

174.6±7.6 cm, 77.7±7.0 kg, 25.6±3.0 kg.m<sup>-2</sup>) males volunteered. Supine, resting measures of cf-PWV, Alx corrected to a heart rate of 75 (Alx75) and RM were obtained prior to (baseline), and 20-, 40- and 60-minutes following a short period of sitting (24-30 minutes). Heart rate (HR), systolic (SBP), diastolic (DBP) and mean arterial (MAP) blood pressure were recorded throughout the sitting period. Significant ( $p < 0.05$ ) differences over time and between groups were examined by 2-way ANOVA and post-hoc, pairwise comparisons with Bonferroni correction.

**Results:** During the short period of sitting, lower HR ( $53.9 \pm 8.0$  vs.  $64.6 \pm 7.7$  bpm,  $p < 0.001$ ) and greater peripheral SBP ( $131.2 \pm 13.1$  vs.  $118.8 \pm 9.6$  mmHg,  $p < 0.001$ ), DBP ( $79.9 \pm 8.7$  vs.  $74.7 \pm 6.4$  mmHg,  $p = 0.027$ ) and MAP ( $97.0 \pm 9.2$  vs.  $89.4 \pm 7.0$  mmHg,  $p = 0.003$ ) were observed in the older compared to the young group. The older group exhibited significantly greater resting cf-PWV ( $9.0 \pm 1.4$  vs.  $7.3 \pm 0.9$  m.s<sup>-1</sup>,  $p < 0.001$ ), Alx75 ( $12.6 \pm 9.2$  vs.  $4.0 \pm 14.0$  %,  $p = 0.011$ ) and RM ( $73.6 \pm 14.0$  vs.  $59.0 \pm 12.4$  %,  $p < 0.001$ ), and lower HR ( $48.9 \pm 6.4$  vs.  $55.0 \pm 7.7$  bpm,  $p = 0.002$ ) compared to the young group. Compared to baseline, cf-PWV was significantly increased at 60-minutes after the sitting period ( $p < 0.05$ ) with the change being similar between groups ( $p = 0.792$ ). In contrast, Alx75 and RM were significantly decreased at 40- and 60-minutes after sitting ( $p < 0.05$ ) with the change being similar between groups ( $p > 0.05$ ).

**Discussion:** A short period of sitting resulted in a significant increase in central arterial stiffness (cf-PWV) and a concurrent decrease in peripheral arterial stiffness (Alx75 and RM) with these responses being unaffected by age in healthy males. The current results extend previous work that sitting, even for a short period, may progressively contribute to changes in central and peripheral arterial stiffness and future cardiovascular event risk.

"My co-authors and I acknowledge that we have no conflict of interest of relevance to the submission of this abstract."

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## S103

### Lower-limb work during low- and high-impact tasks in hip-related pain: Associations with sex and symptoms

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**Background:** Hip-related pain (HRP) is a movement-related condition; however, previous biomechanics research into HRP have concentrated on male-dominated cohorts and focused on people undergoing surgical intervention. As a result, little is known about the biomechanical impairments of women with HRP and those not seeking surgery. Therefore, the aims of this study were threefold: (i) to evaluate the differences in lower-limb joint work between football players with and without HRP, (ii) to explore the relationship between lower-limb work and a person's burden of HRP, and (iii) to determine whether any potential differences/relationships were sex-dependent.

**Methods:** Football players aged 18-50 years were eligible to participate. For the HRP group, participants were eligible if they presented with a 6-month history of HRP; whereas control players were eligible if they presented with no lower-limb or lower-back pain/injury over the previous six months. A total of 88 players with HRP (23 women) and 30 asymptomatic controls (13 women) participated. Biomechanical data were collected during walking and single-leg drop jumps (SLDJ). HRP burden was quantified using the International Hip Outcome Tool (iHOT33). Between-group differences and relationships between lower-limb work done and a person's burden of HRP were assessed using linear regressions incorporating sex-based interactions.

