MAX PLANCK INSTITUTE
FOR HUMAN COGNITIVE AND BRAIN SCIENCES

Thursday, June 22, 2023, 15:00 hrs
Wilhelm Wundt Room

Guest Lecture

Professor Carsten H. Wolters

Institute for Biomagnetism and Biosignalanalysis,
University of Münster, Germany

Individualized EEG/MEG targeted and D-CMI optimized multi-channel transcranial electric stimulation in focal epilepsy

My talk will address the efficacy of targeted (by combined MEG/EEG source analysis) and optimized multi-channel transcranial direct current stimulation (mc-tDCS) as therapy for focal epilepsy in a double blind sham-controlled N-of-1 trial. Targeted and optimized mc-tDCS was applied in a 20 year-old pharmaco-resistant epilepsy patient. For mc-tDCS optimization we used our recently developed algorithm - Distributed Constrained Maximum Intensity (D-CMI) (Khan et al., 2022, doi: 10.1016/j.clinph.2021.10.016 < https://doi.org/10.1016/j.clinph.2021.10.016>) – on a target region which was determined by mean of combined MEG/EEG source analysis of averaged interictal epileptiform discharges (IEDs) using realistic and skull-conductivity calibrated finite-element head modeling. D-CMI was shown to be superior to standard bipolar tDCS in a somatosensory group study (Khan et al., 2023, doi: 10.1016/j.brs.2022.12.006 <https://doi.org/10.1016/j.brs.2022.12.006>). A total amplitude of 4 mA was applied twice for 20 minutes, with a pause of 20 minutes in between, for five consecutive days. An Acti-Sham montage was also applied. There was a washout of 5 weeks between the two stimulation weeks. With regard to interictal activity, targeted D-CMI mc-tDCS led to a highly significant reduction in IED frequency after treatment, while Acti-Sham did not. Side effects entirely pertained to transient sensations. With regard to ictal activity, the patient experienced a seizure with decreased severity during the stimulation week.