How to determine which TMS approach to use for supporting recovery of motor deficits after stroke: how the presence versus absence of initial motor response may guide optimal protocol selection

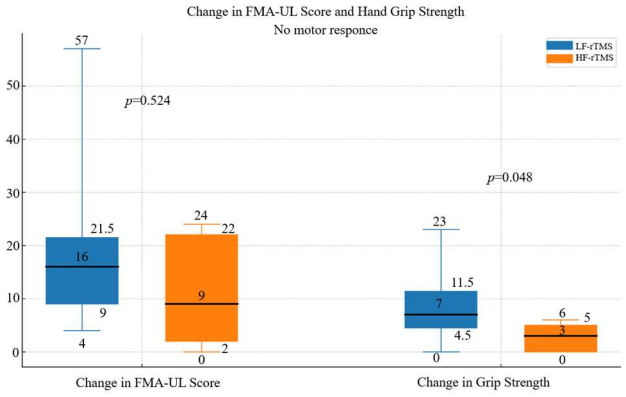
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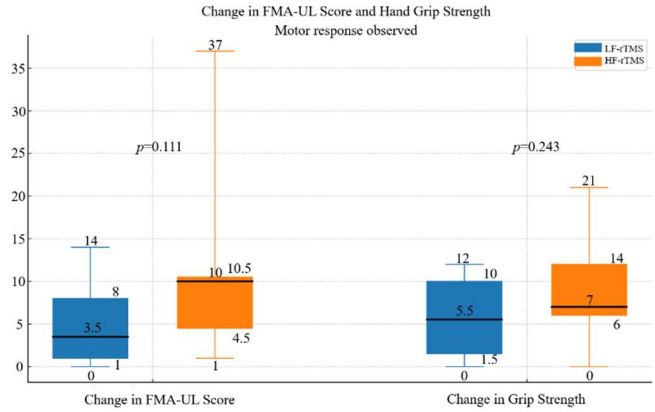
Background: Repetitive transcranial magnetic stimulation (rTMS) is widely used to enhance motor recovery after stroke; however, the optimal protocol remains unclear. Some studies report good results when inhibiting the contralesional hemisphere with low-frequency (LF-rTMS), whereas other studies propose to use excitatory stimulation using high-frequency rTMS (HF-rTMS) targeting the ipsilesional hemisphere. We here propose that the absence versus presence of an initial TMS-induced motor response in the affected pathways may help decide which of these 2 approaches is more effective.

Methods: Thirty-seven individuals who had experienced a first-time ischemic stroke were enrolled and randomly assigned to either LF-rTMS (1 Hz) or HF-rTMS (10 Hz) groups. In the LF-rTMS group, an figure-of-8 coil was placed over the primary motor cortex (M1) of the contralesional hemisphere, while in the HF-rTMS group, the coil was positioned over M1 of the ipsilesional hemisphere. Both groups received ten rTMS sessions over two weeks. Hand grip strength and Fugl-Meyer Assessment for Upper Extremity (FMA-UE) were measured at baseline and after seven weeks of rehabilitation. Results were compared dependent on the presence or absence of a motor response during the first rTMS session.

Results: Among participants without an initial motor response, the LF-rTMS group showed significantly greater improvements in hand grip strength of the affected arm compared to the HF-rTMS group (p=0.048). No significant difference was observed in FMA-UE scores between groups (p=0.524). For participants with a motor response to TMS and a determined resting motor threshold, hand grip strength (p=0.243) and FMA-UE (p=0.111) improved equally in both groups.

Conclusion: LF-rTMS may potentially offer greater benefits for upper extremity motor function recovery in stroke patients who do not exhibit a motor response to TMS during initial sessions.





Keywords: repetitive transcranial magnetic stimulation, stroke rehabilitation, neurorehabilitation, neuromodulation