Dry Needling: Current Evidence and **Clinical Application**

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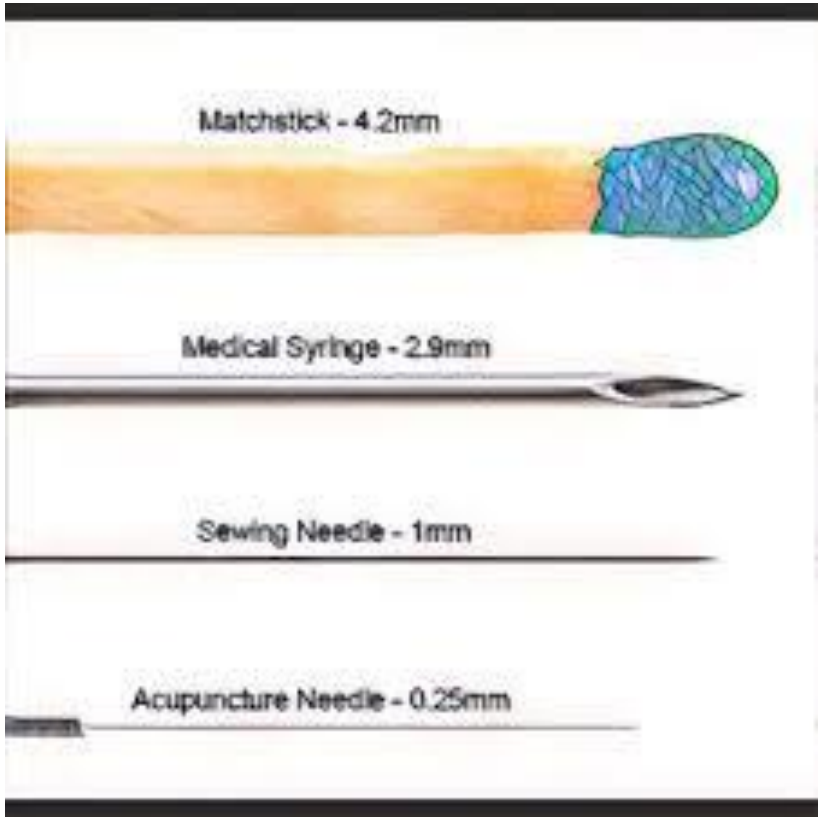
Objectives

- What is dry needling?
- Types of needling?
- Current evidence?
- Mechanisms of action?
- Clinical application?
- Demonstration

What is Dry Needling?

- Use of thin-filiform needle for tissue manipulation
    - Typically muscle or fascia, but can be scar, nerve, tendon, etc.
- Aimed at increasing mobility, altering muscle activation and/or decreasing pain
    - Potentially through mechanical mechanisms, likely through neurophysiological mechanisms

What is Dry Needling?



- Acupuncture
  - Multiple schools of thought
  - Primarily follows eastern medicine meridians
    - Some western medicine acupuncture
- Dry needling
  - Multiple schools of thought
  - Superficial dry needling
  - Deep dry needling- best outcomes (Acupuncture vs. SDN vs. DDN)
    - Myofascial model, radiculopathy model, trigger point model, functional movement model, intermuscular stimulation model, etc.
    - Trigger point model- >70% overlap with eastern medicine acupoints

Does Dry Needling Work?

- Myofascial pain syndrome- also following lumpectomy or mastectomy
- Fibromyalgia
- Migraine/headache
- Low back pain- Cochrane Review
- Shoulder pain- muscle activation patterns, impingement, hemiparetic shoulder pain, etc.
- Neck pain
- TMD
- Chronic pelvic pain
- Abdominal pain
- Pelvic floor dysfunction
- Plantar heel pain
- Upper-quarter myofascial pain- systematic review and meta-analysis
- Carpal tunnel syndrome?
- Lateral elbow pain?
- Total knee arthroplasty?
- Reduced reliance on medications?

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Effectiveness of Myofascial Trigger Point Manual Therapy Combined With a Self-Stretching Protocol for the Management of Plantar Heel Pain: A Randomized Controlled Trial

Acupuncture and dry-needling for low back pain (Review)

Furlan AD, van Tulder MW, Cherkin DC, Tsukayama H, Lao L, Koes BW, Berman BM

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What are the limitations of the research?

How do we manipulate tissue?

- “Stick and leave”- endogenous opioids
- “Stick and twist (+/- leave)”- above + neuromechanical signaling
- “Stick and piston/sweep (typically without leave)”- above + altered neurochemical environment

The Needle Effect

- "Stick and leave"- endogenous opioids
  - The needle effect- immediate analgesia in 86.8% of cases (long-term relief?)
  - Predetermined points vs. clinically assessed points
  - When do we do this?

