

## **One-Year Follow-Up in Employees Sick-Listed Because of Low Back Pain: Randomized Clinical Trial Comparing Multidisciplinary and Brief Intervention**

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**Study Design.** Randomized clinical trial comparing two interventions in employees sick-listed 3 to 16 weeks because of low back pain (LBP).

**Objective.** To compare 1-year return to work (RTW), pain, disability and physical and mental health dimensions in subjects offered a hospital-based multidisciplinary intervention or a brief intervention.

**Summary of Background Data.** Previous studies in sick-listed employees with LBP have indicated efficacy of both brief and more comprehensive multidisciplinary interventions. However, it remains unknown, which is the more effective, and which elements are instrumental in furthering RTW, and improving health.

**Methods.** The brief intervention comprised clinical examination and advice offered by a rehabilitation physician and a physiotherapist. In the multidisciplinary intervention, this intervention was supplemented with the expertise of a team and the assignment of a case manager who drew up a rehabilitation plan in collaboration with the patient and the multidisciplinary team. One-year RTW was estimated by data from a comprehensive national database of social transfer payments. Questionnaires were used to obtain baseline and 1-year data on Roland Morris disability score, LBP Rating Scale, SF36, and fear-avoidance.

**Results.** A total of 351 patients were included and randomized and 344 (98%) patients participated in all the consultations according to the study protocol. RTW was achieved by 125 (71.0%) participants in the multidisciplinary and 133 (76.0%) participants in the brief intervention group. The hazard ratio was 0.84 after adjustment for sex, age, smoking, compensation claims, disability score, and diagnosis (95% confidence interval [CI]: 0.65–1.08,  $P = 0.18$ ). Multiple linear regression analysis displayed no differences in secondary outcomes, except for the mental health score (SF36), which was a little higher in the multidisciplinary intervention group than in the brief intervention group.

**Conclusion.** Hospital-based multidisciplinary intervention may be no better than brief intervention to increase RTW and improve health in sick-listed employees with low back pain.

# Physical Exercise, Body Mass Index, and Risk of Chronic Pain in the Low Back and Neck/Shoulders: Longitudinal Data From the Nord-Trøndelag Health Study

1. Tom Ivar Lund Nilsen,
2. Andreas Holtermann and
3. Paul J. Mork\*

## Abstract

Chronic musculoskeletal pain constitutes a large socioeconomic challenge, and preventive measures with documented effects are warranted. The authors' aim in this study was to prospectively investigate the association between physical exercise, body mass index (BMI), and risk of chronic pain in the low back and neck/shoulders. The study comprised data on approximately 30,000 women and men in the Nord-Trøndelag Health Study (Norway) who reported no pain or physical impairment at baseline in 1984–1986. Occurrence of chronic musculoskeletal pain was assessed at follow-up in 1995–1997. A generalized linear model was used to calculate adjusted risk ratios. For both females and males, hours of physical exercise per week were linearly and inversely associated with risk of chronic pain in the low back (women:  $P$ -trend = 0.02; men:  $P$ -trend < 0.001) and neck/shoulders (women:  $P$ -trend = 0.002; men:  $P$ -trend < 0.001). Obese women and men had an approximately 20% increased risk of chronic pain in both the low back and the neck/shoulders. Exercising for 1 or more hours per week compensated, to some extent, for the adverse effect of high BMI on risk of chronic pain. The authors conclude that physical inactivity and high BMI are associated with an increased risk of chronic pain in the low back and neck/shoulders in the general adult population.

# Experimental Muscle Pain Challenges the Postural Stability During Quiet Stance and Unexpected Posture Perturbation

The Journal of Pain, 06/20/2011 Hirata RP et al.

## Abstract

Musculoskeletal pain impairs postural control and stability. Nine subjects stood as quietly as possible on a moveable force platform before, during, and after experimental pain in the right leg muscles. A moveable force platform was used to measure the center of pressure and provided unexpected perturbations. Lower limb muscle activity, joint angles, and foot pressure distributions were measured. Hypertonic saline was used to induce pain in the vastus lateralis, vastus medialis, or biceps femoris muscle of the right leg. Compared to baseline and control sessions, pain in the knee extensor muscles during quiet standing evoked: 1) larger sway area, greater medial-lateral center of pressure displacement and higher speed ( $P < .05$ ); 2) increased sway displacement in the anterior-posterior direction ( $P < .05$ ); and 3) increased electromyography (EMG) activity for left tibialis anterior and left erector spinae muscles ( $P < .05$ ). Pain provoked longer time to return to an equilibrium posture after forward EMG activity for, and pain in vastus medialis muscle decreased the time for the maximum hip flexion during this perturbation ( $P < .05$ ). These results show that muscle pain impairs postural stability during quiet standing and after unexpected perturbation, which suggest that people suffering from leg muscle pain are more vulnerable to falls.

## Perspective

This article presents the acute responses to leg muscle pain on the postural control. This measure could potentially help clinicians who seek to assess how pain responses may contribute to patient's postural control and stability during quiet standing and after recovering from unexpected perturbations.

# Topographical Pressure and Thermal Pain Sensitivity Mapping in Patients With Unilateral Lateral Epicondylalgia

The Journal of Pain, 06/20/2011

Ruiz–Ruiz B et al. –

## Abstract

Our aim was to quantify spatial differences in pressure and thermal pain sensitivity maps between patients with unilateral lateral epicondylalgia (LE) and age- and sex-matched controls. Pressure (PPT), cold (CPT), and heat (HPT) pain thresholds were assessed over 12 points forming a 3 × 4 matrix (4 points in the superior part, 4 points in the middle, and 4 points in the lower part around the lateral epicondyle) bilaterally in 16 subjects with strictly unilateral LE and 16 age- and sex-matched controls in a blinded design. Topographical pain sensitivity maps to pressure and thermal stimulation over the elbow in patients with LE and healthy controls were calculated. A multilevel 3-way ANCOVA test was applied to detect differences in topographical maps between groups. Subjects with LE showed bilateral lower PPT, higher CPT (pain at higher temperature) and lower HPT (pain at lower temperature) at all the measurement points as compared to controls (all,  $P < .01$ ). PPT were lower at points over the extensor carpi radialis brevis (ECRB) muscle as compared to points over the extensor digitorum communis muscle ( $P < .01$ ) and over the extensor carpi ulnaris muscle ( $P < .001$ ). CPT and HPT were not significantly different between points ( $P > .05$ ). Topographical pressure and thermal pain sensitivity maps revealed bilateral hyperalgesia in patients with strictly unilateral LE. LE patients exhibited heterogeneously distributed pressure pain hyperalgesia while cold or heat maps were homogenous. The most sensitive localizations for PPT assessment corresponded to the muscle belly of the ECRB. Our results confirm the role of ECRB muscle in LE and argue for evidence of peripheral and central sensitization mechanisms in patients with strictly unilateral symptoms.

## Perspective

Topographical pressure and thermal sensitivity maps revealed bilateral hyperalgesia in patients with strictly unilateral lateral epicondylalgia (LE). LE patients exhibited heterogeneously distributed pressure pain hyperalgesia while cold or heat pain maps were homogenous. The most sensitive localizations for PPT assessment corresponded to the muscle belly of the ECRB.

# Alterations in brain structure and functional connectivity in prescription opioid-dependent patients

Brain,

## Summary

A dramatic increase in the use and dependence of prescription opioids has occurred within the last 10 years. The consequences of long-term prescription opioid use and dependence on the brain are largely unknown, and any speculation is inferred from heroin and methadone studies. Thus, no data have directly demonstrated the effects of prescription opioid use on brain structure and function in humans. To pursue this issue, we used structural magnetic resonance imaging, diffusion tensor imaging and resting-state functional magnetic resonance imaging in a highly enriched group of prescription opioid-dependent patients [ $n = 10$ ]; from a larger study on prescription opioid dependent patients ( $n = 133$ ) and matched healthy individuals ( $n = 10$ ) to characterize possible brain alterations that may be caused by long-term prescription opioid use. Criteria for patient selection included: (i) no dependence on alcohol or other drugs; (ii) no comorbid psychiatric or neurological disease; and (iii) no medical conditions, including pain. In comparison to control subjects, individuals with opioid dependence displayed bilateral volumetric loss in the amygdala. Prescription opioid-dependent subjects had significantly decreased anisotropy in axonal pathways specific to the amygdala (i.e. stria terminalis, ventral amygdalofugal pathway and uncinate fasciculus) as well as the internal and external capsules. In the patient group, significant decreases in functional connectivity were observed for seed regions that included the anterior insula, nucleus accumbens and amygdala subdivisions. Correlation analyses revealed that longer duration of prescription opioid exposure was associated with greater changes in functional connectivity. Finally, changes in amygdala functional connectivity were observed to have a significant dependence on amygdala volume and white matter anisotropy of efferent and afferent pathways of the amygdala. These findings suggest that prescription opioid dependence is associated with structural and functional changes in brain regions implicated in the regulation of affect and impulse control, as well as in reward and motivational functions. These results may have important clinical implications for uncovering the effects of long-term prescription opioid use on brain structure and function.

## **Secondary Resurfacing of the Patella After Primary Total Knee Arthroplasty: Does the Anterior Knee Pain Resolve**

**Journal of Arthroplasty, 06/17/2011**

Parvizi J et al. – Anterior knee pain was the indication for secondary resurfacing in all patients. Although the clinical and functional knee scores improved significantly for whole cohort, 8 patients were dissatisfied with the outcome of surgery. This study highlights that secondary resurfacing is not an always rewarding procedure and patients need to be consulted appropriately with regard to the outcome.

Archives of Physical Med. 2011 May 25.

## Corticospinal Excitability is Dependent on the Parameters of Peripheral Electric Stimulation A Preliminary Study.

[Chipchase LS](#), [Schabrun SM](#), [Hodges PW](#).

**Abstract** Chipchase LS, Schabrun SM, Hodges PW. Corticospinal excitability is dependent on the parameters of peripheral electric stimulation: a preliminary study.

**OBJECTIVE:** To evaluate the effect of 6 electric stimulation paradigms on corticospinal excitability.

**DESIGN:** Using a same subject pre-post test design, transcranial magnetic stimulation (TMS) was used to measure the responsiveness of corticomotor pathway to biceps and triceps brachii muscles before and after 30 minutes of electric stimulation over the biceps brachii. Six different electric stimulation paradigms were applied in random order, at least 3 days apart. **SETTING:** Motor control research laboratory. **PARTICIPANTS:** Healthy subjects (N=10; 5 women, 5 men; mean age  $\pm$  SD, 26 $\pm$ 3.6y).

**INTERVENTIONS:** Six different electric stimulation paradigms with varied stimulus amplitude, frequency, and ramp settings.

**MAIN OUTCOME MEASURE:** Amplitudes of TMS-induced motor evoked potentials at biceps and triceps brachii normalized to maximal M-wave amplitudes.

**RESULTS:** Electric stimulation delivered at stimulus amplitude sufficient to evoke a sensory response at both 10Hz and 100Hz, and stimulus amplitude to create a noxious response at 10Hz decreased corticomotor responsiveness (all  $P < 0.01$ ). Stimulation sufficient to induce a motor contraction (30Hz) applied in a ramped pattern to mimic a voluntary activation increased corticomotor responsiveness ( $P = 0.002$ ), whereas constant low- and high-intensity motor stimulation at 10Hz did not. Corticomotor excitability changes were similar for both the stimulated muscle and its antagonist.

**CONCLUSIONS:** Stimulus amplitude (intensity) and the nature (muscle flicker vs contraction) of motor stimulation have a significant impact on changes in corticospinal excitability induced by electric stimulation.

Here, we demonstrate that peripheral electric stimulation at stimulus amplitude to create a sensory response reduces corticomotor responsiveness. Conversely, stimulus amplitude to create a motor response increases corticomotor responsiveness, but only the parameters that create a motor response that mimics a voluntary muscle contraction. Copyright © 2011 the American Congress of Rehabilitation Medicine. Published by

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Euro J. P. 2011 May 12. [Epub ahead of print]

## The effect of pain on training-induced plasticity of the corticomotor system.

[Ingham D](#), [Tucker KJ](#), [Tsao H](#), [Hodges PW](#).

### Source

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### Abstract

Pain is thought to interfere with training-induced plasticity of corticomotor pathways. Although this implies direct interference with plastic processes, it may be explained by compromised performance in the training task during pain. Repeated finger movements can induce plasticity and change the amplitude/direction of acceleration of finger movement evoked by transcranial magnetic stimulation (TMS). We hypothesized that if pain interferes with plasticity, acceleration of finger movement would not change when the training task was painful, despite control of training task performance. TMS was applied over the optimal scalp site to evoked index finger abduction movements in nine participants. Participants then trained finger adduction with feedback of finger acceleration for three 8-min sessions, in three conditions on separate days. Conditions: first dorsal interosseus (FDI) pain and control (no-pain), with injection of 5% and 0.9% hypertonic saline, respectively, into FDI; and remote pain (5% saline injection into infrapatellar fat pad). Peak acceleration of TMS-evoked finger movement and amplitude of motor evoked potentials (MEPs) in FDI were measured at baseline, between training sessions, and at three 5-min intervals after training ceased. Plastic change was observed (reduced TMS evoked peak finger acceleration in the abduction direction) after motor training during control and FDI pain, but not during the remote pain. There was no change in FDI MEPs in any conditions. These data do not support direct effects of nociceptive input (pain) on training-induced plasticity of corticomotor pathways. Remote pain may compromise learning due to distraction from the training task or other complex central pain processes.

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## **Fear of movement, passive coping, manual handling, and severe or radiating pain increase the likelihood of sick leave due to low back pain.**

[Dawson AP](#), [Schluter PJ](#), [Hodges PW](#), [Stewart S](#), [Turner C](#).

### **Abstract**

Sick leave due to low back pain (LBP-SL) is costly and compromises workforce productivity. The fear-avoidance model asserts that maladaptive pain-related cognitions lead to avoidance and disuse, which can perpetuate ongoing pain. Staying home from work is an avoidant behavior, and hence pain-related psychological features may help explain LBP-SL. We examined the relative contribution of pain catastrophizing, fear of movement, and pain coping (active and passive) in LBP-SL in addition to pain characteristics and other psychosocial, occupational, general health, and demographic factors. Two-way interactions between age and gender and candidate exposures were also considered. Our sample comprised 2164 working nurses and midwives with low back pain in the preceding year. Binary logistic regression was performed on cross-sectional data by manual backward stepwise elimination of nonsignificant terms to generate a parsimonious multivariable model. From an extensive array of exposures assessed, fear of movement (women, odds ratio [OR]=1.05, 95% confidence interval [CI] 1.02-1.08; men, OR=1.17, 95% CI 1.05-1.29), passive coping (OR=1.07, 95% CI 1.04-1.11), pain severity (OR=1.61, 95% CI 1.50-1.72), pain radiation (women, OR=1.45, 95% CI 1.10-1.92; men, OR=4.13, 95% CI 2.15-7.95), and manual handling frequency (OR=1.03, 95% CI 1.01-1.05) increased the likelihood of LBP-SL in the preceding 12 months. Administrators and managers were less likely to report LBP-SL (OR=0.44, 95% CI 0.27-0.71), and age had a protective effect in individuals in a married or de facto relationship (OR=0.97, 95% CI 0.95-0.98). In summary, fear of movement, passive coping, frequent manual handling, and severe or radiating pain increase the likelihood of LBP-SL. Gender-specific responses to pain radiation and fear of movement are evident. The relative contribution of pain-related psychological features in sick leave due to low back pain is established in a large homogeneous worker cohort. Multidimensional preventive interventions are needed that address fear of movement and passive coping behaviors, promote effective pain management and optimize manual handling frequency.

Gait Posture 2011 May;34(1):97-102. Epub 2011 May 6.

## Postural recovery following voluntary arm movement is impaired in people with chronic low back pain.

[Mok NW](#), [Brauer SG](#), [Hodges PW](#).

**Abstract STUDY DESIGN:** Recovery of postural equilibrium following bilateral voluntary arm movement was evaluated using a case-control study, with 13 subjects with chronic LBP and 13 age- and gendermatched control subjects.

**OBJECTIVES:** To evaluate control of the centre-of-pressure (COP), as a marker of the quality of control of postural equilibrium associated with voluntary arm movements, in people with and without LBP. Summary of background data. When healthy individuals perform rapid voluntary arm movements, small spinal movements (preparatory movement) opposite to the direction of the reactive moments precede voluntary arm movements. Evaluation of trunk movement in people with LBP suggests that this strategy is used infrequently in this population and is associated with an increased spinal displacement following arm flexion. As the preparatory spinal movement was also thought to be an anticipatory mechanism limiting postural perturbation caused by arm movements, we hypothesized that LBP subjects would have compromised control of postural equilibrium following arm flexion.

**METHODS:** Subjects performed bilateral voluntary rapid arm flexion while standing on support surface of different dimensions with eyes opened or closed.

**RESULTS:** Results indicated that people with LBP consistently took longer to recover postural equilibrium and made more postural adjustments in different stance conditions. However, there was no increase in the excursion of the COP during the recovery period in the LBP group.

