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Benefits of Electrical Stimulation Therapy Found With People Paralyzed by Spinal Cord Injury

A new treatment approach which uses tiny bursts of electricity to reawaken paralyzed muscles "significantly" reduced disability and improved grasping ability in people with incomplete spinal cord injuries, according to results published February 17.

In a study posted online in the journal *Neurorehabilitation and Neural Repair*, Toronto researchers report that functional electrical stimulation (FES) first-of-its-kind study shows benefits of electrical stimulation therapy for people paralyzed by spinal cord injury) therapy worked considerably better than conventional occupational therapy alone to increase patients' ability to pick up and hold objects.

FES therapy uses low-intensity electrical pulses generated by a pocket-sized electric stimulator. Unlike permanent FES systems, the one designed by Dr. Popovic and colleagues is for short-term treatment. The therapist uses the stimulator to make muscles move in a patient's limb. The idea is that after many repetitions, the nervous system can 'relearn' the motion and eventually activate the muscles on its own, without the device.

The randomized trial, believed to be the first of its kind, involved 21 rehabilitation inpatients who could not grasp objects or perform many activities of daily living. All received conventional occupational therapy five days per week for eight weeks. However, one group (9 people) also received an hour of stimulation therapy daily, while another group (12 people) had an additional hour of conventional occupational therapy only.

Patients who received only occupational therapy saw a "gentle improvement" in their grasping ability, but the level of improvement achieved with stimulation therapy was at least three times greater using the Spinal Cord Independence Measure, which evaluates degree of disability in patients with spinal cord injury.

Based on their findings, the study's authors recommend that

stimulation therapy should be part of the therapeutic process for people with incomplete spinal cord injuries whose hand function is impaired.

Dr. Popovic's team has almost completed a prototype of their stimulator, but need financial support to take it forward. Dr. Popovic thinks the device could be available to hospitals within a year of being funded. One limitation of the study is that the research team could not get all participants to take part in a six-month follow-up assessment. However, six individuals who received FES therapy were assessed six months after the study. All had better hand function after six months than on the day they were discharged from the study.

Dr. Popovic stresses that FES therapy should augment, and not replace, existing occupational therapy. Another study, now underway, will determine whether stimulation therapy can improve grasping ability in people with chronic (long-term) incomplete spinal cord injuries.

"This study proves that by stimulating peripheral nerves and muscles, you can actually 'retrain' the brain," says the study's lead author, Dr. Milos R. Popovic, a Senior Scientist at Toronto Rehab and head of the Rehabilitation Engineering Laboratory. "A few years ago, we did not believe this was possible."

Source: M. R. Popovic, N. Kapadia, V. Zivanovic, J. C. Furlan, B. C. Craven, C. McGillivray. Functional Electrical Stimulation Therapy of Voluntary Grasping Versus Only Conventional Rehabilitation for Patients With Subacute Incomplete Tetraplegia: A Randomized Clinical Trial. *Neurorehabilitation and Neural Repair*, 2011; DOI: 10.1177/1545968310392924