TABLE I

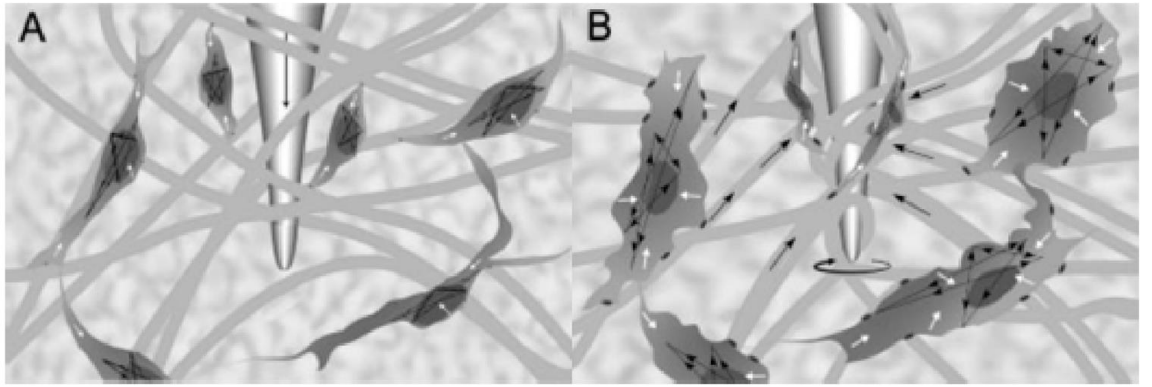
STRUCTURES TREATED AND IMMEDIATE EFFECT OF DRY NEEDLING

The Huneke phenomenon refers to subsidence of seemingly unrelated symptoms after needling of a scar, as described in the text.

Needling site	Effect			
	Analgesia	Huneke phenomenon	No effect	Total
Posterior arch of C1	55	—	6	61
Scars	33	22	2	35
Pelvic ligaments	23	—	3	26
Ribs	18	—	4	22
Spinous process of axis	16	—	3	19
Other spinous processes	18	—	4	22
Levator scapulae	16	—	3	19
Ischial tuberosity	13	—	1	14
Interdigital fold	11	—	3	14
Head of fibula	10	—	1	11
Biceps tendon	10	—	0	10
Rotator insertions	7	—	0	7
Collateral knee ligament	6	—	0	6
Trapezius muscle	5	—	1	6
Acromioclavicular joint	4	—	2	6
Radial epicondyle	3	—	2	5
Miscellaneous	23	—	6	29
	271	22	41	312

Needle Grasp

- "Stick and twist" (+/- leave)- above + neuromechanical signaling
  - Myofascial tissue manipulation/fibroblas stimulation
    - Mechanically induced cytoskeletal reorganization
    - May modulate sensory input from mechanosensory and nociceptor afferent neurons within connective tissue
    - May stimulate A-delta fibers and activate inhibitory pathways
  - Typically clinically assessed points
  - When do we do this?



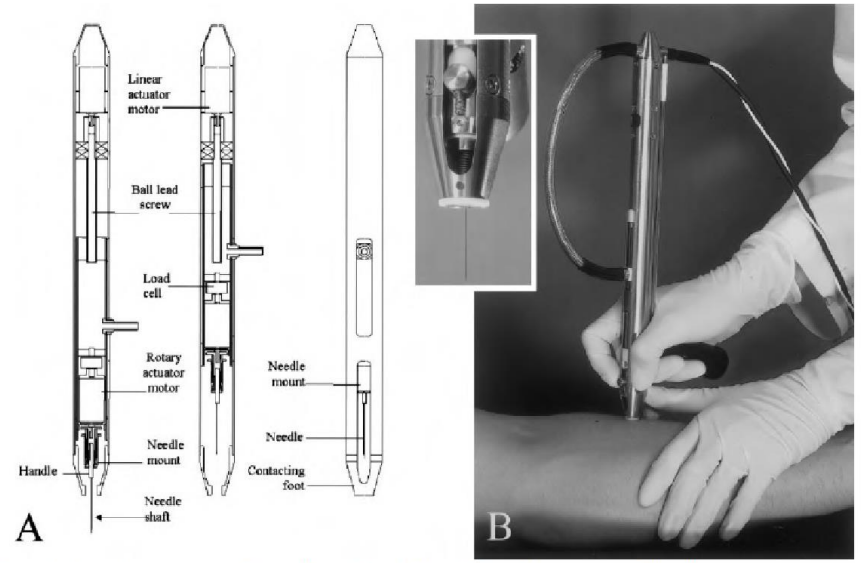
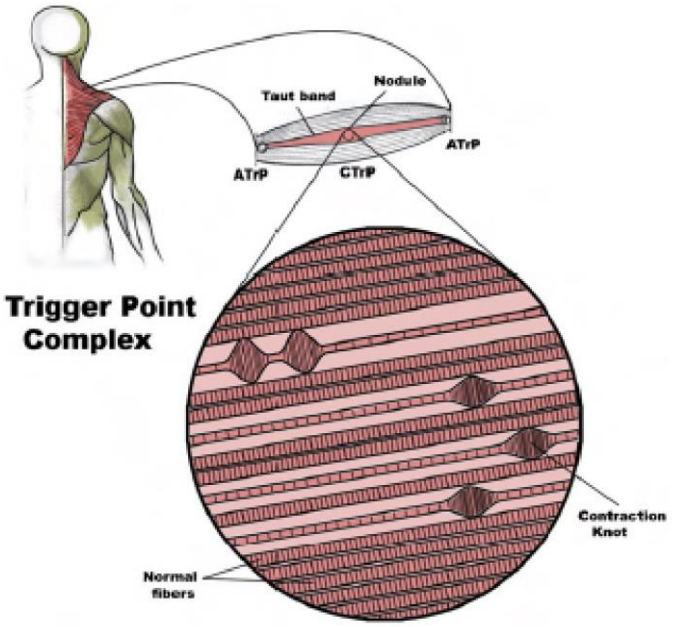
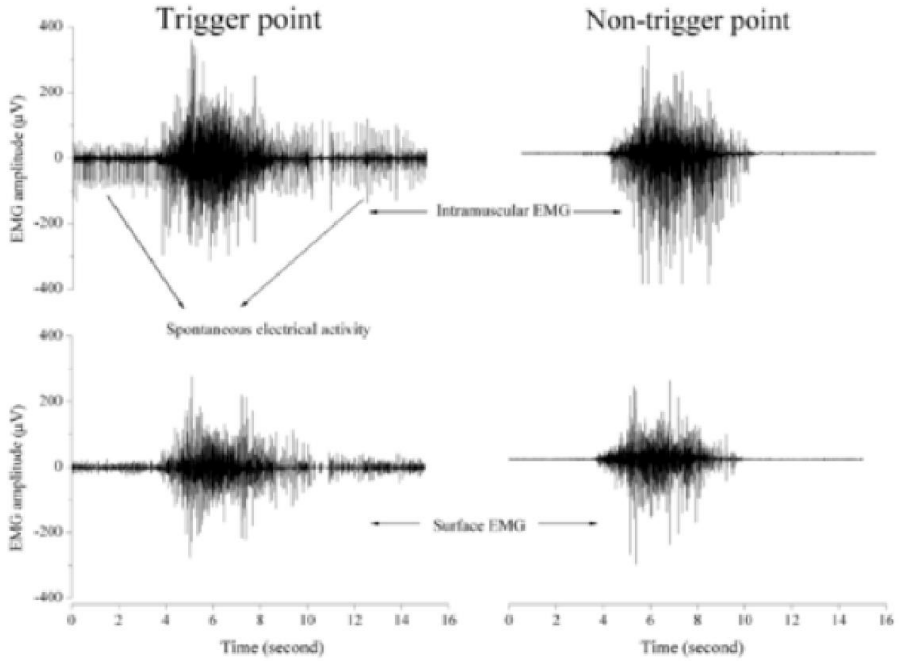


