment for this group of population.

P964

**COMPLEMENTARY USE OF TBS FOR OBESE AND/OR DIABETIC MALE PATIENTS**J. Chun<sup>1</sup>, M. Coco<sup>2</sup><sup>1</sup>Montefiore Medical Center, Albert Einstein College of Medicine, Dept. of Radiology, <sup>2</sup>Montefiore Medical Center, Albert Einstein College of Medicine, Dept. of Medicine, Bronx NY, USA

**Objective:** BMD measurement is key to clinical evaluation of osteoporosis. TBS for assessing spine bone texture is accepted as a complementary measurement to DXA BMD score from spine. Male patients with comorbidities such as obesity may have elevated DXA BMD measurements that may not be attributable to degenerative changes in spine. TBS may offer more accurate diagnosis of bone quality.

**Methods:** We reviewed a total of 89 cases for male patients with confirmed prostate cancer on androgen deprivation therapy referred between January 2020 and January 2022 for BMD and TBS measurements. For each patient at the time of measurement, patient's age, DXA BMD score and TBS T-score were measured for lumbar vertebrae. Cases were then ranked by difference of TBS T-score vs. spine BMD.

**Results:** The top-quartile (22 out of total 89) of cases by rank were characterized by TBS T-scores ranging from -1.0 (low bone mass) to -3.6 (osteoporotic). 17 cases in this top-quartile had TBS T-score between -1 and higher than -2.5, indicating osteopenia, and 7 cases had TBS T-score below -2.5, indicating osteoporosis. For this same top-quartile, however, no cases had spine BMD scores indicating either osteopenia or osteoporosis. Closer review of the outlying cases found that these patients were obese and/or diabetic. Age was not a differentiating feature of this top-quartile as the ages of patients were similar in range and average to total population.

**Conclusion:** Nondiabetic obese patients can have vascular calcification in hypercholesterolemia as well as in DM with visible abdominal aortic calcification (AAC). Nondiabetic, nonobese patients can exhibit vascular calcification arising from other medical conditions. We observed 89 males who underwent BMD study and for whom TBS calculations were available for comparison. It appears that high BMI cases show wider discrepancies between TBS and BMD scores. Some cases showed evidence of vascular calcification, including abdominal calcification. From Vertebral Fracture Assessment (VFA) studies, we were able to identify AAC. Aerial view of BMD captures both spinal BMD as well as calcific density in the abdominal aortic vessel wall, often demonstrated in obese diabetic patients. For these cases, TBS can potentially offer more accurate diagnosis of bone quality that is not well reflected in BMD score. Further study in larger scale would be helpful to offer more accurate bone health status in this vulnerable population.

P965

### VERTEBRAL FRACTURES IN A YOUNG WOMAN WITH SUBCLINICAL HYPERTHYROIDISM

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Thyrotoxicosis is known to be associated with an increased risk of osteoporosis and fragility fractures.

We present the case of a 39 years old woman, who addressed our clinic for subclinical thyrotoxicosis. The thyroid ultrasound revealed a large nodular conglomerate in the right lobe, which had an intense non-homogenous uptake at the scintigraphy. Total thyroidectomy was performed, with subsequent substitution therapy. 6 months later, she presented for low back pain, with no history of trauma. Lumbar CT revealed vertebral fractures at L1-L3 levels. The scintigraphy showed recent vertebral fractures at T9, T10, L1-L2 levels and older L3 and L4 fractures. The osteodensitometry confirmed a low BMD at lumbar spine (BMD L3-L4 0.625g/cmp, Z=-4.1, T=-4.3), with normal BMD at the femoral level. Osteoanabolic therapy by teriparatide was started, along with calcium and vitamin D supplementation.

Comments: Rapid correction of even mild thyroid hormone excess is recommended, as several studies and meta-analyses revealed the association with excessive stimulation of bone remodeling, with consequent bone loss, decrease in BMD and increase in fracture risk.

P966

### PRELIMINARY RESULTS FROM CLINICAL AND BIOCHEMICAL DATA COLLECTED IN A DUCHENNE'S MUSCULAR DYSTROPHY ITALIAN POPULATION: THE BONEMI-DMD STUDY

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**Objective:** Duchenne Muscular Dystrophy (DMD) commonly associates with reduced bone mass and increased fragility fracture (FF) risk. Here, we describe preliminary macroaggregate data of the prospective longitudinal study, BoneMI-DMD, in collaboration with the "Besta Neurological Institute" of Milan, Italy.

**Methods:** BoneMI-DMD Study currently includes 73 DMD male patients (age range 4-30 y), with clinical follow-up from 2000-2021. Subjects were divided into ambulant (n=22) and non-ambulant (n=39) groups (no data on 14 patients due to the COVID-19 pandemic). Bone turnover markers (BTMs), as CTX, osteocalcin, and bAP, as also Ca-PO<sup>4</sup> metabolism and circulating 25OHD levels were evaluated. The lumbar spine BMD Z-scores were estimated through serial DXA scans (adjusted for body height), and clinical prevalence of FFs was also recorded.

**Results:** Preliminary macroaggregate results indicate that among nonambulants, 16.6% had basal, presteroid therapy, insufficient 25OHD values (<30 ng/ml), whereas in ambulants deficient-insufficient levels were observed in 31.8%. In 61 patients (83.5%), we observed a total number of FFs of 28, 21 in nonambulants (75%) (age range 9-31), and 7 in ambulants (25%) (age range 4-18), distributed as follows: 5 with vertebral fractures only (VFso) (8.2%), 16 with appendicular fractures only (AFso) (26.2%), and 7 with vertebral and appendicular fractures (VAFs) (11.5%). In nonambulants, we noted 3 with VFso (14.2%), 12 with AFso (57.1%), 6 with VAFs (28.5%); in ambulants, 2 with VFso (28.5%), 4 with AFso (57.1%), 1 with VAFs (14.2%). The overall number of DMD without VAFs is 31 (50.8%), divided as follows: 16 (51.6%) in nonambulants and 15 (48.4%) in ambulants. The statistical analysis of biochemical parameters and DXA results is in progress.

**Conclusion:** preliminary macroaggregate results in 28 young DMD patients with FFs show 5 with insufficient 25OHD values (17.8%), and 23 with levels higher than 30 ng/ml (82.14%). In the non-fractured group, 7 and 23 subjects have insufficient (23.3%) and normal 25OHD values (76.7%), suggesting no significant differences in serum 25OHD levels between ambulant or nonambulant DMD, with/without FFs. Moreover, DMD patients, prevalently nonambulants, exhibit a higher FF risk, with both AFso and VAFs represented, thus indicating that early muscle suffering also plays a role in skeletal frailty beyond dysmobility. Completion of the biochemical and clinical data analysis will allow to further clarify the correlation of bone parameters with DMD phenotype.

P967

### IMPLEMENTATION OF A MULTIDISCIPLINARY PROTOCOL FOR THE MANAGEMENT OF ANTIPLATELET AGENTS, ANTICOAGULANTS AND ANEMIA IN ADULTS WITH HIP FRACTURE AND ITS IMPACT ON BLOOD TRANSFUSIONS

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**Objective:** To determine if implementing a multidisciplinary protocol for managing antiplatelet agents, anticoagulants, and anaemia in adults undergoing hip fracture surgery reduces blood transfusion rate during hospitalisation.

**Methods:** Retrospective observational study of patients over 69 y admitted with a hip fracture into an Orthogeriatrics Unit from February to May 2021 and eligible for surgical treatment were included. According to the protocol, previous therapy with antiplatelets or anticoagulants should be reviewed; intravenous iron infusion should be provided when haemoglobin (Hb) at admission was <13 g/dl and blood transfusion when Hb was <7 g/dl. The protocol was applied according to clinician criteria. Primary outcome was blood transfusion rate during hospitalisation. Sociodemographic, clinical and analytical data were collected. Patients receiving a blood transfusion during hospitalisation were compared with those that did not. Between groups, comparisons were made in the univariate analysis. A multivariate logistic regression model was employed to determine possible factors associated with transfusion during hospitalisation.

