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## 2. LBP

### Hip involvement

#### **Hip and Lumbar Spine Physical Examination Findings in People Presenting With Low Back Pain With or Without Lower Extremity Pain**

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#### **Study Design**

Prospective cohort study, cross-sectional design.

#### **Background**

The hip-spine syndrome is described in patients with known arthritis of the hip. This study describes the hip examination findings of people presenting with low back pain (LBP).

#### **Objectives**

(1) report examination findings of the hip in patients with LBP, (2) compare pain and function of patients with positive hip examination findings to those without.

#### **Methods**

An examination and validated questionnaires of spine and hip pain and function were completed. Pain and function scores were compared between patients with and without hip findings.

#### **Results**

Consecutive patients (68 women, 33 men) with a mean age 47.6 years (range 18.4-79.8). On physical examination: 1) 81(80%) had reduced hip flexion (HF), 76 (75%) had reduced hip internal rotation (HIR), 2) 25 (25%) had 1, 32 (32%) had 2 and 23 (23%) had 3 positive provocative hip tests. Patients with reduced HF had less LBP -related (mean mODI 25.6 vs. 33.5,  $p=0.04$ ) and hip-related function (mean mHHS 82.0 vs. 66.0,  $p=0.03$ ). Patients with reduced HIR had less LBP-related function (mean RMQ 8.2 vs. 12.4,  $p=0.003$ ). A positive provocative hip test(s) was coupled with more intense pain (median 7 vs. 9,  $p=0.05$ ); and less LBP-related (mean RMQ 8.5 vs. 12.1,  $p=0.02$ ) and hip-related function (mean mHHS 89.7 vs. 65.8,  $p=0.005$ ).

#### **Conclusion**

Physical examination findings indicating hip dysfunction are common in patients presenting with LBP. Patients with LBP and positive hip examination findings have more pain and less function compared to patients with LBP without positive hip examination findings.

## 7. PELVIC ORGANS/WOMAN'S HEALTH

### Homeopathy and endometriosis

#### **Potentized estrogen in homeopathic treatment of endometriosis-associated pelvic pain: A 24-week, randomized, double-blind, placebo-controlled study**

European Journal of Obstetrics & Gynecology and Reproductive Biology, 01/30/2017

Teixeira MZ, et al.

Analysts assess the adequacy and safety of potentized estrogen compared to placebo in homeopathic treatment of endometriosis-associated pelvic pain (EAPP). This study revealed that the potentized estrogen (12cH, 18cH and 24cH) at a dose of 3 drops twice daily for 24 weeks was significantly more effective than placebo for decreasing endometriosis-associated pelvic pain.

#### Methods

- For this study, they conducted a 24-week, randomized, double-blind, placebo-controlled trial.
- This study included total 50 women aged 18–45 years old with diagnosis of deeply infiltrating endometriosis based on magnetic resonance imaging or transvaginal ultrasound after bowel preparation, and score  $\geq 5$  on a visual analogue scale (VAS: range 0 to 10) for endometriosis-associated pelvic pain.
- Potentized estrogen (12cH, 18cH and 24cH) or placebo was administered twice daily per oral route.
- The primary result measure was changed in the severity of EAPP global and partial scores (VAS) from baseline to week 24, determined as the difference in the mean score of five modalities of chronic pelvic pain (dysmenorrhea, deep dyspareunia, non-cyclic pelvic pain, cyclic bowel pain and/or cyclic urinary pain).
- The secondary result measures were mean score difference for quality of life evaluated with SF-36 Health Survey Questionnaire, depression symptoms on Beck Depression Inventory (BDI), and anxiety symptoms on Beck Anxiety Inventory (BAI).

#### Results

- In this study, the EAPP global score (VAS: range 0 to 50) reduced by 12.82 (P?
- The group that utilized potentized estrogen likewise exhibited partial score (VAS: range 0 to 10) decrease in 3 EAPP modalities: dysmenorrhea (3.28; P?
- The placebo group did not indicate any important changes in EAPP global or partial scores.
- In addition, the potentized estrogen group indicated a significant improvement in 3 of 8 SF-36 domains (bodily pain, vitality, and mental health) and depression symptoms (BDI).
- The placebo group indicated no significant improvement in this regard.
- These outcomes show the superiority of potentized estrogen over placebo.
- Few adverse events were connected with potentized estrogen.

## 8. VISCERA

### Diet and diverticulitis

Gastroenterology. 2017 Jan 5. pii: S0016-5085(17)30006-9. doi: 10.1053/j.gastro.2016.12.038.

#### **Western Dietary Pattern Increases, Whereas Prudent Dietary Pattern Decreases, Risk of Incident Diverticulitis in a Prospective Cohort Study.**

Strate LL<sup>1</sup>, Keeley BR<sup>2</sup>, Cao Y<sup>3</sup>, Wu K<sup>4</sup>, Giovannucci EL<sup>5</sup>, Chan AT<sup>6</sup>.

##### *BACKGROUND & AIMS:*

Dietary fiber is implicated as a risk factor for diverticulitis. Analyses of dietary patterns may provide information on risk beyond those of individual foods or nutrients. We examined whether major dietary patterns are associated with risk of incident diverticulitis.

##### *METHODS:*

We performed a prospective cohort study of 46,295 men who were free of diverticulitis and known diverticulosis in 1986 (baseline) using data from the Health Professionals Follow-up Study. Each study participant completed a detailed medical and dietary questionnaire at baseline. We sent supplemental questionnaires to men reporting incident diverticulitis on biennial follow-up questionnaires. We assessed diet every 4 years using a validated food frequency questionnaire. Western (high in red meat, refined grains, and high-fat dairy) and prudent (high in fruits, vegetables, and whole grains) dietary patterns were identified using principal component analysis. Follow-up time accrued from the date of return of the baseline questionnaire in 1986 until a diagnosis of diverticulitis, diverticulosis or diverticular bleeding; death; or December 31, 2012. The primary endpoint was incident diverticulitis.

##### *RESULTS:*

During 894,468 person years of follow-up, we identified 1063 incident cases of diverticulitis. After adjustment for other risk factors, men in the highest quintile of western dietary pattern score had a multivariate hazard ratio (HR) of 1.55 (95% CI, 1.20-1.99) for diverticulitis compared to men in the lowest quintile. High vs low prudent scores were associated with decreased risk of diverticulitis (multivariate HR 0.74; 95% CI, 0.60-0.91). The association between dietary patterns and diverticulitis was predominantly attributable to intake of fiber and red meat.

##### *CONCLUSIONS:*

In a prospective cohort study of 46,295 men, a western dietary pattern was associated with increased risk of diverticulitis, whereas a prudent pattern was associated with decreased risk. These data may guide dietary interventions for the prevention of diverticulitis.

## 10 A. CERVICAL SPINE

### Whiplash sensory

#### The Effect of Visual Feedback of the Neck During Movement in People With Chronic Whiplash-Associated Disorders: An Experimental Study

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**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2017 **Volume:**0 **Issue:**0 **Pages:**1–33 **DOI:**10.2519/jospt.2017.6891

#### Study Design

Controlled laboratory study.

#### Background

Chronic whiplash-associated disorder (WAD) is an important health issue associated with poor recovery outcomes. Sensorimotor incongruence (SMI), defined as a mismatch between the efference copy in the brain and afferent sensory feedback from the body, is proposed as a possible underlying cause of chronic pain.

#### Objectives

To determine whether SMI causes sensory disturbances or pain in people with chronic WAD and healthy controls.

#### Methods

Study participants (30 participants with chronic WAD and 34 healthy controls) participated in a visual feedback experiment involving the neck and a bimanual coordination experiment involving the arms. In both experimental setups, SMI was induced by modifying the visual feedback during movement. Sensory disturbances and pain were the primary outcome measures.

#### Results

A statistically significant difference in perceived sensory disturbance between conditions was found in the WAD group ( $p < .0001$ ). Intensity scores were highest for induced SMI, but only for visual feedback of the neck and not for visual feedback of the arms. This effect was not present in the control group ( $p = .139$ ). SMI did not affect pain in either group.

#### Conclusion

Persons with chronic WAD are more susceptible to sensory disturbances owing to SMI and this effect is specific for the region affected by pain. The hypothesis that SMI causes pain was not substantiated by the results of the present study. *J Orthop Sports Phys Ther*, Epub 3 Feb 2017. doi:10.2519/jospt.2017.6891

Keyword: chronic whiplash associated disorder, neck, pain, sensorimotor

## Chronic neck pain walk stiffer

## People With Chronic Neck Pain Walk With a Stiffer Spine

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**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2017 **Volume:0 Issue:0 Pages:1–33 DOI:10.2519/jospt.2017.6768**

**Study Design**

Case-control.

**Background**

People with chronic neck pain present a number of sensorimotor and biomechanical alterations, yet little is known about the influence of neck pain on gait and motions of the spine during gait.

**Objective**

To evaluate the spine kinematics and gait characteristics in people with non-specific chronic neck pain.

**Methods**

People with chronic non-specific neck pain and age and gender matched asymptomatic controls walked on a treadmill at three different speeds (self-selected, 3km/h, 5km/h) either with their head in a neutral position or rotated 30°. Tridimensional motion capture was employed to quantify body kinematics. Neck and trunk rotations were derived from the difference between the transverse plane component of the head and thorax and thorax and pelvis angles to provide an indication of neck and trunk rotation during gait.

**Results**

Overall, the patient group showed shorter stride length compared to the control group ( $P < 0.0001$ ). Moreover, the patients with neck pain showed smaller trunk rotations ( $P < 0.0001$ ), regardless of the condition or speed. The difference in the amount of trunk rotation between groups became larger for the conditions of walking with the head rotated.

**Conclusion**

These results show that people with chronic neck pain walk with reduced trunk rotation, especially when challenged by walking with their head positioned in rotation. Reduced rotation of the trunk during gait may have long term consequences on spinal health. *J Orthop Sports Phys Ther*, Epub 3 Feb 2017. doi:10.2519/jospt.2017.6768

## Passive neck flexion test

**Reliability and minimal detectable change of a modified passive neck flexion test in patients with chronic nonspecific neck pain and asymptomatic subjects**

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DOI: <http://dx.doi.org/10.1016/j.msksp.2017.01.004>

**Highlights**

- The mPNFT is reliable regardless of the examiner and the time factor.
- A MDC<sub>90</sub> value was established for the mPNFT. This value provides relevant data for the clinician.
- CNSNP patients have an earlier onset of symptoms in the mPNFT than healthy subjects.
- Differences in the OS-mPNFT and VAS-mPNFT that exceeded the MDC<sub>90</sub> were found between the two samples.

**Background** The Passive Neck Flexion Test (PNFT) can diagnose meningitis and potential spinal disorders. Little evidence is available concerning the use of a modified version of the PNFT (mPNFT) in patients with chronic nonspecific neck pain (CNSNP).

**Objectives** To assess the reliability of the mPNFT in subjects with and without CNSNP. The secondary objective was to assess the differences in the symptoms provoked by the mPNFT between these two populations.

**Design** We used repeated measures concordance design for the main objective and cross-sectional design for the secondary objective.

**Method** A total of 30 asymptomatic subjects and 34 patients with CNSNP were recruited. The following measures were recorded: the range of motion at the onset of symptoms (OS-mPNFT), the range of motion at the submaximal pain (SP-mPNFT), and evoked pain intensity on the mPNFT (VAS-mPNFT).

**Results** Good to excellent reliability was observed for OS-mPNFT and SP-mPNFT in the asymptomatic group (intra-examiner reliability: 0.95–0.97; inter-examiner reliability: 0.86–0.90; intra-examiner test-retest reliability: 0.84–0.87). In the CNSNP group, a good to excellent reliability was obtained for the OS-mPNFT (intra-examiner reliability: 0.89–0.96; inter-examiner reliability: 0.83–0.86; intra-examiner test-retest reliability: 0.83–0.85) and the SP-PNFT (intra-examiner reliability: 0.94–0.98; inter-examiner reliability: 0.80–0.82; intra-examiner test-retest reliability: 0.88–0.91). The CNSNP group showed statistically significant differences in OS-mPNFT ( $t = 4.92$ ;  $P < 0.001$ ), SP-mPNFT ( $t = 2.79$ ;  $P = 0.007$ ) and in VAS-mPNFT ( $t = -10.39$ ;  $P < 0.001$ ) versus the asymptomatic group.

**Conclusion**

The mPNFT is a reliable tool regardless of the examiner and the time factor. Patients with CNSNP have a decrease range of motion and more pain than asymptomatic subjects in the mPNFT. This exceeds the minimal detectable changes for OS-mPNFT and VAS-mPNFT.

**13. CRANIUM/TMJ****TMD and depression**

BMC Oral Health. 2017 Feb 1;17(1):50. doi: 10.1186/s12903-017-0343-z.

**Temporal relationship between dysthymia and temporomandibular disorder: a population-based matched case-control study in Taiwan.**

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Author information

Abstract

**BACKGROUND:**

Numerous studies have reported a relationship between depression and temporomandibular disorders (TMD), but the conclusions remain undefined. The aim of this article was to examine the temporal relationship between depression and TMD.