Fig. 2. *A*: design schematic of acupuncture needling instrument. From *left* to *right*: cutaway view with needle extended, cutaway view with needle retracted, side view. *B*: needling instrument in use. *Inset* shows needle in extended position.

Trigger Point Needling

- "Stick and piston/sweep" (typically without leave)- above + altered neurochemical environment
  - Myofascial tissue manipulation/fibroblastic stimulation and trigger point needling
    - What are trigger points?
  - Typically clinically assessed points
  - When do we do this?





Where Does Dry Needling Fit in Practice?

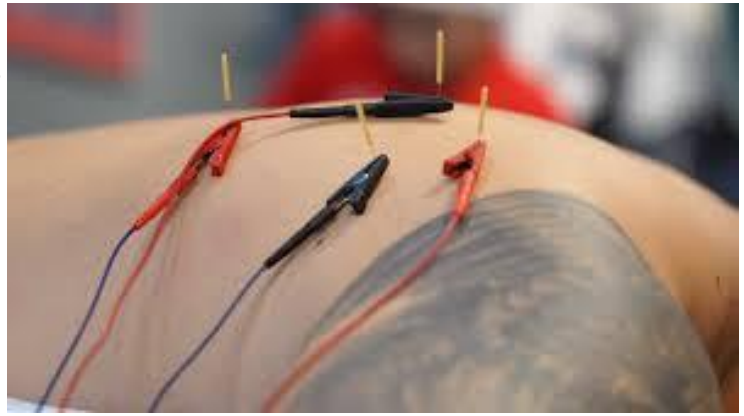
- Dry needling can:
  - Alter chemical environment of trigger points
  - Reduce local and referred pain
  - Can reverse some aspects of central sensitization
  - Improve range of motion and muscle activation pattern

Pain

Performance

Clinical Application

- For pain
  - Local pain
  - Referred pain
  - Centrally sensitized pain
- For performance
  - Muscle inhibition
  - Muscle facilitation
- Mobility, mobility-activation, activation, activation-strength
- Reset, reinforce, reload



Clinical Experiences- Trigger Point Needling

- 17 y/o male football player with left shoulder pain x2 days
- 35 y/o male with localized neck pain and stiffness x5 years
- 40 y/o female with neck pain with radiating symptoms x6 months
- 51 y/o female with left shoulder pain x5 months diagnosed as frozen shoulder
- 15 y/o female soccer player with localized low back pain x3 months
- 29 y/o male with right lateral elbow pain x4 months diagnosed as lateral epicondylalgia
- 22 y/o female with groin pain x3 months

Trigger Points

- Active myofascial trigger points are one of the major peripheral pain generators for regional and generalized musculoskeletal pain
  - Can be locally or globally perpetuated
    - Local muscle overuse vs local/regional joint dysfunction vs nervous system sensitivity
- Local pain and tenderness at myofascial trigger points are largely due to nociceptor sensitization
- Related to process of muscle ischemia associated with sustained focal muscle contraction

How do trigger points form?

