

## Scientific/Educational Workshop

### Workshop title

**Restoring Voluntary Grasping Function After Stroke or SCI Using Functional Electrical Stimulation**

### Workshop organizer

Milos R Popovic (Toronto Rehabilitation Institute-UHN)

### Speakers

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### Workshop goals

1. Understand the therapeutic applications of FES.
2. Describe the clinical application method.
3. Identify indications and contraindications.

### Abstract

FES is a methodology that uses bursts of short electrical pulses to generate muscle contraction. If these electrical pulses are applied to motor nerves they can elicit action potentials that propagate along the axons towards the target muscle. To date, two FES-based approaches for improving upper limb function in individuals with SCI have emerged. One approach proposes the use of FES as a permanent orthotic device that patients have to use all the time to grasp and release objects. In this application, the FES systems for grasping are better known as neuroprostheses for grasping. The second approach proposes the use of FES as a short-term therapeutic intervention with an objective to help the damaged central nervous system relearn how to execute the grasping function voluntarily. More specifically, after the therapy is completed and the FES system is permanently removed, the patients are able to grasp and release objects on their own. In its first embodiment, FES technology is used as a permanent orthosis; in its second embodiment, it is used as a therapeutic tool. Our team over the past 20+ years has used a multi channel surface FES system to retrain various functions in individuals with spinal cord injury and stroke, and the results are compelling. The aim of this workshop is to illustrate the application of FES therapy for retraining upper extremity function, in particular reaching and grasping, in individuals with stroke and spinal cord injury. In this workshop we will provide a brief overview of stimulation parameters, identification of patients appropriate for FES applications, indications and contraindications to FES, the results of various RCT's with stroke and SCI subjects. We will demonstrate the use of various reaching and grasping stimulation protocols for upper extremity functional retraining using a fully programmable surface multi channel functional electrical stimulator. This will be followed by an interactive "hands on" session.