**Results:** A total of 131 patients (75.4% females, mean age 85.1±6.7 y) were included, of whom 62 (47.7%) received a blood transfusion. Patients who received blood transfusion were older (86.8 vs. 83.5 y,  $p=0.01$ ), more dependent for activities of daily living (Barthel Index) (68.9 vs. 77.8,  $p=0.05$ ), had more comorbidities using Cumulative Illness Rating Scale-Geriatrics (15.3 vs. 12.6,  $p=0.004$ ), and took antiplatelets (45.9% vs. 26.9%,  $p=0.03$ ) and anti-vitamin K (AVK) anticoagulants (24.6% vs. 9%,  $p=0.02$ ) more frequently. Adherence to the protocol was lower in patients receiving blood transfusions (42.6% vs. 63.6%,  $p=0.02$ ). The main cause of not complying with the protocol was not providing intravenous iron at admission (98.3%). In the multivariate analysis, only previous AVK treatment was independently associated with blood transfusions (OR 4, CI 95% 1.22-13.1). However, complying with the protocol showed a tendency towards the significance in blood transfusions reduction (OR 0.5, CI 95% 0.21-1.001).

**Conclusion:** It remains to be determined whether strict adherence to the protocol reduces transfusions during hospitalisation in adults with hip fracture undergoing surgery. Previous AVK therapy is associated with a higher blood transfusion rate during hospitalisation.

## P968

### PREVIOUS FRAGILITY FRACTURES IN HIP FRACTURE PATIENTS: AN IGNORED WARNING?

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**Objective:** To assess the type and timing of the occurrence of previous fragility fractures in patients with hip fractures.

**Methods:** Retrospective study that included patients admitted to our hospital with hip fracture for six consecutive months. Data were collected regarding the existence of previous fragility fractures, their location and timing of occurrence, as well as previous anti-osteoporotic therapy. Comparison between groups of patients was made using chi-square and Mann-Whitney U tests.

**Results:** 126 patients were included, 103 (81.7%) females, aged 82.2±7.2 y. Forty-five (35.7%) patients had a previous fragility fracture, occurring a median of 3 (1-8) y before the hip fracture; there were 19 (42.2%) fractures of the distal radius, 13 (28.9%) hip, 6 (13.3%) proximal humerus, 3 (6.7%) pelvis, 2 (4.4%) malleolar and 1 (2.2%) of the spine and clavicle. Only 9 (20.0%) of the patients with a previous fragility fracture underwent antiosteoporotic therapy. There were no statistically significant differences between the different fracture sites and timing of occurrence; there was no fracture site significantly more associated with the prescription of anti-osteoporotic therapy, and it should be noted that, of the most prevalent fractures, only 2 (15.4%) patients with hip fracture underwent anti-osteoporotic therapy, 4 (21.1%) patients with fracture of the distal radius and 1 (16.7%) patient with fracture of the proximal humerus.

**Conclusion:** In this series, it was demonstrated that a relevant percentage of patients with hip fractures already have a history of previous fragility fracture; the identification, evaluation and prescription of adequate and timely anti-osteoporotic therapy in this context can change the functional and vital prognosis of patients with severe osteoporosis.

## P969

### VITAMIN D DEFICIENCY, OBESITY, ALCOHOL AND SMOKING ADDICTION: A CASE REPORT

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**Objective:** Vitamin D deficiency and obesity are two public health problems extensively exacerbated over the last years. Among the various causes proposed, nutrition, physical activity and alcohol intake are among the most important. We will examine through the analysis of a case report how alcoholism obesity and vitamin D deficiency can be strictly correlated

**Methods:** Herein we present a case of a 39-year-old woman from a general rehabilitation department where she arrived after a period in orthopedics for a road polytrauma with multiple rib fractures, transverse processes of lumbar vertebrae, left calcaneal treated conservatively, and right tibial malleolus treated with osteosynthesis. The patient came to our operating unit for occasional finding of positivity to the nasopharyngeal swab for SARS CoV2. Patient known for obesity schizophrenia arterial hypertension, alcoholism and smoking.



**Results:** We performed BMI 33,2, blood count with leukocyte formula resulting in the norm, creatinine in the norm, vitamin D(25-OH) 8,2; 1, 1.25 calcitriol 14,2;TSH in the norm. The patient performed exercises of strengthening the lower limbs and passive mobilization until the granting of the load when she started with gradual resumption of the load. Therapy with cholecalciferol was set the therapy set by the treating psychiatrist was maintained and interviews were carried out with the support psychologist on a weekly basis. The patient interrupted hospital admission early after fifteen days of hospitalization for craving towards cigarette smoking, although therapies were proposed to reduce the craving

**Conclusion:** From what emerged from the literature data consulted on various search engines lifestyle habits regarding nutrition, physical activity, alcohol consumption and smoking have a substantial impact on progression osteoporosis and musculoskeletal diseases. In our experience, psychiatric pathologies associated with potus and smoking have a negative impact on the patient's therapeutic compliance

## P970

### POSTMENOPAUSAL OSTEOSARCOPENIA

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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 BMD decrease, which, in combination with elderly patients comorbidity is realized in an increased frequency of fractures, disability and mortality. The combination of sarcopenia and osteoporosis is a dangerous duo, as it doubles the risk of fractures and premature death of patients. According to the US Center for Disease Control and Prevention, sarcopenia is recognized as one of the five leading risk factors for morbidity and mortality in people over 65. However, in general clinical practice, this syndrome remains underestimated and rarely diagnosed.

Own research results: The study involved 65 women aged 55.7±0.6 y, postmenopausal with osteoporosis. Assessment of the state of the musculoskeletal system and the risk of falls were studied using functional tests and ultrasound examination of the main ultrasound parameters m. quadriceps femoris on the Toshiba aplio 300. Functional tests: impaired coordination, stability (FRAX All (R= -0.67)), and the risk of falls (FRAX All (R=0.64)), dynamometry (FRAX All (R=-0.77), FRAX hit (R=-0.70)) 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 (echogenicity with muscle width (R=0.78), with pennation angle (R=0.99)).

## P971

### COMORBIDITIES IN RHEUMATOID ARTHRITIS

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**Objective:** To assess the prevalence of comorbidities in patients with rheumatoid arthritis (RA) and to determine the predictive factors of their occurrence.

**Methods:** This retrospective, monocentric study included 99 patients with diagnosed RA according to EULAR/ACR 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:** 76.8% were women, the mean age of patients was 54.2±5 y and the mean disease duration was 9±2.6 y. 54.5% were positive for rheumatoid factor and 71.7% for ACPA. The disease activity score (DAS) 28-ESR was 4.9±3.8. 83.8% used methotrexate, 16.6% sulfasalazine, 12.1% leflunomide and 34.3% biologic therapy. 58 patients (58.6%) had at least one comorbidity: 37 patients had one comorbidity and 13 patients had two. The most common comorbidities were: cardiovascular conditions (59.6%) followed by diabetes (36.4%), osteoporosis (19.2%), thyroid disease (6.1%), asthma (5.1%) and solid cancers (3.03%). In the group of patients with comorbidities, the mean age was 56.2±11.3 y (p=0.001), women represented 46.5%. The mean disease duration was 11±4.1 y (p=0.01). Rheumatoid factor was positive in 65.5% (p<0.05) and the DAS28 was 5.8 (p=0.2).

**Conclusion:** Our study showed a high prevalence of cardiovascular diseases and diabetes in RA patients. Systematic measurement of vital signs and laboratory testing detect comorbid conditions.

