

## 2018 Talent Development Competition Awardees

**Title:** Effects of Theta Burst Stimulation on Plasticity in the Dorsolateral Prefrontal Cortex in Treatment Resistant Depression

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**Abstract:** Depression represents one of the leading causes of disability worldwide. Unfortunately, as many as a third of patients do not respond to antidepressant medications. This speaks to a great need for non-pharmacological methods to be further investigated in regards to treatment-resistant depression (TRD). Repetitive transcranial magnetic stimulation (rTMS) is a form of non-invasive brain stimulation that has been demonstrated to significantly improve the symptoms of TRD, and is now approved for clinical delivery across Canada. To optimize its therapeutic efficacy, novel forms of rTMS are being investigated. Intermittent theta burst stimulation (iTBS) involves the application of burst stimuli at a frequency that mimics the brain's natural firing pattern, and has been closely linked with long-term excitatory effects in motor regions of the brain. However, no studies have assessed whether iTBS induces plasticity in the dorsolateral prefrontal cortex (DLPFC), a brain region implicated in depression. In this study, I will evaluate the parameters which enhance iTBS-induced plasticity in the DLPFC of patients with TRD. 30 patients with TRD and 30 healthy participants will be recruited to undergo 3 weekly sessions of iTBS, and will receive either 1 session of TBS, 2 sessions of TBS, or sham TBS. TMS combined with electroencephalography will be conducted to measure the induction of plasticity in the DLPFC. My research will ultimately determine the effects of iTBS on cortical plasticity in depression and identify the optimal parameters to induce long-lasting changes in plasticity. These findings hold tremendous promise in the development of new biomarkers that can be used to predict treatment efficacy and also optimize patient outcomes for TRD.