

Robotic technology teaches spinal cord injury patients to walk again

DALLAS – April 29, 2004 – A 50-year-old man paralyzed from the neck down in a devastating motorcycle accident a year ago is learning to walk again with the help of a robot named Lokomat at UT Southwestern Medical Center at Dallas.

Chuck Benefield of Dallas was riding his motorcycle on a quiet country road when a car rear-ended him, throwing him from the bike. When he awoke from a coma 11 days later, he learned he was paralyzed.

“I was banged up real bad,” Mr. Benefield said. “The doctors said it was an incomplete spinal-cord injury, and I would probably never be able to walk again. That was hard to adjust to.”

But that was before he met Lokomat.

Physicians and physical therapists at UT Southwestern are using the device to teach Mr. Benefield to walk again.

The robot provides “gait training” by teaching a patient’s spinal cord and brain, with sensory information, to signal the body to step again. A harness supports the patient’s body weight over a large treadmill. The legs and hips are strapped into the machine’s robotic exoskeleton, which simulates a fluid walking motion. A computer records precise movement measurements and plots them on a graph, which is displayed in real time on a nearby monitor and allows patients and therapists to track progress.

UT Southwestern is the only institution in Texas and is among only a handful in the nation using the new machine.

During conventional treatments, patients are supported by a harness over a treadmill, but a therapist must manually move the patient's hips and legs. The procedure is extremely fatiguing to the patient and the therapist, and the patient's spasticity often cannot be overcome to accomplish gait training.

“The robot not only provides specific and consistent training parameters and the needed power, it can also quantify the patient's responses, freeing the therapist to make ongoing adjustments in the robot and improve the patient's stepping,” said Dr. Keith Tansey, who coordinates the medical center's new multidisciplinary, interdepartmental clinical program for spinal-cord injury and is an assistant professor of neurology and physical medicine and rehabilitation.

Dr. Patricia Winchester, chairwoman of physical therapy, said: “The functional results we see with body-weight supported treadmill training go beyond improved muscle performance. Our observations support the theory that locomotor training on the treadmill is driving reorganization in the spinal cord and brain.

“Supporting body weight reduces the postural challenge patients face during walking. The Lokomat moves the legs in a normal physiological pattern that helps the spinal cord relearn to step.”

Mr. Benefield, who has regained some use of his arms, has been using Lokomat for about a month and said he could already see results in his lower extremities. He is regaining muscle tone and feeling in his legs; the swelling in his ankles and calves is gone; and he has more mobility.

“I wasn't getting near these results with manual gait training,” Mr. Benefield said. “It's just a night and day difference. I could walk for hours, if they'd let me. The therapy has been really good, and it's such a good feeling when you come off it.”

Researchers are recruiting patients with spinal-cord injuries to participate in studies involving Lokomat technology. Eligible patients must have range of motion in the hips, knees and ankles to allow an upright stance. Patients are ineligible for the study if they have a history of long bone fractures, have pressure sores that would be irritated by the robot exoskeleton, weigh more than 250 pounds or have blood pressure problems.

Those interested in participating may e-mail scilab@utsouthwestern.edu or call 214-648-0788.

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