PASIG PERFORMING ARTS SPECIAL INTEREST GROUP

ORTHOPAEDIC SECTION AMERICAN PHYSICAL THERAPY ASSOCIATION

APTA American Physical Therapy Association The Science of Healing. The Art of Caring.

PASIG MONTHLY CITATION BLAST: No.62 **July 2011**

Dear PASIG members:

Save the date: Combined Sections Meeting 2012 will be held in Chicago, February 8 – 11.

Abstracts acceptances for CSM usually go out in August. Don't forget, the PASIG sponsors an annual student research scholarship. This award is to recognize students, who have had an abstract accepted to CSM, for their contribution to performing arts medicine and research. For more information on the research award please check our webpage (www.orthopt.org/sig_pa.php). Students with additional questions can contact Amy Humphrey (ahumphrey@bodydynamicsinc.com).

PERFORMING ARTS CONTINUING EDUCATION AND CONFERENCES

****Performing Arts Independent Study Couses****

Orthopaedic Section Independent Study Course. *20.3 Physical Therapy for the Performing Artist*.

Monographs are available for:

- Figure Skating (J. Flug, J. Schneider, E. Greenberg),
- Artistic Gymnastics (A. Hunter-Giordano, Pongetti-Angeletti, S. Voelker, TJ Manal), and
- Instrumentalist Musicians (J. Dommerholt, B. Collier).

Contact: Orthopaedic Section at: www.orthopt.org

Orthopaedic Section Independent Study Course. *Dance Medicine: Strategies for the Prevention and Care of Injuries to Dancers*.

This is a 6-monograph course and includes many PASIG members as authors.

- Epidemiology of Dance Injuries: Biopsychosocial Considerations in the Management of Dancer Health (MJ Liederbach),
- Nutrition, Hydration, Metabolism, and Thinness (B Glace),
- The Dancer's Hip: Anatomic, Biomechanical, and Rehabilitation Considerations (G. Grossman),
- Common Knee Injuries in Dance (MJ Liederbach),
- Foot and Ankle Injuries in the Dancer: Examination and Treatment Strategies (M. Molnar, R. Bernstein, M. Hartog, L. Henry, M. Rodriguez, J. Smith, A. Zujko),
- Developing Expert Physical Therapy Practice in Dance Medicine – (J. Gamboa, S. Bronner, TJ Manal).

Contact: Orthopaedic Section at: www.orthopt.org

PAMA: Medical Problems of Performing Artists
July 21 – 24, 2011, Snowmass, CO

International Association for Dance Medicine and Science (IADMS) 21st Annual Meeting
October 13 – 16, 2011, Washington DC
Contact: www.iadms.org

Please send information about other courses of interest to our membership to: Amy Humphrey PT, DPT, OCS, MTC; ahumphrey@Bodydynamicsinc.com

For this July Citation BLAST, Michelle Finnegan and Mandy Blackmon have put together a continuation of the June topic, "*Myofascial trigger points and trigger point dry needling related to pain—Part 2*." This focuses on the treatment of trigger points in different areas of the body, and on nutritional aspects that can perpetuate trigger points. The format is an annotated bibliography of articles generally from the last decade. The PASIG Research Committee initiated this monthly Citation BLAST on performing arts-related topics in June 2005 in the hopes of encouraging our members to stay current in the literature and, perhaps, consider conducting research themselves. Each month we send a new list of performing arts (PA) citations to members of the PASIG to further the pursuit of PA-related scholarship. (Information about EndNote referencing software can be found at http://www.endnote.com, including a 30-day free trial).

If you are interested in joining the Research Committee or putting your name forward as the new Research Chair, please contact me. I will step down in February. As always, your comments, suggestions, and entry contributions to these Citation BLASTs are welcome. Please drop me an e-mail anytime.

Regards,
Shaw

Shaw Bronner PT, PhD, OCS
Chair, PASIG Research Committee
sbronner@liu.edu

PASIG Research Committee members
Jeff Stenback, jsptocs2@hotmail.com
Sheyi Ojofeitimi, sojofeit@gmail.com
Jennifer Gamboa, jgamboa@bodydynamicsinc.com

Myofascial trigger points and trigger point dry needling related to pain—Part 2

The purpose of this blast is to educate readers on the benefits of the treatment approach, called trigger point dry needling, used in the treatment of myofascial conditions that are due to trigger points. Part 1 offered insight into the foundational sciences of this treatment approach for a better understanding of how the trigger points come about, their effects on the body, and how treatment generally works. In Part 2, we

present literature to address pain syndromes in various regions of the body, as well as research regarding nutritional and other systemic factors that may contribute to these myofascial syndromes.

Mandy Blackmon, PT, DPT, OCS, CMTPT
One on One Physical Therapy
Atlanta, GA

Michelle Finnegan, PT, DPT, OCS, MTC, CMTPT, FAAOMPT
Bethesda Physiocare
Bethesda, MD

Although this region is not commonly injured in dancers, there are several articles published that address the treatment of myofascial trigger points in and around the head and neck, specifically in patient populations with cervical spine pain, headache and TMJ complaints.

Fernandez-Carnero J, La Touche R, et al. (2010). Short-term effects of dry needling of active myofascial trigger points in the masseter muscle in patients with temporomandibular disorders. J Orofac Pain **24**(1): 106-112.

AIMS: To investigate the effects of dry needling over active trigger points (TrPs) in the masseter muscle in patients with temporomandibular disorders (TMD). METHODS: Twelve females, aged 20 to 41 years old (mean = 25, standard deviation +/- 6 years) diagnosed with myofascial TMD were recruited. Each patient attended two treatment sessions on two separate days and received one intervention assigned in a random fashion, at each visit: deep dry needling (experimental) or sham dry needling (placebo) at the most painful point on the masseter muscle TrP. Pressure pain threshold (PPT) over the masseter muscle TrP and the mandibular condyle and pain-free active jaw opening were assessed pre- and 5 minutes postintervention by an examiner blinded to the treatment allocation of the subject. A two-way repeated-measures analysis of variance (ANOVA) with intervention as the between-subjects variable and time as the within-subjects variable was used to examine the effects of the intervention. RESULTS: The ANOVA detected a significant interaction between intervention and time for PPT levels in the masseter muscle ($F = 62.5$; $P < .001$) and condyle ($F = 50.4$; $P < .001$), and pain-free active mouth opening ($F = 34.9$; $P < .001$). Subjects showed greater improvements in all the outcomes when receiving the deep dry needling compared to the sham dry needling ($P < .001$). CONCLUSION: The application of dry needling into active TrPs in the masseter muscle induced significant increases in PPT levels and maximal jaw opening when compared to the sham dry needling in patients with myofascial TMD.

Fernandez-de-las-Penas C, Caminero AB, et al. (2009). Multiple active myofascial trigger points and pressure pain sensitivity maps in the temporalis muscle are related in women with chronic tension type headache. Clin J Pain **25**(6): 506-512.

