

NMES Treatment Protocols

The primary aim of NMES is to provide muscle rehabilitation post injury, surgery or disease by exciting targeted motor nerves and thereby producing muscle contractions. The presence of intact peripheral nerve excitability and healthy muscle tissue are necessary to induce therapeutic and functional motor responses.

The following is meant to serve as guidelines. Adjustments and parameters are to ultimately be decided by the treating physician or therapist.

NMES Parameters

1. *Waveform*

- Symmetrical: Incorporate for larger muscle groups (e.g., quadriceps)
- Asymmetrical: Incorporate for smaller muscle groups (e.g., fingers); negative electrode is more active in this wave form – place directly over motor point.

2. *Frequency*: Affects the quality of contraction

- Tetany Range: 25 – 50 Hz
- Twitch/Muscle Fatigue Range: 80+ Hz

3. *Pulse Width/Duration*: Affects patient comfort

- Durations between 200 – 400 microsec are advisable

4. *Ramp*: Affects patient comfort, can mimic normal muscle recruitment

- Ramp up/down: 0 – 10 seconds (see following page for appropriate times)

5. *Duty Cycle*: On/Off stimulation affects muscle fatigue rate

- Times: 0 – 99 (see following page for appropriate times)

6. *Amplitude*: (Intensity) affects the muscular response - higher intensity = increase excitability

- General Rule: Strong but not painful

7. *Stimulation Modes*:

- Continuous
- Cycled: Both Channels will execute simultaneously as specified by the Duty Cycle
- Reciprocate: Channels will alternate stimulation

NMES Recommended Treatment Programs

**highlighted parameters are a critical element, to ensure successful outcomes

	Treatment Program	Quality of Contractions	Frequency	◆ ON:OFF times ● Ramps	Treatment Duration
Muscle Conditioning	Strength Training	60% + MVIC	Comfort	◆ 10:50 ● Comfort	● 10-15 reps ● 3-5 days/wk ● 2-3 weeks
	Endurance Training	Max Contraction up to 3+/5 MMT	Tetany	◆ 4:12 ● Comfort	● 30-60 min stimulation ON time ● Daily ● 2+ weeks
Range of Motion	Maintain ROM	3+/5 MMT	Tetany & Comfort	◆ 4:12 ● Comfort or Spasticity	● 30 min ● 60-90 reps ● Daily for life
	Contracture Management	3+/5 MMT	Tetany	◆ 4:12 ● Comfort or Spasticity	● 3 X 30 min ● ~ 200 reps ● 3-7 days/wk ● 2+ weeks
Enhanced Motor Control	Facilitation	Sensory only up to 3+/5 MMT Patient Participation	Tetany or Higher	◆ Triggered or 4:12 ● Comfort	● 10-30 min Rx ● 2-3 X/day ● 3-7 days/wk ● 2+ weeks
	Re-education	Sensory only up to 3+/5 MMT Patient Participation	Tetany or Higher	◆ Triggered or ● Comfort	● 10-30 min Rx ● 1-2 X/day ● 1-5 days
FES	Orthotic Substitution	3+/5 MMT	Tetany	◆ Triggered ● 0-10	● Daily ● For life
Edema	Edema Management	1-3/5 MMT Muscles in the area of edema	Twitch or Tetany	◆ Continuous or 4:4-12 ● Comfort	● 2 X 30 min ● 3-5 days/week ● 1-2 weeks
Spasticity Management	Spasticity - Antagonist	Up to 3+/5 MMT	Tetany or Higher	◆ 4:12 ● As needed to ↓ reflexes	● Before next Treatment ● As needed
	Spasticity - Agonist	3+/5 MMT	Tetany or Higher	◆ 4:12 ● As needed to ↓ reflexes	● Before next Treatment ● As needed
	Spasticity - Sensory Habituation	Sensory only	1-2 pps or bps	◆ Continuous	● Throughout the day ● 1-2 week trial

Information above is based on the work by Los Amigos Research & Education Institute. It is an extract from the book **Neuro Muscular Electrical Stimulation, A Practical Guide, 4th Edition.**

Common Conditions that Warrant NMES Therapy

Local Osteoarthritis/Leg	
Osteoarthritis/Leg	
Chondromalacia Patella	
Internal Derangement Knee	
Old Disrupted Anterior Cruciate Ligament	
AQC Ankle/Foot Defect	
Tear Lateral Meniscus	
Dislocated Patella	
Sprain/Cruciate Ligament (Knee)	
Sprain/Knee and Leg	
Paraplegia NOS	
Bell's Palsy	
Stroke CVA	
Muscle Disuse Atrophy	
Muscle Weakness	
Muscle Spasm	
Muscle/Ligament DIS NEC	
Spinal Cord Injury	
Serum Reaction	
Joint Replacement Knee	
Post Surgical State	
Sprain/ Rotator Cuff	
Sprain/Supraspinatus	