

Intra and inter-image reliability analysis suggested that measurements taken in transverse plane are better indicators of muscle thickness compared to the longitudinal measurements. ICCs calculated for pennation angles were not satisfactory due to number of factors including intra-image variation. It was concluded that more comprehensive analysis is needed in order to measure confidently the pennation angles.

### **P71 The communication of higher level evidence in Osteoarthritis: are we speaking the same language?**

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**Objectives:** Guidelines for research conduct and reporting aim to improve quality. However, there is no single gold standard for the communication of higher level evidence and impact in osteoarthritis (OA) research. To determine the consistency between current guidelines, OA journals were reviewed to test the hypothesis that conduct and reporting guidelines are consistent across disciplines.

**Methods:** Twenty two OA journals were selected to reflect molecular, cellular, animal and human research. The 'author information' for publication was screened for each of the most frequently cited conduct and reporting guidelines. Similarities and differences between these guidelines were identified objectively and systematically using an inductive approach after categorising into 37 subthemes representing the original text. The content of each guideline was reviewed by JD and DM, experienced in human and animal research respectively, assessed by a third reviewer (AG) and the final output agreed by consensus.

**Results:** Sixty eight percent (15/22) of the OA journals recommended standardised conduct/reporting explicitly (59%) or implicitly (9%) through reference to websites promoting standardised methods (EQUATOR, ICJME or MIBBI), whilst 32% (7/22) did not. The most commonly endorsed guidelines for human, animal and molecular research were the CONSORT (55%), ARRIVE (23%) and MIAME (32%) guidelines respectively. There were no recommendations for cellular research.

CONSORT, ARRIVE and MIAME guidelines were evaluated with reference to 37 subthemes. Whilst guidelines were similar in terms of the description of trial design, interventions and statistical methods, the language used was often different; 'statistical methods used to compare groups' (CONSORT) and 'MAIME indicates preferred detailed specifications of all numerical calculations'. CONSORT was the only guideline to recommend trial registration.

**Conclusions:** Standardisation of OA journal recommendations is required. Although, higher level evidence is communicated similarly amongst

disciplines using CONSORT, ARRIVE and MIAME guidelines, the language used is inconsistent. The lack of a requirement to define protocols or trials in advance of molecular or animal experiments, may limit reporting of negative data. It remains to be seen whether this effects the potential for interdisciplinary OA research impact. These data will inform a survey to assess higher level evidence and impact in interdisciplinary OA research.

### **P72 Characterisation of spinal cord injury-induced osteoporosis in a rat model**

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Structural, densitometric and mechanical changes that occur in the paralysed limbs of a rat model of complete spinal cord injury (SCI) are described. Providing a uniquely-detailed description of the spatiotemporal changes throughout the distal femur (a fracture-prone site in human SCI patients).

Male rats (200-250g) were assigned into eight (n=8) experimental groups. Four-groups sustained transection SCI at thoracic level T9 and were sacrificed at 2, 6, 10 and 16-weeks post-surgery. Each SCI group had an age-matched sham-operated control group. Bone quantity and quality were assessed using microCT for global and site-specific analysis of trabecular (epiphyseal and metaphyseal) and cortical bone (metaphyseal and diaphyseal) morphometry and densitometry. Whole-bone and material-level properties were assessed using three-point bending and torsional testing.

A severe deterioration of metaphyseal trabecular bone was observed, after 2-weeks volume fraction (BV/TV) was 59% lower than controls, resulting in a compromised structure composed of 53% fewer and 15% thinner trabeculae. At later time points post-SCI there were no further reductions in metaphyseal BV/TV, although microstructural changes did occur. In contrast, epiphyseal trabecular bone was more resistant to SCI-induced osteoporosis. There was a 23% lowering of BV/TV at 2-weeks post-SCI compared to control, characterised by 15% thinner trabeculae, suggesting the epiphyseal structure's connectivity was maintained. At later times post-SCI growth-related increases in epiphyseal BV/TV were observed. Rapid changes to cortical bone were also observed. Metaphyseal regions experienced the most severe lowering of cortical area at 2-weeks post-SCI compared to control. The varying degree of change in the amount of trabecular and cortical bone was concomitant with each region's surface-to-volume ratio. Analysis at more chronic times post-SCI highlighted that caution must be exercised when interpreting results from

skeletally-immature rodents, since SCI-induced bone changes were a combination of bone loss and suppressed bone growth. No difference in mineral density was observed between SCI and control at any time-point, indicating that decreases in whole-bone mechanical properties post-SCI were a result of changes to the distribution of bone, rather than changes to material properties.

