

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?

D. Dwyer<sup>a</sup>, P. Gastin<sup>a</sup>, D. Hoffman<sup>a</sup>

<sup>a</sup>Deakin University, Australia

**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

J. Denham<sup>a</sup>, M. Sellami<sup>b</sup>

<sup>a</sup>RMIT University, Australia

<sup>b</sup>Qatar University, Qatar

**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?

D. McGhee<sup>a</sup>, J. Steele<sup>a</sup>

<sup>a</sup>University of Wollongong, Australia

**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

participation is limited by the adverse physical effects following different types of breast cancer surgery. This study investigated how the adverse physical effects following different types of breast cancer surgery are perceived to limit physical activity and sport.

**Methods:** 506 Australian women who had breast cancer surgery (breast conserving surgery (BCS)  $n=176$ , mastectomy (MAST)  $n=167$ , breast reconstruction surgery (BRS)  $n=163$ ) completed an on-line survey where they retrospectively ranked the perceived frequency and severity of their adverse physical effects and their impact on physical activity and sport 6, 12-, and 24-months post-surgery. Fisher exact tests compared the frequency amongst the three groups with moderate-to-very-high frequency/severity scores ( $\geq 6/10$ ) versus scores  $<6/10$  for each adverse physical effect; (ii) moderate-to-very-high Total scores ( $\geq 36/60$ ) versus total scores  $<36/60$ ; and (iii) in "Agreement" that their physical activity and sport were limited (agree versus disagree) at the three points of time (3, 6, 12 months). The frequency of the entire cohort ( $n=632$ ) with Total scores  $\geq 36/60$  were grouped according to previously identified risk factors (yes/no) and independent t-tests compared the mean Total scores grouped according to these identified risk factors ( $p < 0.05$ ).

**Results:** At 6 months following surgery, 43-58% of respondents perceived physical activity/sport were limited by their adverse physical effects, which were moderate-to-very-high in frequency/severity and over multiple body regions for ~25% of respondents. Sport was perceived to be limited by a significantly higher percentage of the BRS group compared to the MAST and BCS groups at 6 months post-surgery ( $p < 0.05$ ). Physical activity and sport were limited by a significantly higher percentage of the BRS and MAST groups compared to the BCS group at 12 months post-surgery ( $p < 0.05$ ). A significantly higher percentage reported moderate-to-very-high adverse physical effects if they: (i) had lymph nodes removed ( $p=0.012$ ); (ii) had post-operative complications ( $p < 0.001$ ); and (iii) were younger than 50-years ( $p=0.048$ ).

**Discussion:** Physical activity and the resumption of sport is limited for a high percentage of women following all types of breast cancer, particularly following breast reconstruction surgery because of adverse physical effects of surgery/treatment. Greater investment in physical rehabilitation following all types of breast cancer surgery is required to enable women to participate in physical activity and resume sport.

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## S110

### Hospital-treated Australian Football injury in women and girls, Victoria, 2010/11-2019/20

V. Stathakis<sup>a</sup>

<sup>a</sup>Victorian Injury Surveillance Unit (VISU), Monash University Accident Research Centre, Monash University, Australia

**Introduction:** Rates of participation for women and girls playing Australian Football at the school, club and professional level in recent years has increased significantly, from 95,000 participants nationally in 2011 to 586,422 in 2019. In 2010, there were 58 female club teams in Victoria, increasing almost 20-fold to 1092 teams in 2019. The dramatic increase in participation has also seen a sharp rise in serious injuries such as concussion, ruptured ACLs and fractured wrists. The study aims to describe the incidence of hospital-treated Australian Football injuries among women and girls aged 5 years and above in Victoria, Australia.

**Methods:** Routinely collected Victorian emergency department and hospital admissions data from 2010/11 to 2019/20 will be extracted and analysed. Trends over a ten-year period will be examined, while in-

depth analysis will focus on the three most recent years of available data. Records will be restricted to females aged 5 plus years with an ICD-10-AM external cause activity code indicating Australian Football (admissions data), while narrative texts and Australian Football sports code will be used for selection of ED presentation data.

**Results:** Outcome measures include frequencies and rates per 100,000 participants for hospital-treated Australian Football injury. Preliminary results: 2509 hospitalisations for women and girls injured while playing Australian Football from 2010/11 to 2019/20; hospitalisations were 94 in 2010/11, increased to 584 in 2018/19 and dropped to 311 in 2019/20 (reflecting limited activity during COVID-19 lockdown). Thirty-four percent ( $n=859$ ) recorded for females aged 15 to 19 years, followed by 10 to 14 year olds (19%,  $n=473$ ). Most injuries were to the head (29%,  $n=727$ ), wrist/hand (24%,  $n=610$ ) and knee/lower leg (21%,  $n=521$ ).

**Discussion:** It's anticipated that both the frequency and participation-adjusted rate of hospital-treated female Australian Football injury will have increased over the past 10 years, with the highest increases occurring in more recent years of data. This research pushes the boundaries through the capture of state-wide population-based hospital treated injury cases. The inclusion of descriptive text regarding the circumstances of injury events in the VEMD is a unique feature that can provide valuable information not adequately described by standard health coding systems. The demographic profile and injury description might also provide a basis for injury prevention to curb the injury trend.

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## S111

### Prevalence and pain distribution of anterior knee pain in college basketball players

C. Bonello<sup>a</sup>

<sup>a</sup>La Trobe Sport & Exercise Medicine Research Centre, Australia

**Background:** Causes of anterior knee pain (AKP) in jumping athletes include patellofemoral pain and patellar tendinopathy. Differential diagnosis of AKP is challenging, with variation in clinical presentations. No previous research has used pain location to describe AKP in basketball athletes therefore the aim of this study was to describe the prevalence and pain distribution of AKP in college basketball and the incidence of focal inferior pole pain.

**Methods:** This cross-sectional study investigated university and college basketball athletes ( $n=242$ ) utilising two main outcome measures. The single leg decline squat test (SLDS) was used to capture pain location using pain mapping (dichotomised into focal/diffuse) and pain severity (numerical rating scale). The Oslo Sports Trauma Research Centre Knee questionnaire (OSTRC-Knee) and adapted version for patellar tendinopathy (OSTRC-P) were used to report the prevalence of anterior knee pain (AKP) and patellar tendinopathy respectively. Focal inferior pole pain during the SLDS was used to classify patellar tendinopathy.

**Results:** Of the 242 players (138 women, 104 men), 146 (60%) reported pain with the SLDS [unilateral  $n=64$ , (26%); bilateral  $n=82$  (34%)], 101 (43%) reported knee pain using the OSTRC-Knee. Pain mapping captured variability in pain location. Diffuse pain was more prevalent [left 70%; right 72%] than focal pain [left 30%; right 28%]. There was low prevalence of patellar tendinopathy with either outcome measure; OSTRC-P [ $n=21$ , 8.7%] and inferior pole pain during the SLDS [ $n=25$ , 10.3%]

**Discussion:** Diffuse AKP was common in college basketball players, however pain mapped to the inferior pole of the patella was not. Few