CDMRP
DEPARTMENT OF DEFENSE
CONGRESSIONALLY DIRECTED
MEDICAL RESEARCH PROGRAMS

Impact Highlights

CDMRP Impact Highlights

SPINAL CORD INJURY RESEARCH PROGRAM

Vision: Advance the treatment and management of spinal cord injury and ameliorate its consequences relevant to injured Service Members

Mission: To fund research and encourage multidisciplinary collaborations for the development and translation of more effective strategies to improve the health and well-being of Service Members, Veterans, and other individuals with spinal cord injury

Years Program Appropriated: FY09-FY23

Total Appropriations: $437.9M

The Spinal Cord Injury Research Program (SCIRP) was established to support medical research into traumatic spinal cord injury and treatments, with the goal of enhancing the long-term care of wounded Soldiers. Congress specifically highlighted the complexity of neurotraumatic wounds as well as promising treatment regimens including regenerating/repairing damaged spinal cords and improving rehabilitation therapies. To meet this directive, the SCIRP focuses on funding within strategic priority areas that meet the needs of the spinal cord injury consumer community and address critical gaps in research, patient care, and quality of life.

Exoskeletal-Assisted Walking to Improve Mobility

IMPACT: The major takeaway from this study was that exoskeleton technology made walking possible in over 80% of individuals with chronic non-ambulatory spinal cord injury.

DESCRIPTION

This project is a multi-site clinical trial exploring the benefits of exoskeletal-assisted walking in 50 non-ambulatory participants. The results from this study provide guidelines for estimating the potential of individuals with spinal cord injury to achieve proficient and safe walking skills and include the proposed time commitment necessary to obtain meaningful functional gains. These guidelines are targeted to medical professionals, caregivers, and people living with a spinal cord injury regarding utilization of two commercially available exoskeleton devices in both institutional and personal use settings. The research team also investigated secondary health benefits to exoskeletal-assisted walking and observed significant improvements in bowel measures, cardiovascular function, and body composition in chronically injured participants.

PARTNERS/COLLABORATORS

Bronx Veterans Medical Research Foundation; University of Maryland; Kessler Foundation

AWARD NUMBER: W81XWH-14-2-0170

U.S. Marine Corps Veteran William Lehman walks in the Ekso exoskeletal-assisted walking device under the supervision of study staff.

Improved Bladder and Bowel Function via an Implantable Stimulator

DESCRIPTION

Electrical stimulation via an implantable, pacemaker-like, stimulator is being tested to aid in bladder and bowel continence and voiding in spinal cord injury patients. This technology has been available for over 10 years but was not widely adopted by the community due in part to the practice of severing sensory nerves at the time of implantation to permanently abolish the bladder reflexes. This study, however, is modulating the nervous system and observing functional improvements without purposefully damaging sensory nerves. Promisingly, the device allowed urination without catheterization and continence without medication for the first time in 41 years for a recent participant, illustrating for the first time that this technology can be utilized in spinal cord injury patients without permanent and purposeful nerve damage.

PARTNERS/COLLABORATORS

Leland Stanford Junior University and VA Palo Alto HC System; MetroHealth Medical Center; Santa Clara Valley Medical Center; University of New Mexico School of Medicine

AWARD NUMBER: W81XWH-14-2-0132

IMPACT: Using electrical stimulation to restore both bladder continence and emptying without destructive surgery is a game changer for the field and has the potential to significantly change clinical practice, allowing for a less invasive, non-destructive method to restore bladder function in individuals with a spinal cord injury.

Implantable Device Restores Upper Limb Function and Sense of Touch

IMPACT: This technology can help people with chronic spinal cord injuries regain reach and grasp abilities to restore functional independence.

DESCRIPTION

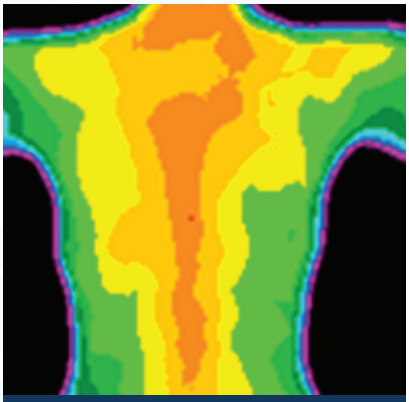
A SCIRP-funded clinical trial is testing the efficacy of a new device to restore hand and arm movements as well as the sense of touch in individuals with cervical spinal cord injuries. This device combines a brain implant with electrical stimulators in the arm to bypass the point of injury, mimicking the lost connections between the hand, arm, and brain. Early results are promising; not only can the first participant voluntarily move his paralyzed arm to offer a firm handshake and feed himself, but he is also able to feel the sensation of touch on his hand for the first time since his injury six years ago.

