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### Perceived Muscle Soreness Does Not Modulate Corticospinal Excitability

Maria C. Canino, Felix S. Proessl, Juliana R. Hougland, James M. Baker, Deanna R. Huck, Bradley C. Nindl, FACSM, and Shawn D. Flanagan. University of Pittsburgh, Pittsburgh, PA

Soreness due to exercise-induced muscle damage temporarily impairs motor performance. Transcranial magnetic stimulation (TMS) is often used to assess subtle changes in corticospinal excitability (CSE) and motor system input-output properties and demonstrates sensitivity to chronic pain. Nevertheless, the acute effects of muscle soreness on TMS-based measures of corticospinal excitability require further investigation. **PURPOSE:** To examine the relationship between perceived muscle soreness and CSE of postural and lower-extremity muscles. **METHODS:** 12 healthy adults (3W, age: 27.2±5.4 yr, ht: 175.6±11.0 cm, wt: 72.6±13.4 kg) completed three visits with maximal anaerobic lower extremity exercise. At the start of each visit, participants confirmed they abstained from any physical activity 24hr prior, and rated their overall residual muscle soreness using a 100mm visual analog scale. Visits were ranked based on muscle soreness with the highest and lowest soreness visits retained for analysis. To assess CSE, electromyographic motor-evoked potentials (MEPs) were recorded from the right rectus abdominis (RA) and vastus lateralis (VL). Active motor thresholds (AMT) were determined for each muscle during 15% of maximal voluntary isometric force using a biphasic stimulator and 96mm curved double coil. To determine CSE, ten TMS pulses were applied to each M1 hotspot at 120% AMT with the resultant MEPs averaged based on peak-to-peak amplitude from 15-65ms post-stimulus. Paired-samples t-test were used to assess mean differences in soreness, AMT, and MEP amplitudes. **RESULTS:** As expected, muscle soreness differed between visits (mean difference: 25.3 mm,  $t=5.08$ ,  $p<0.01$ ). Similar motor-thresholds were observed for the RA (mean difference: 0.3%,  $t=0.26$ ,  $p=0.80$ ) and VL (mean difference: 0.5%,  $t=0.45$ ,  $p=0.66$ ). MEP amplitudes were also similar for the RA (mean difference: 0.13 mV,  $t=1.74$ ,  $p=0.12$ ) and VL (mean difference: 0.01 mV,  $t=0.30$ ,  $p=0.77$ ). **CONCLUSION:** Day-to-day variation in CSE during lower extremity and axial contractions is not explained by differences in muscle soreness. Future work should examine CSE at multiple timepoints after acute exercise and use various submaximal intensities to further clarify whether CSE is responsive to muscle soreness.

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