

## DRY NEEDLING:



Orthopedic physical therapists employ a variety of interventions to improve patients function, strength, balance, gait, and the reduction of pain. With progression in the medical community new treatment approaches are being introduced to the field of physical therapy. The arrival of manual therapy approaches in the 1960's was initially opposed by many physical therapy boards. In spite of the early resistance, many manual therapy approaches have become main stream treatments in all physical therapy schools and clinics. A similar development is in progress with the relatively new technique of dry needling. Currently 23 state physical therapy boards have approved dry needling to be within the scope of practice of physical therapist. Wisconsin is currently included in these 23 states and many other states are reviewing the treatment option for physical therapist. Similar to physical therapy boards, many chiropractic boards are also reviewing the dry needling technique and 15 states currently are also adopting the approach for chiropractors.

Many people are familiar with acupuncture which has been practiced for over 2000 years. However, from a dry needling perspective there are no similarities with traditional acupuncture except the use of the same tool the needle. The objective of dry needling is not to control and regulate the flow and balance of energy and is not based on empirical and metaphysical concepts. Instead dry needling and other commonly practiced physical therapy procedures are based on anatomy, biomechanics, physiology, and scientific neurophysiology principles. Therefore, the dry needling technique is a modern western medical modality practiced worldwide with its own theoretical concepts, terminology, needling techniques, and clinical application. Dry needling is not related to traditional Chinese acupuncture in any way because it does not apply traditional terminology, theories, meridians, and diagnostics.

When a medical physician injects a local anesthetic, saline, corticosteroid, lidocaine, procaine, or non steroidal anti-inflammatory agent into a trigger point or known acupuncture point it is medically referred to as a trigger point injection. However, if the practitioner utilizes a needle into the same precise point without the administration of a substance, it is globally referred to as "dry needling". Recent research by Cummings and White supported past research by Dr. Karl Lewit that the nature of the substance makes no difference to the outcome for musculoskeletal pain, thus needling with an injectable substance is not therapeutically superior to dry needling.

Although muscle needling techniques have been used for thousands of years in the practice of acupuncture, there is still uncertainty about their mechanisms. The acupuncture literature may provide some answers; however, recent scientific research and clinical data has helped to bridge the gap of knowledge. The following mechanisms have been extensively studied to explain dry needling: mechanical, neurophysiologic, and chemical effects. These mechanisms can begin to help the explanation of why dry needling is effective locally and systemically in managing acute and chronic pain.



Dry needling works directly on the soft tissue including muscle, ligaments, tendons, and fascial tissues that help to create the structural system of the body. The mechanical effects of dry needling involve mechanically disrupting the integrity of the dysfunctional muscle. Accurately placed needles into extremely shortened muscles can provide a localized stretch response to the contracted structures affecting the myosin filaments and actin within the sarcomere. When a needle is inserted perpendicularly to the muscle fibers one centimeter, it may break at least 1000 muscle fibers, If the needle is inserted deeper into the muscle thousands of muscle fibers are stimulated along with local capillaries, and nerve endings. This change in the muscle fiber length or integrity may activate the gate control system within the nervous system and ultimately block nociceptive input from the trigger point and alleviate pain. The mechanical pressure of the needle may electrically polarize the connective tissue and muscle to aid in tissue remodeling or healing. The small needle lesion stimulates the vascular system to begin the natural immune response also aiding in healing to the dysfunctional tissues.

The chemical effects of dry needling were demonstrated by the studies of Shah and colleagues. Many trigger points are hypoxic or lacking oxygen ultimately creating an acidic environment. This acidic environment can lead to swelling, noxious biochemical waste products, distorted nerve endings, and increases in muscle pain. Shah and colleagues found that increased levels of various chemicals were present at the area where an acupuncture needle was inserted into the muscle to create a local twitch response. These chemicals included: increased bradykinin, CGRP, calcitonin, substance P, and others. The needle insertion not only changes the physical properties of the muscle, but it also can help to create a balance of these chemicals within the muscle trigger point and the surrounding connective tissue.

The neurophysiologic effects of dry needling were described by Dr. Baldry when he performed superficial needling techniques similar to acupuncture. He concluded that when a needle is inserted into the body it stimulates afferent sensory A-delta nerve fibers. These fibers can be stimulated for 72 hours after needle insertion. They release opioid mediated pain suppression along with increases in cortical cerebral blood flow most likely from a reflex response of the afferent pathway. Other studies on animals have found that the descending pain inhibitory system of the hypothalamus is activated with an insertion of a needle into the body which can reduce pain throughout the system.

