

Spinal Cord Injury

Making a Difference Today

Even something as mundane as driving to work puts you at risk.

Annually, about 11,000 Americans experience a spinal cord injury, mostly caused by a car accident, violence, sporting activity, or fall. Victims often face a devastating loss of leg movement that hinders everyday functions like walking. Many also lose the ability to move their hands and trunk or to feel touch. Most lose bowel, bladder, and sexual function, and some experience chronic pain. Lives change overnight.

Research Equals Improved Therapy

Fortunately, thanks to research, the outlook for the injured keeps improving. Typically, therapy has focused on helping patients learn ways to compensate for their function losses. Studies partially aided by funding from the National Institutes of Health (NIH) recently made it clear that intense rehabilitation techniques that include movement training also can help recoup some lost movement abilities.

Scientists once thought that damage to the spinal cord prevented key brain signals from transmitting to the body and impaired functions like movement—permanently. But then researchers studied cats that had their spinal cords cut, which paralyzed their back legs, and found that rehabilitation can activate circuits in the spine and sidestep the injury. Intense movement training on a treadmill enabled cats to step with their back legs on the moving treadmill belt when supported (although they could not walk by themselves). This pivotal discovery formed the basis for novel therapeutic approaches in humans.

As with cats, step training on a treadmill improves the ability of some people with spinal cord injuries to step “automatically.” During the training, therapists help move the patient’s legs in a natural walking motion while they are held in a harness suspended over a moving treadmill. Gains in stepping ability can allow patients to walk overground while braced with a walker. In one study, 25 out of 33 people who had previously been confined to wheelchairs learned to walk without help from another person, seven walked with help, and one person showed no improvement.

Researchers now are comparing the effects of the treadmill training strategy with other types of intense rehabilitation programs, including a regimen that involves therapist-assisted walking practice.

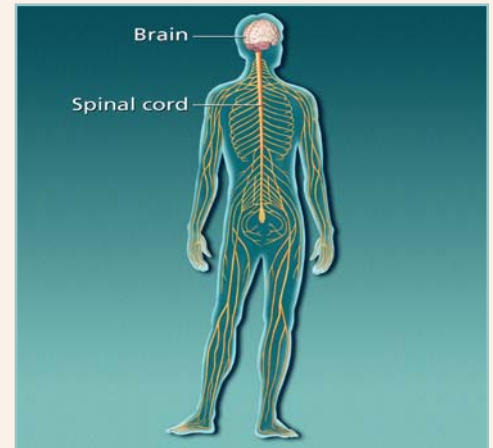
Lower Costs

Regardless of which program ends up working best, researchers suspect that the gains from intense rehabilitation will create huge savings. Economic costs for spinal cord injury approach \$10 billion a year. At the very least, increases in movement function could help prevent muscle deterioration, clots in the legs, and skin lesions that occur when patients sit for long periods.

Better Medicine

Although the advances with rehabilitation are impressive, they are not enough. Rehabilitation does not repair the injury, limiting potential benefits. Additional NIH funding, however, could help scientists develop medicines that curtail or actually mend damage. Already, researchers have identified some promising strategies. Together with rehabilitation, these methods could further lower costs and create dramatic improvements in the function and lives of patients.

For more information please email brss@sfn.org.



Normally, information easily transmits between the brain, spinal cord, and rest of the body, allowing a healthy individual to stride across the street or even cartwheel down the lawn. Scientists thought that an injury to the spinal cord severs this communication line, prevents key brain signals from transmitting, and permanently impairs movement abilities. Thanks to research in animals and humans, however, it has become clear that certain intense rehabilitation techniques can sometimes sidestep the injury and help some people with spinal cord injuries regain lost movement abilities.

Continued funding for research could lead to:

- The development of medical therapies that stem the increasing damage that occurs in the weeks following an injury.
- The development of medicines that actually rebuild the injured spinal cord and restore function.
- Insights into how to treat additional ailments marked by tissue damage, like stroke.



www.sfn.org

Spinal Cord Injury

Making a Difference Tomorrow

Notable progress has occurred in the study of spinal cord injuries, yet there are still no cures. Many patients remain sidelined by movement impairments that harm their ability to work and take care of themselves. Many still can't feel the hug of a spouse or child. Many have lost control of important body functions like going to the bathroom, sexual responses, and even breathing. Did you know that:

- An estimated 250,000 people are living with spinal cord injury in the United States, and an estimated 11,000 new injuries occur each year.
- Spinal cord injury primarily affects young adults; more than half of these injuries occur between the ages of 16 and 30.
- Economic costs approach \$10 billion a year.
- The annual cost of treating pressure sores—skin lesions that erupt when a patient can't move easily—is estimated at \$1.2 billion alone.

Research Equals Hope for the Future

Early spinal cord studies determined that intense rehabilitation techniques that include movement training can create internal reactions that sidestep the injury and help some patients recover some lost movement abilities. This advance is only the beginning. Scientists are getting closer to developing additional techniques that directly treat the injury. Continued funding from the National Institutes of Health (NIH) could help bring these strategies to the clinic.

One promising technique designed to limit the increasing damage that occurs in the weeks following an injury involves use of cells known as macrophages, which normally help the healing process in the body. Transplants of these cells into the spinal cord of injured animals aided their recovery and helped restore some lost function. Tests in people are under way.

Repair

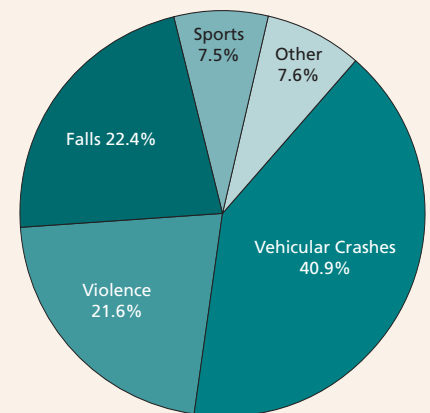
Additional promising strategies aim to rebuild injured nerve fiber networks in the spinal cord. One method involves transplants of cells that appear to promote the growth of nerve fibers. Animal studies indicate that the transplants can help repair damage in the spinal cord and restore some functions. Now some scientists are studying transplants in humans.

Other techniques, which have advanced with the aid of NIH funding, block naturally occurring substances that researchers discovered prevent the regrowth of nerve fibers after damage. This “inhibitor-blocking” strategy promotes recovery of the spinal cord and enhances function, according to animal studies.

Hope for Other Diseases

In addition to aiding spinal cord injury, advances could help many other ailments marked by tissue destruction. For example, evidence indicates that the inhibitor-blocking strategy can aid stroke. With continued funding, researchers could revolutionize the care of many Americans and cut society's burden.

Causes of Spinal Cord Injury 1990-2003



Some 11,000 spinal cord injuries occur annually in the United States, mostly caused by car accidents, violence, and falls. Victims often face a devastating loss of leg movement that hinders everyday functions like walking. Some also lose the ability to move their arms and trunk or to feel touch.

Already research has led to:

- The discovery that intense rehabilitation therapy can help reinstate partial movement abilities in some people with spinal cord injury.
- The identification of additional strategies that may be able to create even more benefits.
- Greater understanding that patients with spinal cord injury can indeed be helped.

For more information please email brss@sfn.org.