PARTNERS/COLLABORATORS

Case Western Reserve University; Brown University; Massachusetts General Hospital

AWARD NUMBER: W81XWH-19-1-0707

Near-Infrared Spectroscopy Sensor



DESCRIPTION

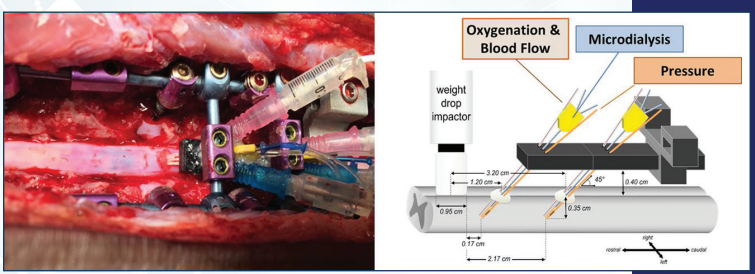
The Near-Infrared Spectroscopy system uses sensors to monitor the oxygenation, blood flow, pressure, and metabolism within the spinal cord and surrounding tissue in real time immediately after spinal cord injury. Researchers have shown that the system works in large animal models to detect local tissue changes within the injured spinal cord that reflect systemic hemodynamic changes, i.e., blood pressure, over the first seven days post-injury. They are now extending the work with support from SCIRP to a human clinical trial as well as developing advanced parameters that can help guide hemodynamic management in acute spinal cord injury to improve outcomes.

PARTNERS/COLLABORATORS

University of British Columbia

AWARD NUMBERS: W81XWH-16-1-0602, W81XWH-21-1-0388, HT9425-23-1-0777

IMPACT: The Near-Infrared Spectroscopy system is a monitoring tool that can provide clinicians with real-time data about how their interventions are affecting the tissue within the injured spinal cord, delivering previously unavailable information that is needed for evidence-based clinical practice guidelines to optimize management of acute spinal cord injury and improve neurologic recovery.



Intraparenchymal monitoring of the acutely injured spinal cord of the pig; probes for measuring oxygenation/blood flow, hydrostatic pressure, and microdialysis.

TRACK-SCI: Leveraging Fundamental Clinical Discoveries to Guide Treatment and Improve Recovery after Spinal Cord Injury

IMPACT: This database of patient treatments and outcomes is helping to inform evidence-based clinical care strategies to improve care in the acute phase of injury when decisions need to be made quickly and can have huge impacts on outcome and recovery.

DESCRIPTION

TRACK-SCI (Transforming Research and Clinical Knowledge in Spinal Cord Injury) is a SCIRP-funded collaborative effort that collects patient demographics, treatment, and outcomes data across multiple sites to establish crucial evidence-based standards of care for early treatment of spinal cord injury. Data from this long-term patient database is leveraged across multiple research sites to change clinical care for blood pressure management and surgical decompression post-injury. Machine learning approaches were also recently applied across the patient database to identify an optimal blood pressure range that correlates with improved recovery post-injury. Moreover, the TRACK-SCI patient database is being leveraged in additional SCIRP funded studies to examine novel drug candidates for improved neuroprotection, spinal plasticity, and pain reduction after injury.

PARTNERS/COLLABORATORS

University of California, San Francisco Brain and Spinal Injury Center; University of California, Fresno; Ohio State University Wexner Medical Center

AWARD NUMBERS: W81XWH-13-1-0297, W81XWH-16-1-0497, W81XWH-20-1-0245, W81XWH-21-1-0505, W81XWH-21-1-0505

Stentrode™, a Brain-Computer Interface to Facilitate Independence After Paralysis

DESCRIPTION

The Stentrode device, a blending of "stent" and "electrode," is a novel brain-computer interface technology that is unique in its minimally invasive delivery method: the thin, flexible device is implanted within a blood vessel of the brain without the need for invasive brain surgery. A SCIRP-funded project provided development, optimization, and biosafety testing of the Stentrode in a large animal model, which was integral for an industry-funded first-in-human clinical trial in individuals with motor deficits and severe paralysis. In the clinical trial, participants regained their ability to perform independent activities of daily living such as communication, using the Stentrode to control computers remotely with their minds in order to text, send emails, and shop online. TIME magazine named the Stentrode one of the 100 Best Inventions of the 2021. Synchron, the company developing the Stentrode, received FDA approval to commence human trials in the U.S. Other CDMRP programs are investing in this technology for additional indications as the device can be implanted in multiple locations to access different regions of the brain.

PARTNERS/COLLABORATORS

University of Melbourne

AWARD NUMBER: W81XWH-17-1-0210

IMPACT: The Stentrode's method of implantation via the vascular system allows the device to record from the brain without the need for invasive brain surgery, greatly increasing the safety and accessibility of the technology for users and providing real hope for individuals living with neurological disorders or injuries of regaining meaningful independence and autonomy.

SeePain

DESCRIPTION

SeePain is a comprehensive guide to understand and treat chronic spinal cord injury-associated neuropathic pain for those who have spinal cord injuries and their caregivers. This SCIRP-funded educational tool was developed with input from people living with spinal cord injury, their families, care partners, and health care providers. The SeePain guide considers many factors in pain control, including barriers to successful pain management. SeePain provides individuals with neuropathic pain, their family members, and caregivers a better understanding of the underlying mechanisms and external factors that affect pain management to encourage more effective communication regarding pain management plans.

IMPACT: The SeePain guide provides individuals with spinal cord injury, their family members, and health care providers with knowledge and tools to discuss pain and pain management more effectively.

PARTNERS/COLLABORATORS

Case Western Reserve University

AWARD NUMBERS: W81XWH-12-1-0465, W81XWH-15-1-0602, W81XWH-21-1-0497