Understanding the basic physiological mechanisms of dry needling is of the most fundamental importance to the practitioner. These mechanisms underlie the actual process of stimulation by needles, and how much stimulation is needed to bring a therapeutic result. Dr. Ma in his text book reports that needling is both a physical disturbance to soft tissue and a minute biological traumatic lesion into the soft tissue. This physical movement of the needle in the deep tissues increases muscle fiber and connective tissue tension creating a signal in the tissue to stimulate self healing. The brain identifies the traumatic lesion in the soft tissue and directs biological systems, including the cardiovascular, immune, and endocrine systems to replace the damaged tissue with the same type of fresh tissue within 7-10 days according to research by Dr. Ma. In addition to this local healing effect, the lesion induces systemic effects to restore homeostasis or natural balancing through a number of reflex processes at several levels within the nervous system.



The majority of clinical pain is myofascial. It has been reported that 85% of back pain and 55% of chronic headache and neck pain is myofascial pain. Myofascial pain includes various types of soft tissue dysfunction or pathology including: tissue inflammation, tissue contracture, blockage of circulation, tissue degeneration, tissue adhesion, scarring of tissue, and biomechanical imbalance of the musculoskeletal system, including improper posture. Dr Ma believes that soft tissue pain, especially chronic pain, always involves all of these dysfunctions and clinicians should treat all of them to achieve the optimal level of pain relief and recovery of tissue function. For example, when a joint is out of alignment, it causes both the attached and opposing muscle groups to be shortened or lengthened. This can compromise the surrounding neuromuscular structures and connective tissues. Muscle spasm, muscle tension, and increased sympathetic output develops; resulting in soft tissue pain, the development of trigger points, edema, ischemia, and tissue degeneration. If the condition continues over time and becomes chronic, tissue adhesion and the formation of scar tissue will occur and central sensitization will likely follow.

Dry needling by its physiological nature is a specific therapy for myofascial pain and other soft tissue dysfunctions. Muscle accounts for nearly 50% of the human body mass, therefore many pathological conditions involve the soft tissues, whether in the case of physical injury, overuse, poor posture, sporting injuries, past surgical interventions, stroke, cancer, and other medical pathologies can have an effect within the soft tissues. Dry needling is a specific soft tissue therapy that has few side effects if practiced properly. Several evidence based studies have concluded that needling is more effective than conventional treatments for back pain.

The dry needle is a thin filament needle typically between 30 and 40 gauges. Approximately 5 to 8 of these needles can fit within a typical needle utilized for injecting substances into the tissues by physicians. The body area undergoing dry needling will determine the size and length of the needle, but generally the smallest gauge needle is utilized. The technique of dry needling requires a great understanding of anatomy and physiology. Many risk factors can be completely avoided if the clinician understands anatomy and practices safe techniques.

Dry needling has a specific protocol as well as an individual approach for each condition. Through clinical research and neuroscience research by Dr Ma and others 24 primary homeostatic acupressure points exist consistently in everyone's body (see figure). These 24 points often occur at neuromuscular junction points and are frequently tender to palpation. These points are numbered 1-24 typically in the order they become tender as the body becomes run down or dysfunctional. Along with the 24 possible homeostatic acupressure points, other palpable tender points can occur anywhere in the body. These additional points are called symptomatic points because they typically occur around the painful area or the area where the body is injured. Finally, there is a third palpable acupressure point which is located along the spine. These acupressure points are called paravertebral points and correlate with the peripheral nerves. The greater the number of acupressure points throughout the body and the greater the sensitivity to palpation of these points helps the clinician to determine the significance of the soft tissue dysfunction.

By inserting a needle into the soft tissue, it creates a minor lesion within the targeted tissues; this activates the natural healing process, resulting in pain relief and restoration of a healthy physiology. A typically treatment for a patient with arm pain and numbness would include treating all the homeostatic points in the upper body that are easily accessible. Next the symptomatic points in the area of the neck, upper back, or arm would be located and properly dry needled. Finally, the levels of C5-T1 would be treated along the paravertebral region to access the peripheral nerves that supply the upper extremity. Thus, each treatment a patient receives is specific to the location of their musculoskeletal dysfunction; however, it also can be nonspecific because of the multiple mechanisms that can be influence throughout the entire body to aid in the natural healing process and pain reduction.

In closing, dry needling has been proven to be an effective treatment for many myofascial pain syndromes. Dry needling is a useful addition to standard therapies that offers clinicians another option for treating and managing chronic pain. The advantage of using dry needles is that it is effective quickly, easy to perform, reproducible, reliable, and safe to perform on nearly all patients.