

## ABSTRACTS

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## 1. LUMBAR SPINE

### Kyphosis

Eur Spine J. 2016 Mar 19.

#### **Incidence and risk factors for proximal junctional kyphosis: a meta-analysis.**

Liu FY<sup>1</sup>, Wang T<sup>1</sup>, Yang SD<sup>1</sup>, Wang H<sup>1</sup>, Yang DL<sup>1</sup>, Ding WY<sup>2,3</sup>.

Author information

Abstract

#### **PURPOSE:**

To analyse the incidence and risk factors associated with proximal junctional kyphosis (PJK) following spinal fusion, we collect relative statistics from the articles on PJK and perform a meta-analysis.

#### **METHODS:**

An extensive search of literature was performed in PubMed, Embase, and The Cochrane Library (up to April 2015). The following risk factors were extracted: age at surgery, gender, combined anterior-posterior surgery, use of pedicle screw at top of construct, hybrid instrumentation, thoracoplasty, fusion to sacrum (S1), preoperative thoracic kyphosis angle (T5-T12) >40°, bone mineral density (BMD) and preoperative to postoperative sagittal vertical axis (SVA difference) >5 cm. Data analysis was conducted with RevMan 5.3 and STATA 12.0.

#### **RESULTS:**

A total of 14 unique studies including 2215 patients were included in the final analyses. The pooled analysis showed that there were significant difference in age at surgery >55 years old (OR 2.19, 95 % CI 1.36-3.53, p = 0.001), fusion to S1 (OR 2.12, 95 % CI 1.57-2.87, p < 0.001), T5-T12 >40° (OR 2.68, 95 % CI 1.73-4.13, p < 0.001), low BMD (OR 2.37, 95 % CI 1.45-3.87, p < 0.001) and SVA difference >5 cm (OR 2.53, 95 % CI 1.24-5.18, p = 0.01). However, there was no significant difference in gender (OR 0.98, 95 % CI 0.74-1.30, p = 0.87), combined anterior-posterior surgery (OR 1.55, 95 % CI 0.98-2.46, p = 0.06), use of pedicle screw at top of construct (OR 1.55, 95 % CI 0.67-3.59, p = 0.30), hybrid instrumentation (OR 1.31, 95 % CI 0.92-1.87, p = 0.13) and thoracoplasty (OR 1.55, 95 % CI 0.89-2.72, p = 0.13). The incidence of PJK following spinal fusion was 30 % (ranged from 17 to 62 %) based on the 14 studies.

#### **CONCLUSIONS:**

The results of our meta-analysis suggest that age at surgery >55 years, fusion to S1, T5-T12 >40°, low BMD and SVA difference >5 cm are risk factors for PJK. However, gender, combined anterior-posterior surgery, use of pedicle screw at top of construct, hybrid instrumentation and thoracoplasty are not associated with PJK.

**KEYWORDS:** Incidence; Meta-analysis; Proximal junctional kyphosis; Risk factors  
PMID: 26994925

## Spondylo

**Diagnostic utility of patient history and physical examination data to detect spondylolysis and spondylolisthesis in athletes with low back pain: A systematic review**

Linn Helen J. Grødahl Louise Fawcett Madeleine Nazareth Richard Smith Simon cer, Nicola Heneghan, Alison Rushton

**Highlights**

- Systematic review of diagnostic data validity for spondylolysis/spondylolisthesis
- 1 risk of bias study supports gender (male) and age <20 in diagnosing spondylolysis
- No clinical test included in this review has the ability to diagnose spondylolysis
- No recommendations regarding patient history data in diagnosing spondylolisthesis
- 1 study support step-deformity palpation in diagnosing spondylolisthesis

**Abstract**

**Background** In adolescent athletes, low back pain has a 1-year prevalence of 57% and causes include spondylolysis and spondylolisthesis. An accurate diagnosis enables healing, prevention of progression and return to sport.

**Objective** To evaluate the diagnostic utility of patient history and physical examination data to identify spondylolysis and/or spondylolisthesis in athletes.

**Design** Systematic review was undertaken according to published guidelines, and reported in line with PRISMA.

**Method** Key databases were searched up to 13/11/15. Inclusion criteria: athletic population with LBP, patient history and/or physical examination accuracy data for spondylolysis and/or spondylolisthesis, any study design including raw data. Two reviewers independently assessed risk of bias (ROB) using QUADAS-2. A data extraction sheet was pre-designed. Pooling of data and investigation for heterogeneity enabled a qualitative synthesis of data across studies.

**Results** Of the eight included studies, two were assessed as low ROB, one of which also had no concerns regarding applicability. Age (<20 years) demonstrated 81% sensitivity and 44% specificity and gender (male) 73% sensitivity and 57% specificity for spondylolysis. Difficulty falling asleep, waking up because of pain, pain worse with sitting and walking all have sensitivity >75% for spondylolisthesis. Step-deformity palpation demonstrated 60-88% sensitivity and 87-100% specificity for spondylolisthesis. The one-legged hyperextension test was not supported for spondylolysis (sensitivity 50-73%, specificity 0-87%).

**Conclusion** No recommendations can be made utilising patient history data. Based on one low ROB study, step deformity palpation may be useful in diagnosing spondylolisthesis. No physical tests demonstrated diagnostic utility for spondylolysis. Further research is required.

Keywords: Spondylolysis, Spondylolisthesis, patient history, physical examination

## 2. LBP

### Sensory discrimination

BMC Musculoskelet Disord. 2016 Apr 2;17(1):143. doi: 10.1186/s12891-016-0997-8.

#### **What is the effect of sensory discrimination training on chronic low back pain? A systematic review.**

Kälin S<sup>1</sup>, Rausch-Osthoff AK<sup>1</sup>, Bauer CM<sup>2,3</sup>.

Author information

Abstract

#### **BACKGROUND:**

Sensory discrimination training (SDT) for people with chronic low back pain (CLBP) is a novel approach based on theories of the cortical reorganization of the neural system. SDT aims to reverse cortical reorganization, which is observed in chronic pain patients. SDT is still a developing therapeutic approach and its effects have not been systematically reviewed. The aim of this systematic review was to evaluate if SDT decreases pain and improves function in people with CLBP.

#### **METHODS:**

A systematic review was performed on the available literature to evaluate the effects of SDT. Randomised controlled trials compared the effectiveness of SDT on pain and function in people with CLBP with the effectiveness of other physiotherapy interventions, no treatment, or sham therapy. The methodological quality of the included studies and the clinical relevance of reported treatment effects were investigated.

#### **RESULTS:**

The original search revealed 42 records of which 6 fulfilled the inclusion criteria. The majority of studies showed that SDT caused statistically significant improvements in pain and function, but only two studies reported clinically relevant improvements. The applied SDT varied considerably with regard to dosage and content. The methodological quality of the included studies also varied, which hampered the comparability of results.

#### **CONCLUSIONS:**

Although SDT seems to improve pain and function in people with CLBP, study limitations render firm conclusions unsafe. Future studies should pay closer attention to power and sample selection as well as to the content and dosage of the SDT intervention. We recommend a large, well-powered, prospective randomized control study that uses a standardized SDT approach to address the hypothesis that SDT causes clinically relevant improvements in pain and function.

**KEYWORDS:** Low Back pain; Physical therapy; Rehabilitation; Sensory feedback training; Systematic review  
PMID: 27038609

## Obesity and LBP

BMC Musculoskelet Disord. 2016 Mar 31;17(1):140. doi: 10.1186/s12891-016-0992-0.

**Obesity is associated with more disability at presentation and after treatment in low back pain but not in neck pain: findings from the OIOC registry.**

Wertli MM<sup>1,2,3</sup>, Held U<sup>4</sup>, Campello M<sup>5</sup>, Schechter Weiner S<sup>5</sup>.

Author information

## Abstract

**BACKGROUND:** The influence on the treatment response in patients with low back pain (LBP) and neck pain (NP) is unknown. The aim of the study was to investigate the influence of body weight in patients with low back pain (LBP) and neck pain (NP) on baseline and end of treatment disability.

**METHODS:** Cross-sectional analysis of baseline factors. Longitudinal analysis of prospectively collected patient information at an outpatient physical therapy registry (data from June 2010 to December 2012). WHO-BMI classification was used: underweight, lean, overweight, obesity class I, obesity class II and III. The influence of body weight and a predefined set of confounders was analyzed by multiple regression models.

**RESULTS:** In LBP, disability increased with increasing BMI [lean = reference, obesity class I Beta 5.41 (95 % CI 0.75; 10.07), obesity class II-III Beta 7.58 (95 % CI 2.13; 13.03)]. Compared to lean patients, disability after treatment improved in overweight subjects [Beta -3.90 (95 % CI -7.4; -0.41)] but not in subjects with obesity class II-III [Beta 3.43 (95 % CI -3.81; 10.68)]. There were insufficient patients in the sample with severe obesity and therefore this trend has to be confirmed. The likelihood for meaningful important change (MID) was similar in all BMI subgroups. For patients with NP, BMI was not associated with baseline disability, and did not predict end of treatment disability or the likelihood of a MID. These findings must be interpreted with caution as BMI subgroups did not meet the required sample size.

