

College of Health Sciences Research Day

Poster Presentation Abstracts

174 Abstract Title: **Trunk Muscle Adaptations Responsible for Altered Gait Mechanics in Individuals with ACL Reconstruction**

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Abstract: HYPOTHESIS: Excessive trunk lean over the injured leg is a risk factor for Anterior Cruciate Ligament reconstruction (ACLR) re-tear. Thus, the objective of this study is to identify the muscles responsible for excessive trunk lean in ACLR individuals. NUMBER OF SUBJECTS: 11 control (22.7±3.5 years, 60.56±8.51 kg, 1.68±0.08 m); 11 ACLR (19.7±3.7 years, 64.22±12.04 kg, 1.67±0.06 m) METHODS: Three dimensional kinematics and ground reaction forces were recorded during a running protocol at a self-selected speed (control 2.76±0.26 m/s; ACLR 2.80±0.29 m/s). Muscle-tendon actuated simulations were developed for each participant in OpenSim, a musculoskeletal modeling software program. Trunk (internal and external obliques; rectus abdominis; erector spinae) muscle forces were assessed at impact peak. STATISTICAL ANALYSIS: A two-tailed t-test compared the ratio of injured side/non-injured side trunk muscle forces between the two groups ($\alpha=0.05$). RESULTS: At impact peak control subjects had a greater erector spinae ratio (3.438±1.58) than ACLR subjects (1.561±1.66) ($p = .03$). There was no difference between the groups for the rectus abdominis (Control: 3.62±4.23, ACLR 2.15±1.46, $p=0.32$) and the obliques were not significantly active at impact peak. CONCLUSIONS: The significantly different injured to non-injured side erector spinae force production in the ACL group indicates that abnormal injured side force production may be responsible for excessive trunk lean at impact. The lack of differences for the rectus abdominis and internal and external obliques not being significant further supports the aforementioned finding. These results indicate that post ACLR rehabilitation should also focus on strengthen and motor control of the erector spinae muscles.

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