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Whole-hand electrical stimulation in stroke patients in the subacute stage

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Background and aims: This study examines the effect of whole-hand electrical stimulation on motor recovery in stroke patients at subacute stage. Peripheral electrical stimulation has been proved to modulate cortical plasticity in healthy and in patients. Such neuromodulatory effects have been found after application of electrical hand mesh-glove stimulation (MGS) in our previous studies on healthy subjects.

Methods: 20 patients with cortico-subcortical ischemic stroke and predominantly motor hemiparesis of the upper extremity were recruited. MGS was applied on the paretic hand 60 min per day for 3 weeks before standard rehabilitation training. Hand motor and sensory functions were evaluated with Wolf Motor Function test, Fugl-Meyer Assessment score, Nine hole peg test, and Semmes-Weinstein monofilaments. Single and paired-pulse transcranial magnetic stimulation (TMS) was applied to follow corticospinal excitability changes over the treatment period. Functional magnetic resonance imaging (fMRI) was conducted to assess the cortical brain reorganization changes after treatment. Effects of MGS were compared to control group receiving sham stimulation.

Results: Patients from both groups showed significant functional improvement as assessed with the motor functional tests. However the improvement degree for the MGS group was increased compared to the control group. These functional effects correlated with neuroplastic changes within the sensorimotor area as revealed by TMS and fMRI.

Conclusion: Electrical stimulation applied before physiotherapeutic training raises motor cortical excitability in the lesioned cortex so that subsequent training becomes more effective. The obtained results provide better understanding of the modulation of central motor controlling structures by somatosensory stimulation in correlation with the functional motor recovery.

Disclosure: Nothing to disclose

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