Neither a sensitization nor a habituation effect was observed for MNA elicited using the paired pulse stimulation paradigms (all p >0.05).

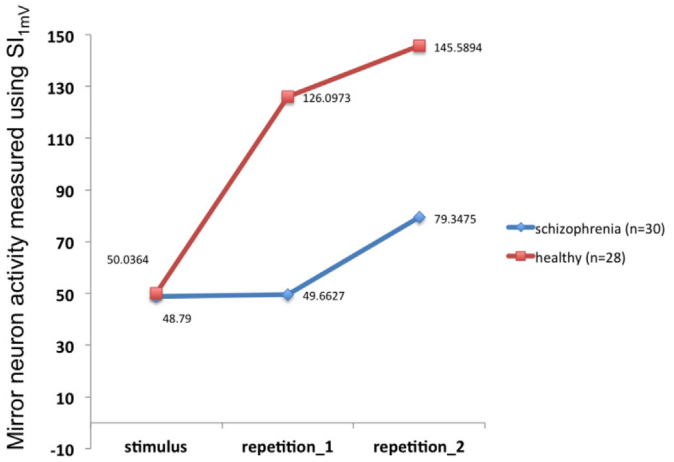

Figure1: MNA changes from first stimulus through the two repetitions

Conclusion: There is preliminary evidence for sensitization of MNA with repeated presentations of emotion-embedded action observation stimuli. Replication and further exploration of this phenomenon may reveal better insights into interface between emotions, mirror neuron activity and learning potential.

Keywords: Mirror Neurons, Transcranial Magnetic Stimulation, Schizophrenia

[0378]

FUNCTIONAL IMPROVEMENT OF SUBCORTICAL APHASIA AFTER SERIES OF REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION

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Background: A re-organization mechanism following such injuries may include overactively recruitment of contralesional homotopic area. Many studies suggest that instead of improvement, this particular mechanism caused supression of functional recovery. Repetitive Transcranial Magnetic Stimulation (rTMS) has been recognized for its effect on inducing long term depression or potentiation in the cortical area. It is now increasingly used as a complementary therapy in aphasia management word widely. Although not widely known, subcortical stroke can caused aphasic syndrome. There is unsufficient data regarding the effects of cortical rTMS on functional changes due to subcortical lesion.

Objective: to study the functional improvement of rTMS subcortical aphasia.

Methods: We observed 5 subcortical chronic post stroke aphasia patients who received 4Hz rTMS (80-90%MT) for 15 minutes, 5 days per week, across 2 weeks, over undamaged Inferior Frontal Gyrus (IFG). On each day of treatment, rTMS were followed by immediately speech therapy session. Fluency, comprehension, naming, repetition, reading, and writing were evaluated before and after the rTMS series completion.

Results: All subjets showed improvement almost in all language modalities. The most significant improved functions were fluency and naming ($p<0.05$). Great improvements were also seen in reading and written comprehension ($p<0.05$). Writing skills were also improved eventhough not statistically significant ($p>0.05$). The least improvement seen were in auditoric comprehension and repetition ($p>0.05$).

Conclusion: rTMS improved functional outcome language performance of subcortical aphasia. Focal rTMS on the cortex did modify the connected subcortical area.

Keywords: subcortical aphasia, stroke, rTMS

[0379]

TRANSCRANIAL ULTRASOUND IMPROVES MOOD AND AFFECTS RESTING STATE FUNCTIONAL CONNECTIVITY IN HEALTHY VOLUNTEERS

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Introduction: Transcranial ultrasound (TUS) is an emerging method for noninvasively modulating human brain function. In three previous experiments, we reported that TUS targeting the right inferior frontal gyrus (rIFG) enhanced mood in healthy volunteers. Here, network connectivity changes were investigated in a small pilot study to elucidate how TUS to the rIFG might alter mood. The rIFG is associated with cognitive control of emotional processing and is part of a larger network associated with emotional regulation and mood disorders.

Methods: Resting state fMRI was recorded at baseline ($N = 9$). Focused TUS (500 kHz, $I_{spta} = 272$ mW/cm^2) was delivered to the rIFG for 2 minutes and resting state fMRI was recorded again 25 minutes later. The prediction was that connectivity patterns in cognitive control and other networks related to mood would show opposite patterns to those found in mood disorders after focused TUS, thus offering a mechanism for the enhancement of mood states reported previously.

Results: Previous self-report mood effects were replicated: Participants reported an enhancement of overall mood 25 minutes after TUS, $p = 0.022$ (Bonferroni corrected). After controlling for multiple comparisons, significant increases in connectivity in cognitive control areas (dorsolateral prefrontal cortex, medial prefrontal cortex, rIFG), decreased connectivity between rIFG and limbic systems (nucleus accumbens, cingulate gyrus), and decreased connectivity in the default mode network was observed.

Discussion: Altered connectivity between neural systems involved in cognitive control and emotional/salience networks might reflect better regulation of mood. Decreased connectivity in networks involved in internal processing may have led participants to engage more with the external environment. Overall, these changes in connectivity correspond to the enhancement of mood reported by participants. These are the first results to suggest that TUS targeting the rIFG modulates network level activity consistent with the enhancement of mood and emotional regulation.

Keywords: Focused Ultrasound, Mood, Functional Connectivity, Mood Disorders

[0380]

IMPROVEMENT IN AUDITORY VERBAL MEMORY INDUCED BY THETA TACS TO BILATERAL DORSAL PREFRONTAL CORTEX

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Introduction: The Rey Auditory Verbal Learning Test (RAVLT) is a neuropsychological test for memory and learning capacity using auditory verbal materials in the clinical setting. Past neuroimaging studies have reported that the performance of this test involved activation in multiple regions including the bilateral dorsolateral prefrontal cortex (DLPFC) and hippocampal cortex. In the present study using the RAVLT, we applied transcranial alternating current stimulation (tACS) to the bilateral DLPFC to examine effects of stimulation at the theta frequency to the inter-hemispheric connection on auditory verbal memory and learning.

Methods: 15 Japanese healthy young adult volunteers participated in this study. Each participant underwent the Japanese version of the RAVLT for the active bilateral DLPFC stimulation and sham stimulation conditions. In the single condition, the participant was presented with a list of 15 common words in audition and asked to recall the words as many as possible. Different word lists were used for the two conditions. This procedure was repeated five times in the single condition. During the active stimulation conition, tACS (1 mA, 4.5 Hz) was delivered by DC-stimulator (neuroConn GmbH, Germany) using a pair of conductive-rubber electrodes (5 x 7 cm) placed on F3 and F4 (left and right DLPFC, respectively).

Results: In both tACS and Sham conditions, the number of recalled words comparably increased from the first trial to the second, third, and fourth trial. However, increment in the number of recalled words at the fifth trial was significantly larger for tACS than for Sham condition ($P = 0.0182$, $t = 2.314$). No significant difference was found between the two word lists.

Discussion: The results suggest that the neural pathway connecting the bilateral DLPFC is critical for auditory verbal memory and learning and that information interaction in this pathway may be reflected in the theta-range oscillation.

Keywords: dorsolateral prefrontal cortex, verbal memory, theta range oscillation