**METHODS:**

In this retrospective matched case-control study, we recruited all samples from a random sample sub-dataset of one million insured individuals for the year 2005 (Longitudinal Health Insurance Database (LHID2005)). All beneficiaries were enrolled in the National Health Insurance (NHI) programme in Taiwan. We used propensity scoring and matched the case and control groups (1:1) by ten confounding factors to detect the effect of different types of depression on TMD.

**RESULTS:**

The positive correlative factors of TMD included the total number of times medical advice was sought for an unspecified anomaly of jaw size plus malocclusion (TTSMA-JS,  $p = 0.045$ ), the total number of times medical advice was sought for an anxiety state (TTSMA-AS,  $p = 0.000$ ), and the total number of times medical advice was sought for a panic disorder (TTSMA-P,  $p = 0.009$ ). Dysthymia (synonymous with chronic depression) had an effect on TMD. The odds ratio (OR) of dysthymia for TMD measured by multiple logistic regression was 1.91 ( $p = 0.008$ ) after adjusting for demographic factors, psychiatric comorbidities, and maxillofacial confounders.

**CONCLUSIONS:**

This study demonstrated the established temporal relationship between dysthymia and TMD. The inclusion of a psychiatrist on the TMD management team is appropriate.

## Sleep apnea

Eur J Orthod. 2016 Dec 8. pii: cjw078.

**Dentoskeletal effects of oral appliance wear in obstructive sleep apnoea and snoring patients.**

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Author information

Abstract

*OBJECTIVES:*

To evaluate the dentoskeletal changes associated with long-term and continuous mandibular advancement device (MAD) use in sleep-related breathing disorder patients.

*METHODS:*

Cephalometric measurements and three-dimensional model analysis were performed at baseline and after  $3.5 \pm 1.1$  years in 20 snoring and obstructive sleep apnoea patients treated with the Silensor® appliance. Intra-group differences were compared using paired t-test or Wilcoxon signed-rank test. A regression analysis was performed for variables that showed a statistically significant difference between time points to evaluate the influence of treatment time and patient's initial characteristics on their variations. The statistical significance was set at  $P < 0.05$ .

*RESULTS:*

At cephalometric assessment, the maxilla revealed a significant decrease in horizontal position (SNA:  $-0.4 \pm 0.72$  degree,  $P = 0.021$ ) and a significant retroclination of the upper incisor ( $-1.59 \pm 1.07$  degree,  $P < 0.001$ ), while the mandible displayed a significant downward rotation ( $0.88 \pm 1.28$  degree,  $P = 0.006$ ) and a proclination of the lower incisor ( $2.27 \pm 1.38$  degree,  $P < 0.001$ ). Model analysis showed a decrease in upper total space discrepancy ( $-0.66 \pm 0.72$  mm,  $P < 0.002$ ), overjet (OJ;  $-0.34 \pm 0.47$  mm,  $P < 0.011$ ), and overbite ( $-0.4 \pm 0.52$  mm,  $P < 0.004$ ). In the regression analysis, treatment time influenced the lower incisor inclination (Beta =  $-0.713$ ,  $P = 0.018$ ) and OJ (Beta =  $-0.218$ ,  $P = 0.018$ ); patients' initial characteristics had an effect on OJ (Beta =  $-0.195$ ,  $P = 0.011$ ).

*LIMITATIONS:*

A larger sample size could increase the generalizability of the findings.

*CONCLUSION:*

MAD wear after a mean of 3.5 years determines statistically significant but clinically irrelevant dentoskeletal changes. Their potential occurrence should be thoroughly discussed with patients; regular follow-up visits by a specialist experienced in dental sleep medicine are also mandatory during treatment in addition to polysomnographic examinations.

## PD and MI

BMC Cardiovasc Disord. 2017 Feb 1;17(1):50. doi: 10.1186/s12872-017-0480-y.

**The association between periodontal disease and the risk of myocardial infarction: a pooled analysis of observational studies.**

Xu S<sup>1</sup>, Song M<sup>2</sup>, Xiong Y<sup>3</sup>, Liu X<sup>2</sup>, He Y<sup>2</sup>, Qin Z<sup>4</sup>.

Author information

Abstract

*BACKGROUND:*

Several meta-analyses have indicated that periodontal disease (PD) are related to cardiovascular diseases (CVDs). However, the association between PD and myocardial infarction (MI) remains controversial. Here we aimed to assess the association between PD and MI by meta-analysis of observational studies.

*METHODS:*

PubMed, EMBASE and the Cochrane Library were searched through July, 2016. Observational studies including cohort, cross-sectional and case-control studies reporting odds ratio (OR) or relative risk (RR) with 95% confidence intervals (CIs) were included in the analysis. Either fixed or random-effects model were applied to evaluate the pooled risk estimates. Sensitivity and subgroup analyses were also carried out to identify the sources of heterogeneity. Publication bias was assessed by the Begg's, Egger's test and funnel plot.

*RESULTS:*

We included 22 observational studies with 4 cohort, 6 cross-sectional and 12 case-control studies, including 129,630 participants. Patients with PD have increased risk of MI (OR 2.02; 95% CI 1.59-2.57). Substantial heterogeneity in risk estimates was revealed. Subgroup analyses showed that the higher risk of MI in PD patients exists in both cross-sectional studies (OR 1.71; 95% CI 1.07-2.73) and case-control studies (OR 2.93; 95% CI 1.95-4.39), and marginally in cohort studies (OR 1.18; 95% CI 0.98-1.42). Further, subgroup meta-analyses by location, PD exposure, participant number, and study quality showed that PD was significantly associated with elevated risk of MI.

*CONCLUSION:*

Our meta-analysis suggested that PD is associated with increased risk of future MI. However, the causative relation between PD and MI remains not established based on the pooled estimates from observational studies and more studies are warranted.

## Mandibular arch

**Comparison of dental arch and mandibular-maxillary base widths between true and pseudo-Class III malocclusions**

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DOI: <http://dx.doi.org/10.1016/j.ajodo.2016.06.039> February 2017 Volume 151, Issue 2,  
Pages 317–323

**Highlights**

- Morphology of dental arches differs between untreated pseudo-Class III and true Class III.
- Morphology of mandibular-maxillary bases differs between pseudo-Class III and true Class III.
- Transversal evaluation should be considered when planning treatment.
- True and pseudo-Class III differ in maxillary molar and biantegonial widths.

**Introduction**

The aim of the study was to analyze the morphology of dental arches and skeletal mandibular-maxillary bases in untreated pseudo-Class III and true Class III malocclusions, by using posteroanterior radiographs and 3-dimensional digital models.

**Methods**

The records of 50 untreated patients (24 boys and 26 girls between 14 and 16 years of age) with Class III malocclusions were included in this study. They were divided into 2 groups according to their Class III malocclusion type: true or pseudo-Class III malocclusion. Maxillary skeletal base, and bigonial and biantegonial widths were measured on posteroanterior cephalograms. Also, maxillary and mandibular intermolar widths were calculated on 3-dimensional digital models. For the statistical evaluation, the independent-samples *t* test was used, and the Pearson correlation coefficient was calculated to determine the relationship between the dental and skeletal widths.

**Results**

Maxillary intermolar, and bigonial and biantegonial widths in true Class III malocclusions were significantly larger than those in pseudo-Class III malocclusions ( $P < 0.05$ ). On the other hand, maxillary skeletal base width in pseudo-Class III malocclusions was significantly larger than in true Class III malocclusions ( $P < 0.05$ ). Also, mandibular intermolar widths in true Class III malocclusions were larger than in pseudo-Class III malocclusions, but the difference was not significant ( $P > 0.05$ ). Significant positive correlations were determined not only between the maxillary and mandibular molar widths but also between the bigonial and biantegonial widths ( $P < 0.01$ ).

**Conclusions**

The morphologies of the dental arches and the skeletal mandibular-maxillary bases differ in a significant manner between untreated pseudo-Class III and true Class III malocclusions.

**Sleep and osteoporosis****Association between sleep duration and osteoporosis risk in middle-aged and elderly women: a systematic review and meta-analysis of observational studies**

Sajjad Moradi Sakineh Shab-bidar Shahab Alizadeh Kurosh Djafarian

DOI: <http://dx.doi.org/10.1016/j.metabol.2017.01.027>**Abstract****Objective**

Increasing evidence has suggested an association between sleep duration and osteoporosis risk, although the results of previous studies have been inconsistent. To our knowledge, this is the first meta-analysis of the literature and quantitative estimates of the association between sleep duration and risk of osteoporosis in population-based studies of middle aged and elderly women.

**Methods**

Pertinent studies were identified by searching PubMed and EMBASE databases up to February 2016. Five out of six included studies were cross-sectional and one was a prospective cohort study. They included 72,326 participants from three different countries. We extracted 31,625 individuals in these studies for our meta-analysis.

**Results**

A pooled odds ratio analysis in women between 40 to 86 years indicated that there is an inverse relationship between sleep duration and osteoporosis (Overall OR =1.07 95% CI: 1.00–1.15). The negative association of long sleep duration (8 h or more per day) with osteoporosis risk was observed in middle aged and elderly women (OR =1.22, 95%CI: 1.06–1.38) but not in women with short sleep duration (7 h or less per day) (OR =0.98, 95%CI: 0.90–1.05).

**Conclusion**

This meta-analysis suggests that long sleep duration (8 h or more per day) may be associated with a higher risk of osteoporosis in middle-aged and elderly. Further prospective cohort studies with longer follow-up periods, valid instruments for measurement of sleep duration and dynamic sleep quality are warranted to support the possible relationship between sleep duration and osteoporosis risk in women.

## 14. HEADACHES

### Depression in severe cases

Headache. 2017 Jan 31. doi: 10.1111/head.13021

#### **Psychological Factors Associated With Chronic Migraine and Severe Migraine-Related Disability: An Observational Study in a Tertiary Headache Center.**

Seng EK<sup>1,2,3</sup>, Buse DC<sup>1,2,3</sup>, Klepper JE<sup>1</sup>, J Mayson S<sup>1</sup>, Grinberg AS<sup>1</sup>, Grosberg BM<sup>4</sup>, Pavlovic JM<sup>2,3</sup>, Robbins MS<sup>2,3</sup>, Vollbracht SE<sup>2,3</sup>, Lipton RB<sup>2,3</sup>.

Author information

Abstract

#### *OBJECTIVE:*

To evaluate the relationships among modifiable psychological factors and chronic migraine and severe migraine-related disability in a clinic-based sample of persons with migraine.

#### *BACKGROUND:*

Evidence evaluating relationships between modifiable psychological factors and chronic migraine and severe migraine-related disability is lacking in people with migraine presenting for routine clinical care.

#### *METHODS:*

Adults with migraine completed surveys during routinely scheduled visits to a tertiary headache center. Participants completed surveys assessing chronic migraine (meeting criteria for migraine with  $\geq 15$  headache days in the past month), severe migraine disability (Migraine Disability Assessment Scale score  $\geq 21$ ), and modifiable psychological factors (depressive symptoms [Patient Health Questionnaire-9], anxious symptoms [Generalized Anxiety Disorder-7], Pain Catastrophizing Scale and Headache Specific Locus of Control). Logistic regression evaluated relationships between modifiable psychological factors and chronic migraine and severe migraine disability.

#### *RESULTS:*

Among 90 eligible participants the mean age was 45.0 (SD = 12.4); 84.8% were women. One-third (36.0%) met study criteria for chronic migraine; half of participants (51.5%) reported severe migraine-related disability. Higher depressive symptoms (OR = 1.99, 95% CI = 1.11, 3.55) and chance HSLC (OR = 1.85, 95% CI = 1.13, 1.43) were associated with chronic migraine. Higher depressive symptoms (OR = 3.54, 95% CI = 1.49, 8.41), anxiety symptoms (OR = 3.65, 95% CI = 1.65, 8.06), and pain catastrophizing (OR = 1.95, 95% CI = 1.14, 3.35), were associated with severe migraine-related disability.

#### *CONCLUSIONS:*

Psychiatric symptoms and pain catastrophizing were strongly associated with severe migraine-related disability. Depression and chance locus of control were associated with chronic migraine. This study supports the need for longitudinal observational studies to evaluate the relationships among naturalistic variation in psychological factors, migraine-related disability, and migraine chronification.

**19. GLENOHUMERAL/SHOULDER**

## Disability index

**The Responsiveness and Interpretability of the Shoulder Pain and Disability Index**

**Authors:** Marloes Thoomes-de Graaf, MSc<sup>1,2</sup>, Wendy Scholten-Peeters, PhD<sup>1-3</sup>, Edwin Duijn, MSc<sup>1,2</sup>, Yasmaine Karel, PT, MSc<sup>1,2</sup>, Henrica C.W. de Vet, PhD<sup>4</sup>, Bart Koes, PhD<sup>2</sup>, Arianne Verhagen, PhD<sup>1,2</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*,  
2017 **Volume:**0 **Issue:**0 **Pages:**1–21 **DOI:**10.2519/jospt.2017.7079

**Study Design** Clinical measurement study; prospective cohort design.

**Background** Shoulder pain is a common disorder and treatment is most often focused on a reduction of pain and functional disabilities. Several reviews have encouraged the use of the Shoulder Pain and Disability Index (SPADI) to objectify functional disabilities. It is important to assess the responsiveness and interpretability of the SPADI when it is used by patients seeking help by a physical therapist for their shoulder pain in primary care setting.