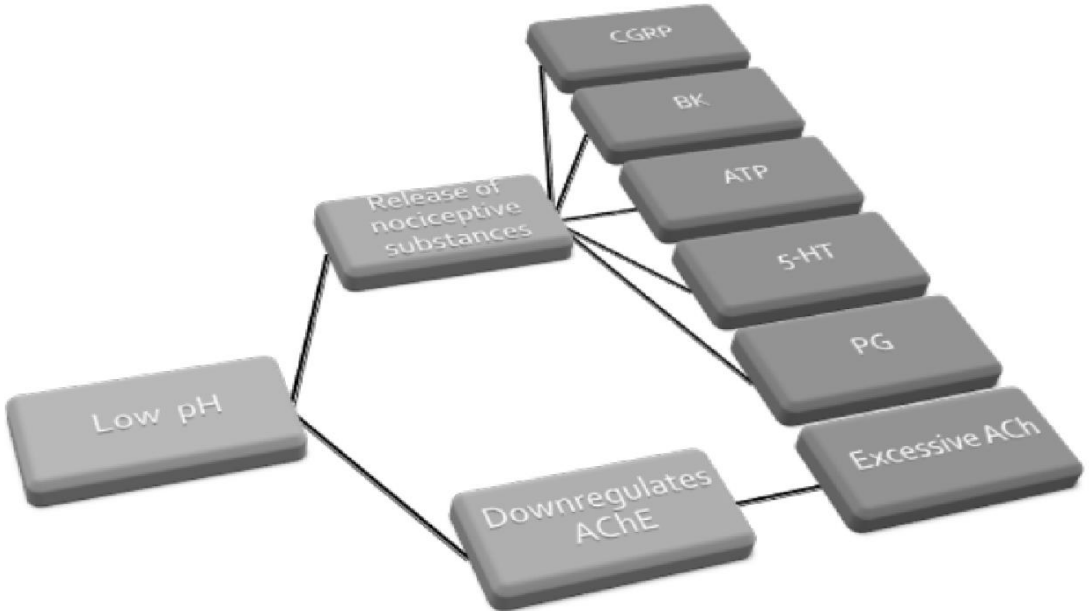
- Ectopic nerve impulses and/or unregulated release of Ach
- Cinderella hypothesis- repeated motions/sustained positions
  - Chronic vs sub-acute vs acute changes?
- Exercise under conditions that limit availability of oxygen
- Development of high pressures within contracting muscles
  - Vascular constriction/closure

The authors hypothesize that the activating event in the development of the TrP is the performance of

- unaccustomed eccentric exercise
- eccentric exercise in unconditioned muscle or
- maximal or submaximal concentric exercise

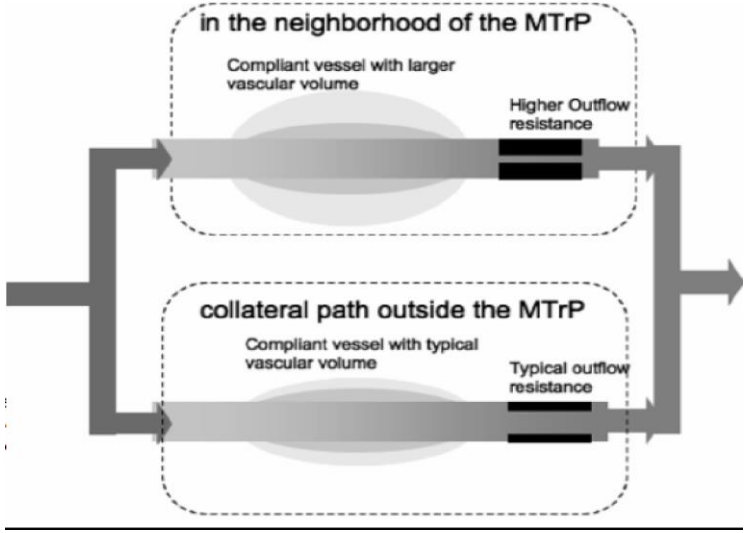
that leads to muscle fiber damage and to segmental hypercontraction within the muscle fiber

Fig. 1. Depiction of three experimental conditions (from left to right, VL/PL, VH/PL, VL/PH).



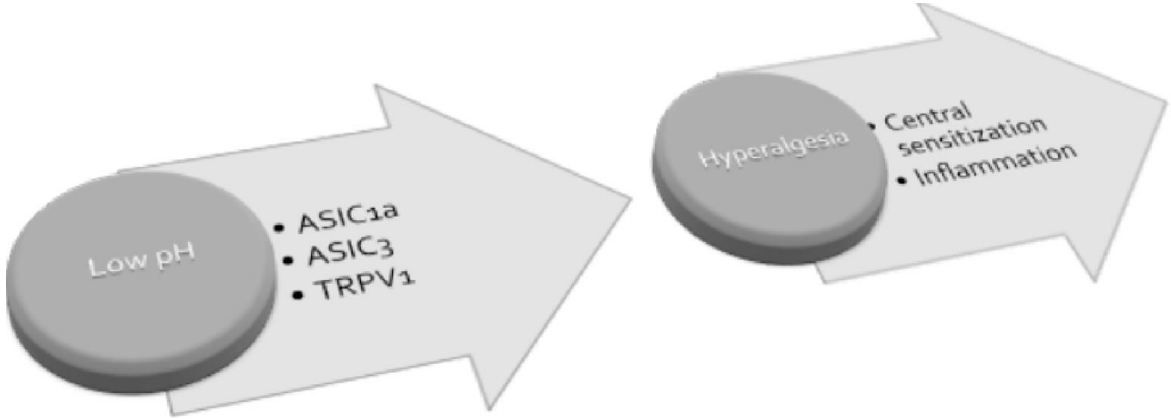
Why are Trigger Points Painful?