**Results:** Walking: No joint work variables were different between

footballers with and without HRP independent of sex, nor were any relationships with a person's burden of HRP evident. SLDJ: A sex-specific interaction was present for the knee's relative contribution to total lower-limb negative work done, with women with HRP demonstrating a lower contribution compared to their asymptomatic female peers (37.7% vs 42.4%,  $P = 0.04$ ). The iHOT33 was significantly associated with positive ( $P = 0.03$  to  $< 0.01$ ) and negative ( $P = 0.02$  to  $< 0.01$ ) work done by the hip as well as negative work done by the ankle ( $P = 0.03$  to  $0.01$ ), independent of sex

**Discussion:** Overall, few differences were observed between players with and without HRP. Only one significant between-group difference was revealed, involving the knee in women only, providing further insight that the relationship between hip pain and biomechanics may be modified by sex. In addition, players with a greater self-reported burden of HRP tended to display lower hip joint work during the SLDJ. Rehabilitation programs for people with HRP should target these impairments and normalize lower-limb work done during high impact tasks.

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## S105

### Physical performance and fitness gain during an Infantry Commanders Course are influenced by chronic ankle instability

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**Introduction:** Army training often incurs physical injury, with ankle injuries occurring in 10-20 % of soldiers during training. These patterns are reported with similar frequency and body-part distribution of injury in Israeli Defence Force (IDF) combat units. Research has shown that 32 % of individuals with ankle injuries develop chronic ankle instability (CAI). This study aimed to determine whether having chronic ankle instability (CAI) affects the physical performance of soldiers during their army training, as measured in routine army fitness tests, and in other neuromuscular tests. It was hypothesised that soldiers with CAI would not perform as well on all lower limb performance tests, and would improve less during the period of military training.

**Methods:** A prospective cohort comparison was made within soldiers undertaking the Infantry Commanders Course (IC Course) of the IDF. Soldiers were tested at weeks one and 14 of the course, including with a 3,000m timed run, an agility test over an X-shaped course, the Y Balance Test (YBT) and the Active Movement Extent Discrimination Assessment (AMEDA) somatosensory test. All participants completed the required physical training throughout the course. Changes in physical performance were analysed using a two-way ANOVA, for soldier groups categorised as having healthy ankles or CAI based on a score of  $\leq 25$  on the Cumberland Ankle Instability Tool (CAIT) questionnaire.

**Results:** 105 soldiers (mean ( $\pm$ SD) height  $1.75\text{m} \pm 0.06$ , weight  $75.15\text{kg} \pm 10.74$ ) participated and were separated into those with and without CAI ( $n = 59$  and  $46$ , respectively). Overall, scores on all 4 tests (3,000 m run, X-agility test, YBT and AMEDA) improved during the course. However, soldiers with CAI did not improve on the X-agility test, while those with healthy ankles did. At the start of the course, soldiers with CAI performed worse on the YBT-PM (postero-medial direction), but this difference was no longer present at 14 weeks. Compared with their

healthy counterparts, soldiers with CAI performed better on the AMEDA at the start and 14 -week testing points.

**Discussion:** Ankle instability restricts agility gains in soldiers during 14-weeks of physical training but has no effect on 3,000m running performance. Soldiers with CAI perform worse in YBT balance tests, in the Anterior and PM directions particularly. Soldiers with CAI have better somatosensory acuity than those with stable ankles, despite the CAI association with worse performance in other tests. This heightened somatosensory awareness may enable them to compensate for lower performance in other tests.

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### S107

#### The risk of injury in the first five years of an Australian football career – Can it be predicted without using player load?

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**Background:** The concept of predicting injury risk has been criticised (Bahr, 2016), however research using machine learning methods has demonstrated that it is possible to predict injury risk in basketball (Talukder 2016a) and soccer (Talukder 2016b). Player load is by far the strongest injury risk factor (Rossi 2018), however player load data may not always be available for analysis and the prediction of risk. The aim of this study was to investigate whether player characteristics alone, could be used to predict injury risk in the first five seasons of an Australian football player's professional career.