## P972

### OSTEOACTIVIN: AN ORTHOBIOLOGIC FACTOR THAT INDUCES SPINAL FUSION IN AN OSTEOPOROTIC RAT MODEL

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**Objective:** To investigate the potential use of osteoactivin (OA), a protein known to have osteoinductive properties *in vivo* using spinal fusion in a postmenopausal osteoporotic rat model.

**Methods:** Sprague Dawley rats (n=160) were ovariectomized to surgically-induce postmenopausal osteoporosis. Animals were randomized into 5 groups: PBS (control), autologous bone graft, recombinant OA (rOA), OA peptide (OAp) and recombinant BMP-2 (rBMP-2). Groups received posterolateral interlaminar fusion at the L4-L5 segment. Animals were sacrificed 10 weeks post-surgery and spines assessed using  $\mu$ CT analyses.

**Results:** Quantification of bone volume and trabecular segmentation showed differences between surgical treatments. Three-dimensional spinal visualization presented successful and significant spinal fusion and enhanced bone growth in rOA, OAp, BMP-2 and autologous graft compared to control animals. Furthermore, in comparison to PBS-treated animals, those treated with rOA, OAp, BMP-2 and autologous graft showed higher bone volumes, with the pOA group having the largest increase in trabecular segmentation. Interestingly, while the rOA and OAp groups demonstrated increased bone growth at the target surgical sites, rBMP2 treatment resulted in heterotopic ossification in areas close to the fusion site.

**Conclusion:** Our results indicated that rOA and OAp may serve as alternative orthobiologics in spinal fusion procedures. OAp or rOA compared to BMP-2 show potential to increase bone formation and minimize deleterious side effects making this osteoinductive agent of interest for further investigation for potential clinical use.

## P973

### IMPACT OF COVID-19 IN PATIENTS WITH MUSCULOSKELETAL DISORDERS

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**Objective:** To investigate whether patients with musculoskeletal disorders had (1) increased susceptibility to SARS-CoV2 infection or to develop more severe forms of COVID-19; (2) worsening of the underlying disease; and (3) changes in health care delivery during the pandemic.

**Methods:** Patients with and without musculoskeletal disorders were recruited to participate in a retrospective survey evaluating the period from June 30, 2020, to December 31, 2021. Demographics, clinical features, type of musculoskeletal disorders, suspected or confirmed COVID-19 in the patients or cohabitants, and changes in care delivery were recorded.

**Results:** 2055 patients were included: 1335 (65%) female, median age 48 y (interquartile range [19–72] y), 1227 (60%) with musculoskeletal disorders. COVID-19 was suspected or confirmed in 473 (23%) (all mild), with a frequency similar in patients with and without musculoskeletal disorders (295/1227 [24%] vs. 178/828 [21.5%],  $p=0.4122$ ). The worsening of the underlying disease was observed more in patients with COVID-19 ( $p<0.01$ ). Factors associated with COVID-19 included having cohabitants with COVID-19

( $p<0.01$ ) and lower blood levels of vitamin D ( $p=0.025$ ). Return to face-to-face interactions or mask type did not influence the risk of infection, although 544 (26.5%) patients had contact with a family or friends with COVID-19. Clinic visits changed from face-to-face to remote for 1588 (77%) patients; 1397 (68%) were satisfied with the change.

**Conclusion:** In this cohort of patients with musculoskeletal disorders, the frequency of COVID-19 was low but led to a worsening of the underlying disease. The main risk factors for developing COVID-19 were having cohabitants with COVID-19 and low vitamin D levels.

## P974

### ANABOLIC RESPONSES OF HIGH AEROBIC CAPACITY ON BONE HOMEOSTASIS

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**Objective:** To understand the impact of aerobic capacity in bone, we assessed rat models selectively bred as low (LCR) and high-capacity runners (HCR) at different age groups for bone homeostasis.

**Methods:** Bone mass was analyzed in both age groups of LCR and HCR rats. Femurs and tibiae were analyzed using  $\mu$ CT. Osteoblast (OBs) and osteoclast (OCs) differentiation was assessed using bone marrow derived cells from LCR and HCR rats. Gene expression was assessed using qPCR analysis.

**Results:**  $\mu$ CT analysis of the femurs and tibiae displayed a significant decrease in trabeculae connectivity via trabecular segmentation in LCR compared to HCR groups. Furthermore, trabecular segmentation was most significantly decreased in the LCR in comparison to HCR rats. OB differentiation using ALP staining and activity as well as gene expression and matrix mineralization in HCR rats were significantly increased in HCR OBs compared to LCR OBs. qPCR analysis showed significantly greater levels of OSX, RUNX2, COL2A1 and ALP mRNA in the young HCR OBs compared to their young LCR counterparts.

**Conclusion:** Our study of the effects of low aerobic capacity revealed the genotypic, phenotypic, and functional decrease associated with that of low aerobic capacity on bone. In summary, we provide evidence that high aerobic capacity enhances OBs gene expression and an overall increase in bone mass in the animal model via increased aerobic capacity. Our data provide the first evidence of the potential therapeutic effects of high aerobic capacity on bone homeostasis.

P975

### MORPHOLOGICAL CHARACTERISTICS, CELL SURFACE MARKER AND GENE EXPRESSION PROFILES OF HUMAN ARTICULAR CHONDROCYTES IN TISSUEGENE-C

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**Objective:** TissueGene C (TG-C) is a cell-based gene therapy for knee osteoarthritis (OA) designed to be administered through a single intra-articular injection. It is composed of a 3:1 mixture of non-irradiated allogeneic human chondrocytes (hChonJ) and irradiated and transduced human GP2-293 cells, a protein production platform used for overexpressing TGF- $\beta$ 1, a growth factor that promotes cell differentiation and anti-inflammatory activity. The aim of this study was to examine the phenotypic characteristics and gene expression profile of the hChonJ component of TG-C and compare the expression of chondrogenic genes and cell surface markers in hChonJ with the chondrocyte cell line C28/I2 and primary human chondrocytes isolated from healthy and OA cartilage.

**Methods:** The expression of surface markers and chondrogenic genes of TG-C hChonJ was compared to an established human chondrocyte cell line (C28/I2) and primary adult human chondrocytes isolated from healthy and OA cartilage.

**Results:** The hChonJ cells in TG-C exhibited a number of phenotypic differences and similarities when compared with C28/I2 and primary human chondrocytes. hChonJ was similar to C28/I2 line and primary human chondrocytes in the expression percentage of CD44, CD81, CD151, CD166, however had higher expression of CD10 and CD26. Moreover, the abundance of CD49c, CD151 and CD166 were higher in hChonJ cells. In the chondrogenic medium and pellet cultures, hChonJ cells responded to TGF- $\beta$ 1 and TGF- $\beta$ 3 stimulation by up-regulating SOX9, COL2A1 and ACAN genes, three markers of hyaline cartilage, indicating that they have the ability to respond to relevant paracrine signaling. In addition, hChonJ exhibited a higher expression of MMP13 and COL10A1 compared to other cells examined.

**Conclusion:** Despite obvious phenotypic and gene expression differences with C28/I2 and primary human chondrocytes, hChonJ cells appear to possess a fibro-chondrocyte-like phenotype that is likely to have paracrine effects on transduced human GP2-293 cells overexpressing TGF- $\beta$ 1, which qualifies their suitability as a key component of TG-C.

