

Novel multimodal approaches for precision brain stimulation

Wednesday, Jun 20: 2:45 PM - 4:00 PM

3281

Symposium

Wednesday - Symposia PM

Transcranial magnetic stimulation (TMS) offers the unique possibility for targeted, non-invasive interaction with cerebral circuits using pulsed magnetic fields. While the exact mechanisms of action are not fully understood, high-frequency repetitive TMS of left dorsolateral prefrontal cortex is FDA-approved as interventional therapy of treatment-resistant depression and has been applied in a number of other brain disorders. Moreover, TMS has been used as neuroscientific interventional tool to induce a well-defined spatio-temporal modulation of neural activity in order to reveal causal interactions in functional brain networks. Combining TMS with other brain mapping modalities is challenging, but yields detailed information about the neurophysiological effects of TMS on the stimulated brain circuits. Recent years have witnessed substantial progress in merging TMS with advanced human brain mapping techniques. In this symposium, we will highlight several multimodal approaches where TMS is combined with EEG, magnetic resonance spectroscopy (MRS) and functional magnetic resonance imaging (fMRI).

Objective

Learn how to model brain stimulation effects in the brain

Learn how to combine brain stimulation with neuroimaging techniques

Learn how to introduce precision medicine approaches into brain stimulation therapy

Target Audience

This topic is of high interest both to basic science researchers focussing on neurophysiology, and clinical researchers who apply brain stimulation techniques (psychiatrists, neurologists, psychologists).

Co Organizer

Hartwig Siebner, Danish Research Center for Magnetic Resonance, Copenhagen University Hospital Hvidovre

Organizer

Christian Windischberger, Medical University of Vienna

Presentations

Comparing the results of field modelling to physiological measurements and MR-based current flow measurements ([index.cfm?do=ev.viewEv&ev=1695](#))

We will highlight approaches for exact biophysical modelling of TMS-induced electrical fields in the brain.

Presenter

Axel Thielscher, Danish Research Centre for Magnetic Resonance, Copenhagen University Hospital Hvidovre

Linking brain stimulation and metabolites ([index.cfm?do=ev.viewEv&ev=1696](#))

We will show how magnetic resonance spectroscopy (MRS) can be used to trace TMS-induced changes in neurotransmission and metabolism .

Presenter

The state is the art: EEG-informed TMS to target cortical states ([index.cfm?do=ev.viewEv&ev=1697](#))

We will highlight the potential and pitfalls of recent approaches that use EEG to inform the timing of TMS or record the cortical responses evoked by focal TMS (TEPs) with a focus on targeting target cortical oscillations.

Presenter

Hartwig Siebner, Danish Research Center for Magnetic Resonance, Copenhagen University Hospital Hvidovre

Concurrent TMS-fMRI for individual dose-response assessment ([index.cfm?do=ev.viewEv&ev=1698](#))

Using an integrated coil device, we will demonstrate that the combination of TMS with concurrent functional magnetic resonance imaging (fMRI) enables the high-resolution assessment of neural activity at the TMS target site.

Presenter

Christian Windischberger, Medical University of Vienna
