

Neuronal circuitry and rTMS in Tourette syndrome

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Gilles de la Tourette Syndrome (GTS) is a neuropsychiatric disorder characterised by multiple fluctuating motor and vocal tics. Although anti-dopaminergic drugs often ameliorate symptoms, they carry the risk of marked side effects. Therefore, alternative therapies are desirable.

In the pathophysiology of GTS, cortico-striato-thalamo-cortical circuits and its neurotransmitters systems are involved. Functional MRI, PET and SPECT studies show abnormal activation of cortical and subcortical areas. For example, a PET study by Stern et al measured increased activity in the motor, premotor, dorsolateral prefrontal and anterior cingulate cortex and the striatum. Electrophysiologically, there is additional evidence to suggest that the motor cortex is hyperexcitable, probably due to defective inhibitory mechanisms. It was hypothesized that normalisation of this cortical hyperexcitability might improve tics. As slow-frequency repetitive transcranial magnetic stimulation (rTMS) decreases cortical excitability in man, two studies in GTS patients were performed using slow (1 Hz) rTMS.

In the first study, sub threshold (80% of active motor threshold) 1 Hz rTMS applied over left motor or left premotor cortex failed to improve tics in 16 patients with GTS, as determined both subjectively (using self-assessment scores) and objectively (using blinded video assessment of tics). In the second study, sub threshold 1 Hz rTMS over the left and/or right premotor cortex in 5 GTS patients without obsessive compulsive disorder also failed to show a significant improvement of tics.

We conclude that neither left motor cortex nor left, right or bilateral premotor cortex low intensity 1 Hz rTMS improved tics in GTS patients. The effect on tics of different rTMS protocols, e.g. using higher intensities or longer durations of stimulation, perhaps focused at different cortical targets, remains to be investigated.

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Speaker session 39