OBJECTIVE: To describe the common locations of active trigger points (TrPs) in the temporalis muscle and their referred pain patterns in chronic tension type headache (CTTH), and to determine if pressure sensitivity maps of this muscle can be used to describe the spatial distribution of active TrPs. METHODS: Forty women with CTTH were included. An electronic pressure algometer was used to assess pressure pain thresholds (PPT) from 9 points over each temporalis muscle: 3 points in the anterior, medial and posterior part, respectively. Both muscles were examined for the presence of active TrPs over each of the 9 points. The referred pain pattern of each active TrP was assessed. RESULTS: Two-way analysis of variance detected significant differences in mean PPT levels between the measurement points ($F=30.3$; $P<0.001$), but not between sides ($F=2.1$; $P=0.2$). PPT scores

decreased from the posterior to the anterior column (P<0.001). No differences were found in the number of active TrPs (F=0.3; P=0.9) between the dominant side the nondominant side. Significant differences were found in the distribution of the active TrPs (chi2=12.2; P<0.001): active TrPs were mostly found in the anterior column and in the middle of the muscle belly. The analysis of variance did not detect significant differences in the referred pain pattern between active TrPs (F=1.1, P=0.4). The topographical pressure pain sensitivity maps showed the distinct distribution of the TrPs indicated by locations with low PPTs. CONCLUSIONS: Multiple active TrPs in the temporalis muscle were found, particularly in the anterior column and in the middle of the muscle belly. Bilateral posterior to anterior decreased distribution of PPTs in the temporalis muscle in women with CTTH was found. The locations of active TrPs in the temporalis muscle corresponded well to the muscle areas with lower PPT, supporting the relationship between multiple active muscle TrPs and topographical pressure sensitivity maps in the temporalis muscle in women with CTTH.

Fernandez-de-Las-Penas C, Cuadrado ML, et al. (2008). Association of cross-sectional area of the rectus capitis posterior minor muscle with active trigger points in chronic tension-type headache: a pilot study. Am J Phys Med Rehabil **87**(3): 197-203.

OBJECTIVE: To investigate whether cross-sectional area (CSA) of the suboccipital muscles was associated with active trigger points (TrPs) in chronic tension-type headache (CTTH). DESIGN: Magnetic resonance imaging (MRI) of the cervical spine was performed in 11 females with CTTH aged from 26 to 50 yrs old. CSA for both rectus capitis posterior minor (RCPmin) and rectus capitis posterior major (RCPmaj) muscles were measured from axial T1-weighted images, using axial MRI slices aligned parallel to the C2/3 intervertebral disc. A headache diary was kept for 4 wks to record the pain history. TrPs in the suboccipital muscle were identified by eliciting referred pain to palpation, and increased referred pain with muscle contraction. TrPs were considered active if the elicited referred pain reproduced the head pain pattern and features of the pattern seen during spontaneous headache attacks. RESULTS: Active TrPs were found in six patients (55%), whereas the remaining five patients showed latent TrPs. CSA of the RCPmin was significantly smaller (F = 13.843; P = 0.002) in the patients with active TrPs (right side: 55.9 +/- 4.4 mm; left side: 61.1 +/-: 3.8 mm) than in patients with latent TrPs (right side: 96.9 +/- 14.4 mm; left side: 88.7 +/- 9.7 mm). No significant differences were found for CSA of the RCPmaj between the patients with either active or latent TrP (P > 0.5). CONCLUSIONS: It seems that muscle atrophy in the RCPmin, but not in the RCPmaj, was associated with suboccipital active TrPs in CTTH, although studies with larger sample sizes are now required. It may be that nociceptive inputs in active TrPs could lead to muscle atrophy of the involved muscles. Muscle disuse or avoidance behavior can also be involved in atrophy.

Fernandez-de-Las-Penas C, Cuadrado ML, et al. (2009). Active Muscle Trigger Points as Sign of Sensitization in Chronic Primary Headaches. J Musculoskeletal Pain **17**(2): 155-161.

Objective: To describe the differences in the presence of trigger points [TrPs] in neck and shoulder muscles that elicit referred pain to the head between nummular headache [NH], chronic tension-type headache [CTTH], and healthy controls [HNC]. Methods: Ten NH [i.e., head pain exclusively felt in a small rounded or elliptical area of the head, not attributed to another disorder], 10 CTTH, and 10 HNC participated. The upper trapezius, sternocleidomastoid, and temporalis muscles were bilaterally examined by an assessor blinded to the subjects' condition for the presence of muscle TrPs as follows: hyperirritable spot within a taut band, local twitch response, and referred pain with palpation. TrPs were considered active if the referred pain reproduced the pattern and features of spontaneous headache attacks. Results: The number of TrPs was significantly higher [P 0.001] in the CTTH group [mean: 4.4, standard deviation [SD]: 1.7] as compared to both NH [mean: 0.9, SD: 0.7] and HNC groups [mean: 1.2, SD: 0.6], but not significantly different between NH and HNC [P = 0.8]. Active TrPs were only found in the CTTH group [P 0001]. Latent TrPs were

more conspicuous in both temporalis muscles within the CTTH group [P 0.05], but not significantly different for the remaining muscles [P = 0.6]. Differences in the distribution of TrPs were significantly different between CTTH and both NH and HNC groups [P 0.01], but not between the two last groups [P = 0.7]. Conclusions: The absence of active TrPs could be clinically useful to distinguish NH, a peripheral primary headache, from CTTH, a central primary headache.

Fernandez-de-Las-Penas C, Cuadrado ML, et al. (2009). Referred pain elicited by manual exploration of the lateral rectus muscle in chronic tension-type headache. Pain Med **10**(1): 43-48.

OBJECTIVE: To analyze the presence of referred pain elicited by manual examination of the lateral rectus muscle in patients with chronic tension-type headache (CTTH). DESIGN: A case-control blinded study. SETTING: It has been found previously that the manual examination of the superior oblique muscle can elicit referred pain to the head in some patients with migraine or tension-type headache. However, a referred pain from other extraocular muscles has not been investigated. METHODS: Fifteen patients with CTTH and 15 healthy subjects without headache history were included. A blinded assessor performed a manual examination focused on the search for myofascial trigger points (TrPs) in the right and left lateral rectus muscles. TrP diagnosis was made when there was referred pain evoked by maintained pressure on the lateral corner of the orbit (anatomical projection of the lateral rectus muscle) for 20 seconds, and increased referred pain while the subject maintained a medial gaze on the corresponding side (active stretching of the muscle) for 15 seconds. On each side, a 10-point numerical pain rate scale was used to assess the intensity of referred pain at both stages of the examination. RESULTS: Ten patients with CTTH (66.6%) had referred pain that satisfied TrPs diagnostic criteria, while only one healthy control (0.07%) reported referred pain upon the examination of the lateral rectus muscles (P < 0.001). The elicited referred pain was perceived as a deep ache located at the supraorbital region or the homolateral forehead. Pain was evoked on both sides in all subjects with TrPs, with no difference in pain intensity between the right and the left. The average pain intensity was significantly greater in the patient group (P < 0.001). All CTTH patients with referred pain recognized it as the frontal pain that they usually experienced during their headache attacks, which was consistent with active TrPs. CONCLUSION: In some patients with CTTH, the manual examination of lateral rectus muscle TrPs elicits a referred pain that extends to the supraorbital region or the homolateral forehead. Nociceptive inputs from the extraocular muscles may sustain the activation of trigeminal neuron, thus sensitizing central pain pathways and exacerbating headache.