**CONCLUSION:** Overweight and obesity are associated with higher levels of disability before treatment in LBP patients, but not in NP. In severely obese patients class II-III with LBP the rate of MID was lowest indicating that these patients experienced the least treatment response compared to the other groups. Further studies should address the impact of severe obesity on the prognosis of LBP. In patients with LBP, severe obesity may be an important factor to consider during the physical therapy treatment. In particular, combined treatment strategies combining weight management, cardiovascular fitness, and low back pain rehabilitation should be investigated.

PMID: 27036857

## Defining acute care

J Manipulative Physiol Ther. 2016 Mar 28. pii: S0161-4754(16)00052-X. doi: 10.1016/j.jmpt.2016.02.005.

Exploring the Definition of Acute Low Back Pain: A Prospective Observational Cohort Study Comparing Outcomes of Chiropractic Patients With 0-2, 2-4, and 4-12 Weeks of Symptoms.

Mantel KE<sup>1</sup>, Peterson CK<sup>2</sup>, Humphreys BK<sup>3</sup>.  
Author information

## Abstract

**OBJECTIVE:**

The purpose of this study was to compare improvement rates in patients with low back pain (LBP) undergoing chiropractic treatment with 0-2 weeks vs 2-4 and 4-12 weeks of symptoms.

**METHODS:**

This was a prospective cohort outcome study with 1-year follow-up including adult acute (symptoms 0-4 weeks) LBP patients. The numerical rating scale for pain (NRS) and Oswestry questionnaire were completed at baseline, 1 week, 1 month, and 3 months after starting treatment. The Patient Global Impression of Change (PGIC) scale was completed at all follow-up time points. At 6 months and 1 year, NRS and PGIC data were collected. The proportion of patients reporting relevant "improvement" (PGIC scale) was compared between patients having 0-2 and 2-4 weeks of symptoms using the  $\chi^2$  test at all data collection time points. The unpaired t test compared NRS and Oswestry change scores between these 2 groups.

**RESULTS:**

Patients with 0-2 weeks of symptoms were significantly more likely to "improve" at 1 week, 1 month, and 6 months compared with those with 2-4 weeks of symptoms ( $P < .015$ ). Patients with 0-2 weeks of symptoms reported significantly higher NRS and Oswestry change scores at all data collection time points. Outcomes for patients with 2-4 weeks of symptoms were similar to patients having 4-12 weeks of symptoms.

**CONCLUSION:**

The time period 0-4 weeks as the definition of "acute" should be challenged. Patients with 2-4 weeks of symptoms had outcomes similar to patients with subacute (4-12 weeks) symptoms and not with patients reporting 0-2 weeks of symptoms.

**KEYWORDS:** Chiropractic; Low Back Pain; Treatment Outcome  
PMID: 27034105

### 3. DISC

#### Stem cells

Eur Spine J. 2016 Mar 16.

#### **Distinguishing characteristics of stem cells derived from different anatomical regions of human degenerated intervertebral discs.**

Wang H<sup>1,2</sup>, Zhou Y<sup>1</sup>, Chu TW<sup>1</sup>, Li CQ<sup>1</sup>, Wang J<sup>1</sup>, Zhang ZF<sup>1</sup>, Huang B<sup>3</sup>.

[Author information](#)

#### Abstract

##### **INTRODUCTION:**

Several types of stem cells have been successfully demonstrated to exist in the human degenerated intervertebral disc (IVD), which is composed of annulus fibrosus (AF), nucleus pulposus (NP) and cartilage endplate (CEP). However, the differences in the biological characteristics among these and bone marrow derived mesenchymal stem cells (BM-MSCs) remain unclear.

##### **MATERIALS AND METHODS:**

To investigate this issue, cells were harvested from human AF, NP, CEP, and bone marrow, respectively; passage 2 cells were selected using the agarose suspension culture system to obtain stem cell clones. Following expansion in vitro, stem cells from different anatomical regions were compared regarding the morphology, proliferation ability, immunophenotypic expression, and multi-lineage differentiation capacity. In addition, stem cell-alginate bead compositions were constructed for the comparison of DNA and sGAG content.

##### **RESULTS:**

There were subtle differences regarding cell morphology, but no significant differences in proliferation ability among the four types of stem cells. For the immunophenotypic analysis, all stem cells basically fulfilled the criteria for mesenchymal stem cells (MSCs), which have been published by the International Society for Cellular Therapy (ISCT), with a significant difference in CD105 expression. A comparison of the osteogenic capacities indicated: cartilage endplate-derived stem cells (CESCs) > annulus fibrosus-derived stem cells (AFSCs) > BM-MSCs > nucleus pulposus-derived stem cells (NPSCs). The chondrogenesis difference was similar to osteogenesis. For adipogenesis: BM-MSCs > NPSCs > CESCs > AFSCs. In the stem cell/alginate composition, the CESCs consistently showed the superior chondrogenic potential among all those cell types.

##### **CONCLUSIONS:**

Our data indicated that all the four types of stem cells shared some similar biological properties (regarding shape, proliferation ability and immunophenotypic expression). CESCs, which had the strongest osteogenic and chondrogenic potentials, may serve as excellent seed cells for NP/cartilage or bone tissue engineering.

**KEYWORDS:** Biological characteristics; Comparison; Intervertebral disc; Tissue-specific stem cells

PMID: 26984881

## 5. SURGERY

### Fusion and adjacent segments

Eur Spine J. 2016 Mar 11.

#### **Adjacent segment degeneration after lumbar spinal fusion compared with motion-preservation procedures: a meta-analysis.**

Pan A<sup>1</sup>, Hai Y<sup>2</sup>, Yang J<sup>1</sup>, Zhou L<sup>1</sup>, Chen X<sup>1</sup>, Guo H<sup>1</sup>.

Author information

#### Abstract

##### **PURPOSE:**

This meta-analysis aimed to evaluate the efficacy of motion-preservation procedures to prevent the adjacent segment degeneration (ASDeg) or adjacent segment disease (ASDis) compared with fusion in lumbar spine.

##### **METHODS:**

PubMed, Embase and the Cochrane Library were comprehensively searched and a meta-analysis was performed of all randomized controlled trials and well designed prospective or retrospective comparative cohort studies assessing the lumbar fusion and motion-preservation procedures. We compared the ASDeg and ASDis rate, reoperation rate, operation time, blood loss, length of hospital stay, visual analogue scale (VAS) and Oswestry disability index (ODI) improvement of the two procedures.

##### **RESULTS:**

A total of 15 studies consisting of 1474 patients were included in this study. The meta-analysis indicated that the prevalence of ASDeg, ASDis and reoperation rate on the adjacent level were lower in motion-preservation procedures group than in the fusion group ( $P = 0.001$ ;  $P = 0.0004$ ;  $P < 0.0001$ ). Moreover, shorter length of hospital stay was found in motion-preservation procedures group ( $P < 0.0001$ ). No difference was found in terms of operation time ( $P = 0.57$ ), blood loss ( $P = 0.27$ ), VAS ( $P = 0.76$ ) and ODI improvement ( $P = 0.71$ ) between the two groups.

##### **CONCLUSIONS:**

The present evidences indicated that the motion-preservation procedures had an advantage on reducing the prevalence of ASDeg, ASDis and the reoperation rate due to the adjacent segment degeneration compared with the lumbar fusion. And the clinical outcomes of the two procedures are similar.

##### **KEYWORDS:**

Adjacent segment degeneration; Adjacent segment disease; Lumbar spinal fusion; Meta-analysis; Motion-preservation procedures  
PMID: 26968875

### 6. PELVIC GIRDLE

#### Pelvic floor mob

#### **Hip and groin pain in a cyclist resolved after performing *apelvic floor fascial mobilization***

Sivan Navot, BPT Leonid Kalichman, PT, PhD

#### **Abstract**

Pelvic floor muscle assessment in situations of hip/groin pain in both male and female patients can be a key element in treatment success. We present herein, a 32 year old male professional cyclist, exhibiting right hip and groin pain during cycling and prolonged sitting. The pain commenced after the patient suffered a right hip severe contusion in 2013 causing a tear in the tensor fascia lata and gluteus medius muscle. The patient did not complain of pelvic floor dysfunctions. After receiving several series of conventional physical therapy for the hip/groin pain, the patient experienced partial pain relief and slight improvement of hip range of motion. His pelvic floor muscles and fascia involvement were subsequently assessed. Two sessions of *Pelvic Floor Fascial Mobilization (PFFM)* were performed and the patient fully recovered. The authors believe that *PFFM*, a new fascial-oriented manual therapy of the pelvic floor approach, can be used for both hip/groin and pelvic floor pain or dysfunction.

Keywords: Pelvic floor fascial mobilization, Hip and groin pain, Pelvic floor, Fascial manipulation

## 7. PELVIC ORGANS/WOMAN'S HEALTH

### IBS and malignancies

J Gastroenterol. 2016 Apr 7.

#### **A population-based study examining the risk of malignancy in patients diagnosed with inflammatory bowel disease.**

Wilson JC<sup>1</sup>, Furlano RI<sup>2</sup>, Jick SS<sup>3</sup>, Meier CR<sup>4,5,6</sup>.  
Author information

Abstract

#### **BACKGROUND:**

Recent studies suggest an increased risk of malignancy in patients with inflammatory bowel disease (IBD), although the findings were inconsistent. We used data from the clinical practice research datalink (CPRD) to further examine this association.

