Dry Needling Physiology

Trigger Point Model / Motor End Plate Model

Trigger points are painful points within taut bands of connective tissue in which there is a pathological shortening. These trigger points result from increased acetylcholine at the motor end plate or the neuromuscular junction. Dry Needling removes the pain signals from trigger points, improve the acetylcholine levels at the motor end plates, which improves overall tissue healing, pain, and function. Many other mechanical, chemical/cellular, electrophysiologic, and neurophysiologic effects occur as well.

Energy Crisis Model

Energy Crisis Model is an extension of the trigger point model based off the increased metabolic demand at trigger points.

Injury to muscle causes Calcium release, sarcomere shortens, increased metabolic demand and compromise of local circulation, recovery is compromised, prolonged shortening of muscle fibers, ischemic by-products accumulate and then back to further injury to muscle and more Calcium released as the spiral continues on.

Radiculopathy Model

• Focuses on musculoskeletal pain that result from neuropathies and radiculopathy.
• Denervated tissues develop supersensititivity (Cannon and Rosenbleuth’s “Law of Denervation”).
• Muscles then shorten, have pain, and develop into taut bands with trigger points.
• Particular interest with muscles in the back: leads to disk compression and pressure on nerve roots, which leads to peripheral neuropathy and the development of supersensitive nociceptors and pain.
• Thus, there is restricted flow of nerve impulses in all innervated structures.
• Explains trigger points, tendinopathies and enthesopathies.
Mechanical Effects
The needle mechanically disrupts trigger points and tissue, resulting in normal resting length. Micro-bleeding releases platelet derived growth factor into the tissue, promoting healing.

Chemical Effects
Chemical/Cellular Stimulus- The needle depolarizes and neutralizes abnormal chemicals at motor end plates, resulting in improved symptoms.

Electrophysiological Effects
Spontaneous Electric Activity improve at the motor end plates/ neuromuscular junction with dry needling.

Neurophysiological Effects
Inhibits painful neural pathways
Activation of the descending inhibitory systems, which blocks noxious stimulus from pain neural pathways.

Sympathetic Nervous System Effects
Dry needling activates opioid-based pain reduction, mediated by the sympathetic nervous system.

Brain Stem Effects
Dry needling activates non-opioid pain relief via serotonin and norepinephrine from the brain stems.

Pain Effects
Dry needling reduces the painful input from trigger points
Dry needling reverses sensitivity to pain and normalizes nociceptive (pain response) channels.

Inflammation Effects
Dry needling also triggers the systems that control inflammation and decrease pain.
References:


