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Abstract

Aphasia, a language impairment resulting from stroke or neurodegenerative disease, presents complex rehabilitation challenges. Recently, neuromodulation techniques such as transcranial direct current stimulation (tDCS), transcranial magnetic stimulation (TMS), and mirror neuron system (MNS) therapy have emerged as promising adjuncts to traditional speech-language therapy. This narrative review summarizes current advances in these 3 modalities. tDCS involves low-intensity electrical stimulation to modulate cortical excitability, with evidence supporting its use in post-stroke aphasia (PSA) and primary progressive aphasia (PPA). TMS, a magnetic stimulation technique, provides more precise cortical targeting through low- or high-frequency protocols and emerging paradigms such as intermittent theta-burst stimulation (iTBS). MNS therapy employs behavioral strategies like action observation and imitation to enhance motor-language pathways. The review also discusses the neural mechanisms underlying aphasia recovery, such as cortical reorganization and interhemispheric compensation, and examines the role of advanced tools such as functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI) in guiding personalized treatment. Future directions include closed-loop stimulation, multimodal integration, and individualized protocols. This article aims to review recent developments in neuromodulation techniques for rehabilitating patients with aphasia, including transcranial direct current stimulation, transcranial magnetic stimulation, and mirror neuron system therapy.