#### **METHODS:**

Patients with a first-time diagnosis of IBD were randomly matched to an equally sized IBD-free comparison group. Multivariable adjusted hazard ratios (AHRs) for cancer risk were estimated using Cox's proportional hazard regression. A nested case-control analysis comprising IBD patients only was then conducted using conditional logistic regression to estimate the risk of cancer development according to IBD severity, disease duration and IBD therapy.

#### **RESULTS:**

We identified 1077 cancers among 39,294 IBD or IBD-free patients followed between 1995 and 2012. There was no association between IBD and overall risk of cancer [AHR 1.11, 95 % confidence interval (CI) 0.98-1.25], but a borderline increase in the risk of lymphoproliferative malignancies was observed in patients with IBD (AHR 1.49, 95 % CI 1.00-2.23).

Aminosalicylate use was significantly associated with reduced risk of all cancers [adjusted odds ratio (AOR), 0.72, 95 % CI 0.54-0.96], of intestinal cancer (AOR 0.33, 95 % 0.12-0.89) and of prostate cancer (AOR 0.32, 95 % 0.13-0.80).

#### **CONCLUSIONS:**

There was no increased risk of cancer overall in individuals with IBD compared to IBD-free individuals. Consistent with previous findings, a reduction in cancer risk was observed in IBD patients using aminosalicylates, with a substantial reduction in prostate cancer risk. Further large-scale studies examining the relationship between IBD therapy and cancer risk appear to be warranted.

**KEYWORDS:** Cancer risk; Inflammatory bowel disease; Malignancy; Observational study  
PMID: 27056729

**Endometriosis and leg pain****A Model for Radiating Leg Pain of Endometriosis**

Geoffrey M. Bove, DC PhD

University of New England College of Osteopathic Medicine, Biddeford, ME USA

DOI: <http://dx.doi.org/10.1016/j.jbmt.2016.04.013>**Summary**

Endometriosis is a prevalent female health disorder that often leads to back pain and radiating leg pain. Patients with such pain often seek care from multiple health care professionals, including manual therapists. We hypothesized that endometrioma can induce nerve inflammation thus the radiating leg pain that often accompanies endometriosis. To model sciatic endometriosis in female Wistar rats, a section of uterine horn was autotransplanted to the sciatic nerve. Uterus sections with the endometrium removed and autotransplanted to the sciatic nerve served as controls. After 1, 3, and 15 months the nerves were harvested and processed for immune cell presence and for neural elements. Control nerves were harvested after 4 months. All autotransplants survived, resulting in a fusion of the uterus sections to the nerves. Macroscopically, turgid cysts apposed to the nerves characterized the complexes. Microscopically, the complexes contained recruited macrophages, indicating persistent inflammation, and were innervated by small diameter axons. Only 1 of 8 control rats developed a small cyst, presumably due to residual endometrium. The persistent immune response and innervation suggest the nerve-uterus complexes as sources of inflammation and persistent neural discharge, and thus pain. This model could shed light upon the radiating leg pain that often accompanies endometriosis. Manual therapists should be aware of the possibility of endometriosis causing symptoms and examination findings that mimic musculoskeletal etiologies.

*Keywords:* endometrium, sciatic nerve, pain, rat, autotransplant

**Pelvic floor ex for incontinence**

*Urology*. 2016 Apr 5. pii: S0090-4295(16)30021-8. doi: 10.1016/j.urology.2016.03.034.

**Effects of Stabilization Exercises Focusing on Pelvic Floor Muscles on Low Back Pain and Urinary Incontinence in Women.**

Ghaderi F<sup>1</sup>, Mohammadi K<sup>2</sup>, Sasan RA<sup>2</sup>, Kheslat SN<sup>2</sup>, Oskouei AE<sup>3</sup>.

Author information

**Abstract****OBJECTIVES:**

To investigate the effects of stabilization exercises focusing on pelvic floor muscles on both low back pain and urinary incontinence in women suffering from chronic non-specific low back pain.

**METHODS:**

In a randomized clinical trial, 60 women with chronic non-specific low back pain and stress urinary incontinence ranging from 45 to 60 years old were recruited. They were randomly assigned to the control group (n=30) which received routine physiotherapy modalities and regular exercises or the training group (n=30) which received routine physiotherapy modalities and stabilization exercises focusing on pelvic floor muscle (12 weeks). Clinical characteristics of the study subjects including urinary incontinence intensity and quality of life assessed by International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form questionnaire, functional disability assessed by Oswestry disability index scores, pain intensity, pelvic floor muscle strength and endurance, and transverses abdominis muscle strength were measured before and after treatment.

**RESULTS:**

Functional disability and pain intensity were significantly decreased in control (p<0.05) and training groups (p<0.05), with no significant difference between the groups after treatment. However, urinary incontinence intensity was smaller for the training group (p<0.05). Pelvic floor muscle strength and endurance, and transverses abdominis muscle strength were statistically increased in the training group compared with those in the control group (p<0.05).

**CONCLUSIONS:**

Stabilization exercises focusing on pelvic floor muscle improves stress urinary incontinence as well as low back pain in women with chronic non-specific low back pain.

**KEYWORDS:** Low back pain; pelvic floor muscle; regular exercise; stabilization exercise; stress urinary incontinence

PMID:27059833

**High fructose and pregnancy**

Am J Obstet Gynecol. 2016 Apr 7. pii: S0002-9378(16)00530-5. doi: 10.1016/j.ajog.2016.03.038.

**High-fructose diet in pregnancy leads to fetal programming of hypertension, insulin resistance, and obesity in adult offspring.**

Saad AF<sup>1</sup>, Dickerson J<sup>2</sup>, Kechichian TB<sup>2</sup>, Yin H<sup>2</sup>, Gamble P<sup>2</sup>, Salazar A<sup>2</sup>, Patrikeev I<sup>2</sup>, Motamedi M<sup>2</sup>, Saade GR<sup>2</sup>, Costantine MM<sup>2</sup>.

Author information

Abstract

**BACKGROUND:**

Consumption of fructose-rich diets in the United States is on the rise and thought to be associated with obesity and cardiometabolic diseases.

**OBJECTIVE:**

We sought to determine the effects of antenatal exposure to high-fructose diet on offspring's development of metabolic syndrome-like phenotype and other cardiovascular disease risk factors later in life.

**STUDY DESIGN:**

Pregnant C57BL/6J dams were randomly allocated to fructose solution (10% wt/vol, n = 10) or water (n = 10) as the only drinking fluid from day 1 of pregnancy until delivery. After weaning, pups were started on regular chow, and evaluated at 1 year of life. We measured percent visceral adipose tissue and liver fat infiltrates using computed tomography, and blood pressure using CODA/noninvasive monitor. Intraperitoneal glucose tolerance testing with corresponding insulin concentrations were obtained. Serum concentrations of glucose, insulin, triglycerides, total cholesterol, leptin, and adiponectin were measured in duplicate using standardized assays. Fasting homeostatic model assessment was also calculated to assess insulin resistance. P values <.05 were considered statistically significant.

**RESULTS:**

Maternal weight, pup number, and average weight at birth were similar between the 2 groups. Male and female fructose group offspring had higher peak glucose and area under the intraperitoneal glucose tolerance testing curve compared with control, and higher mean arterial pressure compared to control. Female fructose group offspring were heavier and had higher percent visceral adipose tissue, liver fat infiltrates, homeostatic model assessment of insulin resistance scores, insulin area under the intraperitoneal glucose tolerance testing curve, and serum concentrations of leptin, and lower concentrations of adiponectin compared to female control offspring. No significant differences in these parameters were noted in male offspring. Serum concentrations of triglycerides or total cholesterol were not different between the 2 groups for either gender.

**CONCLUSION:**

Maternal intake of high fructose leads to fetal programming of adult obesity, hypertension, and metabolic dysfunction, all risk factors for cardiovascular disease. This fetal programming is more pronounced in female offspring. Limiting intake of high fructose-enriched diets in pregnancy may have significant impact on long-term health.

**Breast-feeding and Vit. D**

Osteoporos Int. 2016 Apr 5.

**The effect of prolonged breast-feeding on the development of postmenopausal osteoporosis in population with insufficient calcium intake and vitamin D level.**

Yun BH<sup>1,2</sup>, Chon SJ<sup>3</sup>, Choi YS<sup>1,2</sup>, Cho S<sup>2,4</sup>, Lee BS<sup>1,2</sup>, Seo SK<sup>5,6</sup>.

Author information

**Abstract**

Breast-feeding affects bone metabolism and calcium homeostasis, and prolonged breast-feeding may influence the development of postmenopausal osteoporosis, particularly in highly susceptible populations. The study determined that breast-feeding may be a risk factor for postmenopausal osteoporosis, especially in people with low calcium intakes and vitamin D deficiencies.

**INTRODUCTION:**

The purpose of this study was to determine whether breast-feeding is a risk factor in the development of postmenopausal osteoporosis, especially in highly susceptible population.

