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**Intermittent Theta Burst Stimulation Does Not Improve Reaction Speeds in Females with Anterior Cruciate Ligament Injuries**

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Traumatic peripheral musculoskeletal injuries may reduce the excitability of sensorimotor circuits and alter patterns of activity in the prefrontal cortex. This may explain the long term disability experienced after injuries such as ACL rupture. Recently, non-invasive neuromodulation has been used to ameliorate motor deficits associated with chronic pain and tendinopathy. However, no research has examined the effects of intermittent theta burst stimulation (iTBS) reaction time (RT), during a lower extremity psychomotor choice reaction test (Stroop). **PURPOSE**: To determine if iTBS can improve congruent (CoM) and incongruent (IcM) stimuli movements after ACL reconstruction (ACL) and in matched healthy controls (CON). **METHODS**: Nine ACL females (20.6±2.3yr, 166.1±8.0cm, 68.1±9.1kg) were matched with 11 CON (20.3±1.4yr, 165.0±5.3cm, 65.7±8.4cm). Over two visits, participants were stimulated with sham or iTBS in a randomized and counterbalanced order, with double blinding. After each stimulation session, a lower extremity Stroop test was completed, consisting of 40 trials in a randomized order. To determine RT, force plates, goniometers, and EMG were used to detect initial movement, and time was subtracted from the point of stimuli presentation. Repeated measures ANOVA was used to compare mean CoM and IcM RT within Sham and iTBS visits, between ACL and CON ($p<0.05$). **RESULTS**: CoM demonstrated faster RTs overall ($F = 10.911$; $p = 0.005$). When broken into CON and ACL, CoM RT was significantly faster in CON ($F = 11.821$; $p = 0.004$). CoM RT was also significantly faster than IcM after iTBS ($F = 6.321$; $p = 0.24$) and sham ($F = 6.617$; $p = 0.021$). When comparing groups, RTs during CoM was significantly faster than IcM ($F = 5.872$; p 0.029) in CON only. **CONCLUSIONS**: Within this study IcM tasks were accompanied by longer RT, specifically within the CON, iTBS, and Sham groups. The lack of change in ACL could reflect neurological deficits in areas outside of M1, including dorsolateral prefrontal cortex or S1, where altered functional activity is evident. More research must be done on neurological pathway stimulation targets to further understand the effects of the injury, specifically for rehabilitation and return to play.