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Neuroplasticity in post-stroke rehabilitation: Role of transcranial magnetic stimulation (tms) in motor recovery

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Background : Stroke is a leading cause of adult disability globally, with many survivors experiencing persistent motor deficits. Recent research highlights the role of neuroplasticity—the brain's ability to reorganize itself—in functional recovery post-stroke. Transcranial Magnetic Stimulation (TMS) has emerged as a promising non-invasive neuromodulation tool to enhance neuroplastic changes in the motor cortex.

Objective : This study aims to evaluate the efficacy of repetitive TMS (rTMS) in promoting motor recovery among subacute ischemic stroke patients undergoing rehabilitation.

Methodology : A total of 40 patients diagnosed with subacute ischemic stroke were randomized into two groups: one receiving rTMS combined with standard physiotherapy, and the other receiving sham stimulation with physiotherapy. High-frequency rTMS (10 Hz) was applied to the ipsilesional motor cortex for 10 consecutive sessions. Functional motor improvement was assessed using the Fugl-Meyer Assessment (FMA) and Motor Activity Log (MAL) at baseline, post-intervention, and at 3-month follow-up.

Results : Patients who received rTMS showed significantly greater improvements in FMA and MAL scores compared to the control group ($p < 0.01$). Improvements were sustained at the 3-month follow-up, suggesting lasting neuroplastic effects. No serious adverse events were reported.

Conclusion : rTMS is a safe and effective adjunctive therapy to enhance motor recovery in subacute stroke patients. By promoting cortical reorganization, TMS could play a vital role in neurorehabilitation protocols, warranting its integration into clinical practice for stroke recovery.

Biography

Lukas Steiner is a clinical neurologist and researcher based at the Medical University of Vienna, Austria. He earned his MD and later specialized in neurorehabilitation and non-invasive brain stimulation techniques. Dr. Steiner's research focuses on post-stroke neuroplasticity and innovative rehabilitation strategies, including TMS and neurofeedback. He has co-authored over 25 publications in international neurology journals and is involved in several EU-funded projects on neurotechnology in rehabilitation. Passionate about translational medicine, Dr. Steiner works closely with interdisciplinary teams to bring neuroscience research from bench to bedside.

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