**METHODS:**

The study was performed using data from the 2010 to 2011 Korea National Health and Nutrition Examination Survey, and it included 1231 postmenopausal women who were aged between 45 and 70 years. Osteoporosis was defined using the World Health Organization's T-score criteria, namely, a T-score of  $\leq -2.5$  at the femoral neck or the lumbar spine. The patients' ages, body mass indexes, daily calcium intakes, serum vitamin D levels, exercise levels, smoking histories, and reproductive factors relating to menarche, menopause, delivery, breast-feeding, hormone treatment, and oral contraceptive use were evaluated. Comparisons between the osteoporosis and non-osteoporosis groups were undertaken using Student's t test and the chi-square test, and logistic regression models were built.

**RESULTS:**

A significant increase in the risk of osteoporosis was apparent in postmenopausal women with prolonged breast-feeding histories ( $\geq 24$  months) (model 1: odds ratio [OR] = 2.489; 95 % confidence interval [CI] = 1.111 to 5.578,  $p = 0.027$ ; model 2: OR = 2.503; 95 % CI = 1.118 to 5.602,  $p = 0.026$ ; model 3: OR = 2.825; 95 % CI = 1.056 to 7.56,  $p = 0.039$ ), particularly in those with inadequate serum vitamin D levels and calcium intakes ( $< 800$  mg/day).

**CONCLUSIONS:**

Breast-feeding seems to increase the risk of postmenopausal osteoporosis; however, its impact may not be definitive in women with sufficient vitamin D levels and calcium intakes. Therefore, sufficient calcium intakes and adequate vitamin D levels may be important to prevent osteoporosis in postmenopausal women that is derived from breast-feeding.

**KEYWORDS:** Breast-feeding; Calcium intake; Menopause; Osteoporosis; Vitamin D deficiency  
PMID: 27048389

## 8. VISCERA

### Crohn's disease and depression

Am J Gastroenterol. 2016 Apr 5. doi: 10.1038/ajg.2016.98.

#### **Association Between Affective-Cognitive Symptoms of Depression and Exacerbation of Crohn's Disease.**

Gaines LS1,2, Slaughter JC3, Horst SN1, Schwartz DA1, Beaulieu DB1, Haman KL2, Wang L3, Martin CF4, Long MD4, Sandler RS4, Kappelman MD5.

Author information

Abstract

#### **OBJECTIVES:**

The prevalence of depression is high in patients with Crohn's disease (CD). We examined the influence of affective-cognitive symptoms of depression on the risk of exacerbation of CD.

#### **METHODS:**

We studied 2,144 adult volunteers with a self-reported diagnosis of CD who completed a baseline survey that included demographics, CD status, and an affective-cognitive index of depression. Linear and logistic regression analyses were used to determine whether CD status at 12 months was associated with the baseline measure of depression. Analyses were adjusted for confounders including age, gender, race, baseline disease activity, disease duration, prior hospitalization and surgery, corticosteroid and anti-TNF use, medication adherence, body mass index, current smoking, education, and sleep quality.

#### **RESULTS:**

Depression was significantly associated with subsequent increases in SCDAI score in both unadjusted ( $P < 0.001$ ) and adjusted ( $P < 0.001$ ) analyses. This association was non-linear, with a shallower slope for lower levels of depression. A 10-point increase in depression t-scores from 55 to 65 was associated with a 18.6-point increase in SCDAI (95% CI 11.5-25.6) and an odds ratio of 1.27 for SCDAI > 150 at follow-up (CI: 1.01-1.60). We also found a significant association between depressive symptoms and hospitalization.

#### **CONCLUSIONS:**

Cognitive-affective depressive symptoms were significantly associated with a risk of exacerbation of CD and hospitalization. Am J Gastroenterol advance online publication, 5 April 2016; doi:10.1038/ajg.2016.98.

PMID: 27045927

**IBS and anemia**

Digestion. 2016 Mar 25;93(3):214-220.

**Anaemia in Patients with Inflammatory Bowel Disease - A Nationwide Cross-Sectional Study.**

Portela F<sup>1</sup>, Lago P, Cotter J, Gonçalves R, Vasconcelos H, Ministro P, Lopes S, Eusébio M, Morna H, Cravo M, Peixe P, Cremmers I, Sousa H, Deus J, Duarte M, Magro F; CAPOR Investigators and GEDII.

Author information

Abstract

**BACKGROUND:**

Anaemia is the most common complication in patients with inflammatory bowel disease (IBD). This study aims to assess the prevalence of anaemia in IBD patients and to know its characteristics with regard to the main IBD clinical features.

**METHODS:**

An observational cross-sectional multicentre study was conducted. We included all patients who had an appointment at the 15 participating centres during the period of 1 month, and who met the following selection criteria: age  $\geq 18$ , diagnosis of IBD. Disease activity was evaluated by Harvey-Bradshaw Index (HBI) for Crohn's disease (CD), and by Simple Clinical Colitis Activity Index (SCCAI) for ulcerative colitis (UC).

**RESULTS:**

One thousand three hundred and thirteen patients, were included: 54.8% female, mean age 42.8 (interquartile range (25th-75th): 31-53 years), 59% had a diagnosis of CD, 39% of UC and 2% IBD unclassified. The median follow-up since diagnosis was 7 years. The ongoing treatment was aminosalicylates (63.1%), corticosteroids (11.6%), immunomodulators (36.4%) and anti-tumour necrosis factor (27.3%). Anaemia was identified in 244 patients, representing a prevalence of 18.6% (95% CI 16.6-20.9). A majority of cases (90%) have mild/moderate anaemia (mean haemoglobin  $11.3 \pm 0.8$  g/dl). Anaemia was significantly higher in females ( $p = 0.006$ ), but there were no differences between CDs (19.1%) and UCs (17.7%;  $p = 0.688$ ). Anaemia was more frequent in patients with active disease (HBI  $>4$ ; SCCAI  $>2$ ) than in those in clinical remission (33.6 vs. 15.6%,  $p < 0.001$ ) and in patients on steroids (36.8%) vs. other treatments ( $p < 0.001$ ). Only 47% of patients with anaemia were under any specific treatment (oral iron 67%; intravenous iron 41%).

**CONCLUSION:**

Anaemia was more frequent in patients with active disease and in those on corticosteroids. The treatment of anaemia still seems undervalued, whereas more than half of anaemic patients were not receiving any specific treatment and the use of oral iron prevails contrarily to current recommendations.

PMID: 27022722

**Bladder and central sensitisation**

J Urol. 2016 Mar 26. pii: S0022-5347(16)30012-X. doi: 10.1016/j.juro.2016.03.142.

**Autonomic Testing in Women with Chronic Pelvic Pain.**

Chelimsky G<sup>1</sup>, Simpson P<sup>1</sup>, McCabe N<sup>2</sup>, Zhang L<sup>1</sup>, Chelimsky T<sup>3</sup>.

Author information

Abstract

**PURPOSE:**

Determine if abnormal autonomic nervous system (ANS) innervation of the bladder underlies interstitial cystitis/bladder pain syndrome (IC/BPS) differently than other chronic pelvic pain (CPP).

**MATERIAL AND METHODS:**

IRB approved protocol, 134 subjects enrolled, 3 excluded, 39 healthy controls (HC), 36 IC/BPS, 14 myofascial pelvic pain (MPP), 42 IC/BPS plus MPP. ANS evaluations: deep breathing, Valsalva maneuver, tilt table test (TTT), and sudomotor test (evaluates for autonomic neuropathy (AN)). A modified validated composite autonomic laboratory score was applied.

**RESULTS:**

IC/BPS group 47.5 (21, 78) yrs was older than HC 34 (20, 75) yrs ( $p=0.006$ ), MPP group 33 (22, 56) yrs ( $p=0.004$ ), and IC/BPS plus MPP 38 (18, 64) yrs ( $p=0.03$ ). BMI was not significantly different among groups, but the MPP and IC/BPS plus MPP groups had a higher BMI than HC ( $p=0.03$  and  $p=0.05$  respectively). Cardiovascular and adrenergic indexes did not differ among groups. TTT showed more orthostatic intolerance (OI) in all CPP groups. TTT diagnoses (orthostatic hypotension, postural tachycardia syndrome -POTS, reflex syncope) occurred rarely. Baseline heart rate (HR) was higher in all CPP groups ( $p=0.004$ ). All MPP groups showed significantly more clearcut AN (defined as sweat score  $\geq 3$ ) compare to HC (HC vs IC/BPS plus MPP  $p=0.007$ ; HC vs MPP  $p=0.03$ ).

**CONCLUSIONS:**

Some CPP types show an autonomic neuropathy, and some show vagal withdrawal. In all types, orthostatic intolerance likely reflects central sensitization and perhaps catastrophization. Some of these findings suggest novel therapeutic targets.

**KEYWORDS:** Interstitial Cystitis/Bladder Pain Syndrome; autonomic nervous system; autonomic neuropathy; pelvic pain

PMID: 27026035

**Esophagus**

JAMA Otolaryngol Head Neck Surg. 2016 Mar 24. doi: 10.1001/jamaoto.2015.3038.

**Cervical Spine Spondylodiscitis After Esophageal Dilation in Patients With a History of Laryngectomy or Pharyngectomy and Pharyngeal Irradiation.**

D'Souza JN<sup>1</sup>, Luginbuhl AJ<sup>1</sup>, Goldman RA<sup>2</sup>, Heller JE<sup>3</sup>, Curry JM<sup>1</sup>, Cognetti DM<sup>1</sup>.  
Author information

## Abstract

**IMPORTANCE:**

Dysphagia is a frequently reported sequela of treatment for head and neck cancer and is often managed with esophageal dilation in patients with dysphagia secondary to hypopharyngeal or esophageal stenosis. Reported complications of esophagoscopy with dilation include bleeding, esophageal perforation, and mediastinitis. These, though rare, can lead to substantial morbidity or mortality. In patients who have undergone irradiation, tissue fibrosis and devascularization may contribute to a higher incidence of these complications.

