**Myofascial Trigger Points and Central Sensitization in Myofascial Pain Syndrome:** *Exploring their Enigmatic Pathophysiology, Dynamic Clinical Manifestations and Novel Strategies for Optimizing Patient Outcomes*

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**Workshop Description**

Participantsin **t**his interactive, hands-on thought-provoking and clinically impactful workshop will explore the dynamic and pivotal roles that myofascial trigger points (MTrPs), sensitization, limbic system dysfunction and associated objective/quantitative physical findings play in the evaluation and management of chronic myofascial pain syndrome (MPS). Participants will learn and integrate important palpation skills with various acupuncture dry needling and electrical stimulation techniques to treat painful MTrPs and sensitized spinal nerve segments more effectively.

An important dichotomy in the current literature is whether the MTrP is a *cause* or *effect* (i.e., *Chicken* or the *Egg*?) of chronic MPS. The emerging research in basic and clinical neurosciences informs *novel directions* in the clinical diagnosis and non-pharmacologic management of MPS.

The Integrated Hypothesis is the current prevailing theory characterizing the pathophysiology of MPS. According to this hypothesis, MTrPs are the primary source of nociception (*cause*) in MPS and are caused by a local injury to the muscle, either acute or chronic, leading to dysfunctional motor endplates and local muscle contracture.

Emerging research, however, suggests that neurogenic mechanisms play a foundational role in the formation of MTrPs and MPS without the need for direct local injury to the muscle. Accordingly, the *Neurogenic Hypothesis* proposes that the clinical manifestations of MPS are initiated, amplified and facilitated by central sensitization, in the absence of mechanical injury to the muscle.

Accordingly, MTrPs may form secondary to central sensitization (*effect*) evoked by persistent nociceptive input from a distinct primary pathologic source (either somatic or visceral) in the common neuromeric field and/or dysfunction of descending pain modulation.

Novel animal model and clinical research demonstrates strong neuro-inflammatory responses in *neuro-segmentally linked* muscles and joint cartilage subsequent to both naturally occurring and experimentally induced spine osteoarthritis models. Our group’s intriguing findings greatly enhance our understanding of the underlying neuro-inflammatory, neuro-segmental mechanisms in muscle, elucidate the potential physiologic mechanisms contributing to the dynamic clinical manifestations of chronic MPS, and, most importantly, have profound implications for patient management and optimizing outcomes.

Long considered a “local” pain syndrome, MPS actually has a broader impact beyond the active (i.e., spontaneously painful) MTrP and has significant associations with mood, health-related quality of life and function. In fact, recent findings compel us to look at the phenomena of MPS and MTrPs as a type of *spectrum disorder* of sensitization that manifests clinically by varying symptoms and signs.

Spinal segmental sensitization (SSS) is a hyperactive state of the dorsal, ventral and intermediate horns caused by bombardment of nociceptive impulses. Active MTrPs, osteoarthritis, and visceral conditions (e.g., endometriosis, peptic ulcer disease, cystitis, etc.) are very common sources of persistent nociception and sensitization that often results in SSS, facilitated segments, somato-visceral interactions, and chronic myofascial pain.

In addition, viscero-somatic convergence may not only provide the means for pain referral to somatic structures, but may also govern the reflex that induces muscle spasm and the eventual formation of MTrPs. If activated, painful MTrPs, in turn, may serve as an additional source of nociceptive input, and become a key component of a chronic visceral condition – *even if the underlying visceral condition has been optimally managed* – creating enormous diagnostic confusion. Apropos, the deactivation of active MTrPs through a targeted intervention may be a critical aspect to reversing central sensitization and improving pain associated with an underlying visceral disorder such as endometriosis.

Conversely, maladaptive changes in subcortical structures and dysfunctional descending inhibition may create somatic tissue abnormalities (e.g., tissue texture changes, tenderness, etc.) in addition to adversely impacting mood, affect and sleep. Either way, typical manifestations of the sensitized spinal segment include dermatomal allodynia/hyperalgesia, sclerotomal tenderness, and MTrPs within the affected myotomes. These objective, quantitative and reproducible findings allow the clinician and patient to identify the affected spinal segment(s) that should be treated.

Participants in this state-of-the-art course will acquire an in-depth understanding of the emerging research characterizing the pathophysiology and clinical manifestations of MPS. The curriculum will focus on a mechanism-based approach for the diagnosis and treatment of MPS, anchored in a neuro-segmental model that reflects the current understanding of the pathophysiology and clinical manifestation of central sensitization.

