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May 19, 2011

Electrode Experiment Shows Promise as a Paralyzed Man Stands

By **DENISE GRADY**

A young man paralyzed by an injury to his spinal cord has regained the ability to stand for short periods, take steps with help and move his legs and feet at will, with the help of an electrical stimulator implanted in his lower back.

The device is experimental and not available to other patients, and because it has been studied in only one person it is not known whether it would work as well in other people with different types of [spinal injury](#).

But the researchers say that scientifically the work is an important advance, because it shows that a bit of electrical stimulation can unlock the ability of the spinal cord to control movement — even if its signals from the brain have been cut off by injury. Similar findings had been made in animals.

“It’s been thought that the brain controls all our movement,” said Susan Harkema, research director at the Kentucky Spinal Cord Injury Research Center in Louisville and the lead author of an article about the research being published online on Thursday in [the journal Lancet](#). “But the spinal cord is the primary controller.”

Another author, V. Reggie Edgerton, a leading expert at the University of California, Los Angeles, on animal research on [paralysis](#), said: “People think everything below the injury dies and is nonfunctional. But in fact in most injuries, the damage is just to a few segments, and the neurons below it remain intact.

“These neurons are very smart. They know what to do. They play a major role in your normal

movement.”

A researcher not involved in the study, [Dr. W. Zev Rymer](#), vice president of research at the Rehabilitation Institute of Chicago, said: “From a scientific and research standpoint, it’s outstanding. Will it make a difference in the lives of many people with [spinal cord injury](#)? I don’t know yet.”

Animal studies had suggested that signals from the brain were not needed to control the details of movement, but just to activate the spinal cord.

The man in the study was Rob Summers, now 25, who has been paralyzed since he was hit by a car when he was 20. He lost all motor control in his legs, but retained some feeling, and could use his hands and arms. He had been an athlete — a baseball player for Oregon State University — and was determined to walk and even play ball again.

At the center in Louisville, he underwent 170 sessions over 26 months in which he was placed in a harness and therapists worked to help him stand and make stepping motions on a treadmill. He made almost no progress.

Then, in December 2009, surgeons implanted electrodes in the lower part of his back to stimulate his spinal cord. The electrodes are attached to a pulse generator, similar to a pacemaker, which is also fully implanted and controlled by a remote device outside the body. The device was switched on for about two hours a day, for therapy sessions.

On his third day of electrical stimulation, Mr. Summers managed to stand on his own. He did not rise from a sitting position, but managed to support his own weight briefly when the harness that had been holding him was gradually released.

“It was unbelievable,” he said in a telephone interview. “There was so much going through my head at that point; I was amazed, was in shock.”

Dr. Harkema was surprised, too. “It certainly fits with the theory we were testing, but we didn’t expect it to happen this early,” she said. Mr. Summers went through hundreds more therapy sessions and began to gain strength and muscle mass, and his overall health improved. He still hopes to walk someday.

Dr. Harkema said that four more patients would receive electrode implants, but that the research had a long way to go.

The study was paid for by the National Institutes of Health and the Christopher and Dana Reeve Foundation.