Lane Community College PTA Program
Electrical Stimulation Lab Activities

Transcutaneous Electrical Nerve Stimulation (TENS)

TENS Unit

- Using units in black plastic cases labeled TENS
- Clinical use – portable, superficial stimulation across the skin for (chronic) pain management
- Short lasting pain relief – typically, only during use
- Modes: Normal, Burst, Modulated

There are multiple setting on the TENS unit. Many units these days are marketed for easy use for the general public and have very few buttons to push. Try various settings and see which ones feel better for pain relief.

Lab Activity 1– Upper Traps Sensory Analgesia

- Prepare skin and unit according to instructions on front page of handout.
- Apply electrodes to bilateral upper trapezius muscles. (See photo. You may need assistance from a partner or to pull back long hair in order to achieve proper connection.)
- Turn on unit and set proper parameters given by your instructor.

TENS Questions:

1. What parameters did you use?
2. What other settings did you try?
3. What settings gave the most pain relief?
4. How does electrode placement affect the response?
5. How long did you feel the effects of the TENS?

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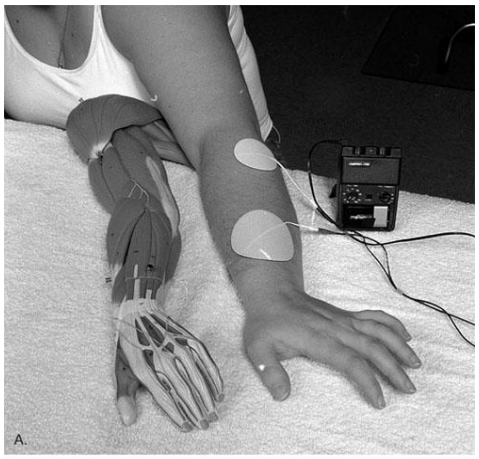
Neuromuscular Electrical Stimulation (NMES)



Prepare the skin and unit as described on the front page of this lab handout.

Place electrodes on the wrist extensor muscles as shown in the picture.

Set the following parameters:

- Pulse Duration: unit fixed 250 µsec
- Frequency (Pulse Rate): 50Hz
- On/Off Times: 10sec/10sec
- Reciprocal (A-C-S on this unit): No (C)

(A=Alternation, C=Constant, S=Synchronous)

- Ramp Time: 1 sec

Turn up the Intensity of the correct channel (light comes on) until something is felt under the electrodes. How high is the intensity (mA) when the first sensation is felt?

- Continue to turn up the intensity until a tetanic muscle contraction is elicited. How high was this?
- Continue 2-3 cycles, actively contracting into full wrist extension. Note the abrupt start and stop of the electrical stimulation. Now turn the intensity all the way off and set the ramp time to 5 seconds. Turn the intensity back and repeat the previous. Which is more comfortable, less or more ramp time?
- Turn the intensity all the way back down and turn the pulse rate up to 80pps. What happens to the quality of the contraction?
- This time, turn the pulse rate down to 10pps. Now what happens to the quality of the contraction?

Neuromuscular Electrical Stimulation (NMES) Questions

1. What was the optimal pulse rate (frequency) to elicit the full tetanic contraction? How does this compare to your classmates?

2. What is the clinical significance of ramp time? Off Phase?

3. What is the role the length-tension relationship and patient position in muscle contraction in this scenario?

4. With what other muscles groups could this technique be easily utilized by a patient at home?

5. If using this technique on a much larger muscle group and the patient feels painful under the electrodes, what steps can be taken to increase comfort?

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Clinic Unit – RichMar Winner

Available waveforms:

- Quadpolar IFC (Classic Interferential)
- Premod IFC (Bipolar Interferential)
- Russian
- Hi-Volt
- Microcurrent

Quadpolar IFC (Classic Interferential)

Set up a partner as in the picture above with electrodes across the lumbar spine. These machines have pre-set parameters for this setting.

- Have your partner increase the intensity until you start to feel some sensation. How high was the intensity for you to first feel something?
- Continue increasing intensity until you feel a strong but comfortable tingle but no muscle twitch. How high was this comfortable level of stimulation?
- After several minutes of stimulation, did your sensation change? Did it feel more intense, less intense or about the same?
- Did you feel all 4 electrodes? Was there a pattern to the movement of current?
- How was the skin after removal of the electrodes?

IFC Questions:

1. How does this application most differ from TENS?
2. What safety measures would a PTA take when leaving a patient in a room on this type of machine?
3. How would you use just 2 electrodes on this machine?
4. What other applications or treatment techniques can be done of this machine?