**OBJECTIVES:**

To describe the occurrence of cervical spine spondylodiscitis (CSS) following esophageal dilation in patients with a history of laryngectomy or pharyngectomy and irradiation with or without chemotherapy.

**DESIGN, SETTING, AND PARTICIPANTS:**

Medical records from a 5-year period (January 1, 2009, through December 31, 2014) in an academic tertiary care center were searched for patients with a history of laryngopharyngeal irradiation and a diagnosis of CSS following esophageal dilation. Four eligible patients were identified.

**MAIN OUTCOMES AND MEASURES:**

Recognition and treatment of CSS in the study population.

**RESULTS:**

A total of 1221 patients underwent esophageal dilation for any reason. Of these, 247 patients carried a diagnosis of head and neck cancer at the following sites: piriform sinus, larynx, hypopharynx, epiglottis, oropharynx, base of the tongue, and tonsil. Of these, 4 patients with a diagnosis of CSS following esophageal dilation were included in this assessment. Prompt diagnosis and multidisciplinary management of CSS with intravenous antibiotics as well as spinal surgical debridement and stabilization led to recovery of full ability to take food by mouth in 3 of the 4 included patients. One patient remained dependent on the feeding tube.

**CONCLUSION AND RELEVANCE:**

In patients with a history of laryngopharyngeal irradiation and esophageal dilation, complaints of neck pain or upper extremity weakness should trigger immediate evaluation for CSS; if present, prompt therapy is essential for prevention of substantial morbidity and mortality.

PMID:27010455

**12 A. WHIPLASH****Tongue volume**

Head Face Med. 2016 Mar 22;12(1):12. doi: 10.1186/s13005-016-0110-4.

**Tongue volume in adults with skeletal Class III dentofacial deformities.**

Ihan Hren N<sup>1</sup>, Barbič U<sup>2</sup>.

Author information

Abstract

**BACKGROUND:**

The size of the tongue is implicated as an essential etiological factor in the development of malocclusions. The aim of our study was to assess tongue size in skeletal Class III (SCIII) patients in comparison to adults with normal occlusion, using three-dimensional (3D) ultrasound.

**METHODS:**

The SCIII group consisted of 54 subjects; 34 females and 20 males and the control group contained 36 subjects, 18 from each gender with Class I relationship. 3D ultrasound images of the tongues were acquired, and then the tongues' volumes were assessed.

**RESULTS:**

The males in both the SCIII and control groups had significantly larger tongue volumes than the female subjects (mean SCIII  $100.8 \pm 6.3$  and control  $92.4 \pm 9.8$  cm<sup>3</sup> in males vs. SCIII  $77.4 \pm 10.2$  and control  $67.2 \pm 5.6$  cm<sup>3</sup> in females). The highly significantly larger tongue volumes were in SCIII patients of both genders (p were less than 0.01 for female and 0.03 for male). The tongue volumes within the whole SCIII group were significantly larger with more negative Wits values.

**CONCLUSION:**

The tongue volumes are significantly bigger in SCIII subjects than normal. Larger tongues correlate with more severe SCIII. The clinical importance of this data is that limited mandibular setback planning is necessary to prevent narrowing of respiratory airways.

**KEYWORDS:** Skeletal Class III; Tongue; Volume

PMID: 27004947

## Fusion for a specific subset of C spine pain

### **A small group Whiplash-Associated-Disorders (WAD) patients with central neck pain and movement induced stabbing pain, the painful segment determined by mechanical provocation: Fusion surgery was superior to multimodal rehabilitation in a randomized trial**

Scandinavian Journal of Pain, 04/06/2016 Nyström B, et al.

The authors' aim was to evaluate the possibility of (a) selecting a subgroup of chronic WAD patients based on specified symptoms possibly indicating segmental pain, and (b) treating said segmental pain through fusion operation based on non-radiological segment localization. The results support the supposition that among patients with central neck pain for long periods of time following a whiplash injury there are some in whom the neck pain emanates from a motion segment, probably the disc, a situation suitable for fusion surgery.

#### Methods

- Eligible patients for the study had a traffic accident as the origin for their neck pain, and no previous neck symptoms.
- Neck pain should be the predominant symptom and the pain origin reported to be in the midline, being dull, aching in character and at sudden movements combined by a stabbing pain in the same area.
- Forty-nine patients with these specified symptoms were identified among a large number of chronic WAD patients.
- Those selected had pronounced symptoms for a median of around 50 months and had previously been investigated and fully treated within the ordinary healthcare system without success.
- No neurological abnormalities were to be found at clinical examination and no specific changes to be seen on X-ray and MRI.
- The patients were randomized to either cervical fusion operation or multimodal rehabilitation.
- By using a mechanical provocation test the level/s to be fused were identified.
- In all but one patient the surgery was performed anteriorly using microsurgical technique and a right-sided Smith-Pedersen approach and plate fixation.
- The multimodal rehabilitation at the Clinic of Medical Rehabilitation, Karolinska Hospital, Stockholm, included outpatient treatment for four days a week for six weeks and included treatment by physician, physiotherapists, occupational therapist, psychologists, social-service worker and nurses.
- Perceived change in neck pain was assessed using the Balanced Inventory for Spinal Disorders questionnaire at the 2-year-follow-up.

#### Results

- Mean age of the patients was 38 and 40 years (surgery and rehabilitation groups, respectively), the most common type of accident being rear-end collision.
- At clinical examination muscle tenderness was not an outstanding sign.
- In most patients the mid-cervical region appeared to be the painful area but one patient localized the pain to C1.
- At follow-up 67% of the patients in the surgery group and 23% in the rehabilitation group assessed improvements in the ITT analysis.
- Corresponding proportions in the per protocol analysis were 83% and 12%, respectively.

### 13. CRANIUM/TMJ

#### Swallowing

J Oral Rehabil. 2016 Mar 29. doi: 10.1111/joor.12397.

#### **Effect of occlusal vertical dimension on swallowing patterns and perioral electromyographic activity.**

MacAvoy SK<sup>1</sup>, Jack HC<sup>1</sup>, Kieser J<sup>1</sup>, Farella M<sup>1</sup>.

Author information

#### Abstract

Abnormal swallow patterns have been associated with specific dentofacial traits, such as an anterior open bite, but the cause-effect relationship between swallowing and malocclusion remains highly controversial. The aim of this research was to determine the effects of acute change in occlusal vertical dimension (OVD) on intraoral pressure swallow patterns and perioral electromyographic activity (EMG) during swallowing. Ten volunteers (five female, five male; 27-32 years) repeated standardised swallowing tasks as the OVD was progressively increased using mandibular trays of different heights. Standardised swallowing tasks were performed repetitively with each tray in place. Individual swallowing waveforms were quantitatively and qualitatively analysed. Peak pressure, swallow duration, time to peak pressure and lip EMG peak activity were assessed for each swallow. Data were analysed using mixed-model analysis. As OVD increased, lip peak pressure during swallowing increased almost threefold (+2.1 kPa;  $P \leq 0.001$ ), whereas swallow duration increased by 12.7 per cent (+160 ms;  $P = 0.01$ ) at lip level and by 26.4 per cent (+270 ms;  $P < 0.001$ ) at tongue level. Perioral muscle activity during swallows increased by 43.7 per cent ( $P \leq 0.01$ ) up to the OVD where resting lip seal was not attainable. Swallowing waveforms varied markedly between individuals, but interindividual waveforms were only minimally affected. The adaptive response and the waveform similarities associated with OVD variation supports the existence of a central control mechanism for swallowing, which may be modified by peripheral inputs.

**KEYWORDS:** electromyo-graphy; intraoral pressure; malocclusion; open bite; swallowing; vertical dimension  
PMID: 27027864

**Muscles**

J Dent Res. 2016 Apr;95(4):416-22. doi: 10.1177/0022034515625216. Epub 2016 Jan 12.

**Longitudinal Multilevel Modeling of Facial Pain, Muscle Tension, and Stress.**

Glaros AG<sup>1</sup>, Marszalek JM<sup>2</sup>, Williams KB<sup>3</sup>.

Author information

**Abstract**

The role of masticatory muscle activation on pain in temporomandibular muscle and joint disorders (TMJD) is controversial. This single-group, prospective panel study examined the relationships among masticatory muscle tension, emotional distress, and TMJD pain in a sample of 7,023 observations obtained from 171 individuals using longitudinal multilevel modeling. Three main hypotheses were tested. The first posited that emotional distress and muscle tension directly influenced pain (hypothesis 1a: Distress → TMJD Pain; hypothesis 1b: Muscle Tension → TMJD Pain). The second posited that emotional distress directly influenced muscle tension (Distress → Muscle Tension), and the third posited that the effect of emotional distress on pain was mediated by muscle tension (Distress → Muscle Tension → TMJD pain). We also examined the fit of the data to possible alternative models. All the data used in this study were collected via an experience sampling methodology. The fit of the preferred models was better than that of the alternative models, with the preferred models explaining large proportions of the data, especially for level 2 variance (hypothesis 1a = 41% variance; hypothesis 1b = 69% variance; hypothesis 2 = 48% variance). In the mediation model, the addition of muscle tension to the model reduced the impact of emotional distress.

