<table>
<thead>
<tr>
<th>Arndt-Schultz Law</th>
<th>Davis' Law</th>
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<tbody>
<tr>
<td>● “Weak stimuli excite physiologic activity, moderately strong ones favor it, strong ones retard it and very strong ones arrest it.”</td>
<td>● “If muscle ends are brought closer together, the pull of tonus is increased, thereby shortening the muscle, which may even cause hypertrophy. If muscle ends are separated beyond normal, then tonus is lessened or lost thereby weakening the muscle.”</td>
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<tr>
<td>● Pertains to the physiologic effect of stress and relaxation (massage)</td>
<td>● Chronic shortening may cause spasms</td>
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<tr>
<td>● Strong stimuli like pain/trigger points arrest normal function</td>
<td>● Microtrauma may cause loss of strength</td>
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<tr>
<td>● Massage being a weak stimuli helps return homeostasis</td>
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| Hilton’s Law                                                                  | Pfluger’s Laws                                                              |
|                                                                                |                                                                            |
| ● “A nerve trunk that supplies a joint also supplies the muscles of the joint and the skin over the insertions of such muscles.” | ● A series of laws that are progressive by nature                           |
| ● Each nerve trunk supplies afferent and efferent information for joints, muscles skin and organs in a specific area. Pain increases sensory impulse to spinal cord. Some impulses are sent to motor pathways, increase vasoconstriction, etc. (Arndt’s law) | ● Dependent on nerve irritation                                             |
|                                                                                | ● They are experienced in order                                              |
|                                                                                  | ● Not ever client will progress through all five laws                        |
| ● Massage directly increases local circulation and interrupts the physiopathologic reflex arc. Normal function returns. |                                                                            |
1. Law Of Unilaterality

- “If a mild irritation is applied to one or more sensory nerves, then the movement takes place usually on one side only - the side that is irritated.”
- Movement refers to motor reflexes responding to stimuli. They “tighten” muscles on the affected side and limit ROM as protective mechanisms to prevent further injury
- Vasoconstriction prevents internal bleeding in muscle tears

2. Law of Symmetry

- “If the stimulation is sufficiently increased, then motor reaction is exhibited not only by the irritated side, but also in similar muscles on the opposite side of the body”
- Symptoms begin to migrate to opposite side if injury is left untreated
- Spasm on right side increase intensity if left untreated. The body will try to reduce sensory overload by shifting it to the motor nerve on the opposite side increasing tonus to the left side.

3. Law of Intensity

- “Reflex movements are usually more intense on the side of irritation. At times, the movements of the opposite side equal them in intensity, but they are usually less pronounced.”
- Irritation increases in intensity on both sides of the body, but pain is greater on the initial side of irritation.

4. Law of Radiation

- “If the excitation continues to increase, then it is propagated upward, and reactions take place through centrifugal nerves coming from the cord segments higher up.”
- Discomfort grows and the client progresses from one law to the next.
- “Tight” shoulder muscles will lead to “tight” neck muscles
5. Law of Generalization

- "When the irritation becomes very intense, it is propagated in the medulla oblongata, which becomes a focus from which stimuli radiate to all parts of the cord causing a general increase of tonus in all muscles of the body."

- Chronic Pain
- The goal of myomassologists is to reduce sensory stimulation and muscle tonus so client can progress back down the laws
- Hydrotherapy

Sherrington's Law

- "When a muscle receives a nerve impulse to contract, its antagonist simultaneously receives an impulse to relax"
- The law of reciprocal inhibition
- Hamstrings in spasm, so enlist quads in an isometric contraction. Hold for 10 – 20 seconds repeat 3 times.
- Techniques of proprioceptive neuromuscular facilitation.

The Law of facilitation

- "When an impulse has passed once through a certain set of neurons to the exclusion of others, it tends to take the same course on future occasions, and each time it traverses this path, the resistance is less."

- Habits – posture, pain and movement
- Massage can break up these patterns giving nerves new pathways through experience, as long as it is not perceived as painful.
- Massage and passive movement can reprogram muscle and movement

Proprioceptors

- Found in muscles, joints, fascia, and ears
- Detect body movements, body position, and muscle stretch
- Classified by type of stimuli detected
  - Chemoreceptors detect chemical stimuli or changes in chemical concentrations of fluids
  - Photoreceptors detect light stimuli
  - Thermoreceptors detect changes in temperature
  - Osmoreceptors detect changes in electrolyte concentrations
  - Nociceptors detect noxious stimuli, such as excessive heat and cold or tissue damage
  - Mechanoreceptors detect mechanical stimuli
Clinical massage uses specific, focused techniques

