

Woodcock Research Grant Final Report

Project title: Role of Cerebellum and Motor Cortex in Balance and Cognition in Chronic Stroke: A Repetitive Transcranial Magnetic Stimulation (rTMS) Study.

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The award started in May 2022, IRB approval for this study was received in Jan 2022

Project progress: After receiving the grant, we have completed testing of 14 participants after grant approval (total of 19 out of 20 for this study). The study was closed due to co-PI graduating from PhD program. We were unable to complete data collection for 1 participant.

Preliminary results: Data analysis performed for 19 participants. A single session of stand-alone repetitive transcranial magnetic stimulation (rTMS) was effective in improving balance performance in individuals with chronic stroke. Stimulating the primary motor cortex (M1) was effective in improving anticipatory balance control as indexed by Limits of Stability (LOS) test overall sway angle. On the mCTSIB test, M1 rTMS also improved static standing balance when vision was compromised, but proprioception was available (eyes closed, firm surface). Cerebellar rTMS was effective in improving static standing balance under the most sensory deprived condition i.e., when both vision and proprioceptive input was unavailable (eyes closed, foam surface). Cerebellar rTMS significantly improved cognition assessed using the cerebellar cognitive assessment scale (CCAS) as compared to M1 rTMS.

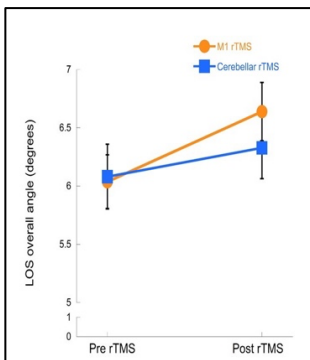


Fig 1. LOS overall sway angle

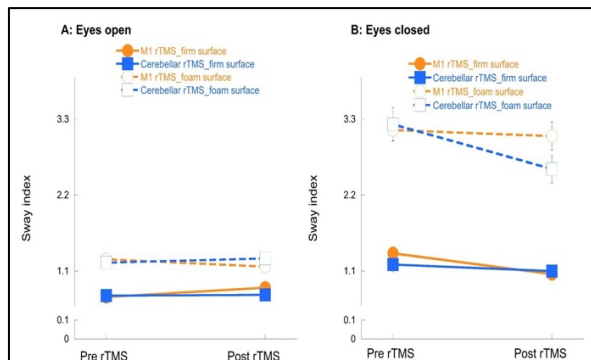


Fig 2. Modified Clinical Test of Sensory Interaction of Balance (mCTSIB) sway index

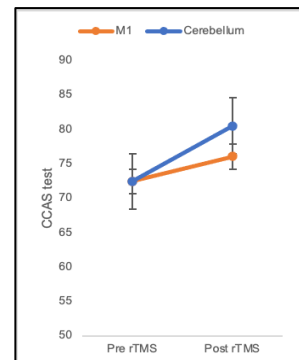


Fig 3. Cognitive assessment scale

The above findings support our hypothesis that rTMS applied to M1 improves anticipatory balance whereas cerebellar rTMS improves reactive balance in most sensory deprived condition. These findings were presented at the APTA national conference in February 2023 and at the ASNR conference in March 2023. We plan to submit a manuscript by Fall 2023.

Budgetary expenditure: As of May 31, 2023, the total expenditure is \$13088.17. (87% of the award) including PI's salary, supplies and participant's incentive. The remaining balance \$1793.83 including PI salary (\$1693.83) and participant incentive (\$100) will be returned and remain unused.