

Neuromodulation as an emerging intervention technique in aging and stroke

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Aims: Brain neuromodulation has increasingly become an alternative treatment for the most varied neurological and psychiatric pathologies, with promising results in terms of its efficacy and safety. The increasing use of neuromodulation in research and for therapeutic purposes is based on the growing evidence, which indicates that, in addition to altering neuronal activity, neuromodulation results also produce persistent changes in connectivity, induce changes in neuroplasticity and, therefore, can be used to try to reverse maladaptive brain neuroplasticity changes, to prevent the development of maladaptive changes, or to improve adaptive neuroplasticity changes that occur in the brain. Consequently, there has been an increase in the number of studies using non-invasive brain neuromodulation in aging, especially in

dementia, but also in stroke, since the effectiveness of current treatments still has major limitations. This symposium intends to present some of these studies that are being developed in Portugal and Spain.

Method: Transcranial magnetic stimulation (TMS), transcranial direct current stimulation (tDCS) and transcranial alternating current stimulation (tACS)

Results: All studies presented reveal statistically significant results following the use of proposed neuromodulation techniques.

Conclusions: These results reinforce and contribute to the increase of scientific evidence regarding the efficacy and safety of using neuromodulation techniques in aging and stroke. More research is still needed, but these results are encouraging.

Efficacy and safety of TMS and tDCS in memory deficits of Alzheimer's disease

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Aims: Transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS) are promising non-pharmacological therapeutic options for Alzheimer's Disease (AD). The aim of this meta-analysis is to assess which intervention (i.e., TMS or tDCS) is more effective for memory losses in people with AD. As secondary outcome, safety will be addressed.

Method: Studies were screened independently by two authors to identify studies that met the inclusion criteria. Random effect models were done for tDCS and TMS studies considering the standardized mean difference (i.e., Hedges' g) with 95% confidence intervals (CIs) between active and sham stimulations. The heterogeneity was assessed using heterogeneity test and the I^2 index for both analysis.

Results: A total of 19 studies were included in the meta-analysis, with a total of 514 participants. The results suggest positive effects for tDCS (SMD = 0.16, $p = 0.041$, 95% CI = 0.01, 0.30, $I^2 = 0\%$), and for TMS (SMD = 0.41, $p < .001$, 95% CI = .26 to 0.56, $I^2 = 29.3\%$), in terms of memory losses in people with AD. Two studies reported transient adverse effects such as, painful scalp sensations, eyelid twitches, tinnitus, sleep problems and headache. All the events were tolerable, and all diminished gradually after treatment cessation.

Conclusions: Both interventions yield a positive effect on memory symptoms in people with DA. As expected, no serious adverse events were found for any of the interventions. These results highlight the usefulness and safety profile of these interventions in people with AD.