P976

### PRECLINICAL SAFETY OF TG-C: A CELL-BASED GENE THERAPY OVEREXPRESSING TGF- $\beta$ 1

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**Objective:** TGC is a cell-mediated gene therapy that is in clinical development for the treatment of knee osteoarthritis (OA). It consists of a 3:1 mixture of non-irradiated allogeneic human chondrocytes and irradiated transduced human GP2-293 cells that serve as a protein production platform overexpressing TGF- $\beta$ 1. The safety and efficacy of a single intraarticular injection of TGC into the knee joint have been evaluated in a Phase 1, multicenter, single-blind, randomized, placebocontrolled, doseescalation trial, a Phase 2, multicenter, double-blind, randomized, placebocontrolled, fixed-dose trial, and an ongoing Phase 3, multicenter, double-blind, randomized, placebo-controlled trial. However, there are gaps in reports of the pre-clinical safety of TG-C. The aim of this study was to focus on the preclinical safety of TG-C. In this pre-clinical study we employed various experimental animal models to focus on the pre-clinical safety of the cellular components in TGC and determine adverse outcomes following joint and subcutaneous injections.

**Methods:** All animal studies were conducted with ethical committee permission and approval and in line with the World Medical Association (WMA) Declaration of Helsinki and NC3Rs ARRIVE guidelines to ensure the welfare of animals used for research.  $2 \times 10^6$  / mL (20 mL) TG-C cells (48Gy-irradiated) were injected into the knee joints of 70 (35 male and 35 female) Sprague-Dawley (SD) rats. The rats that were not injected were used as the control group. 10 rats (5 male and 5 female) that were injected were sacrificed, and the tissues were harvested at 0.4, 1, 3, 7, 14, 30, and 60 days. The harvested tissues included blood, bone marrow, brain, heart, kidney, the entire knee joint, liver, lung, lymph nodes, ovaries, testes, pancreas and spleen. Genomic DNA was isolated from the rat tissues and subjected to quantitative PCR (qPCR) analysis was used to detect human cells and RvTGF $\beta$ 1 vector-transduced cells. The tumorigenicity studies in mice were conducted in 30 5-week old female athymic nude (nu/nu) mice (Harlan) injected with TG-C cells at a density of  $5 \times 10^7$  cells/mL (20 mL). All positive control mice were sacrificed and necropsied 14 days post-injection. All negative control mice were sacrificed and necropsied 84 days after injection. Safety studies in goats examined a total of 71 animals. Goats received high and low doses of TG-C; 10 animals received a high single-dose of  $5 \times 10^7$  cells/mL (500 mL); 10 animals received a low dose single-dose  $1 \times 10^7$  cells/mL (500 mL); 10 animals received a high multiple-dose  $5 \times 10^7$  cells/mL (500 mL) and were followed up for 6 and 12 months.

**Results:** Real-time qPCR was performed to determine if human TG-C cells can be detected the knee joints and other organs. Treatment with TG-C had no effect on mortality, body weight, or



gross or microscopic pathology of the injection site in rats. TG-C cells were detected for up to 3 d in the joint, but not after 7 d, as determined by qPCR. A few cells were detected in lymph nodes in 3 (2 males and 1 female) of the 10 rats on day 0.4 d, but no cells were detected in lymph nodes after 1 d. TG-C cells were not detected in any other tissue. Parallel studies of TG-C tumorigenicity conducted in nude athymic mice and SCID revealed the formation of fibrosarcomas at the injection site of all positive control mice. Carcinomas were also detected in 30% 10 TG-C injected mice. There were no neoplastic lesions detected at the site of injection or in any of the other organs examined in the TG-C injected or negative control injected mice. Safety studies in goats including clinical chemistry, haematology, and organ histology revealed no adverse findings, either systemically or locally at the 6 or 12-month timepoints. None of the animals died as a consequence of being injected with TG-C. TG-C was well tolerated and did not elicit any immune responses in the goats either in the low, high, single or multiple doses.

**Conclusion:** The distribution of TG-C cells administered in the synovial joint of rats did not result in any adverse effects or cytotoxicity. The studies in the nude athymic and SCID mice revealed evidence of tumorigenicity, which was expected as these animals are immunodeficient and are incapable of mounting a T-cell mediated immune response against infections and tumors, including the administration of neoplastic cells. Safety studies in goats revealed no adverse reactions either locally or systemically. The results of the pre-clinical and in vitro studies demonstrate the safety of TG C. The radiation inactivation of cell proliferation in the GP2-293 component of TG C underlines the suitability for intra-articular injection into the knee joint. Furthermore, the introduction of a gamma or x-ray radiation inactivation step in the preclinical development pipeline for TG-C highlights the utility of this approach for developing other cell-based approaches for the intra-articular treatment of OA. In summary, these results demonstrate that TG C consists of cellular components that are safe for preclinical and translational studies in animals and clinical studies of knee OA in healthy and immunocompetent patients.

P977

### RISK FACTORS FOR OSTEOPOROSIS AND FRACTURES IN MIDDLE-AGED WOMEN WITH SELF-REPORTED OSTEOPOROSIS: A CROSS-SECTIONAL POPULATION-BASED STUDY

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**Objective:** Fracture risk cannot be determined by bone density alone. It is important to identify and consider risk factors that individually increase the risk of osteoporosis and fractures. Risk calculators have been developed worldwide to determine fracture risk. The current listed risk factors are diverse and the magnitude

as well as the interaction of these potential factors may varies among different populations. We aimed to evaluate the association between self-reported osteoporosis and selected risk factors for osteoporosis and fragility fractures, in Brazilian middle-aged women.

**Methods:** A secondary analysis of household survey data from a previous cross-sectional, population-based study conducted with a sample of 749 women of a population of 257,434 female urban residents in the age bracket of interest (45-60 y). Associations between self-reported osteoporosis and potential direct and indirect risk factors for osteoporosis and fragility fractures were evaluated. The selected risk factors studied were age, time since menopause, premature ovarian insufficiency, physical activity, sedentarism, alcohol consumption, smoking, arthritis/arthrosis, diabetes, previous hormonal contraceptive use, current and previous intake of menopause hormone therapy, multimorbidity, polypharmacy, BMI <18.5 kg/m<sup>2</sup> and medication intake that may affect bone mass. Simple and multiple Poisson regression analyses were performed to evaluate the significance of risk factors associated with self-reported osteoporosis (95%CI for the prevalence ratio). The level of statistical significance was set at 5%.

**Results:** Mean age of participants was 52.5±4.4 y. Mean age at menopause was 46.5±5.8 y. Two-thirds of the sample population consisted of Caucasian women. The prevalence of self-reported osteoporosis was 7.3%. About 79% of women reported having chronic disease. The overall prevalence of medication use was 68.8%, with the drugs consisting of those used for cardiovascular diseases (34.6%), antidepressant/anxiolytics (25%), hormone therapy (20%), treatment of osteoarticular diseases (12%), and treatment of diabetes (9.6%). Only 6% of the entire studied population reported using calcium and vitamin D supplementation. The overall frequency of polypharmacy was 24.6%. After multiple regression analysis, the risk factors for osteoporosis and fragility fractures associated with self-reported osteoporosis were time since menopause (PR=3.67; 95%CI: 1.01-13.41; p=0.049), having osteoarthritis/osteoarthritis (PR=1.97; 95%CI: 1.06-3.65; p=0.031), and multimorbidity (PR=2.31; 95%CI: 1.15-4.66; p=0.019).

**Conclusion:** This observational study provides an epidemiological contribution. The meticulous methodology and the representativeness of the population sample permit these conclusions to be extrapolated to the entire population of middle-aged women residing in the metropolitan region of Campinas, Brazil. Some limitations of this study must be considered, particularly bearing in mind that much of the data was self-reported, which may lead to biases. The prevalence of morbidities and medication use among middle-aged women was high in a relatively young population. The results of our analysis show that women with self-reported osteoporosis were more likely to be longer time on post menopause, to have osteoarticular disease, besides having multimorbidity. Several established risk factors for osteoporosis and fracture may also impact general health. These factors are dynamic and complex, yet clinically intuitive. This research reinforces literature that has established the importance of risk factors associated to osteoporosis in their roles as direct and/or indirect risk



for fractures. Our findings also suggest that bone health care in the earliest period may be improved by routinely monitoring of these potential risk factors to identify postmenopausal women with osteoporosis, to prevent fragility fracture.

