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Effects of Repetitive Transcranial Magnetic Stimulation on Mood When Targeting Motor-Related Brain Regions

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Repetitive transcranial magnetic stimulation (rTMS) is often used as a therapeutic modality to treat psychiatric and neurological disorders by modulating cortical activity. Through functional connections to subcortical areas, stimulation of the primary motor cortex (M1) can modulate the perception of pain. Recent work also confirms that M1 is active during emotional processing, but it is not clear if the modulation of activity in M1 can alter mood. **PURPOSE:** To determine whether acute intermittent theta burst stimulation (iTBS) or continuous theta burst stimulation (cTBS) of M1 influences mood. **METHODS:** 21 participants (8W age: 25.85.4 yr, height: 172.58.3 cm, weight: 70.813.0 kg) were randomly assigned to an iTBS (N=11) or cTBS (N=10) intervention. During three counterbalanced visits, each group received 600 pulses of rTMS at an intensity equal to 80% of active motor threshold over the supplementary motor area (SMA), M1 leg, or M1 trunk representation. Targeting accuracy and precision was confirmed with individual structural neuronavigation. Total mood disturbance (TMD) and six subdomains of mood (vigor, tension, fatigue, anger, confusion, depression) were assessed before and after rTMS using the Profile of Mood States short form (POMS). TMD and each subdomain were compared before and after rTMS, between target locations, and among stimulation protocols using a mixed model ANOVA. **RESULTS:** No changes in TMD were detected from pre to post rTMS ($F_{1,19}=0.4$ $p=0.5$) independent of protocol ($F_{1,19}=2.8$, $p=0.1$) or target location ($F_{2,38}=0.6$, $p=0.5$; mean diff iTBS SMA: -1.12.3, Leg: 0.52.2, Trunk: -0.22.2; cTBS SMA: 04.6, Leg: 1.74.0, Trunk: 0.64.0). Similarly, no subdomain differed over time between targets or protocols (all $p>0.05$). **CONCLUSION:** Our results suggest that when applied to the corticomotor system, a single session of subthreshold patterned rTMS does exert acute modulatory effects on affective state. Future studies may explore the effects of repeated rTMS visits as well as other stimulation parameters such as intensity and duration.

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