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Altered Neural Drive From an ACL Injury May Lead to Re-Injury

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The big impact of musculoskeletal injuries

- Sport and tactical athletes (i.e., military, police, firefighters) commonly suffer musculoskeletal injury, and must undergo a **long recovery process**.
- **Risk of re-injury** of an ACL tear, after an initial ACL injury, is as high as 75%.
- The study of why re-injury rates are so high is the next step to build rehabilitation efforts to **reduce the risk** of re-injury.

Testing movement in the lab

- Created a task to mimic **unexpected switch in action**
- Goal of **evaluating movement** strategy and reaction time.
- Force participates to inhibit a common action to start a new one, similar to a **cutting maneuver**.
- **Test both** the injured and uninjured limbs of those who have torn their ACL to evaluate limb deficit.

First experiment of its kind

- This study is first to observe, in parallel, **changes in neural drive and performance** post-musculoskeletal injury.
- We use **transcranial magnetic stimulation (TMS)** to observe strength of neural drive from the brain to the leg immediately prior to performance.

People with ACL injuries may be less effective at reacting

- Hypothesis: subjects in the **ACL group will be less effective** at inhibiting action, specifically when acting upon reaction.
- Effectiveness reflected by **descending neural drive**.
- If a link is found, it will be fundamental in how we **rehabilitate** these injuries in the future.

Altered **neural drive** from an ACL injury may lead to **re-injury**

Placement of TMS coil



The TMS coil is placed over the motor cortex prior to each trial.

Leaning/blindfolded



The subject is in a forward lean and blinded as the blocks change.

Unblindfolded/released



After vision, they will be released and forced to take the available step.

Three major comparisons

Groups		Preparation		Task	
ACL	vs. Control	Proactive	vs. Reactive	Go	vs. Inhibit
Subjects ages 18-35, recovered from an ACL tear and continue to be active.	Subjects ages 18-35 that are active and match the ACL subject's attributes.	Subject can see surroundings before being released and forced to take a step.	Subject can not see surrounding until 400 ms before being released and forced to take a step.	Subject will be instructed to expect to take a right or left step. 75% this will be accurate.	Subject will have to inhibit and take the opposite step instructed 25% of the time.

Student Researcher: Hunter Horsley



- Hometown: Logan, UT
- Personal sports injury got me interested in sports medicine
- Kinesiology major, emphasis in exercise science
- My desire to become an orthopedic surgeon led me to this project

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Faculty Mentor | *Dr. Anne Beethe*