Fernandez-de-las-Penas C, Madeleine P, et al. (2009). Pressure pain sensitivity mapping of the temporalis muscle revealed bilateral pressure hyperalgesia in patients with strictly unilateral migraine. Cephalalgia **29**(6): 670-676.

Previous studies on pressure pain sensitivity in patients with migraine have shown conflicting results. There is emerging evidence suggesting that pain sensitivity is not uniformly distributed over the muscles, indicating the existence of topographical changes in pressure pain sensitivity. The aim of this study was to calculate topographical pressure pain sensitivity maps of the temporalis muscle in a blind design in patients with strictly unilateral migraine compared with controls. For this purpose, an electronic pressure algometer was used to measure pressure pain thresholds (PPT) over nine points of the temporalis muscle: three points in the anterior, medial and posterior parts, respectively. Pressure pain sensitivity maps of both sides (dominant or non-dominant; symptomatic or non-symptomatic) were calculated. The analysis of variance showed significant differences in PPT values between both groups (F = 279.2; P < 0.001) and points (F = 4.033; P < 0.001). Patients showed lower PPT at all nine points than healthy controls (P < 0.001). We also found lower PPT in the centre of the muscle compared with the posterior part of the muscle within both groups (P < 0.01).

Interaction between group and points (F = 1.9; P < 0.05) was also found. Within the migraine group, PPT levels were decreased bilaterally from the posterior to the anterior column of the temporalis muscle (Student-Newman- Keuls analysis; P < 0.05), with the most sensitive in the anterior part of the muscle. For controls, PPT did not follow such anatomical distribution, the most sensitive point being the centre of the mid-muscle belly. This study showed bilateral sensitization to pressure in unilateral migraine, suggesting the involvement of central components.

Irnich D, Behrens N, et al. (2002). Immediate effects of dry needling and acupuncture at distant points in chronic neck pain: results of a randomized, double-blind, sham-controlled crossover trial. Pain **99**(1-2): 83-89.

To evaluate immediate effects of two different modes of acupuncture on motion-related pain and cervical spine mobility in chronic neck pain patients compared to a sham procedure. Thirty-six patients with chronic neck pain and limited cervical spine mobility participated in a prospective, randomized, double-blind, sham-controlled crossover trial. Every patient was treated once with needle acupuncture at distant points, dry needling (DN) of local myofascial trigger points and sham laser acupuncture (Sham). Outcome measures were motion-related pain intensity (visual analogue scale, 0-100 mm) and range of motion (ROM). In addition, patients scored changes of general complaints using an 11-point verbal rating scale. Patients were assessed immediately before and after each treatment by an independent (blinded) investigator. Multivariate analysis was used to assess the effects of true acupuncture and needle site independently. For motion-related pain, use of acupuncture at non-local points reduced pain scores by about a third (11.2 mm; 95% CI 5.7, 16.7; P = 0.00006) compared to DN and sham. DN led to an estimated reduction in pain of 1.0 mm (95% CI -4.5, 6.5; P = 0.7). Use of DN slightly improved ROM by 1.7 degrees (95% CI 0.2, 3.2; P = 0.032) with use of non-local points improving ROM by an additional 1.9 degrees (95% CI 0.3, 3.4; P = 0.016). For patient assessment of change, non-local acupuncture was significantly superior both to Sham (1.7 points; 95% CI 1.0, 2.5; P = 0.0001) and DN (1.5 points; 95% CI 0.4, 2.6; P = 0.008) but there was no difference between DN and Sham (0.1 point; 95% CI -1.0, 1.2; P = 0.8). Acupuncture is superior to Sham in improving motion-related pain and ROM following a single session of treatment in chronic neck pain patients. Acupuncture at distant points improves ROM more than DN; DN was ineffective for motion-related pain.

Ketenci A, Basat H, et al. (2009). The efficacy of topical thiocolchicoside (Muscoril) in the treatment of acute cervical myofascial pain syndrome: a single-blind, randomized, prospective, phase IV clinical study. Agri **21**(3): 95-103.

OBJECTIVES: Myofascial pain syndrome is a disorder characterized by hypersensitive sites called trigger points at one or more muscles and/or connective tissue, leading to pain, muscle spasm, sensitivity, rigor, limitation of movement, weakness, and rarely, autonomic dysfunction. Various treatment methods have been used in the treatment of myofascial pain syndrome. Among these, stretch and spray technique, trigger point injection, dry needling, pharmacological agents, and physical therapy modalities have been proven effective. METHODS: Sixty-five patients with acute myofascial pain syndrome were recruited into the study. Patients were randomized into three groups. The first group received thiocolchicoside ointment onto the trigger points, the second group received 8 mg thiocolchicoside intramuscular injection to the trigger points, and the third group received both treatments. Treatment was applied for 5 consecutive days. Algometric and goniometric measurements and pain severity assessments with visual analog scale (VAS) were repeated on the first, third, and fifth days of the treatment. RESULTS: Pain severity measured with VAS significantly improved after the first day in the mono-therapy groups and after the third day in all groups. While significant improvement was observed in all three groups in right lateral flexion measurements, no significant changes were observed in the combined treatment group in left lateral flexion measurements. CONCLUSION: Thiocolchicoside can be used in

the treatment of myofascial pain syndrome. The ointment form may be a good alternative, particularly in patients who cannot receive injections.

Peloso P, Gross A, et al. (2007). Medicinal and injection therapies for mechanical neck disorders. Cochrane Database Syst Rev(3): CD000319.