Cumulatively, this illustrates that SCI-induced osteoporosis detrimentally affects the spatial distribution of bone site-specifically.

### P73 Jumping Joints: the complex relationship between osteoarthritis and jumping mechanography

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**Objectives:** We investigated the relationship between lower limb osteoarthritis (OA) and muscle strength and power (assessed by jumping mechanography) in UK community dwelling older adults.

**Materials and methods:** We recruited 249 older adults (144 males, 105 females). OA was assessed clinically at the knee according to ACR criteria and radiographically, at the knee and hip, using Kellgren and Lawrence grading. Two-footed jumping tests were performed using a Leonardo Mechanography Ground Reaction Force Platform to assess maximum muscle force, power and Esslinger Fitness Index. Linear regression was used to assess the relationship between OA and jumping outcomes.

**Results:** The mean age of participants was 75.2 years (SD 2.6). Males had a significantly higher maximum total power during lift off (mean 25.7 W/kg vs 19.9 W/kg,  $p < 0.001$ ) and maximum total force during lift off (mean 21 N/kg vs 19.1 N/kg,  $p < 0.001$ ) than females. We found significant associations in males between clinical knee OA and maximum total power ( $\beta$  -6.00 (95% CI -9.05, -2.94)  $p < 0.001$ ) and Esslinger fitness index (-19.33 (-28.98, -9.680)  $p < 0.001$ ). In females radiographic knee OA was associated with total maximum power (-2.02 (-3.89, -0.14),  $p < 0.04$ ) and Esslinger fitness index (-8.17 (-15.91, -0.42)  $p < 0.04$ ). No significant associations were observed for maximum total force.

**Conclusions:** We observed significant negative associations between maximum total power and Esslinger Fitness Index and clinical knee OA in males and radiographic knee OA in females. We have used novel methodology to demonstrate relationships between muscle function and OA in older adults.

### P74 Common vitamin D-related genetic variants are associated with bone health in the Hertfordshire Cohort Study

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**Objectives:** While single-nucleotide polymorphisms (SNPs) in genes related to vitamin D metabolism have been shown to be associated with serum 25-hydroxy vitamin D (25(OH)D) concentration, no previous studies have related these SNPs to musculoskeletal health in late adulthood. Here we consider relationships between SNPs in the vitamin D metabolic pathway, in DHCR7, CYP2R1 and CYP24A1 and GC and (i) bone indices assessed by DXA at the femoral neck and total hip, and (ii) grip strength in a cohort of community-dwelling older adults, using participants from the Hertfordshire Cohort Study (HCS).

**Methods:** Bone mineral content (BMC), bone area and bone mineral density (BMD) were measured by dual energy X-ray absorptiometry (DXA) at the femoral neck and total hip using a Hologic QDR 4500 instrument. Grip strength was assessed using a Jamar dynamometer. SNPs were genotyped by LGC Genomics (Hoddeston, UK).

**Results:** Data were available for 495 men and 488 women. The mean age (SD) of the participants was 64.3 (2.5) years for men and 65.7 (2.5) years for women. The median Body Mass Index (BMI) of participants in men and women was similar (26.5 kg/m<sup>2</sup> (IQR 24.4 – 28.7) and 26.4 kg/m<sup>2</sup> (IQR 23.6 – 29.9) respectively). In men, the common allele of a SNP in CYP2R1, rs10741657, was associated with lower femoral neck BMC ( $\beta = -0.15$ ; 95% CI, -0.28 to -0.02;  $p = 0.024$ ) and total hip BMC ( $\beta = -0.15$ ; 95% CI, -0.28 to -0.02;  $p = 0.023$ ), after adjustment for season of blood sampling. In women, the same SNP was associated with lower total hip BMD ( $\beta = -0.13$ ; 95% CI, -0.24 to -0.11;  $p = 0.032$ ), after adjustment for confounders (season of blood collection, vitamin D intake, age, BMI, social class, smoker status, alcohol consumption, activity, calcium intake, years since menopause and HRT use). No significant associations were observed with grip strength.

**Conclusion:** A SNP in CYP2R1 was associated with poorer hip BMC in men and hip BMD in women in late middle age.