**CONCLUSION:**

These data suggest that while COP is tightly controlled during postural recovery, the finetuning of the control of postural equilibrium is compromised in people with LBP. Postural control dysfunctions should be considered in the management of chronic low back pain.

Spine 2011 Apr 19. [Epub ahead of print]

## Smudging the motor brain in young adults with recurrent low back pain.

[Tsao H](#), [Danneels LA](#), [Hodges PW](#).

**Source**1 The University of Queensland, Centre for Clinical Research Excellence in Spinal Pain, Injury and Health, School of Health and Rehabilitation Sciences, Brisbane Australia. 2 Ghent University, Department of Rehabilitation Sciences and Physiotherapy, Ghent Belgium.

### Abstract

**ABSTRACT:** Study design: Cross-sectional designObjective: To investigate whether recurrent low back pain (LBP) is associated with changes in motor cortical representation of different paraspinal muscle fascicles.Summary of background data: Fascicles of the lumbar paraspinal muscles are differentially activated during function. Human studies indicate this may be associated with a spatially separate array of neuronal networks at the motor cortex. Loss of discrete control of paraspinal muscle fascicles in LBP may be due to changes in cortical organisation.Methods: Data were collected from nine individuals with recurrent unilateral LBP and compared with eleven healthy participants from an earlier study. Fine-wire electrodes selectively recorded myoelectric activity from short/deep fascicles of lumbar multifidus (DM) and long/superficial fascicles of longissimus erector spinae (LES), bilaterally. Motor cortical organisation was investigated using transcranial magnetic stimulation (TMS) at different scalp sites to evoke responses in paraspinal muscles. Location of cortical representation (centre of gravity [CoG]) and motor excitability (map volume) were compared between healthy and LBP groupsResults: Individuals with LBP had a more posterior location of LES CoG, which overlapped with that for DM on both hemispheres. In healthy individuals, LES CoG was located separately at a more anterior location to that for DM. Map volume was reduced in LBP compared to healthy individual across muscles. **Conclusions:** The findings highlight LBP is associated with a loss of discrete cortical organization of inputs to back muscles. Increased overlap in motor cortical representation of DM and LES may underpin loss of differential activation in this group. The results further unravel the neurophysiological mechanisms of

motor changes in recurrent LBP and suggest motor rehabilitation that includes training of differential activation of the paraspinal muscles may be required to restore optimal control in LBP.

Clinical Neurophysiology 2011 Mar 4. [Epub ahead of print]

## **Individual fascicles of the paraspinal muscles are activated by discrete cortical networks in humans.**

[Tsao H](#), [Danneels L](#), [Hodges PW](#).

### **Abstract OBJECTIVE:**

To investigate whether functional specificity in different fascicles of the paraspinal muscles is associated with discrete organisation within the motor cortex.

### **METHODS:**

In 11 healthy volunteers, electromyographic (EMG) activity was recorded bilaterally using fine-wire intramuscular electrodes from the short and deep fibres of multifidus (DM) at L4, and the longer and more superficial fibres of longissimus erector spinae (LES) at L4 and L1. Surface electrodes were also placed over the right LES at L4 and L1. Organisation at the motor cortex associated with motor excitation was investigated using transcranial magnetic stimulation (TMS).

### **RESULTS:**

The results showed that motor cortical representation for DM was located posteriorly to that for LES. TMS maps from surface recordings of LES showed two optimal sites, which were located in proximity to the sites for DM and LES from intramuscular recordings.

### **CONCLUSION:**

Different fascicles of the paraspinal muscles are organised and thus could be controlled by discrete neuronal networks within the motor cortex. Further, TMS mapping from surface recordings of paraspinal muscles may be confounded by cross-talk from multiple underlying fascicles.

**SIGNIFICANCE: Discrete organisation at the motor cortex appears consistent with differential activation of different fascicles of the paraspinal muscles with function.**

Gait Posture 2011 Apr;33(4):588-93. Epub 2011 Mar 5.

## **En bloc control of deep and superficial thoracic muscles in sagittal loading and unloading of the trunk.**

[Lee LJ](#), [Coppieters MW](#), [Hodges PW](#).

### **Abstract**

External perturbation of the trunk via sudden loading and unloading is an established method to study control of spinal stability and postural equilibrium. As differential control of the deep and superficial lumbar multifidus occurs during predictable sagittal loading, we hypothesized that the deep and superficial components of the thoracic paraspinal muscles would also be differentially active during loading and unloading of the trunk. Variation in sagittal mobility between regions of the thorax and previous data of differences in control of the thoracic paraspinal muscles between regions in other tasks supported a hypothesis that there would be region-specific differences in responses to loading and unloading. This study used fine-wire electrodes to record electromyographic (EMG) activity from the right deep (multifidus/rotatores) and superficial (longissimus) muscles at T5, T8, and T11 in ten healthy subjects during predictable and unpredictable sudden loading and unloading of the trunk. EMG amplitude was calculated during 10 ms epochs for 50 ms before the onset of trunk perturbation and 150 ms after the perturbation. Contrary to our hypotheses, deep and superficial thoracic paraspinal muscles were similarly active (loading:  $p=0.470$ ; unloading:  $p=0.137$ ) and similarly affected by the degree of predictability at all levels. Thus, deep and superficial thoracic paraspinal muscles are recruited en bloc during sagittal plane trunk perturbations. This contrasts previous findings of differential control between the deep and superficial thoracic paraspinal muscles during rotational tasks, and provides evidence that discrete control of thoracic paraspinal muscle fascicles is specific to the direction of forces applied to the trunk.

# Effects of myofascial release techniques on pain, physical function, and postural stability in patients with fibromyalgia: a randomized controlled trial

Clinical Rehabilitation, 06/16/2011 Clinical Article

Castro-Sanchez AM et al.

## Abstract

**Objective:** To determine the effect of myofascial release techniques on pain symptoms, postural stability and physical function in fibromyalgia syndrome.

**Design:** A randomized, placebo-controlled trial was undertaken.

**Subjects:** Eighty-six patients with fibromyalgia syndrome were randomly assigned to an experimental group and a placebo group.

**Interventions:** Patients received treatments for 20 weeks. The experimental group underwent 10 myofascial release modalities and the placebo group received sham short-wave and ultrasound electrotherapy.

**Main measures:** Outcome variables were number of tender points, pain, postural stability, physical function, clinical severity and global clinical assessment of improvement. Outcome measures were assessed before and immediately after, at six months and one year after the last session of the corresponding intervention.

**Results:** After 20 weeks of myofascial therapy, the experimental group showed a significant improvement ( $P < 0.05$ ) in painful tender points, McGill Pain Score ( $20.6 \pm 6.3$ ,  $P < 0.032$ ), physical function ( $56.10 \pm 17.3$ ,  $P < 0.029$ ), and clinical severity ( $5.08 \pm 1.03$ ,  $P < 0.039$ ). At six months post intervention, the experimental group had a significantly lower mean number of painful points, pain score ( $8.25 \pm 1.13$ ,  $P < 0.048$ ), physical function ( $58.60 \pm 16.30$ ,  $P < 0.049$ ) and clinical severity ( $5.28 \pm 0.97$ ,  $P < 0.043$ ). At one year post intervention, the only significant improvements were in painful points at second left rib and left gluteal muscle, affective dimension, number of days feeling good and clinical severity.

**Conclusion:** The results suggest that myofascial release techniques can be a complementary therapy for pain symptoms, physical function and clinical severity but do not improve postural stability in patients with fibromyalgia syndrome

# **Do anatomic variants of the acromion shape in the frontal plane influence pain and function in calcifying tendinitis of the shoulder**

Knee Surgery, Sports Traumatology, Arthroscopy, 06/15/2011

## **Purpose**

To evaluate the relationship of a large acromion index and calcifying tendinitis of the supraspinatus tendon at the shoulder.

## **Materials and methods**

Between 2002 and 2008, 109 consecutive patients with isolated calcifying tendinitis of the supraspinatus tendon were prospectively analysed by clinical investigation and standardized radiographs. Deposit size and appearance were measured and classified according to Bosworth and Gartner. The acromion index (AI) was calculated based on measurements on true anteroposterior radiographs. Pain record on VAS scale, active and passive range of motion and the constant score (CS) were recorded.

## **Results**

The mean age of the patients was  $48.2 \pm 8.0$  ( $n = 46$  male  $48.6 \pm 7.3$ ;  $n = 63$  female  $47.9 \pm 8.6$ ;  $P > 0.05$ ). Pain and function were not significantly correlated with deposit size or classification. The acromion index (mean  $0.64 \pm 0.08$ ) was not significantly correlated with the affected or dominant side, gender, deposit size or classification or any functional parameter like pain and the CS or its subgroups.

## **Conclusion**

The theoretical concept of a high acromion index resulting in an increased resulting upward force against the subacromial space, which influences pain and function in calcifying tendinitis of the shoulder, was not supported.

## **Level of evidence**

Diagnostic clinical study, Level II.

## **The association between isoinertial trunk muscle performance and low back pain in male adolescents** *Full Text*

European Spine Journal, 09/24/2009

The literature reports inconsistent findings regarding the association between low back pain (LBP) and trunk muscle function, in both adults and children. The strength of the relationship appears to be influenced by how LBP is qualified and the means by which muscle function is measured. The aim of this study was to examine the association between isoinertial trunk muscle performance and consequential (non-trivial) low back pain (LBP) in male adolescents. Healthy male adolescents underwent anthropometric measurements, clinical evaluation, and tests of trunk range of motion (ROM), maximum isometric strength (STRENGTH) and peak movement velocity (VEL), using an isoinertial device. They provided information about their regular sporting activities, history and family history of LBP. Predictors of “relevant/consequential LBP” were examined using multivariable logistic regression. LBP status was reassessed after 2 years and the change from baseline was categorised. At baseline, 33/95 (35%) subjects reported having experienced consequential LBP. BMI, a family history of LBP, and regularly playing sport were each significantly associated with a history of consequential LBP ( $p < 0.05$ ). 85/95 (89%) boys participated in the follow-up: 51 (60%) reported no LBP at either baseline or follow-up (never LBP); 5 (6%) no LBP at baseline, but LBP at follow-up (new LBP); 19 (22%) LBP at baseline, but none at follow-up; and 10 (12%) LBP at both time-points (recurrent/persistent LBP). The only distinguishing features of group membership in these small groups were: fewer sport-active in the “never LBP” group); worse trunk mobility, in the “persistent LBP” group, lower baseline sagittal ROM in the “never LBP” and “new LBP” ( $p < 0.05$ ). Regular involvement in sport was a consistent predictor of LBP. Isoinertial trunk performance was not associated with LBP in adolescents.



# A Painful Challenge

Steve Schmidt, PT, M.App.Sc Physio, OCS, FAAOMPT

## Education is Therapy

In 1995 Gordon Waddell stated that back pain was a *modern medical disaster*.<sup>1</sup> Unfortunately, in 2011 we seem to be no further along with managing this problem, and despite evidence based practice, clinical guide-lines, and prediction rules, the problem appears to be growing worse.<sup>2</sup> Emerging from pain science research is the idea that some of the reasons for the struggle might be an over-reliance of unnecessary imaging, pathoanatomic biases in diagnosis and limited consideration of neurophysiologic mechanisms underpinning clinical presentations.<sup>3</sup> Chronic pain is not just unresolved acute pain. It operates with distinct and identifiable features related to neuroplasticity within the nervous system. While many complexities exist when sorting out and managing complex clinical presentations, an important distinction is to differentiate between nociceptive and neuropathic pain presentations.

To this end, several tools have recently emerged to assist in this dilemma, all of which share common interview and physical exam components to supplement patient-specific assessment.<sup>5</sup> These tools are easy to use in the clinic without the need for highly technical or expensive equipment. In addition, they have demonstrated relevant reliability and validity in clinical practice.<sup>6</sup> Reported symptoms of *pricking, pins and needles, burning, numbness, electric shocks, shooting, pain evoked by light touch and pain evoked by hot or cold stimulation* are more common in neuropathic presentations. If multiple symptoms are present, the likelihood of neuropathic pain significantly increases. Likewise, physical examination including *altered threshold for pinprick* (either hypo or hyperesthesia), *hyperalgesia from gentle pal-pation and brush evoked allodynia* also support a hypothesis of a neuropathic origin. See Table 1 on page 2 for more detail.

### **Table 1. Modern clinical tools for detecting a component of neuropathic pain (Cruccu & Truini 2010)**

Identification of a neuropathic component to a patient's presentation is only one small step in the complex milieu of patient management; however, it is often difficult to solve a problem without first understanding the nature of the problem. Eighty to ninety percent of back pain is reported to be non-specific in that despite an ongoing hunt for relevant structural pathology, none can be identified. For the individual patient experiencing chronic pain without a *structural cause* it is easy for a thought to emerge that it must be *all in their head*. Evidence from the pain science and neuro-plasticity literature can add to the dialogue, "No, not all in your head... but it is in your brain."

### **Steve Schmidt, PT, M.App.Sc (physio), OCS, FAAOMPT**

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**The analgesic effect of crossing the arms Pain; 152 (6); June 2011, Pages 1418-1423 - From Lorimer Moseley and his group**

The ability to determine precisely the location of sensory stimuli is fundamental to how we interact with the world; indeed, to our survival. Crossing the hands over the body mid-line impairs this ability to localize tactile stimuli. We hypothesized that crossing the arms would modulate the intensity of pain evoked by noxious stimulation of the hand. In two separate experiments, we show (1) that the intensity of both laser-evoked painful sensations and electrically evoked non-painful sensations were decreased when the arms were crossed over the mid-line, and (2) that these effects were associated with changes in the multimodal cortical processing of somatosensory information.

Critically, there was no change in the somatosensory-specific cortical processing of somatosensory information. Besides studies showing relief of phantom limb pain using mirrors, this is the first evidence that impeding the processes by which the brain localizes a noxious stimulus can reduce pain, and that this effect reflects modulation of multimodal neural activities. By showing that the neural mechanisms by which pain emerges from nociception represent a possible target for analgesia, we raise the possibility of novel approaches to the treatment of painful clinical conditions.

**One-Year Follow-Up in Employees Sick-Listed Because of Low Back Pain:  
Randomized Clinical Trial Comparing Multidisciplinary and Brief Intervention**  
Spine; 01 July 2011 - Volume 36 - Issue 15 - p 1180–1189

Previous studies in sick-listed employees with LBP have indicated efficacy of both brief and more comprehensive multidisciplinary interventions. However, it remains un-known, which is the more effective, and which elements are instrumental in furthering return to work (RTW), and improving health.

**Methods:** The brief intervention comprised clinical examination and advice offered by a rehabilitation physician and a physiotherapist. In the multidisciplinary intervention, this intervention was supplemented with the expertise of a team and the assignment of a case manager who drew up a rehabilitation plan in collaboration with the patient and the multidisciplinary team. One-year RTW was estimated by data from a comprehensive national database of social transfer payments. Questionnaires were used to obtain baseline and 1-year data on Roland Morris disability score, LBP Rating Scale, SF36, and fear-avoidance.

**Results:** A total of 351 patients were included and randomized and 344 (98%) patients participated in all the consultations according to the study protocol. RTW was achieved by 125 (71.0%) participants in the multidisciplinary and 133 (76.0%) participants in the brief intervention group. The hazard ratio was 0.84 after adjustment for sex, age, smoking, compensation claims, disability score, and diagnosis. Multiple linear regression analysis displayed no differences in secondary outcomes, except for the mental health score (SF36), which was a little higher in the multidisciplinary intervention group than in the brief intervention group.

**Conclusion:** Hospital-based multidisciplinary intervention may be no better than brief intervention to increase RTW and improve health in sick-listed employees with low back pain.

Reports of patients' own accounts of sciatica and its impact on daily life are still scarce. Research on back pain has shown that it is important to understand how people live with pain and how they perceive interactions with health care professionals and interpret interventions. These types of insights help to improve treatments and their acceptability to patients.

**Methods:** In-depth qualitative interviews with 37 people at baseline and 6 and 12 months' follow-up. The interviews covered topics that were derived from the Illness Perceptions Questionnaire and allowed open-ended talk about people's experiences of pain. All interviews were tape-recorded, fully transcribed, and thematically analyzed.

**Results:** People needed to make sense of sciatica through identifying a cause and having it clinically diagnosed. The impact of sciatic pain was seen to be constant, intense, and all-encompassing. Appreciation of this by clinicians was considered important, as well as the provision of clear information about treatment and prognosis. Expectations about treatment options varied between patients, and people balanced pain relief with adverse effects.

**Conclusion:** Our study highlights patients' own accounts of the distinctiveness, impact, and intrusiveness of their sciatic symptoms. Our findings emphasize the importance of leg pain in identifying a subgroup of back-pain patients more likely to have severe symptoms, be at risk of poor outcome, and who should be considered a priority for early diagnosis and management. Future management of sciatica needs to include listening to patients' stories, offering a credible physical assessment, explanation, and diagnosis of the condition. Explaining the limits to treatment is seen as positively contributing to the partnership between patients and clinicians.

