Electrical Stimulation:

Application of Contemporary Evidence Based Practice

Live Interactive Webinar

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Overview of Course

This course presents current information about the use of electrical stimulation alternating current as a therapeutic intervention including indications/contraindications, physiologic effects, determination of treatment parameters, application techniques to manage tissue edema, muscle spasm, and muscle weakness/re-education.

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Course Rationale

The purpose of this course is to present course participants with evidence based contemporary information about the application of neuromuscular electrical stimulation to address impairments limiting functional activity performance. Refreshing knowledge on this modality will allow the therapist and assistant to more effectively direct their interventions to maximize patient outcomes and progression toward therapeutic goals.

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Goals/Objectives

1. Identify contraindications for the use of electrical stimulation.
2. Recognize the physiologic effects of alternating current electrical stimulation.
3. Identify indications for the use of electrical stimulation and specific impairments managed.
4. Summarize the role of electrical stimulation in rehabilitation and achievement of functional goals.
5. Define intervention parameters including frequency, duty cycle, amplitude, ramp time, treatment time, and patient positioning.
6. Determine specific electrical stimulation parameters best suited to manage tissue edema, muscle spasm, and muscle weakness/re-education.
7. Describe the influence of electrode placement on effectiveness of the current.
8. Recognize safety considerations when applying electrical stimulation.

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- Application of concepts presented in this webinar is at the discretion of the individual participant in accordance with federal, state, and professional regulations.

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Course Outline/Schedule:

3 hour live interactive webinar

Topic	Time
Electrical Stimulation Types of Current	0:00-0:05
Electrical Stimulation Contraindications	0:06-0:14
Physiologic Effects of Alternating Current Electrical Stimulation	0:15-0:30
Impairments Managed with Electrical Simulation	0:31-0:40
Role of Electrical Stimulation in Rehabilitation	0:41-0:50
Interactive Discussion of Clinical Applications	0:51-0:60
Electrical Stimulation Parameters for Specific Impairments	1:01-1:10
Frequency	1:11-1:20
Amplitude	1:21-1:30
Duty Cycle	1:31-1:40
Ramp Time	1:41-1:45
Treatment Time	1:46-1:50
Interactive Discussion of Clinical Applications	1:51-2:00
Electrode Placement	2:01-2:05
Muscle Spasm	2:06-2:15
Edema	2:16-2:25
Weakness/Re-Education	2:26-2:35
Patient Positioning	2:36-2:40
Electrical Stimulation for Strengthening	2:41-2:45
Safety Considerations	2:46-2:50
Interactive Discussion of Clinical Applications	2:50-3:00

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- After the live interactive webinar and prior to 11:59 pm TONIGHT go to www.cheapceus.com
- Complete the post test with score of at least 70%
  - May be retaken multiple times
- Submit online payment for course
- Print Certificate
- Course Review and Summary for Post Test at the end of the webinar.

Consider This!

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Emphasis of Course

- Goal is to simplify the concepts of electrical stimulation and current research findings to facilitate immediate clinical application with an understanding of the physiologic effects supporting modifications to interventions to achieve desired outcomes.

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Electrical Stimulation: Types of Current

- Can become very confusing so we are limiting this course to what is called Alternating or Biphasic Pulsed Current.
- There is no net effect from the positive or negative poles.

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When selecting a piece of equipment look for the setting Alternating Current, Biphasic, Biphasic Symmetrical

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Clinical Terminology

When documenting or reading research, interventions with this specific type of stimulation may be referred to as

- NMES Neuromuscular Electrical Stimulation
- Mechanism of action is stimulating innervated muscle through stimulation of the nerve.

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Patient Impairments Managed

- Impairments to manage with biphasic current:
  - Edema
  - Muscle Spasm
  - Muscle Weakness
    - May be referred to as muscle strengthening or re-education.
    - When utilized during performance of an activity of daily living may be referred to as Functional Electrical Stimulation (FES)

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Contraindications

- Resources have some agreement on when electrical stimulation CANNOT be utilized.
- There is variability among sources, but when in doubt patient safety must come first as other interventions can address the impairments.

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Contraindications cont.

- Placement over the anterior neck or carotid sinus

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Contraindications cont.

- Areas with active or suspected venous or arterial thrombosis or thrombophlebitis
  - Muscle contraction may dislodge thrombus leading to cardiac infarction, stroke, pulmonary embolism, or organ failure.
  - Vasodilation of contralateral limb or at peripheral locations could also result in embolism.

