

Augmenting the Behavioral and Neurophysiological Effects of Voice Treatment by Adjuvant Transcranial Magnetic Stimulation

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Abstract

We investigated ways to accelerate the effects of voice treatment while maintaining and/or enhancing the duration of its therapeutic effects. We tested the efficacy of 5 Hz TMS as a treatment adjuvant to LSVT LOUD®. We randomized 15 patients with PD hypophonia into groups receiving LSVT only (sham TMS), or LSVT with TMS applied to left or right primary laryngeal motor cortex (LTMS, RTMS respectively). Participants underwent TMS and voice treatment 4 days a week for 4 weeks. TMS was delivered using neuro-navigation at M1_{larynx}. Voice and speech data were collected twice a week. We examined the changes in rate of skill learning, vocal intensity, and blood oxygenation level dependent signal (BOLD) in the speech motor network following treatment and at 3-month follow-up in the three groups. Across groups there was significant improvement in voice intensity. The LTMS group had the steepest increase in voice intensity. On fMRI, Left TMS also had the strongest activations in the auditory cortex, putamen and amygdala. Results are consistent with the hypothesis that adjuvant TMS accelerates learning and improves retention of gains. Behavioral and imaging results also support the hypothesis that TMS reinforces the effect of LSVT by inducing a network wide activity increase.