# Intermittent theta-burst stimulation

Intermittent theta-burst stimulation (iTBS) is a more tolerable protocol administered at lower intensities and shorter intervals than conventional repeated TMS (rTMS) protocols

Intermittent theta-burst stimulation (iTBS), a novel repetitive transcranial magnetic stimulation (rTMS) technique, appears to have antidepressant effects when applied over left dorsolateral prefrontal cortex (DLPFC). However, its underlying neurobiological mechanisms are unclear. Proton magnetic resonance spectroscopy (Proton magnetic resonance spectroscopic imaging) provides in vivo measurements of cerebral metabolites altered in major depressive disorder (MDD) like N-acetyl-aspartate (NAA) and choline-containing compounds (Cho).

Zavorotnyy et al. used MRS to analyze the effects of iTBS on the associations between the shifts in the NAA and Cho levels during therapy and MDD improvement.

In-patients with unipolar MDD (N = 57), in addition to treatment as usual, were randomized to receive 20 iTBS or sham stimulations applied over left DLPFC over four weeks. Single-voxel Proton magnetic resonance spectroscopic imaging of the anterior cingulate cortex (ACC) was performed at baseline and follow-up. Increments of concentrations, as well as MDD improvement, were defined as endpoints. They tested a moderated mediation model of effects using the PROCESS macro (an observed variable ordinary least squares and logistic regression path analysis modeling tool) for SPSS.

Improvement of depressive symptoms was significantly associated with a decrease of the Cho/NAA ratio, mediated by NAA. iTBS had a significant moderating effect enhancing the relationship between NAA change and depression improvement.

These findings suggest a potential neurochemical pathway and mechanisms of antidepressant action of iTBS, which may moderate the improvement of metabolic markers of neuronal viability. iTBS might increase neuroplasticity, thus facilitating normalization of neural circuit function [1].

1)
Zavorotnyy M, Zöllner R, Rekate H, Dietsche P, Bopp M, Sommer J, Meller T, Krug A, Nenadić I. Intermittent theta-burst stimulation moderates interaction between increment of N-Acetyl-Aspartate in anterior cingulate and improvement of unipolar depression. Brain Stimul. 2020 Mar 27;13(4):943-952. doi: 10.1016/j.brs.2020.03.015. [Epub ahead of print] PubMed PMID: 32380445.