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Contraindications cont.

- Over/around abdomen or low back during pregnancy
  - May elicit uterine contraction with potential miscarriage or early labor induced.

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Contraindications cont.

- Patients with a cardiac pacemaker or arrhythmias
  - Expand to include any area where it can malfunction implanted electronic devices
  - Also consider cardiac defibrillator, bone stimulator, spinal cord neurostimulators

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Contraindications Cont.

- Regions of known or suspected malignancy
  - May increase circulation allowing spread of cancerous cells.
  - May stimulate cell replication and growth of tumor.
  - TENS (transcutaneous electrical nerve stimulation) might be appropriate for palliative care specifically pain management.
  - At end of life, benefits of may outweigh risks.

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Physiologic Effects

- Current takes path of least resistance.
- Excitable tissues with a **high water content** offer less impedance and are **good conductors** offering less impedance/resistance.
- This means that the current flows well through them and these are the tissues that CAN be targeted to elicit physiologic effects.
  - » **Nerve**
  - » **Muscle**
  - » **Cell membrane**
  - » **Blood cells**

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Consider your target tissue

Non-excitable tissues will NOT respond well to the current because of their low water content. They are resistant or impede current flow.

- » Bone
- » Cartilage
- » Tendon
- » Ligament
- » Fat

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Nerve Excitation

- Sensory (afferent) and Motor (efferent) nerves are receptive to stimulation.
- Application of the current through the electrodes induces movement of the ions (Sodium, Potassium, etc.) in that region.

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Nerve Excitation cont.

- Larger diameter nerve fibers have more ions which offer less resistance and conduct their signals faster.
- Superficial Nerve fibers closest to the electrodes are more excitable. Example: A beta sensory fibers for superficial touch in the dermis.
  - – This is why the patient “feels” the “tingle” first.

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Nerve Excitation cont.

- At rest the nerve is positively charged on the outside.
- Application of the electrodes over the region of the nerve causes the movement of the sodium and potassium ions creating depolarization of the nerve.
- The impulse propagates down the nerve ultimately facilitating muscle contraction.

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Muscle Contraction

- The motor nerve is stimulated to elicit an action potential which causes the muscle to contract.
  - – Must have an intact nerve to muscle junction for this type of current to work.
- The muscle fibers are then recruited to contract in a specific order.

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Muscle Fiber Recruitment

- **Normally**:
  - During typical activities, our body will recruit the **Smaller Diameter Type I Slow Twitch** fibers.
  - These generate low force contractions and are fatigue and atrophy resistant.
- **Electrical Stimulation**:
  - **Larger Diameter Type II Fast Twitch** fibers are recruited first which is **opposite voluntary contraction.**
  - These generate strong quick contractions but fatigue easily.
  - These fibers also atrophy rapidly with disuse.

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Muscle Recruitment cont.

- This recruitment pattern is why Electrical Stimulation encourages strength gains for patients with
  - weakness or disuse atrophy following surgery or immobilization
  - muscle weakening pathologies
- Clinically, this may be referred to muscle re-education (teaching it how to contract after injury).

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Skeletal Muscle Regeneration

- Research in mice indicates that electrical stimulation is effective in enhancing muscle satellite cell proliferation.
- These cells are crucial for skeletal muscle regeneration following disuse atrophy.

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Muscle Oxidative Capacity

- Research supports increased activity of oxidative enzymes following the use of electrical stimulation.
- These enzymes contribute to fatigue resistance (endurance)and functional exercise capacity.

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Muscle Fiber Hypertrophy

- Research on healthy subjects indicates increased muscle mass/fiber size and strength gains following electrical stimulation.
  - Counteracts disuse atrophy
- May not be appropriate for certain populations such as Rheumatoid Arthritis as they cannot tolerate high intensity exercise.
- Must consider specific patient pathology, impairments, goals, and co-morbidities when determining is electrical stimulation is indicated.

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Impairments Managed with Alternating/Biphasic Pulsed Current

- **Muscle Spasm** by fatiguing the muscle forcing it to relax.
- **Range of motion** can be improved when muscle spasms are alleviated breaking into the pain-spasm cycle.

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Impairments cont.

- **Pain** resulting from muscle spasm may be diminished through muscle fatigue breaking the pain spasm cycle.
  - TENS (transcutaneous electrical nerve stimulation) or Interferential Current may also be effective to directly relieve pain. (not covered in this course)

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Impairments cont.