BACKGROUND: Controversy persists regarding medicinal therapies and injections. OBJECTIVES: To determine the effects of medication and injections on primary outcomes (e.g. pain) for adults with mechanical neck disorders and whiplash. SEARCH STRATEGY: We searched CENTRAL, MANTIS, CINAHL from their start to May 2006; MEDLINE and EMBASE to December 2006. We scrutinised reference lists for other trials. SELECTION CRITERIA: We included randomised controlled trials with adults with neck disorders, with or without associated headache or radicular findings. We considered medicinal and injection therapies, regardless of route of administration. DATA COLLECTION AND ANALYSIS: Two authors independently selected articles, abstracted data and assessed methodological quality. When clinical heterogeneity was absent, we combined studies using random-effects models. MAIN RESULTS: We found 36 trials that examined the effects of oral NSAIDs, psychotropic agents, steroid injections, and anaesthetic agents. Trials had a mean of 3.1 on the Jadad Scale for methodological quality; 70% were high quality. For acute whiplash, administering intravenous methylprednisolone within eight hours of injury reduced pain at one week (SMD -0.90, 95% CI -1.57 to -0.24), and sick leave but not pain at six months compared to placebo in one trial. For chronic neck disorders at short-term follow-up, intramuscular injection of lidocaine was superior to placebo (SMD -1.36, 95% CI -1.93 to -0.80); NNT 3, treatment advantage 45% and dry needling, but similar to ultrasound in one trial each. In chronic neck disorders with radicular findings, epidural methylprednisolone and lidocaine reduced neck pain and improved function more than when given by intramuscular route at one-year follow-up, in one trial. In subacute and chronic neck disorders, muscle relaxants, analgesics and NSAIDs had limited evidence and unclear benefits. In participants with chronic neck disorders with or without radicular findings or headache, there was moderate evidence from five high quality trials that Botulinum toxin A intramuscular injections had similar effects to saline in improving pain (pooled SMD: -0.39, 95%CI -1.25 to 0.47), disability or global perceived effect. AUTHORS' CONCLUSIONS: The major limitations are the lack of replication of the findings and sufficiently large trials. There is moderate evidence for the benefit of intravenous methylprednisolone given within eight hours of acute whiplash, from a single trial. Lidocaine injection into myofascial trigger points appears effective in two trials. There is moderate evidence that Botulinum toxin A is not superior to saline injection for chronic MND. Muscle relaxants, analgesics and NSAIDs had limited evidence and unclear benefits.

There is significant literature regarding the existence of myofascial pain syndromes in the upper extremity, specifcally involving the shoulder, elbow, and hand. These syndromes include the treatment of myofascial trigger points, and are shown to improve function and pain in the upper extremity.

Gerwin RD (1997). Myofascial pain syndromes in the upper extremity. J Hand Ther **10**(2): 130-136.

Myofascial pain syndromes of the upper extremity are common causes of pain that may follow trauma and are associated with acute or chronic musculoskeletal stress. The syndromes are characterized by the presence of the myofascial trigger point, a physical finding that is reliably identified by palpation. Local and referred pain are hallmarks of the syndrome, and the referred pain patterns may mimic such conditions as radiculopathy and nerve entrapment syndromes. Treatment is directed toward inactivating the myofascial trigger point, correcting underlying perpetuating factors, and restoring the normal relationships between the muscles of the affected functional motor units.

Bron C, Wensing M, et al. (2007). Treatment of myofascial trigger points in common shoulder disorders by physical therapy: a randomized controlled trial. BMC Musculoskelet Disord **8**: 107.
BACKGROUND: Shoulder disorders are a common health problem in western societies. Several treatment protocols have been developed for the clinical management of persons with shoulder pain. However available evidence does not support any protocol as being superior over others. Systematic reviews provide some evidence that certain physical therapy interventions (i.e. supervised exercises and mobilisation) are effective in particular shoulder disorders (i.e. rotator cuff disorders, mixed shoulder disorders and adhesive capsulitis), but there is an ongoing need for high quality trials of physical therapy interventions. Usually, physical therapy consists of active exercises intended to strengthen the shoulder muscles as stabilizers of the glenohumeral joint or perform mobilisations to improve restricted mobility of the glenohumeral or adjacent joints (shoulder girdle). It is generally accepted that a-traumatic shoulder problems are the result of impingement of the subacromial structures, such as the bursa or rotator cuff tendons. Myofascial trigger points (MTrPs) in shoulder muscles may also lead to a complex of symptoms that are often seen in patients diagnosed with subacromial impingement or rotator cuff tendinopathy. Little is known about the treatment of MTrPs in patients with shoulder disorders.The primary aim of this study is to investigate whether physical therapy modalities to inactivate MTrPs can reduce symptoms and improve shoulder function in daily activities in a population of chronic a-traumatic shoulder patients when compared to a wait-and-see strategy. In addition we investigate the recurrence rate during a one-year-follow-up period. METHODS/DESIGN: This paper presents the design for a randomized controlled trial to be conducted between September 2007 - September 2008, evaluating the effectiveness of a physical therapy treatment for non-traumatic shoulder complaints. One hundred subjects are included in this study. All subjects have unilateral shoulder pain for at least six months and are referred to a physical therapy practice specialized in musculoskeletal disorders of the neck-, shoulder-, and arm. After the initial assessment patients are randomly assigned to either an intervention group or a control-group (wait and see). The primary outcome measure is the overall score of the Dutch language version of the DASH (Disabilities of Arm, Shoulder and Hand) questionnaire. DISCUSSION: Since there is only little evidence for the efficacy of physical therapy interventions in certain shoulder disorders, there is a need for further research. We found only a few studies examining the efficacy of MTrP therapy for shoulder disorders. Therefore we will perform a randomised clinical trial of the effect of physical therapy interventions aimed to inactivate MTrPs, on pain and impairment in shoulder function in a population of chronic a-traumatic shoulder patients. We opted for an intervention strategy that best reflects daily practice. Manual high velocity thrust techniques and dry-needling are excluded. Because in most physical therapy interventions, blinding of the patient and the therapist is not possible, we will perform a randomised, controlled and observer-blinded study.

Ge, HY, Fernandez-de-Las-Penas C, et al. (2008). Topographical mapping and mechanical pain sensitivity of myofascial trigger points in the infraspinatus muscle. Eur J Pain **12**(7): 859-865.
OBJECTIVES: To screen for the presence of latent and active myofascial trigger points (MTrPs) in patients with unilateral shoulder and arm pain and perform topographical mapping of mechanical pain sensitivity bilaterally in the infraspinatus muscles. METHODS: Nineteen patients with unilateral musculoskeletal shoulder pain participated in the study. The area overlying the infraspinatus on each side was divided into 10 adjacent sub-areas of 1cm(2), corresponding to the area of a pressure algometer probe. Pressure pain threshold (PPT) was measured in each sub-area bilaterally in the infraspinatus muscles. Following PPT measurement, an acupuncture needle was inserted into each sub-area five times in different directions in order to induce local twitch response and/or referred pain. RESULTS: A significantly lower PPT level in the infraspinatus muscle was detected on the painful side compared with the non-painful side (P=0.001). PPT at midfiber region of the infraspinatus

muscles was lower than that at other muscle parts (P<0.05). Multiple, but not single, active MTrPs were found in the infraspinatus muscle on the painful side and there were also multiple latent MTrPs bilaterally in the infraspinatus muscles. PPT at active MTrPs was much lower than the latent MTrPs and again lower than the non-MTrPs. CONCLUSIONS: There exists bilateral mechanical hyperalgesia in patients with unilateral shoulder pain. Further, the association of multiple active MTrPs with unilateral shoulder pain and the heterogeneity of mechanical pain sensitivity distribution suggest a crucial role of peripheral sensitization in chronic myofascial pain conditions. Additionally, the locations of MTrPs identified with dry needling correspond well to PPT topographical mapping, suggesting that dry needling and PPT topographical mapping are sensitive techniques in the identification of MTrPs.

Lucas, KR, Rich PA, et al. (2010). Muscle activation patterns in the scapular positioning muscles during loaded scapular plane elevation: the effects of Latent Myofascial Trigger Points. Clin Biomech **25**(8): 765-770.