The findings support a causal role for masticatory muscle tension in TMJD pain. Clinically, the results suggest that addressing tension and other oral parafunctions in those diagnosed with TMJDs should be an important part of the conservative, noninvasive care of individuals diagnosed with the myofascial pain or arthralgia of TMJD.

**KEYWORDS:** distress; experience sampling; masticatory muscles; parafunctions; temporomandibular; therapeutics

PMID: 26758381

**14. HEADACHES****Cerebellar involvement in HA**

Cephalalgia. 2016 Apr 7. pii: 0333102416643527.

**Cerebellar function and ischemic brain lesions in migraine patients from the general population.**

Koppen H<sup>1</sup>, Boele HJ<sup>2</sup>, Palm-Meinders IH<sup>3</sup>, Koutstaal BJ<sup>2</sup>, Horlings CG<sup>4</sup>, Koekkoek BK<sup>2</sup>, van der Geest J<sup>2</sup>, Smit AE<sup>2</sup>, van Buchem MA<sup>3</sup>, Launer LJ<sup>5</sup>, Terwindt GM<sup>6</sup>, Bloem BR<sup>4</sup>, Kruit MC<sup>3</sup>, Ferrari MD<sup>6</sup>, De Zeeuw CI<sup>7</sup>.

Author information

Abstract

**OBJECTIVE:**

The objective of this article is to obtain detailed quantitative assessment of cerebellar function and structure in unselected migraine patients and controls from the general population.

**METHODS:**

A total of 282 clinically well-defined participants (migraine with aura n = 111; migraine without aura n = 89; non-migraine controls n = 82; age range 43-72; 72% female) from a population-based study were subjected to a range of sensitive and validated cerebellar tests that cover functions of all main parts of the cerebellar cortex, including cerebrotocerebellum, spinocerebellum, and vestibulocerebellum. In addition, all participants underwent magnetic resonance imaging (MRI) of the brain to screen for cerebellar lesions. As a positive control, the same cerebellar tests were conducted in 13 patients with familial hemiplegic migraine type 1 (FHM1; age range 19-64; 69% female) all carrying a CACNA1A mutation known to affect cerebellar function.

**RESULTS:**

MRI revealed cerebellar ischemic lesions in 17/196 (8.5%) migraine patients and 3/79 (4%) controls, which were always located in the posterior lobe except for one control. With regard to the cerebellar tests, there were no differences between migraine patients with aura, migraine patients without aura, and controls for the: (i) Purdue-pegboard test for fine motor skills (assembly scores p = 0.1); (ii) block-design test for visuospatial ability (mean scaled scores p = 0.2); (iii) prism-adaptation task for limb learning (shift scores p = 0.8); (iv) eyeblink-conditioning task for learning-dependent timing (peak-time p = 0.1); and (v) body-sway test for balance capabilities (pitch velocity score under two-legs stance condition p = 0.5). Among migraine patients, those with cerebellar ischaemic lesions performed worse than those without lesions on the assembly scores of the pegboard task (p < 0.005), but not on the primary outcome measures of the other tasks. Compared with controls and non-hemiplegic migraine patients, FHM1 patients showed substantially more deficits on all primary outcomes, including Purdue-peg assembly (p < 0.05), block-design scaled score (p < 0.001), shift in prism-adaptation (p < 0.001), peak-time of conditioned eyeblink responses (p < 0.05) and pitch-velocity score during stance-sway test (p < 0.001).

**CONCLUSIONS:**

Unselected migraine patients from the general population show normal cerebellar functions despite having increased prevalence of ischaemic lesions in the cerebellar posterior lobe. Except for an impaired pegboard test revealing deficits in fine motor skills, these lesions appear to have little functional impact. In contrast, all cerebellar functions were significantly impaired in participants with FHM1.

## Migraine and frontal lobe

Cephalalgia. 2016 Apr 5. pii: 0333102416641665.

**The altered right frontoparietal network functional connectivity in migraine and the modulation effect of treatment.**

Li Z<sup>1</sup>, Lan L<sup>2</sup>, Zeng F<sup>2</sup>, Makris N<sup>3</sup>, Hwang J<sup>4</sup>, Guo T<sup>2</sup>, Wu F<sup>2</sup>, Gao Y<sup>2</sup>, Dong M<sup>2</sup>, Liu M<sup>5</sup>, Yang J<sup>2</sup>, Li Y<sup>2</sup>, Gong Q<sup>6</sup>, Sun S<sup>3</sup>, Liang F<sup>7</sup>, Kong J<sup>3</sup>.

Author information

**Abstract****AIMS:**

This study aims to investigate the resting-state functional connectivity (rs-fc) of the right frontoparietal network (rFPN) between migraineurs and healthy controls (HCs) in order to determine how the rFPN rs-fc can be modulated by effective treatment.

**METHODS:**

One hundred patients and 46 matched HCs were recruited. Migraineurs were randomized to verum acupuncture, sham acupuncture, and waiting list groups. Resting-state functional magnetic resonance imaging data were collected before and after longitudinal treatments. Independent component analysis was applied in the data analysis.

**RESULTS:**

We found that migraineurs showed decreased rs-fc between the rFPN and bilateral precuneus compared with HCs. After treatments (real and sham), rFPN rs-fc with the precuneus was significantly reduced. This reduction was associated with headache intensity relief. In order to explore the role of the precuneus in acupuncture modulation, we performed a seed-based rs-fc analysis using the precuneus as a seed and found that the precuneus rs-fc with the bilateral rostral anterior cingulate cortex/medial prefrontal cortex, ventral striatum, and dorsolateral prefrontal cortex was significantly enhanced after treatment.

**CONCLUSION:**

Our results suggest that migraineurs are associated with abnormal rFPN rs-fc. An effective treatment, such as acupuncture, may relieve symptoms by strengthening the cognitive adaptation/coping process. Elucidation of the adaptation/coping mechanisms may open up a new window for migraine management.

**KEYWORDS:** Acupuncture; fMRI; frontoparietal network; independent component analysis; migraine without aura; resting-state functional connectivity

PMID:27053062

**Migraine secondary TP's**

Plast Reconstr Surg. 2016 Apr;137(4):712e-6e. doi: 10.1097/PRS.0000000000002011.

**Emergence of Secondary Trigger Sites after Primary Migraine Surgery.**

Punjabi A<sup>1</sup>, Brown M, Guyuron B.

**Author information**

<sup>1</sup>Cleveland, Ohio From the Department of Plastic Surgery, Case Western Reserve University.

**Abstract****BACKGROUND:**

Surgical decompression of a migraine headache may unmask headaches originating from secondary sites. A retrospective chart review investigated the incidence and characteristics of secondary trigger sites to identify clinical patterns that could aid in predicting and perhaps reducing postoperative migraines.

**METHODS:**

One hundred eighty-five charts for migraine patients who underwent surgery at the senior author's (B.G.) practice were reviewed. Sites from which migraine headaches initiated or occurred independently were considered primary. The sites that were not active at the time of preoperative evaluation but became active after surgery were considered secondary. Bivariate analysis was performed to characterize postoperative migraines.

**RESULTS:**

Of 185 patients, 33 (17.8 percent) developed secondary migraine headache trigger sites. Of patients with primary site I (frontal) symptoms, 20.83 percent had site III (septonasal) symptoms unmasked after surgery (versus 7 percent for patients with other primary sites;  $p = 0.04$ ). Of the patients with site II (temporal) migraines, 17.14 percent had secondary frontal symptoms (versus 5.68 percent;  $p = 0.04$ ). Primary site II symptoms predicted postoperative site IV (occipital) symptoms (11.43 versus 1.1 percent;  $p = 0.008$ ), and primary occipital symptoms predicted postoperative temporal symptoms (11.1 versus 2.33 percent;  $p = 0.04$ ).

**CONCLUSIONS:**

The authors observed that 17.8 percent of patients develop postoperative migraine headache triggers that are not reported during the initial assessment. Knowledge of secondary migraine emergence patterns, and the presence of some preoperative symptoms, can aid in predicting the migraines that will arise from a new site postoperatively.

**CLINICAL QUESTION/LEVEL OF EVIDENCE:**

Therapeutic, IV.

PMID: 27018699

**Olfactory hallucinations and migraines**

Cephalalgia. 2016 Mar 31. pii: 0333102416630580.

**Scent of aura? Clinical features of olfactory hallucinations during a migraine attack (OHM).**

Mainardi F<sup>1</sup>, Rapoport A<sup>2</sup>, Zanchin G<sup>3</sup>, Maggioni F<sup>3</sup>.  
Author information

## Abstract

**INTRODUCTION:**

Olfactory hallucination during a migraine attack (OHM) is a rare phenomenon. At present, it is not considered a manifestation of migraine aura.

**MATERIAL AND METHODS:**

The clinical features of OHM were collected in 11 patients.

