derived from other lesion types, which was at (-44,38,30), and a previous TMS target derived from subgenual cingulate anti-correlations at (-42,44,30).
Conclusions: The precomputed functional connectome is a high-resolution atlas of voxel-wise functional connectivity that can reveal potential therapeutic neuromodulation targets by comparing their connectivity to a template brain map. Our proposed TMS target for MS depression is near the current clinical TMS targets for depression, suggesting that MS depression may be amenable to TMS.
Research Category and Technology and Methods
Translational Research: 10. Transcranial Magnetic Stimulation (TMS)
Keywords: multiple, depression, TMS, connectome

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Abstract key: PL- Plenary talks; S- Regular symposia oral; FS- Fast-Track symposia oral; OS- On-demand symposia oral; P- Posters

P3.160

RECRUITMENT OF THE INDIRECT PATHWAY BY SUBTHALAMIC DEEP BRAIN STIMULATION

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Abstract
Background: Deep brain stimulation (DBS) of the subthalamic nucleus is a therapeutic neurocircuit intervention to treat symptoms of Parkinson's disease (PD). Recently, evoked resonant neural activity (ERNA) has been described as a signature of subthalamic DBS that scales with therapeutic efficacy, but the single neuron and synaptic bases underlying ERNA remain unsubstantiated.
Methods: We combine STN microelectrode recordings in PD patients undergoing DBS surgery with computational mesocircuit modelling to test different circuit montages and short-term synaptic dynamics necessary for the emergence of ERNA and use mapping of ERNA hotspots to test the relation of ERNA to clinical improvement achieved by DBS.
Results: High frequency stimulation (HFS) of the STN resulted in ERNA waveforms predictive of patterned inhibition of action potential firing. At HFS, depression of the first peak of ERNA was coupled to the emergence of a second peak. Computational modelling revealed that this relationship could be explained by (i) distinct synaptic dynamics in the reciprocal STN-external-pllidum (GPe)-loop and (ii) self-inhibition within GPe via recruitment of axon-collaterals. Finally, electrophysiological mapping localized the highest ERNA amplitudes within the STN and was able to predict clinical improvement achieved by DBS.
Interpretation: These multi-modal findings suggest that concurrent antidromic and orthodromic activations of the indirect pathway by subthalamic DBS produce a spatially defined neuronal circuit signature that is predictive of its therapeutic potential.
Research Category and Technology and Methods
Translational Research: 1. Deep Brain Stimulation (DBS)
Keywords: DBS mechanism of action, Synpatic mechanisms, ERNA, Indirect pathway

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P3.161

QUASI-STATIC ASSUMPTION IN ELECTROCONVULSIVE THERAPY COMPUTATIONAL MODELING

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Abstract
Background: Computational models of current flow during Electroconvulsive Therapy (ECT) rely on the quasi-static assumption, yet tissue impedance during ECT may be frequency specific and change adaptively to local electric field intensity.
Objectives: We systematically consider the application of the quasi-static assumption to ECT under conditions where 1) static impedance is measured before ECT and 2) during ECT when dynamic impedance is measured. We propose an update to ECT modeling accounting for frequency-dependent impedance.
Methods: The frequency content on an ECT device output is analyzed. The ECT electrode-body impedance under low-current conditions is measured with an impedance analyzer. A framework for ECT modeling under quasi-static conditions based on a single device-specific frequency (e.g., 1 kHz) is proposed.
Results: Impedance using ECT electrodes under low-current is frequency dependent and subject specific, and can be approximated at >100 Hz with a subject specific lumped parameter circuit model but at <100 Hz increased non-linearly. Combined with prior evidence suggesting that conductivity does not vary significantly across ECT output frequencies at high-currents, we adapt our previously developed adaptive pipeline for individualized ECT modeling around a 1 kHz frequency.
Conclusions: By considering ECT modeling to occur at a single representative frequency, existing ECT adaptive and non-adaptive modeling are rational under the quasi-static assumption.
Research Category and Technology and Methods
Basic Research: 2. Electroconvulsive Therapy (ECT)
Keywords: Quasi-static assumption, electroconvulsive therapy, computational modeling

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P3.162

THE EFFECTS OF TRANSCRANIAL DIRECT CURRENT STIMULATION ON BEAT PERCEPTION AND MOTOR PERFORMANCE

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Abstract
Humans have an intrinsic tendency to move to music, perhaps because motor brain areas respond to beat perception. However, our understanding of the neural mechanisms underlying the music-movement connection remains limited, and most studies have used correlational, not causal, methods. Here, we investigated the role of four motor brain regions involved in the timing of movement and beat perception: the supplementary motor area (SMA), the left and right premotor cortex (PMC), and the right cerebellum, using transcranial direct current stimulation (tDCS) as a causal method. Subjects were randomly assigned to receive stimulation in one of the four brain regions. They participated in three sessions, receiving anodal, cathodal, or sham stimulation in each session while they reproduced different types of rhythmic sequences. In part of the sequences, a beat was easily perceived; in the other part, the beat was unclear or not present. As the SMA plays a primary role in beat perception, while the premotor cortex and cerebellum appear to have a general role in timing, we predicted that the SMA stimulation would affect reproduction of rhythms with a beat, whereas premotor and cerebellar stimulation would affect reproduction of sequences with no beat. As expected, improved reproduction was observed according to whether the rhythm had a beat or not, but no difference was found based on the stimulation received. Thus, we find no evidence that modulating brain excitability alters accuracy of rhythm reproduction. We discuss the implications of these results and the future perspectives for this research.
Research Category and Technology and Methods
Basic Research: 9. Transcranial Direct Current Stimulation (tDCS)