- **Muscle Weakness** by recruiting Type II fast twitch muscle fibers that typically atrophy with disuse.
- **Muscle Re-education through proprioceptive input**
  - Neurological conditions such as stroke, spinal cord injury, or peripheral nerve injury
  - Orthopedic conditions such as ACL surgery where muscle is intact.

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Impairments cont.

- **Edema** can be diminished by utilizing electrical stimulation on the muscles proximal to the region of the edema.
  - By stimulating the muscle pump, venous return and lymphatic flow can be increased to alleviate edema.
  - Ensure muscle contraction is not contraindicated.
- Do not use electrical stimulation for edema of cardiac or renal origin.

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Role of Electrical Stimulation in Rehabilitation

- Professional organizations reiterate need to combine modality use with other interventions in order to be considered therapy.
- Examples:
  - Stretching /Strengthening
  - Manual therapy
  - Preparation for or during actual performance of functional activities

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APTA
American Physical Therapy Association
The Science of Healing. The Art of Caring.

EXCLUSIVE USE OR USE OF MULTIPLE PHYSICAL AGENTS/MODALITIES HOD P06-10-08-05 [Initial HOD P06-95-29-18] [Position]

Physical agents/modalities should be utilized only as a component of patient/client management. The use of physical agents/modalities in the absence of other interventions or the use of multiple physical agents/modalities with a similar physiologic effect should not be considered physical therapy nor should it be considered medically necessary without documentation that justifies the necessity of the physical agents/modalities.

Relationship to Vision 2020: Evidence Based Practice; (Practice Department, ext 3176)

http://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/HOD/Practice/ExclusiveUse.pdf

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AOTA The American Occupational Therapy Association, Inc.

Physical Agent Modalities

The American Occupational Therapy Association (AOTA) asserts that physical agent modalities (PAMs) may be used by occupational therapists and occupational therapy assistants in preparation for or concurrently with purposeful and occupation-based activities or interventions that ultimately enhance engagement in occupation (AOTA, 2008a, 2008b). AOTA further stipulates that PAMs may be applied only by occupational therapists and occupational therapy assistants who have documented evidence of possessing the theoretical background and technical skills for safe and competent integration of the modality into an occupational therapy intervention plan (AOTA, 2008b).

http://www.aota.org/-/media/corporate/files/secure/practice/officialdocs/position/physical-agent-modalities-2012.pdf#sthash.GikB7tnJ.dpuf

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ASHT

AMERICAN SOCIETY OF HAND THERAPISTS

American Society of Hand Therapists

A Position Paper on the Use of Physical Agents/Modalities in Hand Therapy

Revised October 2012

POSITION:

The American Society of Hand Therapists (ASHT) endorses the safe and effective use of physical agents/modalities in upper extremity rehabilitation by certified hand therapists, occupational therapists and physical therapists. Physical agents/modalities must only be utilized in accordance with the parameters, established by the professional regulatory and licensing boards, of the occupational therapy and physical therapy professions.

http://www.asht.org/sites/default/files/downloads/2012/modality_position_paper_final_oct_2012.pdf

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NATA

NATIONAL ATHLETIC TRAINERS' ASSOCIATION

HEALTH CARE FOR LIFE & SPORT

Athletic Training Association Education Competencies

- "Describe the relationship between the application of therapeutic modalities and the incorporation of active and passive exercise and/or manual therapies, including therapeutic massage, myofascial techniques, and muscle energy techniques."

National Athletic Trainers' Association. "Athletic training educational competencies." (2011): 35-36. https://www.nata.org/sites/default/files/competencies_5th_edition.pdf

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Knobology

"Knobology is a 'tongue-in-cheek' term for the study of application without theory… [the term] for students and clinicians who want to know only which knobs on a therapeutic modality to turn but are uninterested in why they are doing so. Not only would there be little advancement in medicine if all clinicians were knobologists, but patients would suffer from inadequate treatment. Don't be a knobologist!" (from Knight and Draper, Therapeutic Modalities: The Art and Science)

https://books.google.com/books?id=U_LQLp9v5_QC&pg=PA4&lpg=PA4&dq=knobologist&source=bl&ots=rv41s0ukX_&sig=r88up63YZ_zdf3j6FzMCyG9pEP8&hl=en&sa=X&ei=utGXVO6fOoHcggTUqITQDA&ved=0CD0Q6AEwBA#v=onepage&q=knobologist&f=false

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After this course, you will

- Select the specific parameters (equipment settings) to elicit the desired physiologic effects necessary to achieve the goal of the intervention.
- Have a rationale for each parameter so that you can monitor the patient response and modify accordingly to maintain safety and achieve the desired outcome.

