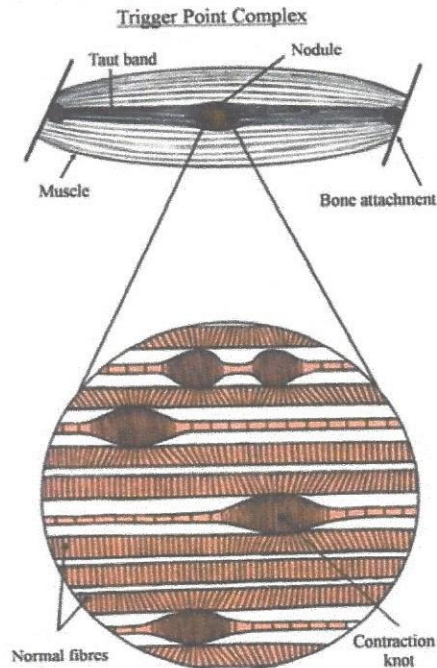


Myo-fascial Trigger Points (MTrPs)

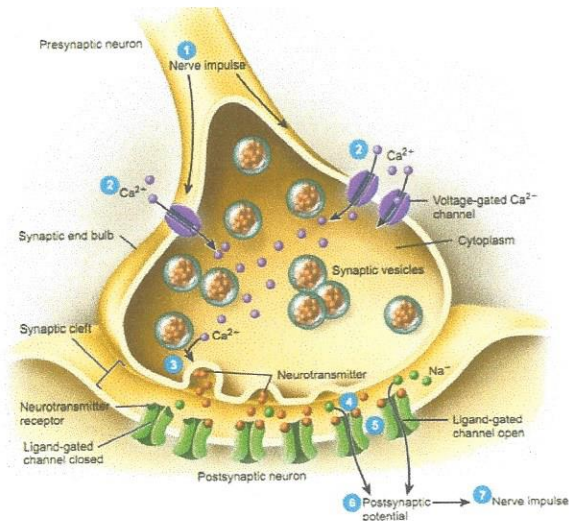
- Etiological definition – A cluster of electrically active loci each of which is associated with a contraction knot and a dysfunctional motor endplate in skeletal muscle.¹
- Clinical definition – a hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band. The spot is painful on compression and can give rise to characteristic referred pain, referred tenderness, motor dysfunction, and autonomic phenomena.¹

Travell & Simons' Integrated TrP Hypothesis:
Micro-contractions occur in clusters of sarcomeres due a dysfunctional motor endplate, creating a local energy crisis that is self-sustaining, with a biochemical milieu and electrophysiological characteristics distinct from healthy muscle tissue, which deliver a constant, low-level nociceptive input to the CNS.¹



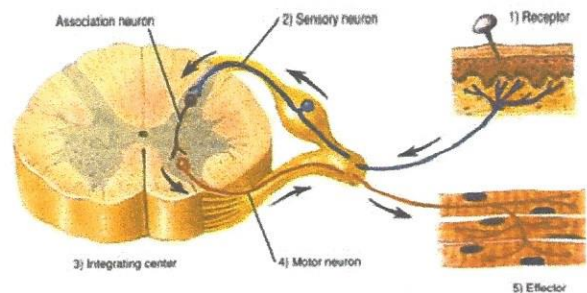
Energy Crisis^{1,2}

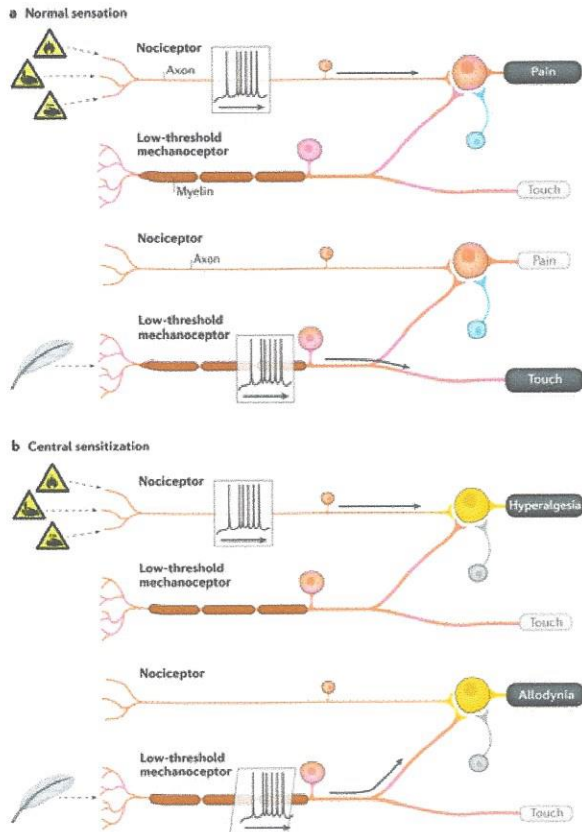
- A dysfunctional motor endplate leaks excess ACh in the absence of an action potential.
- ACh opens calcium channels in the sarcolemma, allowing a rush of free Ca^{2+} ions into the cell.
- Ca^{2+} binds to troponin, allowing unrestricted cross-bridging between actin and myosin.
- Maximal contraction restricts local capillary flow, causing hypoxia and a drop in pH.
- Acidic pH inhibits acetylcholinesterase (AChE), allowing the leakage of ACh to continue.
- Acidity increases calcitonin gene-related peptide (CGRP) activity. CGRP is a pro-inflammatory mediator that also down-regulates AChE.
- The contracture becomes self-sustaining as local hypoxia prevents normal cell metabolism and the production of ATP, which is needed to break the actin-myosin bond and pump Ca^{2+} out of the cell.