- Low O2 – Low pH
- Altered SP, CGRP, bradykinin, serotonin, norepinephrine, etc.- measured through microdialysis
- Increase in CGRP that occurs with ischemia can result in
  - •Increase in AChR activity
  - •Inhibition of AChE activity
  - •*Perpetuation of muscle contraction and pain*
- Activation of ASIC1/ASIC3 muscle nociceptors



CGRP

- Enhances the contraction of striated muscle
- Enhances the spontaneous release of ACh from the motor nerve terminal
- Increases synthesis of ACh receptors at the NM junction
- Down-regulates ACh esterase
- Prolongs the action of SP in the spinal cord



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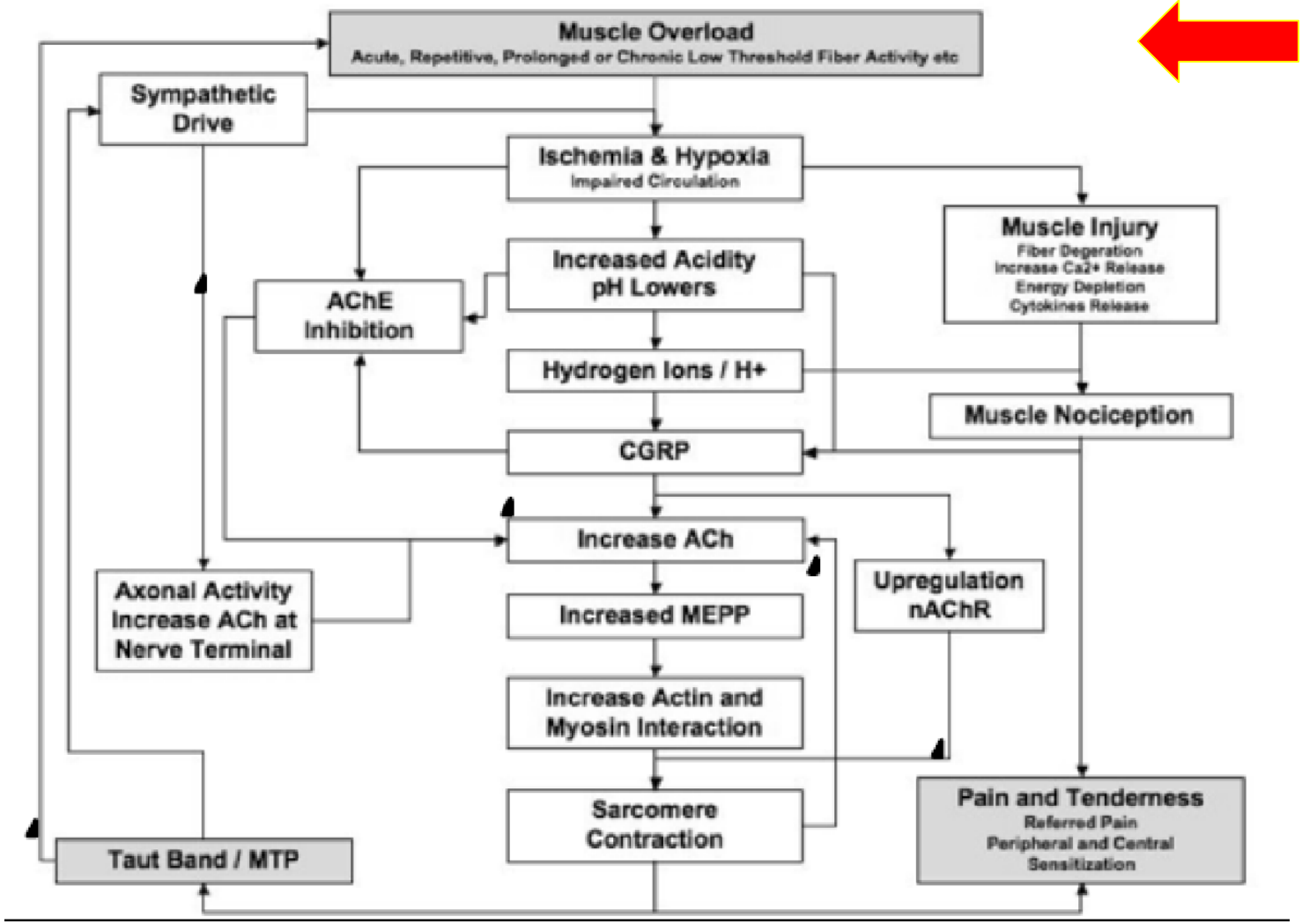
Integrative Trigger Point Hypothesis



Does treating muscle overload sound familiar?

