

CORRELATION BETWEEN IPSILATERAL AND CONTRALATERAL LIMB EMG IN ABLE SUBJECTS

W. BESIO¹, S. GANGADHAR¹ AND K.C. CHELETTE¹

¹Louisiana Tech University, Biomedical Engineering, Ruston, LA

Researchers have obtained positive results with chronic stroke subjects using patterned electrical stimulation on agonist and antagonist muscles. Our study is one step towards developing an advanced method to automatically generate patterned electrical stimulation for stroke rehabilitation.

Five aged and four young subjects with no history of stroke participated in the study. The subjects rocked a footplate for 30 seconds while EMG was recorded from the contralateral and ipsilateral Tibialis Anterior (TA) and Gastrocnemius (GS) muscles. Four channels of EMG were bandpass filtered (1-250Hz, 3dB/dec), sampled (1000S/S), rectified, integrated (30ms) and smoothed (3pt avg). The processed EMG was analyzed during the plantarflexion and dorsiflexion phases to determine if there was a correlation: (1) between EMG from the contralateral and ipsilateral TA muscles, (2) between EMG from the contralateral and ipsilateral GS muscles.

The mean average correlation coefficients for aged subjects were 0.879 and 0.875, with SD of 0.074 and 0.102 for plantarflexion and dorsiflexion, respectively. For young subjects, the mean average coefficients were 0.889 and 0.915, with SD of 0.058 and 0.044. The result indicates strong synergistic coactivation between contralateral and ipsilateral TA/GS muscles during the motion. This synergy makes it feasible for us to apply electrical stimulation on an affected limb to match the EMG pattern of an unaffected limb. This patterned stimulation will send coordinated afferent signals to the brain, which we hope will provoke lasting positive effects.