impact of the lesion site and size, and to identify whether the tDCS target region was intact, structural MRI data were obtained during the pretreatment scanning session. To establish whether tDCS supports re-recruitment of LH structures, lateralisation indices (LI) will be calculated as a measure for the relative contribution of the left and right hemisphere. LI will be compared for patients receiving tDCS versus patients receiving sham, both pre and post treatment. We will unveil the significantly activated brain areas during both paradigms, in relation to behavioural performance on these language tasks.

**Results:** At present, the analysis is ongoing. Results will be available in March 2017.

**Discussion:** The results of this study will improve our understanding of tDCS-induced language reorganisation, and will contribute to the ongoing discussion among aphasiologists on the roles of the RH and LH in post-stroke language reorganisation.

Keywords: transcranial Direct Current Stimulation, neural reorganisation, aphasia, stroke

A SIMPLE SIMULATION MODEL FOR SPIRAL INDUCED EPILEPSY

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In order to effectively use DBS for epileptic seizures the electrodes location is crucial and depends on the understanding of the phenomenon. We assume that epilepsy in the brain is a similar phenomenon to that of heart fibrillation. Since the phenomenon of heart fibrillation, both in the atria and in the ventricles, is known to be initiated by a spiral (rotor), the assumption entails a spiral source also for epilepsy. Effective DBS should then be targeted to eliminate a developing ominous spiral wave.

In order to investigate this hypothesis, we wanted to use a simple numerical model. Existing models of nervous brain operation are rather complex. We therefore adapted for this task a model which is relatively very simple but is versatile enough to enable spatiotemporal responses and E.E.G.’s similar to the actual ones. The model is based on the Morris-Lecar system of equations with diffusion. Temporal changes of “external current” and the diffusion constant are used to simulate alterations of excitation-inhibition neuron dominance.

The model is used to investigate brain response to an initial spiral wave. It is shown that, indeed, this procedure can lead to epileptic-like patterns. Starting with a spiral in a self-contained excitatory medium, the model uses different random changes of the connectivity and of the excitability level, simulating actual brain conditions. Results demonstrate that in some cases the initial spiral breaks down into many repeating patterns, ectopic sources and double spirals, similar to fibrillatory patterns in the heart. Simulated EEG’s are calculated by restrained averaging of local action potentials. Those reveal “disordered” behavior ordinary in epilepsy. E.E.G. spikes appearing in epilepsy could be the result of the initial spiral itself.

Keywords: epilepsy, rotor, spiral, Morris-Lecar

STIMULATING YOUNG MINDS: INVESTIGATING A NEXT GENERATION TREATMENT FOR DEPRESSION IN YOUTH

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**Background:** One third of young patients with depression do not respond to antidepressants and are at risk for chronic treatment resistance. Repetitive transcranial magnetic stimulation (rTMS) has shown to be efficacious in treating depression, however, few studies have investigated patients at earlier stages of illness when providing optimal treatments are likely to result in better response outcomes. A subset of patients show inadequate response to rTMS and identifying features of patients that predict response is needed to inform personalised approaches.

**Methods:** In this open-label study, 17 young inpatients and outpatients with depression (aged 18-30; 22±3.8) were recruited. Neuronavigationally targeted high frequency (10 Hz) rTMS was administered at 110% of resting motor threshold on the left DLPFC for 45 trains of 4 seconds for 20 sessions over 4 weeks. Clinical interview, cognitive assessment and, psychosocial self-report scales were carried out within 2 weeks pre- and post-treatment.

**Results:** Paired-samples t-tests revealed that depression, anxiety and psychiatric symptoms were significantly reduced with rTMS treatment (all p<.05) but no significant changes in cognitive or psychosocial functioning were found (p>.05). Greater improvements in depressive symptoms were associated with better pre-treatment set-shifting performance (p<.05; r=.53). In patients with moderate-severe depression (n=9), greater improvements in psychiatric symptoms were associated with later age of illness onset (p<.05; r=.88).

**Conclusion:** In keeping with the literature, rTMS improves depressive, anxiety and psychiatric symptoms in young people. These data suggest that cognition may have utility in predicting rTMS treatment response and targeting rTMS earlier in the course of illness may result in better response outcomes in young people with depression.

Keywords: repetitive transcranial magnetic stimulation, depression, youth, cognition

RESPONSE TO HIGH-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION OVER LEFT DORSOLATERAL PREFRONTAL CORTEX IS UNAFFECTED BY NUMBER OF TREATMENT SESSIONS IN MAJOR DEPRESSION: A SYSTEMATIC META-ANALYSIS OF RANDOMIZED, SHAM-CONTROLLED TRIALS

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**Background:** High frequency repetitive transcranial magnetic stimulation (HF-rTMS) of the dorsolateral prefrontal cortex (DLPFC) appears to have acute antidepressant properties. Studies have suggested that a higher number of sessions increases response rate; patients with major depression (MD) have achieved clinical response criteria between the 13th and 15th sessions and even after 5 weeks. The aim of this meta-analysis was to determine if number of sessions is related to the antidepressant effects of HF-rTMS.

**Method:** Following a systematic literature search of Pubmed/Medline and PsycInfo, randomized, sham-controlled trials from 1999 to 2016 comparing the response % in patients with MD were included. The odds ratio (OR) was used as effect size measure to evaluate the effectiveness of TMS vs. sham. In case of heterogeneity in effect sizes, number of sessions as well as other variables (number of trains and pulses, frequency, intertrain interval) were evaluated.

**Results:** The search resulted in 57 publications, totaling 1447 patients receiving real TMS and 1299 sham TMS. The response rate of >40% improvement in the TMS condition was significantly higher than in the sham condition (OR = 3.54; 95% Confidence interval: 2.66 - 4.69, p = 0.000). Heterogeneity between studies was high (Q= 79.88, p = 0.020). Only number of trains influenced the OR, i.e., an increase in number of trains was associated with a decrease in the odds of response in the TMS vs. sham condition (β = 0.02; z = -3.66, p = 0.0003). Number of sessions did not influence the odds of response in the TMS vs. sham condition (β = -0.03; z = 1.07, p = 0.28).

**Conclusions:** This review suggests that the TMS effect is uninfluenced by the number of sessions. Alternatively, it seems to be negatively correlated with the number of trains. More studies submitting patients to > 20 sessions are needed.

Keywords: Response rate, major depression, meta-analysis, repetitive transcranial magnetic stimulation

BRAIN STIMULATION, AGING AND COGNITION

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**Introduction:** Alterations in neural plasticity are reported to occur both across the lifespan and in Mild Cognitive Impairment (MCI). As MCI may represent a prodromal stage of neurodegeneration, it is important to further investigate these neural changes in order to inform the development of therapeutic interventions. One novel method to achieve this is by combining transcranial magnetic stimulation with...