NO EVIDENCE FOR CHANGES IN PREFRONTAL AND TEMPORO-PARIETAL AREAS BY tDCS TREATMENT OF AUDITORY HALLUCINATIONS

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According to a prominent theory, transcranial direct current stimulation (tDCS) reduces auditory hallucinations in individuals with schizophrenia by inhibiting neural activity in hyperactive language areas in the temporo-parietal cortex (TPC), while simultaneously boosting neural activity in hypoactive attentional control areas in the dorsolateral prefrontal cortex (DLPFC). In a series of studies, we tested the effects of tDCS over TPC and DLPFC regions in healthy participants but also a small sample of patients with medication resistant, auditory-verbal hallucinations that received tDCS treatment. Anatomical, neurotransmitter, brain activity, and network connectivity changes in both patients and healthy individuals were examined.

The results revealed a small reduction of auditory hallucinations in patients as compared to sham with d=0.14 to 0.47, consistent with previous findings. However, tDCS did not lead to measurable effects in the neuroimaging data of the patients. In healthy participants, single session tDCS did not lead to robust changes in GABA, glutamate or in functional activity measures in the TPC or DLPFC. In line with previous reports, modelling of the tDCS electrical currents suggested that with the DLPFC/TPC montage that is used in most tDCS treatment studies, the activation is strongest in Broca's area, not the DLPFC or the TPC itself.

In conclusion, our findings call into question the currently leading theory behind tDCS treatment of AVH. New avenues, including Broca's area will be discussed.

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ACCELERATED ITBS rTMS PROTOCOL IN A CLINICAL ROUTINE SETTING: ONE YEAR EXPERIENCE

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Background: Williams reported results of Stanford Accelerated intelligent Neuromodulation Therapy: they found striking 78/90% remission rates from depression in severely treatment-resistant patients in a short 5-days duration of treatment (depending on the open label or sham-controlled, double blinded clinical trials). Neverthless, high-dose, accelerated and spaced protocol is challenging for implementation in clinical routine setting.

Method: We report here one year experience of 10 daily neuronavigated spaced rTMS sessions regimen (intermittent theta burst protocol of 1800 pulses at 90% motor threshold) for 5 consecutive days, MRI individually targeting of L-DLPFC (using Broadmann area 46) with 75 patients suffering from treatment-resistant depression, in our neuromodulation unit. Clinical screening included BDI, QIDS, SHAPS, STAI A, Pichot fatigue, EPWORTH, WEMWBS, PDQ-D and automated neurocognitive battery (CogniFit).

Results: no serious adverse effect were reported and all but 3 patients completed the protocol. Response and remission rate was of only 18/14% on QIDS-SR16 and 23/15% on BDI-SF 13 items.

We present the socio-demographic, big Five personality traits and clinical comorbidity profiles of our entire population along with individual Talairach coordinates and MRI results.

During an exploratory phase with the twenty first patients, we found a 94% improvement on cognitive flexibility score: we implement a more detailed neuropsychological testing for the 40 next ones, including Corsi test, facial emotions recognition task (TREF), switch task, N back task, sustain attention to response task (SART) and Trail Making Test A and B.

Conclusion: such a protocol is feasible and safe in a clinical routine setting. Cognitive improvement was more systematically present than symptoms reduction in a highly comorbid treatment-resistant cohort, especially for facial emotion recognition.

References:

1. *Cole EJ et al: Stanford Neuromodulation Therapy (SNT): a double-blinded randomized controlled trial. Am J Psychiatry 2022; 179:132-141*
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A CASE SERIES EXPLORING THE EFFECTS OF HIGH-FREQUENCY TRANSCRANIAL RANDOM NOISE STIMULATION IN PATIENTS WITH SCHIZOPHRENIA

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Background: One out of three patients with schizophrenia experiences symptoms which are refractory to conventional antipsychotic treatments. In such cases, transcranial direct current stimulation, a non-invasive brain stimulation technique, has been proposed as a novel therapeutic approach and has showed promising beneficial effects for reducing symptoms of schizophrenia, namely auditory hallucinations and negative symptoms. However, the high variability observed in clinical response leaves much room for optimizing stimulation parameters and strengthen its benefits. We propose to investigate the effects of high frequency transcranial random noise stimulation (hf-tRNS), which is supposed to induced larger effects than conventional direct current stimulation. Here, we present an initial case series of patients with schizophrenia who underwent hf-tRNS with the anode placed over the left dorsolateral prefrontal cortex and the cathode over the left temporoparietal junction.

Methods: Seven patients with schizophrenia according to DSM5 criteria (4 females, 3 males) presenting persistent symptoms received 10 sessions (2 sessions per day over 5 consecutive days) of 20 minutes hf-tRNS (2 mA, 100-500 Hz, 1 mA offset). Each patient underwent assessments of schizophrenia symptoms with the Positive and Negative Syndrome Scale (PANSS) and auditory hallucinations with the Auditory Hallucination Rating Scale (AHRS) at baseline and within 3 days after the final hf-tRNS session.

Results: Patients showed a significant mean reduction of total PANSS scores (-16 ± standard deviation 18%, p=0.039), mainly driven by a reduction in positive symptoms (-12±5%, p=0.002). Furthermore, they showed a significant reduction of auditory hallucinations (-33±24%, p=0.019).

Conclusions: The current case series suggests that hf-tRNS merits further investigation in the treatment of schizophrenia symptoms. However, additional work should investigate how some participant characteristics may affect outcome and therefore explain the observed variability in clinical response.

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