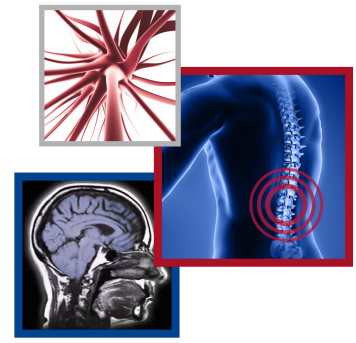
Editorial

Pain Management





# How have the views on myofascial pain and its treatment evolved in the past 20 years? From spray and stretch and injections to pain science, dry needling and fascial treatments

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Although the International Association of Pain has recognized myofascial pain as a prevalent type of musculoskeletal pain, not everyone agrees with this characterization. Some continue to proclaim that myofascial pain and trigger points are 'inventions without scientific merit', [1] while others have ridiculed researchers in this field by characterizing trigger points as entities in the same realm as mythical unicorns [2]. In contrast to these opinions, the fact is that the number of studies, reviews and case reports on the topic of myofascial pain and trigger points is increasing annually and the quality of these studies, determined by the PEDro scale, has improved consistently over the past several decades [3]. In addition, several quantitative MRI and elastography studies, both MRI and sonography, have confirmed the presence, size and location of trigger points.

During the past decades, a shift has occurred in the choice of treatments for myofascial pain. Travell and Simons recommended manual therapy and a combination of spray and stretch with procaine or lidocaine injections. Of interest is that studies of the effect of injecting the serotonin antagonist tropisetron directly into trigger points had superior outcomes compared with prilocaine injections [4,5]. While in the USA, the US FDA has not approved injections with tropisetron, it is somewhat surprising that there are no other studies of injections with antagonists to the many substances identified in the immediate environment of active trigger points in both human and animal models. Dry needling can also reduce the concentrations of several of the substances found near active trigger points.

Dry needling has become a very popular approach worldwide, especially among physical therapists. Although Travell did mention dry needling occasionally, she did not practice the technique routinely. When she performed dry needling, typically she used a hollow injection needle and not the filament needles that are common today. Currently, dry needling is used not only in the treatment of individuals with myofascial pain, but also for the treatment of patients with spasticity in a variety of neurological conditions, patients with cancer, as well as for painful scar tissue and fascial adhesions [6]. One study suggested that adding dry needling to an exercise program for subacromial pain may be more cost-effective [7], but this issue requires more and larger studies of different body regions.

Even though there are studies and systematic reviews that show no additional benefit to dry needling compared with other modalities or sham [8], slowly but steadily the trend is shifting toward comparative studies favoring dry needling over other interventions with higher quality studies and improved methodologies. Several systematic reviews and meta-analyses concluded that dry needling combined with more standard physiotherapy is superior to

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physical therapy alone, while others demonstrated that dry needling is superior to other interventions for reducing pain or improving range of motion, for example in patients with temporomandibular disorders, low back pain and plantar heel pain [9]. Whether dry needling is superior to trigger point injections is not clear based on published studies, which at least partially may be related to the nature of many dry needling and injection studies.

The majority of dry needling studies use the randomized controlled trial (RCT) study format with usually very small sample sizes, poor blinding, very selective study participants and a strong focus on determining clinical efficacy. Furthermore, RCTs do not resemble real life situations and have the inherent risk of overestimating benefits and underreporting risks. To meet the need for standardization, in some studies dry needling is described as administering one needle stick with possibly one local twitch response in comparison to another simplified intervention. While this setup may satisfy the need for standardization from an RCT perspective, frequently it does not resemble dry needling as practiced in the clinic. Concluding that dry needling would or would not provide benefit or may or may not cause harm based on such a simplified study design does not really add much to our understanding of the efficacy of dry needling as a clinical intervention. The results of RCTs do not necessarily translate smoothly into clinical practice even though they are considered the gold standard for conducting intervention studies. In clinical practice, therapeutic interventions are rarely offered in isolation and clinicians usually consider dry needling as an integral aspect of a comprehensive treatment regimen, which may include soft tissue mobilization, exercises, pain education, ergonomic advice and postural modifications, among others. Very few dry needling studies have used a pragmatic approach, which may be more appropriate to assess the possible benefits of the intervention and create more meaningful outcomes [10]. Practice-based research, simulating real world conditions, is needed to determine whether adding dry needling or other interventions to a comprehensive treatment approach will be beneficial under various conditions. To design pragmatic studies, researchers must consider the guidelines of the Consolidated Standards of Reporting Trials (CONSORT) and the Pragmatic-Explanatory Continuum Indicator Summary (PRECIS) [11].

