

induced changes. This is a within-subjects randomized, double-blind, cross-over study, where subjects were administered on separate sessions: carbamazepine (Na⁺ channel blocker), nimodipine (Ca²⁺ channel blocker), lorazepam (GABA_A receptor positive allosteric modulator), dextromethorphan (NMDA receptor antagonist), or placebo. In each session, participants take the drug and after 1.5 hours, they participate in online coupled TUS-TMS stimulation, where TMS is delivered at the last 10 ms of a 500 ms TUS sonication over M1. This is followed by delivery of a theta-burst TUS over M1, where pre-stimulation TMS measures are compared offline to post-stimulation measures at several timepoints. The effects of the pharmacological agents on TUS-induced plasticity are compared to that of placebo. This study will elucidate the mechanisms of TUS neuromodulation in the human motor cortex. This will be a crucial step in the development of TUS as a novel non-invasive treatment for neurological and psychiatric disorders. We intend to present preliminary data of our study at the conference.

Keywords: Focused Ultrasound, Neurophysiology, Neuropharmacology

P2.006

SAFETY AND FEASIBILITY OF ACCELERATED LOW-FREQUENCY REPETITIVE NAVIGATED TRANSCRANIAL MAGNETIC STIMULATION (rNTMS)

Melina Engelhardt¹, Jana Kimmel¹, Giovanni Raffa², Alfredo Conti³, Thomas Picht^{1,4}, ¹Charité - Universitätsmedizin Berlin, Germany; ²University of Messina, Italy; ³University of Bologna, Italy; ⁴Humboldt Universität zu Berlin, Germany

Abstract

Low frequency repetitive transcranial magnetic stimulation (rTMS) is capable of inducing changes in functional organization of underlying brain regions, however often at the cost of long stimulation protocols over several weeks. As these protocols can be difficult to implement in clinical settings, the aim of the present study was to show the feasibility and safety of an accelerated low-frequency rTMS protocol applying multiple sessions daily.

To this purpose, nine healthy subjects (mean age 25.4 years; 1 female) received 14 sessions of rTMS (1 Hz, 30 minutes, 110% RMT) to the hand motor hotspot. Subjects received stimulation for either 14 days once daily (classical rTMS; c-rTMS), 7 days twice-daily (accelerated rTMS; a-rTMS) or sham stimulation for 14 days once-daily (s-rTMS). Daily stimulation sessions in the a-rTMS group were delivered with a 90-minute break in between.

In total, 74% of rTMS sessions in the c-rTMS group, 89% in the a-rTMS group and 98% in the s-rTMS group were free of any side effects. Subjects reported occurrence of brief headaches in 14% of sessions in the c-rTMS group, 2% in the a-rTMS group and 0% in the s-rTMS group. Dizziness during stimulation was reported in 5% of sessions in the c-rTMS group, 2% in the a-rTMS group and 0% in the s-rTMS. Subjects reported a feeling of fatigue in the stimulated hand muscles in 2% of all sessions in the c-rTMS group, 7% in the a-rTMS group and 0% in the s-rTMS group. All side effects were reported to be at maximum mild and of short duration.

Thus, accelerated low-frequency rTMS of the motor cortex is a safe and feasible method, previously shown to induce a functional reorganisation of the motor system. By shortening treatment duration in days, this approach can potentially make rTMS protocols more accessible to a wider range of patients.

Keywords: rTMS, neuromodulation, plasticity, safety

P2.007

TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS) FOR SEVERELY ILL SCHIZOPHRENIA PATIENTS

Elisa Suonmaa, Niuvianniemen sairaala, Finland

Abstract

Title: Transcranial Direct Current Stimulation (tDCS) for severely ill schizophrenia patients

Author: Elisa Suonmaa, MD, Niuvianniemi hospital, Finland

Aim: The aim of this study was to examine the efficacy of frontal cortex tDCS for negative and neurocognitive symptoms in severely ill treatment resistant schizophrenia patients in Niuvianniemi hospital.