**Objective** To assess the responsiveness and interpretability of the SPADI in patients with shoulder pain visiting a physical therapist in primary care.

**Methods** The target population consisted of patients consulting a physical therapist for their shoulder pain. Patients received physical therapy treatment and completed the Dutch language version of the SPADI (SPADI-D) at baseline and at follow up of 26 weeks. To assess the interpretability floor and ceiling effects and the minimal important change (MIC) using the ROC method including a visual anchor based MIC distribution for several Global Perceived Effect scale (GPE) based anchors was used. The measurement error was calculated using the Smallest Detectable Change (SDC). For the responsiveness, the Area under the ROC curve (AUC) was used and correlations with the GPE and the change score of the Shoulder Disability Questionnaire (as this questionnaire measures the same construct) were assessed.

**Results** In total 356 patients participated at baseline and 237 (67%) returned the SPADI after 26 weeks. The mean score at baseline of the SPADI was 46.7 points (on a 0-100 scale). The SPADI showed no signs of floor and ceiling effects. The SDC was 19.7 points. The MIC was 20 (43% of baseline value) and therefore we consider a change of more than 43% or more in an individual patient as clinically relevant. The AUC was 0.81, the Spearman correlation between the SPADI change score and the GPE was 0.53 and the Pearson correlation between the SDQ and the SPADI change scores was 0.71.

**Conclusion**

The results of this study confirm the responsiveness of the SPADI, making it a useful instrument to assess functional disability in longitudinal studies, however the measurement error should be taken into account when making decisions in individual patients. *J Orthop Sports Phys Ther*, *Epub 3 Feb 2017*. doi:10.2519/jospt.2017.7079

**22 A. IMPINGMENT****Factors for****Clinical assessment of subacromial shoulder impingement – Which factors differ from the asymptomatic population?**Helen Land Susan Gordon<sup>1</sup>, Kerrienne Wattr Kerrienne WattDOI: <http://dx.doi.org/10.1016/j.msksp.2016.12.003> February 2017 Volume 27, Pages 49–56

- • Measurements were compared in cases experiencing SSI and a matched asymptomatic group.
- • Groups were matched for age, gender, hand dominance and physical activity level.
- • Differences were found in active and passive upper thoracic posture and head posture.
- • Passive internal rotation and posterior shoulder range were significantly reduced.

**Background** To date, the significance of factors purported to be associated with subacromial shoulder impingement (SSI) and what differences, if any, are present in those with SSI compared to a matched asymptomatic population has not been identified. Gaining information about differences between people with SSI and asymptomatic people may direct clinicians towards treatments that impact upon these differences.

**Objective** Compare the assessment findings of factors suggested to be associated with SSI; passive posterior shoulder range, passive internal rotation range, resting cervical and thoracic postures, active thoracic range in standing and scapula positioning between cases experiencing SSI and a matched asymptomatic group (controls).

**Study design** Case Control Study.

**Method**

Fifty one SSI cases and 51 asymptomatic controls were matched for age, gender, hand dominance and physical activity level. The suggested associated factors were measured bilaterally. Independent t-tests were used to compare each of these measurements between the groups. Any variables for which a significant difference was identified, were then included in a conditional logistic regression analysis to identify independent predictors of SSI.

**Results** The SSI group had significantly increased resting thoracic flexion and forward head posture, as well as significantly reduced upper thoracic active motion, passive internal rotation range and posterior shoulder range than the matched asymptomatic group. No independent predictors of SSI were identified in conditional logistic regression analysis.

**Conclusion**

Thoracic posture, passive internal rotation range and posterior shoulder range were significantly different between cases experiencing SSI and a matched asymptomatic group.

**26. CARPAL TUNNEL SYNDROME**

PT vs. surgery

**The Effectiveness of Manual Therapy versus Surgery on Self-Reported Function, Cervical Range of Motion and Pinch Grip Force in Carpal Tunnel Syndrome: A Randomized Clinical Trial**

**Authors:** César Fernández-de-las-Peñas, PT, PhD, DMSc<sup>1</sup>, Joshua Cleland, PT, PhD, OCS, FAAOMPT<sup>2-4</sup>, María Palacios-Ceña, PT<sup>1</sup>, Stella Fuensalida-Novo, PT<sup>1</sup>, Juan A. Pareja, MD, PhD<sup>5</sup>, Cristina Alonso-Blanco, PT, PhD<sup>1</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2017 **Volume:**0 **Issue:**0 **Pages:**1–43 **DOI:**10.2519/jospt.2017.7090

**Study Design**

Randomized parallel-group trial.

**Background**

Carpal tunnel syndrome (CTS) is a common pain condition that can be managed surgically or conservatively.

**Objective**

To compare the effectiveness of manual therapy versus surgery for improving self-reported function, cervical range of motion, and pinch grip tip in women with CTS.

**Methods**

In this randomized clinical trial, 100 women with CTS were randomly allocated to either a manual therapy (n=50) or a surgery (n=50) group. The primary outcome was self-rated hand function, assessed with the Boston Carpal Tunnel Questionnaire (BCTQ). Secondary outcomes included active cervical range of motion, pinch tip grip force and symptoms severity subscale of the BCTQ. Patients were assessed at baseline, and 1, 3, 6, and 12 months after the last treatment by an assessor unaware of group assignment. Analysis was by intention to treat with mixed ANCOVAs adjusted for baseline scores.

**Results** At 12 months, 94 women completed the follow-up. Analyses showed statistically significant differences in favour of manual therapy at 1 month for self-reported function ( $\Delta$  -0.8, 95%CI -1.1 to -0.5) and pinch tip grip force on the symptomatic side (thumb-index finger:  $\Delta$ 2.0, 1.1 to 2.9; thumb-little finger:  $\Delta$ 1.0, 0.5 to 1.5). Improvements in self-reported function and pinch grip force were similar between both groups at 3, 6 and 12 months. Both groups reported similar improvements in symptoms severity at all follow-up periods. No significant changes were observed for pinch tip grip force on the less symptomatic side and in cervical range of motion in either group.

**Conclusion**

Manual therapy and surgery had similar effectiveness for improving self-reported function, symptom severity and pinch tip grip force on the symptomatic hand in women with CTS. Neither manual therapy nor surgery resulted in changes in cervical range of motion.

**Level of Evidence** Therapy, Level 1b. Prospectively registered September 3, 2014 on www.clinicaltrials.gov (NCT02233660). *J Orthop Sports Phys Ther*, Epub 3 Feb 2017. doi:10.2519/jospt.2017.7090

**27. HIP****Exercise glut activation**

Int J Sports Phys Ther. 2015 Oct;10(5):573-91.

**AN EXAMINATION OF THE GLUTEAL MUSCLE ACTIVITY ASSOCIATED WITH DYNAMIC HIP ABDUCTION AND HIP EXTERNAL ROTATION EXERCISE: A SYSTEMATIC REVIEW.**

Macadam P1, Cronin J, Contreras B1.

**BACKGROUND:**

A wide variety of hip abduction and hip external rotation exercises are used for training, both in athletic performance and in rehabilitation programming. Though several different exercises exist, a comprehensive understanding of which exercises best target the gluteus maximus (Gmax) and gluteus medius (Gmed) and the magnitude of muscular activation associated with each exercise is yet to be established.

**PURPOSE:**

The purpose of this systematic review was to quantify the electromyographic (EMG) activity of exercises that utilize the Gmax and Gmed muscles during hip abduction and hip external rotation.

**METHODS:**

Pubmed, Sports Discuss, Web of Science and Science Direct were searched using the Boolean phrases (gluteus medius OR gluteus maximus) AND (activity OR activation) AND (electromyography OR EMG) AND (hip abduction OR hip external rotation). A systematic approach was used to evaluate 575 articles. Articles that examined injury-free participants of any age, gender or activity level were included. No restrictions were imposed on publication date or publication status. Articles were excluded when not available in English, where studies did not normalize EMG activity to maximum voluntary isometric contraction (MVIC), where no hip abduction or external rotation motion occurred or where the motion was performed with high acceleration.

**RESULTS:**

Twenty-three studies met the inclusion criteria and were retained for analysis. The highest Gmax activity was elicited during the lateral step up, cross over step up and rotational single leg squat (ranging from 79 to 113 % MVIC). Gmed activity was highest during the side bridge with hip abduction, standing hip abduction with elastic resistance at the ankle and side lying hip abduction (ranging from 81 to 103 % MVIC).

**LIMITATIONS:**

The methodological approaches varied between studies, notably in the different positions used for obtaining MVIC, which could have dramatically impacted normalized levels of gluteal activation, while variation also occurred in exercise technique and/or equipment.

**CONCLUSIONS:**

The findings from this review provide an indication for the amount of muscle activity generated by basic strengthening and rehabilitation exercises, which may assist practitioners in making decisions for Gmax and Gmed strengthening and injury rehabilitation programs.

**KEYWORDS:**

EMG; gluteal musculature; hip strength; rehabilitation

**Knee mechanics and hip strength**

Int J Sports Phys Ther. 2015 Oct;10(5):592-601.

**THE INFLUENCE OF HIP STRENGTH ON KNEE KINEMATICS DURING A SINGLE-LEGGED MEDIAL DROP LANDING AMONG COMPETITIVE COLLEGIATE BASKETBALL PLAYERS.**

Suzuki H, Omori G1, Uematsu D2, Nishino K3, Endo N4.

**BACKGROUND:**

A smaller knee flexion angle and larger knee valgus angle during weight-bearing activities have been identified as risk factors for non-contact anterior cruciate ligament (ACL) injuries. To prevent such injuries, attention has been focused on the role of hip strength in knee motion control. However, gender differences in the relationship between hip strength and knee kinematics during weight-bearing activities in the frontal plane have not been evaluated.

**HYPOTHESIS/PURPOSE:**

The purpose of this study was to determine the influence of hip strength on knee kinematics in both genders during a single-legged landing task in the frontal plane. The hypotheses were that 1) subjects with a greater hip strength would demonstrate larger knee flexion and smaller knee valgus and internal rotation angles and 2) no gender differences would exist during the single-legged landing task.

**METHODS:**

Forty-three Japanese collegiate basketball players (20 males, 23 females) participated in this study. Three-dimensional motion analysis was used to evaluate knee kinematics during a single-legged medial drop landing (SML). A hand-held dynamometer was used to assess hip extensor (HEXT), abductor (HAB), and external rotator (in two positions: seated position [SHER] and prone [PHER]) isometric strength. Spearman rank correlation coefficients ( $\rho$ ) were determined for correlations between hip strength and knee kinematics at initial contact (IC) and peak (PK) during SML ( $p < 0.05$ ).

**RESULTS:**

Negative correlations were observed between the knee valgus angle at IC and HEXT ( $\rho = -0.48$ ,  $p = 0.02$ ), HAB ( $\rho = -0.46$ ,  $p = 0.03$ ) and PHER ( $\rho = -0.44$ ,  $p = 0.04$ ) strength in females. In addition, a significant positive correlation was observed between the knee flexion angle at PK and HEXT strength ( $\rho = 0.61$ ,  $p = 0.004$ ) in males.

**CONCLUSIONS:**

Significant correlations between hip strength and knee kinematics during SML were observed in both genders. Hip strength may, therefore, play an important role in knee motion control during sports activities, suggesting that increased hip strength may help to prevent non-contact ACL injuries in athletes of both genders. Moreover, gender-specific programs may be needed to control abnormal knee motion, as the influence of hip strength on knee kinematics may differ based on gender.

**LEVEL OF EVIDENCE:** 3.

**KEYWORDS:** Gender differences; hip strength; knee biomechanics; risk of anterior cruciate ligament injury

**32 A. KNEE/ACL****Neuroplasticity****Neuroplasticity Associated With Anterior Cruciate Ligament Reconstruction**

**Authors:** Dustin R. Grooms,<sup>1,2</sup> Stephen J. Page,<sup>3</sup> Deborah S. Nichols-Larsen,<sup>3</sup> Ajit M.W. Chaudhari,<sup>3</sup> Susan E. White,<sup>3</sup> James A. Onate,<sup>3</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*,  
2016 **Volume:**0 **Issue:**0 **Pages:**1–27 **DOI:**10.2519/jospt.2017.7003

**Study Design**

Controlled laboratory study.

**Background**

Anterior cruciate ligament (ACL) injury may result in neuroplastic changes due to lost mechanoreceptors of the ACL and compensations in neuromuscular control. These alterations are not completely understood. Assessing brain function after ACL injury and reconstruction with functional magnetic resonance imaging (fMRI), provides a means to address this gap in knowledge.

**Objective**

To investigate brain activation differences during knee flexion/extension in persons who have undergone ACL reconstruction (ACLR) and matched controls.

**Methods**

Fifteen participants who had undergone left ACLR (38.13±27.16 months post-surgery) and 15 healthy controls matched on age, height, mass, extremity dominance, education level, sport participation, and physical activity level participated. fMRI data were obtained during a unilateral knee motor task consisting of repeated cycles of knee flexion and extension.

