

## Scientific/Clinical Workshop

### Workshop Title

Targeting Function through Invasive and Non-invasive Applications of Electrical Stimulation after Spinal Cord Injury

### Workshop Responsible

Ashraf Gorgey (Hunter Holmes McGuire VA Medical Center)

### Speakers

Ashraf Gorgey, Glen M Davis, Ines Bersch-Porada, Vanesa Bochkezanian, Nazirah Hasnan

### Attendee Engagement

We will plan to have 5 minutes discussion at the end of each presentation. We will have several video case reports to share with our audience. Several other case scenario will be presented in a storytelling format of a person with SCI showing the improvements in muscle mass and strength, physical health outcomes and spasticity. Handouts will be given to attendee to share with them the progress of our presentation and will ensure to have specific learning objectives to cover including the following objectives:

- 1- This workshop will present different innovative experiences and latest evidence-based practice of the use of electrical stimulation by presenting different people with SCI, who have used electrical stimulation and have experienced improvement in their lives using this intervention. These stories would be presented with focus of highlighting the evidence behind health improvements after electrical stimulation.
- 2- This course will also present the evidence-based interventions and parameters to use electrical stimulation as a prescribed medicine, highlighting the improvements in musculoskeletal health (including spasticity) and restore locomotion. The audience can use this information to plan sessions in the clinical practice based on specific goals determined for each individual with SCI.
- 3- The audience will gain knowledge and develop skills to use different forms of electrical stimulation and FES-supported standing in clinical practice.
- 4- The course will introduce the concept of neuromodulation approaches to enhance function, improve motor recovery and level of physical activity after SCI.

### Abstract

Spinal cord injury (SCI) leads to several health-related consequences often linked to reduced levels of physical activity and function. In 2019-2020, evidenced-based Clinical Guidelines for FES-cycling were developed arising out of an international consensus-building approach, called AGREE-II. FES-cycling guidelines will be summarized in the health domains of aerobic fitness, muscle strength and quality, and other outcomes after SCI.

Direct muscle stimulation has moderate to very good scientific evidence in the fields of prevention, functional support and improvement in neurorehabilitation. For example, electrical stimulation has shown promising results on reduced voluntary activation of the muscles below the level of the lesion. Decreased muscle activation may impair musculoskeletal health and compromise physical health status. Nevertheless, the standard integration of this method into clinical treatment is not yet established. Often, electrostimulation is seen and performed as a stand-alone treatment. Different case scenarios of using locomotor training and standing in combination with FES will be introduced. The strategies used for standing to restore prolonged FES-supported standing in persons with paraplegia and lower-level tetraplegia for the promotion of health, functioning and participation will be presented.

Finally, neuromodulation approaches similar to spinal cord trans-spinal stimulation (TS) applications now offer rehabilitation tools to improve locomotion, and mobility restoration after SCI. The use of TS may overcome several of the existing barriers related to applications of electrical stimulation in rehabilitation. TS applied at the cervical level can increase arm and hand function in individuals with tetraplegia. Furthermore, robotic exoskeletons combined with TS can be used as a rehabilitation tool to improve locomotion, motor activity and restore mobility after SCI.