EFFICACY OF TRANSCRANIAL DIRECT CURRENT STIMULATION TO IMPROVE INSIGHT IN PATIENTS WITH SCHIZOPHRENIA: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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Importance: Lack of insight in schizophrenia, i.e. the unawareness of illness and its consequences, is associated with poor outcomes and usual treatments do not appear to convincingly improve it. While transcranial direct current stimulation (tDCS) may represent a potentially useful treatment strategy to relieve various symptoms of schizophrenia, its impact on insight remains unclear.

Objective: To investigate the association between repeated sessions of tDCS and insight improvement in patients with schizophrenia.

Methods: PubMed and ScienceDirect databases were systematically searched up until March 2021. Eligible randomized sham-controlled trials were those comparing active *versus* sham tDCS, including at least 10 sessions, in patients with schizophrenia. Only studies measuring insight with the PANSS #G12 item were selected. Of 116 studies identified, 17 studies were selected and 13 were included. Effect sizes were calculated for all studies and pooled using a random-effects model. Meta-regression and subgroup analyses were conducted. The primary outcome established prior data collection was the change of insight score, assessed by PANSS #G12 item, following active tDCS sessions compared to sham stimulation.

Results: Thirteen studies including 587 patients with schizophrenia were included (297 receiving active stimulation and 290 receiving sham stimulation). A significant pooled effect size of -0.46 (95% CI [-0.62; -0.30]) was observed, suggesting that 10 sessions of active treatment was associated with a greater improvement in insight compared to sham treatment. Age and G12 score at baseline were identified as significant moderators.

Conclusions: This study suggests that patients with schizophrenia showing poor insight may benefit from treatment with tDCS with the anode over the dorsolateral prefrontal cortex, using either bifrontal or frontotemporal montage. This effect could contribute to beneficial outcomes observed following stimulation.

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THE ROLE OF THE CEREBELLUM ON SOCIAL SEQUENCES: PRELIMINARY FINDINGS OF A CONCURRENT tDCS-fMRI STUDY

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The cerebellum is a brain structure traditionally known for its role in motor sequences. However in the last decades the posterior cerebellum has shown to be involved in understanding social sequences as well (Heleven et al. 2019). In order to understand these social sequences humans use complex cognitive processes such as mentalizing. Mentalizing is the ability to attribute mental states such as desires, intentions and beliefs to other people. This ability helps us to predict future behaviour by generating social sequences. The ability to mentalize seems to be impaired in some clinical populations such as the autism spectrum (Olivito et al. 2018), thus the possibility of using brain stimulation in order to enhance it sounds enticing.

In order to prove the causal role of the cerebellum in social sequences we conducted an experiment that included a pictorial sequencing task in order to compare false belief sequences (which require mentalizing) with other types of social and non-social sequences. A within-subjects sham-controlled design

was used. Healthy participants completed two sessions (sham and stimulation) in a randomised order. We applied a novel tDCS montage in order to maximise the focality of the anodal stimulation over the right posterior cerebellum while concurrently measuring brain activity using fMRI (Figure 1).

Preliminary results showed differences due to stimulation mostly in temporal areas, suggesting that remote effects were more prominent than local effects. These differences in brain activation did not affect all conditions equally, having the smallest effects in the non-social conditions.

Further, a more exhaustive analysis (including simulations of the induced electric field, resting state connectivity and scores in autism questionnaires) will be performed in order to further unravel the specifics of this interaction between stimulation and different types of sequences.

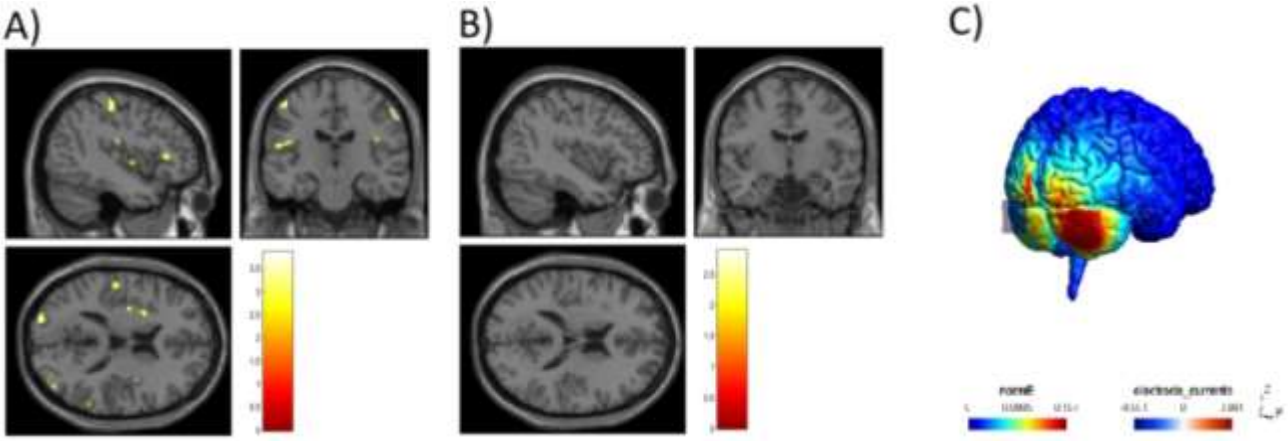

Figure 1. A) t-test of all social conditions averaged stimulation<sham. B) t-test of social conditions averaged sham<stimulation. C) simulation of the electrode montage

References:

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TRANSCRANIAL DIRECT CURRENT (tDCS) NEUROSTIMULATION FOR OLD AGE PEOPLE WITH DEPRESSION LIVING IN RESIDENTIAL CARE HOME: THE LIMONADE PROJECT

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In France, the prevalence of depression in the elderly living at home varies from 3.1 to 13.4%. In institutions, it increases considerably, from 22% in residential care home to 40% in long-term care units. Indeed, institutionalization is an important risk factor for APD, as is female gender, social isolation, bereavement, sleep disorders, disability, somatic illness or a history of depression.

Late-life depression is associated with a major functional impact, an alteration in quality of life and a significant risk of suicide. Often not identified, it can be insufficiently treated when it is diagnosed.