MTrPs can lead to:

- Peripheral sensitization – reduction in the pain threshold and an increase in responsiveness of peripheral nociceptors
- Central sensitization – an increase in the excitability of neurons within the CNS characterized by allodynia and hyperalgesia
- Also – referred pain, altered length-tension relationships, poor motor recruitment.²





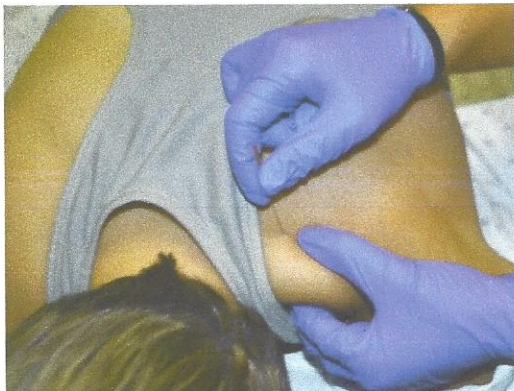
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Common Mechanisms of Injury

- Unaccustomed eccentric and concentric loading
- Low-load repetitive tasks
- Sustained postures
- Respiratory stress (such as over-breathing)
- Associated with visceral pain and dysfunction³

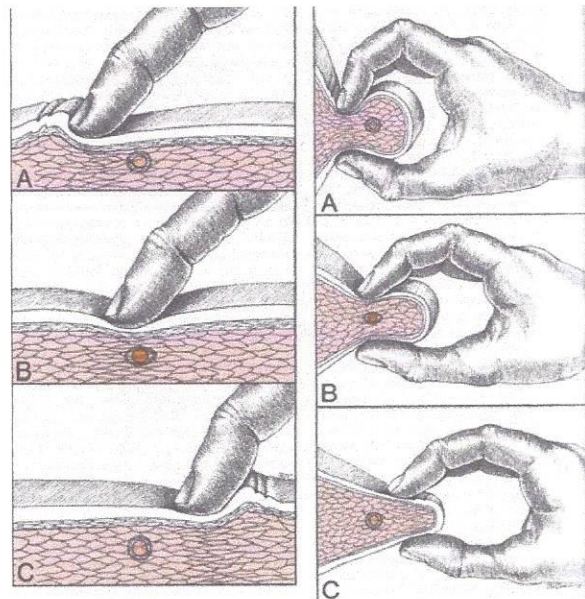
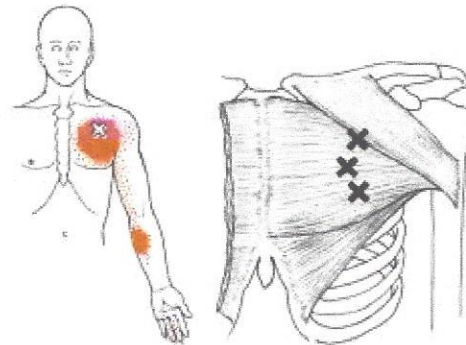
PT Treatment Options

- Manual therapy (soft tissue massage, ischemic compression)
- Spray and stretch
- TrP dry needling



Clinical Characteristics

- Steady, deep, aching, diffuse pain
- Referred pain to other body parts when compressed or stretched, such as pec major referring to medial elbow (see below)
- Hyperalgesia or allodynia
- Rarely described as burning, painful prickling or numbness, throbbing, sharp, or lancinating¹



Trigger Point Dry Needling

- Significantly reduces inflammatory mediators in active trigger points
- Can restore range of motion and muscle activation patterns
- Reduces local, referred, and widespread pain
- Reduces dysfunctional endplate noise
- Comparable effects to lidocaine injections but superior in long-term reduction of pain⁴

Sources

1. Simons DG, Travell JG, Simons LS. *Myofascial Pain and Dysfunction: The Trigger Point Manual, Vol 1 (Upper Half of Body)*. 2nd ed. (Johnson EP, Napora LS, Myers JS, eds.). Philadelphia: Lippincott Williams & Wilkins; 1999.
2. Dommerholt J, Fernández-de-Las-Peñas C. *Trigger Point Dry Needling: An Evidenced and Clinical-Based Approach*. 1st ed. (Dommerholt J, Fernández-de-Las-Peñas C, eds.). Edinburgh: Elsevier; 2013.
3. Gerwin RD, Dommerholt J, Shah JP. An expansion of Simons' integrated hypothesis of trigger point formation. *Curr Pain Headache Rep*. 2004;8(6):468-475. doi:10.1007/s11916-004-0069-x.
4. Dommerholt J. Dry needling — peripheral and central considerations. *J Man Manip Ther*. 2011;19(4):223-227. doi:10.1179/106698111X13129729552065.