**Risk factors of sciatic pain: A prospective study among middle-aged employees**  
European Journal of Pain; 15 (6); July 2011 Pages 584-590

**Objective:** To study the effects of occupational class, physical and psychosocial working conditions, health behaviors, and pain in the low back and the neck on sciatic pain among middle-aged employees.

**Methods:** The participants were municipal employees without previous sciatica, aged 40, 45, 50, 55, and 60 years at baseline ( $n = 5261$ , 80% women). Sciatica was defined as low back pain radiating to the calf or the foot. Data on occupational class, physical and psychosocial working conditions, body mass index, smoking, leisure-time physical activity, neck pain, local low back pain, and sciatica were obtained from baseline questionnaire surveys in 2000–2002. The question on sciatica was repeated in a follow-up survey in 2007. Logistic regression analysis was used.

**Results:** In women, manual occupational class (compared with managers/professionals), overweight, obesity, smoking, low leisure-time physical activity, previous acute and chronic local low back pain, and acute and chronic neck pain predicted the onset of sciatica in a multivariable model. In men, semi-professionals and manual workers had an increased risk compared with managers/professionals; also acute and chronic local low back pain predicted sciatica.

**Conclusions:** Manual occupational class in both genders and semi-professional occupations in men, unhealthy behaviors and previous pain both in the neck and the lower back predicted sciatica, while physical and psychosocial working conditions had no independent effect.

**Relationship Between Pressure Pain Thresholds and Pain Ratings in Patients With Whiplash-associated Disorders** Clinical Journal of Pain; July/August 2011 - Volume 27 - Issue 6 - p 495–501

**Objectives:** Increased sensitivity to pressure is commonly associated with painful musculoskeletal conditions, including whiplash-associated disorders (WADs). Pressure pain thresholds (PPTs) close to the site of presumed tissue damage are thought to represent the degree of peripheral nociceptive sensitization. PPTs over healthy tissue, away from the site of injury, are a marker of central nervous system hyperexcitability. There is uncertainty, however, as to what extent does the sensitization of the nociceptive system, whether peripheral or central, contribute to the ongoing, habitual pain experienced by people with WAD.

**Methods:** One hundred patients with WAD were assessed within 4 weeks of their accident and followed after 3 months; 24-hour average neck pain score, PPTs at the cervical spine and tibialis anterior, demographic factors, and psychological measures were collected.

**Results:** Cervical PPT and neck pain score were significantly, but weakly correlated. There was no significant correlation between tibialis anterior PPT and pain score at any time point. Regression analyses indicated a strong influence of generalized psychological distress and fear avoidance on the relationship between PPT and pain report.

**Discussion:** The competing explanations for these findings are that either PPTs provide a poor marker of peripheral and central sensitivity or that these processes are only weakly related to the day-to-day pain experienced by patients with WAD. The latter explanation is supported by the confounding effect of psychological factors on pain score.

**Assessing Fear-Avoidance Beliefs in Patients With Whiplash-associated Disorders: A Comparison of 2 Measures** Clinical Journal of Pain; July/August 2011 - Volume 27 - Issue 6 - p 502–507

**Objectives:** To examine the development of fear avoidance behaviours following whiplash injury using two different measures of fear avoidance, the Pictorial Fear of Activities Scale-Cervical (PFActS-C), and the Tampa Scale of Kinesiophobia (TSK-17). Secondly we assessed the capacity of these measures to predict recovery status at long term follow up and initial cervical range of movement (ROM).

**Methods:** Ninety-eight patients with acute WAD were recruited and completed measures of pain and disability (NDI), fear avoidance beliefs and cervical ROM at baseline (<4 weeks), 3 and 6 months post injury. Participants were grouped based on NDI scores at 6 months follow up as either recovered (NDI <10), mild (NDI 10-28) or moderate/severe (NDI ≤30).

**Results:** Repeated measures, linear mixed model analysis showed a significant main effect for time and group for both TSK-17 and PFActSC scores. On both measures the moderate/severe group scored significantly higher than the mild and recovered groups. TSK-17 scores, age and initial pain intensity at baseline significantly predicted NDI scores at 6 months. PFActSC scores, age and initial pain intensity at baseline significantly predicted initial cervical ex-tension and rotation ROM.

**Discussion:** Fear avoidance beliefs and behaviors develop quickly following whiplash injury and influence both the initial physical presentation and long term outcome of patients with WAD. The PFActS-C may provide a measure of fear of movement which is more specific to the cervical spine in patients with WAD in comparison to the TSK-17.

**Job strain, work characteristics and back pain: A study in a University hospital** European Journal of Pain; 15 (6); July 2011 Pages 634-640

**Objectives:** The demand-control-support “job strain” model is frequently used in occupational health research. We sought to explore the relationship between job strain and back pain.

**Method:** One thousand two hundred and ninety-eight collaborators of a Swiss teaching hospital responded to a cross-sectional questionnaire survey that measured job strain, the occurrence of back pain as well as the characteristics and consequences of this pain.

**Results:** Job strain computed with both psychological and physical demands was strongly and significantly associated with various measures of back pain. These associations displayed a dose–response pattern, and remained strong even after adjustment for job characteristics and professional categories. In contrast, separate dimensions of job strain (except physical demands) and job strain computed with only psychological demands did not remain significantly associated with back pain after adjustment for other variables.

**Conclusion:** Our results support the findings linking back pain to job strain. Moreover, the relationship between back pain and job strain is much stronger if job strain includes both psychological and physical demands. Results of this study suggest that workplace interventions that aim to reduce job strain may help prevent back pain and may alleviate the personal, social, and economic burden attributable to back pain.



**Patient Characteristics and Variation in Treatment Outcomes: Which Patients Benefit Most From Acupuncture for Chronic Pain?** Clinical Journal of Pain; July/August 2011 - Volume 27 - Issue 6 - p 550–555

**Objectives:** The aim of this study was to identify patients' characteristics that increase or decrease their benefit from acupuncture treatment of chronic pain.

**Methods:** Patients with chronic low back pain, headache, neck pain, or pain due to osteoarthritis of the knee or hip, were included in 4 multicenter, randomized, controlled studies, all conducted in Germany. All patients received routine care; the patients randomized to the acupuncture group received additional acupuncture treatment. Data were pooled, and the main outcome was defined as the 3-month change from baseline of the SF-36 bodily pain subscale. To identify predictors for treatment effects and effect modifiers (ie, variables that interact with the form of treatment), patients' characteristics and their interaction with treatment were included in a mixed linear model to predict treatment outcome.

**Results:** A total of 9,990 patients who were treated by 2,781 physicians were analyzed. The out-come was markedly improved in the acupuncture group. Age, education, duration of illness, baseline pain, and some concomitant diseases predicted treatment outcome in both groups. Patients' characteristics that enlarged the acupuncture effect (ie, acted as effect modifiers) were being female, living in a multi-person household, failure of other therapies before the study, and former positive acupuncture experience.

**Discussion:** Future research to clarify the modifying effects with special focus on patients' expectations and other psychological variables is needed.

**The impact of Alzheimer's disease on the functional connectivity between brain regions underlying pain perception** European Journal of Pain; 15 (6); July 2011 Pages 568

Patients with Alzheimer's disease (AD) are administered fewer analgesics and report less clinical pain compared with their cognitively-intact peers, prompting much speculation about the likely impact of neurodegeneration on pain perception and processing. This study used functional connectivity analysis to examine the impact of AD on the integrated functioning of brain regions mediating the sensory, emotional, and cognitive aspects of pain. Fourteen patients with AD and 15 controls attended two experimental sessions. In an initial psychophysical testing session, a random staircase procedure was used to assess sensitivity to noxious mechanical pressure applied to the thumbnail. In a subsequent brain imaging session, fMRI data were collected as participants received noxious or innocuous thumbnail pressure, delivered at intensities corresponding with previously identified subjective pain thresholds.

Two approaches to functional connectivity analysis were utilized. A seed-based correlation method was first used to identify regions showing significant functional connectivity with the right dorsolateral prefrontal cortex (DLPFC). Functional connectivity between a network of 17 predefined pain processing regions was then assessed. Between-group comparisons revealed enhanced functional connectivity between the DLPFC and the anterior mid cingulate cortex, periaqueductal grey, thalamus, hypothalamus, and several motor areas in patients with AD compared with control group. Likewise, inter-regional functional connectivity across most regions of the predefined pain network was shown to be greater in the patient group, with the enhanced functional connectivity centered on three nodes: the DLPFC-R, hypothalamus, and PAG.

The results of this study support previous research suggesting an interplay between pain and cognitive processes in patients with AD.

**General Practitioners' Attitudes and Beliefs Regarding the Management of Chronic Low Back Pain in Ireland: A Cross-sectional National Survey** *Clinical Journal of Pain*; July/August 2011 - Volume 27 - Issue 6 - p 542–549

**Objectives:** General practitioners (GPs) manage the majority of patients with chronic low back pain (LBP) in the Republic of Ireland's health system; however, little is known about their attitudes and beliefs, and how these influence their practice behavior. This study aimed to determine the attitudes and beliefs of GPs regarding chronic LBP, the factors that influence these, and their impact on the management of patients with chronic LBP.

**Method:** A cross-sectional questionnaire survey of a random sample of GPs (n=750) was undertaken. The questionnaire pack contained a demographic questionnaire, an attitudes measure (the Pain Attitudes and Beliefs Scale, which measured “biomedical” and “biopsychosocial” orientations), and 2 LBP clinical vignettes.

**Results:** The response rate was 57% (n=432). Doctor-related factors (use of LBP clinical guide-lines, number of years qualified) had a statistically significant impact on biomedical scores, that is, those who used guidelines, and were qualified a shorter time had significantly lower biomedical scores; however, they had a limited impact on the consultation outcomes. No doctor-related factor impacted on the biopsychosocial score, and only sex impacted on the consultation outcome, that is, female GPs referred patients more frequently to allied health professionals.

**Discussion:** The current results show partial adherence to current LBP guidelines: GPs manage patients within a biomedical framework, and post-graduate education is not significantly impacting on chronic LBP management. GPs' beliefs do not correlate with their management, which only reflects partial adherence to LBP guideline recommendations. Further research is needed to explore the role of patient factors in the consultation out-comes.

**Clinical Effectiveness of Botulinum Toxin Type B in the Treatment of Subacromial Bursitis or Shoulder Impingement Syndrome** Clinical Journal of Pain; July/August 2011 - Volume 27 - Issue 6 - p 523–528

**Objectives:** Sub-acromial steroid injections are used as a treatment method in sub-acromial bursitis (SB) or shoulder impingement syndrome (SIS). However, the steroid effect is relatively restricted to the short-term and repeated injections are frequently required, which contributes to unwanted side effects. As an alternative, botulinum toxin (BT) has recently been used for pain relief. This study aimed to investigate the clinical effectiveness of BT type B and to compare this with the effectiveness of steroids.

**Methods:** Sixty-one patients diagnosed with SB or SIS were divided into 2 groups and treated with BT type B (BT group) and trimacinelone injection (TA group) under ultrasound guidance, respectively. Numeric Rating Scale (NRS), active shoulder abduction angle, and the Korean version of the score on the Disability of Arm, Shoulder, and Hand (DASH) were measured before the treatment, and at 1 and 3 months after the treatment.

**Results:** Both groups obtained a significant improvement of NRS, DASH, and active shoulder abduction at 1 and 3 months follow-up. BT group showed significantly better outcomes in terms of reduction of NRS and DASH at 3 months than TA group. BT group showed strong trend toward the larger degree of active shoulder abduction than the TA group at 3 months follow-up, as well. Whereas, no significant difference was found in NRS, DASH, and active shoulder abduction between the 2 groups at 1 month follow-up.

**Discussion:** BT type B can be a useful strategy and has great potential for replacing steroids as a treatment for SB or SIS.

## **Histological characteristics of the deep fascia of the upper limb**

**Carla Stecco<sup>1,2</sup> M.D., Andrea Porzionato<sup>1</sup> M.D., Veronica Macchi<sup>1</sup> M.D.,  
Cesare Tiengo<sup>1</sup> M.D., Anna Parenti<sup>3</sup> M.D., Roberto Aldegheri<sup>2</sup> M.D.,  
Vincent Delmas<sup>4</sup> M.D. and Raffaele De Caro<sup>1</sup> M.D.**

Post-mortem specimens taken from the antebrachial and brachial fasciae of 20 upper limbs were studied by histological and immunohistochemical staining in order to evaluate collagen fibre bundle arrangement, the presence of elastic fibres, and the density of innervation in deep muscular fascia. The study demonstrated that the fasciae are formed of numerous layers of undulating collagen fibre bundles. In each layer, the bundles are parallel to each other, whereas adjacent layers show different orientations. Each layer is separated from the adjacent one by a thin layer of adipose tissue, like plywood. Many elastic fibres and a variety of both free and encapsulated nerve endings, especially Ruffini and Pacini corpuscles, are also present, suggesting a proprioceptive capacity of the deep fascia.

Thanks to the undulating collagen fibre bundles and elastic fibres, the fasciae can adapt to stretching, but this is only possible within certain limits, beyond which nerve terminations are activated by stretching. This mechanism allows a sort of “gate control” on the normal activation of intrafascial receptors. The capacity of the various collagen layers to slide over each other may be altered in cases of over-use syndrome, trauma or surgery. In such cases, the amortising mechanism of the fascia on the nervous terminations is lost, causing incorrect paradoxical activation of nerve receptors within the fascia, resulting in the propagation of a nociceptive signal even in situations of normal physiological stretch. At the same time, the layered collagen fibres allow transmission of tension according to the various lines of force. This structure of the muscular fascia guarantees perceptive and directional continuity along a particular myokinetic chain, acting like a transmission belt between two adjacent joints and also between synergic muscle groups.

## Anatomical study of myofascial continuity in the anterior region of the upper limb

Antonio Stecco<sup>a</sup>, Veronica Macchi<sup>b</sup>, Carla Stecco<sup>c</sup>, Andrea Porzionato<sup>b</sup>, Julie Ann Day<sup>d</sup>, Vincent Delmas<sup>e</sup>, Raffaele DeCaro<sup>b</sup>, \_

### Summary

Fifteen unembalmed cadavers were dissected in order to study ‘anatomical continuity’ between the various muscles involved in the movement of flexion of the upper limb. This study demonstrated the existence of specific myofascial expansions, with an early constant pattern, which originate from the flexor muscles and extend to the overlying fascia. The clavicular part of the pectoralis major sends a myofascial expansion, with a mean length of 3.6 cm, to the anterior region of the brachial fascia, and the costal part ends one to the medial region of the brachial fascia (mean length: 6.8 cm). The biceps brachii presents two expansions: the lacertus fibrosus, oriented medially, with a mean height of 4.7 cm and a base of 1.9 cm, and a second, less evident, longitudinal expansion (mean length: 4.5 cm, mean width: 0.7 cm). Lastly, the Palmaris longus sends an expansion to the fascia overlying the thenar muscles (mean length: 1.6 cm, mean width: 0.5 cm). During flexion, as these muscles contract, the anterior portion of the brachial and antebrachial fascia is subject to tension. As the fascia is rich in proprioceptive nerve endings, it is hypothesized that this tension activates a specific pattern of receptors, contributing to perception of motor direction. If the muscular fascia is in a non-physiological state, these mechanisms are altered, and the proprioceptors in the fascia may be incorrectly activated, thus giving rise to many types of extra-articular pain.

## Treating patellar tendonopathy with Fascial Manipulation

Alessandro Pedrelli, PT<sup>a</sup>, Carla Stecco, M.D.<sup>b</sup>, , Julie Ann Day, PT<sup>c</sup>

### Summary

According to Fascial Manipulation theory, patellar tendon pain is often due to uncoordinated quadriceps contraction caused by anomalous fascial tension in the thigh. Therefore, the focus of treatment is not the patellar tendon itself, but involves localizing the cause of this incoordination, considered to be within the muscular fascia of the thigh region. Eighteen patients suffering from patellar tendon pain were treated with the Fascial Manipulation technique. Pain was assessed (inVAS) before (VAS 67.8/100) and after (VAS 26.5/100) treatment, plus a follow-up evaluation at 1 month (VAS 17.2/100). Results showed a substantial decrease in pain immediately after treatment ( $p < 0.0001$ ) and remained unchanged or improved in the short term. The results show that the patellar tendon may be only the zone of perceived pain and that interesting results can be obtained by treating the muscular fascia of the quadriceps muscle, whose alteration may cause motor incoordination and subsequent pathology. © 2008 Elsevier Ltd. All rights reserved.