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P978

### ASSOCIATION OF CORONARY ARTERY CALCIUM SCORE AND OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN: A CROSS-SECTIONAL STUDY

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**Objective:** The association of osteoporosis, the common metabolic bone disorder, with atherosclerosis has been reported in different studies. In this study, the association between coronary artery calcium score (CACS) and BMD at different sites and bone biomarkers in postmenopausal women was investigated.

**Methods:** A total of 184 postmenopausal women enrolled in the study. The CACS, BMD at different sites including spinal, total hip, and femoral neck were measured using computed tomography angiography and DXA, respectively. The serum level of bone biomarkers including osteocalcin,  $\beta$ -CTX, PTH, and 25 hydroxyvitamin D was measured.

**Results:** There was a negative association between CACS and bone biomarkers (osteocalcin P value=0.021;  $\beta$ -CTX P value=0.013). The univariable model showed the association between CACS and osteoporosis at the femoral neck (P value=0.03). Using the multivariate logistic regression model, it was found that with an increase of 10 units in CACS the odds of osteoporosis at the femoral neck escalates by 2% (OR: 1.02, 95%CI: 1.002-1.03); while we couldn't find such an association with the osteoporosis at the spinal site. The best cut-point of the calcium score was estimated as 127.

**Conclusion:** To conclude, the results suggest that in postmenopausal women, coronary atherosclerosis is independently associated with osteoporosis at the femoral neck but we could not detect such association with spinal osteoporosis. Considering the common risk factors, the importance of screening for osteoporosis in CVD patients and the implication of preventive measures in the primary care setting is highlighted.

P979

### INFLUENCE OF BIOFEEDBACK MECHANOTHERAPY AND VIRTUAL REALITY ON GAIT BIOMECHANICS IN PATIENTS WITH HIP FRACTURE

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**Objective:** To study the effectiveness of a rehabilitation complex using mechanotherapy technologies, virtual reality and training on a sensory treadmill with a biofeedback function to restore the gait biomechanics in patients after surgical treatment of osteoporotic hip fracture.

**Methods:** The study included 96 patients (M-10, F-86) aged 50-85 y.o. in the period from 6-12 months after arthroplasty or osteosynthesis of low traumatic proximal femur fracture. Patients were randomized into 2 groups. Patients of the study group (n=49) received a rehabilitation complex which included: 10 group sessions with a special physical exercises in the gym; 10 sessions on the simulator-ergometer with biofeedback; 10 sessions on an interactive sensory treadmill with biofeedback; 10 sessions on an interactive rehabilitation system with virtual reality technology with projection of scenarios on the floor; 10 procedures of laser therapy for the area of the hip joint. Patients of the Control group (n=49) were prescribed a rehabilitation complex which included only physical exercises in the gym and laser. Gait biomechanics measured on a sensory treadmill-ergometer at baseline, immediately after completion of rehabilitation (Day 12) and 48 d after completion of rehabilitation as a follow-up (Day 60).

**Results:** Step length of the right leg statistically increased in study group from 286.0 [198.0; 365.0] mm at baseline to 344.0 [207.0; 398.0.0] mm at Day 12 (p=0.036) and to 367.0 [273.0; 426.0] mm at Day 60 (p=0.008), and in Control group from 289.0 [181.0; 372.0] mm at baseline to 340.0 [242.0; 429.0] mm at Day 60 (p=0.042). Step width decreased from 178.0 [159.0; 289.0] mm at baseline to 162.0 [95.0; 224.0] mm at Day 60 (p=0.012) in Study group and did not change significantly in the Control group. There was no difference between the groups in the rate of increase in step length of the left leg (mm) and in step frequency (steps per minute).

**Conclusion:** In patients with osteoporosis who underwent surgical treatment of a hip fracture, the use of mechanotherapy technologies, virtual reality and training on a sensory treadmill with a biofeedback function increases the speed and improves the biomechanics of walking.

P980

### DETERMINATION OF THE PREDICTIVE ACCURACY OF ASSESSING THE RISK OF LOW-ENERGY FRACTURES IN PATIENTS WITH RHEUMATOID ARTHRITIS USING THE FRAX ALGORITHM

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**Objectives.** To determine accuracy of osteoporotic fracture risk prediction in patients with RA using the algorithm FRAX (Russia).

**Material and Methods.** This monocentric (single-center) prospective study included 110 patients with RA, aged 40 to 80 years. The follow-up period - 8,55±1,34 years; mean age at the baseline was 55,9±7,05 years; the mean disease duration at the baseline - 14,6± 9,86 years. All patients retrospectively calculated the 10-year probability of fractures.

**Results.** According to the Fracture Risk Assessment Tool, 59 (54%) patients had a low risk of osteoporotic fractures, 51 (46%) had a high risk. During the follow-up period, osteoporotic fractures were occurred in 51 (46%) patients: 35 (69%) of them had a high risk of fractures according to the Fracture Risk Assessment Tool. The sensitivity and specificity of the Fracture Risk Assessment Tool was 69% and 59%, respectively.

**Conclusion.** In our study, FRAX (Russia) had insufficient sensitivity and specificity in determining the risk of low-energy fractures in patients with RA.

P981

### LOW-ENERGY FRACTURES IN PATIENTS WITH RHEUMATOID ARTHRITIS: FOLLOW UP OBSERVATIONAL STUDY

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**Objectives.** To determine the frequency and risk factors of low-energy fractures in patients with RA occurred during the long-term prospective observational study.

**Material and Methods.** The study included 103 women with RA (ACR/EULAR2010). Mean duration of observation - 8.45±1.34 years, mean age - 63.5±8.13 years, mean RA duration - 22.8±9.50.

All patients took a clinical examination, assessment of the anamnestic data, X-ray of hands, feet, thoracic and lumbar spine. A vertebral fracture was determined by a semiquantitative method with deformity of graded I or higher [1]. X-rays of hands and feet of 85 patients were assessed by the Sharp van der Heijde method at baseline and over time.

**Results.** During the follow-up period, the number of patients with fractures increased from 36 (35%) to 60 (58%). 43 (42%) patients had one or more low-energy fractures during the follow-up period, including 19 (44%) patients with a history of low-energy fracture and 24 (56%) had a fracture for the first time. Two or more fractures during the follow-up period had 9 (9%) patients. A total of 55 fractures occurred during the follow-up period, 27 (49%) of them were vertebral and 28 (51%) were peripheral. We divided patients into two groups: group I - 43 patients "with fractures", group II - 60 patients "without fractures" occurred during the follow-up period. 43 (100%) patients of group I and 53 (90%) patients of group II were in menopause (p=0,032). Mean age, duration of the disease, activity of RA (DAS28), HAQ were not differ significantly. At baseline in group I were more patients using GCs (p=0.002), including long-term GCs therapy (more than 3 months) (p=0.011). At baseline erosion score (p=0,053), joint space narrowing score (p=0,044), and total Sharp van der Heijde score (0,031) were significantly higher in group I. In multi-dimensional step-by-step discriminant analysis long-term GCs therapy (p=0,011), the presence of menopause (p=0,032) and erosion score (p=0,053) were defined as a set of factors associated with low-energy fractures. The sensitivity/specificity of the model is 83%/55%, respectively

**Conclusion.** During the follow-up period, the number of patients with fractures has increased by 23%. In 42% of women with long-term RA, during the eight-year follow-up period, a low-energy fracture occurred. The risk factor for fractures was long term GCs therapy, high erosion score by Sharp van der Heijde and menopause.

