



Inventors

Jiping He, PhD

Professor

Harrington Department of
Bioengineering

Arizona State University

James Sweeney, PhD

Associate Professor

Harrington Department of
Bioengineering

Arizona State University

Richard Herman, MD

Director

Clinical Neurobiology and
Bioengineering Research
Center

Banner Good Samaritan
Rehabilitation Institute

Stephen D'Luzansky, BSE

Research Coordinator

Clinical Neurobiology and
Bioengineering Research
Center

Banner Good Samaritan
Rehabilitation Institute

Ryan Knight

Research Specialist

University of Florida

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Contact

Jack Geltosky, PhD

Senior Vice President
of Business Development, Life
Sciences

Arizona Technology
Enterprises, LLC (AzTE)

P: 480.884.1989

F: 480.884.1984

JGELTOSKY@AZTE.COM

Innovative Technologies for the Restoration of Gait in Chronic Spinal Cord Injury Patients

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Invention Description

Spinal Cord Injuries (SCI) occurs when the cells within the spinal cord are damaged or the nerve tracts that relay signals up and down the spinal cord are severed. There are an estimated 250,000 people with SCI and roughly 10,000 new cases annually. Depending on the type and level of the injury, SCI can have different effects and is usually divided into two categories; complete and incomplete. A Complete injury means that there is no function below the level of the injury; no sensation, no voluntary movement, and an incomplete injury means that there is some functioning below the primary level of the injury. The American Spinal Injury Association also has further classifications.

Researchers at Arizona State University and Banner Good Samaritan Rehabilitation Institution have developed an implantable device that generates electrical epidural stimulation (EES) which, when used in conjunction with partial weight bearing therapy, restores functional ambulation in individuals having incomplete spinal cord injuries. Patients move from partial to full weight bearing gait training, until they have independent walking with EES with or without an assistive device.

Potential Applications

This device works with incomplete spinal cord injuries to promote independent walking with EES for short durations of time. Typical levels of SCI and other disorders that can potentially be rehabilitated include:

- **ASIA B** – Some sensory sparing and abolished motor power
- **ASIA C** - Some sensory sparing and sub-functional motor power
- **ASIA D** – Significant functional motor power
- **Multiple Sclerosis**

Benefits and Advantages

This method and device alleviate many of the immediate barriers to rehabilitation of SCI victims.

- **Cost Effective** – The weight bearing system eliminates the need for multiple physical therapists
- **Improvement in gait**– EES stimulates the spinal cord to improve the weakened neural signal which is restored with the gait training device
- **Increased Patient comfort** – Partial weight bearing gait training alleviates stress on weakened muscles reducing effort of walking and improving recovery time