

Spinal Shocks Ease Parkinson's in Mice

By SANDRA BLAKESLEE

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By electrically stimulating the spinal cords of rodents, scientists have reversed some of the worst symptoms of [Parkinson's disease](#).

Health Guide: [Parkinson's Disease](#)

As long as a mild current flows up their spines and into their brains, the animals regain the ability to scamper around their cages, as if they were normal.

The therapy, described in Friday's issue of the journal *Science*, is a potential alternative to direct stimulation, which requires risky and invasive surgery to implant electrodes deep in the brain, researchers said. Only 30 percent of severely impaired Parkinson's patients qualify for the operation.

Spinal cord stimulation would be less invasive and inherently safer, and it would reduce the amount of drugs needed to treat the disease, said the report's lead author, Dr. Miguel A. L. Nicolelis, a neuroscientist at Duke. Dr. Nicolelis added that the procedure was now being tested on monkeys, and "if it succeeds, human clinical trials could begin in the next few years."

An expert on stimulation theories who was not involved in the research, Dr. Rodolfo Llinás, said the treatment "makes good sense," but he added:

"How successfully it will translate to humans is an important issue. The human spinal cord is much more complex than the rodent counterpart, and long-term stimulation might result in nasty secondary effects."

Dr. Llinás is chairman of neuroscience and physiology at the N.Y.U. School of Medicine.

Dr. Ali Rezai, a neurosurgeon and director of the Center for Neurological Restoration at the Cleveland Clinic, said spinal cord stimulation was "technically simple to do" and had been performed on tens of thousands of people to treat chronic pain, [spasticity](#), stroke and other medical problems. The main side effect is a sense of vibration, like pins and needles, that never lets up.

The idea of using spinal cord stimulation to treat Parkinson's disease, however, is entirely new, Dr. Rezai said, and he called it both "provocative" and "fascinating," though further research was needed on how it would work in practice.

Parkinson's disease results from a loss of cells that secrete [dopamine](#), a brain chemical essential for normal movement. Patients develop tremors, rigid posture, impaired balance and an inability to initiate movement. In the United States, at least half a million people are believed to suffer from Parkinson's disease, and about 50,000 new cases are reported each year.

The first line of treatment is L-dopa, a drug that restores dopamine but stops working over time. Direct brain stimulation seeks to ease symptoms by focusing on specific brain regions involved in dopamine transmission.

In the new treatment, animals whose brains were depleted of dopamine had tiny electrodes, the size of a fingernail, implanted on their spinal cords. Three seconds after a mild electrical stimulation began, they could move about normally.

The treatment was also effective when combined with L-dopa in further experiments; only two doses of L-dopa were needed to produce movement, compared with five doses when it was used by itself.

Spinal cord stimulation represents a "big conceptual change" in how to treat Parkinson's disease, Dr. Nicolelis said. Rather than looking at where things happen in the brain, as in small regions missing dopamine, the approach focuses on *when* things happen, as in the dynamic firing patterns of large circuits of neurons. These circuits oscillate in harmony and underlie normal brain function.

Parkinson's patients have abnormal low-frequency oscillations in the brain regions controlling movement, Dr. Nicolelis said. Stimulation of the topmost layer of the spinal cord, which conveys touch sensations to the brain, may work by disrupting these abnormal oscillations, restoring normal firing patterns across multiple brain structures involved in the control of voluntary movements.

Dr. Nicolelis added that more research was needed to determine whether other mechanisms might explain the therapy's success in rodents.