Non-pharmacological approaches such as dry needling, and electrical stimulation will be discussed, demonstrated and practiced by attendees. These techniques aim to deactivate painful MTrPs, desensitize affected segments and neuro-modulate subcortical dysfunction, providing more permanent pain and symptom relief. The diagnostic and treatment techniques presented in this workshop are applicable in the management of a variety of chronic myofascial and musculoskeletal pain conditions.

**Learning Objectives**

In this workshop participants will learn:

1. The unique neurobiology of muscle pain and the dynamic interplay of muscle nociceptors and endogenous biochemicals in the initiation, amplification, and perpetuation of peripheral and central sensitization and neurogenic inflammation.

(Specific topics include determining whether the MTrP is the *primary* pathology or *secondary* manifestation in the clinical presentation of MPS). Is the MTrP the *Chicken* or the *Egg*?

1. The pivotal roles of persistent nociceptive bombardment, central sensitization, neurogenic inflammation, wide dynamic range neurons, limbic system structures, and dysfunctional descending inhibition in mediating muscle sensitization, pain chronification, receptive field expansion, and somato-visceral interactions.
2. How novel applications of diagnostic ultrasound can be used as objective, quantifiable and repeatable outcome measures for acupunture dry needling and electrical stimulation techniques. Specific topics include the application of ultrasound imaging to visualize MTrPs, measure their stiffness properties (i.e., elastography) and local blood flow dynamics to differentiate MTrPs from normal muscle tissue *and* how these properties may be used to *quantitatively* measure the effects of acupunture dry needling (pre- and post-treatment).
3. How to identify the reproducible manifestations of spinal segmental sensitization (involving dermatomes, myotomes, and sclerotomes), how to examine the *objective*, *quantifiable* and *reproducible* physical findings of allodynia and hyperalgesia and the referred pain patterns in MPS.
4. How to design a *mechanism-based treatment approach* (e.g., acupuncture dry needling [peripherally and paraspinally], trigger point release, and electrical stimulation techniques to desensitize involved spinal nerve segments, eliminate chronic MTrPs and alleviate chronic MPS and associated chronic MSK and visceral conditions.
5. Insights into how clinicians can immediately integrate these concepts and techniques into a *contemporary neurophysiologic paradigm* for management of chronic pain into clinical practice.

**Speaker Bio:**

*Jay P. Shah, MD* is a physiatrist and clinical investigator in the Rehabilitation Medicine Department at the National Institutes of Health in Bethesda, Maryland USA. His interests include the pathophysiology of myofascial pain and the integration of physical medicine techniques with promising complementary approaches in the management of neuro-musculoskeletal pain and dysfunction. He also completed the one-year UCLA Medical Acupuncture course and a two-year Bravewell Fellowship at the Arizona Center for Integrative Medicine.

Jay is a well-known lecturer on mechanisms of chronic pain syndromes (including chronic pelvic pain), myofascial pain, dry needling, neuro-anatomical acupuncture techniques and other related topics. He and his co-investigators have utilized novel microanalytical and ultrasound imaging techniques that have uncovered the unique biochemical milieu and viscoelastic properties of myofascial trigger points and surrounding soft tissue. Their studies have demonstrated *objective, reproducible* and *quantifiable* muscle tissue properties associated with MTrPs and the quantitative effects of dry needling of active MTrPs on these tissue properties, in addition to showing significant improvements in pain, range of motion and patient self-report outcomes in mental health and physical function.

In addition, Jay has done novel collaborative research studies (with a gynecologist and neurologist) on chronic pelvic pain and endometriosis at the NIH. He and his team have published several landmark papers in this area. Moreover, their work has been internationally recognized and called “transformative” by the World Endometriosis Foundation. Their clinically impactful studies have helped shift the focus from studying endometriosis lesions to understanding how endometriosis and pain are related with emphasis on elucidating the underlying mechanisms of chronic pelvic pain.

Jay has given hundreds of invited lectures and hands-on courses nationally and internationally for physicians, physiotherapists, acupuncturists, dentists (specializing in orofacial pain), chiropractors, and massage therapists, among other professional groups. His presentations integrate the fascinating knowledge emerging from the basic and clinical pain sciences in order to optimize evaluation and management approaches to musculoskeletal pain and dysfunction.

Jay was selected by the American Academy of Pain Management as the 2010 recipient of the Janet Travell Clinical Pain Management Award for excellence in clinical care and by the National Association of Myofascial Trigger Point Therapists as the 2012 recipient of the David G. Simons Award for excellence in clinical research.