

investigated the predictive value of confirmed and severe sarcopenia, using the recent European Working Group on Sarcopenia in Older People (EWGSOP2) recommendations, for incident fracture, independent of femoral neck bone mineral density (FNBMD), FRAX 10-year fracture probability and prior falls.

#### Methods

In USA, Sweden and Hong Kong (HK) MrOS cohorts, we used an extension of Poisson regression to investigate relationships between sarcopenia (y/n) and incident major osteoporotic fracture (MOF: clinical vertebral, hip, wrist or proximal humerus). Confirmed sarcopenia was based on low DXA ALM/height<sup>2</sup> in combination with high chair stand time or low grip strength. Additional low gait speed constituted severe sarcopenia. Associations were adjusted for age and follow-up time, reported as hazard ratio (HR) for first incident MOF. Further analyses adjusted additionally for FRAX MOF probability, prior falls (y/n) or FNBMD T-score. Results were synthesized by meta-analysis.

#### Results

We studied 5660 men in USA, 2764 in Sweden and 1987 in HK; (mean ages 73.5, 75.4 and 72.4 years; mean follow-up time 10.9, 8.7 and 9.9 years; mean % incident MOF 10%, 16%, 7% respectively). Confirmed sarcopenia (prevalence=5.5% USA; 2.9% Sweden; 10.1% HK) was associated with incident MOF [HR: 1.82 (95%CI: 1.46, 2.27)]. Associations remained after adjustment for prior falls or FRAX probability. Adjustment for FNBMD T-score led to attenuation of the relationship: (HR:1.39; 95%CI:1.11, 1.75). In addition, severe sarcopenia (prevalence 0.5% USA; 0.6% Sweden; 3.6% HK) appeared more robustly associated with incident MOF [HR: 2.07 (95%CI: 1.28, 3.33)], and remained associated after each adjustment [e.g. with BMD T-score, HR: 1.80 (95%CI: 1.12, 2.91)].

#### Conclusions

The predictive value for fracture of EWGSOP2 sarcopenia definitions is reduced by inclusion of FN BMD T-score, but addition of low gait speed as the marker of severe sarcopenia yields a more robust predictive measure, albeit with lower prevalence. These findings further support the importance of physical performance measures in defining sarcopenia.

#### OC13

##### MUSCLE DENSITY, BUT NOT SIZE, CORRELATES WELL WITH MUSCLE PERFORMANCE

L. W. Wang<sup>1</sup>, Y. L. Yin<sup>2</sup>, G. G. Guglielmi<sup>3</sup>, X. C. Cheng<sup>1</sup>, G. M. B. Blake<sup>4</sup>, K. E. Engelke<sup>5</sup>

<sup>1</sup>Department of Radiology, Beijing Jishuitan Hospital, Beijing, China, <sup>2</sup>Medical Research & Biometrics Center, National Center for Cardiovascular Disease, China, Beijing, China, <sup>3</sup>Department of Radiology, University of Foggia, Foggia, Italy, <sup>4</sup>School of Biomedical Engineering & Imaging Sciences, King's College London, London, United Kingdom, <sup>5</sup>FAU, Department of Medicine 3, University Hospital, Erlangen, Germany

**OBJECTIVE:** To determine the associations of handgrip strength (HGS) and the Timed Up and Go test (TUG) with muscle size and density of different muscle levels in healthy controls.

**METHODS:** 301 controls were enrolled in this study and recruited for QCT imaging of the lumbar, hip and mid-thigh. We also test muscle strength (HGS) and physical performance (TUG). Gluteus maximus muscle(GMaxM) and gluteus medius/minimus muscle(GM/MinM), trunk muscle at vertebrae L2 level and mid-thigh muscle were measured for cross-sectional areas and attenuations. Health-related covariates included blood pressure, diabetes mellitus, fracture history, fast serum glucose and the EuroQol five-dimension score (EQ-5D). General linear models were fitted using method of least squares to evaluate associations of TUG and handgrip strength with muscle CSA and density.