**Results**

Participants with ACLR had increased activation in the contralateral motor cortex, lingual gyrus, and ipsilateral secondary somatosensory area and diminished activation in the ipsilateral motor cortex and cerebellum when compared to healthy matched controls.

**Conclusion**

Brain activation for knee flexion-extension motion may be altered following ACLR. The ACLR brain activation profile may indicate a shift towards a visual-motor strategy as opposed to sensory-motor strategy to engage in knee movement. *J Orthop Sports Phys Ther*, Epub 5 Nov 2016. doi:10.2519/jospt.2017.7003

**Outpatient good**

Knee. 2017 Jan 20. pii: S0968-0160(17)30002-9. doi: 10.1016/j.knee.2017.01.002. [

**Outpatient versus inpatient anterior cruciate ligament reconstruction: A systematic review with meta-analysis.**

Ferrari D<sup>1</sup>, Lopes TJ<sup>2</sup>, França PF<sup>3</sup>, Azevedo FM<sup>4</sup>, Pappas E<sup>5</sup>.

Author information

Abstract

**BACKGROUND:**

Efforts to reduce the financial costs related to anterior cruciate ligament reconstruction (ACLR) include reducing the length of hospitalization of the patient undergoing ACLR. However, it is unclear if inpatient and outpatient ACLR differ in terms of safety, satisfaction, costs and clinical outcomes.

**AIM:**

To systematically review and synthesize the literature that directly compared costs and outcomes after outpatient and inpatient ACLR.

**METHODS:**

Studies that directly compared outcomes of inpatient and outpatient ACLR were retrieved via searches in MEDLINE, EMBASE, CINAHL, AMED, Cochrane, SPORTDiscus, Web of Science and SCOPUS databases. Random effects meta-analysis and descriptive analysis were performed for relevant outcomes.

**RESULTS:**

Costs analysis suggests that outpatient ACLR may be a cost effective procedure with savings ranging from \$1371 to \$7390. There were no differences for systemic and local complications  $p=0.64$  (odds ratio 1.65, 95% confidence interval 0.20 to 13.49) and  $p=0.72$  (0.81, 0.26 to 2.56) respectively, or pain in the second and seventh days after surgery,  $p=0.78$  (mean difference -0.16; 95% confidence interval -1.28 to 0.96) and  $p=0.44$  (0.48, -0.75 to 1.71), respectively. However, the outpatient group had less pain than the inpatient group in the first and third days after surgery,  $p=0.0001$  (-0.39, -0.57 to -0.21) and  $p=0.0001$  (-0.39, -0.39 to -0.20), respectively. Descriptive analysis revealed that the outpatient group experienced similar or better satisfaction, strength and knee function compared to the inpatient group.

**CONCLUSION AND KEY FINDINGS:**

Complications, pain, satisfaction, knee function and strength are similar or better after outpatient compared to inpatient ACLR. Furthermore, cost savings may be achieved with outpatient ACLR. However, included studies presented low methodological quality and the quality of evidence was very low, so these results need to be confirmed by future studies.

### 35. KNEE/TOTAL

#### Pre-op costs

#### What are the costs of knee osteoarthritis in the year prior to total knee arthroplasty?

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Journal of Arthroplasty, 02/03/2017

Bedard NA, et al.

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**T**his study demonstrated that over half of the non–inpatient costs associated with knee osteoarthritis (OA) in the year prior to total knee arthroplasty (TKA) were from injections, therapy, prosthetics and prescriptions. Hyaluronic acid (HA) injections alone incurred approximately 30% of this cost. Additionally, it was concluded that if only interventions recommend by the CPG are utilized then costs associated with knee OA could be decreased by 45%.

### 37. OSTEOARTHRITIS/KNEE

HA vs. cortisone

#### **Efficacy and safety of intraarticular hyaluronic acid and corticosteroid for knee osteoarthritis: A meta-analysis**

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International Journal of Surgery, 02/01/2017

He WW, et al.

**T**his study suggested that intraarticular corticosteroids (CS) is more effective for pain relief than intraarticular hyaluronic acid (HA) in short term (up to 1 month), while HA appeared more effective in long term (up to 6 months). Knee function improvement was similar with the two therapies. Results suggested that both of these methods are relatively safe, but intraarticular HA causes more topical adverse effects compared with intraarticular CS.

**38 B. FOOT TYPES****Static vs dynamic posture**

Int J Sports Phys Ther. 2016 Feb;11(1):64-71.

**THE USE OF A STATIC MEASURE TO PREDICT FOOT POSTURE AT MIDSUPPORT DURING RUNNING.**

Bade MB1, Chi TL1, Farrell KC1, Gresl AJ1, Hammel LJ1, Koster BN1, Leatzow AB1, Thomas EC1, McPoil TG1.

**Author information****BACKGROUND:**

The posture of the foot has been implicated as a factor in the development of running-related injuries. A static measure of foot posture, such as the longitudinal arch angle (LAA), that can be easily performed and is predictive of the posture of the foot at midsupport while running could provide valuable information to enhance the clinician's overall evaluation of the runner.

**PURPOSE:**

The purpose of this study was to determine if the LAA, assessed in relaxed standing, could predict the posture of the foot at midsupport while running on a treadmill.

**STUDY DESIGN:**

Cross-sectional Study.

**METHODS:**

Forty experienced runners (mean age 26.6 years) voluntarily consented to participate. Inclusion criteria included running at least 18 miles per week, previous experience running on a treadmill, no history of lower extremity congenital or traumatic deformity, or acute injury three months prior to the start of the study. Each runner had markers placed on the medial malleolus, navicular tuberosity, and medial aspect 1(st) metatarsal head of both feet. A high speed camera (240 Hz) was used to film both feet of each runner in standing and while running on a treadmill at their preferred speed. The LAA in standing and at mid-support while running was determined by angle formed by two lines drawn between the three markers with the navicular tuberosity serving as the apex. The LAA in midsupport was determined using the mean of the middle five running trials.

**RESULTS:**

The levels of intra-rater and inter-rater reliability for the dynamic LAA were excellent. The results of the t-tests indicated that mean values between the left and right foot were not significantly different for the standing or running LAA. The results of the t-tests between male and female runners were also not significantly different for standing or running LAA. The Pearson correlation between standing and running LAA for all 80 feet was  $r = 0.95$  ( $r(2) = 0.90$ ).

**CONCLUSIONS:**

The standing LAA was found to be highly predictive of the running LAA at midsupport while running. Approximately 90% of the variance associated with foot posture at midsupport in running could be explained by the standing LAA.

**LEVEL OF EVIDENCE:** 4, Controlled laboratory study.

**KEYWORDS:** Foot posture; longitudinal arch angle; running

**40. ANKLE SPRAINS AND INSTABILITY**

## Postural changes

**Assessment of Relationships Between Joint Motion Quality and Postural Control in Patients With Chronic Ankle Joint Instability**

**Authors:** Dawid Bączkiewicz, PhD<sup>1</sup>, Krzysztof Falkowski, MD<sup>2</sup>, Edyta Majorczyk, PhD<sup>1,3</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*,  
2016 **Volume:**0 **Issue:**0 **Pages:**1–26 **DOI:**10.2519/jospt.2017.6836

**Study Design**

Controlled laboratory study, cross sectional.

**Background**

Lateral ankle sprains are among the most common injuries encountered during athletic participation. Following the initial injury there is an alarmingly high risk of re-injury and development of chronic ankle instability (CAI), which is dependent on a combination of factors, including sensorimotor deficits and changes in the biomechanical environment of the ankle joint.

**Objective**

To evaluate CAI-related disturbances in arthrokinematic motion quality and postural control and the relationships between them.

**Methods**

Sixty-three male subjects (31 with CAI and 32 healthy controls) were enrolled in the study. For arthrokinematic motion quality analysis, the vibroarthrographic signals were collected during ankle flexion/extension motion using an acceleration sensor and described by variability (VMS), amplitude (R4) and frequency (P1 and P2) parameters. Using the Biodex Balance System, single leg dynamic balance was measured by overall (OSI), anteroposterior (APSI), and mediolateral (MLSI) stability indices.

**Results**

In the CAI group values of vibroarthrographic parameters (VMS, R4, P1 and P2) were significantly higher than in the controls ( $p < 0.01$ ). Similar results were obtained for all postural control parameters (OSI, APSI, MLSI;  $p < 0.05$ ). Moreover, correlations between OSI and VMS, P1 and P2, as well as APSI and P1 and P2 were observed in the CAI patient group but not in controls.

**Conclusions**

In patients with CAI, deficits in both quality of ankle arthrokinematic motion and postural control was present. Therefore physical therapy interventions focused on improving ankle neuromuscular control and arthrokinematic function are necessary in CAI patient care. *J Orthop Sports Phys Ther*, Epub 4 Nov 2016. doi:10.2519/jospt.2017.6836

Keyword: arthrokinematics, balance/postural stability, crepitus, lateral ankle sprain,

**41 A. ACHILLES TENDON AND CALF****Eccentric exercise**

Int J Sports Phys Ther. 2015 Aug; 10(4): 552–562.  
PMCID: PMC4527202

**WHY ARE ECCENTRIC EXERCISES EFFECTIVE FOR ACHILLES TENDINOPATHY?**

Seth O'Neill, MSc, BSc, PGCE HE, MSCP, MACP,<sup>1</sup> Paul J. Watson, PhD, PGCE HE, MSCP,<sup>1</sup> and Simon Barry, PhD, PGCE HE, MCSP<sup>2</sup>

**ABSTRACT** Achilles Tendinopathy is a complex problem, with the most common conservative treatment being eccentric exercises.

Despite multiple studies assessing this treatment regime little is known about the mechanism of effect. This lack of understanding may be hindering therapeutic care and preventing optimal rehabilitation. Of the mechanisms proposed, most relate to tendon adaptation and fail to consider other possibilities. The current consensus is that tendon adaptation does not occur within timeframes associated with clinical improvements, therefore the clinical benefits must occur through another unidentified pathway. This clinical commentary critically reviews each of the proposed theories and highlights that muscle alterations are observed prior to onset of Achilles Tendinopathy and during the disease. Evidence shows that the observed muscle alterations change with treatment and that these adaptations have the ability to reduce tendon load and thereby improve tendon health.

The purpose of this clinical commentary is to review previous theories regarding the mechanisms by which eccentric exercise might affect Achilles tendinopathy and offers a novel mechanism by which the plantarflexor muscles may shield the Achilles tendon. Keywords: Achilles, eccentric exercise, efficacy, Tend\* Level of Evidence: 5

### 42. PLANTAR SURFACE

#### Manual PT and plantar pain

##### **The symptomatic and functional effects of manual physical therapy on plantar heel pain: a systematic review**

**John J. Mischke**, Dhinu J. Jayaseelan, Josiah D. Sault & Alicia J. Emerson Kavchak

##### **Abstract**

**Objectives:** Plantar heel pain is common and can be severely disabling. Unfortunately, a gap in the literature exists regarding the optimal intervention for this painful condition. Consequently, a systematic review of the current literature regarding manual therapy for the treatment of plantar heel pain was performed.

**Methods:** A computer-assisted literature search for randomized controlled trials in MEDLINE, EMBASE, Cochrane, CINAHL, and Rehabilitation & Sports Medicine Source, was concluded on 7 January 2014. After identification of titles, three independent reviewers selected abstracts and then full-text articles for review.

**Results:** Eight articles were selected for the final review and underwent PEDro scale assessment for quality. Heterogeneity of the articles did not allow for quantitative analysis. Only two studies scored  $\geq 7/10$  on the PEDro scale and included joint, soft tissue, and neural mobilization techniques. These two studies showed statistically greater symptomatic and functional outcomes in the manual therapy group.

**Discussion:** This review suggests that manual therapy is effective in the treatment of plantar heel pain; however, further research is needed to validate these findings given the preponderance of low quality studies.

**PRRT treatment**

Int J Sports Phys Ther. 2015 Oct;10(5):690-9.

**A NOVEL APPROACH TO TREATING PLANTAR FASCIITIS - EFFECTS OF PRIMAL REFLEX RELEASE TECHNIQUE: A CASE SERIES.**

Hansberger BL1, Baker RT2, May J2, Nasypany A2.

**BACKGROUND/PURPOSE:**

Plantar fasciitis (PF), a common condition affecting physically active individuals, is typically treated with orthotics, two to four months of stretching programs, and/or surgery. Primal Reflex Release Technique™ (PRRT) is thought to reduce over-arousal of the nervous system through down-regulation of the primal reflexes. The technique has been suggested as a novel treatment method for patients suffering from PF. The purpose of this case series was to examine the effects of PRRT on patients with PF.

**DESCRIPTION OF CASES:**

The PRRT technique was applied in eight consecutive cases of PF in physically active subjects. The Numeric Pain Rating Scale, the Disability in the Physically Active (DPA) Scale, and the Patient Specific Functional Scale (PSFS) were administered to identify patient-reported pain and dysfunction.

