E-Poster

EP-164

Acoustic-Magnetic PAS for Modulating Cortical Reticular Spinal Tract Function: A Step Towards Clinical Applications in Stroke Recovery

Topic: Neurostimulation (rTMS, tDCS, etc.)

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BACKGROUND

Loud auditory stimuli (LAS) engage the reticulospinal tract (RST) to elicit startle reflexes, a pathway distinct from canonical auditory-motor processing. While acoustic startle priming (ASP) enhances RST-mediated muscle output, its transient effects limit clinical utility. Acoustic-magnetic paired associative stimulation (AM-PAS) has emerged as a promising approach to induce long-term potentiation (LTP) in motor pathways. This study aims to optimize AM-PAS parameters and evaluate its neuromodulatory effects on the cortical reticular spinal tract (CRST).

METHODS

Twenty right-handed healthy adults participated in the study. The optimal AM-PAS parameters were identified: 0.1 Hz frequency, 100 stimuli, 120 dB/50 ms sound, TMS at 120% resting motor threshold, with a 100 ms sound-TMS interval. Motor-evoked potentials (MEPs) were measured at baseline and post-intervention at 10, 15, and 20 minutes. Functional near-infrared spectroscopy (fNIRS) was used to assess brain functional connectivity.

RESULTS

AM-PAS induced significant increases in MEP amplitudes at 10, 15, and 20 minutes post-intervention ($p = 0.031$, $p<0.001$, $p<0.001$), indicating short-term t-LTP. Functional near-infrared spectroscopy analysis revealed a significant decrease in functional connectivity ($p<0.05$) from the left CRST to the cerebral cortex, confirming the modulation of subcortical motor pathways.

CONCLUSION

AM-PAS is a potent neuromodulatory tool that induces CRST plasticity, offering a non-invasive strategy for motor rehabilitation. Future studies will investigate its clinical application and biphasic effects.

Statement of Disclosures

None

Doi: 10.5606/archisprm.2026.EP-164

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