Keywords: TMS, TMS-evoked potentials, microstates , cortical excitability

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P2.106

NEURAL PLASTICITY IN SCHIZOPHRENIA: AN INTEGRATED APPROACH FOR REHABILITATION BY MEANS OF TMS AND COGNITIVE REMEDIATION TRAINING

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Abstract

Schizophrenia is a severe and disabling psychiatric disorder probably based on complex pathophysiological mechanisms of reduced inhibition, impaired connectivity and reduced plasticity in neural networks. Beside clinical symptomatology, a core feature of schizophrenia is a global cognitive and social disability, which strongly affect patients' lives and their quality of life. The cognitive impairment involves memory, attention, executive functions, language, facial emotion recognition and theory of mind abilities.

Cognitive remediation strategies, in addition to pharmacological and psychological treatments, has received increasing attention in recent years , as well as the use of non-invasive brain stimulation techniques such as TMS, which have demonstrated promising therapeutic potential.

In order to evaluate the efficacy of TMS to induce improvements in cognitive functioning in schizophrenia, 16 patients were submitted to effective or sham iTBS over the left dorsolateral prefrontal cortex during 3 consecutive weeks. In half of patients the neuromodulation was combined with daily cognitive remediation training (Cogpack software), administered immediately after the application of TMS. Clinical, cognitive and social functioning were tested at baseline and at different timepoints after conclusion of the rehabilitation protocol (immediately after the 3 weeks protocol, and after 1, 3 and 6 months).

The preliminary results indicate that the proposed TMS protocol induced significant improvements in global cognition, in particular in the domains subserved by the prefrontal cortex and the interconnected regions. In addition, patients submitted to TMS showed major benefits after 1 month from brain stimulation, suggesting that TMS induced long-lasting plastic changes.

Research Category and Technology and Methods

Clinical Research: 10. Transcranial Magnetic Stimulation (TMS)

Keywords: schizophrenia, TMS, cognitive remediation

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P2.107

EFFECTIVENESS OF OPTIMIZED TRANSCRANIAL DIRECT CURRENT STIMULATION BASED ON THE ELECTRIC FIELD STRENGTH OF COMPUTATIONAL MODEL ON COGNITIVE FUNCTION IN PATIENTS WITH MILD COGNITIVE IMPAIRMENT

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Abstract

The various electric field distributions induced by transcranial direct current stimulation (tDCS) in each subject were considered as one potential factor of inter-subject variability in the effects of tDCS. Numerical optimization techniques could be applied to a computer model with T1-weighted MR images of individual subjects to reduce the variability of tDCS-induced electric field (EF) distribution. None of the studies have prospectively verified the role and effectiveness of tDCS with optimal electrode position (opt-tDCS). This study was aim to examine the effectiveness of EF-based opt tDCS in patients with MCI on cognitive function and depression, so we determined that possible electrode locations in defined grid and found best electrode positions which maximize EF in target region; inferior and middle frontal gyrus in left dorsolateral prefrontal cortex (LDLPFC). 58 MCI patients participated in this study. All patients underwent MRI scanning and were assessed with the cognitive function and depression examination before the first session and after the 10th session. Cognitive function examination and depression scale include Hamilton Depression Rating Scale (HDRS), Korean version of Montreal Cognitive Assessment (MoCA-K), the Korean version of Consortium to Establish a Registry for Alzheimer's Disease (CERAD-K) neuropsychological assessment battery. Patients received tDCS sessions with 2 mA, disc-shaped electrodes of a radius 3 cm over optimized electrode location for 30 min/day, 5 days/week for 2 weeks. This study found significant effects of opt-tDCS on changes in cognitive function of CERAD-K, the 15-item Boston Naming Test ($p < 0.05$), Word List Memory ($p < 0.05$), Word List Recognition ($p < 0.05$), total scores of memory domains ($p < 0.05$) and total CERAD-K scores excluding the MMSE-K scores ($p < 0.05$). There were no adverse events such as itching or burning sensation. The results suggest that opt-tDCS is safe and could improve cognitive function in MCI patients.

Research Category and Technology and Methods

Clinical Research: 9. Transcranial Direct Current Stimulation (tDCS)

Keywords: tDCS, optimized tDCS, MCI, cognitive rehabilitation

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P2.108

IMPACT OF MULTIPLE SESSIONS OF LOW-FREQUENCY TRANSCRANIAL MAGNETIC STIMULATION TARGETING VENTRAL MEDIAL FRONTAL CORTEX ON BEHAVIORAL AND PHYSIOLOGICAL STATES IN MONKEYS

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Abstract

The ventral medial frontal cortex (vMFC) has long been implicated in the pathology of mood disorders. Although the abnormalities of this brain region in patients with mood disorders have often been reported in human brain imaging studies, its causal involvement in the pathogenesis of such disorders remains to be fully elucidated. Recently, we have shown that, by using low-frequency repetitive transcranial magnetic stimulation (LF-rTMS) as an inhibitory intervention, a single session of LF-rTMS targeting the vMFC temporarily induced a depression-like state in monkeys, which was characterized by a reduced movement activity level in the home cage, impaired sociability, and decreased motivation level, as well as increased plasma cortisol level. In the current study, we further examined how multiple sessions of LF-rTMS targeting the vMFC would affect the behavioral and physiological states of monkeys, since accumulating lines of evidence indicate that the effectiveness of a single rTMS intervention can be enhanced and prolonged by its repetition, possibly through neural plasticity mechanisms. We performed a single session of LF-rTMS targeting the vMFC daily for four consecutive days. As a result, the recovery time constants in the movement activity level and the cortisol level after the multiple LF-rTMS sessions were much prolonged compared with those after the single LF-rTMS session. We further analyzed the changes in the