### **A histological study of the deep fascia of the upper limb**

**Carla Stecco<sup>1,2</sup> M.D., Andrea Porzionato<sup>1</sup> M.D., Veronica Macchi<sup>1</sup> M.D.,  
Cesare Tiengo<sup>1</sup> M.D., Anna Parenti<sup>3</sup> M.D., Roberto Aldegheri<sup>2</sup> M.D.,  
Vincent Delmas<sup>4</sup> M.D. and Raffaele De Caro<sup>1</sup> M.D.**

Post-mortem specimens taken from the antebrachial and brachial fasciae of 20 upper limbs were studied by histological and immune histochemical staining in order to evaluate collagen fibre bundle arrangement, the presence of elastic fibres, and the density of innervation in deep muscular fascia. The study demonstrated that the fasciae are formed of numerous layers of undulating collagen fibre bundles. In each layer, the bundles are parallel to each other, whereas adjacent layers show different orientations. Each layer is separated from the adjacent one by a thin layer of adipose tissue, like plywood. Many elastic fibres and a variety of both free and encapsulated nerve endings, especially Ruffini and Pacini corpuscles, are also present, suggesting a proprioceptive capacity of the deep fascia.

Thanks to the undulating collagen fibre bundles and elastic fibres, the fasciae can adapt to stretching, but this is only possible within certain limits, beyond which nerve terminations are activated by stretching. This mechanism allows a sort of "gate control" on the normal activation of intrafascial receptors. The capacity of the various collagen layers to slide over each other may be altered in cases of over-use syndrome, trauma or surgery. In such cases, the amortising mechanism of the fascia on the nervous terminations is lost, causing incorrect paradoxical activation of nerve receptors within the fascia, resulting in the propagation of a nociceptive signal even in situations of normal physiological stretch. At the same time, the layered collagen fibres allow transmission of tension according to the various lines of force. This structure of the muscular fascia guarantees perceptive and directional continuity along a particular myokinetic chain, acting like a transmission belt between two adjacent joints and also between synergic muscle groups.



## How much time is required to modify a fascial fibrosis?

Borgini Ercole, MD <sup>a</sup>, Stecco Antonio, MD <sup>b</sup>, Day Julie Ann, PT <sup>c</sup>,  
Carla Stecco, MD <sup>d,\*</sup>

### Summary

The perception of what appears to be connective tissue fibrosis, and its consequent modification during therapy, is a daily experience for most manual therapists. The aim of this study was to evaluate the time required to modify a palpatory sensation of fibrosis of the fascia in correlation with changes in levels of patient discomfort in 40 subjects with low back pain utilizing the Fascial Manipulation technique. This study evidenced, for the first time, that the time required to modify an apparent fascial density differs in accordance with differences in characteristics of the subjects and of the symptoms. In particular, the mean time to halve the pain was 3.24 min; however, in those subjects with symptoms present from less than 3 months (sub-acute) the mean time was lesser (2.58 min) with respect to the chronic patients (3.29 min). Statistically relevant ( $p < 0.05$ ) differences were also evidenced between the specific points treated.

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## Fascial plasticity – a new neurobiological explanation:

### Part 1

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Robert Schleip

In myofascial manipulation an immediate tissue release is often felt under the working hand. This amazing feature has traditionally been attributed to mechanical properties of the connective tissue. Yet studies have shown that either much stronger forces or longer durations would be required for a permanent viscoelastic deformation of fascia. Fascia nevertheless is densely innervated by mechanoreceptors which are responsive to manual pressure. Stimulation of these sensory receptors has been shown to lead to a lowering of sympathetic tonus as well as a change in local tissue viscosity. Additionally smooth muscle cells have been discovered in fascia, which seem to be involved in active fascial contractility. Fascia and the autonomic nervous system appear to be intimately connected. A change in attitude in myofascial practitioners from a mechanical perspective toward an inclusion of the self-regulatory dynamics of the nervous system is suggested. © 2003 Elsevier Science Ltd. All rights reserved.

## Fascial plasticity – a new neurobiological explanation

### Part 2

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Robert Schleip

#### Abstract

Part 1 of this two part article showed that immediate fascial responsiveness to manipulation cannot be explained by its mechanical properties alone. Fascia is densely innervated by mechanoreceptors which are responsive to myofascial manipulation. They are intimately connected with the central nervous system and specially with the autonomic nervous system.

Part 2 of the article shows how stimulation of these receptors can trigger viscosity changes in the ground substance. The discovery and implications of the existence of fascial smooth muscle cells are of special interest in relation to fibromyalgia, amongst other conditions. An attitudinal shift is suggested, from a mechanical body concept towards a cybernetic model, in which the practitioner's intervention are seen as stimulation for self-regulatory processes within the client's organism. Practical implications of this approach in myofascial manipulation will be explored.

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## **Fascia Is Able to Contract in a Smooth Muscle-like Manner and Thereby Influence Musculoskeletal Mechanics**

**R. Schleip<sup>1</sup>, W. Klingler<sup>1,2</sup> and F. Lehmann-Horn<sup>1</sup>**

### **Summary**

With immunohistological analysis we demonstrate the presence of myofibroblasts in normal human fasciae, particularly the fascia lata, plantar fascia, and the lumbar fascia. Density was found to be highest in the lumbar fascia and seems to be positively related to physical activity. For in vitro contraction tests we suspended strips of lumbar fascia from rats in an organ bath and measured for responsiveness to potential contractile agonists. With the H1 antagonist mepyramine there were clear contractile responses; whereas the nitric oxide donator glyceryltrinitrate induced relaxation. The measured contraction forces are strong enough to impact upon musculoskeletal mechanics when assuming a similar contractility in vivo.

## NOI Notes on spirituality and the nerve root

### **Nasty nerve roots**

Nerve root pains can be downright nasty, sometimes tricky to identify and they often last a long time - shooting pains in the leg, sleepless nights, latent pains, weird behaviour, and impaired quality of life. It may well be hard for a patient to give meaning to it, especially with the unfamiliar symptoms. "It just eats into my soul" commented a recent sufferer.

If this is the case, perhaps you should hope/pray that your patient is the spiritual type. On an analysis of basic sciences, the spiritual type may do much better than the non-spiritual person when faced with a nasty and unfamiliar nerve root problem. And you can be a spiritual assistant!

### **Spirituality**

Differences between spirituality and religion have been argued for years and I don't really want to get into that hot potato. Spirituality is usually defined as a personal quest for seeking meaning and purpose and a connectedness with the world. It includes a willingness to accept transcendence i.e. things that cannot be objectively demonstrated (Emblen 1992; Maliski et al. 2010). You don't have to be religious to be spiritual although there is often overlap. Faith is a manifestation of spirituality and in the health care context this could be faith in the health care provider, self, family and the system. High levels of spirituality may be really important in getting an acute nerve root problem to calm down and to minimise the number and effect of reoccurrences. Health professionals should be aware of the spiritual needs of patients and the fact that the spiritual person will be more likely to have biopsychosocial mental frameworks to tap into.

### **What is so spiritual about a nerve root?**

While the brain is a far more trendier part of the of the nervous system to experimentally probe, a recent revival of interest in the peripheral nervous system is noted, especially the nerve root, the 'brain' of the peripheral nervous system. No doubting anatomically that nerve roots (referring here to the rootlets, roots and dorsal root ganglion) are in a tricky place for modern life and surgery can be spectacularly successful for some, however the common mechanistic 'pinched root' and nerve root 'compression' thinking needs a challenge.

When a part of the peripheral nervous system is injured, immune cells such as glia, Schwann and T cells in the dorsal root ganglia, spinal cord and brain produce pro and anti-inflammatory cytokines – a sterile inflammatory response. The pro-inflammatory cytokines include interleukins 1, 6 and TNF alpha. The anti-inflammatory cytokines include interleukins 4 and 10. These two groups kind of balance each other out, with the balance ultimately contributing to how the injury plays out (Austin and Moalem-Taylor 2010). For example, people with painless neuropathies have heightened levels of anti-inflammatory cytokines and patients with painful neuropathies have heightened levels of pro-inflammatory cytokines. Other linked processes related to nerve root sensitivity include altered sensitivity to mechanical, adrenaline and ischaemic stimuli (Devor 2005). Inflammation does not necessarily show on imaging and the spiritual person may readily accept that their pain does not have to have an objective measure.

### **Searching for a sense of self in a nerve root?**

Those more spiritual may see the nerve root problem as a microcosm of self. The inflammatory component of the nerve root problem, which will be mimicked in the cord and brain is driven in part by mind status. The 'out of balance' notion of mental disorders, increasingly seen as unbalanced glial activity (Fields 2009) may apply to the peripheral nerve injury. For some there may well be 'goodies and baddies' or 'angels and demons' in the inflammatory response and heightened spirituality enhanced by biological knowledge may tip the balance in favour of the anti-inflammatory immune response.

For example, catastrophisation which is known to have immune inflammatory effects (Edwards, Kronfli et al. 2008) could be minimised by a spirituality which encourages a search for meaning and knowledge, and perhaps a 'go with the flow' thinking. You can help the person seek meaning. For example, knowledge of the pain referral zones, that immune based 'sympathy pains' in the other side are common, and that immune based responses for months after are expected and normal as the system slowly balances. And in particular, the knowledge that neuroinflammation is influenced by unhelpful thoughts like catastrophisation and emotions such as fear should be welcome by the spiritual person. Ultimately early movement with minimised fear may be a beneficial outcome.

The religious discussion is inevitable here. Cusick, a minister writing in the American Pain Society Bulletin (Cusick 2003) noted five spiritual religious interpretations of pain – pain as punishment, pain as a test, pain as an opportunity for transcendence (i.e. a little pain is good for the soul), pain as atonement (i.e. experiencing pain to help other people) and pain to gain control. However, as Cusick notes, the social

meanings of pain are now changing rapidly with improved pain medications and increased understanding of its biology – that pain, like other brain constructions is a protective coping strategy to help us change behaviour and is not necessarily a voluntary and potentially harmful experience.

### **Assessing spirituality**

Given that most people report having a spiritual life and that spirituality may well have an influence on the potency of neuro-inflammatory soup, it seems worthwhile asking about it. Questions such as “what helps you get through tough times” and “to whom do you turn when you need support” (Mueller, Plevak et al. 2001) may well be obvious questions to a health professional with a biopsychosocial framework.

### **More on spirituality**

These are complex issues ripe for discussion. This perplexing topic of the relationship between spirituality, pain, immune and other systems will be up for discussion at the second [Neurodynamics and The Neuromatrix conference](#) in Adelaide, Australia, April 2012. The reverend Dr Andrew Dutney, next head of the Uniting Church in Australia will talk and present a workshop with Professor Frank Keefe who has researched in the area of spirituality and arthritis and Mick Thacker, immunologist and spiritual atheist. Keen to have your thoughts here - David

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## Effects of paracetamol, non-steroidal anti-inflammatory drugs, acetylsalicylic acid, and opioids on bone mineral density and risk of fracture: Results of the Danish Osteoporosis Prevention Study (DOPS)

Osteoporosis International, 07/06/2011

Vestergaard P et al. –Significant differences exist between subjects exposed to pain medications and non-users. Despite an absence of an effect over time on BMD, users of NSAID experienced more fractures than expected. The reasons for this have to be explored in further studies.

**Methods** 2016 perimenopausal women Followed for 10 years Part of partly randomised comprehensive cohort study on hormone therapy (HT) BMD measured at baseline and after 10 years by DXA (Hologic)

### Results

- Paracetamol users were heavier ( $70.4 \pm 13.4$  vs.  $67.7 \pm 11.9$  kg,  $2p < 0.01$ ) than non-users. NSAID users were heavier ( $71.6 \pm 15.6$  vs.  $67.8 \pm 11.9$  kg,  $2p = 0.04$ ) than non-users. ASA users had lower 25-hydroxy-vitamin D (25OHD) levels ( $21.9 \pm 9.3$  vs.  $25.3 \pm 12.4$  ng/ml,  $2p < 0.01$ ) than non-users Opioid users had lower 25OHD ( $21.4 \pm 8.4$  vs.  $25.2 \pm 12.3$  ng/ml) and lower intake of vitamin D ( $2.2 \pm 1.1$  vs.  $3.1 \pm 3.0$   $\mu\text{g/day}$ ,  $2p < 0.01$ ) than non-users Despite these differences, no baseline differences were present in spine, hip, forearm or whole body BMD Over 10 years, no differences were present in BMD alterations except small trend towards higher BMD gain in spine in users of paracetamol, NSAID, ASA, and opioids compared to non-exposed After adjustment, NSAID exposed sustained more fractures (HR=1.44, 95% CI 1.07–1.93) than non-users For users of paracetamol and opioids, non-significant trend towards more fractures was present after adjustment For ASA users, no excess risk of fractures was present
- Pain medication has been associated with fractures. We found higher weight in paracetamol and non-steroidal anti-inflammatory drugs (NSAID) users and lower vitamin D levels in opioid and acetylsalicylic acid users. None of the pain medications influenced bone mineral density or loss. NSAID were associated with an increased fracture risk.
- **Introduction** - To study the effects of use of paracetamol, non-steroidal anti-inflammatory drugs (NSAID), acetylsalicylic acid (ASA), and opioids on bone mineral density (BMD) and risk of fractures.
- **Methods** - Two-thousand sixteen perimenopausal women followed for 10 years as part of a partly randomised comprehensive cohort study on hormone therapy (HT). BMD was measured at baseline and after 10 years by DXA (Hologic).
- **Results** -Paracetamol users were heavier ( $70.4 \pm 13.4$  vs.  $67.7 \pm 11.9$  kg,  $2p < 0.01$ ) than non-users. NSAID users were heavier ( $71.6 \pm 15.6$  vs.  $67.8 \pm 11.9$  kg,  $2p = 0.04$ ) than non-users. ASA users had lower 25-hydroxy-vitamin D (25OHD) levels ( $21.9 \pm 9.3$  vs.  $25.3 \pm 12.4$  ng/ml,  $2p < 0.01$ ) than non-users. Opioid users had lower 25OHD ( $21.4 \pm 8.4$  vs.  $25.2 \pm 12.3$  ng/ml) and lower intake of vitamin D ( $2.2 \pm 1.1$  vs.  $3.1 \pm 3.0$   $\mu\text{g/day}$ ,  $2p < 0.01$ ) than non-users. Despite these differences, no baseline differences were present in spine, hip, forearm or whole body BMD. Over 10 years, no differences were present in BMD alterations except a small trend towards a higher BMD gain in the spine in users of paracetamol, NSAID, ASA, and opioids compared to non-exposed. After adjustment, NSAID exposed sustained more fractures (HR = 1.44, 95% CI 1.07-1.93) than non-users. For users of paracetamol and opioids, a non-significant trend towards more fractures was present after adjustment. For ASA users, no excess risk of fractures was present.
- **Conclusion** -Significant differences exist between subjects exposed to pain medications and non-users. Despite an absence of an effect over time on BMD, users of NSAID experienced more fractures than expected. The reasons for this have to be explored in further studies.

# Evaluation of wet-cupping therapy for persistent non-specific lower back pain: a randomised, waiting-list controlled, open-label, parallel-group pilot trial

*Trials*, 07/06/2011

Kim JI et al. – This pilot study may provide preliminary data on the effectiveness and safety of wet-cupping treatments for Persistent non-specific low back pain (PNSLBP). Future full-scale randomised controlled trials will be needed to provide firm evidence of the effectiveness of this intervention.

## Methods

- Authors recruited 32 participants (21 in the wet-cupping group and 11 in the waiting-list group) who had been having PNSLBP for at least 3 months.
- The participants were recruited at the clinical research centre of the Korea Institute of Oriental Medicine, Korea.
- Eligible participants were randomly allocated to wet-cupping and waiting-list groups.
- Following the practice of traditional Korean medicine, the treatment group was provided with wet-cupping treatment at two acupuncture points among the BL23, BL24 and BL25 6 times within 2 weeks.
- Usual care, including providing brochures for exercise, general advice for PNSLBP and acetaminophen, was allowed in both groups.
- Separate assessors participated in the outcome assessment.
- Authors used the 0 to 100 numerical rating scale (NRS) for pain, the McGill Pain Questionnaire for pain intensity (PPI) and the Oswestry Disability Questionnaire (ODQ), and we assessed acetaminophen use and safety issues.

## Results

- The results showed that the NRS score for pain decreased (-16.0 [95% CI: -24.4 to -7.7] in the wet-cupping group and -9.1 [-18.1 to -0.1] in the waiting-list group), but there was no statistical difference between the groups ( $p = 0.52$ ).
- However, the PPI scores showed significant differences between the two groups (-1.2 [-1.6 to -0.8] for the wet-cupping group and -0.2 [-0.8 to 0.4] for the waiting-list group,  $p < 0.01$ ).
- In addition, less acetaminophen was used in the wet-cupping group during 4 weeks ( $p = 0.09$ ).
- The ODQ score did not show significant differences between the two groups (-5.60 [-8.90 to -2.30] in the wet-cupping group and -1.8 [-5.8 to 2.2] in the waiting-list group,  $p = 0.14$ ).
- There was no report of adverse events due to wet-cupping.

# Spinal Manipulative Therapy for Chronic Low-Back Pain: An Update of a Cochrane Review

Spine, 05/27/2011

Rubinstein SM et al. – High-quality evidence suggests that there is no clinically relevant difference between SMT and other interventions for reducing pain and improving function in patients with chronic low-back pain. Determining cost-effectiveness of care has high priority.

