high synchrony of the brain signal and the stimulation artifact, these signals are separable enough to uncover subtle tACS-induced brain modulations.

Using interventions that lead to well-established and robust modulations of alpha power (eyes open vs. closed and stimulus induced alpha power decrease), we demonstrate for the first time that using MEG in conjunction with a spatial filtering technique can successfully disentangle oscillatory brain activity from the highly correlated tACS signal.

These techniques provide new opportunities for studying brain activity during ongoing tACS, which will undoubtedly have far-reaching implications for both the cognitive and clinical neurosciences.

233

Intra and interhemispheric modulation of motor and somatosensory cortices using cTBS: a TMS/EEG study

Gan Huang, André Mouraux
Institute of Neuroscience (IONS), Université catholique de Louvain (UCL)

Introduction: Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive technique widely used to probe the function of a given brain structure. It also has promising therapeutic applications for the treatment of various neuropsychiatric disorders. However, the after-effects of rTMS are highly variable across individuals. Recently, Hamada et al. (2013) found that the effect of continuous theta burst stimulation (cTBS) on M1 could be predicted by the latency of the motor-evoked potentials (MEPs) recorded before applying cTBS. This suggests that inter-individual variability of the effects of rTMS could be driven by differences in the interneuronal networks preferentially activated by TMS.
Methods: We investigated the effect of cTBS delivered over M1 on the ipsilateral and contralateral M1 and primary somatosensory cortex (S1) using motor-evoked potentials (MEPs), somatosensory-evoked brain potentials (SEP) and TMS-evoked brain potentials (TEP) recorded from both hemispheres before and after cTBS.
Results: Our results confirm that the variable effect of cTBS can be predicted by the latency of the MEPs recorded before applying cTBS. Short MEP latencies were associated with an enhancement of the MEPs elicited by stimulation of the ipsilateral M1 whereas late MEP latencies were associated with a reduction of MEP amplitude. In contrast, there was a positive correlation between MEP latency and the change in the amplitude of the MEPs elicited by stimulation of the contralateral hemisphere. A similar relationship was observed between MEP latency and the effect of cTBS on the magnitude of the N100 wave of TEPs. Finally, there was a group-level effect of cTBS on the magnitude of the N20 and P100 waves of SEPs, which, after cTBS, were decreased over the ipsilateral hemisphere and increased over the contralateral hemisphere.
Discussion: The reverse relationship between MEP latency and the effects of cTBS on the ipsilateral and contralateral hemisphere is compatible with interhemispheric inhibitory interactions.

234

Boosting recovery of vision loss in post-acute stroke with tDCS – A pilot Study

R. Alber[a,*], H. Moser[a], B.A. Sabel[b], Gall C[b]
[a] *Neurologisches Therapiezentrum Gmundnerberg, Altmünster, Austria*
[b] *Medical Faculty, Institute of Medical Psychology, Otto-von-Guericke University, Magdeburg, Germany*
*E-mail: raimund.alber@gmail.com.

Introduction: Posterior cerebral artery (PCA) stroke usually results in visual field defects varying in size and extent of the blind field. Vision restoration training (VRT) may reduce the visual field impairment. Combined application of anodal transcranial direct current stimulation (tDCS) over visual cortex together with VRT indicates that tDCS may accelerate VRT-effects in the post-acute stage. We investigated safety, applicability and efficacy in 7 post-acute PCA stroke patients and compared their visual field changes to 7 control subject who were matched with respect to lesion-age and defect-size and underwent standard rehabilitation.
Methods: Fourteen patients with homonymous field defects after PCA stroke were included in this pilot study. Seven subjects were treated with up to 10 tDCS-sessions (2mA, 15-20 minutes, cathode: Cz, anode: O1/O2) combined with VRT (Anops: LinguAdapt). Data of safety monitoring as well as a survey of side effects was collected. Perimetric detection thresholds (Oculus, Twinfield) after tDCS combined with VRT were compared to baseline to investigate training effects. Control subjects were retrospectively picked out of a data source of patients who underwent a standard rehabilitation program consisting of compensatory eye movement training .
Results: Referring to the safety monitoring no negative side effects apart from skin itching beneath the electrodes were reported. Significant improvement of detection accuracy within impaired visual fields was observed in all 14 subjects. However, there was a stronger improvement in patients who received combined VRT and tDCS (36.93% ±36.65) compared to controls (10.81% ±9.48)
Discussion: Concerning this pilot study, the application of tDCS combined with VRT in sub-acute stroke is safe and easily applicable in clinical routine. Anodal tDCS might facilitate rehabilitation of visual field loss, although the tDCS-effect itself can not be sufficiently estimated here due to limitations of the study design. Further studies are needed to compare real-tDCS vs. sham-tDCS in neurovisual rehabilitation.

235

Calculation of the induced electric field of a dedicated transcranial magnetic stimulation coil for the rat

A. Miranda, J. Verhaeghe, S. Servaes, J. Parthoens, S. Staelens
Molecular Imaging Center Antwerp, University of Antwerp

Introduction: Recently our group, in collaboration with Magventure, Denmark, developed a dedicated 40 mm outer diameter circular rat transcranial magnetic stimulation (TMS) coil consisting of two bended layers with 12 windings in each layer operated at a current of 6960 A with a frequency of 3546 Hz. Here we calculated the induced electric field generated by the coil when placed 2 mm above a 15 mm radius tissue-equivalent water sphere mimicking the head of a rat.
Methods: Calculations were performed using the finite element simulation software COMSOL multiphysics (4.3 b), using the multi-turn coil definition of the magnetic fields physics. The maximum electric field at several depths from the surface were calculated as well as the half power region (HPR), surface area in which $|E| \geq |E|_{max} * 0.707$. Also the first time derivative of the magnetic field was calculated and measured (measurements provided by the manufacturer).
Results: The calculated maximum electric field at the surface of the spherical rat head model was ~260 V/m with the amplitude decaying with the depth (figure 1). However, at a depth of 7.5 mm from the sphere surface the maximum induced electric field was still more than 100 V/m. The HPR was located in 12.5 % of the surface area (figure 2). Further, the calculated shape and magnitude of the derivative of the magnetic field were in very close agreement with the experimentally measured field (scaling factor 0.988).
Conclusion: The distribution of the induced electric field and the derivative of the magnetic field for the dedicated TMS coil design were calculated. The field exceeded 100 V/m at depths up to 7.5 mm from the surface.