**OUTCOMES:**

Primal Reflex Release Technique (PRRT) was an effective treatment for subjects with either acute or chronic PF. The use of the PRRT treatment resulted in an average reduction in plantar fascia pain across all subjects that was both statistically significant and clinically following a single treatment. Statistically and clinically significant improvements on averaged measures of function, such as the DPA Scale and PSFS, were also found over the course of treatment.

**DISCUSSION:**

In this case series, the use of PRRT produced positive changes in terms of improvements in reported pain and dysfunction and a shorter time to resolution, when compared to traditional treatment methods for PF reported in the literature. Subjects who undergo PRRT treatment for both acute and chronic PF may experience reduction in pain and improvement of function that exceeds what is experienced in traditional conservative therapy programs found in the available literature. Clinicians should consider the regional interdependence model in order to identify underlying related factors when evaluating and treating PF. The autonomic nervous system may play a role in the perception of pain and should be addressed during treatment.

**LEVEL OF EVIDENCE:** Level 4 - case series.

**KEYWORDS:** Autonomic nervous system; primal reflex; regional interdependence; up-regulation.

**44. RHUMATOID ARTHRITIS****RA and Diet**

Ann Rheum Dis. 2017 Jan 30. pii: annrheumdis-2016-210431. doi: 10.1136/annrheumdis-2016-210431

**Long-term dietary quality and risk of developing rheumatoid arthritis in women.**

Hu Y<sup>1</sup>, Sparks JA<sup>2</sup>, Malspeis S<sup>2</sup>, Costenbader KH<sup>2</sup>, Hu FB<sup>3,4</sup>, Karlson EW<sup>2</sup>, Lu B<sup>2</sup>.

Author information

Abstract

**OBJECTIVES:**

To evaluate the association between long-term dietary quality, measured by the 2010 Alternative Healthy Eating Index, and risk of rheumatoid arthritis (RA) in women.

**METHODS:**

We prospectively followed 76 597 women in the Nurses' Health Study aged 30-55 years and 93 392 women in the Nurses' Health Study II aged 25-42 years at baseline and free from RA or other connective tissue diseases. The lifestyle, environmental exposure and anthropometric information were collected at baseline and updated biennially. Cumulative follow-up rates were more than 90% for both cohorts. The primary outcome was RA alone with two subtypes of the disease: seropositive and seronegative RA.

**RESULTS:**

During 3 678 104 person-years, 1007 RA cases were confirmed. In the multivariable-adjusted model, long-term adherence to healthy eating patterns was marginally associated with reduced RA risk. To assess potential effect modification by age at diagnosis, we stratified by age. Among women aged  $\leq 55$  years, better quality diet was associated with lower RA risk (HR<sub>Q4 vs Q1</sub>: 0.67; 95% CI 0.51 to 0.88; p trend: 0.002), but no significant association was found for women aged  $> 55$  years (p interaction: 0.005). When stratifying by serostatus, the inverse association among those aged  $\leq 55$  years was strongest for seropositive RA (HR<sub>Q4 vs Q1</sub>: 0.60; 95% CI 0.42 to 0.86; p trend: 0.003).

**CONCLUSIONS:**

A healthier diet was associated with a reduced risk of RA occurring at 55 years of age or younger, particularly seropositive RA.

**45 A. MANUAL THERAPY LUMBAR & GENERAL****Osteopathic MT****Osteopathic manipulative treatment: A systematic review and critical appraisal of comparative effectiveness and health economics research**

Amie Steell Tobias Sundberg , Rebecca Reid , Lesley Ward , Felicity L. Bishop Matthew Leach , Holger Cramer Jon Wardle Jon Adams

DOI: <http://dx.doi.org/10.1016/j.math.2016.10.067> February 2017 Volume 27, Pages 165–175

**Highlights**

- Cost and comparative effectiveness of osteopathic manipulative treatment (OMT) is underresearched
- Most comparative effectiveness studies examining OMT do not comply with the reporting guidelines.
- Economic analyses of OMT are limited but promising in some areas.
- Future osteopathic research needs to prioritise quality cost and comparative effectiveness Research.

In recent years, evidence has emerged regarding the effectiveness of osteopathic manipulative treatments (OMT). Despite growing evidence in this field, there is need for appropriate research designs that effectively reflect the person-centred system of care promoted in osteopathy and provide data which can inform policy decisions within the healthcare system.

The purpose of this systematic review is to identify, appraise and synthesise the evidence from comparative effectiveness and economic evaluation research involving OMT. A database search was conducted using CINAHL, PubMed, PEDro, AMED, SCOPUS and OSTMED.DR, from their inception to May 2015. Two separate searches were undertaken to identify original research articles encompassing the economic evaluation and comparative effectiveness of OMT. Identified comparative effectiveness studies were evaluated using the Cochrane risk of bias tool and appraised using the Good Reporting of Comparative Effectiveness (GRACE) principles. Identified economic studies were assessed with the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) guidelines. Sixteen studies reporting the findings of comparative effectiveness (n = 9) and economic evaluation (n = 7) research were included. The comparative effectiveness studies reported outcomes for varied health conditions and the majority (n = 6) demonstrated a high risk of bias.

The economic evaluations included a range of analyses and considerable differences in the quality of reporting were evident. Despite some positive findings, published comparative effectiveness and health economic studies in OMT are of insufficient quality and quantity to inform policy and practice. High quality, well-designed, research that aligns with international best practice is greatly needed to build a pragmatic evidence base for OMT.

**45 B. MANUAL THERAPY CERVICAL****CPR**February 2017 **Volume 27, Pages 155–164****Clinical prediction rules for prognosis and treatment prescription in neck pain: A systematic review**

Joan Kelly Joan Kelly Carrie Ritchie Michele Sterling

DOI: <http://dx.doi.org/10.1016/j.math.2016.10.066>**Highlights**

- 15 prognostic and 11 prescriptive clinical prediction rules (CPRs) were identified.
- Most CPRs are at the initial stage of development.
- Four prognostic CPRs have undergone initial validation.
- Further validation and impact analyses of all neck pain CPRs are recommended.

Clinical prediction rules (CPRs) developed to identify sub-groups of people with neck pain for different prognoses (i.e. prognostic) or response to treatments (i.e. prescriptive) have been recommended as a research priority to improve health outcomes for these conditions.

A systematic review was undertaken to identify prognostic and prescriptive CPRs relevant to the conservative management of adults with neck pain and to appraise stage of development, quality and readiness for clinical application. Six databases were systematically searched from inception until 4th July 2016. Two independent reviewers assessed eligibility, risk of bias (PEDro and QUIPS), methodological quality and stage of development. 9840 records were retrieved and screened for eligibility. Thirty-two studies reporting on 26 CPRs were included in this review. Methodological quality of included studies varied considerably. Most prognostic CPR development studies employed appropriate designs. However, many prescriptive CPR studies (n = 12/13) used single group designs and/or analysed controlled trials using methods that were inadequate for identifying treatment effect moderators. Most prognostic (n = 11/15) and all prescriptive (n = 11) CPRs have not progressed beyond the derivation stage of development. Four prognostic CPRs relating to acute whiplash (n = 3) or non-traumatic neck pain (n = 1) have undergone preliminary validation.

No CPRs have undergone impact analysis. Most prognostic and prescriptive CPRs for neck pain are at the initial stage of development and therefore routine clinical use is not yet supported. Further validation and impact analyses of all CPRs are required before confident conclusions can be made regarding clinical utility.

### 45 C. MANUAL THERAPY THORACIC

#### T spine manip

##### **The effect of direction specific thoracic spine manipulation on the cervical spine: a randomized controlled trial**

**Steve Karas**, Megan J. Olson Hunt, Bill Temes, Martin Thiel, Trenton Swoverland & Brett Windsor

##### **Abstract**

**Objectives:** To determine the difference on neck outcomes with directional manipulation to the thoracic spine. There is evidence that thoracic spine manipulation is effective in treating patients with neck pain. However, there is no research that determines if the assessment of directional hypomobility and the selection of thrust direction offer improved outcomes.

**Methods:** A total of 69 patients with cervical spine pain were randomly assigned to receive either a manipulation that was consistent with their thoracic spine motion loss (matched) or opposite their motion loss (unmatched). The patient was given care consistent with the orthopedic section guidelines for neck pain and the physical therapist's clinical reasoning. Baseline outcome measures (NPRS, NDI, GROG) were taken and reassessed two days and two weeks after treatment.

**Results:** Both groups had positive results when pain, neck disability index, and global rating of change were assessed. There was no difference between the matched and unmatched groups.

**Discussion:** Directional manipulation of hypomobile thoracic spine segments may not be required to improved outcomes in patients with neck pain. Future studies should assess a variety of factors when determining the best available treatment, including manual therapy procedures, exercise, and patient selection.

**Level of Evidence:** 1b.

**45 D. MANUAL THERAPY EXTREMITIES****McKenzie and extremities****Inter-examiner classification reliability of Mechanical Diagnosis and Therapy for extremity problems – Systematic review**

Hiroshi Takasaki Kousuke Okuyama Richard Rosedale

DOI: <http://dx.doi.org/10.1016/j.msksp.2016.12.016> February 2017 Volume 27, Pages 78–84

**Highlights**

- Mechanical Diagnosis and Therapy (MDT) is used for patients with extremity problems.
- Inter-examiner reliability of the MDT classification for extremities was explored.
- There is strong evidence of acceptable reliability when vignettes are used.
- There is limited evidence of reliability when real patients are used.

**Abstract****Background**

Mechanical Diagnosis and Therapy (MDT) is used in the treatment of extremity problems. Classifying clinical problems is one method of providing effective treatment to a target population. Classification reliability is a key factor to determine the precise clinical problem and to direct an appropriate intervention.

**Objectives**

To explore inter-examiner reliability of the MDT classification for extremity problems in three reliability designs: 1) vignette reliability using surveys with patient vignettes, 2) concurrent reliability, where multiple assessors decide a classification by observing someone's assessment, 3) successive reliability, where multiple assessors independently assess the same patient at different times.

**Design**

Systematic review with data synthesis in a quantitative format.

**Method**

Agreement of MDT subgroups was examined using the Kappa value, with the operational definition of acceptable reliability set at  $\geq 0.6$ . The level of evidence was determined considering the methodological quality of the studies.

**Results/findings**

Six studies were included and all studies met the criteria for high quality. Kappa values for the vignette reliability design (five studies) were  $\geq 0.7$ . There was data from two cohorts in one study for the concurrent reliability design and the Kappa values ranged from 0.45 to 1.0. Kappa values for the successive reliability design (data from three cohorts in one study) were  $< 0.6$ .

**Conclusion**

The current review found strong evidence of acceptable inter-examiner reliability of MDT classification for extremity problems in the vignette reliability design, limited evidence of

acceptable reliability in the concurrent reliability design and unacceptable reliability in the successive reliability design.

### 46 A. UPPER LIMB NEUROMOBILIZATION

#### Adhesive capsulitis

#### Addressing neurodynamic irritability in a patient with adhesive capsulitis: a case report

Kevin Farrell & Katherine Lampe

- <http://dx.doi.org/10.1179/2042618614Y.0000000092>

#### Abstract

Background: Patients with adhesive capsulitis are commonly seen by physical therapists. Pain and limited shoulder motion from adhesive capsulitis have at times been linked to neural irritation. The purpose of this case is to describe the examination and intervention of a patient with adhesive capsulitis who appeared to have a coexisting, underlying neural irritation. This paper emphasizes how the neurological component must initially be identified and addressed for a successful outcome.

Case description:: A 47-year-old female presented with reduced shoulder motion and function, upper extremity neural irritation, diffuse weakness, altered sensation in the involved extremity, and symptoms reproduced with upper limb neurodynamic testing. Her reduced shoulder range of motion was accompanied by limited glenohumeral glides and a report of local neck stiffness. Symptoms began several months earlier after an apparent electrical shock injury to the arm that caused symptoms and guarding of the shoulder. Intervention initially addressed the underlying neural component with spinal mobilizations while avoiding further irritation. Interventions were progressed to include mobilization and exercise to address shoulder mobility.

Outcomes:: The patient's neurodynamic irritability, distal symptoms, and neck stiffness were normalized within the first weeks of care. Subsequently, interventions were directed at the shoulder. Outcomes over an 12-week time frame included reduced pain from 10/10 to 2/10. Passive range of motion increases included flexion from 121 to 160°, abduction from 71 to 121°, and external rotation from 18 to 60°. Disability scores on Disabilities of the Arm, Shoulder, and Hand (DASH) dropped from initially 68.3 to 18.3% at discharge. She ultimately regained full upper extremity function.

Discussion:: Therapists should be cognizant of possible neural irritation in shoulder disorders, which may contribute to conditions such as adhesive capsulitis. Identifying neural irritation is critical when determining which interventions will achieve optimal outcomes without aggravating the condition.

Keywords: Adhesive capsulitis, Neurodynamic mobility, Physical therapy/rehabilitation, Upper limb tension testing, Manual therapy, Shoulder

**Alterations****Impact of shoulder internal rotation on normal sensory response during ulnar nerve-biased neurodynamic testing of asymptomatic individuals**

Mark Gugliotti, Danielle Cohen, Angela Hernandez, Kristen Hinrichs & Nicole Osmundsen

- <http://dx.doi.org/10.1080/10669817.2016.1173317>

**Abstract**

**Objective:** To determine if substitution of shoulder internal rotation for external rotation during the upper limb neurodynamic test (ULNT<sub>3</sub>) evokes comparable ulnar nerve sensory responses in asymptomatic individuals.

