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After Spinal-Cord Stimulation, Can Paralyzed People Walk Again?

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Editorial

It's a remarkable advancement that could affect hundreds of thousands of people all over the world. It's also the culmination of decades of multidisciplinary study that has slowly established an evidence base in animal studies - with the scientists involved often facing scrutiny for doing so - and carefully transferred that work into the clinic. Researchers have been working on a variety of ways to heal and reactivate the spinal cord following an injury for a long time. Many methods are highly successful in regenerating and restoring function in mice and other animals, but they do not apply to human treatments.

The researchers applied patterns of stimulation determined to stimulate the correct groups of leg muscles at the correct time during stepping, rather than providing a steady electric current, as had been tried previously. Specific areas of the spinal cord could be targeted in this way, allowing the muscles to be activated in a synchronised manner. When the electrical stimulation was switched off, this patterned stimulation protocol not only enabled the individuals to regain control of previously paralysed muscles, but it also allowed them to walk again. This suggests that functional relations between the brain and spinal cord have been re-established, showing an unexpected level of plasticity. The prognosis for what was once thought to be an irreversible disease appears to be far brighter in light of such development. However, there is still much more work to be done. The position, severity, and outcome of spinal injuries differ greatly, and further research is required to decide who will benefit from this technology.

The current research is a proof of concept in a small group of challenge. One source of variability, for example, may be the people who had a range of residual leg function when they started. Understanding what defines good healing is a big amount of sensory input that the weakened spinal cord can still send to the brain. The same team reveals in a similar study published this week in Nature Neuroscience that constant stimulation (which is enough to restore locomotion in rodents) is less successful in humans because it interferes with sensory input about an individual's own movements and body position being transmitted to the brain. Another explanation why temporally patterned stimulation could be more successful is that it may have been one of the keys to the three participants' success in the Nature study. Different stimulation methods, on the other hand, can prove to be more or less useful for different people.

It's also crucial to temper this exhilarating success storey with caution when it comes to access. According to the World Health Organisation, between 250,000 and 500,000 people are affected by a spinal-cord injury each year, with the majority of these injuries occurring as a result of car crashes, falls, or abuse. Spinal stimulation is a time-consuming and costly medical procedure, and recovery appears to necessitate extensive rehabilitation.

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