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Referred pain

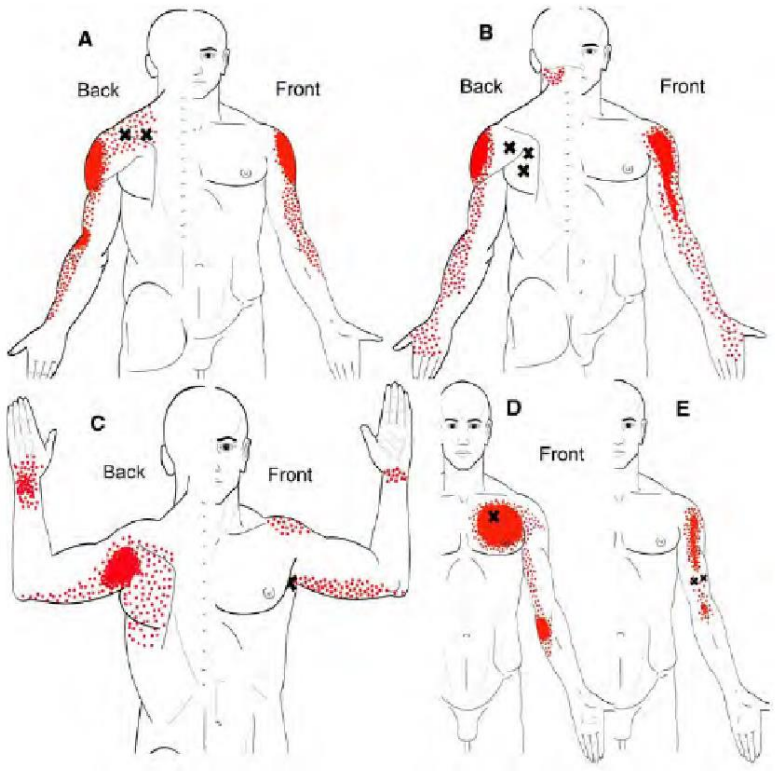
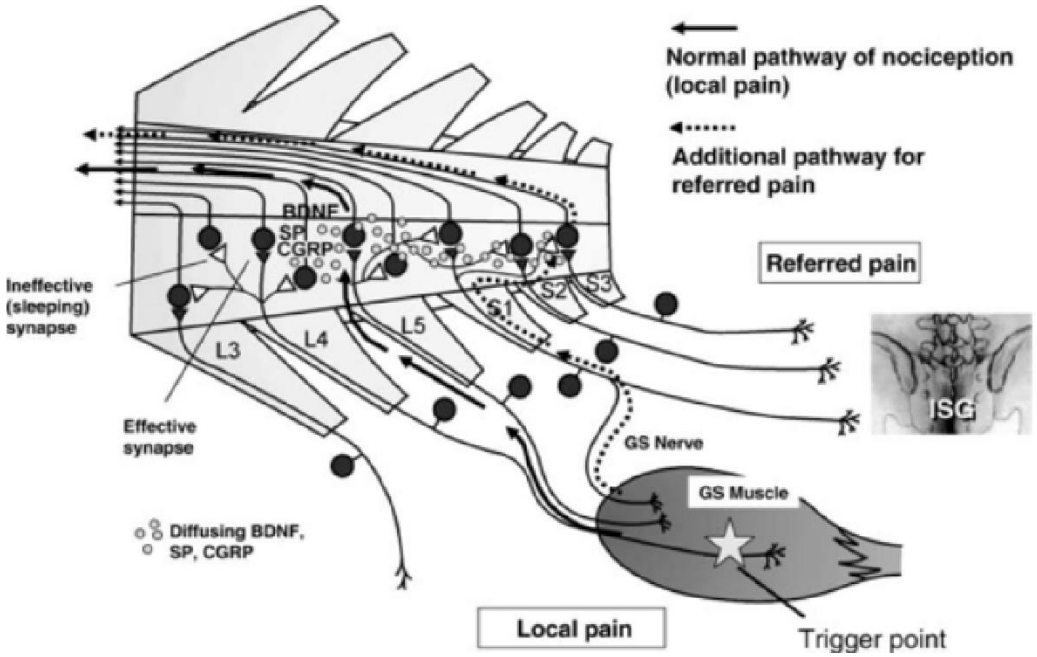
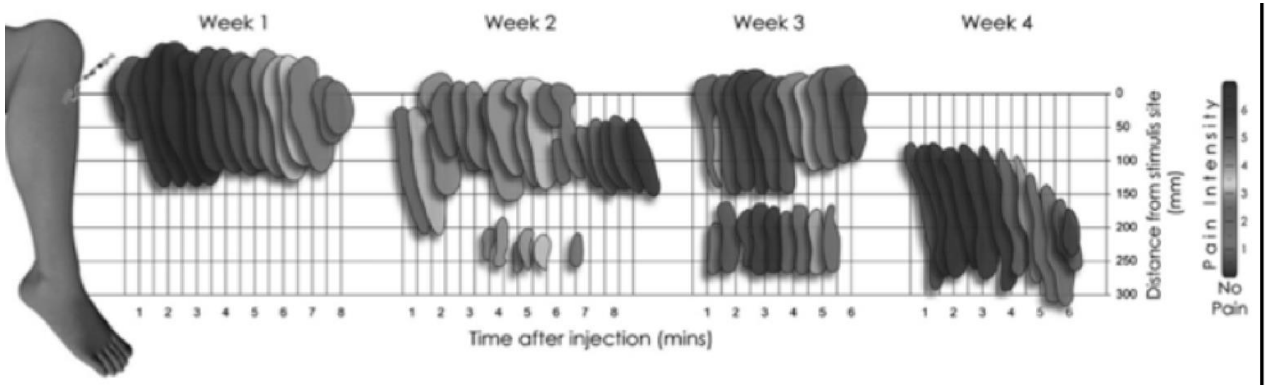