The context in which myofascial pain is being approached is slowly changing. Fernandez-de-Las-Penas and Nijs published a recent review of trigger point dry needling within a pain neuroscience paradigm [9]. Dommerholt *et al.* also advocated to consider myofascial pain within the broader context of pain science in the recently updated Travell, Simons & Simons' Myofascial Pain and Dysfunction textbook [12]. A recent Delphi study reported that 60 specialists from 12 countries preferred the term 'referred sensation' over the more commonly used expression of 'referred pain,' as symptoms reported by patients may include tingling, deep pain, and burning, among others [13]. Since peripheral and central sensitization commonly are maintained by persistent peripheral nociceptive input, active and latent trigger points should be viewed as potential sources of such input and included in the treatment [14]. Critics of this model have emphasized that manual trigger point techniques and dry needling, which commonly are experienced as somewhat painful interventions, may result in triggering more central sensitization, but there is no evidence at all that this actually occurs. Quite to the contrary, a brief nociceptive stimulus administered within the context of a therapeutic encounter will likely activate endogenous pain inhibitory mechanism inhibiting nociceptive processing [15].

Although Travell advocated for the term 'myofascial pain,' in her publications she rarely addressed the fascial aspect of the pain. In fact, the index of her textbooks does not mention fascia, which may be related to the lack of information of the role of fascia in general at that time. Today, there is considerably more known about the interactions between muscles and fascia and it seems that clinicians working with patients with myofascial pain have started considering the interconnectiveness between muscles and fascia and incorporate fascia in their clinical approach. Anatomically, all muscles are surrounded by the epimysium, muscle fiber bundles are separated by the perimysium and individual fibers are embedded in the endomysium, which are different fascial layers. Studies have shown that about 40% of force transmission occurs via fascia. Decreased viscoelasticity of fascia layers has been attributed to a lack of hyaluronan, which is a glycosaminoglycan polymer of the extracellular matrix. A recent study identified increased levels of glycosaminoglycan near contraction knots, which may be worthy of further study as a potential therapeutic target [16]. The researchers did not identify the type of glycosaminoglycan they found in trigger points, but their presence is likely linked to the release of nociceptive substances near active trigger points. Glycosaminoglycans are hygroscopic which may imply that the treatment of trigger points may reduce their volume and contribute to the removal of nociceptive substances. Similarly, manual trigger point release increased the concentration of lactate concentrations, and caused a significant increase in pressure pain thresholds [17]. From a sensory point of view, the role of fascia cannot be ignored either. To illustrate this, the thoracolumbar fascia contains three-times as many nociceptors as back muscles. Nociceptive neurons of the lumbar dorsal horn receive

input from muscles and from the thoracolumbar fascia, and activation of these neurons may contribute to the onset and maintenance of myofascial pain. Furthermore, injections of nerve growth factor into the anterior tibialis and low back muscles and their fascia caused more pronounced mechanical hyperalgesia in the tibial fascia than in the muscle. The thoracodorsal fascia was more sensitive than the tibial fascia.

Finally, recent studies suggest that there may be potentially new therapeutic targets on the horizon. Acupuncture caused changes in the levels of enkephalin and β-endorphin in muscles, the dorsal root ganglion, spinal cord and serum, which suggests that the endogenous opioid system could be a potential analgesic mechanism underlying TrP pain management [18]. A quantitative proteomics analysis in rodents concluded that the glycolysis/gluconeogenesis pathways played dominant roles in the pathogenesis of chronic myofascial pain [19]. More basic research is needed to shed light on other contributing factors. In summary, there are many new developments in the etiology and management of myofascial pain. Not many of these new developments have altered the way clinicians practice, but hopefully in the near future that will change. Clinicians could start with adopting a pain science perspective and consider fascia in their treatment approaches.

### Financial & competing interests disclosure

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