BACKGROUND: Latent Myofascial Trigger Points are pain-free neuromuscular lesions that have been found to affect muscle activation patterns in the unloaded state. The aim was to extend these observations to loaded motion by investigating muscle activation patterns in upward scapular rotator muscles (upper and lower trapezius and serratus anterior) hosting Latent Myofascial Trigger Points simultaneously with lesion-free synergists for shoulder abduction (infraspinatus and middle deltoid). This approach allowed examination of the effects of these lesions on both their hosts and their lesion-free synergists in order to understand their effects on the performance of shoulder abduction. METHODS: Surface electromyography was employed to measure the timing of onset of muscle activation of the upper and lower trapezius and serratus anterior (upward scapular rotators), infraspinatus (rotator cuff) and middle deltoid (abductor of the arm) initially without load and then with light (1-4 kg) dumbbells. Comparisons were made between control (no Latent Trigger Points; n=14) and Latent Trigger Point (n=28) groups. FINDINGS: The control group displayed a relatively stable sequence of muscle activation that was significantly different in timing and variability to that of the Latent Trigger Point group in all muscles except middle deltoid (all P<0.05). The Latent Trigger Point group muscle activation pattern under load was inconsistent, with the only common feature being the early activation of the infraspinatus. INTERPRETATION: The presence of Latent Trigger Points in upward scapular rotators alters the muscle activation pattern during scapular plane elevation, potentially predisposing to overuse conditions including impingement syndrome, rotator cuff pathology and myofascial pain.

Osborne NJ, Gatt IT (2010). Management of shoulder injuries using dry needling in elite volleyball players. Acupunct Med **28**(1): 42-45.

These case reports describe the short-term benefits of dry needling in shoulder injuries in four international female volleyball athletes during a month-long intense competitive phase, using both replicable subjective and objective measures. Dry needling of scapulohumeral muscles was carried out. Range of movement, strength and pain were assessed before and after treatment, with a functional assessment of pain immediately after playing and overhead activity, using the short form McGill Pain Questionnaire. All scores were improved post-treatment and athletes were able to continue overhead activities. Previous studies have suggested that myofascial trigger points may cause significant functional weakness and reduced range of motion, with referred pain. Trigger point dry needling has been successful in treating athletes with myofascial pain and impingement symptoms but with only subjective improvement and not during a competitive phase. These cases support the use of dry needling in elite athletes during a competitive phase with short-term pain relief and improved function in shoulder injuries. It may help maintain rotator cuff balance and strength, reducing further pain and injury.

Perez-Palomares S, Olivan-Blazquez B, et al. (2009). Contributions of myofascial pain in diagnosis and treatment of shoulder pain. A randomized control trial. BMC Musculoskelet Disord **10**: 92.

BACKGROUND: Rotator cuff tendinopathy and subacromial impingement syndrome present complex patomechanical situations, frequent difficulties in clinical diagnosis and lack of effectiveness in treatment. Based on clinical experience, we have therefore considered the existence of another pathological entity as the possible origin of pain and dysfunction. The hypothesis of this study is to relate subacromial impingement syndrome (SIS) with myofascial pain syndrome (MPS), since myofascial trigger points (MTrPs) cause pain, functional limitation, lack of coordination and alterations in quality of movement, even prior to a tendinopathy. MTrPs can coexist with any degenerative subacromial condition. If they are not taken into consideration, they could perpetuate and aggravate the problem, hindering diagnosis and making the applied treatments ineffective.The aims and methods of this study are related with providing evidence of the relationship that may exist between this condition and MPS in the diagnosis and treatment of rotator cuff tendonitis and/or SIS. METHOD/DESIGN: A descriptive transversal study will be made to find the correlation between the diagnosis of SIS and rotator cuff tendonitis, positive provocation test responses, the existence of active MTrPs and the results obtained with ultrasonography (US) and Magnetic Renonance Imaging (MRI). A randomized double blinded clinical trial will be carried out in experimental conditions: A Protocolized treatment based on active and passive joint repositioning, stabilization exercises, stretching of the periarticular shoulder muscles and postural reeducation. B. The previously described protocolized treatment, with the addition of dry needling applied to active MTrPs with the purpose of isolating the efficacy of dry needling in treatment. DISCUSSION: This study aims to provide a new vision of shoulder pain, from the perspective of MPS. This syndrome can, by itself, account for shoulder pain and dysfunction, although it can coexist with real conditions involving the tendons. TRIAL REGISTRATION: ISRCTN Number: 30907460.

Fernandez-Carnero J, Fernandez-de-las-Penas C, et al. (2008). Bilateral myofascial trigger points in the forearm muscles in patients with chronic unilateral lateral epicondylalgia: a blinded, controlled study. Clin J Pain **24**(9): 802-807.

OBJECTIVE: The aim of the present study was to investigate the presence of active and latent muscle trigger points (TrPs) in the forearm musculature on both affected and unaffected sides in patients with lateral epicondylalgia (LE) and healthy controls. METHODS: Twenty-five patients with LE and 20 healthy matched controls participated. Both groups were examined for the presence of TrPs in the extensor carpi radialis brevis, extensor carpi radialis longus, extensor digitorum communis, and brachioradialis muscles in a blinded fashion. TrPs were identified in both affected and unaffected sides within the patient group. In the control group, TrPs were explored around the dominant side. Pressure pain thresholds (PPTs) were assessed on both affected and unaffected arms. RESULTS: In the patient group, the number of active muscle TrPs in the affected side was 3.1 [95% confidence interval (CI): 2.8-3.4], whereas in the unaffected arm, only latent TrPs were found (mean: 2.2; 95% CI: 1.8-2.6). Active TrPs were only located on the affected side (P<0.001). Within the control group, the number of latent TrPs in the dominant arm was 0.4 (95% CI: 0.0-0.7), which was significantly lower than the number of latent TrPs in the unaffected arm (P<0.001) in patients. Therefore, latent muscle TrPs in the forearm musculature were associated with the unaffected side in the patient group as compared with the dominant arm in healthy controls: extensor carpi radialis brevis [odds ratio (OR)=66 (95% CI: 9.9-48.8)], extensor carpi radialis longus [OR=16 (95% CI: 3.7-29.6)], brachioradialis [OR=2.6 (95% CI: 0.3-27.1)], and extensor digitorum communis [OR=0.5 (95% CI: 0.4-0.8)]. PPTs were lower around the affected side than around the unaffected arm in patients (mean+/-SD: 274.5+/-90.4 KPa vs. 465.4+/-140.7 KPa; P<0.001) in the patient group. Finally, PPT from the extensor digitorum muscle in those patients with active TrPs (mean+/-SD: 244+/-70.4 KPa) was significantly lower (P<0.001)

than PPT levels of patients with no TrP in the same muscle (mean+/-SD: 370+/-83.4 KPa). CONCLUSIONS: Latent TrPs are present in forearm muscles on the unaffected side in patients with LE where active TrPs contribute to the pain on the affected arm. The presence of latent TrPs on the unaffected side in unilateral LE may be related to central sensitization and be a mechanism explaining bilateral pain in some patients with unilateral pathologies.

