

## **Asymmetry in a Functional Hop Test Effectively Identifies Differences in Landing Kinematics**

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Asymmetry in neuromuscular control of the lower extremity has been shown to result in asymmetrical landing patterns, which may increase the risk of anterior cruciate ligament (ACL) injuries. Valid and efficient screening methods are needed to help identify those that may be at greatest risk of ACL injury. While functional hop tests are commonly used to assess asymmetry in the neuromuscular function of the lower extremity, it is unknown whether asymmetries during functional hop tests result in different landing patterns during dynamic tasks. **PURPOSE:** To compare landing kinematics between limbs during a single leg landing (SLL) task in those who exhibit asymmetry and those who do not exhibit asymmetry in hop distance with the single leg triple hop test (SLTH). **METHODS:** Nineteen Division I female soccer players ( $19.2 \pm 1.0$  yrs,  $168.3 \pm 6.6$  cm,  $63.7 \pm 5.2$  kg) participated in the study. The SLTH reflected the distance traveled following 3 consecutive hops for maximal distance. Three-dimensional trunk, hip, and knee kinematic data were collected during 3 SLL trials. The limb symmetry index (LSI = [preferred limb/non-preferred limb] x 100%) was calculated using the preferred limb as the limb that hopped the furthest. Participants were dichotomized into an asymmetrical (ASYM, n=8, LSI=94.4%) or symmetrical (SYM, n=11, LSI=98.1) group based on the average LSI in the overall sample. Differences in the kinematic variables during the SLL were analyzed via separate repeated measures ANOVA with one-between (LSI group) and one with-in (limb) subject factors. **RESULTS:** The ASYM group landed in greater hip abduction at initial contact ( $3.5 \pm 1.2^\circ$ ,  $P=0.011$ ) and went through greater hip adduction ( $3.7 \pm 1.4^\circ$ ,  $P=0.016$ ) and trunk flexion ( $4.9 \pm 2.1^\circ$ ,  $P=0.036$ ) compared to the SYM group during the SLL. No significant LSI group-by-limb interactions and no differences between limbs during the SLL were observed. **CONCLUSIONS:** Asymmetry between limbs observed in a SLTH result in differences in landing kinematics at the hip and trunk during a SLL. This suggests that asymmetry observed in a SLTH might be an effective screening method to identify those that may have decreased neuromuscular control of the hip and core, potentially increasing the risk of ACL injuries.

### **ABSTRACT CLASSIFICATION**

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