

including heading and non-heading exercises; they also completed two regular football sessions. For each accelerative event recorded, PLA, PRA and PRV outputs were compared to video recordings. Receiver operating characteristic curves were used to determine the sensor's discriminatory capacity in both on-field settings, determining cut-off values for predicting outcomes.

**Results** For the laboratory tests, the random error was 11% for PLA, 20% for PRA and 5% for PRV, respectively; the systematic error was 11%, 19% and 5%. For the structured training protocol, heading events yielded higher absolute values (PLA=15.6±11.8 g) than non-heading events (PLA=4.6±1.2 g); the area under the curve (AUC) was 0.98 for PLA. In regular training sessions, AUC was >0.99 for PLA. A 9 g cut-off value yielded a positive predictive value of 100% in the structured training protocol, compared to only 65% in regular football sessions.

**Conclusion** The sensor displayed systematic overestimation with considerable random error. Despite excellent on-field accuracy for discriminating head-impacts from other accelerative events, secondary means of verifying events are still necessary.

#### 24 EVALUATION OF IN-EAR SENSOR SYSTEMS FOR QUANTIFYING HEAD IMPACT EXPOSURE IN YOUTH FOOTBALL

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**Introduction** Wearable sensor systems may be useful for measuring head-impact exposure. Here, we tested the validity of in-ear sensors developed to improve head coupling.

**Methods** First, the sensor was mounted to a Hybrid III head-form (HIII) and impacted with a linear impactor or football. Peak linear acceleration (PLA), peak rotational acceleration (PRA) and peak rotational velocity (PRV) were obtained from both systems; random and systematic error were calculated using HIII as reference. Then, six youth football players wore sensors and performed a structured training protocol including heading and non-heading exercises; they also completed two regular football sessions. For each accelerative event recorded, PLA, PRA and PRV outputs were compared to video recordings. Receiver operating characteristic curves were used to determine the sensor's discriminatory capacity in both on-field settings, determining cut-off values for predicting outcomes.

**Results** For the laboratory tests, the random error was 11% for PLA, 20% for PRA and 5% for PRV, respectively; the systematic error was 11%, 19% and 5%. For the structured training protocol, heading events yielded higher absolute values (PLA=15.6±11.8 g) than non-heading events (PLA=4.6±1.2 g); the area under the curve (AUC) was 0.98 for PLA. In regular training sessions, AUC was >0.99 for PLA. A 9 g cut-off value yielded a positive predictive value of 100% in the structured training protocol, compared to only 65% in regular football sessions.

**Conclusion** The sensor displayed systematic overestimation with considerable random error. Despite excellent on-field accuracy for discriminating head-impacts from other accelerative events, secondary means of verifying events are still necessary.

#### 25 INCREASED TTTG MEASURED ON AXIAL MRI. IS IT DUE TO LATERALIZATION OF THE TIBIAL-TUBERCLE OR MEDIALIZATION OF THE TROCHLEAR-GROOVE?

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**Introduction** To investigate if increased Tibial tubercle – Trochlear Groove distance (TT-TG) measured on axial MRI is due to lateralization of the tibial tubercle or medialization of the trochlear groove.

**Methods** 65 knees (28 normal (NK), 25 with trochlear dysplasia (TD) and 12 with patellar dislocation without TD (PD)) were examined. The medial border of the posterior cruciate ligament (PCL) was chosen as the central anatomical landmark. The distance from the tibial tubercle (TT) to PCL (TT-PCL) was measured to examine the lateralization of the tibial tubercle. The distance from the trochlear groove to PCL (TG-PCL) was measured to examine the medialization of the trochlear groove. Between group differences was investigated by use of one-way ANOVA.

**Results** The mean (SD) values for TT-TG were 8.5 mm (3.6) for NK, 11.4 mm (6.2) for PD and 17.1 mm (4.8) in the TD group (p<0.01). The mean (SD) values for TT-PCL were 19.5 mm (4.2) for NK, 17.0 mm (5.0) for PD and 20.2 mm (5.0) in the TD group (p=0.10). The mean (SD) values for TG-PCL were 10.5 mm (3.7) for NK, 5.8 mm (4.9) for PD and 3.9 mm (3.9) in the dysplastic group (p<0.01).

**Conclusion** TD knees had increased TT-TG compared to NK and PD. The TT-PCL distance did not differ significantly between groups, whereas the TG-PCL distance declined with increased TT-TG. The present results indicate that increased TT-TG is due to medialization of the trochlear groove and not lateralization of the tibial tubercle.

#### 26 AFTER SIX-WEEKS OF INTENSIVE BALLET REHEARSALS CHANGES IN THE ACHILLES TENDONS STRUCTURE APPEAR WHEREAS SELF-REPORTED SEVERITY SCORES REMAIN THE SAME

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**Introduction** The aim was to study whether six weeks of intensive dance exposure (Swan Lake rehearsals) is a significant contributor to structural changes, symptoms, clinical signs and pain in the Achilles tendon (AT).

**Materials and methods** Ballet dancers from The Royal Danish Ballet Company (aged 18–41) were invited (n=79) of which