Fernandez-Carnero J, Fernandez-de-Las-Penas C, et al. (2009). Widespread mechanical pain hypersensitivity as sign of central sensitization in unilateral epicondylalgia: a blinded, controlled study. Clin J Pain **25**(7): 555-561.

OBJECTIVE: The aim of this study was to investigate whether generalized deep tissue hyperalgesia exists in patients with chronic unilateral lateral epicondylalgia (LE). METHODS: A total of 26 LE patients (10 males and 16 females, aged 25 to 63 y) and 20 healthy comparable matched controls (aged 26 to 61 y) were recruited and pressure pain threshold (PPT) was assessed bilaterally over the median, ulnar, and radial nerve trunks, the lateral epicondyle, C5-C6 zygapophyseal joint, and the tibialis anterior muscle in a blind design. RESULTS: PPT was significantly decreased bilaterally over the median, ulnar, and radial nerve trunks, the lateral epicondyle, the C5-C6 zygapophyseal joint, and tibialis anterior muscle in patients with LE than healthy controls (all $P<0.001$). PPTs over those measured points was negatively related to current elbow pain intensity (all $P<0.05$). A more significant decrease in PPTs were present in females (all $P<0.05$). CONCLUSIONS: This revealed a widespread mechanical hypersensitivity in patients with LE, which suggest that central sensitization mechanisms are involved in patients with unilateral LE. The generalized decrease in PPT levels was associated with elbow pain intensity, supporting a role of peripheral sensitization mechanisms in the initiation or maintenance of central sensitization mechanisms. In addition, females may be more prone to the development of generalized mechanical hypersensitivity.

Fernandez-Carnero J, Fernandez-de-las-Penas C, et al. (2009). Exploration of the extent of somato-sensory impairment in patients with unilateral lateral epicondylalgia. J Pain **10**(11): 1179-1185.

There is evidence suggesting an important role of nociceptive sensitization in lateral epicondylalgia (LE). Our aim was to explore somato-sensory changes in patients with unilateral LE to better understand this musculoskeletal condition. Twelve patients (6 female) with LE with a mean (SD) age 47 (10) years, and 16 controls (7 female), aged 41 (9) years were tested. The following somato-sensory parameters were assessed: pressure-pain threshold (PPT), heat- and cold-pain thresholds, thermal, cold- and vibration-detection thresholds. All these tests were bilaterally assessed over the lateral epicondyle (affected/unaffected in patients; dominant/nondominant in controls) and at the dorsal-lateral surface of the wrist in all patients and controls. The results showed that patients with unilateral LE not only exhibited substantial reductions in PPT on the affected side compared to the unaffected side (mean difference and 95% confidence intervals: 219 kPa [136.8 to 301.1 kPa] but also when compared to controls (581.1 kPa [340.5 to 821.7 kPa]), showing bilateral pressure-pain hyperalgesia. These differences represented an effect size (ie, standardized mean difference) of 1.23 and .94, respectively. In the same cohort, there were no such deficits in cold and heat pain, cold- and warm-detection thresholds, and vibration-detection thresholds, either between affected and unaffected sides in patients with LE or between patients and controls. Effect sizes for the sensory-detection tests were small, which were generally less than the pain tests. Our data imply that LE is largely characterized by peripheral and central mechanical pain hyperalgesia. PERSPECTIVE: This article reveals the presence of bilateral pressure-pain hypersensitivity in patients with unilateral LE. On the contrary, thermal and vibration tests were not significantly different from controls.

Dommerholt J (2010). Performing arts medicine - instrumentalist musicians: part III - case histories. J Bodyw Mov Ther **14**(2): 127-138.

In parts I and II of this article series, the basic principles of examining musicians in a healthcare setting were reviewed [Dommerholt, J. Performing arts medicine - instrumentalist musicians: part I: general considerations. J. Bodyw. Mov. Ther., in press-a; Dommerholt, J. Performing arts medicine – instrumentalist musicians: part II: the examination. J. Bodyw. Mov. Ther., in press-b]. Part III describes three case reports of musicians with hand pain, interfering with their ability to play their instruments. The musicians consulted with a performing arts physiotherapist. Neither musician had a correct medical diagnosis if at all, when they first contacted the physiotherapist. Each musician required an individualized approach not only to establish the correct diagnosis, but also to develop a specific treatment program. The treatment programs included ergonomic interventions, manual therapy, trigger point therapy, and patient education. All musicians returned to playing their instruments without any residual pain or dysfunction.

There is less literature to support existence of myofascial pain syndromes and the use of dry needling in the lower extremities. However, in treating performing artists, we often see patients with complaints of heel pain and "plantar fasciitis." Clinicians should be aware of the contributing factors of muscle in these diagnoses.

Cotchett MP, Landorf KB, et al. (2010). Effectiveness of dry needling and injections of myofascial trigger points associated with plantar heel pain: a systematic review. J Foot Ankle Res **3**: 18.

BACKGROUND: Plantar heel pain (plantar fasciitis) is one of the most common musculoskeletal pathologies of the foot. Plantar heel pain can be managed with dry needling and/or injection of myofascial trigger points (MTrPs) however the evidence for its effectiveness is uncertain. Therefore, we aimed to systematically review the current evidence for the effectiveness of dry needling and/or injections of MTrPs associated with plantar heel pain. METHODS: We searched specific electronic databases (MEDLINE, EMBASE, AMED, CINAHL, SPORTDiscus and AMI) in April 2010 to identify randomised and non-randomised trials. We included trials where participants diagnosed with plantar heel pain were treated with dry needling and/or injections (local anaesthetics, steroids, Botulinum toxin A and saline) alone or in combination with acupuncture. Outcome measures that focussed on pain and function were extracted from the data. Trials were assessed for quality using the Quality Index tool. RESULTS: Three quasi-experimental trials matched the inclusion criteria: two trials found a reduction in pain for the use of trigger point dry needling when combined with acupuncture and the third found a reduction in pain using 1% lidocaine injections when combined with physical therapy. However, the methodological quality of the three trials was poor, with Quality Index scores ranging form 7 to 12 out of a possible score of 27. A meta-analysis was not conducted because substantial heterogeneity was present between trials. CONCLUSIONS: There is limited evidence for the effectiveness of dry needling and/or injections of MTrPs associated with plantar heel pain. However, the poor quality and heterogeneous nature of the included studies precludes definitive conclusions being made. Importantly, this review highlights the need for future trials to use rigorous randomised controlled methodology with measures such as blinding to reduce bias. We also recommend that such trials adhere to the Standards for Reporting Interventions in Controlled Trials of Acupuncture (STRICTA) to ensure transparency.

Grieve R, Clark J, et al. (2011). The immediate effect of soleus trigger point pressure release on restricted ankle joint dorsiflexion: A pilot randomised controlled trial. J Bodyw Mov Ther **15**(1): 42-49.