**Methods:** Range of motion, quality, quantity, and distribution of sensory responses in 50 asymptomatic individuals during the traditional ULNT<sub>3</sub> were compared to identical measures during an experimental maneuver using shoulder internal rotation. Quality and quantity of sensory responses were recorded using a 10-cm visual analog scale.

**Results:** Means of sensory responses for traditional and experimental maneuvers, respectively, were as follows: stretching,  $3.84 \pm 8.85$  and  $5.38 \pm 2.85$  cm; burning,  $1.82 \pm 2.82$  and  $2.50 \pm 3.10$  cm; tingling,  $2.13 \pm 3.12$  and  $2.18 \pm 2.97$  cm; and numbness,  $1.04 \pm 2.17$  and  $1.01 \pm 2.03$  cm. A moderate to strong correlation (ICC = 0.51–0.86) was shown to exist between maneuvers; this relationship was significant ( $p = .001$ ).

**Discussion:** Results of this study provide evidence that there was no appreciable difference in sensory responses with regard to burning and tingling when substituting shoulder internal rotation for external rotation during the ULNT<sub>3</sub>. The results also suggest that there were only marginal differences in the sensory responses of stretching and numbness during the same substitution.

**Conclusion:** Patients who have limited glenohumeral external rotation due to pain, instability, and/or articular limitation may benefit from this substitution when presenting with signs of ulnar nerve pathodynamics. Further research will be needed to validate this maneuver in a symptomatic population.

## 46 B. LOWER LIMB NEUROMOILIZATION

### Neuropathic LBP

#### **Distinguishing between nociceptive and neuropathic components in chronic low back pain using behavioural evaluation and sensory examination**

N. Spahr<sup>1</sup> D. Hodkinson K. Jolly S. Williams M. Howard<sup>1</sup> M. Thacker<sup>1</sup>

DOI: <http://dx.doi.org/10.1016/j.msksp.2016.12.006>

#### **Highlights**

- Identification of underlying CLBP pain phenotypes is challenging.
- We used painDETECT to identify nociceptive and neuropathic CLBP subgroups.  
We demonstrate unique sensory and behavioural clinical profiles for each group.  
More accurate identification of CLBP pain phenotypes may improve treatment outcomes.

#### **Background**

Diagnosis of chronic low back pain (CLBP) is traditionally predicated on identifying underlying pathological or anatomical causes, with treatment outcomes modest at best. Alternately, it is suggested that identification of underlying pain mechanisms with treatments targeted towards specific pain phenotypes may yield more success. Differentiation between nociceptive and neuropathic components of CLBP is problematic; evidence suggests that clinicians fail to identify a significant neuropathic component in many CLBP patients. The painDETECT questionnaire (PDQ) was specifically developed to identify occult but significant neuropathic components in individuals thought to have predominantly nociceptive pain.

#### **Methods**

Using the PDQ, we classified 50 CLBP patients into two distinct groups; those with predominantly nociceptive pain (Group 1) and those with a significant neuropathic component (Group 2). We characterised these two distinct CLBP sub-groups using a) questionnaire-based behavioural evaluation measuring pain-related function and quality of life, pain intensity and psychological well-being and b) sensory examination, using two-point and tactile threshold discrimination.

#### **Objective**

We sought to determine if differences in the pain phenotype of each CLBP sub-group would be reflected in sensory and behavioural group profiles.

#### **Results**

We report that Group 1 and Group 2 sub-groups demonstrate unique clinical profiles with significant differences in sensory tactile discrimination thresholds and in a wide range of behavioural domains measuring pain intensity, disability and psychological well-being.

**Conclusion**

We have demonstrated distinct clinical profiles for CLBP patient sub-groups classified by PDQ. Our results give diagnostic confidence in using the PDQ to characterise two distinct pain phenotypes in a heterogeneous CLBP population.

**LBP****Effects of lower body quadrant neural mobilization in healthy and low back pain populations: A systematic review and meta-analysis**

Tiago Neto Sandro R. Freitas Marta Marques Luis Gomes Ricardo Andrade Raúl Oliveira

DOI: <http://dx.doi.org/10.1016/j.msksp.2016.11.014> vFebruary 2017Volume 27, Pages 14–22

**Background**

Neural mobilization (NM) is widely used to assess and treat several neuromuscular disorders. However, information regarding the NM effects targeting the lower body quadrant is scarce.

**Objectives**

To determine the effects of NM techniques targeting the lower body quadrant in healthy and low back pain (LBP) populations.

**Design**

Systematic review with meta-analysis.

**Method**

Randomized controlled trials were included if any form of NM was applied to the lower body quadrant. Pain, disability, and lower limb flexibility were the main outcomes. PEDro scale was used to assess methodological quality.

**Results**

Forty-five studies were selected for full-text analysis, and ten were included in the meta-analysis, involving 502 participants. Overall, studies presented fair to good quality, with a mean PEDro score of 6.3 (from 4 to 8). Five studies used healthy participants, and five targeted people with LBP. A moderate effect size ( $g = 0.73$ , 95% CI: 0.48–0.98) was determined, favoring the use of NM to increase flexibility in healthy adults. Larger effect sizes were found for the effect of NM in pain reduction ( $g = 0.82$ , 95% CI 0.56–1.08) and disability improvement ( $g = 1.59$ , 95% CI: 1.14–2.03), in people with LBP.

**Conclusion**

Evidence suggests that there are positive effects from the application of NM to the lower body quadrant. Specifically, NM shows moderate effects on flexibility in healthy participants, and large effects on pain and disability in people with LBP. Nevertheless, more studies with high methodological quality are necessary to support these conclusions.

## 47. STRETCHING/MUSCLES

## Delayed onset of muscle soreness

Eur J Pain. 2017 Jan 20. doi: 10.1002/ejp.993.

**Pain-evoked trunk muscle activity changes during fatigue and DOMS.**

Larsen LH<sup>1,2</sup>, Hirata RP<sup>1</sup>, Graven-Nielsen T<sup>1</sup>.

Author information

Abstract

*BACKGROUND:*

Muscle pain may reorganize trunk muscle activity but interactions with exercise-related muscle fatigue and delayed onset muscle soreness (DOMS) is to be clarified.

*METHODS:*

In 19 healthy participants, the trunk muscle activity during 20 multi-directional unpredictable surface perturbations were recorded after bilateral isotonic saline injections (control) and during unilateral and bilateral hypertonic saline-induced low back pain (LBP) in conditions of back muscle fatigue (Day-1) and DOMS (Day-2). Pain intensity and distribution were assessed by visual analogue scale (VAS) scores and pain drawings. The degree of fatigue and DOMS were assessed by Likert scale scores. Root-mean-square electromyographic (RMS-EMG) signals were recorded post-perturbation from six bilateral trunk muscles and the difference from baseline conditions (Delta-RMS-EMG) was extracted and averaged across abdominal and back muscles.

*RESULTS:*

In DOMS, peak VAS scores were higher during bilateral control and bilateral saline-induced pain than fatigue ( $p < 0.001$ ) and during bilateral compared with unilateral pain ( $p < 0.001$ ). The saline-induced pain areas were larger during DOMS than fatigue ( $p < 0.01$ ). In response to surface perturbations during fatigue and DOMS, the back muscle Delta-RMS-EMG increased during bilateral compared with unilateral pain and control injections ( $p < 0.001$ ) and decreased during unilateral pain compared with control injections ( $p < 0.04$ ). In DOMS compared with fatigue, the post-perturbation Delta-RMS-EMG in back muscles was higher during bilateral pain and lower during unilateral pain ( $p < 0.001$ ). The abdominal Delta-RMS-EMG was not significantly affected.

*CONCLUSION:*

Facilitated and attenuated back muscle responses to surface perturbations in bilateral and unilateral LBP, respectively, was more expressed during exercise-induced back muscle soreness compared with fatigue.

*SIGNIFICANCE:*

Back muscle activity decreased during unilateral and increased during bilateral pain after unpredictable surface perturbations during muscle fatigue and DOMS. Accumulation effects of DOMS on pain intensity and spreading and trunk muscle activity after pain-induction.

**48 A. STM****Manual TP mob**

Acupunct Med. 2017 Jan 23. pii: acupmed-2016-011176. doi: 10.1136/acupmed-2016-011176.

**Manual acupuncture for myofascial pain syndrome: a systematic review and meta-analysis.**

Wang R<sup>1,2</sup>, Li X<sup>3,4</sup>, Zhou S<sup>1</sup>, Zhang X<sup>5</sup>, Yang K<sup>3,4</sup>, Li X<sup>1</sup>.

Author information

Abstract

**OBJECTIVE:**

To assess the efficacy of manual acupuncture (MA) in the treatment of myofascial pain syndrome (MPS).

**METHODS:**

We searched for randomised controlled trials (RCTs) comparing MA versus sham/placebo or no intervention in patients with MPS in the following databases from inception to January 2016: PubMed; Cochrane Library; Embase; Web of Science; and China Biology Medicine. Two reviewers independently screened the literature extracted data and assessed the quality of the included studies according to the risk of bias tool recommended by the Cochrane Handbook (V.5.1.0). Then, a meta-analysis was performed using RevMan 5.3 software.

**RESULTS:**

Ten RCTs were combined in a meta-analysis of MA versus sham, which showed a favourable effect of MA on pain intensity after stimulation of myofascial trigger points (MTrPs; standardised mean difference (SMD) -0.90, 95% CI -1.48 to -0.32; p=0.002) but not traditional acupuncture points (p>0.05). Benefit was seen both after a single treatment (SMD -1.05, 95% CI -1.84 to -0.27; p=0.009) and course of eight sessions (weighted mean difference (WMD) -1.96, 95% CI -2.72 to -1.20; p<0.001). We also found a significant increase in pressure pain threshold following MA stimulation of MTrPs (WMD 1.00, 95% CI 0.32 to 1.67; p=0.004). Two of the included studies reported mild adverse events (soreness/haemorrhage) secondary to MA.

**CONCLUSIONS:**

Through stimulation of MTrPs, MA might be efficacious in terms of pain relief and reduction of muscle irritability in MPS patients. Additional well-designed/reported studies are required to determine the optimal number of sessions for the treatment of MPS.

Foam rolling

Int J Sports Phys Ther. 2015 Nov;10(6):827-38.

**THE EFFECTS OF SELF-MYOFASCIAL RELEASE USING A FOAM ROLL OR ROLLER MASSAGER ON JOINT RANGE OF MOTION, MUSCLE RECOVERY, AND PERFORMANCE: A SYSTEMATIC REVIEW.**

Cheatham SW1, Kolber MJ2, Cain M1, Lee M3.

**BACKGROUND:**

Self-myofascial release (SMR) is a popular intervention used to enhance a client's myofascial mobility. Common tools include the foam roll and roller massager. Often these tools are used as part of a comprehensive program and are often recommended to the client to purchase and use at home. Currently, there are no systematic reviews that have appraised the effects of these tools on joint range of motion, muscle recovery, and performance.

**PURPOSE:**

The purpose of this review was to critically appraise the current evidence and answer the following questions: (1) Does self-myofascial release with a foam roll or roller-massager improve joint range of motion (ROM) without effecting muscle performance? (2) After an intense bout of exercise, does self-myofascial release with a foam roller or roller-massager enhance post exercise muscle recovery and reduce delayed onset of muscle soreness (DOMS)? (3) Does self-myofascial release with a foam roll or roller-massager prior to activity affect muscle performance?

**METHODS:**

A search strategy was conducted, prior to April 2015, which included electronic databases and known journals. Included studies met the following criteria: 1) Peer reviewed, english language publications 2) Investigations that measured the effects of SMR using a foam roll or roller massager on joint ROM, acute muscle soreness, DOMS, and muscle performance 3) Investigations that compared an intervention program using a foam roll or roller massager to a control group 4) Investigations that compared two intervention programs using a foam roll or roller massager. The quality of manuscripts was assessed using the PEDro scale.

**RESULTS:**

A total of 14 articles met the inclusion criteria. SMR with a foam roll or roller massager appears to have short-term effects on increasing joint ROM without negatively affecting muscle performance and may help attenuate decrements in muscle performance and DOMS after intense exercise. Short bouts of SMR prior to exercise do not appear to effect muscle performance.

**CONCLUSION:**

The current literature measuring the effects of SMR is still emerging. The results of this analysis suggests that foam rolling and roller massage may be effective interventions for enhancing joint ROM and pre and post exercise muscle performance. However, due to the heterogeneity of methods among studies, there currently is no consensus on the optimal SMR program.

**LEVEL OF EVIDENCE:** 2c.

**KEYWORDS:** Massage; muscle; treatment

**Impact of tight hip flexors**

Int J Sports Phys Ther. 2015 Dec;10(7):946-54.

