Effects of Continuous Theta Burst Stimulation on the Reading Network After Stimulation of the Middle Temporal Gyrus

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RATIONALE
• Reading requires the integrated use of multiple brain regions
• Two parallel streams make up the left lateralized ‘reading network’ which works together to accomplish fluent and proficient reading
• The left middle temporal gyrus (MTG) is a portion of the ventral system of the reading network
• Noninvasive neurostimulation, such as transcranial magnetic stimulation (TMS), can be used to modulate this network’s activity

METHODS
Participants:
• 8 healthy adults with typical reading skills (mean age = 23.59, female = 5)

Continuous Theta Burst Stimulation:
• 40s train of uninterrupted cTBS (600 pulses) delivered to MTG
• 3 pulses at 50 Hz every 200ms
• cTBS delivered at 80% of active motor threshold

Event-related fMRI:
• Picture Word Identification task probes ability to read single words and identify whether it matches picture presented on screen
• Activation map of baseline (pre-cTBS) used to create masks of cortical and subcortical regions associated with reading
• Masks used to assess BOLD amplitude changes of reading network after cTBS at 20mins and 50mins post stimulation

RESULTS
Baseline:
• Robust activation of the left lateralized reading network including visual, temporal, premotor, and frontal areas (p= 0.02, cluster size= 40)
• Consistent with previous studies

20 Minutes Post Stimulation:
• Deactivation of left angular gyrus
• Activation of bilateral cerebellum

50 Minutes Post Stimulation:
• Changes in activation in bilateral MTG and left middle frontal gyrus

CONCLUSIONS
• Continuous theta burst stimulation is effective in suppressing network activation up to 50 minutes post stimulation
• Stimulation in the ventral stream lead to downstream suppression of reading network activation
• The findings of this study are the first to display the long-term effects of cTBS
• This suggests that cTBS may be effective in treating treatment-resistant neurological conditions

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