

6.3, SD 0.6, ES = 0.8), however this was non-significant ( $p = .187$ ).

**Conclusion** S-MAS scores are higher in footballers with HSI's compared to controls, suggesting sub-optimal sprint mechanics are associated with previous and possibly future HSI. The easy-to-use nature of the S-MAS means screening sprint running mechanics can be simply integrated into routine practice, potentially identifying footballers at HSI risk.

### 51 FACTORS ASSOCIATED WITH GOOD RECOVERY FROM ACHILLES TENDON RUPTURE AT 1 YEAR POST RUPTURE

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**Introduction** Achilles tendon rupture (ATR) leads to long-term structural and functional impairments (1,2). Currently, the predictors of good recovery after ATR are poorly understood. Thus, we applied multivariable linear regression analysis to identify factors that explain good recovery.

**Materials and Methods** A total of 35 unilateral ATR patients (6 females) were recruited. Structural, mechanical, and neuromuscular parameters were measured 1-year after rupture. Multivariable linear regression was used to predict differences between limbs ( $\Delta$ ) in: 1) tendon length at rest, 2) non-uniformity of tendon displacement, and 3) flexor hallucis longus (FHL) surface electromyography (EMG) activation% during isometric submaximal contraction. Relevant covariates were included in the models based on previous knowledge (1,3–5). We also investigated the relative contribution of FHL to total triceps surae EMG activity during submaximal contraction between limbs.

**Results** Medial Gastrocnemius (MG)-tendon  $\Delta$ stiffness was significantly associated with both  $\Delta$ MG ( $p=0.007$ ) and  $\Delta$ lateral gastrocnemius ( $p=0.030$ ) subtendon lengths. FHL EMG% difference between limbs was associated with MG ( $p=0.003$ ) and soleus ( $p=0.040$ )  $\Delta$ subtendon lengths. The relative contribution of MG to plantarflexion was lower in the injured limb with a mean difference of 0.061 (95%CI [0.02–1.0];  $p=0.007$ ). This was accompanied by an increased FHL contribution in the injured limb of -0.061 (95%CI [-1.06- -0.016];  $p=0.011$ ).

**Conclusions** The increased contribution of FHL appears to counteract deficits caused by the elongated tendon and smaller contribution of MG in the injured limb. Excessive lengthening of the tendon post-rupture could result in lower stiffness, reducing maximal isometric force production capacity, and worsening the ramifications after ATR.

### 55 WHAT DO UPPER-EXTREMITY PHYSICAL PERFORMANCE TESTS ACTUALLY MEASURE? INSIGHTS FROM AN ELECTROMYOGRAPHICAL STUDY

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**Introduction** Physical performance tests (PPTs) focus on multi-joint evaluations in which the athlete performs an activity that

represents some aspects of athletic function. Evaluating the electromyographical (EMG) demands of those PPTs enables clinicians to select appropriate PPTs for their athletes.

**Material and Methods** Thirty asymptomatic overhead athletes participated in this descriptive laboratory study. Four PPTs (Y-Balance Test - Upper Quarter (YBT-UQ), Closed Kinetic Chain Upper Extremity Stability Test (CKCUEST), Upper Limb Rotation Test (ULRT) and Shoulder Endurance Test (SET)) were evaluated using surface EMG on both dominant and non-dominant sides to measure muscle activity of upper (UT), middle (MT), and lower (LT) trapezius, serratus anterior (SA), infraspinatus (IS), and posterior deltoid (PD).

**Results** During YBT-UQ performance on both sides, the supporting hand showed high SA activity levels (range: 51–94% MVIC) during all reach directions while IS was most active when supporting the superolateral reach (range: 92 –129% MVIC). For the reaching hand, SA was most active (range: 46–83%MVIC). During the CKCUEST, all muscles were moderately to highly active, with SA (range: 64 – 87%MVIC) and IS (range: 42 – 85%MVIC) being the most active ones in both moving and supporting hand. Moderate to high activity was recorded for all muscles on both sides during the ULRT. For the SET, muscle activity progressively increased with increasing speed for both dominant and non-dominant performance.

**Conclusion** Our results provide specific EMG based information which allows clinicians to better understand PPT performance, enhancing selection of appropriate PPTs that match their patients' needs to return to sport.

### 59 DISORDERED EATING, EXERCISE ADDICTION AND MUSCLE DYSMORPHIA MAY PREDICT LOW ENERGY AVAILABILITY IN FEMALE ATHLETES

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Low energy availability (LEA) describes a complex state of insufficient energy intake to support normal physiological function, after exercise energy expenditure has been accounted for. LEA is a common challenge in athletes and can stem from a range of causes. The aim of this study was to compare the occurrence of disordered eating (DE) as well as other less studied traits, e.g. exercise addiction (EA) and muscle dysmorphia (MD), in Icelandic female athletes considered at risk of LEA vs not.

Elite and sub-elite female athletes ( $n=60$ , age  $24.1\pm 7.8$ ) from various sport disciplines completed the Low Energy Availability in Female Questionnaire (LEAF-Q), Eating Disorder Examination – Questionnaire Short (EDE-QS), Exercise Addiction Inventory (EAI), and Muscle Dysmorphic Disorder Inventory (MDDI).