Fig. 1 Referred pain patterns from supraspinatus (**a**), infraspinatus (**b**) Subscapularis (**c**), pectoralis major (**d**), and biceps brachii (**e**) muscle TrPs as described by Simons et al. (1999)





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Centrally Sensitized Pain

Review

Central sensitization: Implications for the diagnosis and treatment of pain

Clifford J. Woolf

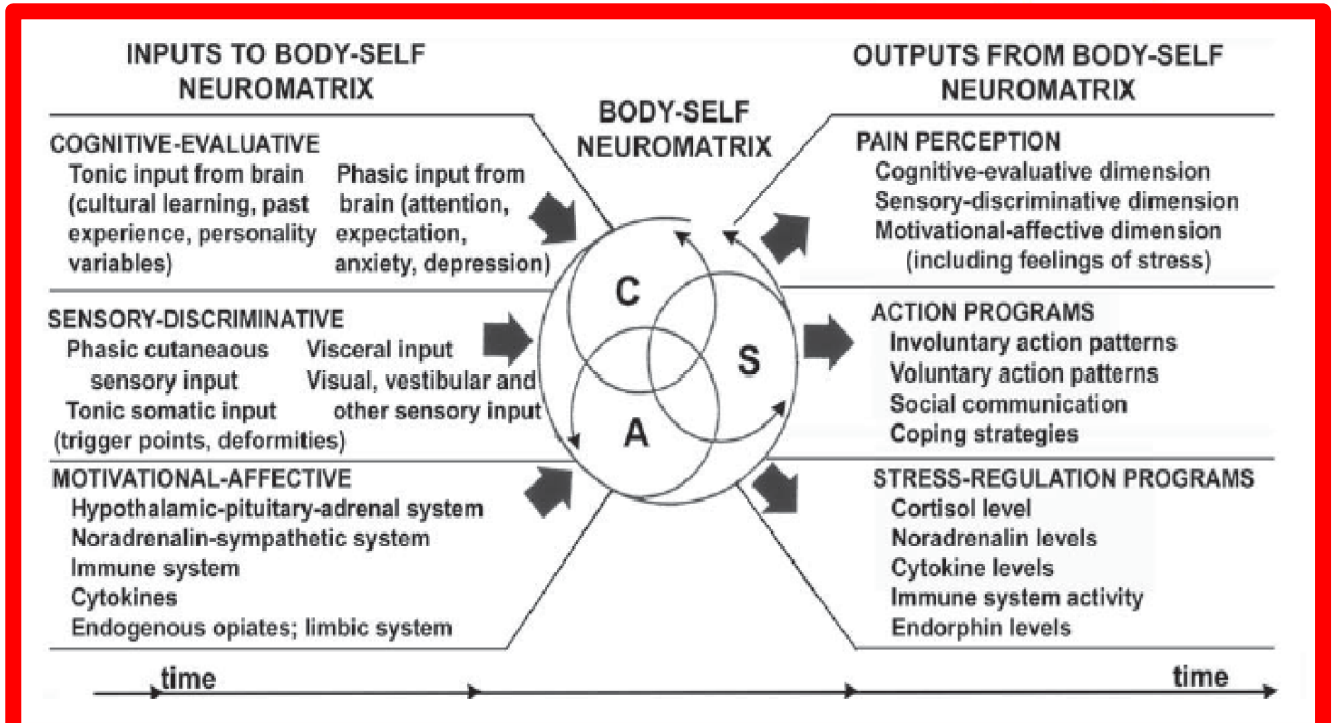
- Clinical pain is not simply the consequence of a "switching on" of the "pain system" in the periphery by a particular pathology, but instead reflects to a substantial extent, the state of excitability of central nociceptive circuits.

Review

Central sensitization: Implications for the diagnosis and treatment of pain

Clifford J. Woolf

- The induction of activity-dependent increases in synaptic function in these circuits triggered and maintained by dynamic nociceptor inputs, shifts the sensitivity of the pain system such that normally innocuous inputs can activate it and the perceptual responses to noxious inputs are exaggerated, prolonged and spread widely.