**RESULTS:**

Of the 11 patients, 10 had migraine without aura and one migraine with aura associated with OHM. Mean age at onset of headache and at appearance of OHM were respectively 17.8 and 32.3 years. Migraine average frequency was 3.9 attacks/month, 19% of them being associated with OHM. The temporal pattern of OHM maintained the same characteristics in the different attacks. OHM onset was described as sudden (n = 5), gradual (n = 3), initially sudden and then gradual (n = 2), or developing in a few seconds (n = 1). In most of the cases (n = 8) OHM lasted from 3 to 10 minutes; it persisted during the pain phase (2-24 hours) in only three patients. The type of the perceived smell was invariably constant in nine patients.

**CONCLUSION:**

OHM features fulfilled the ICHD-III beta criteria for typical aura.

**KEYWORDS:**

International Classification of Headache Disorders (ICHD-III beta); Olfactory hallucination; atypical aura; aura; headache diagnostic criteria; migraine; olfactory aura; panthosmia; pathogenesis  
PMID: 27036639

## 16. CONCUSSIONS

### Frontal blows

Int J Sports Med. 2016 Feb 9.

**Effect of Repetitive Sub-concussive Head Impacts on Ocular Near Point of Convergence.**  
Kawata K1, Tierney R1, Phillips J1, Jeka JJ1.

#### **Abstract**

This study intended to examine effects of repetitive sub-concussive head impacts on ocular near point of convergence (NPC). 20 healthy young adult soccer players were assigned to either a heading or control group.

Heading subjects completed 10 headers of soccer balls projected at a speed of 11.2 m/s. Control subjects did not perform heading. Linear head acceleration was measured with a triaxial accelerometer. The NPC assessment was performed at pre-, 0 h post-, and 24 h post-heading. During the NPC assessment participants were seated and a visual target was moved towards the eyes at 1cm/sec. The participant signaled when he/she experienced diplopia or deviation of the eye was observed, and the distance was recorded. The assessment was repeated twice and average NPC scores were used for further analysis. Soccer heading induced mean group head accelerations of  $14.49 \pm 5.4$  g. Mild head impacts led to an increased NPC distance, which was supported by a significant Group x Time interaction. In the heading group, 0 h post- and 24 h post-heading NPC scores were significantly receded compared to baseline. Conversely, NPC scores for the control group showed no difference over time.

Our findings indicate that mild frontal head impacts affect NPC for a minimum of 24 h-post heading, suggesting that oculomotor processes are disrupted, at least transiently, by repetitive mild head impact.

**20 A. ROTATOR CUFF****RC Pain****Rotator cuff related shoulder pain: Assessment, management and uncertainties**

Dr Jeremy Lewis, PhD FCSP

DOI: <http://dx.doi.org/10.1016/j.math.2016.03.009>**Abstract****Introduction**

Rotator cuff related shoulder pain (RCRSP) is an over-arching term that encompasses a spectrum of shoulder conditions including; subacromial pain (impingement) syndrome, rotator cuff tendinopathy, and symptomatic partial and full thickness rotator cuff tears. For those diagnosed with RCRSP one aim of treatment is to achieve symptom free shoulder movement and function. Findings from published high quality research investigations suggest that a graduated and well-constructed exercise approach confers at least equivalent benefit as that derived from surgery for; subacromial pain (impingement) syndrome, rotator cuff tendinopathy, partial thickness RC tears and atraumatic full thickness rotator cuff tears. However considerable deficits in our understanding of RCRSP persist. These include; (i) cause and source of symptoms, (ii) establishing a definitive diagnosis, (iii) establishing the epidemiology of symptomatic RCRSP, (iv) knowing which tissues or systems to target intervention, and (v) which interventions are most effective.

**Purpose**

The aim of this masterclass is to address a number of these areas of uncertainty and it will focus on; (i) RC function, (ii) symptoms, (iii) aetiology, (iv) assessment and management, (v) imaging, and (vi) uncertainties associated with surgery.

**Implications**

Although people experiencing RCRSP should derive considerable confidence that exercise therapy is associated with successful outcomes that are comparable to surgery, outcomes may be incomplete and associated with persisting and recurring symptoms. This underpins the need for ongoing research to; better understand the aetiology, improve methods of assessment and management, and eventually prevent these conditions.

**25. WRIST AND HAND****Scapholunate lig**

J Hand Surg Am. 2016 Mar 22. pii: S0363-5023(16)00215-X. doi: 10.1016/j.jhsa.2016.02.010.

**Force in the Scapholunate Interosseous Ligament During 2 Simulated Pushup Positions.**

Scordino L<sup>1</sup>, Werner FW<sup>2</sup>, Harley BJ<sup>1</sup>.

Author information

Abstract

**PURPOSE:**

To determine the in vitro force between the scaphoid and the lunate supported by the scapholunate interosseous ligament (SLIL) during 2 wrist pushup positions.

**METHODS:**

Six fresh-frozen cadaveric wrists were tested in a neutral flexion-extension (knuckle) pushup position and in an extended pushup position. Tensile forces were measured across the scapholunate joint as half body weight axial forces were applied through the radius and ulna. Forces were measured after sectioning the SLIL, after also sectioning the dorsal radiocarpal and dorsal intercarpal ligaments, and then after also sectioning the radioscaphocapitate ligament.

**RESULTS:**

In the neutral position with the SLIL sectioned, the tensile force across the scapholunate joint was significantly larger in the extended position (45 N) than in the neutral position (25 N). Sectioning additional ligaments did not significantly increase the measured force. Extrapolation of the measured force in wrist extension with application of 1 time body weight suggests a force of 110 N would occur in the SLIL.

**CONCLUSIONS:**

This study demonstrated that, with the SLIL sectioned, with or without the dorsal radiocarpal, dorsal intercarpal, and radioscaphocapitate ligaments sectioned, the tensile force across the scapholunate joint is greater in extension than in the neutral wrist position.

**CLINICAL RELEVANCE:**

This study helps characterize the forces experienced across the scapholunate articulation when the SLIL is disrupted.

**KEYWORDS:** Scapholunate interosseous ligament; wrist pushups

PMID: 27021634

**27. HIP****Ballet dancers ext rotation**

J Dance Med Sci. 2016;20(1):3-10. doi: 10.12678/1089-313X.20.1.3.

**Femoral Shaft Torsion in Injured and Uninjured Ballet Dancers and Its Association with Other Hip Measures: A Cross-sectional Study.**

Hafiz E1, Hiller CE2, Nicholson LL3, Nightingale EJ1, Grimaldi A4, Refshaug KM1.

**Author information****Abstract**

Low range femoral torsion, termed "lateral shaft torsion," has been associated with greater range of hip external rotation and turnout in dancers. It is also hypothesized that achieving greater turnout at the hip minimizes torsion at the knee, shank, ankle, and foot, and consequently reduces incidence of lower limb injuries. The primary aims of this study were to investigate: 1. differences in range of femoral shaft torsion between dancers with and without lower limb injuries; and 2. the relationship between femoral shaft torsion, hip external rotation range, and turnout. A secondary aim was to examine the relationship between femoral shaft torsion and other hip measures: hip strength, lower limb joint hypermobility, hip stability, and foot progression angle, as explanatory variables. Demographic, dance, and injury data were collected, along with physical measures of femoral shaft torsion, hip rotation range of motion, and turnout. Hip strength, control, lower limb hypermobility, and foot progression angle were also measured. Eighty female dancers, 50 with lower limb injury ( $20.7 \pm 4.8$  years of age) and 30 without lower limb injury ( $17.8 \pm 4.1$  years of age), participated in the study. There was no difference in range of femoral shaft torsion between the groups ( $p = 0.941$ ). Femoral shaft torsion was weakly correlated with range of hip external rotation ( $r = -0.034$ ,  $p = 0.384$ ) and turnout ( $r = -0.066$ ,  $p = 0.558$ ). Injured dancers had a significantly longer training history than non-injured dancers ( $p = 0.001$ ). It was concluded that femoral shaft torsion does not appear to be associated with the overall incidence of lower limb injury in dancers or to be a primary factor influencing extent of turnout in this population.

**Hip and back problems go together – Dah****Prior Lumbar Spinal Arthrodesis Increases Risk of Prosthetic-Related Complication in Total Hip Arthroplasty**

David C. Sing, BS, Jeffrey J. Barry, MD, Thomas U. Aguilar, MS, Alexander A. Theologis, MD, Joseph T. Patterson, MD, Bobby Tay, MD, Thomas P. Vail, MD, Erik N. Hansen, MD

**Abstract****Background**

Degenerative hip disorders often coexist with degenerative changes of the lumbar spine. Limited data on this patient population suggests inferior functional improvement and pain relief after surgical management. The purpose of this study is to compare the rates of prosthetic-related complication following primary total hip arthroplasty (THA) in patients with and without prior lumbar spine arthrodesis (SA).

**Methods**

811,601 Medicare patients undergoing primary THA were identified and grouped by length of prior SA (no fusion, 1-2 levels fused [S-SAHA],  $\geq 3$  levels fused [L-SAHA]).

**Results**

Compared to controls, patients with prior SA had significantly higher rates of complications including dislocation (control:2.36%; S-SAHA:4.26%; L-SAHA:7.51%), revision (control:3.43%, S-SAHA:5.55%, L-SAHA:7.77%), loosening (control:1.33%, S-SAHA:2.10%, L-SAHA:3.04%) and any prosthetic-related complication (control:7.33%, S-SAHA:11.15% (RR 1.52), L-SAHA:14.16% (RR 1.93)) within 24 months ( $p < 0.001$ ).

