Methods: Five French centers provided data on patients treated with TMS for resistant depression between January 2015 and December 2020. We included patients who were assessed by a hetero-questionnaire and had a baseline and immediate posttreatment assessment. We performed univariate analyses to investigate which factors were significantly associated with the efficacy of TMS. Next, we included age, sex, and significant factors in a multivariate model.

Results: 435 patients were included; 66% of individuals with depression were female and 26% had bipolar depression. Stimulation was delivered with four different stimulation parameters: 1Hz (7% of individuals), 10Hz (43%), 50Hz (38%), and 20Hz (12%). TMS resulted in a significant decrease in MADRS (Delta=9.47 (8.73, MW Stat. 150319.5, p<0.001) with a large effect size (CLES=0.79). The mean improvement was 33% (SD=31%). Response and remission rates were 31% and 23%, respectively. In multivariate analysis, improvement in depressive symptoms was associated with higher baseline symptoms.

Conclusion: TMS is effective in routine clinical practice. Response prediction and personalized targeting could improve its effectiveness.

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BRAIN PERFUSION ALTERATIONS INDUCED BY STANDALONE AND COMBINED TRANSCRANIAL STIMULATION OVER THE PREFRONTAL CORTEX: A RANDOMIZED, PLACEBO-CONTROLLED STUDY, USING 99mTc SPECT

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Background: Non-invasive brain stimulation (NIBS) approaches have been increasingly used to target the prefrontal cortex (PFC), with mixed results in the fields of cognitive and behavioral neuroscience. Recent studies suggest that the combination of distinct NIBS techniques may maximize required changes in brain activity. However, it is unclear whether NIBS combinations could also enhance prefrontal cortical activity and its neurocircuitry.

To evaluate the application of standalone and combined protocols of transcranial direct current stimulation (tDCS) and intermittent theta-burst stimulation (iTBS) over the left dorsolateral PFC (DLPFC) of healthy volunteers through Single Photon Emission Computed Tomography (SPECT) neuroimaging.

Methods: A randomized, double-blind, sham-controlled, full-factorial design was conducted. Participants received four different stimulation protocols (tDCS, iTBS, Combined Interventions and Placebo), one per week, over the DLPFC located by structural neuronavigation. TDCS was applied with a current of 2mA for 20 minutes and iTBS with 1620 pulses for 9 minutes. A radiopharmaceutical (99mTc-ECD) was administered immediately after the start of the iTBS protocol. An adverse effects scale was applied after the end of the neurostimulation session and the SPECT was collected afterwards.

Results: Twenty-five adults with a mean age of 28.6 years (standard deviation (SD) = 7) were included. Of those, 23 underwent 4 sessions while 2 underwent only the first neurostimulation session. The first findings of the neuroimaging data analyses show that the combined intervention significantly modulated deeper regions from the PFC, such as the left anterior (*p=0.03*) and the right posterior cingulate cortex (*p=0.02*), while the tDCS protocol increased the blood flow of the orbitofrontal right (*p=0.04*) and left (*p=0.02*) cortices in comparison with the placebo protocol. iTBS alone did not show significant results compared to placebo. However, those are preliminary findings and will be further explored to be presented at the conference. Finally, all active protocols were similarly tolerable.

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EFFECTS OF COGNITIVE TRAINING AND TRANSCRANIAL DIRECT CURRENT STIMULATION ON WORKING MEMORY OF PATIENTS WITH TREATMENT-RESISTANT SCHIZOPHRENIA: A DOUBLE BLIND, RANDOMIZED, SHAM-CONTROLLED STUDY PROTOCOL

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Background: Working memory (WM) impairment is often found in patients with treatment-resistant (TR) schizophrenia and substantially affects their social functioning and quality of life (de Bartolomeis et al. 2013). Dorsolateral Prefrontal Cortex (DLPFC) embodies computational mechanisms for monitoring and manipulating items in WM. Transcranial direct current stimulation (t-DCS) is a noninvasive brain stimulation technique inducing small changes in membrane potentials that in turn influence the frequency of spike timing and modify net cortical excitability. Recent studies demonstrate that t-DCS on DLPFC in combination with Cognitive Training (CT) can improve working memory in healthy subjects and clinical population. Patients with TR schizophrenia have more robust cognitive impairment than non-TR subjects across several domains like selective attention, cognitive flexibility, processing speed, executive functions, verbal fluency (Frydecka et al. 2016).

Methods:

- Twenty patients with TR schizophrenia will be randomly assigned to receive one session of either active or sham tDCS (2 mA for 20 minutes, anode in F3, cathode in F4) in combination with cognitive training using the Sternberg's task. After two weeks, patients who received the active stimulation will undergo sham stimulation and the viceversa.
- All participants will be assessed with PANSS (Positive and Negative Syndrome Scale), MINI (Mini-International Neuropsychiatric Interview), and SCID-5 (Structured Clinical Interview for DSM V) at the beginning of the study.
- Before and after each stimulation, BACS (Brief Assessment Cognitive Schizophrenia), DSST (Digit Symbol Substitution Test), and N-BACK will be administered to evaluate WM functions.
- Patients with active implantable devices (e.g. pacemaker, intracranial electrodes, implantable defibrillator, cochlear implant), neurological disorders, and drug abuse in the previous six months will be excluded.
- Throughout the duration of the study, the pharmacological treatment will not be modified and will be the same of the previous two months.

Conslusion: This is the first study aiming to assess the potential role of combining t-DCS and CT for improving WM performance in patients with TR schizophrenia.

References:

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