## Methods

- An experienced librarian searched for randomized controlled trials (RCTs) in multiple databases up to June 2009.
- RCTs that examined manipulation or mobilization in adults with chronic low-back pain were included.
- The primary outcomes were pain, functional status, and perceived recovery.
- Secondary outcomes were return-to-work and quality of life. Data collection and analysis.
- Two authors independently conducted the study selection, risk of bias assessment, and data extraction.
- GRADE was used to assess the quality of the evidence.

## Results

- Authors included 26 RCTs (total participants = 6070), 9 of which had a low risk of bias.
- Approximately two-thirds of the included studies (N = 18) were not evaluated in the previous review.
- There is a high-quality evidence that SMT has a small, significant, but not clinically relevant, short-term effect on pain relief (mean difference -4.16, 95% confidence interval -6.97 to -1.36) and functional status (standardized mean difference -0.22, 95% confidence interval -0.36 to -0.07) in comparison with other interventions.
- There is varying quality of evidence that SMT has a significant short-term effect on pain relief and functional status when added to another intervention.
- There is a very low-quality evidence that SMT is not more effective than inert interventions or sham SMT for short-term pain relief or functional status.
- Data were particularly sparse for recovery, return-to-work, quality of life, and costs of care.
- No serious complications were observed with SMT.



# Validity of the Straight-Leg Raise Test for Patients With Sciatic Pain With or Without Lumbar Pain Using Magnetic Resonance Imaging Results as a Reference Standard

Journal of Manipulative and Physiological Therapeutics, 06/03/2011

## Abstract

### Objective

The aim of this retrospective study was to assess validity of the straight-leg raise (SLR) test using magnetic resonance imaging (MRI) results as a reference standard in a group of patients with L4-L5 and L5-S1 lumbar-herniated disks and sciatic pain. The relationship between diagnostic accuracy of this test, age classes, and grade of lumbar disk displacement was investigated.

### Methods

The charts of 2352 patients with sciatic pain with/without lumbar pain were examined. Results of the SLR were then compared with previous spinal MRI. A 2 × 2 contingency table was created, and analysis of sensitivity, specificity, positive and negative predictive values, diagnostic odds ratio, likelihood ratio (LR), and receiver operating characteristic (ROC) curve was carried out. Homogeneous age classes were created to compare them statistically.

### Results

Magnetic resonance imaging findings showed lumbar disk herniation (LDH) in 1305 patients. Of these subjects, 741 were positive on SLR testing. Sensitivity was 0.36, whereas specificity was 0.74. Positive and negative predictive values were 0.69 and 0.52, respectively. Positive LR was 1.38, and negative LR was 0.87. Diagnostic odds ratio was 1.59, and ROC analysis showed an area under the curve (AUC) of 0.596. The AUC decreased from 0.730 in the 16- to 25-year subgroup to 0.515 in the 76- to 85-year subgroup. Similar results were obtained in subjects with LDH and nerve root compression.

### Conclusions

Our results indicate low accuracy of the SLR in diagnosis of LDH if compared with MRI results. The discriminative power of the SLR seemed to decrease as age increased; thus, positive and negative results may be less conclusive in older patients.

# Suppression of anger and subsequent pain intensity and behavior among chronic low back pain patients: the role of symptom-specific physiological reactivity

Journal of Behavioral Medicine, 05/26/2011

## *Abstract*

Suppression of anger may be linked to heightened pain report and pain behavior during a subsequent painful event among chronic low back patients, but it is not clear whether these effects are partly accounted for by increased physiological reactivity during suppression. Chronic low back pain patients ( $N = 58$ ) were assigned to Suppression or No Suppression conditions for a “cooperative” computer maze task during which a confederate harassed them. During baseline and maze task, patients’ lower paraspinal and trapezius muscle tension, blood pressure and heart rate were recorded. After the maze task, patients underwent a structured pain behavior task (behaviors were videotaped and coded). Results showed that: (a) Suppression condition patients revealed greater lower paraspinal muscle tension and systolic blood pressure (SBP) increases during maze task than No Suppression patients (previously published results showed that Suppression condition patients exhibited more pain behaviors than No Suppression patients); (b) residualized lower paraspinal and SBP change scores were related significantly to pain behaviors; (c) both lower paraspinal and SBP reactivity significantly mediated the relationship between Condition and frequency of pain behaviors. Results suggest that suppression-induced lower paraspinal muscle tension and SBP increases may link the actual suppression of anger during provocation to signs of clinically relevant pain among chronic low back pain patients.

# **The association between health care professional attitudes and beliefs and the attitudes and beliefs, clinical management, and outcomes of patients with low back pain: A systematic review**

European Journal of Pain, 07/05/2011 Evidence Based Medicine

## **Abstract**

### **Background**

It has been suggested that health care professional (HCP) attitudes and beliefs may negatively influence the beliefs of patients with low back pain (LBP), but this has not been systematically reviewed. This review aimed to investigate the association between HCP attitudes and beliefs and the attitudes and beliefs, clinical management, and outcomes of this patient population.

### **Methods**

Electronic databases were systematically searched for all types of studies. Studies were selected by predefined inclusion criteria. Methodological quality was appraised and strength of evidence was determined.

### **Results**

Seventeen studies from eight countries which investigated the attitudes and beliefs of general practitioners, physiotherapists, chiropractors, rheumatologists, orthopaedic surgeons and other paramedical therapists were included. There is strong evidence that HCP beliefs about back pain are associated with the beliefs of their patients. There is moderate evidence that HCPs with a biomedical orientation or elevated fear avoidance beliefs are more likely to advise patients to limit work and physical activities, and are less likely to adhere to treatment guidelines. There is moderate evidence that HCP attitudes and beliefs are associated with patient education and bed rest recommendations. There is moderate evidence that HCP fear avoidance beliefs are associated with reported sick leave prescription and that a biomedical orientation is not associated with the number of sickness certificates issued for LBP.

### **Conclusion**

HCPs need to be aware of the association between their attitudes and beliefs and the attitudes and beliefs and clinical management of their patients with LBP.

# **Effects of self-discrepancies on activity-related behaviour: Explaining disability and quality of life in patients with chronic low back pain**

Pain, 07/05/2011

## Summary

The self-discrepancy model is applied to chronic low back pain to explain persistence and avoidance behaviour. Whether both styles are related to disability and quality of life is evaluated.

### Abstract

In chronic low back pain (CLBP) research, the self-discrepancy model has been applied to explain dysfunctional avoidance and persistence behaviour. The main aim of this study was to evaluate whether specific self-discrepancies in patients with CLBP are associated with the abovementioned types of activity-related behaviour and whether changes in self-discrepancies over time are associated with changes in activity-related behaviour. Furthermore, the aim was to evaluate whether avoidance and persistence behaviour are associated with a higher level of disability and a diminished quality of life and whether changes over time in avoidance and persistence behaviour result in changes in disability and quality of life. A longitudinal cohort study in a sample of patients with CLBP (N = 116), in which self-discrepancies, disability, quality of life, and objectively registered characteristics of activity-related behaviour were measured, was performed to evaluate the pathways in the aforementioned self-discrepancy model. Results indicate that patients with CLBP who feel closer to their ideal-other show more characteristics of persistence behaviour. Patients who move further away from their ideal-own also show more characteristics of persistence behaviour. Furthermore, in patients characterized as avoider, a decrease in a patient's daily uptime was associated with a decrease of mental health-related quality of life.

## Why do people with complex regional pain syndrome take longer to recognize their affected hand?

G. Lorimer Moseley, PhD  
NEUROLOGY 2004;62:2182-2186

**Abstract—Background:** People with complex regional pain syndrome (CRPS) take longer to recognize the laterality of a pictured hand when it coincides with their affected hand. The author explored two aspects of this phenomenon: whether the duration of symptoms relates to the extent of the delay and whether guarding-type mechanisms are involved. **Methods:** Eighteen patients with CRPS type 1 of the wrist and 18 matched control subjects performed a hand laterality recognition task. McGill pain questionnaire, Neuropathic Pain Scale, and response time (RT) to recognize hand laterality were analyzed. Regressions related 1) mean RT for patients to the duration of symptoms and to pain intensity; and 2) mean RT for each picture to the predicted pain on executing that movement as judged by the patient, and to the awkwardness of the movement that would be required. **Results:** For patients, the duration of symptoms correlated with mean RT (Spearman  $\rho = 0.44$ ;  $p = 0.02$ ). Predicted pain rating explained 45% of the variance in RT for each picture for each patient ( $p = 0.01$ ). **Conclusions:** The results suggest that in patients with complex regional pain syndrome type 1, delayed recognition of hand laterality is related to the duration of symptoms and to the pain that would be evoked by executing the movement. The former is consistent with chronic pain and disuse and may involve reorganization of the cortical correlate of body schema. The latter is consistent with a guarding-type response that probably occurs upstream of the motor cortex at a motor planning level.

# Is successful rehabilitation of complex regional pain syndrome due to sustained attention to the affected limb? A randomised clinical trial

G. Lorimer Moseley\*

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Pain 114 (2005) 54–61

## Abstract

In complex regional pain syndrome (CRPS1) initiated by wrist fracture, a motor imagery program (MIP), consisting of hand laterality recognition followed by imagined movements and then mirror movements, reduces pain and disability, but the mechanism of effect is unclear. Possibilities include sustained attention to the affected limb, in which case the order of MIP components would not alter the effect, and sequential activation of cortical motor networks, in which case it would. Twenty subjects with chronic CRPS1 initiated by wrist fracture and who satisfied stringent inclusion criteria, were randomly allocated to one of three groups: hand laterality recognition, imagined movements, mirror movements (RecImMir, MIP); imagined movements, recognition, imagined movements (ImRecIm); recognition, mirror movements, recognition (RecMirRec). At 6 and 18 weeks, reduced pain and disability were greater for the RecImMir group than for the other groups ( $P < 0.05$ ). Hand laterality recognition imparted a consistent reduction in pain and disability across groups, however, this effect was limited in magnitude. Imagined movements imparted a further reduction in pain and disability, but only if they followed hand laterality recognition. Mirror movements also imparted a reduction in pain and disability, but only when they followed imagined movements. The effect of the MIP seems to be dependent on the order of components, which suggests that it is not due to sustained attention to the affected limb, but is consistent with sequential activation of cortical motor networks.

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## Left and right hand recognition in upper limb amputees

Daniele Nico,<sup>1,2,3</sup> Elena Daprati,<sup>2,3</sup> François Rigal,<sup>4</sup> Lawrence Parsons<sup>5</sup> and Angela Sirigu<sup>3</sup>

### Summary

Previous research suggests a close similarity in brain activity between mental simulation of a movement and its real counterpart. To explore this similarity, we aimed to assess whether imagery is affected by the loss of a limb or of its motor skills. We examined the performance of 16 adult, upper limb amputees (and age-matched controls) in a left/right hand judgement task that implicitly requires motor imagery. The experimental group included subjects who had suffered the amputation of the dominant or the non-dominant limb. Although responding well above chance, amputees as a group were slower and less accurate than controls. Nevertheless, their response pattern was similar to that of controls, namely slower response times and more errors for stimuli depicting hands in unnatural orientations, i.e. postures difficult to reach with a real movement. Interestingly, for all stimuli, amputees' performance was strongly affected by the side of limb loss: subjects who underwent amputation of their preferred limb made more errors and required greater latencies to respond as compared with amputees of the non-dominant limb. In a further analysis we observed that the habit of wearing an aesthetic prosthesis significantly interfered with the ability to judge the corresponding hand. Our data lead to three main conclusions: (i) loss of a single limb per se does not prevent motor imagery but it significantly enhances its difficulty; (ii) these subjects apparently perform the hand recognition task using a strategy in which they initially mentally simulate movements of their dominant limb; (iii) wearing a prosthesis, devoid of any motor function, seems to interfere with motor imagery, consistent with the view that only 'tools' can be incorporated in a dynamic body schema.

## Temporal Dynamics of Plastic Changes in Human Primary Somatosensory Cortex after Finger Webbing

Maria L. Stavrinou<sup>1,2</sup>, Stefania Della Penna<sup>1,3</sup>, Vittorio Pizzella<sup>1,3</sup>, Kathya Torquati<sup>1,3</sup>, Francesco Cianflone<sup>1,3</sup>, Raffaella Franciotti<sup>1,3</sup>, Anastasios Bezerianos<sup>2</sup>, Gian Luca Romani<sup>1,3</sup> and Paolo Maria Rossini<sup>4,5,6</sup>

The primary somatosensory cortex (SI) exhibits a detailed topographic organization of the hand and fingers, which has been found to undergo plastic changes following modifications of the sensory input. Although the spatial properties of these changes have been extensively investigated, little is known about their temporal dynamics. In this study, we adapted the paradigm of finger webbing, in which 4 fingers are temporarily webbed together, hence modifying their sensory feedback. We used magnetoencephalography, to measure changes in the hand representation in SI, before, during, and after finger webbing for about 5 h. Our results showed a decrease in the Euclidean distance (ED) between cortical sources activated by electrical stimuli to the index and small finger 30 min after webbing, followed by an increase lasting for about 2 h after webbing, which was followed by a return toward baseline values. These results provide a unique frame in which the different representational changes occur, merging previous findings that were only apparently controversial, in which either increases or decreases in ED were reported after sensory manipulation for relatively long or short duration, respectively. Moreover, these observations further confirm that the mechanisms that underlie cortical reorganization are extremely rapid in their expression and, for the first time, show how brain reorganization occurs over time.



## Central sensitization: Implications for the diagnosis and treatment of pain

Clifford J. Woolf

PAIN 152 (2011) S2–S15

### abstract

Nociceptor inputs can trigger a prolonged but reversible increase in the excitability and synaptic efficacy of neurons in central nociceptive pathways, the phenomenon of central sensitization. Central sensitization manifests as pain hypersensitivity, particularly dynamic tactile allodynia, secondary punctate or pressure hyperalgesia, aftersensations, and enhanced temporal summation. It can be readily and rapidly elicited in human volunteers by diverse experimental noxious conditioning stimuli to skin, muscles or viscera, and in addition to producing pain hypersensitivity, results in secondary changes in brain activity that can be detected by electrophysiological or imaging techniques. Studies in clinical cohorts reveal changes in pain sensitivity that have been interpreted as revealing an important contribution of central sensitization to the pain phenotype in patients with fibromyalgia, osteoarthritis, musculoskeletal disorders with generalized pain hypersensitivity, headache, temporomandibular joint disorders, dental pain, neuropathic pain, visceral pain hypersensitivity disorders and post-surgical pain. The comorbidity of those pain hypersensitivity syndromes that present in the absence of inflammation or a neural lesion, their similar pattern of clinical presentation and response to centrally acting analgesics, may reflect a commonality of central sensitization to their pathophysiology. An important question that still needs to be determined is whether there are individuals with a higher inherited propensity for developing central sensitization than others, and if so, whether this conveys an increased risk in both developing conditions with pain hypersensitivity, and their chronification. Diagnostic criteria to establish the presence of central sensitization in patients will greatly assist the phenotyping of patients for choosing treatments that produce analgesia by normalizing hyperexcitable central neural activity. We have certainly come a long way since the first discovery of activity-dependent synaptic plasticity in the spinal cord and the revelation that it occurs and produces pain hypersensitivity in patients. Nevertheless, discovering the genetic and environmental contributors to and objective biomarkers of central sensitization will be highly beneficial, as will additional treatment options to prevent or reduce this prevalent and promiscuous form of pain plasticity.

**Botulinum Type A Toxin Complex for the Relief of Upper Back Myofascial Pain Syndrome: How Do Fixed-Location Injections Compare**

## with Trigger Point-Focused Injections?

### Pain Medicine, 06/22/2011 Clinical Article

Benecke R et al. – Fixed-location treatment with BoNT-A of patients with upper back myofascial pain syndrome did not lead to a significant improvement of the main target parameter in week 5 after treatment. Only in week 8 were significant differences found. Several secondary parameters, such as physicians' global assessment and patients' global assessment, significantly favored BoNT-A over placebo at weeks 8 and 12.

### Methods

- Patients with moderate-to-severe myofascial pain syndrome affecting cervical and/or shoulder muscles (10 trigger points, disease duration 6–24 months) and moderate-to-severe pain intensity were randomized to BoNT-A (N = 81) or saline (N = 72).
- Patients received treatment into 10 predetermined fixed injection sites in the head, neck, and shoulder (40 units of BoNT-A per site or saline, a total of 400 units of BoNT-A).
- The primary efficacy outcome was the proportion of patients with mild or no pain at week 5 (responders).
- Secondary outcomes included changes in pain intensity and the number of pain-free days per week.