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Electrical Stimulation Parameters for Specific Impairments

After selecting alternating/biphasic pulsed current on the unit, the following parameters must be set on the equipment:

1. **Frequency**
2. **Amplitude**
3. **Duty Cycle**
4. **Ramp**
5. **Treatment Time**

Then you must set up the **electrodes** on the target treatment area and **position the patient** appropriately.

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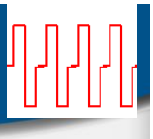
1. Frequency



- Also called **pulse frequency** or **pulse rate**
- It is measured on the stimulation unit and documented in Hertz (**Hz**), pulses per second (**pps**), or cycles per second (**cps**)
- This is the number of pulses of the current delivered to the body in 1 second. Axon response to the current under the electrodes will vary based on frequency.

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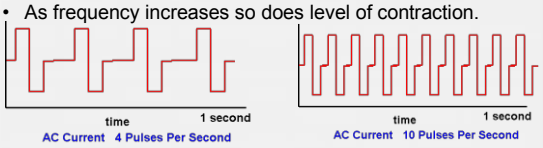
Frequency cont.

- How high to set frequency is based on the type of muscle contraction needed to achieve the desired physiologic effect in the tissues.
- As frequency increases so does level of contraction.



- More pulses → more motor unit stimulation → more contraction

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Frequency based on Impairment

- Research does not indicate a set frequency to manage impairments. Ranges are identified which must be adjusted based on patient response to the intervention.
  - Consider strength, muscle endurance, and goal.
  - Then select a specific frequency.

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Frequency cont.

- **1-10 pps**

- Elicits a gentle **twitch** contraction in muscles where at least one motor unit fires stimulating the muscle pump and lymphatic flow
- Not typically utilized with NMES. Possibly Indicated for **Edema** Management if stronger contraction not tolerated.

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Frequency cont.

- **35-50 pps**

- Elicits a **tetanic** contraction of muscles with multiple motor units reaching summation for a strong contraction
- Indicated for
  - **Strengthening smaller muscles**
  - Greater muscle pump for **Edema**
  - **Muscle Spasm**

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Frequency cont.

- **35 - 80 pps**

- Elicits **tetanic** contraction in larger muscles where greater recruitment is needed for desired response
- Indicated for **Strengthening larger muscles**
- **> 50 pps** suggested for improvement of muscle performance

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2. Amplitude

- Also called Intensity
- This setting determines the strength of the muscle contraction.
- As current is delivered to the tissues neuroexcitation occurs in a predictable pattern.
- Recall that current takes the path of least resistance so proximity to the electrode and diameter of the nerve plays a role.
  - The more superficial and larger nerves will react first.

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Order of Neuroexcitation

1. A Beta sensory fibers (sensory level)
   - Located in superficial dermis which are the large diameter nerves sensing touch react first
   - Patient feels the 'tingle'
2. A Alpha motor neurons (motor level)
   - Depolarize as the amplitude increases and more current is delivered.
   - Visible fasciculation → twitch → tetany
3. A Delta and C pain (noxious level)
   - Small unmyelinated pain fibers results in noxious stimulation.

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Amplitude based on Impairment

- **Sensory** level amplitude
  - Set to maximum comfortable level tolerated by patient without any muscle fasciculation/twitch elicited.
  - Indicated for
    - Muscle Weakness or Re-education in **later stages** when cue needed

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Amplitude cont.

- **Motor** level amplitude
  - Increased to point of **visible muscle contraction**
  - Indicated for
    - **Spasm** to fatigue muscle and break into pain spasm cycle.
    - **Edema** to stimulate muscle pump.
    - Muscle **re-education** to provide sensory input, proprioceptive feedback, strength sufficient for the activity.
    - Muscle **weakness** to recruit fibers and gain strength

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Amplitude cont.

- As the amplitude or amount of current delivered is increased so is the depth of penetration and the motor units recruited.
- Research supports
  - Highest tolerable amplitude
  - At least 50% of Maximum Voluntary Contraction (MVC) should be achieved

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3. Duty Cycle

- Also called on/off time or pulse modulation
- This setting determines if the current will be delivered continuously or if there will be pauses for it to shut off during the overall treatment time.
- Determine this parameter based on patient impairment and if a longer 'rest' is needed after 'work' for the **muscle recovery**.

