ABOUT SPINAL CORD INJURY

• The spinal cord is the main pathway for passing information between the brain and nerves that lead to muscles, skin, internal organs, and glands. Injury to the spinal cord disturbs movement, sensation, and function.

• SCIs are estimated to affect as many as 337,000 Americans, with about 12,500 new injuries occurring each year. About 80 percent of people with new injuries are males.

• Nearly half of all SCIs occur in people between the ages of 16 and 30, meaning many patients must live with the effects of these injuries for decades.

• VA treats more than 27,000 Veterans with SCI and related disorders each year, making the department the largest health care system in the world providing spinal cord care.

VA RESEARCH ON SPINAL CORD INJURY: OVERVIEW

• VA research focuses on returning motor and sensory function to Veterans with SCI. Researchers are working in the many fields, including neural engineering, wheelchairs and adaptive technology, treatment of SCI complications, new rehabilitation methods, and regenerative medicine.

• VA has played a major role in the development of BrainGate, a system that uses microelectrodes implanted in the brain to pick up neural signals. This system shows promise in allowing patients with SCI to control robotic devices and computer software systems using their brains.

• VA’s Center on the Medical Consequences of Spinal Cord Injury is studying ReWalk, a wearable robotic exoskeleton that provides powered hip and knee motion to enable people with SCI to stand upright, walk, and turn.

• Researchers at VA’s Cleveland FES Center completed a 10-year clinical trial to test a surgically implanted electrical stimulation system in people with SCI. In this program, electrodes are implanted in muscles, which allow electrically stimulated standing, better balance, and exercise. Studies show the system is safe and reliable for use.

• VA is part of the Gordon Mansfield Spinal Cord Injury Translational Collaborative Consortium, a project to advance the field of regenerative rehabilitation. Regenerative rehabilitation aims to restore tissue and organ function lost as a result of aging, injury, or disease through techniques such as cell transplantation.

• The VA Rehabilitation Research and Development Center for the Restoration of Nervous System Function is researching molecular and cell-based methods to alleviate pain and restore nervous system function in Veterans whose nerves have been damaged by SCI, multiple sclerosis, and diabetes.

• The VA Center in Wheelchairs and Associated Rehabilitation Engineering continually improves the mobility and function of Veterans with disabilities through advancing engineering and clinical research in wheelchair design and other mobility technologies.

• Researchers modified the VA MOVE! program to better suit the needs of Veterans with SCIs. They created pamphlets that include wheelchair fitness activities, safety tips for wheelchair users, and ideas to help SCI patients perform physical activity safely.

SELECTED MILESTONES AND MAJOR EVENTS

1988 – Established the Center for Neuroscience and Regeneration Research at the VA Connecticut Healthcare System

1989 – Established the Cleveland FES Center to focus on the application of electrical currents to generate or suppress activity in the nervous system

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1994 – Established the Human Engineering Research Laboratories in Pittsburgh

2002 – Conducted, in rodent models, the first transplant of myelin-forming cells that act as insulation around spinal cord nerves

2010 – Published a study showing that intravenously introduced bone marrow stem cells can protect an injured brain and spinal cord in rats

2010 – Established the Gordon Mansfield VA Spinal Cord Injury Collaborative Translational Consortium

2014 – Tested the ReWalk exoskeleton, which has received approval for sale and distribution from the Food and Drug Administration

2015 – Demonstrated that dendritic spine dysgenesis (an abnormality in nerve cells) following SCI results in spasticity and neuropathic pain

2015 – Contributed to the evidence base for VA’s decision to provide the ReWalk exoskeleton to eligible Veterans who will benefit from the new technology

RECENT STUDIES: SELECTED HIGHLIGHTS

• Researchers at the VA Health Services Research and Development Center of Innovation on Disability and Rehabilitation Research and other VA centers found that vocational training that engaged Veterans with SCI in job seeking and provided on-the-job support was more effective at helping Veterans find jobs than general vocational counseling that only involved job preparation. (Topics in Spinal Cord Injury Rehabilitation, Feb. 6, 2015)

• Evidence is lacking to support the benefits of upper-limb resistance circuit training on body composition in people with SCI, according to researchers at the Hunter Holmes McGuire VA Medical Center and their colleagues. Further studies are needed to explore the effects of upper-body exercise on body composition after SCI. (Aging and Disease, Aug. 1, 2015)

• Neuropathic pain, or pain caused by damage to the nervous system, is a difficult-to-treat effect of SCI. Researchers from the VA Connecticut Healthcare System and Yale University School of Medicine have identified through a review of animal-studies literature that changes in the dendritic spine structure are linked to neuropathic pain. Identifying specific causes of neuropathic pain in SCI may lead to more effective and long-lasting therapies. (Neuroscience Letters, Aug. 5, 2015)

• A patient with incomplete locked-in syndrome was able to communicate face-to-face with VA and affiliated researchers using text-to-speech conversion and remotely with an Internet chat application through the BrainGate Interface System. This shows that intracortical brain-computer interfaces may be viable to help people with motor impairment communicate. (Neurorehabilitation & Neural Repair, May 28, 2015)

• A Dingell VA Medical Center and Wayne State University study found that people with SCI typically have moderate to severe sleep-disordered breathing. Poor sleep quality is common in people with SCI, and better screening and treatment methods for sleep-disordered breathing need to be developed. (Spinal Cord, Dec. 16, 2014)

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