DEFINITION

- “A skilled intervention performed by a physical therapist that uses a thin filiform needle to penetrate the skin and stimulate underlying myofascial trigger points, muscular and connective tissues for the management of neuromusculoskeletal pain and movement impairments.”

- To provide procedural support for the Therapeutic Dry Needling:
  - “Dry Needling is a neurophysiological evidence-based treatment technique that requires effective manual assessment of the neuromuscular system. Physical therapists are well trained to utilize dry needling in conjunction with manual physical therapy interventions. Research supports that dry needling improves pain control, reduces muscle tension, and facilitates an accelerated return to active rehabilitation.” (Kinetacore, October 2009)
Dry Needling Terminology

- Functional Dry Needling (FDN)
- Trigger Point Dry Needling (TDN)
- Intramuscular Stimulation (IMS)
- Intramuscular Manual Therapy (IMT)

(www.kinetacore.com)
Dry Needling in Physical Therapy

- **Evaluation**: subjective and objective examination of the neuromuscular system
- **Needle insertion points**: based on assessment and knowledge of neuroanatomy
- **Purpose**: to deactivate hyperirritable points within the muscle
- **Goal**: decreased pain and restoration of function

NEUROPHYSIOLOGICAL RESET

(www.kinetacore.com)
At Affinity Health System/Ministry Health Care, Dry Needling is:

- A treatment option/therapeutic modality utilized as an adjunct to other physical therapy techniques
- Not performed as a stand-alone service, but when appropriate, utilized within an established physical therapy plan of care
- Utilized only with Physical Therapy patients being served in Outpatient Rehab settings
- Performed only by a Physical Therapist who has successfully complete a certification course for Therapeutic Dry Needling
Scope of Practice

- Historical Basis
- Education and Training
  - not an entry level skill and requires additional training
- Evidence
- Regulatory Environment

(Federation of State Boards Resource Paper 2010)
History of Dry Needling

- Early 1900s: Sir William Gowers, MD introduced the term “fibrositis” and noted palpable tenderness and hardness of the muscle. (BMJ 1:117-121)

- 1928: Fred H. Albee, MD, ScD began using the term “myofacitis” and considered it from an orthopedic standpoint

  - It was thought these “lumps” were due to colloidal accumulation in the muscle tissue

- 1938: Arthur Steindler began to referring to pain from the muscle as “myofascial pain” and “trigger points” (JAMA. 1938; 110(2):106-113)

- 1938: JH Kellgran used hypertonic saline injections to irritate various soft tissue and demonstrate referral patterns.

- 1930s and 1940s: many others began to study referral patterns, notably in Germany and Australia
History of Dry Needling: (continued)

• 1979: Karl Lewit, MD, DSc. Published “The Needle Effect”
  
  – recognition that, indeed, a needle could be used as an extension of treatment of orthopedic dysfunctions

• Around this same time, Dr. Janet Travell began her work with an initial paper documenting 32 pain referral patterns from muscles injected with an irritant

  – adopted the terminology “trigger point”
  – published many more referral patterns along with Dr. David Simons
  – two volume set of “red” books:
    • Myofascial Pain and Dysfunction: The Trigger Point Manual (now in the 2nd edition)
More History…. 

  – consideration of the spinal segment in the treatment of myofascial dysfunction

• Treatment of myofacial dysfucntion (or trigger points) with the use of a needle began as “wet needling” (injections)
  – Performed with hypodermic needle and an injectable substance for pain relief

• Conceivable that perhaps the same result could be achieved by simply pistoning the needle without the added injectable

• Over time the dry hypodermic needle was replaced with a solid filament needle to treat the tissue without injections
Trigger Points: Definition

- **Active Trigger Points:**
  - hyperirritable spots
  - taut band of skeletal muscle/fascia
  - painful to palpation
  - produce characteristic pain, referred tenderness, motor dysfunction and/or autonomic phenomena

- **Latent Trigger Points:**
  - painful to palpation
  - sensations unrecognizable

- **Satellite Trigger Points:**
  - develop in a zone of reference of key trigger points
    - synergist, antagonist, neural link or referral zone
  - created neurogenically or mechanically by the key trigger point’s activity

(Simons, Travell and Simons, 1999)
Trigger Points: Characteristics

- Local Twitch Response
- Spontaneous Electrical Activity (SEA)
  - Visible on Ultrasound
  - Stiff to Vibration
- Biochemical Changes

(Simons, Travell and Simons, 1999)
Travell and Simons Mapping

[Diagrams showing muscle mapping and trigger points]
PROCEDURE

• The AHS Universal Protocol Correct Person, Correct Procedure, Correct Site Policy must be followed

• The AHS Consent Policy – Admission Informed Consent for Surgery and Other Invasive Procedures IRB policy must be followed

• Clinicians using Dry Needling with a patient must clearly explain the procedure and associated risks and benefits of the procedure