Methods: 54 voluntary inpatients participated in this sham-controlled randomized trial. Treatment group received 2mA and sham group 0.5mA frontal stimulation for 30 min on 15 consecutive days. Assessments included PANSS and CGI at baseline and at endpoint (10 days after last treatment). Control measurements were also made 30 days after last treatment.

48 participants were enrolled (tDCS, n=20; Sham, n=22). There were no statistically meaningful baseline differences between the groups in demographic and clinical variables, but participants in the tDCS group had somewhat higher scores in PANSS 5-factor model in cognitive (Mean 21.6 vs 19.3) and exited symptoms (Mean 9.8 vs 8.1).

Results: Pre-post changes between groups in PANSS scores were not statistically significant. In PANSS 5-factor model differences in exited symptoms bordered statistical significance ($Z = -1.882$; $p = 0.060$) favoring the treatment group. Differences in cognitive symptoms were statistically significant favoring the treatment group ($Z = -2.183$; $p = 0.029$).

Conclusion: Although only small statistical improvement was noted, clinical changes in participant's symptoms were observed in their daily life in the hospital. Based on the primary results of this study it seems, that tDCS is suitable to combine to medical treatment in severely ill schizophrenia patients. In the treatment group 35% were good or high responders. Only 5% got no help of the treatment. Most of the drop out was before the study period, and all three drop outs during the study period were in the treatment group and due to experienced side effects (vertigo or headache).

Keywords: tDCS, schizophrenia, treatment resistant schizophrenia, cognitive symptoms

P2.008

MECHANICAL AFFECTIVE TOUCH THERAPY (MATT) FOR ANXIETY DISORDERS: EFFECTS ON RESTING STATE FUNCTIONAL CONNECTIVITY

Meghan Gonsalves^{1,2}, Quincy Beck², Andrew Fukuda^{2,3}, Eric Tirrell², Fatih Kokdere^{2,3}, Eugenia Kronenberg², Nicolas Iadarola^{2,4}, Sean Hagberg^{5,6}, Linda Carpenter^{2,3}, Jennifer Barredo^{3,7}, ¹Brown University, Providence, RI, USA; ²Butler Hospital, Providence, RI, USA; ³Brown University Warren Alpert Medical School, Providence, RI, USA; ⁴The University of Arizona College of Medicine Tucson, Tucson, AZ, USA; ⁵AffectNeuro, Inc., USA; ⁶University of New Mexico, Albuquerque, NM, USA; ⁷Providence VA Medical Center, Providence, RI, USA

Abstract

Introduction and Objectives: Mechanical Affective Touch Therapy (MATT) is a safe, novel form of non-invasive peripheral nerve stimulation. Although mechanical stimulation activates nerves, we know little about its impact on psychiatric symptoms and their underlying cortical mechanisms. We examined the effects of open-label MATT on affective symptoms and resting state functional connectivity (RSFC).

Methods and Materials: 22 adults with an Axis I anxiety disorder were recruited from the community. After two initial sessions assisted by research staff, participants self-administered 20-minute sessions of MATT at home at least twice daily for four weeks. Self-report measures of mood and anxiety severity were collected at baseline, two, and four weeks. Resting-state fMRI was collected before the initial MATT session (n=20), immediately after the first session (n=18), and following four weeks of MATT (n=14). Seed-based whole-brain functional connectivity analyses identified brain connectivity patterns correlated with responsiveness to MATT. Seeds were based on Neurosynth meta-analytic maps for "anxiety" or "pain." Connectivity results were corrected for multiple comparisons (voxel $p < .005$, cluster $p < .05$).

Results: Baseline RSFC is predictive of symptom improvement with chronic MATT. Acute increases in insula connectivity were observed between mid-cingulate cortex and postcentral motor regions following the first MATT session. Chronic MATT was associated with increased connectivity between pain and anxiety regions of interest (ROIs) and posterior default mode network (DMN) regions involved in memory and self-