

using an infrared-automated pupillometer in three different illuminance conditions (scotopic, mesopic, photopic).

Results: In scotopic illuminance condition, a significant interaction between intensity and condition (real vs control) was found for the left eye. Post-Hoc analysis showed that during real taVNS at 2 mA, pupil size was significantly larger in comparison to baseline and 2 mA control stimulation.

Conclusions: taVNS induces pupil dilation at specific stimulation intensity and under specific illuminance conditions.

Research Category and Technology and Methods

Translational Research: 12. Vagus Nerve Stimulation (VNS)

Keywords: transcutaneous vagal nerve stimulation, pupil size, VNS

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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

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REMOTELY SUPERVISED TDCS FOR PERSISTENT POST-TRAUMATIC HEADACHE IN VETERANS (RESTORE)

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Abstract

Objectives: Evaluate feasibility and preliminary efficacy of remotely supervised transcranial Direct Current Stimulation (RS-tDCS) interventions for persistent post-traumatic headache (PPTH) secondary to mild TBI (mTBI).

Methods: Veterans with PPTH completed a 28-day baseline observation of headache days and received either active or sham RS-tDCS paired with mindfulness meditation. This 4-week intervention of 20-minutes daily (M-F) RS-tDCS (anodal stimulation dlPFC) was monitored via VA Video Connect. Feasibility was determined by the number of participants completing $\geq 80\%$ of the intervention. Efficacy was measured by changes in number of moderate/severe headache days from baseline period to the end of treatment phase, and 4-week post-treatment follow-up. Secondary endpoints included total number of headache days, acute pain medication use, as well as headache- and mTBI-related disability.

Results: Twenty-six veterans (46.6 ± 8.7 years) with PPTH completed baseline observations and were randomized to either active ($n=13$) or sham ($n=13$) treatment groups. A total of 22/25 (88%) participants fully completed either active (10/12) or sham (12/13) interventions ($p=0.59$). Within-group analyses revealed significant reductions in moderate/severe headache days in the active ($p=0.04$) but not sham ($p=0.54$) groups. This resulted in a trend towards significant reductions in moderate/severe headache days in the active vs. sham groups ($p = 0.07$). Active participants also demonstrated a reduction in total number of headache days during treatment ($p=0.04$) where the sham group did not ($p=0.70$). There is statistically significant reduction in total number of headache days during treatment for active vs. sham participants ($p=0.03$). No significant differences were maintained during the 4-week post-treatment follow-up ($p's > 0.05$).

Conclusions: RS-tDCS treatment feasible with high adherence and effective for veterans with PPTH. Findings suggest that active RS-tDCS via dlPFC reduce headache frequency and improve clinical outcomes. A larger phase II study is warranted to confirm these findings and inform evaluation for clinical use.

Research Category and Technology and Methods

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

Keywords: tDCS, Persistent Post-traumatic headache, Veterans, mTBI

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NON-INVASIVE BRAIN STIMULATION WITH A MONOPHASIC TMS PULSE: A PILOT STUDY OF BDNF (RS6265) AND COMT (RS4680) GENE POLYMORPHISMS

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Abstract

Our goal was to evaluate genetic and gender differences in motor threshold (MT) using monophasic single pulse Transcranial Magnetic Stimulation (TMS).

Methods. In this pilot study, we used TMS over dominant primary motor cortex and recorded motor evoked potentials (MEP) from the contralateral which yielded a higher MT than other TMS methods. We applied the monophasic stimulation to evaluate phenomena of intracortical excitation and inhibition of neuromuscular activity within the upper limb muscles. 112 volunteers (age: mean/max/min 23/41/18 years; 63 females).

Results. The presence of a relatively high MT value (92-100% of the amplitude on the TMS stimulator, or not any MEP) that was revealed for 61 participants (54.4%); this is essential for future planning of experimental and clinical investigations. We have not found a significant relationship between BDNF (rs6265) and COMT (rs4680) gene polymorphisms and MT value (Kruskal-Wallis test, 6 subgroups polymorphism $p=0.696$). Also, we did not find a significant difference in the value of MT in men and women (Mann-Whitney test, $p=0.279$).

On the next step we have decided to apply statistical analysis of MT, candidate genes and non-brain structures based on the sMRI scans. This will allow an assessment of the contribution of extra-axial structures to the somatotopy of the processes of excitation and inhibition of the motor cortex of the brain, along with an assessment of (a) their relationship with the individual amplitude (MT) to select the optimal level of stimulation; and (b) the contribution of the genetic factor.

Conclusion. We did not find significant relationships between BDNF and COMT polymorphisms, as well as gender and MT level. We plan further tasks to evaluate the effect of extra-axial structures on MT levels.

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Research Category and Technology and Methods

Basic Research: 10. Transcranial Magnetic Stimulation (TMS)

Keywords: monophasic single pulse Transcranial Magnetic Stimulation, TMS, BDNF, COMT

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INTERINDIVIDUAL VARIABILITY OF OPTIMIZED INTERFERENTIAL STIMULATION OF HUMAN BRAINS

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Abstract

Interferential stimulation (IFS), also known as transcranial temporal interference stimulation (tTIS), is able to focally stimulate deep brain regions, provided it is properly optimized. We previously presented a mathematical framework for optimizing IFS using two arrays of electrodes and showed that it can achieve more focal stimulation compared to conventional optimized high-definition transcranial electrical stimulation (HD-TES), especially in the deep brain areas such as the hippocampus. However, that proof-of-concept study was only performed on an averaged head (MNI152 template). Here we aim to study the interindividual