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P982

### UNINTENTIONAL FALL FROM HEIGHT LEADING TO A SEPTIC PSEUDOARTROSES OF TIBIA

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**INTRODUCTION:**

We present a case of a 36 year – old male who is suffering a proximal tibial fracture. The patient is brought to the emergency room stable, afebrile with a heart rate of 75 beats/minute, a respiratory

rate of 20 breaths/minute, a blood pressure level of 132/87 mm Hg, and pulse oximetry of 100% on room air. The patient has his right limb immobilized to prevent lacerate vessels and nerves which course along the shaft of the tibia complaining of severe right limp pain that had been treated with IV *fentanyl* 3 µg/kg. in a stepwise approach .

In the emergency room we precede to immobilization with external immobilization and undergoes surgical intervention.

Week later the patient presents moderate pain in his right knee and comes back to emergency room unable to deambulate. His temperature is 38,5 °C . CT scan is performed.

Septic non unions are rare and often occurs after an open fracture. Internal fixation is getting more and more popular, but it's a procedure at risk because of the high rate of infection. X – ray revealing proximal tibia fracture, CT scan.

DIAGNOSIS: Right fracture of proximal tibia

DIFFERENTIAL DIAGNOSIS: Pseudoarthrosis of tibial fracture , septic pseudoarthrosis of a tibial fracture

EVOLUTION:

The treatment of septic non-unions needs a multidisciplinary approach to treat properly both non union and infection of bone and soft tissues. Five months after removal of the frame, the patient was fully anatomically and functionally recovered.

CONCLUSIONS:

Septic pseudoarthroses of the tibia represent a relatively frequent complication of open fractures with a large soft tissue damage. They may be localized: in the proximal metaphysis, between the proximal and middle thirds, between middle and distal thirds, in the distal metaphysis.

The aim of this clinical case presentation is to outline the current thoughts and recommendations for the management of septic non-union. These fractures should be monitored more closely due to the risk of nonunion and they require considering an initial treatment with pharmacological augmentation to reduce the complications for the patient and the health care costs.

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P983

## A HEMORRHAGIC SHOCK IN A 75 YEAR OLD PATIENT SHORT AFTER PRESENTING A LOW ENERGY FEMORAL NECK FRACTURE

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INTRODUCTION:

We present a case of a 75 year – old woman who arrives at the emergency room after suffering a low energy trauma in a accidental fall while walking on the street on flat ground. Is diagnosed with [femoral neck fracture](#) on her right hip .The patient did not lose her consciousness and no sign of head trauma was found on physical examination. The patient underwent surgical treatment: hip prosthesis.

Few days later, she developed a [hemorrhagic shock](#) and was diagnosed with a delayed [splenic rupture](#) and the spleen was resected. Detailed examination showed a delayed rupture of an otherwise normal spleen without signs of an underlying pathology.

DIAGNOSIS: hemorrhagic shock, hip fracture, femoral neck fracture

DIFFERENTIAL DIAGNOSIS: septic shock

EVOLUTION: The patient has recovered weeks after

CONCLUSIONS: A majority of splenic ruptures present acutely with a known mechanism of injury, a minority of patients present days to weeks following trauma with a delayed rupture. The management of major trauma patients remains challenging because of the risk of sudden changing of clinical conditions. There are very little cases in literature that describes a delayed [splenic rupture](#) of a previously normal spleen after a low energy trauma in combination with a [femoral neck fracture](#). Even careful reevaluation of the case did not provide any clues to expect an injury of the spleen according to trauma mechanism.

In conclusion, the main take-home message of this paper is that trauma patients with a history of high energy impact should be strictly monitored and followed up with close imaging.

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## P984

### BILATERAL TRAUMATIC PROXIMAL HUMERUS FRACTURE FOLLOWING EPILEPTIC SEIZURE. A CASE REPORT

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#### INTRODUCTION:

Fractures of the proximal humerus are uncommon in young patients. We report a rare case of bilateral traumatic displaced proximal humerus fractures in a 45 years old male patient, which was treated by means of open reduction and internal fixation with proximal humerus locked plates on both sides and obtained a good functional outcome.

DIAGNOSIS: Humeral fractures; Shoulder fractures; Fracture fixation, internal

DIFFERENTIAL DIAGNOSIS bilateral humeral luxation

EVOLUTION: the patient underwent a surgery and recovered totally.

CONCLUSIONS: Fractures are an uncommon complication of seizure and is extremely rare in the absence of trauma where, however, the fracture may be pathognomonic (bilateral posterior dislocation or fracture-dislocation of the shoulder) or highly suggestive (unilateral posterior dislocation, fracture-dislocation of the shoulder) of seizure.

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January 29, 2020

2. [Seizures Among Patients With Brain Metastases A Population- and Institutional-Level Analysis](#)

Nayan Lamba, Paul J. Catalano, Daniel N. Cagney, et al.

January 05, 2021

## P985

### FEMUR FRACTURE IN A YOUNG MAN DUE TO A BICYCLE ACCIDENT WHILE FAILING TO RELEASE HIS FEET FROM THE PEDALS . A CASE REPORT

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#### INTRODUCTION:

Off road mountain biking is becoming more and more popular as well as a highly recognised sport. Most injuries that occur are minor, such as skin abrasions and contusions resulting from the impact of falling on to unpredictable terrain. The use of clipless pedals amongst recreational cyclists has become increasingly popular in recent years. We describe a hip fracture, that was sustained due to inadequate set up of such pedals. We present a case of a 31-year-old man who was a club cyclist sustained a displaced intracapsular fracture of the hip whilst cycling. As a direct result of the incorrect set-up of his clipless pedals he was unable to release his feet whilst slowing to a halt. This resulted in a loss of balance and subsequent fall with a direct impact onto his left hip. The resulting fracture was managed successfully with early closed reduction and fixation.

DIAGNOSIS: Hip fracture, proximal femur fracture

DIFFERENTIAL DIAGNOSIS fracture – luxation of femoral head

EVOLUTION: At 6 month review he was walking unaided without pain but, as yet, has been unable to return to cycling.

CONCLUSIONS: The cases are reported of three off road cyclists with isolated soft tissue injuries to the right lower leg, caused by the chain ring as they struggled to release their feet from clipless pedals. Correct adjustment of the pedals to facilitate quick release of the feet is required to prevent such injuries. This case highlights the dangers of clipless pedals even in experienced cyclists, and underlines the importance of proper information for their correct setup to minimise the risk of potentially serious injuries, especially in the region of the hip.

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P986

### SPINAL IMMOBILIZATION IN A MULTIPLE TRAUMA PATIENTS

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#### INTRODUCTION:

The aim of our work is to pay attention to the importance of spinal immobilisation of blunt trauma victims with potential spinal cord injury. It is considered standard of care. The traditional management has, however, been increasingly questioned and concerns about harm have been raised. Few studies have described the perspective of the trauma patient regarding the spinal immobilisation. The objective of this study was therefore to evaluate the patient experience of immobilisation after trauma.

We prospectively screened adult trauma patients admitted to a level 1 trauma centre for eligibility. We included adult trauma patients who had been, and remembered being, immobilised for spinal protection with a cervical collar and a spine board prehospitally or upon arrival at the trauma centre.

We have chosen two hundred patients for inclusion based on the patient charts. Out of 191 patients assessed for participation, 45% had no memory of being immobilised. The 40% of the patient reported discomfort and 22% experienced pain related to the immobilisation. Nearly 80% reported a sense of protection related to the immobilisation.

#### CONCLUSIONS:

Discomfort related to spinal immobilisation was reported in 40% of trauma patients. However, a sense of protection was a recurring theme in 80% of the trauma patients, who recalled being immobilised. Nearly half of the awake trauma patients had no memory of being immobilised.