**EFFECT OF RESTRICTED HIP FLEXOR MUSCLE LENGTH ON HIP EXTENSOR MUSCLE ACTIVITY AND LOWER EXTREMITY BIOMECHANICS IN COLLEGE-AGED FEMALE SOCCER PLAYERS.**

Mills M1, Frank B2, Goto S3, Blackburn T2, Cates S2, Clark M3, Aguilar A2, Fava N4, Padua D2.

**Author information**

**BACKGROUND:**

Hip flexor tightness is theorized to alter antagonist muscle function through reciprocal inhibition and synergistic dominance mechanisms. Synergistic dominance may result in altered movement patterns and increased risk of lower extremity injury.

**HYPOTHESIS/PURPOSE:**

To compare hip extensor muscle activation, internal hip and knee extension moments during double-leg squatting, and gluteus maximus strength in those with and without clinically restricted hip flexor muscle length.

**DESIGN:**

Causal-comparative cross-sectional laboratory study.

**METHOD:**

Using a modified Thomas Test, female soccer athletes were assigned to a restricted ( $>0^\circ$  of sagittal plane hip motion above the horizontal;  $n=20$ ,  $\text{age}=19.9 \pm 1$  years,  $\text{ht}=167.1 \pm 6.4$  cm,  $\text{mass}=64.7 \pm 8.2$  kg) or normal ( $>15^\circ$  of sagittal plane hip motion below horizontal;  $n=20$ ,  $\text{age}=19.4 \pm 1$  years,  $\text{ht}=167.2 \pm 5.5$  cm,  $\text{mass}=61.2 \pm 8.6$  kg) hip flexor muscle length group. Surface electromyographic (sEMG) activity of the gluteus maximus and biceps femoris, and net internal hip and knee extension moments were measured between groups during a double-leg squat. Isometric gluteus maximus strength was assessed using handheld dynamometry.

**RESULTS:**

Individuals with restricted hip flexor muscle length demonstrated less gluteus maximus activation ( $p=0.008$ ) and a lower gluteus maximus : biceps femoris co-activation ratio ( $p=0.004$ ). There were no significant differences ( $p>0.05$ ) in hip or knee extension moments, isometric gluteus maximus strength, or biceps femoris activation between groups.

**CONCLUSIONS:**

Female soccer athletes with hip flexor muscle tightness exhibit less gluteus maximus activation and lower gluteus maximus : biceps femoris co-activation while producing similar net hip and knee extension moments. Thus, individuals with hip flexor muscle tightness appear to utilize different neuromuscular strategies to control lower extremity motion.

**LEVEL OF EVIDENCE:** 3.

**KEYWORDS:** ACL Injury; Electromyography; Hamstring Injury; Musculoskeletal Injury; Neuromuscular Control

**48 B. TRIGGER POINTS NEEDLING/ACUPUNCTURE****Hips dry needling**

Int J Sports Phys Ther. 2015 Aug;10(4):540-51.

**EFFECTIVENESS OF DRY NEEDLING, STRETCHING, AND STRENGTHENING TO REDUCE PAIN AND IMPROVE FUNCTION IN SUBJECTS WITH CHRONIC LATERAL HIP AND THIGH PAIN: A RETROSPECTIVE CASE SERIES.**

Pavkovich R1.

**Author information****BACKGROUND AND PURPOSE:**

Chronic lateral hip and thigh pain is regularly treated by the physical therapist. Many issues can cause pain in this region, and trigger points may contribute to pain. Dry Needling (DN) is an intervention used by physical therapists where a monofilament needle is inserted into soft tissue to reduce pain thereby facilitating return to prior level of function. The purpose of this case series is to report the outcomes of DN and conventional physical therapy as a treatment intervention for subjects with chronic lateral hip and thigh pain.

**CASE DESCRIPTIONS:**

Four subjects with chronic lateral hip and thigh pain attended between four and eight sixty-minute sessions of dry needling and stretching/ strengthening activities over a four to eight week intervention course. Outcomes were tested at baseline and upon completion of therapy. A long-term follow up averaging 12.25 months (range 3 to 20 months) was also performed. The outcome measures included the Visual Analog Scale (VAS) and the Lower Extremity Functional Scale (LEFS).

**OUTCOMES:**

The LEFS and VAS indicated clinically meaningful improvements in disability and pain in the short term and upon long term follow up for each subject. The LEFS(mean) for the four subjects improved from 50.75 at baseline to 66.75 at the completion of treatment. At long-term follow-up, the LEFS(mean) was 65.50. Each subject met the minimal clinically important difference (MCID) and minimal detectable change (MDC) for the LEFS and the VAS. The VAS was broken down into best (VAS(B)), current (VAS(C)), and worst (VAS(W)) rated pain levels and averaged between the four subjects. The VAS(B) improved from 20 mm at the initial assessment to 0 mm upon completion of the intervention duration. The VAS(C) improved from 25.75 mm to 11.75 mm, and the VAS(W) improved from 85 mm to 32.5 mm. At the long-term follow up (average 12.25 months), the VAS(B), VAS(C), and VAS(W) scores were 0 mm, 14.58 mm, and 43.75 mm respectively.

**DISCUSSION:**

Clinically meaningful improvements in pain and disability were noted. Subjects reported improved sleep and functional mobility, which were commensurate with their different age ranges and initial reported limitations in mobility. The results of this case series show promising outcomes for the use of dry needling in the treatment of chronic lateral hip and thigh pain. Further controlled clinical trials are recommended to determine the effectiveness of adding dry needling as compared to other interventions for chronic lateral hip and thigh pain.

**LEVEL OF EVIDENCE:** Level 4.

**50 B. PNF****Rolling**

Int J Sports Phys Ther. 2015 Nov;10(6):787-802.

**ROLLING REVISITED: USING ROLLING TO ASSESS AND TREAT NEUROMUSCULAR CONTROL AND COORDINATION OF THE CORE AND EXTREMITIES OF ATHLETES.**

Hoogenboom BJ1, Voight ML2.

**Author information**

Rolling is a movement pattern seldom used by physical therapists for assessment and intervention with adult clientele with normal neurologic function.

Rolling, as an adult motor skill, combines the use of the upper extremities, core, and lower extremities in a coordinated manner to move from one posture to another. Rolling is accomplished from prone to supine and supine to prone, although the method by which it is performed varies among adults. Assessment of rolling for both the ability to complete the task and bilateral symmetry may be beneficial for use with athletes who perform rotationally-biased sports such as golf, throwing, tennis, and twisting sports such as dance, gymnastics, and figure skating. When stability-based dysfunction exists, the rolling patterns can be used as intervention techniques, and have the ability to affect dysfunction of the upper quarter, core, and lower quarter.

By applying proprioceptive neuromuscular facilitation (PNF) principles, the therapist may assist patients and clients who are unable to complete a rolling pattern. Examples given in the article include distraction/elongation, compression, and manual contacts to facilitate proper rolling. The authors assert that therapeutic use of the developmental pattern of rolling with techniques derived from PNF can be creatively and effectively utilized in musculoskeletal rehabilitation. Preliminary results from an exploration of the mechanism by which rolling may impact stability is presented, and available updated evidence is provided.

The purpose of this clinical commentary is to describe techniques for testing, assessment, and treatment of dysfunction, using case examples that incorporate rolling.

**LEVEL OF EVIDENCE:** 5.

**KEYWORDS:** Developmental sequence; neuromuscular sequencing; rolling

## 51. CFS/BET

## Recreational activities

## RESEARCH REPORT

**Increasing Recreational Physical Activity in Patients With Chronic Low Back Pain: A Pragmatic Controlled Clinical Trial**

**Authors:** Noa Ben-Ami, PT, PhD<sup>1,2</sup>, Gabriel Chodick, MHA, PhD<sup>2,3</sup>, Yigal Mirovsky, MD<sup>2,4</sup>, Tamar Pincus, MPhil, MSc, PhD<sup>5</sup>, Yair Shapiro, MD, PhD<sup>1,2</sup>

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2017 **Volume:**47 **Issue:**2 **Pages:**57–66 **DOI:**10.2519/jospt.2017.7057

**Study Design** Prospective, pragmatic, nonrandomized controlled clinical trial.

**Background** Clinical guidelines recommend physical activity for the treatment of chronic low back pain. But engaging patients in physical activity has proven difficult. Known obstacles to physical activity include low self-efficacy and fear avoidance.

**Objectives** This study tested the effectiveness of an enhanced transtheoretical model intervention (ETMI) aimed at increasing recreational physical activity in patients with chronic low back pain, in comparison to usual physical therapy.

**Methods**

Patients (n = 220) referred to physical therapy for chronic low back pain were allocated to ETMI or to a control group. The ETMI was delivered by physical therapists and based on behavior-change principles, combined with increased reassurance, therapeutic alliance, and exposure to reduce fear avoidance. The primary outcome was back pain-related disability (Roland-Morris Disability Questionnaire). Secondary outcomes included pain intensity, mental and physical health, and levels of physical activity.

**Results**

Intention-to-treat analysis in 189 patients at 12 months indicated that patients in the ETMI group had significantly lower disability compared to usual physical therapy. The difference in mean change from baseline between the interventions was 2.7 points (95% confidence interval: 0.9, 4.5) on the Roland-Morris Disability Questionnaire. At 12 months, worst pain, physical activity, and physical health were all significantly better in patients receiving ETMI. The average number of sessions was 3.5 for the ETMI group and 5.1 for controls.

**Conclusion**

Targeting obstacles to physical activity with an intervention that includes components to address self-efficacy and fear avoidance appears to be more effective than usual physical therapy care in reducing long-term disability. Further research is needed to explore the mechanisms that impact outcomes in this intervention package.

**Level of Evidence** Therapy, level 2b. Registered June 7, 2012  
at [ClinicalTrials.gov](https://clinicaltrials.gov) (NCT01631344). *J Orthop Sports Phys Ther* 2017;47(2):57–66.  
*doi:*10.2519/jospt.2017.7057

**Bending changes in mechanics with LBP****Differences in kinematics of the lumbar spine and lower extremities between people with and without low back pain during the down phase of a pick up task, an observational study**

Sara P. Gombatto Natalie D'Arpa, Sarah Landerholm Cassandra Mateo Ryan O'Connor Jana Tokunaga Lori J. Tuttle

DOI: <http://dx.doi.org/10.1016/j.msksp.2016.12.017>

**Highlights**

- Group difference in lumbar spine flexion depends on upper vs. lower region.
- LBP subjects flex the lumbar spine more in early ranges of movement than controls.
- LBP subjects display more frontal plane knee movement than controls.
- There were no significant differences in kinematics among movement-based subgroups.

**Abstract****Background**

Limited research exists on lumbar spine and lower extremity movement during functional tasks in people with and without low back pain (LBP).

**Objective**

To determine differences in lumbar spine and lower extremity kinematics in people with and without LBP during the down phase of a pick up task.

**Design**

Cross-sectional, observational study.

**Method**

35 people (14 M, 21 F,  $26.9 \pm 10.9$  years,  $24.8 \pm 3.2$  kg/m<sup>2</sup>); 18 with and 17 without LBP were matched based on age, gender and BMI. Kinematics of the lumbar spine and lower extremities were measured using 3D motion capture, while subjects picked up an object off the floor. People with LBP were examined and assigned to movement-based LBP subgroups. Repeated measures ANOVA tests were conducted to determine the effect of group and region on lumbar spine and lower extremity kinematics. A secondary analysis was conducted to examine the effect of LBP subgroup on lumbar spine kinematics.

**Results**

Compared to controls, subjects with LBP displayed greater upper and less lower lumbar flexion ( $P < 0.05$ ), and more lumbar flexion during the first 25% of the pick up task ( $P < 0.01$ ). There were no group differences in frontal or axial plane lumbar spine kinematics. Subjects with LBP displayed more frontal plane movement at the knee than control subjects ( $P < 0.01$ ). There were no significant effects of movement-based LBP subgroup on kinematics ( $P > 0.05$ ).

**Conclusions**

When evaluating movement during a functional task, the clinician should consider regional differences in the lumbar spine, pattern of movement, and lower extremity movement.

**52. EXERCISE****Psoas and QL****RESEARCH REPORT****Evaluation of Psoas Major and Quadratus Lumborum Recruitment Using Diffusion-Weighted Imaging Before and After 5 Trunk Exercises**

**Authors:** Atsushi Imai, PhD<sup>1</sup>, Yu Okubo, PT, PhD<sup>2</sup>, Koji Kaneoka, MD, PhD<sup>1</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*,  
2016 **Volume:**47 **Issue:**2 **Pages:**108–114 **DOI:**10.2519/jospt.2017.6730

**Study Design**

Controlled laboratory study, with a pretest-posttest design.

**Background**

Diffusion-weighted imaging is a noninvasive magnetic resonance imaging technique that can be used to assess the recruitment of the psoas major (PM) and quadratus lumborum (QL). The recruitment of these muscles during trunk exercises has not been evaluated.

**Objective**

To evaluate the diffusion of water movement in several trunk muscles using diffusion-weighted imaging before and after specific trunk exercises and thereby to understand the level of recruitment of each muscle during each exercise.

**Methods**

Nine healthy male participants performed the right side bridge, knee raise, and 3 front bridges, including the hand-knee, elbow-knee, and elbow-toe bridges. Diffusion-weighted imaging was performed before and after each exercise. After scanning, the apparent diffusion coefficient (ADC) map was constructed, and ADC values of the rectus abdominis, lateral abdominal muscles, QL, PM, and back muscles were calculated.

