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Hydration Does Not Influence Corticospinal Excitability

Ryan J. Campbell, Maria C. Canino, Felix S. Proessl, Juliana R. Houglund, James M. Baker Deanna R. Huck, John W. Stauffer, Bradley C. Nindl, FACSM, and Shawn D. Flanagan. University of Pittsburgh, Pittsburgh, PA

Euhydration is essential for the maintenance of central nervous system function and human performance. Transcranial magnetic stimulation (TMS), a non-invasive brain stimulation technique, can be used to assess corticospinal excitability and subtle changes in motor system input-output properties. While it is known that hydration influences motor performance, little is known about the affect of hydration on corticospinal excitability. **PURPOSE:** To determine if hydration status influences corticospinal excitability. **METHODS:** On four distinct visits (D1-D4), hydration was assessed in 16 participants (3W, age: 26.3±5.4yr; height: 173.5±10.2; body mass: 73.1±13.7kg) based on refractometry urine specific gravity (USG; range: 1.001-1.029 USG). Corticospinal excitability was determined based on active motor thresholds (AMT) during sustained isometric abdominal flexion (RA) or knee extension (VL) at 15% maximum voluntary isometric contraction force. AMT's were determined with the parameter estimation by sequential testing technique. Each visit ranked by hydration status, with the corresponding AMT's for the RA and VL across visits. **RESULTS:** Hydration status varied among visits (Day1: 1.008± 0.006, Day2: 1.011± 0.007, Day3: 1.016± 0.007, Day4: 1.019± 0.007, $F_{1,7,25.8} = 43.9$, $p < 0.001$), yet AMT's in the RA (Day1: 59.8± 7.5, Day2: 58.9± 8.6, Day3: 59.8± 8.7, Day4: 59.8± 8.8, $F_{3,45} = 0.8$, $p = 0.50$) and VL (Day1: 57.9± 8.6, Day2: 57.2± 9.0, Day3: 57.3± 8.7, Day4: 57.1± 9.4, $F_{3,45} = 0.5$, $p < 0.70$) did not differ across visits. **CONCLUSION:** As determined by urine specific gravity, hydration status (within a normal range) does not appear to influence corticospinal excitability. Future studies should explore a wider range of hydration levels, including dehydrated states.

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