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OC-057

ENHANCING THE HUMAN SWALLOWING MOTOR SYSTEM BY THE APPLICATION OF A NOVEL BRAIN STIMULATION INTERVENTION, INTERMITTENT THETA BURST STIMULATION

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S Mistry,* E Michou, S Hamdy and Manchester Academic Health Sciences Centre *Inflammation Sciences, University of Manchester, Manchester, UK*

Introduction Intermittent theta burst stimulation (iTBS) is a novel non-invasive brain stimulation paradigm that can facilitate corticospinal excitability of human primary motor cortex.[1] This form of plasticity induced within the stimulated brain is proposed to occur through induction of long-term potentiation and has therapeutic potential but has never been applied to the study of human swallowing.

Methods Transcranial magnetic stimulation evoked pharyngeal motor responses were recorded via a swallowed intraluminal catheter and used to assess motor cortical representation of swallowing in both dominant and non-dominant hemispheres[2] before and for up to 90 min after iTBS in 13 healthy adults (6 female/7 male, 18–58 years old). iTBS consisted of 2 s trains of 3 pulses delivered at 50 Hz and repeated at a frequency

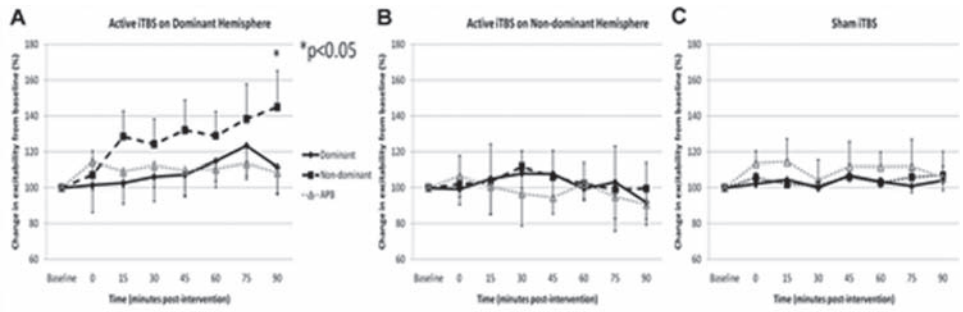

Figure 1 OC-057

of 5 Hz. Bursts were repeated every 10 s for a total of 192 s (20 repetitions, 600 pulses) at 80% of the active motor threshold of abductor pollicis brevis (APB). iTBS (active/sham) was delivered in a double-blind pseudo-randomised order in each hemisphere on separate days at least one week apart. Recordings made from the APB were used as control. Hemispheric interventional data were compared to sham using repeated measures ANOVA and Dunnett post-hoc tests in SPSS.

Results iTBS was tolerated well by all volunteers and delivered at an average intensity of 43% of stimulator output. iTBS to the dominant swallowing hemisphere induced an increase only in pharyngeal responses from the contralateral non-dominant projection to a maximum of 45% ($p < 0.05$), 90 min after stimulation (figure 1), with little change in dominant hemisphere responses. By contrast, iTBS to the non-dominant projection ($p = 0.93$) and sham stimulation ($p = 0.61$) had no significant effects on responses from either projection. APB responses similarly showed no significant effects of intervention ($p = 0.63$). Measurements of intracortical inhibition and facilitation were not affected over the course of the study.

Conclusion These data indicate that iTBS may have transcallosal effects on the excitability of contralateral brain regions that build up over time. This may suggest that iTBS is acting on inhibitory pathways to contralateral swallowing systems via disinhibition mechanisms. While more work is needed to clarify the extent of these non-primary changes in excitability, iTBS may have therapeutic potential in the treatment of dysphagia after stroke.

Competing interests None.

Keywords dysphagia, intermittent theta burst stimulation, swallowing, transcranial magnetic stimulation.

REFERENCES

1 Huang, *et al*. Theta burst stimulation of the human motor cortex. *Neuron* 2005.
2 Mistry, *et al*. Unilateral suppression of pharyngeal motor cortex to repetitive transcranial magnetic stimulation reveals functional asymmetry in the hemispheric projections to human swallowing. *J Physiology* 2007.

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