**Results**

The right PM following the elbow-toe bridge demonstrated the largest increase in ADC values, a change significantly greater than that demonstrated by the hand-knee bridge ( $P < .001$ ) and side bridge ( $P = .002$ ) exercises. The ADC change in the right QL following the side bridge exercise was significantly larger than that of other exercises ( $P < .008$ ).

**Conclusion**

Of the 5 exercises investigated, the elbow-toe bridge and side bridge exercises elicit the greatest recruitment of the PM and QL, respectively. *J Orthop Sports Phys Ther* 2017;47(2):108–114. *Epub* 5 Nov 2016. doi:10.2519/jospt.2017.6730

**53. CORE****Fat infiltration****Trunk Muscle Characteristics of the Multifidi, Erector Spinae, Psoas, and Quadratus Lumborum in Older Adults With and Without Chronic Low Back Pain**

**Authors:** J. Megan Sions, PhD, DPT<sup>1</sup>, James M. Elliott, PT, PhD<sup>2</sup>, Ryan T. Pohlig, PhD<sup>3</sup>, Gregory E. Hicks, PT, PhD<sup>4</sup>

**PUBLISHED:** *JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY*, 2017 **VOLUME:0 ISSUE:0 PAGES:1–26 DOI:10.2519/JOSPT.2017.7002**

**Study Design**

Cross-sectional study.

**Background**

Muscle support for the trunk is provided by the multifidi, erector spinae, psoas, and quadratus lumborum. Trunk muscle characteristics may be altered with aging and/or chronic LBP. To date, most trunk muscle research has been conducted among younger adults. Given age-related muscle changes, i.e. reduced size and increased intramuscular fat, studies are needed in older adults, including comparisons of older adults with and without LBP.

**Objective**

To determine if there are differences in trunk muscle characteristics between older adults with and without chronic low back pain (LBP), while controlling for age, sex, and body mass index.

**Methods**

102 older adults with (n=53) and without chronic LBP (n=49) were included. Cross-sectional area (CSA) measurements were taken by tracing inside fascial borders on magnetic resonance images. Pixel intensity summaries were obtained to compute muscle-to-fat indices and relative muscle CSA, i.e. CSA void of fat. Right-left averages for levels L2-L5 were determined. Mixed design analyses-of-covariances were used to test for differences between groups based on LBP presence and sex, across levels ( $p \leq .050$ ).

**Results**

Older adults with LBP had a greater average multifidi muscle-to-fat index when compared to controls, i.e. .51 versus .49, and smaller average erector spinae relative muscle CSA, i.e. 8.56cm<sup>2</sup> versus 9.26cm<sup>2</sup>; no interactions between LBP status and average muscle characteristics were found for psoas or quadratus lumborum ( $p > .050$ ).

**Conclusion**

Up to 54% of older adult trunk muscle CSA may be fat. Females have smaller muscles and greater intramuscular fat (at lower levels) than males. *J Orthop Sports Phys Ther, Epub 3 Feb 2017. doi:10.2519/jospt.2017.7002*

Keyword: adipose tissue, aged, magnetic resonance imaging, paraspinals muscles

**Multifidus contraction****Effects of different verbal instructions on change of lumbar multifidus muscle thickness in asymptomatic adults and in patients with low back pain**

Sharon Wang-Price, Jason Zafereo, Kelli Brizzolara, Lily Sokolowski &amp; Dawn Turner

- <http://dx.doi.org/10.1179/2042618615Y.0000000021>

**Abstract**

**Background:** Spinal stabilisation exercise has been shown to be effective in the rehabilitation of low back pain (LBP). Due to the isometric nature of spinal stabilisation exercise, manual therapists use various verbal instructions to elicit lumbar multifidus muscle contraction.

**Objectives:** The purpose of this study was to assess whether or not three verbal instructions would alter muscle thickness of the lumbar multifidus muscle differently in asymptomatic individuals and patients with LBP.

**Methods:** Three verbal instructions were selected for this study: (1) swell the muscle underneath the transducer, (2) draw your belly button in towards your spinal column and (3) think about tilting your pelvis but without really doing it. Lumbar multifidus muscle thickness was determined using parasagittal ultrasound (US) imaging. Measurements of muscle thickness were collected at rest and during verbal instructions from 21 asymptomatic adults and 21 patients with LBP. Percent changes of muscle thickness during contraction and at rest were compared between groups and across verbal instructions.

**Results:** ANOVA results showed no significant interaction for both L4-5 and L5-S1, but a significant main effect of verbal instruction ( $P = 0.049$ ) at L4-5. *Post hoc* analysis showed a greater increase with verbal instruction #3 than verbal instruction #2 ( $P = 0.009$ ). There was no significant main effect of group at either segment.

**Discussion:** The results of the study suggest that both groups responded similarly to the three verbal instructions. Verbal instructions may increase lumbar multifidus muscle thickness by different amounts at L4-5, but by the same amount at L5-S1.

**Keywords:** Low back pain, Verbal instruction, Lumbar multifidus, Ultrasound imaging, Muscle activation, Muscle thickness

**54. POSTURE****Adjacent segment failure and posture**

Spine (Phila Pa 1976). 2017 Jan 15;42(2):E86-E92. doi: 10.1097/BRS.0000000000001728.

**Risk Factors of Adjacent Segment Disease After Transforaminal Inter-Body Fusion for Degenerative Lumbar Disease.**

Yamasaki K1, Hoshino M, Omori K, Igarashi H, Nemoto Y, Tsuruta T, Matsumoto K, Iriuchishima T, Ajiro Y, Matsuzaki H.

Author information

Abstract

*STUDY DESIGN:*

A retrospective study.

*OBJECTIVE:*

The purpose of this study was to determine the incidence and risk factors of adjacent segment disease (ASD) after transforaminal inter-body fusion (TLIF) for degenerative lumbar disease.

*SUMMARY OF BACKGROUND DATA:*

ASD is a major complication after spinal fusion. Many reports have been published concerning the risk factors for ASD after TLIF. A number of quantitative relationships to spino-pelvic parameters have been established. A retrospective cohort study was carried out to investigate spino-pelvic alignment in patients with ASD after TLIF.

*METHODS:*

This study evaluated 263 subjects (150 subjects undergoing floating fusion (FF group), and 113 patients undergoing lumbosacral fusion (LF group)) who underwent TLIF from 2009 to 2012. The mean follow-up period was 37.6 months. Several parameters were measured using pre- and postoperative full-length free-standing radiographs, including lumbar lordosis (LL), sacral slope (SS), pelvic incidence (PI), pelvic tilt (PT), and PI-LL. Multivariate logistic regression analysis was performed to evaluate these parameters as potential risk factors of early onset radiographic ASD.

*RESULTS:*

Radiographic ASD was found in 65 cases (43.3%) in the FF group, and 49 cases (43.3%) in the LF group. LL improved by 7.5° and 3.9° in each group respectively after TLIF. However, PT worsened by 6.4° in the LF group. When comparing with ASD positive cases and ASD negative cases, a significant difference in preoperative PT was observed in both FF (P=0.001) and LF groups (P=0.0001). Logistic regression analysis and receiver operating characteristic analysis revealed that preoperative PT of more than 22.5° was a significant risk factor of the incidence of ASD after TLIF (P=0.02; odds ratio: 5.1, 95% CI: 1.62-9.03).

*CONCLUSION:*

Patients with preoperative sagittal imbalance have a statistically significant increased risk of ASD. The risk of ASD incidence was 5.1 times greater in subjects with preoperative PT of more than 22.5°.

**57. GAIT**

Chronic neck pain walk stiffer

**People With Chronic Neck Pain Walk With a Stiffer Spine**

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**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2017 **Volume:**0 **Issue:**0 **Pages:**1–33 **DOI:**10.2519/jospt.2017.6768

**Study Design**

Case-control.

**Background**

People with chronic neck pain present a number of sensorimotor and biomechanical alterations, yet little is known about the influence of neck pain on gait and motions of the spine during gait.

**Objective**

To evaluate the spine kinematics and gait characteristics in people with non-specific chronic neck pain.

**Methods**

People with chronic non-specific neck pain and age and gender matched asymptomatic controls walked on a treadmill at three different speeds (self-selected, 3km/h, 5km/h) either with their head in a neutral position or rotated 30°. Tridimensional motion capture was employed to quantify body kinematics. Neck and trunk rotations were derived from the difference between the transverse plane component of the head and thorax and thorax and pelvis angles to provide an indication of neck and trunk rotation during gait.

**Results**

Overall, the patient group showed shorter stride length compared to the control group ( $P < 0.0001$ ). Moreover, the patients with neck pain showed smaller trunk rotations ( $P < 0.0001$ ), regardless of the condition or speed. The difference in the amount of trunk rotation between groups became larger for the conditions of walking with the head rotated.

**Conclusion**

These results show that people with chronic neck pain walk with reduced trunk rotation, especially when challenged by walking with their head positioned in rotation. Reduced rotation of the trunk during gait may have long term consequences on spinal health. *J Orthop Sports Phys Ther*, Epub 3 Feb 2017. doi:10.2519/jospt.2017.6768

**59. PAIN****Chronic pain changes the brain**

Eur J Pain. 2017 Feb 1. doi: 10.1002/ejp.1003.

**Brain changes associated with cognitive and emotional factors in chronic pain: A systematic review.**

Malfliet A<sup>1,2,3,4</sup>, Coppieters I<sup>2,4</sup>, Van Wilgen P<sup>1,2,5</sup>, Kregel J<sup>2,4</sup>, De Pauw R<sup>4</sup>, Dolphens M<sup>4</sup>, Ickmans K<sup>1,2,3</sup>.

Author information

Abstract

An emerging technique in chronic pain research is MRI, which has led to the understanding that chronic pain patients display brain structure and function alterations. Many of these altered brain regions and networks are not just involved in pain processing, but also in other sensory and particularly cognitive tasks. Therefore, the next step is to investigate the relation between brain alterations and pain related cognitive and emotional factors. This review aims at providing an overview of the existing literature on this subject. Pubmed, Web of Science and Embase were searched for original research reports. Twenty eight eligible papers were included, with information on the association of brain alterations with pain catastrophizing, fear-avoidance, anxiety and depressive symptoms. Methodological quality of eligible papers was checked by two independent researchers. Evidence on the direction of these associations is inconclusive. Pain catastrophizing is related to brain areas involved in pain processing, attention to pain, emotion and motor activity, and to reduced top-down pain inhibition. In contrast to pain catastrophizing, evidence on anxiety and depressive symptoms shows no clear association with brain characteristics. However, all included cognitive or emotional factors showed significant associations with resting state fMRI data, providing that even at rest the brain reserves a certain activity for these pain-related factors. Brain changes associated with illness perceptions, pain attention, attitudes and beliefs seem to receive less attention in literature.

***SIGNIFICANCE:***

This review shows that maladaptive cognitive and emotional factors are associated with several brain regions involved in chronic pain. Targeting these factors in these patients might normalize specific brain alterations.

**63. PHARMACOLOGY****Opioids vs NSAID's**

Pain. 2017 Feb;158(2):289-295. doi: 10.1097/j.pain.0000000000000756.

**Persistent pain after motor vehicle collision: comparative effectiveness of opioids vs nonsteroidal antiinflammatory drugs prescribed from the emergency department—a propensity matched analysis.**

Beaudoin FL<sup>1</sup>, Gutman R, Merchant RC, Clark MA, Swor RA, Jones JS, Lee DC, Peak DA, Domeier RM, Rathlev NK, McLean SA.

Author information

**Abstract**

Each year millions of Americans present to the emergency department (ED) for care after a motor vehicle collision (MVC); the majority (>90%) are discharged to home after evaluation. Acute musculoskeletal pain is the norm in this population, and such patients are typically discharged to home with prescriptions for oral opioid analgesics or nonsteroidal antiinflammatory drugs (NSAIDs).

The influence of acute pain management on subsequent pain outcomes in this common ED population is unknown. We evaluated the effect of opioid analgesics vs NSAIDs initiated from the ED on the presence of moderate to severe musculoskeletal pain and ongoing opioid use at 6 weeks in a large cohort of adult ED patients presenting to the ED after MVC (n = 948). The effect of opioids vs NSAIDs was evaluated using an innovative quasi-experimental design method using propensity scores to account for covariate imbalances between the 2 treatment groups. No difference in risk for moderate to severe musculoskeletal pain at 6 weeks was observed between those discharged with opioid analgesics vs NSAIDs (risk difference = 7.2% [95% confidence interval: -5.2% to 19.5%]). However, at follow-up participants prescribed opioids were more likely than those prescribed NSAIDs to report use of prescription opioids medications at week 6 (risk difference = 17.5% [95% confidence interval: 5.8%-29.3%]).

These results suggest that analgesic choice at ED discharge does not influence the development of persistent moderate to severe musculoskeletal pain 6 weeks after an MVC, but may result in continued use of prescription opioids. Supported by NIAMS R01AR056328 and AHRQ 5K12HS022998.