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MetroHealth Medical Center

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Abstract Submission Form

Poster Title: **Intraoperative Testing of High Frequency Motor Nerve Block: Pilot Study**

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Location of Laboratory: **Old Brooklyn Campus, MetroHealth Center for Rehabilitation Research**

Category: **Physical Medicine and Rehabilitation**

Background: This is the first human study of a research program aimed at developing high frequency stimulation (HFS) technology to modulate spasticity (i.e., muscle hypertonia) in patient populations such as stroke, spinal cord injury, cerebral palsy, multiple sclerosis, and traumatic or non-traumatic brain injury. High frequency stimulation (HFS) characterized as sinusoidal waves of electrical current in the frequency range of 5-50 kHz, when applied to a peripheral nerve through specialized electrodes, has been shown in animal and human studies to be capable of inhibiting (i.e., blocking) the propagation of action potentials in the peripheral nerve. HFS has advanced to human studies for obesity control and pain management but is yet to be used for blocking action potentials to muscles (i.e., inhibiting muscle contractions).

Objective: The purpose of this initial study is to confirm that HFS applied to human peripheral nerves to upper or lower limb muscles reduces or abolishes muscle contractions reversibly. Demonstrating that HFS is effective intraoperatively will lay the foundation for future studies of HFS in awake stroke survivors with spasticity.

Methods: Participants will be individuals already scheduled for a surgery that exposes a peripheral nerve innervating an upper or lower limb muscle (e.g., tendon lengthening procedure). During the surgery a nerve cuff electrode specially designed for nerve conduction block will be placed on the peripheral nerve, and a stimulating probe positioned proximally near the nerve will be used to elicit muscle twitches and/or contractions. Several trials of 10-sec applications of HFS will be conducted using different HFS amplitudes and frequencies to characterize the effects of HFS on electrically-induced muscle twitches/contractions. These effects will be quantified by analysis of video recordings capturing the muscle contractions and associated limb movements.

Results: Enrollment has begun.