### Results

- At week 5, 49% (37/76) of BoNT-A patients and 38% (27/72) of placebo patients had responded to treatment ( $P = 0.1873$ ).
- Duration of daily pain was reduced in the BoNT-A group compared with the placebo group from week 5, with statistically significant differences at weeks 9 and 10 ( $P = 0.04$  for both).
- Treatment was well tolerated.
- **Results.** At week 5, 49% (37/76) of BoNT-A patients and 38% (27/72) of placebo patients had responded to treatment ( $P = 0.1873$ ). Duration of daily pain was reduced in the BoNT-A group compared with the placebo group from week 5, with statistically significant differences at weeks 9 and 10 ( $P = 0.04$  for both). Treatment was well tolerated.
- **Conclusion.** Fixed-location treatment with BoNT-A of patients with upper back myofascial pain syndrome did not lead to a significant improvement of the main target parameter in week 5 after treatment. Only in week 8 were significant differences found. Several secondary parameters, such as physicians' global assessment and patients' global assessment, significantly favored BoNT-A over placebo at weeks 8 and 12.

## **Mechanisms of neuropathic pain**

**European Neuropsychopharmacology, 06/24/2011**

Nickel FT et al. – This review aims to illustrate these pathophysiological principles, focussing on molecular and neurophysiological findings. Finally therapeutic options based on these findings are discussed.

Neuropathic pain is a disease of global burden. Its symptoms include spontaneous and stimulus-evoked painful sensations. Several maladaptive mechanisms underlying these symptoms have been elucidated in recent years: peripheral sensitization of nociception, abnormal excitability of afferent neurons, central sensitization comprising pronociceptive facilitation, disinhibition of nociception and central reorganization processes, and sympathetically maintained pain. This review aims to illustrate these pathophysiological principles, focussing on molecular and neurophysiological findings. Finally therapeutic options based on these findings are discussed.

**Neurophysiology**

**Heightened flexor withdrawal responses following ACL rupture are enhanced by passive tibial translation.** [Courtney CA](#), [Durr RK](#), [Emerson-Kavchak AJ](#), [Witte EO](#), [Santos MJ](#)

201105122(5):1005-10 Language: eng Country: Netherlands University of Illinois at Chicago, Chicago, IL, United States.

**OBJECTIVE:** Hyperexcitability of nociceptive pathways has been demonstrated with several musculoskeletal conditions but not anterior cruciate ligament (ACL) injury. The purpose was to investigate flexor withdrawal reflex (FWR) excitability following ACL rupture and determine if painless stretch of knee joint structures enhanced reflexive responses.

**METHODS:** Ten subjects with and 10 subjects without unilateral ACL rupture were compared. FWRs were induced through sural nerve stimulus in symmetrical stance and recumbent positions, with the knee in relaxed and stressed condition. Latencies and amplitudes of hamstring electromyographic activity were analyzed.

**RESULTS:** FWR thresholds were significantly diminished ( $p=0.05$ ) on the injured limb ( $11.8\pm 8\text{mA}$ ) compared to non-injured limb ( $18.6\pm 13\text{mA}$ ) and controls ( $22.5\pm 3\text{mA}$ ). Anterior tibial translation resulted in increased ( $p=0.001$ ) amplitude of EMG hamstring response on the injured limb ( $70\pm 50\%$ ) versus control ( $-1\pm 20\%$ ) and decreased latency ( $p=0.01$ ) of hamstring activation ( $82.0\pm 13\text{ms}$ ).

**CONCLUSIONS:** Individuals with ACL rupture demonstrated increased excitability of FWR responses indicated by decreased FWR threshold and reduced hamstring muscle latency. Responses were enhanced by passive stretch of the knee joint.

**SIGNIFICANCE:** Subjects with ACL rupture demonstrated hyperexcitability of nociceptive pathways on the injured limb which may trigger the FWR more readily and promote the sensation of instability at the knee.

***Developmental medicine and child neurology***

**Mirror therapy in children with hemiplegia: a pilot study.** [Gygax MJ](#), [Schneider P](#), [Newman CJ](#)

20110553(5):473-6 Language: eng Country: England Paediatric Neurology and Neurorehabilitation Unit, Department of Paediatrics, Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland.

Mirror therapy, which provides the visual illusion of a functional paretic limb by using the mirror reflection of the non-paretic arm, is used in the rehabilitation of hemiparesis after stroke in adults. We tested the effectiveness and feasibility of mirror therapy in children with hemiplegia by performing a pilot crossover study in ten participants (aged 6-14y; five males, five females; Manual Ability Classification System levels: one at level I, two at level II, four at level III, three at level IV) randomly assigned to 15 minutes of daily bimanual training with and without a mirror for 3 weeks. Assessments of maximal grasp and pinch strengths, and upper limb function measured by the Shriner's Hospital Upper Extremity Evaluation were performed at weeks 0 (baseline), 3, 6 (intervention), and 9 (wash-out). Testing of grasp strength behind the mirror improved performance by 15% ( $p=0.004$ ). Training with the mirror significantly improved grasp strength (with mirror +20.4%,  $p=0.033$ ; without +5.9%,  $p>0.1$ ) and upper limb dynamic position (with mirror +4.6%,  $p=0.044$ ; without +1.2%,  $p>0.1$ ), while training without a mirror significantly improved pinch strength (with mirror +6.9%,  $p>0.1$ ; without +21.9%,  $p=0.026$ ). This preliminary study demonstrates the feasibility of mirror therapy in children with hemiplegia and that it may improve strength and dynamic function of the paretic arm.

**Effect of two different weight-loss rates on body composition and strength and power-related performance in elite athletes.** [Garthe I](#), [Raastad T](#), [Refsnes PE](#), [Koivisto A](#), [Sundgot-Borgen J](#)

20110421(2):97-104 Language: eng Country: United States Norwegian School of Sport Sciences, Oslo, Norway.

When weight loss (WL) is necessary, athletes are advised to accomplish it gradually, at a rate of 0.5-1 kg/wk. However, it is possible that losing 0.5 kg/wk is better than 1 kg/wk in terms of preserving lean body mass (LBM) and performance. The aim of this study was to compare changes in body composition, strength, and power during a weekly body-weight (BW) loss of 0.7% slow reduction (SR) vs. 1.4% fast reduction (FR). We hypothesized that the faster WL regimen would result in more detrimental effects on both LBM and strength-related performance. Twenty-four athletes were randomized to SR ( $n = 13$ ,  $24 \pm 3$  yr,  $71.9 \pm 12.7$  kg) or FR ( $n = 11$ ,  $22 \pm 5$  yr,  $74.8 \pm 11.7$  kg). They followed energy-restricted diets promoting the predetermined weekly WL. All athletes included 4 resistance-training sessions/wk in their usual training regimen. The mean times spent in intervention for SR and FR were  $8.5 \pm 2.2$  and  $5.3 \pm 0.9$  wk, respectively ( $p < .001$ ). BW, body composition (DEXA), 1-repetition-maximum (1RM) tests, 40-m sprint, and countermovement jump were measured before and after intervention. Energy intake was reduced by  $19\% \pm 2\%$  and  $30\% \pm 4\%$  in SR and FR, respectively ( $p = .003$ ). BW and fat mass decreased in both SR and FR by  $5.6\% \pm 0.8\%$  and  $5.5\% \pm 0.7\%$  ( $0.7\% \pm 0.8\%$  vs.  $1.0\% \pm 0.4\%/wk$ ) and  $31\% \pm 3\%$  and  $21 \pm 4\%$ , respectively. LBM increased in SR by  $2.1\% \pm 0.4\%$  ( $p < .001$ ), whereas it was unchanged in FR ( $-0.2\% \pm 0.7\%$ ), with significant differences between groups ( $p < .01$ ). In conclusion, data from this study suggest that athletes who want to gain LBM and increase 1RM strength during a WL period combined with strength training should aim for a weekly BW loss of 0.7%.

*The Israel Medical Association journal : IMAJ*

**Increased vitamin D serum levels correlate with clinical improvement of rheumatic diseases after Dead Sea climatotherapy.** [Harari M](#), [Dramsdaahl E](#), [Shany S](#), [Baumfeld Y](#), [Ingber A](#), [Novack V](#), [Sukenik S](#)

20110413(4):212-5Language: engCountry: IsraelDMZ Medical Center, Lot Spa Hotel, Dead Sea, Israel.

**BACKGROUND:** Ultraviolet B (UVB) rays are required by the skin for the production of vitamin D. The intensity of UVB at the Dead Sea area is the lowest in the world. Low vitamin D levels are often associated with musculoskeletal symptoms.

**OBJECTIVES:** To assess the effectiveness of climatotherapy at the Dead Sea on the production of vitamin D in Norwegian patients suffering from various rheumatic diseases and to investigate possible associations between increased vitamin D serum levels, musculoskeletal symptoms and disease severity.

**METHODS:** Sixty Norwegian patients who came to the Dead Sea area for 21 days of medical rehabilitation were divided into three groups according to their diagnosis: chronic pain syndromes, i.e., low back pain or fibromyalgia (Group 1, n=33); rheumatoid arthritis (Group 2, n=16); and osteoarthritis (Group 3, n=11). Serum 25-hydroxyvitamin D (25-OH-D) levels were determined at arrival and prior to departure. The treatment protocol included daily sun exposure (climatotherapy), bathing in the Dead Sea and mineral spring water (balneotherapy), mud applications and fitness classes.

**RESULTS:** 25-OH-D serum levels increased significantly from 71.3 +/- 26.6 nM at arrival to 89.3 +/- 23.2 nM prior to departure ( $P < 0.001$ ). Adjusted for the initial levels of pain (assessed by a visual analog scale) and disease severity, a direct correlation was observed between increased 25-OH-D serum levels and pain reduction ( $P = 0.012$ ) and reduction of disease severity ( $P = 0.02$ ).

**CONCLUSIONS:** Climatotherapy at the Dead Sea induces significant changes in vitamin D. Increased 25-OH-D serum levels are associated with reduced musculoskeletal pain and disease severity.

**The effect of manipulation of the center of pressure of the foot during gait on the activation patterns of the lower limb musculature.**[Goryachev Y](#), [Debbi EM](#), [Haim A](#), [Wolf A](#)

20110421(2):333-9Language: engCountry: EnglandBiorobotics and Biomechanics Lab (BRML), Faculty of Mechanical Engineering, Technion-Israel Institute of Technology, Haifa 32000, Israel.

**BACKGROUND:** Therapeutic devices that manipulate the center of pressure (COP) of the foot can induce kinetic and kinematic changes in gait. Appropriate changes in joint moments and muscle activation during gait have been proven to be beneficial for patients with neuromuscular and orthopedic disorders. The purpose of this study was to investigate the effect of different COP positions during gait on the activity of the lower limb musculature of healthy subjects.

**METHODS:** A novel foot-worn biomechanical device that allows controlled manipulation of the COP during gait was used. Twelve healthy males underwent EMG analyses of the key muscles of the leg while wearing the device. The trials were carried out at six COP positions relative to neutral configuration: anterior, posterior, medial, lateral, dorsi flexion and plantar flexion.

**RESULTS:** The EMG activity of the lateral gastrocnemius varied significantly with COP during terminal stance ( $p=0.023$ ) and preswing ( $p=0.020$ ), the tibialis anterior during load response ( $p=0.019$ ) and midstance ( $p=0.004$ ), the biceps femoris during terminal stance ( $p=0.009$ ) and the vastus lateralis during initial contact ( $p=0.010$ ).

**CONCLUSION:** There are significant changes in the muscle activity of the lower limb in response to manipulation of the COP of the foot during gait.



***Electrophysiological Kinesiology***

**Electromyographic activity of selected trunk muscles in subjects with and without hemiparesis during therapeutic exercise.** [Pereira LM](#), [Marcucci FC](#), [de Oliveira Menacho M](#), [Garanhani MR](#), [Lavado EL](#), [Cardoso JR](#)

20110421(2):327-32 Language: eng Country: England Laboratory of Kinesiological Electromyography and Kinematic, Physical Therapy Department, Universidade Estadual de Londrina, Parana, Brazil.

The purpose of this study was to evaluate the trunk muscles activity of hemiparetic and control subjects during selected therapeutic exercises with surface electromyography (sEMG). The sEMG evaluation included 12 subjects presenting hemiparesis after having suffered a unilateral stroke and 12 apparently healthy subjects. A 16-channel sEMG system was used; data were band pass filtered from 20 to 450Hz. The signal was normalized through reference voluntary contraction (RVC) and presented in percentage. The exercises used in the evaluations were trunk flexion and trunk extension. Rectus abdominis presented greater activation on the paretic side of the experimental group than on the corresponding side of the control group ( $P=0.035$ ) (Cohen's  $d^- = 0.94$ ). During leg elevation, the non-paretic obliquus externus abdominis showed greater activation than in other exercises ( $P=0.019$ ) (Cohen's  $d^- = 0.75$ ). No inter-group differences were found for either erector spinae activity or contraction onset. Experimental group subjects showed muscle activity alterations, principally in the rectus abdominis, indicating the occurrence of compensatory strategies.

**Patellofemoral Joint Forces and Stress During Forward Step-up, Lateral Step-up, and Forward Step-down Exercises.** [Chinkulprasert C](#), [Vachalathiti R](#), [Powers CM](#)

20110441(4):241-8Language: engCountry: United States

**STUDY DESIGN:** Controlled laboratory study using a repeated-measures design.

**OBJECTIVE:** To quantify patellofemoral joint reaction force (PFJRF) and stress (PFJS) during forward step-up (FSU), lateral step-up (LSU), and forward step-down (FSD) exercises.

**BACKGROUND:** Although FSU, LSU, and FSD exercises are commonly used in patellofemoral joint rehabilitation programs, the influence of these stepping tasks on patellofemoral joint kinetics has not been quantified.

**METHODS:** Three-dimensional lower extremity kinematics and kinetics and electromyographic (EMG) data were obtained from 20 healthy adults during their performance of FSU, LSU, and FSD exercises. The step height for each participant was adjusted to permit a standardized knee flexion angle of 45°. A previously described biomechanical model of the patellofemoral joint was used to quantify PFJRF and PFJS during each task. Peak PFJRF and PFJS during the concentric and eccentric phases of each step task were compared using a 2-factor analysis of variance (ANOVA).

**RESULTS:** When collapsed across concentric and eccentric phases, peak PFJS was significantly greater during the FSD (mean  $\pm$  SD, 13.8  $\pm$  0.4 MPa) compared to the LSU (11.5  $\pm$  0.8 MPa;  $P < .001$ ) and FSU (11.2  $\pm$  0.6 MPa;  $P = .002$ ) exercises. Peak PFJRF also was significantly greater during the FSD (51.1  $\pm$  2.7 N/kg) compared to the LSU (44.1  $\pm$  3.4 N/kg;  $P < .001$ ) and FSU (43.6  $\pm$  2.3 N/kg;  $P = .023$ ) exercises.

**CONCLUSION:** In selecting exercises that promote lower extremity muscle strengthening while minimizing patellofemoral joint loading, LSU and FSU should be considered over FSD exercises, if the same step height is used.

J Orthop Sports Phys Ther 2011;41(4):241-248, Epub 2 February 2011.  
doi:10.2519/jospt.2011.3408.



## **The short-term effects of treating plantar fasciitis with a temporary custom foot orthosis and stretching.**[Drake M](#), [Bittenbender C](#), [Boyles RE](#)

20110441(4):221-31Language: engCountry: United States

**STUDY DESIGN:** Prospective single-group cohort study.

**OBJECTIVES:** To identify the effectiveness of a temporary custom foot orthosis (TCFO), followed by a stretching program, for the treatment of plantar fasciitis (PF).

**BACKGROUND:** PF, a common cause of heel pain, often leads to disability. Optimal treatment for this often challenging clinical condition is still unknown.

**METHODS:** Fifteen individuals with PF were recruited from the general public. All participants received a TCFO and were instructed to wear it for 2 weeks while weight bearing. Following the initial 2 weeks, participants were weaned off of the TCFO and instructed to begin a daily stretching program. Follow-up appointments occurred at 2, 4, and 12 weeks. The primary outcome measures included first-step heel pain via numeric pain rating scale (NPRS), the Foot and Ankle Ability Measure activities of daily living subscale (FAAM-A), and the Foot and Ankle Ability Measure sports subscale (FAAM-S). Secondary outcome included the global rating of change (GRC) score.

**RESULTS:** Individuals with a primary complaint of plantar foot pain entered and completed this study. Repeated-measures ANOVAs for the NPRS, FAAM-A, and FAAM-S showed statistically significant changes ( $P < .001$ ). Post hoc analysis using paired t tests demonstrated statistically and clinically significant change at all follow-up times, compared to the initial intervention ( $P < .001$ ). Mean GRC scores at 2, 4, and 12 weeks were 4.4, 4.5, and 4.2, respectively.

**CONCLUSION:** In treating PF, a TCFO used for 2 weeks, followed by a stretching program, provided preliminary evidence that first-step heel pain and foot and ankle function improve in the short term and up to 12 weeks.

**LEVEL OF EVIDENCE:** Therapy, level 2b.J Orthop Sports Phys Ther 2011;41(4):221-231, Epub 2 February 2011. doi:10.2519/jospt.2011.3348.

## **Fear-avoidance beliefs and clinical outcomes for patients seeking outpatient physical therapy for musculoskeletal pain conditions.**[George SZ](#), [Stryker SE](#)

20110441(4):249-59Language: engCountry: United States

**STUDY DESIGN:** Prospective cohort.

**OBJECTIVE:** To investigate fear-avoidance beliefs across different anatomical regions for patients with musculoskeletal pain.

