



Spinal Cord Injury

VA researchers are studying the biological processes involved in spinal cord injury (SCI), in hopes of finding a cure. They are also working to develop better treatments and adaptive technologies for veterans and other with SCI. Another focus of research is preventing the medical complications that often develop as a result of this disability. For example, VA investigators are developing microstimulators that help to prevent respiratory problems by recreating natural breath and cough patterns. Respiratory problems are the leading cause of death in patients with SCI.

Examples of VA research advances

- **Brain-computer interfaces**—A team at VA's Center for Restorative and Regenerative Medicine—a collaboration among VA, Brown University, and MIT—is advancing a system called BrainGate, which has already shown promise in enabling patients with paralysis to use only their thoughts to control external devices. The system uses a tiny sensor implanted in the brain. The sensor sends brain signals to an external decoder that translates them into commands for electronic or robotic devices.
- **Easing chronic pain**—Chronic pain is experienced by more than 50 percent of patients with SCI. Researchers at the West Haven VA and Yale University have identified a particular form of sodium channel—a specialized protein in the membranes of brain cells that regulates the flow of sodium into the cells—that is responsible for conveying pain signals to the brain. The researchers are working to develop a new therapy based on this knowledge. Other research teams are exploring the possibility of grafting specially cultured neurons, or nerve cells, into the spinal cord. The cells would release natural body chemicals, such as GABA, that have a pain-relieving effect.
- **Functional Electrical Stimulation (FES)**—VA researchers and colleagues in Cleveland are developing FES-based walking systems, hand-grasp systems, and other devices that expand the abilities of patients with spinal cord injury and increase their opportunities for employment and independence. Researchers here are now collaborating with the “BrainGate” group (*see above*) to develop applications that may benefit those with spinal cord injury as well as amputees.

Facts About SCI

Spinal cord injury (SCI) impairs the brain's ability to send messages to the rest of the body, and can result in paralysis, loss of feeling, chronic pain, and many other serious medical problems. SCI is estimated to affect some 250,000 Americans, with 10,000 new injuries occurring each year, mostly among young males. VA has the largest single network of SCI care in the nation; in 2006, VA provided a full range of care to nearly 26,000 veterans with SCI, and specialty care to about 13,000 of these veterans.

