Regulation Of Autonomic Control Of Bladder Voiding After A Complete Spinal Cord Injury

Tech ID: 28944 / UC Case 2015-054-0

SUMMARY

UCLA researchers have developed a novel spinal cord stimulator used to restore partial mobility, bladder, and bowel functions in Spinal Cord Injured patients.

BACKGROUND

After SCI, patients lose the ability to store and expel urine in a coordinated, controlled manner. Current management of bladder dysfunction typically includes medications many of which have side effects and vary in efficacy. There is a need for a reliable method to facilitate bladder function in individuals with spinal cord injury. Studies have shown that epidural stimulation of the spinal cord, in the form of electrical enabling motor control (eEmc), enables paralyzed patients to step on a treadmill. It is suggested that eEmc stimulation of the lumbosacral region of the spinal cord can help with bladder functions in paralyzed patients. Restoring bladder function in patients improves the quality of life and longevity of patients, and dramatically reduces ongoing health maintenance after a spinal cord injury

INNOVATION

Epidural stimulation of locomotor-related spinal neuronal circuits has the potential to restore mobility and influence neural networks controlling bladder function in patients with SCI. Researchers have identified specific spinal cord stimulation parameters that initiate bladder voiding within seconds of the initiation of epidural stimulation. Epidural stimulation of the spinal neural network can be combined with motor training and/or pharmacological intervention to enhance the activation of sensorimotor pathways that control bladder function.

APPLICATIONS

Restoring voluntary bladder function in SCI patients

ADVANTAGES

- Mechanisms can play a role in recovering bladder function after complete paralysis
- Substantial clinical implications in improving quality of life longevity of patients, while simultaneously dramatically reducing ongoing health maintenance after SCI
- Long term efficacy
- Nearly immediate voiding when stimulation is turned on (allowing control during daily activities)

RELATED MATERIALS

- Gad, Parag N., Roland R. Roy, Hui Zhong, Daniel C. Lu, Yury P. Gerasimenko, and V. Reggie Edgerton. "Initiation of bladder voiding with epidural stimulation in paralyzed, step trained rats." PloS one 9, no. 9 (2014): e108184.
- Gad, Parag, et al. "Sub-threshold spinal cord stimulation facilitates spontaneous motor activity in spinal rats." Journal of neuroengineering and rehabilitation 10.1 (2013): 1.
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- Gad, Parag N., Gregory W. Salyards, Laura M. Garzel, Kari L. Christe, V. Reggie Edgerton, and Leif A. Havton. "Generalized convulsive seizures are associated with ketamine anesthesia in a rhesus macaque (Macaca mulatta) undergoing urodynamic studies and transcutaneous spinal cord stimulation." Journal of Medical Primatology (2017).

PATENT STATUS

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OTHER INFORMATION

KEYWORDS

Spinal cord injury (SCI), bladder, voiding, Spinal Cord Stimulation, bladder dysfunction, urination, micturition, electrical enabling motor control (eEmc), transcutaneous electrical nerve stimulation (TENS), electromuscular stimulation (EMS), spinal cord stimulation (SCS), neurostimulation, chronic back pain, paralysis, functional electrical stimulation

CATEGORIZED AS

- **Medical**
  - Devices
  - Disease: Central Nervous System
  - Rehabilitation
  - Therapeutics

RELATED CASES

2015-054-0

Country	Type	Number	Dated	Case
Canada	Issued Patent	2,958,924	09/12/2023	2015-054
United States Of America	Issued Patent	10,751,533	08/25/2020	2015-054

Additional Patents Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Design And Fabrication Of Multi-Electrode Array For Spinal Cord Epidural Stimulation

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