

### Reaction Times Altered by Anterior Cruciate Ligament Tear

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#### ABSTRACT

The anterior cruciate ligament (ACL) tear is associated with declined performance upon return to sport, with high rates of reinjury. Despite ACL reconstruction, ACL tears induce neuroplasticity, increasing reliance on vision and preparation time in movement. This increased reliance on vision and time could lead to motor control strategy deficits under sport-specific tasks. **PURPOSE:** To determine if ACL injury results in slower muscle onsets in a reactive stepping task and if this is affected by preparation. **METHODS:** Reactive balance was assessed in ACL (N=6) and healthy control (CON; N=12) participants using a lean and release device to initiate a temporally unpredictable perturbation to prompt reactions by taking a right or left step dictated via leg blocks. 75% of the time, a predetermined right or left step was taken more often (i.e., frequent step; FS) to create unpredictability. The FS leg was counterbalanced midway through testing. Prior to a perturbation, participants viewed the leg blocks move (proactive; P), or were given 400ms of vision prior to release (reactive; R). Muscle onsets were measured by electromyography sensors. Two separate two-way ANOVAs with Bonferroni post-hoc analyses ( $p \leq 0.05$ ) assessed differences in muscle onset between each leg (dominant, nondominant), across groups (CON, ACL), and by preparation time (P, R). **RESULTS:** The FS reaction was consistently faster ( $p < 0.05$ ). The ANOVA results had main effects for legs ( $p < 0.05$ ), and groups ( $p < 0.05$ ). When the infrequent step was taken, significance was evident, but Bonferroni post-hoc analyses showed significance only in the CON group, where dominant legs ( $104 \pm 55$  ms) were faster than nondominant legs ( $171 \pm 50$  ms;  $p < .0001$ ), but not in the ACLR group between uninjured legs ( $78 \pm 36$  ms), and injured legs ( $113 \pm 39$  ms) ( $p = 0.2277$ ). There was no significance when comparing preparation time between groups. **CONCLUSION:** Regardless of condition, the FS was consistently faster, but the ACLR group showed a decreased ability to slow muscle onset when asked to stop action in the FS to initiate the infrequent step. Yet, there is no significant difference between groups regardless of the preparation time given. Such results suggest an impaired motor control strategy after ACL injury, but muscle onset may not be a sensitive enough measure to definitively conclude.