**RESULTS:** None of the associations between muscle area and TUG was significant after adjustment for age, height and weight. The same result was observed in men for associations between muscle density and TUG. In contrast, in women gluteus maximus and trunk muscle density showed a significant association with TUG even after adjustment for age, height and weight, although slopes were rather small. Interestingly the slope was even negative in females ( $\beta$  -0.06,  $p=0.001$ , adjusted). In men but not in women muscle area of the gluteus maximus and of the mid-thigh were significantly associated with HGS but results were not significant for the trunk muscle. Gluteus maximus and trunk muscle density were significantly associated with HGS in men and women. Mid-thigh muscle density was significantly associated with HGS in men only.

**CONCLUSION:** Our study results show that muscle density performs better than muscle size in associating with muscle performance and seems to be as a surrogate for the role of physical performance as hip fracture risk factors.

#### OC14

##### THE MULTIDIMENSIONAL PROGNOSTIC INDEX PREDICTS FALLS IN OLDER PEOPLE: AN 8-YEAR LONGITUDINAL COHORT STUDY OF THE OSTEOARTHRITIS INITIATIVE

N. Veronese<sup>1</sup>, G. Siri<sup>2</sup>, A. Cella<sup>2</sup>, S. Maggi<sup>3</sup>, E. Ziguora<sup>2</sup>, M. Puntoni<sup>2</sup>, L. Smith<sup>4</sup>, C. Musacchio<sup>2</sup>, A. Barone<sup>5</sup>, C. Sabbà<sup>5</sup>, F. Vallone<sup>5</sup>, A. Pilotto<sup>2</sup>  
<sup>1</sup>ULSS 3 Serenissima, Venice, Italy, <sup>2</sup>E.O. Galliera, Genova, Italy, <sup>3</sup>Consiglio Nazionale delle Ricerche, Padova, Italy, <sup>4</sup>Anglia Ruskin University, Cambridge, United Kingdom, <sup>5</sup>University of Bari, Bari, Italy

**OBJECTIVES:** Falls are associated with several negative outcomes. Early identification of those who are at risk of falling is of importance in geriatrics, and comprehensive geriatric assessment (CGA) seems to be promising. Therefore, the present study investigated whether the multidimensional prognostic index (MPI), based on a standard CGA, is associated with falls in the Osteoarthritis Initiative (OAI).

**MATERIALS AND METHODS:** A standardized CGA including information on functional, nutritional, mood, comorbidities, medications, quality of life, and cohabitation status was used to calculate a modified version of the MPI, categorized as MPI-1 (low), MPI-2 (moderate), and MPI-3 (high risk). Falls were self-reported and recurrent fallers were defined as  $\geq 2$  in the previous year. Logistic regression was carried out and results are reported as odds ratio (ORs) with their 95% confidence intervals (CIs).

**RESULTS:** The final sample consisted of 885 older adults (mean age 71.3 years, female = 54.6%). Recurrent fallers showed a significant higher MPI than their counterparts ( $0.46 \pm 0.17$  vs  $0.38 \pm 0.16$ ;  $P < .001$ ). Compared with those in MPI-1 category, participants in MPI-2 (OR 2.13; 95% CI 1.53–2.94;  $P < .001$ ) and in MPI-3 (OR 5.98; 95% CI 3.29–10.86;  $P < .001$ ) reported a significant higher risk of recurrent falls over the 8-years of follow-up.

**CONCLUSIONS:** Higher MPI values at baseline were associated with an increased risk of recurrent falls, suggesting the importance of CGA in predicting falls in older people.

