Abstracts

**Keywords:** Motor Control, Music Cognition, Beat Perception, Rhythm Reproduction

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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

**P3.163**

**NO SUPPLEMENTARY EFFECT OF ONE SESSION OF TRANSCRANIAL DIRECT CURRENT STIMULATION DURING MOTOR SEQUENCE LEARNING ON 24-HOUR RETENTION IN HEALTHY OLDER ADULTS**

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Abstract

Transcranial direct current stimulation (tDCS) of the primary motor cortex (M1) may have a beneficial effect on 24-hour retention of motor learning in healthy older adults, but so far existing studies are small and inconclusive. In addition, it is suggested that the conventional tDCS montage (CONV-tDCS) may produce a relatively non-focal stimulation compared to high-definition tDCS (HD-tDCS). At present, it is unclear whether the effect of tDCS depends on the delivery montage. Hence, this project examined the supplementary effect of tDCS of the M1 during motor sequence learning (MSL) on retention in a large sample of healthy older adults. Fifty-two subjects practiced the serial reaction time task (SRTT) while receiving one session of 20 minutes of CONV- or HD-tDCS in a double-blind, randomized, sham-controlled crossover design. Stimulation intensity was set at 1 mA. As the primary outcome, we studied SRTT reaction times at 24-hour retention. We found successful retention (pre-retention: p<0.001 and post-retention: p=1.900) of the gains in SRTT performance (pre-post: p=0.001) irrespective of receiving active or sham stimulation (p=0.604). Also, these effects were unaffected by tDCS montage (p=0.845). We conclude that there is no surplus value of adding one session of tDCS during motor sequence learning on 24-hour retention. Future research may focus on the effect of multiple sessions of tDCS during MSL on long-term retention and other consolidation outcomes.

**Research Category and Technology and Methods**

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

**Keywords:** tDCS, motor sequence learning, older adults, retention

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**P3.164**

**THREE WEEKS BILATERAL TDCS OVER AUDITORY CORTEX SIGNIFICANTLY IMPROVES TINNITUS. A DOUBLE BLINDED RANDOMIZED CONTROLLED CLINICAL TRIAL.**

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Abstract

Background: Preliminary studies showed possible therapeutic efficacy of multiseession transcranial direct current stimulation (tDCS) over auditory cortex (AC) for chronic tinnitus; however, the findings are controversial.

Objective: To investigate the therapeutic effects of repeated sessions of bilateral tDCS over AC on tinnitus symptoms in chronic intractable tinnitus.

Methods: A double blinded randomized placebo controlled parallel trial was conducted on 40 patients with chronic intractable tinnitus (> 2 years). Participants were randomly assigned into two groups of real tDCS (n=28), anode/cathode on left/right AC, or placebo treatment (n=28). Daily 20 min session of 2 mA current for 5 consecutive days per week and 3 consecutive weeks with 35 cm² electrodes were applied. Tinnitus handicap inventory (THI) was assessed before and after intervention, and at one month follow-up. The tinnitus loudness and distress were assessed using a visual analogue scale (VAS) before intervention, and immediately, one hour, one week, and one month after last stimulation. Possible interaction between the disease features and treatment response was evaluated.

Results: Ten sessions anodal tDCS significantly reduced THI after last session and after 1-month follow-up (P<0.001), in 21 of 28 participants. In addition, significant reduced in distress VAS and loudness VAS were found (P<0.001). The sham tDCS showed no statistically significant differences for any response variables. Age, sex, evolution time, laterality, basal THI, basal distress and basal loudness VAS showed no significant correlation with the treatment response.

Conclusion: The repeated sessions of bilateral AC tDCS may serve as a potential therapeutic modality for chronic tinnitus.

**Research Category and Technology and Methods**

**Clinical Research:** 5. Other Transcranial Electrical Stimulation (tES)

**Keywords:** Transcranial direct current stimulation, Chronic Tinnitus, Intractable, Treatable

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**P3.165**

**SIMULTANEOUS TRANSCRANIAL ELECTRICAL AND MAGNETIC STIMULATION BOOST GAMMA OSCILLATIONS IN THE DORSOLATERAL PREFRONTAL CORTEX**

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Abstract

Neural oscillations in the gamma frequency band have been identified as a fundamental for synaptic plasticity dynamics and their alterations are central in various psychiatric and neurological conditions. Transcranial magnetic stimulation (TMS) and alternating electrical stimulation (tACS) may have a strong therapeutic potential by promoting gamma oscillations expression and plasticity. Here we applied intermittent theta-burst stimulation (iTBS), an established TMS protocol known to induce LTP-like cortical plasticity, simultaneously with transcranial alternating current stimulation (tACS) at either theta (θtACS) or gamma (γtACS) frequency on the dorsolateral prefrontal cortex (DLPFC). We used TMS in combination with electroencephalography (EEG) to evaluate changes in cortical activity on both left/right DLPFC and over the vertex. We found that simultaneous iTBS with γtACS but not with θtACS resulted in an enhancement of spectral gamma power, a trend in shift of individual peak frequency towards faster oscillations and an increase of local connectivity in the gamma band. Furthermore, the response to the neuromodulatory protocol, in terms of gamma oscillations and connectivity, were directly correlated with the initial level of cortical excitability. These results were specific to the DLPFC and confined locally to the site of stimulation, not being detectable in the contralateral DLPFC. We argue that the results described here could promote a new and effective method able to induce long-lasting changes in brain plasticity useful to be clinically applied to several psychiatric and neurological conditions.

**Research Category and Technology and Methods**

**Clinical Research:** 10. Transcranial Magnetic Stimulation (TMS)

**Keywords:** Transcranial alternated current stimulation, Transcranial magnetic stimulation, Dorsolateral prefrontal cortex, Gamma oscillations

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