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P987

### MEASUREMENT TOOLS FOR ATTRIBUTES OF LOCOMOTOR CAPACITY IN OLDER PEOPLE: PROTOCOL FOR A SYSTEMATIC REVIEW OF AVAILABLE TOOLS WITH ASSESSMENT OF QUALITY OF TOOLS AND EVIDENCE-BASED RECOMMENDATIONS

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**Background:** Locomotor capacity is an important factor for well-being in older age, and one of the five domains of the construct of intrinsic capacity, as defined by the World Health Organization (WHO). In the context of public health challenges being induced by the increasing ageing of the World population, there is a need to find ways to measure healthy ageing, including measure of locomotor capacity.

**Objectives:** This study aims to identify all the available tools that were developed and/or validated for measurement of specific attributes of locomotor capacity in older people, and to assess the methodological quality of the studies and psychometric properties of the tools. The findings of this research will then be used to provide evidence-based recommendations for use of these tools in research and clinical practice.

**Methods:** We will perform a systematic literature search of Patient-Reported Outcome Measures (PROMs) that were developed and/or validated for measurement of specific attributes of locomotor capacity in older people, using highly sensitive search strategies combining free vocabulary words and specialized terms. Our literature search will cover the databases Medline (via Ovid), Embase, Scopus, CINAHL and PsycINFO (via Ovid). The study will be conducted following recommendations in the Cochrane handbook for systematic literature reviews (for screening and selection of studies), as well as the ten steps recommenda-

tions for conducting a systematic review of PROMs provided by the COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN) guideline (for assessments of methodological quality of studies and measurement quality of tools, as well as for making recommendations).

**Expected results:** This systematic literature review is expected to identify at least one measurement instrument, for each specific attribute of locomotor capacity, that have good measurement properties to assess locomotor capacity in older people, and that may be recommended for use in clinical practice and research.

## P988

### BONE MINERAL DENSITY AND NUTRITIONAL STATUS IN RHEUMATOID ARTHRITIS PATIENTS

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**Objective:** to evaluate an association between bone mineral density and nutritional status in women with rheumatoid arthritis (RA).

**Material and methods:** 158 women aged 40 and over (mean age 58.6±8.8 years) with confirmed RA according to ACR/EULAR criteria (2010) were enrolled in the study. Dual-energy X-ray absorptiometry (DXA) of the lumbar spine (LS), the femoral neck (FN) and the total hip (TH) was performed. The nutritional status was determined using body mass index (BMI), mid-upper arm (MUAC), calf (CC) and waist (WC) circumferences, the Mini Nutritional Assessment Short Form (MNA-SF) and daily dietary calcium intake (Cal). The percentage of body total fat (BTF) and lean mass (LM) were quantified by DXA of total body. Spearman's correlation test and univariate linear regression was performed.

**Results:** BMD of LS positively correlated with BMI ( $r=0.22$ ,  $p=0.007$ ) and LM ( $r=0.31$ ,  $p<0.001$ ). BMD of FN correlated with BMI ( $r=0.35$ ,  $p<0.001$ ), LM ( $r=0.48$ ,  $p<0.001$ ) and CC ( $r=0.31$ ,  $p<0.001$ ). BMD of TH correlated with BMI ( $r=0.37$ ,  $p<0.001$ ), LM ( $r=0.44$ ,  $p<0.001$ ), CC ( $r=0.27$ ,  $p=0.001$ ) and MUAC ( $r=0.40$ ,  $p<0.001$ ). No correlations between BMD at any site and MNA-SF, Cal, WC and BTF were found.

In the univariate linear regression BMI was associated with BMD of LS, FN, TH ( $\beta=0.26$ ,  $p=0.001$ ;  $\beta=0.38$ ,  $p<0.001$ ;  $\beta=0.41$ ,  $p<0.001$ , respectively) and with AMM / AMI ( $\beta=0.67$  /  $\beta=0.79$ ,  $p<0.001$ ). Total fat also was associated with BMD of LS, FN, TH ( $\beta=0.36$ ,  $\beta=0.37$ ,  $\beta=0.48$ ,  $p<0.001$ , respectively) and with AMM / AMI ( $\beta=0.69$  /  $\beta=0.63$ ,  $p<0.001$ ). RMR was associated with BMD of LS, FN, TH ( $\beta=0.40$ ,  $\beta=0.49$ ,  $\beta=0.52$ , respectively,  $p<0.001$ ) It wasn't founded associations between MNA-SF score, Cal and BMD and AMM.

**Conclusion:** Higher values of BMI, CC, MUAC and LM, but not BTF and MNA-SF, corresponded to higher BMD rates in various parts of the skeleton in RA patients.

## P989

### DOSE RESPONSE TO VITAMIN D SUPPLEMENTATION IN A GREEK POPULATION: A PROSPECTIVE STUDY

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**Objective:** The main aim of this prospective comparative trial was to study the effect of increasing doses of vitamin D3 on serum 25OHD levels.

**Material and Methods:** A total of 146 subjects (31men and 115 women) who met the eligibility criteria, signed informed consent forms and were assigned to 1of 3 vitamin D3 doses (1000,2200,4000 IU/d) (Solgar, Leonia, NJ, United States) according to baseline 25OHD serum levels and their physician decision for 6 months. Serum levels of 25OHD were measured at baseline and at 3and 6 months after treatment. A safety panel including albumin adjusted serum calcium ,phosphorus ,creatinine,and PTH levels were done at baseline and 3 and 6 months. In addition 24-hour urine samples were also collected baseline at3 and 6 months to measure calcium and creatinine levels. At each visit were also collected data on harms. An adverse event was defined as any adverse effect that occurred during the trial.

**Results:** Baseline characteristics, including anthropometric parameters, markers of calcium and vitamin D metabolism, were well balanced across the 3 arms except slight differences among normal values in serum albumin and creatinine levels (Table 1). The significant increase in mean serum 25(OH)D with all 3 doses is presented in (table 2). Interaction between dose of vitaminD3 and age,sex,and BMI were explored and were not significant. No adverse events were reported during the study including hypercalcemia and hypercalciuria.

**Conclusion:** All doses of vitamin D3 (1000,2200,4000UI/d) according to baseline increased mean serum 25OHD levels to greater than 30ng/ml at 6 months in healthy Greek population.

**Table 1** : Demographic characteristics and biochemical markers at baseline ( mean±SD , n=146)

	All participants	Vit D 1000ui n=26	Vit D 2200ui n=98	Vit D4000ui n=22	p-value
Age	46.18±15.32	46.19±14.85	45.83±15.40	47.77±16.22	0.867
Gender, M/F; n(%)	31/ 115(21.2)	6(23.1)/ 20(76.9)	18(18.4)/ 20(81.6)	7(31.8)/15 (68.2)	0.366
Weight	75.95±18.61	75.16±16.08	75.82±19.27	77.45±19.03	0.908
Height	166.40±7.96	168.69±8.35	165.12±7.10	169.36±9.90	0.345
BMI	27,33±5.84	26.30±4.58	27.71±6.26	26.83±4.58	0.505
		N=20	N=72	N=20	
PTH (n=112)	48.27±22.92	52.67±24.70	45.90±19.64	52.43±30.95	0.342
		N=22	N=83	N=21	
Ca (n=126)	9,28±0,40	9.47±0.56	9.27±0.32	9.14±0.45	0.125
		N=15	N=57	N=19	
ALB (n=91)	4,16±0,37	4.28±0.43**	4.23±0.32**	3.85±0.34	<0.005
		N=18	N=75	N=20	
Phosphorous (n=113)	3,38±0,46	3.48±0.29	3.35±0.48	3.39±0.52	0.374
		N=23	N=85	N=20	
Cre (n=128)	0,77±0,18	0.83±0.15*	0.78±0.16*	0.67±0.24*	0.043
		N=8	N=55	N=18	
Ca urine 24h (n=81)	162,07±46.16	150.75±34.04	165.76±51.17	155.81±32.95	0.565