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Duty Cycle cont.

- A **Continuous** duty cycle means that from the moment the treatment time starts until it finished the patient is receiving (feeling) the current at the frequency and amplitude that was set.
  - There is no pause in current delivery.
  - It causes **constant contraction of the muscle** with no rest so the muscle **fatigues** quickly.
  - Indicated for **Spasms**

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Duty Cycle Ratios

- **Interrupted** means that there will be time the current is on then time it is off. A ratio represents the work to rest proportions for the muscle that will occur during the total time of the intervention.
- This ratio is converted into actual seconds of treatment time and must be **documented in seconds**.
- Example with at 1:1 duty cycle, however many seconds the current is on/being delivered will be equal to the number of seconds the current is off/not coming out of the electrodes.
  - This pattern will continue to repeat itself for the full time of the intervention.

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Duty Cycle cont.

- Equal work (current on) and rest (current off) Ratio **1:1**
  - Example: **10 sec on/10 sec off**
- Indicated for
  - **Edema** – Simulates muscle pump
  - **Spasm** - Equal contraction/work and rest time leads to eventual fatigue of the muscle.

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Duty Cycle cont.

- A longer rest (current off) time allows for muscle recovery. Remember NMES recruits Type II fibers that generate a stronger contraction but fatigue more quickly.
- Ratio **1:5**
  - Example: **10 sec on/50 sec off**
  - Indicated for s**trengthening very weak muscles**
- Ratio **1:3**
  - Example: **10 sec on/30 sec off**
  - Indicated for **strengthening stronger mus**cles as there is less recovery time.

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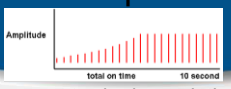
4. Ramp Time



- Ramp allows the current to slowly reach the maximum amplitude as it is delivered to the patient.
- Typically set as a ramp up (rise) and down (decay) of 1 or 2 seconds each. It is **part of the 'on' time** of the duty cycle.
- Ramping **simulates normal recruitment** generating a smoother contraction and normal **relaxation of the contraction.**
- Indicated for **Strengthening**

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Ramp cont.

- With spasticity, a ramp up of the antagonistic muscle group permits gradual development of the active/voluntary muscle contraction.
- Encouraging greater motion as the spasticity muscle relaxes through reciprocal inhibition.
- Example: spastic biceps → apply stimulation with ramp to triceps → as triceps slowly increase in contraction strength, the biceps are given time to relax = success with motion.

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5. Treatment Time based on Intervention Goal

- For Edema Management
  - 10 to 30 min to simulate muscle pump.
- For Relief of Muscle Spasm
  - 10 to 30 minutes based on level of spam present
- If applied with a heat or cold modality defer to that time to avoid tissue damage.

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Treatment Time cont.

- For Strengthening
  - 10 to 20 min based on the duty cycle set to allow performance of a full set of exercise (10 to 20 contractions).
  - Consider how much rest time is needed based on muscle endurance.

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Treatment Time cont.

- For a Muscle Re-education during Functional Task
  - Varies based on task
  - May also need to adjust duty cycle and ramp time for performance.

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Electrode Placement Considerations

- Two electrodes leaving one channel of the unit (**bipolar placement**) are required to complete the circuit with Alternating/Biphasic Pulsed Current.
- Use of red vs. black lead wires with the electrodes has no impact on the intervention with this current as the positive and negative alternate.
- Both **electrodes are of equal size** so that they deliver the same current density.

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Electrode cont.

- Electrodes must be secured to skin with total contact with a conduction medium between the electrode and the skin to avoid tissue damage.

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Electrode cont.

- Prior to the application of the electrodes, cleanse the patient's skin with alcohol or water and allow it to dry.
- This decreases impedance from the skin and improves current delivery to the tissues
  - Allows for less amplitude to achieve desired response.

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Electrode cont.

- Remember your anatomy and palpation!
  - Think about the muscle layers and what you are targeting with the stimulation.
  - The electrodes must be at least one pad width apart from each other on the target treatment area.
- The **closer** together the electrodes are the more **superficial** the stimulation.
- If targeting a deeper muscle, move electrodes **further apart for deeper penetration**.