OBJECTIVES: The primary aim of this study was to investigate the immediate effect on restricted active ankle joint dorsiflexion range of motion (ROM), after a single intervention of

trigger point (TrP) pressure release on latent soleus myofascial trigger points (MTrPs). The secondary aim was to assess aspects of the methodological design quality, identify limitations and propose areas for improvement in future research. DESIGN: A pilot randomised control trial. PARTICIPANTS: Twenty healthy volunteers (5 men and 15 women; mean age 21.7+/-2.1 years) with a restricted active ankle joint dorsiflexion. INTERVENTION: Participants underwent a screening process to establish both a restriction in active ankle dorsiflexion and the presence of active and latent MTrPs in the soleus muscle. Participants were then randomly allocated to an intervention group (TrP pressure release) or control group (no therapy). RESULTS: The results showed a statistically significant (p=0.03) increase of ankle ROM in the intervention compared to the control group. CONCLUSION: This study identified an immediate significant improvement in ankle ROM after a single intervention of TrP pressure release on latent soleus MTrPS. These findings are clinically relevant, although the treatment effect on ankle ROM is smaller than a clinical significant ROM (5 degrees). Suggestions for methodological improvements may inform future MTrP research and ultimately benefit clinical practice in this under investigated area.

Huguenin L, Brukner PD, et al. (2005). Effect of dry needling of gluteal muscles on straight leg raise: a randomised, placebo controlled, double blind trial. Br J Sports Med **39**(2): 84-90.
OBJECTIVES: To use a randomised, double blind, placebo controlled trial to establish the effect on straight leg raise, hip internal rotation, and muscle pain of dry needling treatment to the gluteal muscles in athletes with posterior thigh pain referred from gluteal trigger points. METHODS: A randomised, double blind, placebo controlled trial of 59 male runners was performed during the 2002 Australian Rules football season. Subjects were thoroughly screened and had magnetic resonance imaging of their hamstring muscles to exclude local pathology. The inclusion criterion was reproduction of recognisable posterior thigh pain with the application of digital pressure to the gluteal trigger points. Subjects randomly received either therapeutic or placebo needle treatment on one occasion at their gluteal trigger points. Range of motion and visual analogue scale data were collected immediately before, immediately after, 24 hours after, and 72 hours after the intervention. Range of motion was measured with passive straight leg raise and hip internal rotation. Visual analogue scales were completed for hamstring and gluteal pain and tightness at rest and during a running task. RESULTS: Magnetic resonance imaging scans revealed normal hamstring musculature in most subjects. Straight leg raise and hip internal rotation remained unchanged in both groups at all times. Visual analogue scale assessment of hamstring pain and tightness and gluteal tightness after running showed improvements immediately after the intervention in both groups ($p = 0.001$), which were maintained at 24 and 72 hours. The magnitude of this improvement was the same for therapeutic and placebo interventions. Resting muscle pain and tightness were unaffected. CONCLUSIONS: Neither dry needling nor placebo needling of the gluteal muscles resulted in any change in straight leg raise or hip internal rotation. Both interventions resulted in subjective improvement in activity related muscle pain and tightness. Despite being commonly used clinical tests in this situation, straight leg raise and hip internal rotation are not likely to help the therapist assess response to treatment. Patient reports of response to such treatment are better indicators of its success. The mechanisms by which these responses occur and the reasons for the success of the placebo needling treatment are areas for further investigation.

Low back pain may not be as common as in injuries to the lower extremities, however it is still an occurance that can be quite limiting. Addressing the muscles that can be linked to lower back pain can make a difference in reducing pain to allow for better movement.

Avershin VA, Oleinikov BV, et al. (2009). [Sanatorium-based treatment of lumbar quadrate myofascial pain syndrome]. Vopr Kurortol Fizioter Lech Fiz Kult(4): 44-45.

This paper summarizes experience gained in the Central Military Sanatorium, Sochi, in the field of diagnosis, treatment, and rehabilitation of patients with myofascial pain syndrome affecting the quadratum lumborum muscle. Conditions facilitating development of triggering myofascial structures in these muscles are analysed and methods of their diagnosis are discussed. The proposed compression test allows active trigger structures to be identified in the quadratum lumborum muscle. Detailed description of the method of myofascial meridional reflexotherapy is presented (ischemic compression of condensed trigger structures or points with dry needling, taking account of the breathing act). The authors emphasize the importance of correction of structural disproportions responsible for the formation of myofascial trigger structures.

Grobli C, Dejung B (2003). [Non-medical therapy of myofascial pain]. Schmerz **17**(6): 475-480.
METHODS: In a prospective study, the efficacy of manual therapy and dry needling was examined in 84 patients with chronic low back pain (mean duration of pain 4.4 years). RESULTS: The initial value of pain on the visual analogue scale was about 6.6, the follow up value was reduced to 3.67 (p=0.0033). CONCLUSIONS: Manual trigger point therapy of myofascial trigger points in the low back is effective.

Malanga GA, Cruz Colon EJ (2010). Myofascial low back pain: a review. Phys Med Rehabil Clin N Am **21**(4): 711-724.
Myofascial pain syndrome is a common nonarticular local musculoskeletal pain syndrome caused by myofascial trigger points located at muscle, fascia, or tendinous insertions, affecting up to 95% of people with chronic pain disorders. Clinically, myofascial pain syndrome can present as painful restricted range of motion, stiffness, referred pain patterns, and autonomic dysfunction. The underlying cause is often related to muscular imbalances, and following a thorough physical examination the condition should be treated with a comprehensive rehabilitation program. Additional treatment options include pharmacologic, needling with or without anesthetic agents or nerve stimulation, and alternative medicine treatments such as massage or herbal medicines. Repeated trigger point injections should be avoided, and corticosteroids should not be injected into trigger points.

Perez-Palomares S, Olivan-Blazquez B, et al. (2010). Pecutaneous electrical nerve stimulation versus dry needling: effectiveness in the treatment of chronic low back pain. J Musculoskeletal Pain **18**(1): 23-30.
Objective: The aim of this study was to evaluate the effectiveness of treating myofascial trigger points [TrPs] with dry needling [DN] compared to percutaneous electrical nerve stimulation [PENS]. Method: In this clinical trial, 122 subjects suffering from non-specific chronic low back pain [CLBP] were treated. They were randomly distributed into two treatment groups: one taking PENS and the other taking DN of TrPs on the deep lumbar paraspinal muscles [lumbar multifidi], quadratus lumborum, and gluteus medius. Four variables were measured: perceived pain and sleep quality using a visual analog scale [VAS], pressure-pain tolerance threshold on TrPs with an algometer, and quality of life assessed with the Oswestry Disability Index. Results: At least one TrP was found in all patients, most commonly situated in the quadratus lumborum muscle [97.6 percent]. The improvement achieved for both treatment groups was similar in all the measured variables, although the DN group carried out fewer sessions than the PENS group. Conclusions: It could be concluded that the effectiveness of DN is comparable to that of PENS and, therefore, it may be considered as another useful tool with limited adverse effects within the multidisciplinary approach required in the management of non-specific CLBP.

