

General Guidelines

Neuromuscular Electrical Stimulation (NMES) is widely used to improve muscular immobility, re-educate muscles, increase blood circulation, decrease spasticity, and decrease pain and muscle atrophy in skeletal muscles. Some researchers have shown that the use of neuromuscular electrical stimulation will result in greater muscle, ROM and gait recovery as well as decreased joint pain than a similar regimen of just volitional exercises.^{1,2} Research also shows a positive correlation between contraction intensity with the use of NMES and strength gains—the stronger the training contraction intensity, the higher the strength gain.³

- 1. Snyder-Mackler L, Delitto A, Bailey SL, Stralka SW. Strength of the quadriceps femoris muscle and functional recovery after reconstruction of the anterior cruciate ligament: a prospective, randomized clinical trial of electrical stimulation. *J Bone Joint Surg Am.* 1995;77:1166–1173.**
- 2. Chantraine A, Baribeault A, Uebelhart D, Gremion G: Shoulder pain and dysfunction in hemiplegia: Effects of functional electrical stimulation. *Arch Phys Med Rehabil,* 80:328-331, 1999.**
- 3. Snyder-Mackler L, Delitto A, Stralka SW, Bailey S. Electrically elicited training contraction intensities and strength recovery in the quadriceps femoris muscle after anterior cruciate ligament reconstruction. *Physical Therapy* (in press).**

Current research is inconclusive for the optimal parameters for pulse width/pulse duration. Acceptable ranges fall between 20 to 1000 μ s. For the purposes of these protocols, a range of 250-300 μ s will be used as a default setting. This setting will be high enough to elicit motor level stimulation but still allow for good patient comfort.

It is also important to note that for the purposes of these protocols, the parameters suggested are for increasing strength, not necessarily for improving endurance. If endurance training becomes the primary objective, you will need to make the following adjustments to the protocols:

Pulse rate: 50-65 Hz

Pulse width/duration: 250-300 μ s

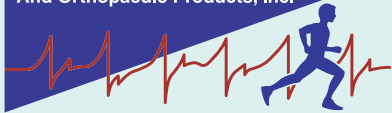
On/Off times: progress to 1:3 or 1:4 ratio (such as 10 sec ON, 30-40 sec OFF)

Amplitude: moderate level contraction

Treatment Time: 30-60 minutes

Frequency: Daily, 1-2 times

There are several instances where NMES is not appropriate. Listed below are the conditions and/or medical situations where NMES is contraindicated.

**General Guidelines
(continued)****Contraindications:**

- **Over carotid sinus**
- **Pacemakers**
- **Urinary bladder stimulators**
- **Peripheral vascular disorders (e.g. thrombosis, thrombophlebitis)**
- **Malignancy**
- **Pregnancy**
- **Infection**
- **Morbid obesity**
- **Significant mental illness**

Setup

1. **Allow the patient to assume a comfortable position where the area of the body to be treated is accessible.**
2. **Expose the skin over the area to be treated. Make sure the skin is clean and dry. If necessary, clean the skin first with an alcohol prep pad.**
3. **Place electrode pads over the area to be treated in an appropriate manner. (Please refer to the protocols within this section for guidelines on the pad placement for specific diagnoses.) Do NOT place any external electrode pads directly over any area where the skin is broken, bleeding, or excessively irritated without prior physician approval. If electrode pads are placed in an area with an open wound, be sure that the electrodes are sterile.**
4. **Follow the specific treatment suggestions within this section for each diagnosis. Once the electrode pads are placed around the treatment area, increase the amplitude to the desired level. (Refer to the parameters for each diagnosis within this section for the specific recommended settings.)**
5. **When treatment has been completed, remove electrode pads from skin and check skin for any reaction to the electrode pads or the electrotherapy treatment. Place the electrodes into a bag that can be sealed to keep them from drying out. Please refer to the Instruction Manual for other specific instructions in caring for electrodes or the electronic device.**