
The Role of Electrical Stimulation in the Treatment of Persons with Central Nervous System Lesion

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Résumé

Electrical stimulation is a powerful tool for the replacement of missing neural signals to muscles. The best known electrical stimulation system controls the heart muscle (pace-maker, implantable cardioverter). The other popular electrical stimulation systems provide the hearing to deaf (cochlear prosthesis), provide visual perception (retinal prosthesis), minimize motor disability in persons with Parkinsonism (deep brain stimulation - DBS), assist breathing (phrenic nerve stimulation), decrease the pain (epidural stimulation of the spinal cord), etc. Electrical stimulation is today often used to control skeletal muscles (drop foot correction in hemiplegic patients, enhancement of the standing and bipedal locomotion as well as the grasping and manipulation in persons with brain and spinal cord lesion, cyclic exercise allowing the biking, etc.). The message to be delivered is that integration of electrical stimulation into the intensive practice of functional movements has noticeable positive effects on the overall health and psychological status of a person with the central nervous system lesion and that in many cases the carryover effects are substantial. The message is that the therapeutic effects can be optimized if the treatment starts in the acute, rather than in the chronic phase of the disability and when the procedure is customized to the specific needs of the user. These messages follow the neuroscience findings that motor re-learning (a set of processes associated with practice or experience) is responsible for the improved and extended use of preserved sensory-motor mechanisms after the lesion.

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