**BACKGROUND:** Fear-avoidance beliefs were first widely studied in patients with low back pain. The early results of studies involving patients with cervical spine, knee, and shoulder disorders suggest that fear-avoidance beliefs have the potential to influence pain and function in different anatomical regions. However, very few prospective studies of fear-avoidance beliefs involve multiple anatomical regions.

**METHODS:** The sample of this study consisted of 313 patients (mean age, 45.5 years; 115 males, 198 females) seeking outpatient physical therapy for cervical spine (n = 63), upper extremity (n = 58), lumbar spine (n = 79), or lower extremity (n = 113) complaints. During the intake session, patients completed the Fear-Avoidance Beliefs Questionnaire physical activity scale (FABQ-PA), modified for the appropriate anatomical location. Patients also rated pain intensity and function on the Therapeutic Associates Outcomes System (TAOS) Functional Index at intake and discharge. The collection of treatment-related parameters included the number of visits, calendar days of physical therapy, and treatment received. FABQ-PA scores were compared across anatomical regions. Elevated FABQ-PA scores and anatomical regions were also investigated for association with intake pain and function, clinical outcomes, and treatment utility parameters.

**RESULTS:** Similar FABQ-PA levels were observed across the 4 anatomical regions ( $P > .05$ ). Number of visits, calendar days of physical therapy, and treatment received did not differ between elevated and lower fear-avoidance belief levels ( $P > .05$ ). Findings for pain intensity and function were similar for each anatomical region. Patients with elevated fear-avoidance beliefs had higher intake scores ( $P < .05$ ), larger improvements ( $P < .05$ ), but similar discharge scores ( $P > .05$ ), compared to those with lower fear-avoidance beliefs.

**CONCLUSION:** These data suggest that, in patients with cervical, upper extremity, lumbar, or lower extremity complaints, fear-avoidance beliefs may have a similar influence on intake and change scores for pain intensity and function. General assessment of fear-avoidance beliefs using the FABQ-PA, especially to predict change scores, may be appropriate for use in patients with various musculoskeletal pain conditions.]

Orthop Sports Phys Ther 2011;41(4):249-259, Epub 18 February 2011. doi:10.2519/jospt.2011.3488.

**Thoracic spine thrust manipulation versus cervical spine thrust manipulation in patients with acute neck pain: a randomized clinical trial.**[Puentedura EJ](#), [Landers MR](#), [Cleland JA](#), [Mintken PE](#), [Huijbregts P](#), [Fernández-de-Las-Peñas C](#)  
20110441(4):208-20Language: engCountry: United States

**STUDY DESIGN:** Randomized clinical trial.

**OBJECTIVE:** To determine if patients who met the clinical prediction rule (CPR) criteria for the success of thoracic spine thrust joint manipulation (TJM) for the treatment of neck pain would have a different outcome if they were treated with a cervical spine TJM.

**BACKGROUND:** A CPR had been proposed to identify patients with neck pain who would likely respond favorably to thoracic spine TJM. Research on validation of that CPR had not been completed when this trial was initiated. In our clinical experience, though many patients with neck pain responded favorably to thoracic spine TJM, they often reported that their symptomatic cervical spine area had not been adequately addressed.

**METHODS:** Twenty-four consecutive patients, who presented to physical therapy with a primary complaint of neck pain and met 4 out of 6 of the CPR criteria for thoracic TJM, were randomly assigned to 1 of 2 treatment groups. The thoracic group received thoracic TJM and a cervical range-of-motion (ROM) exercise for the first 2 sessions, followed by a standardized exercise program for an additional 3 sessions. The cervical group received cervical TJM and the same cervical ROM exercise for the first 2 sessions, and the same exercise program given to the thoracic group for the next 3 sessions. Outcome measures collected at 1 week, 4 weeks, and 6 months from start of treatment included the Neck Disability Index, numeric pain rating scale, and Fear-Avoidance Beliefs Questionnaire.

**RESULTS:** Patients who received cervical TJM demonstrated greater improvements in Neck Disability Index ( $P=.001$ ) and numeric pain rating scale ( $P=.003$ ) scores at all follow-up times. There was also a statistically significant improvement in the Fear-Avoidance Beliefs Questionnaire physical activity subscale score at all follow-up times for the cervical group ( $P=.004$ ). The number needed to treat to avoid an unsuccessful overall outcome was 1.8 at 1 week, 1.6 at 4 weeks, and 1.6 at 6 months.

**CONCLUSION:** Patients with neck pain who met 4 of 6 of the CPR criteria for successful treatment of neck pain with a thoracic spine TJM demonstrated a more favorable response when the TJM was directed to the cervical spine rather than the thoracic spine. Patients receiving cervical TJM also demonstrated fewer transient side-effects.

**LEVEL OF EVIDENCE:** Therapy, level 1b. J Orthop Sports Phys Ther 2011;41(4):208-220, Epub 18 February 2011. doi:10.2519/jospt.2011.3640.

## **Manual therapy**



### **The effectiveness of thoracic manipulation on patients with chronic mechanical neck pain - A randomized controlled trial.** [Lau HM](#), [Wing Chiu TT](#), [Lam TH](#)

20110416(2):141-7Language: engCountry: ScotlandDepartment of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hung Hom, Hong Kong.

The aim of our study was to assess the effectiveness of thoracic manipulation (TM) on patients with chronic neck pain. 120 patients aged between 18 and 55 were randomly allocated into two groups: an experimental group which received TM and a control group without the manipulative procedure. Both groups received infrared radiation therapy (IRR) and a standard set of educational material. TM and IRR were given twice weekly for 8 sessions. Outcome measures included craniovertebral angle (CV angle), neck pain (Numeric Pain Rating Scale; NPRS), neck disability (Northwick Park Neck Disability Questionnaire; NPQ), health-related quality of life status (SF36 Questionnaire) and neck mobility. These outcome measures were assessed immediately after 8 sessions of treatment, 3-months and at a 6-month follow-up. Patients that received TM showed significantly greater improvement in pain intensity ( $p = 0.043$ ), CV angle ( $p = 0.049$ ), NPQ ( $p = 0.018$ ), neck flexion ( $p = 0.005$ ), and the Physical Component Score (PCS) of the SF36 Questionnaire ( $p = 0.002$ ) than the control group immediately post-intervention. All these improvements were maintained at the 6-month follow-ups. This study shows that TM was effective in reducing neck pain, improving dysfunction and neck posture and neck range of motion (ROM) for patients with chronic mechanical neck pain up to a half-year post-treatment.

### **Manual therapy**

#### **Effect of pilates mat exercises and conventional exercise programmes on transversus abdominis and obliquus internus abdominis activity: Pilot randomised trial.**[Critchley DJ](#), [Pierson Z](#), [Battersby G](#)

20110416(2):183-9Language: engCountry: ScotlandAcademic Department of Physiotherapy, King's College London, London SE1 9RT, UK.

Pilates training is said to increase Transversus abdominis (TrA) and Obliquus internus (OI) activation during exercise and functional activities. 34 Pain-free health club members with no Pilates experience, mean (SD) age 30(7) years, were randomised to Pilates mat exercises or strength training. Participants exercised unsupervised twice-weekly for eight weeks. TrA and OI thickness (a proxy for muscle activity at the low-medium efforts of our exercises) were measured with ultrasound pre- and post-training during Pilates exercises 'Imprint' (an abdominal drawing-in manoeuvre) and 'Hundreds A' (lying supine, arms slightly raised, hips and knees flexed to 90°) and 'Hundreds B' (as A, with neck flexion) and functional postures sitting and standing. Pilates participants had increased TrA thickness in Hundreds A [all values mean (SD) mm]: 3.7(1.3) pre-intervention, 4.7(1.1) post-intervention (P = 0.007); and decreased OI muscle thickness during Imprint: 11.7(2.8) pre-intervention, 10.8(3.5) post-intervention (P = 0.008). Strength training participants had greater OI thickness during Imprint (P = 0.014), Hundreds A (P = 0.018) and Hundreds B (P = 0.004) than Pilates participants post-intervention. There were no changes in muscle thickness at rest or during functional postures. Pilates training appears to increase TrA activity but only when performing Pilates exercises. Further research is required into Pilates in clinical populations and how to increase deep abdominal activation during functional activities.

## ***Manual therapy***

### **A preliminary investigation into the magnitude of effect of lumbar extension exercises and a segmental rotatory manipulation on sympathetic nervous system activity.** [Perry J](#), [Green A](#), [Singh S](#), [Watson P](#)

20110416(2):190-5 Language: eng Country: Scotland Coventry University, Faculty of Health and Life Sciences, Department of Physiotherapy, Priory Street, Coventry CV1 5FB, UK.

Two commonly utilised manual therapy techniques; McKenzie's lumbar extension exercises (EE); and segmental rotational grade V manipulation were investigated to determine their magnitude of neurophysiological effect. Proxy measures of sympathetic nervous system (SNS) activity (skin conductance) were utilised to ascertain neurophysiological response. This study determined the neurological effects of these two treatment techniques in addition to establishing the Biopac System as a reliable measure of neurophysiological changes. A quasi-experimental, independent group's design was utilised, with random allocation of 50 normal, healthy participants into a manipulation or an EE group. Neurophysiological measurements of skin conductance were taken in the lower limbs before, during and after the administration of the techniques. Results were converted into percentage change calculations for the intervention and the post-intervention periods. Both treatments increased SNS activity during the intervention period, 63% for the manipulation group ( $p = 0.0005$ ) and 42% for EE group ( $p = 0.0005$ ) with the manipulative technique having significantly greater effect ( $p = 0.012$ ). Further analysis of the manipulation group found no difference between the 'opening' and the 'closing' side of the technique ( $p = 0.76$ ). Biopac System is a reliable method for measuring SNS activity with minimum measurement variability. Preliminary evidence now exists supporting the neurophysiological effects of two lumbar techniques.



## **Manual therapy**

### **The effect of soft tissue mobilisation techniques on flexibility and passive resistance in the hamstring muscle-tendon unit: A pilot investigation.**[Rushton A, Spencer S](#)

20110416(2):161-6Language: engCountry: ScotlandNursing and Physiotherapy, School of Health and Population Sciences, College of Medicine and Dentistry, 52 Pritchatts Road, University of Birmingham, Edgbaston, Birmingham B15 2TT, United Kingdom.

The growing evidence suggests that physiological mobilisation techniques influence the passive properties of the muscle-tendon unit (MTU). Techniques that combine a transverse directed force to the physiological technique attempt greater influence on biomechanical properties. No research has investigated the biomechanical effects of a technique with addition of a transverse directed force. This pilot study aimed to explore preliminary data of effectiveness of two techniques on longitudinal load (extensibility and passive resistance) in the hamstring MTU. A counterbalanced quasi-experimental same subject design using fifteen healthy subjects compared two conditions: physiological technique and a technique with addition of a transverse directed force. Passive resistance (torque, Nm) and extensibility (knee extension range of movement) of the hamstring MTU were recorded during and following both conditions. Paired t tests explored within and across condition comparisons, with Bonferroni adjustment to account for multiple analyses. Passive resistance demonstrated a significant reduction for the technique with addition of a transverse directed force ( $t = 4.26, p < 0.05$ ) that may have contributed to the significant increase in extensibility ( $t = 8.48, p < 0.05$ ). The data suggest that longitudinal load through the hamstring MTU during a physiological mobilisation can be increased by the application of a transverse directed force. This merits further research.

**Do patients with chronic low back pain have an altered level and/or pattern of physical activity compared to healthy individuals? A systematic review of the literature**

yes

platform+medline

author

author

[D.W. Griffin](#) [✉](#) [D.C. Harmon](#) , [N.M. Kennedy](#)

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## Abstract

### Background

It is commonly assumed that patients with chronic low back pain are less active than healthy individuals. There has been a recent increase in the number of studies published comparing the physical activity levels of patients with chronic low back pain and healthy individuals.

### Objectives

The aim of this systematic review was to determine, based on the current body of evidence, if patients with chronic low back pain have a lower level and/or altered pattern of physical activity compared with asymptomatic, healthy individuals.

### Data sources

The electronic databases Embase, Medline, ISI Web of Knowledge, Cinahl, Sport Discus and Nursing and Allied Health were searched from the beginning of each database until the end of December 2009.

### Review methods

Studies which compared the level and/or pattern of physical activity of patients with chronic low back pain and healthy controls were included. The quality of the included studies was assessed using an assessment tool based on the Newcastle-Ottawa Scale. The scale was modified for the purposes of this study.

### Results

Seven studies were included in the final review. Four studies recruited adult patients (18–65 years), two studies examined older adults ( $\geq 65$  years) and one study recruited adolescents ( $< 18$  years). Pooled data revealed no significant difference in the overall activity level of adults or adolescents with CLBP, however there is evidence that older adults with chronic low back pain are less active than controls. The results suggest that patients exhibit an altered pattern of physical activity over the course of a day compared to controls. Major methodological limitations were identified and are discussed.

### Conclusion

There is no conclusive evidence that patients with chronic low back pain are less active than healthy individuals. Based on a limited number of studies, there is some evidence that the distribution of activities over the course of a day is different between patients with chronic low back pain and controls.

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## Effect of a high-density foam seating wedge on back pain intensity when used by 14 to 16-year-old school students: a randomised controlled trial

yes	platform+medline	author	author		
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[Elizabeth A. Candy](#)

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### Objectives

No previous randomised controlled trials had been undertaken investigating the effect of school seating on back pain in 14 to 16 year olds. This study was designed to test the effect of the use of a high-density foam wedge on normal school seating on the intensity of back pain.

### Design

Randomised controlled trial.

### Setting

Suffolk, a predominantly rural county in eastern England.

### Participants

One hundred and eighty-five students with back pain were recruited from 12 schools. Randomisation was stratified by school. The control and intervention groups included 92 and 83 students, respectively.

### Intervention

Following a 1-week baseline observation period, each student in the intervention group was given a wedge to use on their school chairs.

### Outcome measure

The primary outcome measure was pain intensity (numerical rating scale, 0 to 10) recorded in pain diaries over 4 weeks. Random effects models were used to analyse the pain intensity data.

### Results

Ninety-seven students (46 control group, 51 intervention group) completed the trial. For the intervention group, pain intensity was reduced significantly over the 3 weeks of wedge use. The average reduction in pain intensity was estimated to be 0.709 points (95% confidence interval 0.341 to 1.077), representing a 58% reduction in back pain for those in the intervention group.

### Conclusion

Use of a wedge reduced the intensity of back pain significantly, especially in the evenings. The results suggest that further research into the longer-term effect of seating on pain intensity in adolescents should be considered.

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Spine:

15 June 2011 - Volume 36 - Issue 14 - p E950–E960

doi: 10.1097/BRS.0b013e31821cbba5

Cochrane Collaboration

## **Systematic Review of Anterior Interbody Fusion Techniques for Single- and Double-Level Cervical Degenerative Disc Disease**

Jacobs, Wilco MSc\*; Willems, Paul C. MD†; Kruyt, Moyo MD, PhD‡; van Limbeek, Jacques MD, PhD§; Anderson, Patricia G. MA§; Pavlov, Paul MD, PhD¶; Bartels, Ronald MD, PhD||; Oner, Cumhur MD, PhD‡

**Study Design.** A systematic review of randomized controlled trials.

**Objective.** To determine which technique of anterior cervical interbody fusion (ACIF) gives the best outcome in patients with cervical degenerative disc disease.

**Summary of Background Data.** The number of surgical techniques for decompression and ACIF as treatment for cervical degenerative disc disease has increased rapidly, but the rationale for the choice between different techniques remains unclear.

**Methods.** From a comprehensive search, we selected randomized studies that compared anterior cervical decompression and ACIF techniques, in patients with chronic single- or double-level degenerative disc disease or disc herniation. Risk of bias was assessed using the criteria of the Cochrane back review group.

**Results.** Thirty-three studies with 2267 patients were included. The major treatments were discectomy alone and addition of an ACIF procedure (graft, cement, cage, and plates). At best, there was very low-quality evidence of little or no difference in pain relief between the techniques. We found moderate quality evidence for few secondary outcomes. Odom's criteria were not different between iliac crest autograft and a metal cage (risk ratio [RR]: 1.11; 95% confidence interval [CI]: 0.99–1.24). Bone graft produced more fusion than discectomy (RR: 0.22; 95% CI: 0.17–0.48). Complication rates were not different between discectomy and iliac crest autograft (RR: 1.56; 95% CI: 0.71–3.43). Low-quality evidence was found that iliac crest autograft results in better fusion than a cage (RR: 1.87; 95% CI: 1.10–3.17); but more complications (RR: 0.33; 95% CI: 0.12–0.92).

**Conclusion.** When fusion of the motion segment is considered to be the working mechanism for pain relief and functional improvement, iliac crest autograft appears to be the golden standard. When ignoring fusion rates and looking at complication rates, a cage as a golden standard has a weak evidence base over iliac crest autograft, but not over discectomy.

