

## Dry Needling: What's the Point?







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## Disclosures

- I have relevant financial relationships and arrangements with:
  - **Structure & Function Education, PLLC**
    - Owner, President, Founder
  - **On Target Publications**
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## Tools vs Philosophy





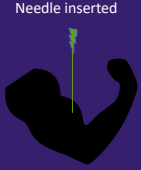

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## Pain and Dry Needling Mechanisms



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## Local Effects



Needle inserted

ATP → ADP → Adenosine

- Binds to endothelial cells
- Releases NO
  - Vasodilator
- Strong muscle contraction (trigger point or "deep ache") stimulates ergoreceptors
  - Releases CGRP
  - CGRP stimulates angiogenesis
  - Vasodilator


- Binds to A1 receptors
- Inhibits pain

*Perrault et al, 2018*

*Lundeberg, BMAS 2013*

*Perrault et al, 2019*

*Lund & Lundeberg, 2016*



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## Local Physiological Effects


- **Creating a local inflammatory response**
  - Releases bradykinin, CGRP, histamine, substance P, nerve growth factor, etc.
  - These can cause pain, inflammation and vasodilation
- CGRP, NO, Adenosine specifically
  - Vasodilators and pain modulators
- **Replacement of innate tissues**
  - Repeated needling creates angiogenesis
  - Nerve growth factor is released, and increases wound healing
  - Myogenic Transcription Factor replaces lesioned muscle tissue

*Gyer, 2016*

*Basbaum et al, 2009*

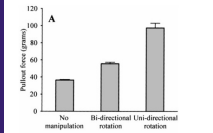
*Cagnie, 2013*

*Sobrian et al, 2014*



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### Needle Grasp of Tissue



Condition	Needle Grasp (Approx.)
No manipulation	40
Bi-directional rotation	60
Uni-directional rotation	100

- Evidence to show physical winding of the tissue around the needle
  - May include skin and subcutaneous tissue, muscle, fascia, etc.
  - Collagen, elastic fibers, fibroblast, adipocytes, and mast cells, CGRP + nerve fibers have all been found histologically on the needle after removal
    - Kimura et al, 1992

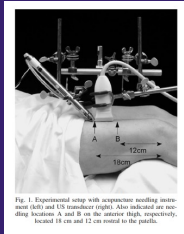
•60 human subjects  
 •US guided for same depth  
 •NO/ BI/ Uni Conditions

*Biomechanical response to acupuncture needling in humans. Langevin, 2001*

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### Needle Grasp

- Evidence to show tissue movement occurred 4cm away from needle
- Evidence that after 5 minutes, there was a "loosening" of the tissue/needle bond



*Tissue displacements during acupuncture...Langevin, 2004.*

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### Periosteal Pecking


- Randomized, single-blinded, multicenter, parallel group trial on knee OA
  - MT (PROM and stretching) and exercise (stationary bike, ROM, strength) versus MT and exercise plus electrical dry needling (EDN)
  - DN group = EDN 9 point protocol for 20-30 min
- 18 outpatient clinics, 10 states, 2 years of data collection, 18 PTs
  - 8-10 treatment session, 1-2 times per week, over 6 weeks
  - 242 patients (split even intervention and control)

*Dunning et al 2018*

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### Periosteal Pecking

- Results:
  - EDN group had significant improvements in WOMAC at 6 weeks and 3 months
  - Improvements in WOMAC subscales at 6 weeks and 3 months
  - Patients in EDN group were 1.7 times more likely to stop taking medication at 3 months than control group



*Dunning et al 2018*

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### Local Physiological Effects

- Overall:
  - Needle insertion stimulates A Beta, A Delta and C Fibers
  - Creates a local inflammatory response
  - Brings satellite cells to the area
    - Differentiate themselves to replace lesioned tissues
  - Some true biomechanical effects occur with local needling
- Local effects happen almost immediately

*Basbaum et al, 2009*  
*Dry Needling for Manual Therapists, Gyer, 2016*  
*Physiological Effects of Dry Needling, Cagnie, 2013*

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### Segmental and Systemic Physiological Effects

*SF*

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### Segmental Effects: Sympathetic Tone

- Immediate increase in sympathetic tone with initial stimulation
- Increases to skin, muscle, visceral organs (somatovisceral reflexes)
- Ex: Gut= sympathetic and parasympathetic reactions based on what you do with the needle

Acute effects = Increase in sympathetic tone

Prolonged stimulation (manual or e-stim), immediate increase followed by decrease of sympathetic tone

Lundeberg, BMAS 2013  
Lund & Lundeberg, 2016

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### Segmental Effects: Pain

1. Ascending Control - Gate Control
2. Descending Control - Neurochemicals that influence transmission of pain

Ruito et al. 2016  
Hwang et al. 2015

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From Pomeranz, Chapter 1 in *Clinical Acupuncture by Stux and Hammerschlag*

Legend:  
E = Met-Enkephalin or Dynorphin (Pre-synaptic inhibition)  
M = Monoamines (Serotonin, Norepinephrine, Noradrenaline) (Post-synaptic inhibition)  
B = Beta Endorphin  
ACTH = Adrenocorticotropic Hormone

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### HPA Axis

Besedovsky, 2000

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### HPA Axis

**THIS HUMORAL RESPONSE TAKES TIME (DAYS)!**

Needle insertion stimulates interleukins

- Injury results in inflammation
- Inflammation produces mast cells
- Mast cells drive cytokines (interleukins)
- Cytokines drive HPA Axis

Besedovsky, 2000

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## Humoral and Neural Influences on Inflammation

- In other words, HUMORAL process takes time
- NEURAL pathways are faster
  - Needling near nerves increases the afferent input into the system driving this process even more
    - Cholinergic Anti-Inflammatory Pathway
  - Adding E-stim also drives the afferent input up
  - Needle manipulation also drives the afferent input up

Cho, 2006  
 Lund & Lundberg, 2016  
 Tracey, 2002  
 Besedovsky, 2000

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## Key Points

- Pre-synaptic and post-synaptic pain control
- Timing
  - Local effects happen immediately
  - The segmental response is rapid and decreases rapidly as well
    - 5-10 minutes aka short-term pain control
  - The systemic effect takes about 20-30 minutes of needles left in situ
    - Electrical stim increases what is secreted as well as how quickly it ramps up in the system, so could be less time

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## Key Points

- Everyone doesn't have the same response to drugs; hence everyone doesn't have the same response to needles
- Not everyone will respond to the central effects of needles
- Everyone will respond to the mechanical effects of needles
  - If you can needle local, do so

Ideally, our patient responds to both

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## Why Does This Matter?

- Location:
  - When needles are placed close to the site of pain, we tap into all 3 levels of pain control (local, segmental and systemic)
  - When needles are placed in the opposite extremity, we tap into 2 levels of pain control (segmental and systemic)
  - When we place needles in the opposite quarter, we tap into 1 level of pain control (systemic)
- Time
  - Systemic (physiological) = 20-30 minutes
  - Segmental (neurological) = 5-10 minutes
  - Local (biomechanical) = in and out

From Pomeranz, Chapter 1 in Clinical Acupuncture by Stux and Hammerschlag  
Butts et al, 2016

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## Demo: Lower Lumbar Spine

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## In Summary

- It's way more than sticking needles in muscles
- Always consider 3 things:
  - Local effects
  - Segmental impact
  - Systemic influence

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**STAY IN TOUCH!**

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