**Methods:** The data represented 1033 unique AFL players, who sustained 4762 injuries in seasons 1997-2016. Player characteristics (height, body mass, age, playing position, indigenouness & natural kicking foot) and the injury characteristics of the previous season, were used in models to predict injury risk.

**Results:** A Naïve Bayes model that was based on player characteristics alone was able to classify injury risk category (low, medium, high) over 5 years, 1.3 times better than random chance. The characteristics of; playing position, height and body mass contributed to 97% of the prediction of injury risk category. A Decision Tree model that classified injury risk category in a single season, based on the characteristics of a player and their injuries in the previous season, performed 1.4 times better than random chance. When the models were used to predict whether a player would be in the highest risk category, the performance of both models increased to 1.9 and 2.2 times better than random chance. Taller and heavier key position players who sustained hamstring strain and groin strain/osteitis pubis injuries in the previous season had a higher injury risk than shorter and lighter non-key position players who remained injury-free in the previous season.

**Discussion:** The injury prediction models reported here did not perform as well previously reported models that were based on training load. Nevertheless, they demonstrate how player characteristics affect injury risk and the models themselves can be used "live" to stratify injury risk, which can then be used to help clinicians make decisions about risk mitigation strategies such as prehabilitation.

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### S108

#### Light to vigorous exercise up-regulates TERT gene expression and telomerase in numerous tissues

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**Background:** Telomeres are a repeat sequence of DNA (in mammals, TTAGGGn) found at the distal ends of chromosomes that protect genomic integrity. Telomeres gradually shorten with each round of cell division which ultimately reduces tissue vitality. Short leukocyte telomeres are often observed in patients with age-related and degenerative diseases, and accelerated telomere shortening is associated with adverse lifestyle factors, such as psychological distress. Telomerase is an enzyme capable of lengthening telomeres. To that end, we conducted a systematic review and meta-analysis to determine the effects of acute exercise and chronic exercise training on telomerase reverse transcriptase (TERT) gene and telomerase enzyme activity in healthy humans and rodents.

**Methods:** We conducted a systematic review and meta-analysis as per the PRISMA guidelines. A comprehensive search of the available literature involving the analysis of the acute and/or chronic exercise training-induced changes in TERT gene and telomerase activity in healthy tissues from humans and rodents was performed using four online databases. Studies were screened according to the inclusion/exclusion criteria before a quality assessment was conducted using the Cochrane risk of bias tool. The meta-analytical procedures were performed using the Review Manager software (version 5.4). We also analysed the TERT gene and telomerase activity in endurance athletes compared to untrained controls from relevant studies.

**Results:** The meta-analytical findings from the five eligible investigations indicated that acute aerobic exercise leads to a very large increase in TERT gene and telomerase activity (standardised mean difference [SMD]: 1.19,  $P < .01$ ). The results from ten chronic aerobic exercise training interventions revealed that training induces a small to medium increase in TERT gene and telomerase activity (SMD: 0.31,  $P < .05$ ). Relative to untrained controls, endurance athletes possessed much higher levels of TERT gene expression and telomerase activity.

**Discussion:** Exercise training is associated with telomere maintenance in the heart, aorta and leukocytes. Our findings suggest both acute and chronic exercise training, as well as long-term endurance training is associated with up-regulated TERT gene and telomerase activity in healthy cells. Importantly, relatively light aerobic exercise and as little as 20 minutes was associated with increased TERT/telomerase activity. Telomerase regulation likely underpins the attenuated telomere attrition associated with exercise training in humans and rodents.

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### S109

#### Do the adverse physical effects of breast cancer surgery affect participation in physical activity and sport?

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**Background:** Women living with breast cancer are encouraged to participate in physical activity to maximise their disease prevention and health promotion. Little is known, however, of the extent that exercise