redness relative to the sham group, though moderate-severe ratings were endorsed in only 2.9% and 0.4% of the sessions, respectively. Relative to those receiving 2mA, participants receiving higher intensities of active stimulation experienced skin redness more frequently, whereas the 2mA reported higher frequencies of itching and scalp pain. A burning sensation was endorsed at equal rates between these groups; however, the higher intensity active group reported it as moderate or severe more frequently than the 2mA active group. Despite these minor differences, most side effects following 3mA+ were reported at low frequencies and were typically mild when endorsed.
Conclusions: Our findings demonstrate that HD-tDCS is well-tolerated for total amplitudes up to 10mA in older adults with little tangible difference in the reported experience relative to sham. Findings support the use of higher HD-tDCS amplitudes, at least when key methodological procedures are followed.

Categories: Neurostimulation/Neuromodulation
Keyword 1: neurostimulation
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67 Blinding and Double-Blinding of HD-tDCS in Double-Blind, Randomized Controlled Trials

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Objective: High-definition transcranial direct current stimulation (HD-tDCS) is a non-invasive brain stimulation technique shown to modulate neuronal networks. In order for HD-tDCS to be used in randomized, placebo-controlled clinical trials, it is critical to have methods that enable blinding. Some research has shown that sham stimulation is an effective blind in tDCS. However, few studies have investigated the double-blinding of HD-tDCS, especially at intensities greater than 2mA. We address this knowledge gap by examining the blinding and double-blinding of HD-tDCS among a mixed neurologic sample of older adults.
Participants and Methods: A sample of 240 older adults (M_{age} = 72.21±8.94) with various clinical diagnoses (Normal Cognition = 34, Amnestic MCI [aMCI] = 172, Dementia-Alzheimer's Type [DAT] = 27, Other = 7) were recruited through five double-blind, randomized controlled trials. All participants were stimulation naïve at their first session and received one to thirty sessions of 20- or 30-minutes of active (n=1472) or sham (n=681) stimulation at total amplitudes of 2mA, 4mA, or 6mA. At the start of each stimulation session, a study team member entered a code into the tDCS unit, and the electrical current was gradually ramped up to the specified (blinded) amplitude over a period of 30 seconds. The current remained at this level for the specified amount of time in the active condition (e.g., 20-minutes) but was ramped down over the next 30 seconds for those in the sham condition. This ramp up/down process was repeated in the final minute (e.g., 20th minute) in the sham session to provide both primacy and recency effects. After each active or sham session, participants were asked whether they received 'real' or sham stimulation. One study also asked a study team member if they believed the participant received real or sham stimulation at two primary outcome endpoints.
Results: We used Fisher's Exact tests to evaluate the efficacy of our blinding and double-blinding procedures. In stimulation naïve participants receiving their first session, there were no differences in accuracy, suggesting adequate blinding. We also examined participant blinding across all sessions to determine whether repeated HD-tDCS exposure might impact blinding. Across all sessions, participants in the sham condition were more likely to endorse being in the 'real' (active) condition, again suggesting adequate blinding. There were no significant group differences for active versus sham in the frequency of the study team correctly stating the participant's condition, suggesting sufficient double-blinding. No significant differences were found in study team blinding when data from the 2mA versus 4mA to 6mA were analyzed separately.

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Conclusions: These results suggest that the HD-tDCS sham method is an effective blind and double-blind for HD-tDCS in clinical trials, even at total amplitudes as high as 6mA.

Categories: Neurostimulation/Neuromodulation
Keyword 1: neurostimulation
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68 Preliminary Evidence of a Therapeutic Effect of Electrical Neuromodulation on Cognitive Deficits in Patients with Mild Cognitive Impairment

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Objective: Episodic memory functioning is distributed across two brain circuits, one of which courses through the dorsal anterior cingulate cortex (dACC). Thus, delivering non-invasive neuromodulation technology to the dACC may improve episodic memory functioning in patients with memory problems such as in amnestic mild cognitive impairment (aMCI). This preliminary study is a randomized, double-blinded, sham-controlled clinical trial to examine if high definition transcranial direct current stimulation (HD-tDCS) can be a viable treatment in aMCI.
Participants and Methods: Participants and Methods: Eleven aMCI participants, of whom 9 had multidomain deficits, were randomized to receive 1 mA HD-tDCS (N=7) or sham (N=4) stimulation. HD-tDCS was applied over ten 20-minute sessions targeting the dACC. Neuropsychological measures of episodic memory, verbal fluency, and executive function were completed at baseline and after the last HD-tDCS session. Changes in composite scores for memory and language/executive function tests were compared between groups (one-tailed t-tests with α = 0.10 for significance). Clinically significant change, defined as > 1 SD improvement on at least one test in the memory and non-memory domains, was compared between active and sham stimulation based on the frequency of participants in each.
Results: No statistical or clinically significant change (N-1 X^2; p = 0.62) was seen in episodic memory for the active HD-tDCS (M_{Diff} = 4.4; SD = 17.1) or sham groups (M_{Diff} = -0.5; SD = 9.7). However, the language and executive function composite showed statistically significant improvement (p = 0.04; MDiff = -15.3; SD = 18.4) for the active HD-tDCS group only (Sham M_{Diff} = -5.8; SD = 10.7). Multiple participants (N=4) in the active group had clinically significant enhancement in language and executive functioning tests, while nobody in the sham group did (p = 0.04).
Conclusions: HD-tDCS targeting the dACC had no direct benefit for episodic memory deficits in aMCI based on preliminary findings for this ongoing clinical trial. However, significant improvement in language and executive function skills occurred in response to HD-tDCS, suggesting HD-tDCS in this configuration has promising potential as an intervention for language and executive function deficits in MCI.

Categories: Neurostimulation/Neuromodulation
Keyword 1: treatment outcome
Keyword 2: technology
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69 Transcranial Random Noise Stimulation Facilitates Phonemic Verbal Fluency and Convergent Thinking in Multilingual Healthy Adults.

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Objective: The aim of the present study was to analyse the effects of the transcranial random noise stimulation (tRNS) technique when placed

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