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Repeated stimulation treatment can restore movement to paralyzed muscles

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Conducted at the BioMag laboratory at the Helsinki University Hospital, a new patient study could open a new opportunity to rehabilitate patients with spinal cord damage.

Dr Anastasia Shulga, a medical doctor specialising in neurology, led a study in which two patients with spinal cord injuries received a form of treatment that combined transcranial magnetic stimulation with simultaneous peripheral nerve stimulation given repeatedly for nearly six months. This was the first time that attempts were made to rehabilitate patients paralysed as a result of a spinal cord injury through long-term stimulation treatment of this type.

Both patients who participated in the study had spinal cord injuries caused by trauma. One patient was paraplegic, paralysed from the knees down, and the other was tetraplegic, with some voluntary movement of the hands but no capacity to grasp. Both patients had been injured more than two years ago and had received conventional rehabilitation treatments throughout their recovery, and continued to do so during the stimulation treatment.

After approximately six months of the stimulation treatment, the paraplegic patient could bend both ankles, and the tetraplegic could grasp an object.

"We observed strengthened neural connections and partial restoration of movement to muscles which the patients were previously entirely unable

to use," explains Dr. Shulga.

The movement restored during the treatment was still present a month after the stimulation treatment had ended. One of the patients is participating in a further study in which stimulation is given more extensively and for an even longer period.

Dr. Jyrki Mäkelä, head of the BioMag laboratory, points out that rehabilitation of patients with chronic spinal cord injuries is highly challenging, and new treatment methods are sorely needed:

"This is a case study with two patients only, but we think the results are promising. Further study is needed to confirm whether long-term paired associative stimulation can be used in rehabilitation after spinal cord injury by itself and, possibly, in combination with other therapeutic strategies."

More information: Anastasia Shulga, Pantelis Lioumis, Aleksandra Zubareva, Nina Brandstack, Linda Kuusela, Erika Kirveskari, Sarianna Savolainen, Aarne Ylinen, and Jyrki P. Mäkelä. Long-term paired associative stimulation can restore voluntary control over paralyzed muscles in incomplete chronic spinal cord injury patient. *Spinal Cord Series and Cases*. 14 July, 2016.

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