medication-resistant depressed patients received twenty sessions (5 per day) of neuronavigated left DLPFC aiTBS in an accelerated sham-controlled crossover fashion, where all stimulation sessions were spread over four days (Trial registration: http://clinicaltrials.gov/show/NCT01832805). Active aiTBS, in contrast to sham, resulted in prompt perfusion increases in functionally connected brain regions such as the ventromedial prefrontal cortex, the left (para)hippocampus, and the right posterior cerebellum. Stronger individual baseline interregional covariance perfusion connectivity patterns between the subgenual Anterior cingulate cortex and the individual left dorsolateral prefrontal cortical (DLPFC) targets predicted response and/or remission. Furthermore, responders and remitters with higher Behavioural Inhibition (BIS) scores displayed stronger baseline interregional perfusion connections. Our perfusion findings indicate that active aiTBS treatment promptly affects brain regions functionally and structurally connected to the stimulated area and known to be part of deregulated brain circuits when clinically depressed. However, targeting the left DLPFC with aiTBS based on personal structural imaging data only may not be the most optimal method to enhance meaningful antidepressant responses. Additional therapies dealing with behavioural inhibition may be warranted.

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BEYOND CLINICAL SYNDROMES: UNDERSTANDING MECHANISMS OF NEUROMODULATION FORM A DIMENSIONAL PERSPECTIVE

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Clinical syndromes in Psychiatry include great heterogeneity, biological and also phenomenological. Dimensional approaches to psychophathology, pathophysiology, biomarker discovery and treatment development have prompted a paradigm shift in neuropsychiatry. That said, this framework is still relatively uncommon to study and optimize treatment development with device neuromodulation technologies. This symposium will present early work introducing dimensional analyses (beyond syndromal clinical severity) of device neuromodulation therapies for depression. We will highlight how this framework allows a more direct identification of structural and functional circuit dynamics characterizing maladaptive pathophysiological processes with translational implications. We will explore these questions across neuromodulation methods, including transcranial magnetic stimulation (TMS), electroconvulsive therapy (ECT) and magnetic seizure therapy (MST).

Dr. Kristen Ellard will discuss the impact of TMS on emotional regulation in major depressive disorder, the role of executive function in mediating these effects, and the circuit-level mechanisms of action.

Dr. Tracy Barbour will present on the effects of TMS and ECT on positive valence processes, including affective (anhedonia) and behavioral (approach/avoidance) components, and dissect the convergence and differences of these 2 treatment modalities.

Dr. Benjamin Ward will outline recent work using machine learning to predict dimensional changes in depressive symptoms in response to ECT and serial ketamine infusion using neuroimaging data.

Dr. Zhi Deng will present a secondary data analysis comparing the efficacy of ultrabrief pulse, right unilateral ECT and MST, using an exploratory factor analysis with the 24-item HAMD (primary outcome of the study) to define clinical dimensions and assess longitudinal response trajectories and predictors of response.

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CEREBELLAR-THALAMO-CORTICAL CIRCUITRY IN TREATMENT-RESISTANT OBSESSIVE-COMPULSIVE DISORDER: A NEUROPHYSIOLOGICAL STUDY PROTOCOL

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Introduction: Obsessive-compulsive disorder (OCD) is a chronic condition with a high rate of poor response to conventional treatments. Recent neurophysiological studies involving OCD patients reported dysfunction of the cerebellar-thalamo-cortical network. Transcranial magnetic stimulation (TMS) is a brain stimulation technique that can be used to non invasively assess cerebellar functions in humans, by paired stimulation of the cerebellum and the primary motor cortex (M1). Transcranial magnetic pulses in the inion region reduced the excitability of corticospinal outputs from the M1 contralateral to the site of cerebellar stimulation if tested 5-6 ms later (Ugawa et al. 1991). This is called cerebellar inhibition of the motor cortex (CBI). Stimulation of cerebellum was also found to interact with other local circuits in M1 that were involved in short interval intracortical inhibition (SICI), long interval intracortical inhibition (LICI) and intracortical facilitation (ICF) (Daskalakis et al. 2004).

This study has two aims:

- to correlate OCD symptoms severity with CBI;
- to compare the CBI of treatment-resistant and non-treatment-resistant OCD patients.

Methods: We will recruit 30 treatment-resistant OCD patients and 30 non-treatment-resistant OCD patients. Treatment response is defined as an absence of significant reduction in YBOCS scores (>35%) after at least two trials with SSRIs and one trial with clomipramine. We will measure the CBI for each patient of both groups.

Discussion: There is little literature regarding the correlation between OCD and the neurophysiological measures of cerebellar function. This is the first study aiming at correlating the CBI dysfunction with OCD symptoms severity and treatment response. Our results will hopefully shed light on the putative neurophysiological features underpinning the treatment response of OCD patients.

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CEREBELLAR TRANSCRANIAL DIRECT CURRENT STIMULATION FOR SCHIZOPHRENIA: A CURRENT MODELLING STUDY

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Background: Schizophrenia is a severe and chronic mental disorder affecting millions of people worldwide. Given that the cerebellum is involved in the pathophysiology of schizophrenia, it constitutes a promising target for transcranial direct current stimulation (tDCS) interventions. However, illness progression and aging have been associated with cerebellar volume loss which might hinder the efficacy of tDCS. Therefore, we aim to conduct a proof-of-concept study on the effect of tDCS in the cerebellum and for that, we will 1) simulate the electric field (EF) of four right cerebellar tDCS (ctDCS) montages, and 2) investigate if age and sex can significantly predict EF strength.