Umbrella terms include:
- Medical massage—generally referring to massage prescribed and or directed by a physician
- Orthopedic massage uses a multidisciplinary approach to treat soft tissue pain and dysfunction
  - A great article about the distinction between medical and orthopedic massage can be found in Massage Today February 2004
- Treatment massage

Clinical massage uses specific, focused techniques

Umbrella terms include:
- Neuromuscular therapy—A combination of therapeutic techniques to work the nervous system reflexively to bring about desired change (Leon Chiatow)
- Trigger point work
- Sports massage
- Deep tissue and deep pressure massage

Clinical Massage

Can be used as a:
- Stand-alone treatment
  - Example: A 15- to 30-minute rotator cuff treatment
  - Rehabilitative approach in sports massage
- Focused segments of relaxation massage

Pressure: Depth and Direction

- Depth of pressure: Application of manual forces to the body’s surface
- Light pressure: About the same amount of pressure needed to apply lubricant to skin
  - Applied with hands, elbows, and forearms
  - Also applied with knees, feet, handheld tools, and external apparatus
Pressure: Depth and Direction

- Direction of pressure is related to anatomic structure or physiologic event; for example:
  - Effleurage applied centripetally on extremities to promote venous and lymphatic flow
  - Deep friction applied at right angles to spread and mobilize tissue strands

Excursion

- Distance traveled or length of a stroke
- Depends on:
  - Muscle length
  - Area of tissue dysfunction
  - Topographical region (back, arm, thigh)
  - Anatomic structure (lateral border of scapula)
- Bow stance: Used to apply longer strokes
- Horse stance: Used to apply shorter strokes

Rhythm and Speed

- **Rhythm** refers to regularity or patterning of massage techniques as they are applied
  - Rhythmic: Applied at regular intervals
  - Arrhythmic: Applied irregularly or juxtaposed

Rhythm and Speed

- **Speed** is the rate at which massage techniques are applied to the body
  - Rapid movements: Stimulating and energizing
  - Slower, rhythmic movements: Calming and relaxing
  - Quick movements: May cause client to tense up
Continuity

- Refers to the uninterrupted flow of techniques and unbroken transitions from one technique to the next
- The glue that holds the massage qualities and techniques together

Duration

- Length of time during:
  - Massage session (for example, 30 minutes, 60 minutes)
  - Massage of an area (for example, back, leg)
- Duration of the session often depends on its purpose
- Duration of localized massage varies according to the area’s size and the chosen technique

Sequence

- A particular order in which events follow each other
- How various massage techniques are arranged during a session
- Area most proximal should be worked first, proceeding to distal (for example, thigh, then calf)
- Listen to client and client’s body
  - Modify strokes to meet the client’s needs

Compression

- A nongliding massage technique, that is sustained and rhythmic
  - Sustained compression: Maintains pressure for a period of time
  - Rhythmic compression: Applied by quickly compressing and releasing pressure repeatedly
Rhythmic Compression

- Press and release pressure using the heel of your hand, fist, or forearm
- Rhythmic alternating compression resembles a “pumping action” and may cause the client’s body to rock back and forth
- You may need to stabilize the client with your nonworking hand

Compression forces

- Two structures pressed together
- A direct blow (sudden) or sustained as in impingement
- Bruising and connective tissue damage, muscle especially
- Major force in massage
  - Circulation, nerve function, connective tissue pliability
  - Often in a broad base application

Compression Technique and Common Uses

- Palm, fist, or forearm is used to press and release soft tissues into underlying bone
- Force is applied at a 45- to 90-degree angle
- Pressure may be sustained or applied rhythmically, resembling a rocking motion
Tension Force

- Also called Tensile force
- Two ends of a structure pulled away from each other
- Bone resists this force
- The way most soft tissue is injured
  - Muscle strain
- Massage techniques of gliding and traction
- Supports proper alignment

Effleurage

- Application of gliding movements that are repeated and follow the contours of the body
- Variations:
  - One-handed
  - Two-handed
  - Alternate hand
  - Nerve stroke
Torsion

- Twisting forces
- Occurs with shear and tension
- Joint injuries
- Massage method – kneading
- Increases pliability of connective tissue

Bending forces

- Combine compression and tension
- Common cause of fracture and ligament injury, seldom soft tissue
- Massage techniques – kneading
- Proprioceptors respond well
- Pliability of connective tissue, especially affects ground substance

Pétrissage

- Lifting, compressing, and releasing soft tissues
- Variations:
  - One-handed
  - Two-handed
  - Alternate hand
  - Skin rolling

