Post Traumatic Stress Disorder

**PTSD** is prevalent (7% USA and 9% Canada), debilitating, and increases suicide risk 2 – 3x

**Risk factors:** gender (2:1 - F:M), low education, intellectual disability, trauma history, psychiatric conditions, neurotic personality, family history of mood/anxiety disorders

**Trauma type (military, assault, sexual), injury, perceived threat to life, and dissociation are predictive of severity**

**Diagnosis** requires: exposure, symptoms (intrusion, avoidance, negative cognition/mood, hyperarousal), duration >1 month, functional impact, not caused by substances/other conditions

### Mindfulness

- Attending to the present with awareness and being non-reactive to one’s inner experience. It includes being open, non-judgmental, observing negative emotions while minimizing avoidance
- The Five Facet Mindfulness Questionnaire (FFMQ) is widely used to measure mindfulness components: observing, describing, acting with awareness, nonjudge, and non-reactivity

### Study Conception

- Based on fMRI data, mindfulness-based interventions (MBI) induce neuroplasticity and alter brain function in various regions, including the dorsolateral prefrontal cortex (DLPFC)
- fMRI also shows correlation between DLPFC activity and reappraisal of negative emotional experiences
- MBI that target DLPFC can modulate affect regulation and help manage PTSD symptoms
- Work by many groups has shown that DLPFC rTMS can improve PTSD symptom severity
- Our previous work: showed improvement in the clinician-administered PTSD Scale-IV (CAPS-IV) following a 2-week course of 1 Hz right DLPFC rTMS

### Hypothesis

- We posit that rTMS targeting the right DLPFC results in significant improvements in dispositional mindfulness

### Methods

- **Recruitment** from the clinics at VGH (46) - declined (8), excluded (7) due to: psychotic illness, Bipolar I, SUD within 3 months, BPD or ASPD, active SI, unstable medical condition, neurological disorders or previous stroke, seizure history, intracranial ferromagnetic devices
- **Inclusion** (31): 19-70 y/o, primary diagnosis of non-combat PTSD confirmed by the Mini-International Neuropsychiatric Interview (MINI), stable meds for 4 weeks before treatment until trial completion

### rTMS

- **Double blind:** sham/rTMS group assignment
- **rTMS protocol:** 5 sessions/week for 2 weeks
- Resting motor threshold and 6 cm rule to find the DLPFC
- **1 Hz + 2250/10 Hz + 3000 pulses over 37.5 mins, 4-second train, 26-second interval**

### Results

- **Post-treatment:** nonjudge and total mindfulness scores significantly improved from baseline in the rTMS vs the Sham group
- **After three months:** acting with awareness, nonreactivity and total mindfulness score significantly improved

### Discussion

- **Acting with awareness, nonjudge, and nonreactivity have the strongest relationship with negative affect and best correlate to PTSD symptomatology**
- **Observing correlates with dissociation, absent-mindfulness, and internalizing psychopathology**
- The DLPFC is closely connected to the limbic system (affect regulation), salience network (rousability), and the default mode network (threat processing, hypervigilance)

### Conclusions

- **DLPFC rTMS improved mindfulness after treatment and months later**
- This correlates with improved PTSD symptoms: hypervigilance, intrusive thoughts, and avoidance
- Future studies can explore concurrent MBIs and rTMS which may have a larger clinical impact and reduce symptomatic relapse

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**References**

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**Brain stimulation can increase levels of dispositional mindfulness: Outcomes from an rTMS trial for PTSD**

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