#### OC15

##### 5-YEAR ADVERSE OUTCOMES OF SARCOPENIA DIAGNOSED ACCORDING TO SIX DIFFERENT DEFINITIONS

L. Lengelé<sup>1</sup>, C. Beaudart<sup>1</sup>, M. Locquet<sup>1</sup>, J.-Y. Reginster<sup>1,2</sup>, O. Bruyère<sup>1,3</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, Liège, Belgium, <sup>2</sup>Chair for Biomarkers of Chronic Diseases, Biochemistry Department, College of Science, King Saud University, Riyadh, Saudi Arabia, Riyadh, Saudi Arabia, <sup>3</sup>Department of Sport and Rehabilitation Sciences, University of Liège, Liège, Belgium, Liège, Belgium

**Introduction:** Six operational definitions are proposed by different working groups for the diagnosis of sarcopenia. We have previously shown, out of our SarcoPhAge study, that most of the sarcopenia definitions were significantly associated with deaths over a 3-year period, but not with physical disabilities and institutionalizations. Our aim is to compare, in the same cohort, the impact of using the 6 definitions on the prevalence and on the 5-years follow-up consequences of sarcopenia.

**Methods:** Sarcopenia was diagnosed according to: EWGSOP 1, IWGS, SSCWD, AWGS, FNHI and EWGSOP 2. Muscle mass was measured with DXA, muscle strength by hand dynamometer and physical performance by 4-m gait speed or the SPPB. Cox Proportional Hazard ratios were calculated for 5-year incidence of mortality, institutionalization, fracture, fall, or hospitalization during the 5-year follow-up period. Analyses were adjusted for age, sex, number of drugs and comorbidities, cognitive status and physical activity level.

**Results:** 534 older subjects were included at baseline (73 (68–78) years, with 321 (60.1%) women). The prevalence of sarcopenia differed depending on the definition used: 13.9% with EWGSOP1, 17.6% with IWGS, 8.6% with SSCWD, 7.9% with AWGS, 5.6% with FNHI and 4.5% with EWGSOP 2. A total of 481 participants were included in the analyses on the 5-year mortality and institutionalizations, 463 on fractures, 465 on hospitalizations and 459 on falls. Among them, 65 died, 10 were institutionalized, 54 had fractures, 240 were hospitalized and 191 fell. In multivariate analysis, a higher risk of mortality is observed when the diagnosis of sarcopenia was made with the EWGSOP 1 [HR of 2.12 (95% IC 1.12–4.03)] and the AWGS definitions [HR of 3.43 (95% IC 1.72–6.86)]. For EWGSOP 2, the smaller sample of sarcopenic individuals identified have impacted the statistical power of the study, and consequently the association was not significant [HR of 1.42 (95% IC 0.59–3.42)] but remained in the same range of those observed using the EWGSOP1. In subjects diagnosed with severe sarcopenia with EWGSOP 2, the association with 5-year mortality was not significant in the multivariate fully-adjusted model [HR of 2.18 (95% IC 0.88–5.40)], probably because of low statistical power, but these participants were at higher risk of experiencing at least one fracture at 5 years [3.76 (95% IC 1.08–13.05)]. Sarcopenia was not significantly associated with the 5-year incidence of institutionalization, fall and hospitalization regardless of the definition chosen.

**Conclusion:** In this sample, we found that sarcopenia diagnosed with EWGSOP 1 and AWGS and severe sarcopenia diagnosed with EWGSOP2 are associated with mortality and fracture respectively. However, the various definitions are leading to significantly different prevalences of sarcopenia, within the same population. This has to be taken into account in future researches.

#### OC16

##### LEVEL AND CHANGE IN SARCOPENIA COMPONENTS PREDICT ADVERSE HEALTH OUTCOMES: FINDINGS FROM THE HEALTH, AGING AND BODY COMPOSITION STUDY

L. D. Westbury<sup>1</sup>, H. E. Syddall<sup>1</sup>, N. R. Fuggle<sup>1</sup>, E. M. Dennison<sup>1</sup>, J. A. Cauley<sup>2</sup>, E. J. Shirroma<sup>3</sup>, R. A. Fielding<sup>4</sup>, A. B. Newman<sup>2</sup>, C. Cooper<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom, <sup>2</sup>Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, United States, <sup>3</sup>Laboratory of Epidemiology and Population Sciences, Intramural Research Program, National Institute on Aging, Baltimore, United States, <sup>4</sup>Nutrition, Exercise Physiology, and Sarcopenia Laboratory, Jean Mayer USDA Human Nutrition Research Center on Aging, Tufts University, Boston, United States

##### Objective

To examine level and change in muscle mass, strength and function in relation to risk of mortality, minor trauma fracture, hospital admission and

falls among older people participating in the Health, Aging and Body Composition Study (USA).