• Signed Consent Form
### Dry Needling versus Acupuncture

<table>
<thead>
<tr>
<th>Similarities</th>
<th>Differences</th>
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<tr>
<td>The Tool</td>
<td>Evaluation</td>
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<td>Application</td>
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<td>Overall Goal</td>
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[www.kinetacore.com](http://www.kinetacore.com)
## INDICATIONS FOR DRY NEEDLING VERSUS ACUPUNCTURE

<table>
<thead>
<tr>
<th>Acupuncture</th>
<th>Dry Needling</th>
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<tbody>
<tr>
<td>-Performed by a licensed acupuncturist or physician with special training in acupuncture</td>
<td>-Performed by a physical therapist with specialty training</td>
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<tr>
<td>-Mind/body/spirit considered in treatment plans along with specific conditions</td>
<td>-Treats specific condition as part of a physical therapy treatment plan</td>
</tr>
<tr>
<td>-Can treat internal and musculoskeletal complaints</td>
<td>-Indications include myofascial pain and range of motion restrictions</td>
</tr>
<tr>
<td>-- Indications include chronic pain, myofascial pain, headaches, fatigue, neuropathy, anxiety and depression</td>
<td>-Needles placed at local area</td>
</tr>
<tr>
<td>-Needles placed throughout body, along meridians</td>
<td>-Needles not retained</td>
</tr>
<tr>
<td>-- Needle depth varies for each patient and condition</td>
<td>-Often deeper needle depth</td>
</tr>
<tr>
<td>-Needles retained for 10-30 minutes</td>
<td>-Needles are manually manipulated or electrically stimulated</td>
</tr>
<tr>
<td>-Possible manual manipulation or electrical stimulation used</td>
<td>(Federation of The State Boards Research Paper, 2010)</td>
</tr>
</tbody>
</table>
CONTRAINDICATIONS

- Patient refused to consent
  - (patients must sign a Dry Needling consent form prior to the procedure)
- 1st trimester of pregnancy
- Uncontrolled anticoagulant usage
- Compromised immune system
- Local infection, skin lesion, or active tumor
- Area over cardiac pacemaker
- Scalp area in infants
- Areas over rib cage or thoracic spine unless the PT has advanced training in this area
- History of lymph node removal
  - (depends on presence of lymphedema and clearance from oncologist)

(APTA, Description of Dry Needling in Clinical Practice: and Educational Resource Paper, 2012)
PRECAUTIONS

- Needle aversion or phobia
- Significant cognitive impairment
- Metal allergy
- Vascular disease
- Severe osteoporosis
- Post surgical

• POST SURGICAL PROTOCOL
  - **6 weeks**: nothing that communicates with the area of surgery
  - **12 weeks**: local area of surgery with surgeon approval

(APTA, Description of Dry Needling in Clinical Practice: and Educational Resource Paper, 2012)
AREAS OF CAUTION

• Some areas call for caution with FDN regardless of the experience level of the dry needling practitioner

• Areas with significant viscera or neurovascular structures nearby:
  – Supra-clavicular triangle
  – Thoracic spine and rib cage
  – Thoraco-lumbar junction to L2
  – Iliac crest
  – Sacral/coccyx/buttock
  – Femoral triangle
  – Cubital and popliteal fossa

• Needling in or around these areas requires a greater skill that comes with experience and advanced level training

(Kinetacore, March 2014)
POTENTIAL COMPLICATIONS

• Common (1-10%):
  – Needle Insertion Pain
  – Muscle soreness
  – Fatigue
  – Bruising

• Uncommon (0.1-1%):
  – Aggravation of symptoms
  – Feeling faint or dizzy
  – Stuck or bent needle
  – Headache

• Rare/Very Rare (.01- 0.1%):
  – Infection
  – Pneumothorax

- Other (<.01%):
  - Vasovagal Response
  - Feeling Faint or Dizzy
  - Forgotten Needle
  - GI Issue (nausea, vomiting)
  - Neurological response
  - Emotional Response
    - (anxiety, euphoria)

- After Care Sheet

-White et. al. (2001)
Physiological Effects of FDN

• Increased Blood Flow:
  – measured with Doppler flowmetry in upper trapezius following needling (Cagnie, 2012)

• Decreased Banding:
  – following the local twitch response in dysfunctional tissue
    • restores normal sarcomere length
    • restores normal length tension relationship
    • allows for a more efficient muscle contraction (Hseih, 2012)

• Decreased Spontaneous Electrical Activity (SEA):
  – eliciting a local twitch response quiets electrical activity (Chen, 2007)
  – real time US confirms a local twitch response, particularly in the deeper muscles were observation of the LTR is not as reliable (Rha, 2011)
    • increased electric activity is noted as a characteristic of neuromuscular dysfunction that is correlated with lower pain pressure thresholds (Ge, 2011 and Xu, 2010)
Biochemical Changes:

- Elevations of below noted in active trigger points (upper trapezius) in remote areas as well (medial gastrocnemius muscle) in patients with neck pain after FDN:

  - **Hydrogen ions:**
    - higher acidity has been associated with ischemia, lowered nociceptor threshold sensitivity and pain

  - **Neurotransmitters:**
    - Bradykinin, Serotonin (5HT), NE, CGRP, Substance P
      - All involved in nociceptive sensitivity
      - Bradykinin can inhibit acetylcholinesterase which can lead to depolarization of the muscle fiber and banding of muscle tissue

  - **Cytokines and Chemokines** (TNF-alpha, IL-1b, IL-6, IL-8)
    - Involved in inflammation and immune regulation

(Shah, 2005 and Shah, 2008)
Biochemical Changes:

- Following a local twitch response elicited by advancement of the needle these chemical concentrations changed both locally and remotely

  - Significant ↓ in substance P and CGRP levels
  - ↑ in Beta-endorphin levels noted in the treated muscle

(Hseih, 2012 and Shah, 2008)
Biochemical Changes: (continued)

- With repeated sessions of dry needling changes noted in:
  - Hypoxia-inducible factor 1 alpha (HIF-1 alpha), isoform of nitric oxide synthases (iNOS), and vascular endothelial growth factor (VEGF)
    - Proteins that respond to hypoxia by creating ed capillarity of the tissue – angiogenesis
  - TNF-alpha and COX-2

(Hseih, 2012)
Central Nervous System Changes:

• As previously stated, biochemical changes noted were not limited to the local area of treatment.

• Changes noted both in the local tissue and systemically in blood serum (Shah, 2008).

• Substance P levels were elevated locally and in the dorsal root ganglion (DRG) (Hseih, 2012).

• Research shows elevated pain pressure thresholds of muscles in the same myotome as the muscle treated with FDN
  – (Srbely, 2010; Tsai, 2012; Hseih, 2007).
More CNS Changes:

- Sensory and proprioceptive stimulus from needling may drive the gate control mechanisms for pain reduction (Chu, 2002)

- Periaqueductal Gray (PAG) Activation:
  - fMRI performed after dry needling shows activation of PAG regions (Niddam, 2007)
  - involved in descending inhibition of pain

- Sympathetic response(s) can be clinically evident
  - Sweating (sudomotor), goose bumps (pilomotor), or circulatory changes (vasomotor)
Dry Needling may be used to:

- ROM
- Pain
- Restore Function
Increased ROM: How?

- blood flow
- banding locally or in segmental muscles
- Improve ability of muscle to move through range

(www.kinetacore.com)
Decrease Pain: How?

• Deactivate painful “trigger point”

• nocioceptive sensitizing agents

• SEA

• banding/compression of nearby tissues

• Segmental inhibition (DRG and dorsal horn)

• Effect on central mediators (PAG and endogenous opioids)

(www.kinetacore.com)
Restore Function: How?

- Restore length tension relationship
- Nociception
- Improve somatosensory mapping

(www.kinetacore.com)
FDN Uses (Continued)

• Manual therapy:
  – restrictions or deactivate a pain generator

• Movement re-education:
  – to restore efficient muscle contraction

• Diminish dysfunction in a muscle assisting restoration of function
  – How?
    • facilitation (i.e. mechanical/tactile stimulation)
    • restoring optimal length tension relationships (by decreased banding)
    • alleviating undue strain on nearby pain generating structures

- “reset” the system to allow more normal movement to occur
  - **RESET, REINFORCE, RELOAD!**

(www.kinetacore.com)
FUNCTION!!

• Selective Functional Movement Assessment (SFMA):
  – Movement analysis developed by Gray Cook
  – Comprehensive movement assessment with top tier movement patterns that can all be broken down into their component parts to assess where movement is breaking down for a patient
  – Practitioner easily able to determine whether the faulty movement is due to restrictions or insufficient/inefficient muscle control

(www.SFMA.com)
SFMA:

- **7 Top Tier Movement Patterns:**
  - Cervical ROM (flexion/extension, rotation and sidebending)
  - Shoulder ROM
  - Multisegmental Flexion
  - Multisegmental Extension
  - Multisegmental Rotation
  - Single Limb Stance
  - Deep Squat

- **Concept of Regional Interdependence**
- **Movement is Graded:**

<table>
<thead>
<tr>
<th></th>
<th>Functional</th>
<th>Dysfunctional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-painful</td>
<td>FN</td>
<td>DN</td>
</tr>
<tr>
<td>Painful</td>
<td>FP</td>
<td>DP</td>
</tr>
</tbody>
</table>

(www.SFMA.com)
QUESTIONS?

• Additional notable contributions to the descriptions of myofascial dysfunction that provide the groundwork for discovery and evolution of dry needling have been made by:
  
  – Peter Baldry, MD
  – Beat DeJung
  – Robert Gerwin

• akriese@affinityhealth.org
References

- Gowers, William MD; BMJ 1:117-121; *Lumbago: Its Lessons and Analogues*.
• www.kinetacore.com
• www.SFMA.com