Average total LEAF-Q score was  $7.8\pm 4.7$  and 46.7% had a score  $\geq 8$  (considered at risk of LEA). According to the other questionnaires 20% were at risk for EA, 13.3% for MD and 11.7% for DE. Athletes at risk of LEA had higher EAI ( $21.6\pm 3.5$  vs  $18.2\pm 4.5$ ,  $p=0.002$ ), EDE-QS ( $8.6\pm 6.9$  vs.  $4.5\pm 5.5$ ,  $p=0.014$ ) and MDDI scores ( $31.9\pm 7.6$  vs.  $27.1\pm 7.5$ ,  $p=0.017$ ) compared to those not at risk. The proportion of athletes at risk of EA was higher in the group at risk of LEA vs not (32.1 vs 9.4%,  $p=0.023$ ) but observed differences in

MD (21.4% vs. 6.3%,  $p=0.084$ ) and DE (17.9 vs. 6.3%,  $p=0.162$ ) risk proportions were not significant.

The results provide evidence that exercise addiction and muscle dysmorphia, and associated health behaviors, are factors to consider when assessing risk of LEA.

63

### SUCCESSFUL ISOLATION OF VIABLE STEM CELLS FROM CRYOPRESERVED MICROFRAGMENTED HUMAN ABDOMINAL ADIPOSE TISSUE FROM PATIENTS WITH KNEE OSTEOARTHRITIS

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**Introduction** Treatment of knee osteoarthritis with stem cells from microfragmented adipose tissue (AT) has shown promising results. Cryopreservation and biobanking of stem cells are important for research, treatment of aged patients, and for repetitive treatments. Our aim was, therefore, to investigate if viable stem cells could be isolated and expanded from cryopreserved microfragmented AT by two different isolation methods.

**Materials and Methods** Microfragmented abdominal AT from knee osteoarthritis patients was cryopreserved at  $-80^{\circ}\text{C}$  in cryoprotectant-medium containing 10% dimethyl sulfoxide. The samples were thawed for stem cell isolation by tissue explant culture (TEC) and enzymatic digestion (ED), respectively. Viability, population doublings, and doubling time were assessed by trypan blue staining. Cell type was investigated using flow cytometry. Osteogenic and adipogenic differentiation was assessed quantitatively by Alizarin-Red-S and Oil-Red-O staining, respectively. Statistical analysis was performed using paired t-tests.  $p$ -values  $<0.05$  were considered statistically significant.

**Results** Microfragmented AT from 7 patients was cryopreserved for a period of 46–150 days (mean (SD) 115.9 days (44.3 days)). Viable stem cells were successfully recovered and expanded from all patients using both isolation methods with no significant difference in viable population doublings or doubling time from passage 1 to 3 ( $p>0.05$ ). Stemness was verified by surface markers and osteogenic and adipogenic differentiation. More pericytes were present when using TEC (25% (24%)) compared to ED (2% (2%)) at passage 4 ( $p=0.04$ ).

**Conclusion** Viable stem cells can be isolated and expanded from cryopreserved microfragmented AT using both TEC and ED. TEC provides more clinically relevant pericytes than ED.

69

### CONCUSSION INCIDENCE AMONGST YOUTH HANDBALL PLAYERS PARTICIPATING IN THE HEALTH AND PERFORMANCE PROMOTION IN YOUTH SPORT (HAPPY) RANDOMIZED CONTROLLED TRIAL

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**Introduction** Knowledge of concussion in handball is limited. The aim of this study is to determine the incidence of concussion in Danish youth community handball.

**Materials and Methods** 758 players aged 11–17 years were followed prospectively as a part of a randomized controlled trial. Handball playing hours and head traumas were monitored weekly by the Oslo Sport Trauma Research Center Health questionnaire (OSTRC-H2) and a concussion specific question over 21 weeks using the app Athlete Monitoring. Players reporting a head injury via the OSTRC-H2 questionnaire or answered yes to the concussion specific question underwent a standardized 5–10-Minute telephone interview within 1 week.

Cases of concussion was defined according to the Consensus in Sport Group. Handball playing hours was defined as time spend in handball training and match. Incidence is reported as cases per 1000 playing hours.

**Results** 44 cases of concussion were identified. Overall incidence of concussion was 0,94 per 1000 hours [95% CI; 0,68–1,26]. Female athletes sustained twice as many concussions than male athletes (incidence rate ratio (IRR) 2,20 [95% CI; 1,09–4,84]). Concussion happened 9 times more often during match compared to training (9,09 [95% CI; 4,72–18,25]). No statistically significant difference in IRR between age groups (U13/U15 vs. U17; IRR 1,48 [95% CI; 0,59–3,24]) was found.

**Conclusion** This is the first study reporting concussion incidence in youth handball. Incidence was higher amongst female handball players compared to males and in match versus training. No difference in concussion incidence was found between age groups.

71

### DOES AN ACTIVITY MODIFICATION STRATEGY FOR ADOLESCENTS WITH PATELLOFEMORAL PAIN AND OSGOOD-SCHLATTER AFFECT SEDENTARY TIME? AN ANCILLARY ANALYSIS

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**Introduction** Two clinical trials tested a new management strategy for adolescents with Patellofemoral Pain (PFP) and Osgood-Schlatter Disease (OSD). The strategy consisted of activity modification (a 4-week break from sport followed by progressive return to sport), education, and exercises. This strategy appeared to improve self-reported symptoms and reduce vigorous physical activity, but it is unclear if this had detrimental effects on adolescents' sedentary behavior. The aim of this study was to investigate the changes in sedentary behavior during an activity modification management strategy for PFP and OSD.

**Materials and Methods** This ancillary analysis included data from two single arm trials of activity modification, education, and exercises of 177 adolescents' with PFP or OSD. ActiGraph GT3X+ measured physical activity and sedentary time before and during the trial (at four weeks follow-up)