##### Material and Methods

Analyses were based on 2902 men and women, aged 70–79 years at baseline (1997–8). Appendicular lean mass (ALM) was ascertained using DXA; muscle strength by grip dynamometry; and muscle function by gait speed. Exposures were mean level of each characteristic and change in age-specific z-scores (characterised by linear mixed models) between baseline and 5-year follow-up. These were examined as predictors of mortality, self-reported and adjudicated hospital admission and minor trauma fracture, and self-reported falls in the subsequent decade using sex-adjusted time-to-first event Cox regression with or without adjustment for potential confounders.

##### Results

Mean(SD) baseline grip strength, gait speed and ALM was 32.7(10.6) kg, 1.1(0.2) m/s and 20.1(5.0) kg respectively; annual percentage declines were 1.3(3.4), 1.3(3.8) and 0.7(1.1). The proportion experiencing each outcome was: death (64%), minor trauma fracture (15%); hospital admission (83%); and falls (71%). Lower grip strength and gait speed were associated with increased risk of all outcomes ( $p < 0.03$ ); lower ALM only predicted mortality and minor trauma fracture ( $p < 0.03$ ). Greater declines in grip strength, gait speed and ALM were related to increased risk of mortality and hospital admission ( $p < 0.01$ ); declines in gait speed and ALM also predicted falls ( $p < 0.01$ ). Hazard ratios for mortality, hospital admission and falls per SD greater decline in gait speed, adjusted for sociodemographic and lifestyle factors, were 1.18(95%CI:1.13,1.24), 1.15(1.11,1.21) and 1.12(1.07,1.18) respectively. Sex-adjusted models for level and change in grip strength and ALM each explained 4% of the variation for mortality; values for gait speed level and change were 12% and 4% respectively.

##### Conclusion

Lower levels and greater declines in muscle mass, strength and function were associated with increased risk of adverse health outcomes. This suggests that interventions to maximize peak levels in earlier life, and to reduce rates of age-related decline, may reduce the burden of disease in this age group.

#### OC17

##### RELATIONSHIP BETWEEN OBESITY AND RISK OF MAJOR OSTEOPOROTIC FRACTURE IN POSTMENOPAUSAL WOMEN: TAKING FRAILTY INTO CONSIDERATION

G. Li<sup>1</sup>, Z. Li<sup>1</sup>, L. Thabane<sup>2</sup>, J. Adachi<sup>2</sup>

<sup>1</sup>Guangdong Second Provincial General Hospital, Guangzhou, China,

<sup>2</sup>McMaster University, Hamilton, Canada

**Background:** The role of obesity in fracture risk remains to be uncertain and inconclusive in postmenopausal women. Our study aimed to assess the relationship between obesity and risk of major osteoporotic fracture (MOF; i.e., a clinical fracture of upper arm or shoulder, hip, spine, or wrist) in postmenopausal women, after taking frailty into consideration.

**Methods:** We used the data from the Global Longitudinal Study of Osteoporosis in Women (GLOW) 5-year Hamilton cohort for this study. Frailty was measured by a frailty index (FI) of deficit accumulation at baseline. We incorporated an interaction term (obesity x FI) in the Cox proportional hazards regression model.

**Results:** We included 3985 women (mean age: 69.4 years) for analyses, among which 29% were obese ( $n = 1118$ ). There were 200 (5.02%) MOF events documented during follow-up: 48 (4.29%) in obese women and 152 (5.65%) in the nonobese group. Significant relationships between obesity, frailty and MOF risk was found: HR = 0.72 (95% CI: 0.67 - 0.78) for obesity, and HR = 1.34 (95% CI: 1.11 - 1.62) per-SD increase