From Fritz: Mosby’s Essential Sciences for Therapeutic Massage, ed 2, St Louis, 2004, Mosby. Copyright © 2004 Mosby, Inc. All rights reserved.
**Shear forces**

- Sliding force with friction
- Tendons often injured by this force creating adhesions and fibrosis
- Cross-fiber friction creates therapeutic inflammation

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**Friction**

- Rubbing one surface over another in several directions
- Can be applied:
  - Superficially with hands gliding over skin
  - Deeply while moving skin across underlying tissue layers

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**Trigger Points**

- *Trigger points*: Palpable nodules or thickened areas found in taut bands in muscles
  - Locally tender and may produce pain, paresthesia, or other autonomic responses when activated or provoked by applied pressure
  - Produce referred pain
- Locations and the corresponding target zones of referral are fairly consistent from one person to another, although variations exists
**Trigger Points**

- **Paresthesia**: A collective term used to describe sensations of tingling, prickling, burning, pins-and-needles, itching, and numbness
- **Local twitch response**: A phenomenon that causes the affected muscle to twitch spontaneously when the trigger point is provoked
- **Jump sign**: A spontaneous reaction of pain or discomfort that causes a client to wince, jump, or verbalize when the trigger point is provoked

**Active and Latent Trigger Points**

- **Active trigger points**: Cause referred sensations that are familiar to the person experiencing them
- **Latent trigger points**: Sensations that occur when provoked, but the person is unfamiliar with the referral pattern
- **Myofascial trigger points**: Located in skeletal muscles and their related fascia
- Trigger points can also be found in tendons, ligaments, skin, and periosteum

**Causes of Trigger Points**

- Predisposing events cause excessive neurotransmitter release in axon terminals that lead to or result from shortened muscle fibers and localized ischemia
  - Creates an oxygen and nutrient deficiency and reduces energy production in muscle cells
  - Energy is no longer available in areas surrounding trigger points, so shortening of fibers is sustained, which causes palpable nodules or thickened bands

**TART**

- **Tissue changes**: Include changes in texture and thickness (induration); nodules; variations in density; and changes in temperature, including hot and cold areas
- **Asymmetry**: Comparison from side to side is essential
- **Range of motion alterations**: Client may report pain or reduction in movement during passive range of motion
- **Tenderness**: Client reports tenderness at the site of compression
Deactivating Trigger Points

- Start with methods to prepare tissue, such as heat applications or superficial warming friction
- Deep, firm gliding may increase local blood flow and mechanically release cross-bridges within muscles' sarcomere
  - Series of short, deep, glides (for example, 3 to 6 sets of 10 repetitions [reps]) along the direction of the taut band

- Sustained pressure (trigger point pressure release) can also be used
  - Depth of pressure depends on depth of point you are trying to release, as well as client's tolerance
  - Try to match the tension in a nodule or band and exceed it slightly, maintaining pressure for 8 to 12 seconds (up to 20) while client gives feedback
  - Can be followed by gliding and stretching

When Not to Deactivate Trigger Points

- If trigger points are limiting range of motion to protect a hypermobile joint or herniated disk, they might be serving a useful purpose
  - Underlying problem needs to be assessed and corrected before release of trigger points begins

Muscle Energy Techniques

- The controlled use of muscle contraction to support tolerance of tissue stretching
- Is considered an active technique
- Uses isotonic or isometric contractions
- Post-isometric Relaxation (PIR) – sometimes called contract-relax (CR)
- Contract-Relax-Antagonist-Contract (CRAC) – uses contraction of target muscle followed by contraction of antagonist to stretch target muscle
Muscle Energy Techniques

- Positional Release – very useful if client feels pain and or to diffuse trigger points.
  - Position client so that pain is reduced
  - Valuable regardless of pathology
  - The tender point is the guide to positioning, use a whole body approach
  - Also known as strain-counterstrain

Sports Massage

- Use of massage techniques that address the needs of athletes
  - Enhance endurance, reduce the risk of injury, and shorten recovery time
- Massage needs of athletes differ from those of the general public
  - Athletes want increased performance fast
  - Performance is the bottom line

Event Sports Massage

- Pre-event massage: Can enhance performance potential by reducing pre-competition apprehension
- Inter-event massage: Given between games or events and within 1 or 2 days before the next event
- Postevent massage: Given 30 minutes to 6 hours after event; focuses on reducing soreness and tension and promoting rest and recovery

Maintenance Sports Massage

- Addresses the athlete's treatment goals and emphasizes prevention
- During massage, spasm and trigger points are located and reduced by alternating gliding strokes

Rehabilitative Sports Massage

- Addresses the physical rehabilitation needs of athletes
- Enhance recovery after injury