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Electrode Placement Spasm

- For Muscle **Spasm**
  - Palpate to **surround** the spasm with the electrodes.
  - Placement **along length of muscle (parallel to direction of muscle fibers)** so that the current traveling from pad to pad follows the direction of the muscle fibers.

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Electrode Spasm cont.

- Placement over **trigger points** may also be effective.
- These locations offer low resistance to the current flow so less amplitude is required to achieve the motor level response.

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Electrode Spasm cont.

- **Two channels** can be utilized to treat bilaterally (right/left) simultaneously.
- Amplitude will be **adjusted individually** on each side as tolerance may be different.
  - Current does not cross between channels.
- Depending on unit, duty cycle on time for Channel 1 is off time of Channel 2.

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Electrode Placement Edema

- For **Edema**, place electrodes on the **muscle belly parallel to direction of the muscle fibers** in region proximal to the edema to facilitate venous/lymphatic flow through the **muscle pump**.
  - Example: Ankle edema – Gastrocnemius
- Research varies as to effectiveness of Alternating/Biphasic Pulsed Current in this manner.
  - Interferential Current or other modalities may be more beneficial.

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Electrode Placement Strengthening/Re-education

- For **Strengthening,** at least one of the electrodes should be placed on or near the **motor point** of the muscle.
  - This is the location where the nerve enters the muscle.
  - Less current amplitude is required to elicit strong muscular contraction at the motor point.

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Electrode Strengthening/Re-education cont.

- Place electrodes **along length of muscle (parallel to direction of the muscle fibers)**so that current flows the direction of the fibers.
- Palpate the muscle against an isometric contraction to locate the muscle belly (not tendon which is less excitable).
  - Motor point typically near the middle of the belly.

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Electrode Strengthening/Re-education cont.

- Consider need to **stimulate multiple muscle bellies** at their motor points to achieve desired joint motion.
  - Example: VMO and Rectus femoris

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Electrode cont.

- Select the appropriate size electrode for the placement need to achieve the goal.
- The smaller the electrode the more dense and uncomfortable to current feels to the patient.
- Larger muscles require larger electrodes to deliver sufficient current at a tolerable amplitude level to elicit the desired effects.

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Locating Motor Points

- When the patient cannot tolerate sufficient amplitude to achieve the desired level of muscle contraction, **motor point mapping** may be beneficial for electrode placement.
  - For instructions, refer to "Muscle Motor Point Identification Is Essential For Optimizing Neuromuscular Electrical Stimulation Use" by Gobbo, Maffiuletti, Orixio, and Minetto 2014
  - http://www.jneuroengrehab.com/content/11/1/17

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Patient Positioning

- For **Edema**
  - **Elevate** allowing gravity to facilitate venous return.
- For **Spasm**
  - Allow muscle **relaxation** and **progressive ROM** if tolerated.

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Patient Positioning Strengthening

- For **Strengthening**
  - The **patient must actively contract the muscle.**
  - Consider Manual Muscle Test (MMT) grade to position against gravity or gravity minimized.

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Positioning Strengthening cont.

- Consider type of muscle contraction **isometric or isotonic** (concentric/eccentric).

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Patient Positioning Muscle Re-education

- For **Muscle Re-education** the sensory stimulation that occurs with motor level amplitude provides feedback for facilitation of motor control.
  - Consider the specific **functional task** being performed for positioning.

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Note on Strengthening

- Electrical stimulation recruits large muscle fibers first (fast twitch) which can aid in retarding disuse atrophy.
- Since this is opposite of normal volitional contraction (small slow twitch first), rehabilitation programs must incorporate strengthening without electrical stimulation and wean the patient off the stimulation.

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Safety Considerations

- Observe all typical electrical equipment safety, inspection, and maintenance procedures.
- Have equipment calibrated annually.
- Do not remove electrodes until current is turned off.
- **Position patient, hot pack, and cold pack prior to increasing amplitude.**
  - Amplitude should be set before “starting” treatment time.
  - **Only increase amplitude during "on time” of duty cycle.**

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Safety cont.

- Adhesive from electrodes may corrode lead wires limiting connection quality.
- Do not allow the weight of the lead wires to pull the electrodes away from the skin.

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Self Adhesive Electrodes

- Seal in air tight plastic bag to avoid drying out.
- For hygiene purposes assign set to one patient and label with patient’s name.
- Must remain adhesive!

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Self Adhesive Electrodes

- Intended to be Disposable!
- Dispose of electrodes when no longer “sticky” as they will not conduct the current.

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