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# Evidence-Based Guidelines for the Chiropractic Treatment of Adults With Headache

Journal of Manipulative and Physiological Therapeutics, 06/07/2011

Bryans R et al. – Evidence suggests that chiropractic care, including spinal manipulation, improves migraine and cervicogenic headaches. The type, frequency, dosage, and duration of treatment(s) should be based on guideline recommendations, clinical experience, and findings. Evidence for the use of spinal manipulation as an isolated intervention for patients with tension-type headache remains equivocal.

## Methods

- Systematic literature searches of controlled clinical trials published through August 2009 relevant to chiropractic practice were conducted using the databases MEDLINE; EMBASE; Allied and Complementary Medicine; the Cumulative Index to Nursing and Allied Health Literature; Manual, Alternative, and Natural Therapy Index System; Alt HealthWatch; Index to Chiropractic Literature; and the Cochrane Library.
- Number, quality, and consistency of findings were considered to assign an overall strength of evidence (strong, moderate, limited, or conflicting) and to formulate practice recommendations.

## Results

- 21 articles met inclusion criteria and were used to develop recommendations.
- Evidence did not exceed a moderate level.
- For migraine, spinal manipulation and multimodal multidisciplinary interventions including massage are recommended for management of patients with episodic or chronic migraine.
- For tension-type headache, spinal manipulation cannot be recommended for the management of episodic tension-type headache.
- Recommendation cannot be made for or against the use of spinal manipulation for patients with chronic tension-type headache.
- Low-load craniocervical mobilization may be beneficial for longer term management of patients with episodic or chronic tension-type headaches.
- For cervicogenic headache, spinal manipulation is recommended.
- Joint mobilization or deep neck flexor exercises may improve symptoms.
- There is no consistently additive benefit of combining joint mobilization and deep neck flexor exercises for patients with cervicogenic headache.
- Adverse events were not addressed in most clinical trials; and if they were, there were none or they were minor.

## Conclusions

- Evidence suggests that chiropractic care, including spinal manipulation, improves migraine and cervicogenic headaches. The type, frequency, dosage, and duration of treatment(s) should be based on guideline recommendations, clinical experience, and findings. Evidence for the use of spinal manipulation as an isolated intervention for patients with tension-type headache remains equivocal.

# Scalene Muscle Injections for Neurogenic Thoracic Outlet Syndrome: Case Series

Pain Practice, 06/06/2011 Clinical Article

Benzon HT et al. - The relief from scalene muscle injections in patients with neurogenic thoracic outlet syndrome is not related to blockade of the brachial plexus.

## Methods

- Authors reviewed the charts of 12 patients who had anterior and middle scalene muscle injections, for neurogenic thoracic outlet syndrome, between April 2009 and September 2010.
- The injections were performed under ultrasound guidance wherein 2 to 5 mL of 0.25% bupivacaine was injected into the belly of the anterior and scalene muscles.
- The following were noted: (1) sites of preprocedure pain; (2) volume injected into each of the anterior and middle scalene muscles; (3) presence of numbness after injection; and (4) presence and duration of pain relief.

## Results

- All 12 patients had relief of their pain. Six of the twelve patients developed numbness, which ranged from blockade of the C4-5, C6-7, and C4-T1 dermatomes.
- In the patients who developed numbness, there was no relationship between the duration of numbness and the duration of pain relief or the location of numbness and the location of pain relief.
- **Methods:** We reviewed the charts of 12 patients who had anterior and middle scalene muscle injections, for neurogenic thoracic outlet syndrome, between April 2009 and September 2010. The injections were performed under ultrasound guidance wherein 2 to 5 mL of 0.25% bupivacaine was injected into the belly of the anterior and scalene muscles. The following were noted: (1) sites of preprocedure pain; (2) volume injected into each of the anterior and middle scalene muscles; (3) presence of numbness after injection; and (4) presence and duration of pain relief.
- **Results:** All 12 patients had relief of their pain. Six of the twelve patients developed numbness, which ranged from blockade of the C4-5, C6-7, and C4-T1 dermatomes. In the patients who developed numbness, there was no relationship between the duration of numbness and the duration of pain relief or the location of numbness and the location of pain relief.
- **Conclusions:** The relief from scalene muscle injections in patients with neurogenic thoracic outlet syndrome is not related to blockade of the brachial plexus. ▪

# **Influence of weather variables on pain severity in end-stage osteoarthritis**

International Orthopaedics, 07/08/2011

Brennan SA et al.

## **Purpose**

Patients often attribute increasing pain in an arthritic joint to changing weather patterns. Studies examining the impact of weather on pain severity have yielded equivocal and sometimes contradictory results. The relationship between subchondral pseudocysts and the role they play in this phenomenon has not been explored.

## **Methods**

Fifty-three patients with end-stage osteoarthritis of the hip completed daily pain severity visual analogue scale (VAS) scores over a one month period. Radiographs were reviewed to determine the presence of pseudocysts. Data pertaining to precipitation, atmospheric pressure and temperature were collected from the nearest weather station. A generalised linear mixed model was used to explore the relationship between weather variables, cysts and pain severity.

## **Results**

Pain levels increased as a function of absolute change in atmospheric pressure from one day to the next. Precipitation, temperature and the presence of subchondral pseudocysts were not shown to influence pain severity.

## **Conclusions**

This data supports the belief held by many osteoarthritic patients that changing weather patterns influence their pain severity.

# Migraine and Vestibular Symptoms-Identifying Clinical Features That Predict Vestibular Migraine

Headache: The Journal of Head and Face Pain, 06/08/2011

Cohen JM et al. – Vestibular migraine is a heterogeneous condition with varying symptomatology. As with migraine itself, symptomatic expression varies along a spectrum that extends from episodic to chronic. As the histories of many of the patients authors evaluated would not meet current International Classification of Headache Disorders criteria, authors suggest that new criteria which account for the heterogeneity and natural history of the disorder may be required to adequately diagnose and treat those who suffer from VM.

## Methods

- Authors retrospectively reviewed charts of patients diagnosed with VM at a headache center.
- In this group authors recorded certain demographic and clinical features related to their disorder, including the most common triggers of the VS and the specific characteristics of the symptoms that suggested VM.

## Results

- This sample consisted of 147 patients (68% women, mean age = 45 years, 39% with aura).
- Migraine onset preceded the onset of VS by a mean of 8 years. A total of 62 patients (42%) had gradual onset of VS, while in 48 (33%) symptoms began suddenly. T
- The most commonly reported symptoms that led to the diagnosis of VM were: unsteadiness (134; 91%), balance disturbance (120; 82%), “light-headedness” (113; 77%), and vertigo (84; 57%). VS and headache occurred concomitantly in 48% of patients.
- A total of 67 (47%) patients had VS that were chronic from onset, 29 (21%) had episodic symptoms, and in 46 (32%) the VS had evolved from episodic to chronic (with an average duration of 7.04 years required for this evolution to occur).
- **Results.**— Our sample consisted of 147 patients (68% women, mean age = 45 years, 39% with aura). Migraine onset preceded the onset of VS by a mean of 8 years. A total of 62 patients (42%) had gradual onset of VS, while in 48 (33%) symptoms began suddenly. The most commonly reported symptoms that led to the diagnosis of VM were: unsteadiness (134; 91%), balance disturbance (120; 82%), “light-headedness” (113; 77%), and vertigo (84; 57%). VS and headache occurred concomitantly in 48% of patients. A total of 67 (47%) patients had VS that were chronic from onset, 29 (21%) had episodic symptoms, and in 46 (32%) the VS had evolved from episodic to chronic (with an average duration of 7.04 years required for this evolution to occur).
- **Conclusions.**— Vestibular migraine is a heterogeneous condition with varying symptomatology. As with migraine itself, symptomatic expression varies along a spectrum that extends from episodic to chronic. As the histories of many of the patients we evaluated would not meet current International Classification of Headache Disorders criteria, we suggest that new criteria which account for the heterogeneity and natural history of the disorder may be required to adequately diagnose and treat those who suffer from VM.



# Analysis of Leukocytes in Medication-Overuse Headache, Chronic Migraine, and Episodic Migraine

Headache: The Journal of Head and Face Pain, 06/10/2011

Forcelini CM et al. – A higher lymphocyte count in the medication-overuse headache (MOH) group relative to the migraine without aura (MWA) group may indicate a chronic inflammatory state. Several clinical and laboratorial characteristics have a range along a spectrum extending from healthy subjects to patients suffering from chronic forms of migraine.

## Methods

- This cross-sectional study comprised 68 subjects divided in 4 groups: MOH, CM, MWA, control.
- Subjects were gender-matched, had no physical co-morbidity, and were taking only acetaminophen.
- Clinical and psychological data were recorded in a standardized protocol. Samples of peripheral blood for hematological analysis were obtained in the morning during the ictal (MOH, CM, and MWA groups) and interictal periods (MWA group), as well from control group.

## Results

- A higher lymphocyte count was measured in MOH patients relative to the MWA patients (mean  $\pm$  standard deviation:  $2448.7/\text{mm}^3 \pm 775.8$  vs  $1859.7/\text{mm}^3 \pm 564.7$ ;  $P = .027$ ).
- The numbers of blood lymphocytes for CM and control subjects were  $2086.1/\text{mm}^3 \pm 540.5$  and  $1961.7/\text{mm}^3 \pm 385.6$ , respectively.
- Multiple linear regression analysis demonstrated that only MOH and MWA groups remained associated with lymphocyte count ( $B = 540.7$ ; CI 95%:  $55.2-1026.1$ ;  $P = .03$ ;  $R^2 = 19.2\%$ ).
- Analysis for linearity of variables in the spectrum control/MWA/CM/MOH resulted positive for body mass index (from  $23.5 \pm 3.25$  in controls to  $26.5 \pm 4.49$  in MOH patients;  $P = .034$ ), scores on Beck Depression Inventory (from  $3.29 \pm 3.05$  to  $14.65 \pm 11.21$ ;  $P < 0.001$ ) and Hamilton Anxiety Scale (from  $4.29 \pm 3.93$  to  $23.24 \pm 11.01$ ;  $P < 0.001$ ), hemoglobin (from  $13.7 \pm 0.79$  to  $14.6 \pm 1.31$ ;  $P = .022$ ), and lymphocyte count (from  $1961.7 \pm 385.6$  to  $2448.7 \pm 775.8$ ;  $P = .01$ ), but negative for CD8+ T lymphocytes (from  $34.0 \pm 8.82$  to  $30.0 \pm 6.64$ ;  $P = .046$ ).

## **Trigeminal neuralgia: the diagnosis and management of this excruciating and poorly understood facial pain**

**Postgraduate Medical Journal, 06/13/2011 Clinical Article**

Zakrzewska JM et al. – Surgical procedures result in markedly improved quality of life. Patient support groups provide information and support to those in pain and play a crucial role.

- Most trigeminal neuralgia is idiopathic, but a small percentage is due to secondary causes—for example, tumours or multiple sclerosis—which can be picked up on CT or MRI.
- Recently published international guidelines suggest that carbamazepine and oxcarbazepine are the first-line drugs.
- There is limited evidence for the use of lamotrigine and baclofen.
- If there is a decrease in efficacy or tolerability of medication, surgery needs to be considered.
- Neurosurgical opinion should be sought early.
- There are several ablative, destructive procedures that can be carried out either at the level of the Gasserian ganglion or in the posterior fossa.
- Only non-destructive procedure is microvascular decompression (MVD).
- Ablative procedures give a 50% chance of patients being pain free for 4 years, compared with 70% of patients at 10 years after MVD.
- Ablative procedures result in sensory loss, and MVD carries a 0.2–0.4% risk of mortality with a 2–4% chance of ipsilateral hearing loss.

## **Causes of headache in patients with a primary diagnosis of sinus headache**

European Archives of Oto-Rhino-Laryngology, 06/08/2011

Foroughipour M et al. – Therapeutic nasal septoplasty was performed in 16% of the patients with a final diagnosis of migraine, and 13% with tension-type headache. Many patients with self-described or primary care physician labeled “sinus headache” have no sinonasal abnormalities. Instead, most of them meet the IHS criteria for migraine or tension-type headache.

Headache is a common occurrence among the general population. Although the pain could be a symptom of acute sinusitis, chronic sinusitis is not considered as a usual cause of headache. In addition, autonomic-related symptoms in the sinonasal region may be associated with vascular pain. Confusion regarding these symptoms could lead to an incorrect diagnosis of sinusitis. A prospective cross-sectional study was conducted at two tertiary referral centers with residency programs in otorhinolaryngology, head and neck surgery and neurology. The study included 58 patients with a diagnosis of “sinus headache” made by a primary care physician. Exclusion criteria were as follows: previous diagnosis of migraine or tension-type headache; evidence of sinus infection during the past 6 months; and the presence of mucopurulent secretions. After comprehensive otorhinolaryngologic and neurologic evaluation, appropriate treatment was started according to the final diagnosis and the patient was assessed monthly for 6 months. The final diagnoses were migraine, tension-type headache and chronic sinusitis with recurrent acute episodes in 68, 27 and 5% of the patients, respectively. Recurrent antibiotic therapy was received by 73% of patients with tension-type headache and 66% with migraine. Sinus endoscopy was performed in 26% of the patients. Therapeutic nasal septoplasty was performed in 16% of the patients with a final diagnosis of migraine, and 13% with tension-type headache. Many patients with self-described or primary care physician labeled “sinus headache” have no sinonasal abnormalities. Instead, most of them meet the IHS criteria for migraine or tension-type headache.

## **Preamputation Mirror Therapy May Prevent Development of Phantom Limb Pain: A Case Series** *Full Text*

### **Anesthesia & Analgesia,**

Hanling SR et al. – The authors report the cases of 4 patients who performed daily mirror therapy for 2 wk before undergoing elective limb amputation. One patient experienced no phantom limb pain (PLP). Two patients experienced rare episodes of mild PLP without effect on their participation in physical therapy (PT) or their quality of life. One patient reported daily, brief episodes of moderate PLP without effect on his participation in PT or his stated quality of life. These results indicate that preoperative mirror therapy may improve postamputation PT compliance and decrease the incidence of PLP. Future prospective studies are needed to confirm the results of this case series.

# Shoe Orthotics for the Treatment of Chronic Low Back Pain: A Randomized Controlled Pilot Study

*Journal of Manipulative and Physiological Therapeutics*, 06/10/2011 **Clinical Article**

Cambron JA et al. – This pilot study showed that the measurement of shoe orthotics to reduce low back pain and discomfort after 6 weeks of use is feasible. A larger clinical trial is needed to verify these results.

## Methods

- The study recruited 50 patients with chronic low back pain through media advertising in a midwestern suburban area.
- Medical history and a low back examination were completed at a chiropractic clinic.
- Subjects were randomized to either a treatment group receiving custom-made shoe orthotics or a wait-list control group.
- After 6 weeks, the wait-list control group also received custom-made orthotics.
- This study measured change in perceived pain levels (Visual Analog Scale) and functional health status (Oswestry Disability Index) in patients with chronic low back pain at the end of 6 weeks of orthotic treatment compared with no treatment and at the end of 12 weeks of orthotic treatment.

## Results

- This study showed changes in back pain and disability with the use of shoe orthotics for 6 weeks compared with a wait-list control group.
- It appears that improvement was maintained through the 12-week visit, but the subjects did not continue to improve during this time.

# Investigation of sleep disturbance in chronic low back pain: An age- and gender-matched case-control study over a 7-night period

Manual Therapy , 06/10/2011

van de Water ATM et al. – The findings provide some evidence to support self-reported sleep assessment as an outcome measure in CLBP research, while further research is needed to determine the validity of objective sleep measurement in this population.

## Abstract

Sleep disturbance is frequently reported by people with chronic low back pain (>12 weeks; CLBP), but few studies have comprehensively investigated sleep in this population. This study investigated differences in subjectively and objectively measured sleep patterns of people with CLBP, and compared this to age- and gender matched controls. Thirty-two consenting participants ( $n = 16$  with CLBP,  $n = 16$  matched controls), aged 24–65 years (43.8% male) underwent an interview regarding sleep influencing variables, completed the Pittsburgh Sleep Quality Index, Insomnia Severity Index, Pittsburgh Sleep Diary, SF36-v2, Hospital Anxiety and Depression Scale, Oswestry Disability Index, Numerical Pain Rating Scales, and underwent seven consecutive nights of actigraphic measurement in the home environment. Compared to controls, people with CLBP had, on self-report measures, significantly poorer sleep quality [Pittsburgh Sleep Quality Index (range 0–21) mean (SD) 10.9 (4.2)], clinical insomnia [Insomnia Severity Index mean (range 0–28) 13.7 (7.6)], lower sleep efficiency, longer sleep onset latency, more time awake after sleep onset, and more awakenings during sleep ( $p < 0.05$ ). However, no significant differences between groups were found on objective actigraphy ( $p > 0.05$ ). The findings provide some evidence to support self-reported sleep assessment as an outcome measure in CLBP research, while further research is needed to determine the validity of objective sleep measurement in this population.