\* p&lt;0.05 vs Vit D4000ui

\*\* p&lt;0.005 vs Vit D4000ui

**TABLE 2.** Comparison of D-3 (250HD) between groups during the supplementation period of 6 months

Group	Base-line, (mean ± SD) N=22	3 months, (mean ± SD) N=97	6 months, (mean ± SD) N=26	p-value within group	% change baseline-3 months, mean ± SD	% change baseline-6 months, mean ± SD
Vit D 1000ui	21.85±2.34	29.65±0.3.96 <sub>c</sub>	34.02±0.013 <sub>cd</sub>	<0.001	37,9% 28,7	57,6%±38,9
Vit D 2200ui	17.72±4.43 <sub>a</sub>	28.21±5.63 <sub>c</sub>	36.58±6.53 <sub>cd</sub>	<0.001	66,4%±46,0 <sup>a</sup>	116,9%±63,6 <sup>a</sup>
Vit D4000ui	12.04±5.05 <sub>ab</sub>	27.28±8.58 <sub>c</sub>	38.04±7.49 <sub>cd</sub>	<0.001	152,0%±105,4 <sub>ab</sub>	266,8%±183,57 <sub>ab</sub>
p-value between group	<0.001	0.366	0.106		<0.001	<0.001

a : p&lt;0,001 vs Vit D 1000ui , b : p&lt;0,001 vs Vit D 2200ui

c : p&lt;0,001 vs baseline , d : p&lt;0,001 vs 3 months,

interaction F(4.284)=23.85 p&lt;0.005

## P990

**THE RELATIONSHIP BETWEEN THE SIGNIFICANT KNEE AND HIP PAIN AND USE OF NON-STEROID MEDICATION IN THE MIDDLE-AGED AND ELDERLY UK RUNNING POPULATION: LARGE COHORT STUDY**S. Kluzek<sup>1</sup>, G. Bullock<sup>2</sup>, T. Bestwick-Stevenson<sup>1</sup>, J. Stocks<sup>1</sup><sup>1</sup>Nottingham University, Nottingham, United Kingdom, <sup>2</sup>Wake University, Winston-Salem, United Kingdom

**Objectives:** Oral anti-inflammatory non-steroidal drugs (NSAID) are used commonly in the general population. Association between knee osteoarthritis (OA) and early cardiovascular mortality is often linked with decreased physical activity. Both running and jogging markedly reduce cardiovascular risk. Although regular exercise is a core treatment of lower-limb osteoarthritic pain, strategic activity pacing to improve compliance and decrease pain is recommended. It is unclear whether runners with significant and frequent knee and hip pain are more likely to use oral NSAIDs or pace their running activities.

**Material and Methods:** Baseline data from 'Running Through' (runningthrough.org), a prospective cohort study of community runners, joggers and Nordic walkers, were collected via electronic survey between February 2021 till February 2022. The National Health and Nutrition Examination Survey (NHANES) questions regarding significant knee and hip pain in the past months have been collected at baseline. Those questions have been previously associated with osteoarthritic pain. Baseline characteristics were compared between those reporting OA knee and/or hip pain and those without significant pain. Logistic regression models were performed calculating an odd ratio between those affected by lower limb OA pain and not, corrected for baseline demographics, comorbidities and other medication use.

**Results:** The study population included 2010 subjects over the age of 44, with 440 (22%) participants who reported significant frequent knee or hip pain (NHANES pain). There were no differences in age (median 56, IQR: 50,64); sex (54% female) or BMI (27.7), or history of diabetes/cardiac problems between the group with and without OA pain. Those affected by lower limb OA pain were more likely to have hypertension (12.7 vs 9.3%, p=0.036). Furthermore, there was no difference in running frequency, with >80% of responders running 2-3 or 4-6 times a week, or favourite distance run (74% between 5 and 10 km). 15.2% of participants with significant knee and hip pain reported regular use of NSAIDs vs only 5% of those without the OA pain. The logistic regression model showed a significant increase in NSAIDs use after correcting for baseline characteristics, comorbidities and other medication use with OR of 3.05 and 95% conf. Interval 2.16-4.3.

**Conclusions:** Over 20% of middle-aged and elderly runners report significant and frequent knee and hip pain. Apart from the higher rates of hypertension, they report three times higher use of NSAID drugs; running distance and frequency was not different between those groups.





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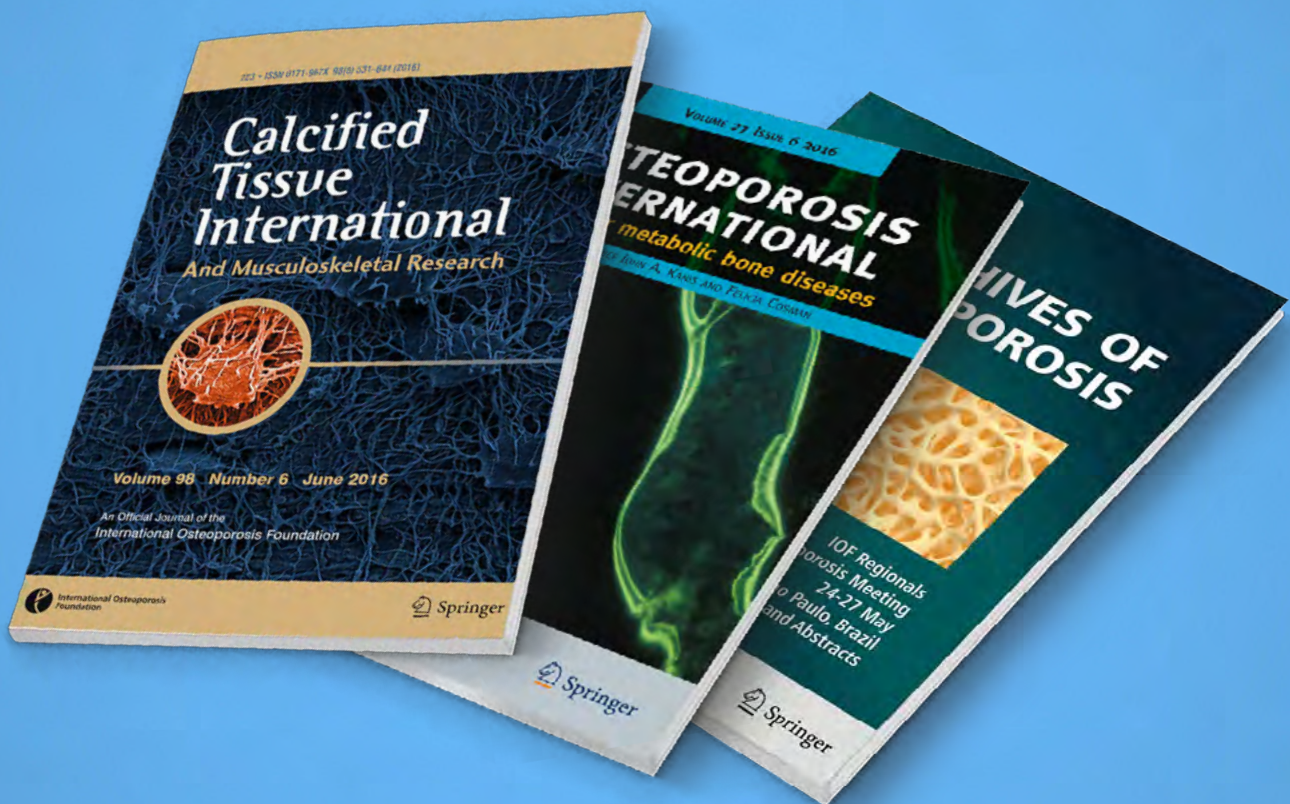
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