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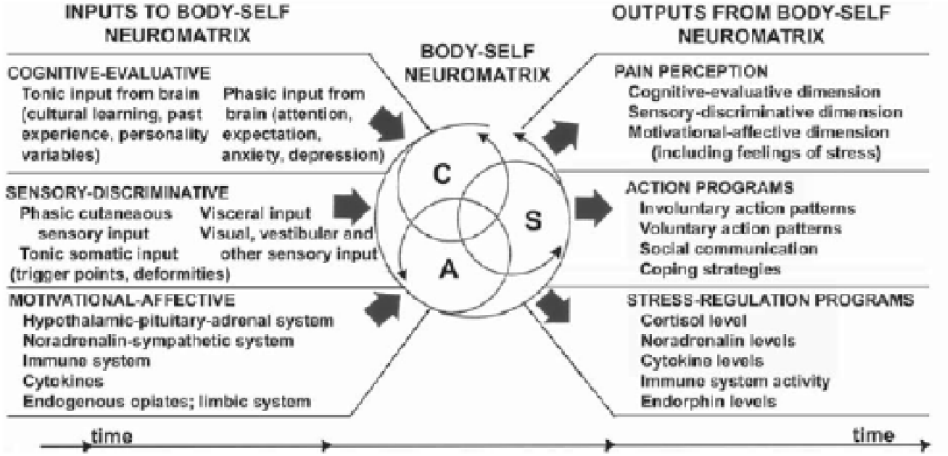
Centrally Sensitized Pain

- “Where possible, nociceptive mechanisms that contribute to threatening information should be treated.”
- “Any strategy that has an inhibitory effect on nociceptive input is probably appropriate in the short term unless it simultaneously activates non-nociceptive threatening inputs.”



Pain and the Neuromatrix in the Brain

Ronald Melzack, Ph.D.

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Where Does Dry Needling Fit in Practice?

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Pain

Performance

Dry Needling for Pain

- Maintenance of referred muscle pain depends on ongoing noxious inputs from the site of primary muscle pain
- Is the pain coming from proximal or distal or both (distal-proximal-distal)
    - Would you treat them differently?
        - Gunn method vs trigger point needling
- Peripheral vs. central pain generators
    - Would you treat them differently?

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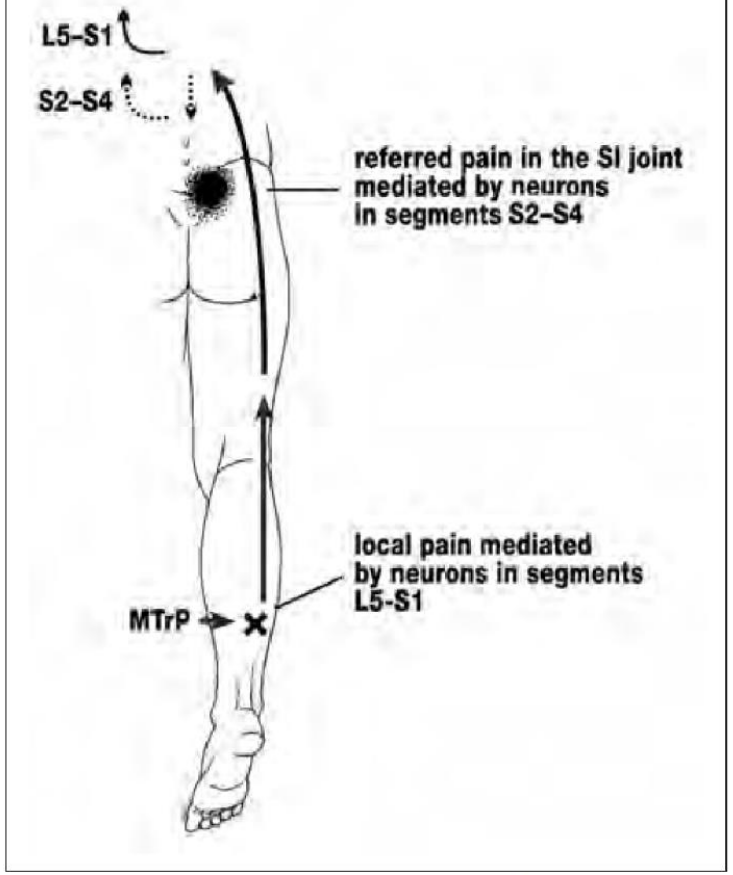
FIGURE 3



Pain referral from a myofascial trigger point (MTrP) in the soleus muscle to the sacroiliac (SI) joint. As shown in *figure 2*, referral of pain to the SI joint can be explained as follows: first, nociceptors in the trigger point induce local pain. The nociceptive impulses arising from the trigger point are then carried over spinal cord neurons belonging to the segments L5–S1, which are the normal relay stations for impulses from the soleus muscle. As excitation spreads in the spinal cord (in this case, mainly in the caudal direction), the normally ineffective connections between the soleus muscle and the neurons of the S2–S4 segments become effective. Impulses from the trigger point nociceptors can now activate neurons in S2–S4 that otherwise provide sensory innervation to the SI joint. The individual therefore feels pain referred to the SI joint.

Dry Needling for Muscle Activation/Performance

Pain Management & Sports Rehabilitation

Integrative Dry Needling IDN Foundation Course Institute

- Latent trigger points in scapular rotator muscles change muscle activation patterns with overhead reaching
- Treatment (dry needling and stretching) to remove latent trigger points normalized muscle activation patterns
  - Mobility, mobility-activation, activation-strength
  - Reset, reinforce, reload
  - Examples:
    - QL to improve gluteus medius strength
    - Thoracic paraspinals to improve overhead reach
    - Levator scapulae to improve scapular upward rotation
    - Etc.

Figure 4 Performing elevation of the arm in the scapular plane. Note that the lateral aspect of the index finger remains in contact with the movement guide to prevent any external rotation of the shoulder.

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