

investigation are indicated to determine which patients are most likely to benefit from cycling stimulation.

Research Category and Technology and Methods

Clinical Research: 1. Deep Brain Stimulation (DBS)

Keywords: Deep Brain Stimulation, Dystonia, Pediatric

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Abstract key: PL- Plenary talks; S- Regular symposia oral; FS- Fast-Track symposia oral; OS- On-demand symposia oral; P- Posters

P1.055

TRANSCRANIAL ELECTRICAL STIMULATION IN STROKE EARLY AFTER ONSET CLINICAL TRIAL (TESSERACT)

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Abstract

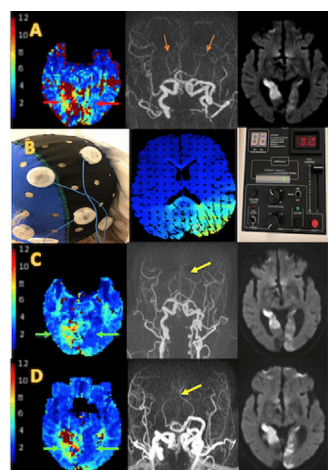


Figure. 72-year-old male with bilateral PCA occlusions. Early recanalization was only observed on the stimulated side (left PCA territory) while the contralateral side (right PCA), serving as a potential internal control, remained occluded highly suggestive of a true biological effect of stimulation.

Panel A) The baseline multimodal MR imaging showed bilateral posterior cerebral arteries (PCA) distal occlusions (orange arrows) with perfusion delays involving bilateral occipital lobes (red arrows).

Panel B) Given the symptomatic nature of the left PCA occlusion, he received 20 minutes of 1 mA of cathodal tDCS to the left occipital region only. The computational modeling (middle image) shows the specificity of the coverage provided to the brain tissue at-risk over the occipital region.

Panel C, D) The 2hr (C) and 24hr (D) MR perfusion demonstrated partial resolution of the left occipital perfusion delay, but persistent right occipital ischemia (green arrows). MRA and MRI brain showed partial recanalization of the left PCA occlusion (yellow arrow) and diffusion weighted image with evolving ischemia of the occipital regions.

Background: Cathodal transcranial direct current stimulation (C-tDCS) provides neuroprotection in preclinical models of acute ischemic stroke (AIS) by inhibiting peri-infarct depolarization, and it enhances collateral perfusion due to its vasodilatory properties. We undertook the first-in-human feasibility study of high-definition (HD) C-tDCS as an individualized treatment strategy in AIS.

Methods: The study design was a randomized, sham-controlled, 3+3 dose-escalation. Key entry criteria were patients within 24 hr from AIS onset, imaging evidence of cortical vessel occlusion and substantial penumbra, and ineligibility for reperfusion therapies. HD C-tDCS was delivered to the penumbra using individualized montages with current flow models showing the specificity of the electrical field coverage to ischemic regions.

Results: Among 10 enrolled patients, 7 were allocated to active C-tDCS and 3 sham. Age was mean 75 (± 19.6) in active vs 77 (± 12) in sham patients; entry NIHSS was mean 8 (± 8.5) in active vs 7 (± 2.6) in sham. The first 4 patients (3 active and 1 sham) received 1 mA-20 min (Tier1) and the subsequent 6 (4 active and 2 sham) 2 mA-20 min (Tier2) of C-tDCS. All patients completed the stimulation with no significant intolerability. C-tDCS met the study primary feasibility endpoint, with speed of tDCS implementation median 12.5 min in the last 4 patients. One symptomatic hemorrhage occurred due to a ruptured mycotic aneurysm for which Tier 2 was extended. Median penumbral salvage proportion in the active group was 66% (IQR 29-80.5) compared to 0% (IQR 0-0) in sham (Figure). Recanalization rate was 83% in active vs 33% in sham.

Conclusion: High-definition C-tDCS is a targeted sub-threshold inhibitory treatment strategy that can be feasibly applied in AIS patients and showed strong signals of beneficial effects upon penumbral salvage and vessel recanalization. These data warrant conduct of large efficacy and safety trials of HD C-tDCS as an AIS therapy.

Research Category and Technology and Methods

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

Keywords: Acute stroke treatment, Neuroprotection, Collateral enhancement, High-definition tDCS

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P1.056

COMBINATION OF TPS AND TMS IN A PATIENT WITH POST COVID-19 DEPRESSION

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Abstract

In the case of a 76 year old patient with moderate depression and anxiosomatic symptoms the treatment was initiated with TMS. After 30 sessions, anxiety improved in the subjective perception around 30% but not the depressive mood. By changing the method to TPS, after 3 sessions the mood improved significantly and after the 6th session we effectuated a nearly complete and lasting remission of depressive symptoms with additionally slightly improved anxiosomatic symptoms. This may be the first reference of potentially synergistic effects of TPS and TMS in depressed patients and also the first description of treating a non-demented depressed patient with tps.

Research Category and Technology and Methods

Clinical Research: 10. Transcranial Magnetic Stimulation (TMS)

Keywords: TPS, TMS, depression, combination

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P1.057

MODULATION OF VISUOSPATIAL WORKING MEMORY PERFORMANCE USING DUAL-SITE TRANSCRANIAL CURRENT STIMULATION OF BILATERAL INTRAPARIETAL SULCI WITH HIGH-GAMMA ALTERNATING CURRENTS WITH DIFFERENT PHASES

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Abstract

The phase delays of the gamma band between the cortical regions are reportedly associated with the direction of communication between the regions. We aimed to demonstrate the role of phase delay between cortical regions involved in visuospatial working memory (VWM) performance using multi-site multi-phase transcranial alternating current stimulation (msmp-tACS).

Eighteen healthy, right eye dominant participants underwent three stimulation sessions, in which the desired phase delays induced by msmp-tACS over bilateral IPS were in-phase (LOR0), right IPS lagging left IPS by 90° (LOR90), and vice versa (L90R0). By using the finite element method (FEM)-based field simulation and the complex least squares (CLS) algorithm, eight electrodes for current stimulation were selected according to the international 10-10 EEG system. Participants were asked to perform a visual delayed match-to-sample task while the stimulation was being delivered. To quantify the VWM capacity, K-value and lateralization index (LI) were calculated.

Simulation study revealed that alternating currents were successfully delivered over region of interests (ROIs), as the difference between the median phase over half-maximum areas of the left and right IPS were 0°, -90.97°, and 87.55° for the LOR0, LOR90, and L90R0 montages, respectively. Meanwhile, it was observed that LI was significantly higher under the L90R0 condition than both LOR0 and LOR90 conditions ($p = 0.002$ and $p = 0.006$, respectively; significant p-value is 0.0167, per Bonferroni correction).

In conclusion, we developed msmp-tACS based on computational simulations. Furthermore, the msmp-tACS applied over bilateral IPS showed