Samuel AS, Peter AA, et al. (2007). The association of active trigger points with lumbar disc lesion. J Musculoskeletal Pain **15**(2): 11-18.

Objective: To seek indication for an association between trigger points [TrPs] and lumbar disc lesions as evidenced by the myotomal level of the disc lesion. Methods: Sixty subjects, 44 men and 16 women, ranging from 22 to 61 years-old who had lumbar disc prolapse [location confirmed with magnetic resonance imaging] were recruited to the cross-sectional study from consecutive sampling. All patients were referred from the Department of Orthopaedic and Accident Surgery Unit I. Subjects with disc prolapse who were scheduled for surgery in the following week participated in this study. They were given a complete physical therapy examination including an assessment of soft tissue pain and dysfunction. The clinical diagnosis of TrPs and myofascial pain syndrome were made according to the criteria by Travell and Simons. Results: The majority of the patients with LL Vdisc prolapse had active TrPs in the tibialis anterior. Subjects with LL Vand LS lesions had active TrPs in the gluteus medius and gastrocnemius. Subjects with LL Vdisc prolapse had active TrPs in the extensor hallucis longus and tibialis anterior. Conclusions: This study affirms that there is a possibility of a myofascial pain syndrome component when there is lumbar disc disease, and it also corresponds to the same myotome level of the lesion.

When treatment of myofascial trigger points for a painful condition is not improving as expected, i.e. the trigger points are only temporarily reduced or they do not improve at all, other factors need to be considered. This includes ensuring that certain levels of important vitamins are not deficient. Since dancers strive to maintain a slim body through limiting their intake of food this is one factor that should not be overlooked in musculoskeletal pain.

Gerwin RD (2005). A review of myofascial pain and fibromyalgia--factors that promote their persistence. Acupunct Med **23**(3): 121-134.

Chronic muscle pain (myalgia) is a common problem throughout the world. Seemingly simple, it is actually a difficult problem for the clinician interested in determining the aetiology of the pain, as well as in managing the pain. The two common muscle pain conditions are fibromyalgia and myofascial pain syndrome. Fibromyalgia is a chronic, widespread muscle tenderness syndrome, associated with central sensitisation. It is often accompanied by chronic sleep disturbance and fatigue, visceral pain syndromes like irritable bowel syndrome and interstitial cystitis. Myofascial pain syndrome is an overuse or muscle stress syndrome characterised by the presence of trigger points in muscle. The problem these syndromes pose lies not in making the diagnosis of muscle pain. Rather, it is the need to identify the underlying cause(s) of persistent or chronic muscle pain in order to develop a specific treatment plan. Chronic myalgia may not improve until the underlying precipitating or perpetuating factor(s) are themselves managed. Precipitating or perpetuating causes of chronic myalgia include structural or mechanical causes like scoliosis, localised joint hypomobility, or generalised or local joint laxity; and metabolic factors like depleted tissue iron stores, hypothyroidism or Vitamin D deficiency. Sometimes, correction of an underlying cause of myalgia is all that is needed to resolve the condition.

Okumus M, Ceceli E, et al. (2010). The relationship between serum trace elements, vitamin B12, folic acid and clinical parameters in patients with myofascial pain syndrome. J Back Musculoskelet Rehabil **23**(4): 187-191.

BACKGROUND: Myofascial pain syndrome (MPS) is characterized by myofascial trigger points in a palpable taut band of skeletal muscle. OBJECTIVE: We aimed to investigate serum trace elements, vitamin B12, folic acid levels and their correlations with clinical findings and functional status in patients with MPS. METHODS: Thirty eight patients with at least one trigger point located on shoulder muscles, and at least 6 months duration, were included in this study. The demographic data, disease duration of patients were noted. Serum copper, zinc, magnesium and iron levels, vitamin B12 and folic acid levels were measured. Visual analogue scale (VAS) was implemented to estimate daily severity of pain. Pain pressure threshold of subjects and control groups were assessed by using Fischer's

tissue compliancemeter. The Turkish version of the Beck Depression Inventory (BDI) was administered for the presence of any depressive disorder. RESULTS: The mean age of patients in MPS group and control group were 33.1 and 37.8 years respectively. Serum levels of zinc ($p< 0.006$) were significantly decreased in patients with MPS. VAS, total myalgic and BDI scores of patients were significantly higher than the control group (Respectively $p< 0.000$, $p< 0.012$, $p< 0.000$). Association between TMS and magnesium, vitamin B12 levels was found statistically significant. BDI score correlated significantly with the serum zinc level (r:-0.548, $p< 0.001$) and VAS in patients with MPS (r:0.641, $p< 0.000$). CONCLUSION: According to the results of this study, it was asserted that trace elements, vitamins may play an important role in the pathophysiology of MPS and psychological factors may also have additional effect.

Plotnikoff GA, Quigley JM (2003). Prevalence of severe hypovitaminosis D in patients with persistent, nonspecific musculoskeletal pain. Mayo Clin Proc **78**(12): 1463-1470.

OBJECTIVE: To determine the prevalence of hypovitaminosis D in primary care outpatients with persistent, nonspecific musculoskeletal pain syndromes refractory to standard therapies. PATIENTS AND METHODS: In this cross-sectional study, 150 patients presented consecutively between February 2000 and June 2002 with persistent, nonspecific musculoskeletal pain to the Community University Health Care Center, a university-affiliated inner city primary care clinic in Minneapolis, Minn (45 degrees north). Immigrant (n = 83) and nonimmigrant (n = 67) persons of both sexes, aged 10 to 65 years, from 6 broad ethnic groups were screened for vitamin D status. Serum 25-hydroxyvitamin D levels were determined by radioimmunoassay. RESULTS: Of the African American, East African, Hispanic, and American Indian patients, 100% had deficient levels of vitamin D (< or = 20 ng/mL). Of all patients, 93% (140/ 150) had deficient levels of vitamin D (mean, 12.08 ng/mL; 95% confidence interval, 11.18-12.99 ng/mL). Nonimmigrants had vitamin D levels as deficient as immigrants (P = .48). Levels of vitamin D in men were as deficient as in women (P = .42). Of all patients, 28% (42/150) had severely deficient vitamin D levels (< or = 8 ng/mL), including 55% of whom were younger than 30 years. Five patients, 4 of whom were aged 35 years or younger, had vitamin D serum levels below the level of detection. The severity of deficiency was disproportionate by age for young women (P < .001), by sex for East African patients (P < .001), and by race for African American patients (P = .006). Season was not a significant factor in determining vitamin D serum levels (P = .06). CONCLUSION: All patients with persistent, nonspecific musculoskeletal pain are at high risk for the consequences of unrecognized and untreated severe hypovitaminosis D. This risk extends to those considered at low risk for vitamin D deficiency: nonelderly, nonhousebound, or nonimmigrant persons of either sex. Nonimmigrant women of childbearing age with such pain appear to be at greatest risk for misdiagnosis or delayed diagnosis. Because osteomalacia is a known cause of persistent, nonspecific musculoskeletal pain, screening all outpatients with such pain for hypovitaminosis D should be standard practice in clinical care.