**Conclusion**

The interplay of coexisting degenerative hip and spine disease deserves further attention of both arthroplasty and spine surgeons.

*keywords:*

lumbar spine fusion, hip arthroplasty, complication, dislocation, revision hip arthroplasty

**31. KNEE****Abduction**

Sports Med. 2016 Apr 5.

**Modifiable Factors Associated with Knee Abduction During Weight-Bearing Activities: A Systematic Review and Meta-Analysis.**

Cronström A<sup>1</sup>, Creaby MW<sup>2</sup>, Nae J<sup>3</sup>, Ageberg E<sup>3</sup>.

Author information

Abstract

**BACKGROUND:**

Increased knee abduction angle during activity is suggested to be a risk factor for sustaining an anterior cruciate ligament (ACL) injury or developing patellofemoral pain syndrome (PFPS). Knowledge of the modifiable mechanisms that are associated with increased knee abduction will aid in the appropriate design of preventive and rehabilitative strategies for these injuries.

**OBJECTIVE:**

Our objective was to systematically review modifiable mechanisms contributing to increased knee abduction in healthy people and in individuals with an ACL injury or PFPS.

**METHODS:**

We performed a systematic review and meta-analysis according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. We searched the databases MEDLINE, CINAHL, and Embase until September 2015. Inclusion criteria were studies in healthy individuals and/or those with ACL injury or PFPS reporting (1) muscle strength, muscle activation, proprioception, and/or range of motion (ROM) and (2) knee abduction angle assessed with either motion analysis or visual observation during weight-bearing activity.

**RESULTS:**

In total, 33 articles were included. Reduced trunk strength, reduced gluteus maximus amplitude, decreased ankle ROM, and increased hip external rotation ROM were moderately associated with increased knee abduction angle ( $r \geq -0.34$  or higher, standardized difference in means (SDM) greater than  $-0.39$ ,  $p < 0.05$ , articles  $n = 3$ , total sample size  $n = 101-114$ ) in healthy individuals. Decreased strength of hip abductors, external rotators, and extensors and knee flexors were at most weakly associated with increased knee abduction angle ( $r \leq 0.21$ ,  $p = 0.013-0.426$ , articles  $n = 2-9$ , total sample size  $n = 80-311$ ). Too few articles included patients with knee injury to be included in any meta-analysis.

**CONCLUSION:**

The associations identified in this review indicate that investigation of strengthening of the trunk muscles, and improvement of gluteus maximus activation and ankle ROM to change knee kinematics is merited. Studies on modifiable factors associated with increased knee abduction angle in people with knee injury are needed.

PMID: 27048463

**Thickness of cartilage**

Rheumatology (Oxford). 2016 Mar 30. pii: kew045.

**The interaction between physical activity and amount of baseline knee cartilage.**

Teichtahl AJ<sup>1</sup>, Wang Y<sup>2</sup>, Heritier S<sup>2</sup>, Wluka AE<sup>2</sup>, Strauss BJ<sup>3</sup>, Proietto J<sup>4</sup>, Dixon JB<sup>5</sup>, Jones G<sup>6</sup>, Cicuttini FM<sup>7</sup>.

Author information

Abstract

**OBJECTIVES:**

Conflicting reports of the effect of physical activity on knee cartilage may be due to the heterogeneity of populations examined and, in particular, the underlying health of the knee joint. This study examined the influence of recreational and occupational physical activity on cartilage volume loss.

**METHODS:**

A total of 250 participants with no significant musculoskeletal disease were recruited. A gender-specific median cartilage volume split was used to define people in the lowest and highest 50% of baseline cartilage volume. Baseline recreational and occupational activity was examined by questionnaire, while cartilage volume was assessed by MRI at baseline and 2.4 : years later.

**RESULTS:**

Significant interactions were demonstrable between physical activity and cartilage volume loss based on stratification of baseline cartilage volume (all  $P \leq 0.03$ ). There was a dose-response relationship between frequently performed baseline occupational activities and medial cartilage volume loss in both the low ( $B = 0.2\%$  per annum, 95% CI: 0.0, 0.04% per annum) and high ( $B = -0.2\%$  per annum, 95% CI: -0.4, 0.0% per annum) baseline cartilage volume groups ( $P = 0.001$  for interaction). Individuals with low baseline cartilage volume who were active in their occupation and/or recreational activity had greater medial cartilage volume loss than their more inactive counterparts (2.4% per annum vs 1.5% per annum,  $P = 0.02$ ).

**CONCLUSION:**

Whereas people with less baseline cartilage volume are more at risk of structural knee damage with either heavy occupational or recreational workloads or both, individuals with high baseline cartilage volume may advantageously modify their risk for knee OA by participating in more frequent occupational physical activities.

**KEYWORDS:** cartilage; knee; occupation; osteoarthritis; physical activity

PMID: 27032425

**32 A. KNEE/ACL****Changes in gait**

Sports Med. 2016 Mar 2.

**Movement Patterns of the Knee During Gait Following ACL Reconstruction: A Systematic Review and Meta-Analysis.**

Kaur M1, Ribeiro DC1, Theis JC2, Webster KE3, Sole G4.

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

Altered gait patterns following anterior cruciate ligament reconstruction (ACLR) may be associated with long-term impairments and post-traumatic osteoarthritis.

**OBJECTIVE:**

This systematic review and meta-analysis compared lower limb kinematics and kinetics of the ACLR reconstructed knee with (1) the contralateral limb and (2) healthy age-matched participants during walking, stair climbing, and running. The secondary aim was to describe the differences over time following ACLR for these biomechanical variables.

**METHOD:**

Database searches were conducted from inception to July 2014 and updated in August 2015 for studies exploring peak knee angles and moments following ACLR during walking, stair negotiation, and running. Risk of bias was assessed with a modified Downs and Black quality index for all included studies, and meta-analyses were performed. Forest plots were explored qualitatively for recovery of gait variables over time after surgery.

**RESULTS:**

A total of 40 studies were included in the review; 26 of these were rated as low risk and 14 as high risk of bias. The meta-analysis included 27 studies. Strong to moderate evidence indicated no significant difference in peak flexion angles between ACLR and control groups during walking and stair ascent. Strong evidence was found for lower peak flexion moments in participants with ACLR compared with control groups and contralateral limb during walking and stair activities. Strong to moderate evidence was found for lower peak adduction moment in ACLR participants for the injured compared with the contralateral limbs during walking and stair descent. The qualitative assessment for recovery over time indicated a pattern towards restoration of peak knee flexion angle with increasing time from post-surgery. Peak knee adduction moments were lower within the first year following surgery and higher than controls during later phases (5 years).

**CONCLUSION:**

Joint kinematics are restored, on average, 6 years following reconstruction, while knee external flexion moments remain lower than controls. Knee adduction moments are lower during early phases following reconstruction, but are higher than controls, on average, 5 years post-surgery. Findings indicate that knee function is not fully restored following reconstruction, and long-term maintenance programs may be needed.

**Return to sports**

Eur J Orthop Surg Traumatol. 2016 Mar 14.

**Return to sport after ACL reconstruction: a survey between the Italian Society of Knee, Arthroscopy, Sport, Cartilage and Orthopaedic Technologies (SIGASCOT) members.**

Grassi A<sup>1</sup>, Vascellari A<sup>2</sup>, Combi A<sup>3</sup>, Tomaello L<sup>4</sup>, Canata GL<sup>5</sup>, Zaffagnini S<sup>6</sup>; SIGASCOT Sports Committee.

Author information

**Abstract****BACKGROUND:**

A worldwide consensus for timing and criteria for return to sport after anterior cruciate ligament (ACL) reconstruction is lacking. The aim of the study was to survey among the Italian Society of Knee, Arthroscopy, Sport, Cartilage and Orthopaedic Technologies (SIGASCOT) members in order to evaluate their approaches to the return to sport after ACL reconstruction regarding timing and criteria.

**METHODS:**

A web survey among the SIGASCOT members was performed, including 14 questions regarding technical and graft preferences, timing for return to training and competitive activity for contact and non-contact sports and criteria to allow return to sport.

**RESULTS:**

Totally, 123 members completed the questionnaire. Return to training sports was allowed within 6 months by 87 % for non-contact sports and by 53 % for contact sports. Return to competitive activity was allowed within 6 months by 48 % for non-contact sports and by 13 % for contact sports. Full ROM (77 %), Lachman test (65 %) and Pivot-Shift test (65 %) were the most used criteria to allow return to sport. The 90 % used at least one clinical score.

**CONCLUSION:**

The SIGASCOT members showed various approaches in the return to sport after ACL reconstruction, with differences between return to training or competitive activity, and between contact and non-contact sports. Six months was generally considered adequate by most of the members for the most demanding activities. The most used criteria to allow return to sport were manual testing. A clear definition of sport activities and more objective criteria for the return to sport are needed.

**LEVEL OF EVIDENCE:**

Level V, expert opinion.

**KEYWORDS:** ACL reconstruction; Criteria; Rehabilitation; Return to sport

PMID: 26972570

**Return to basketball**

Knee Surg Sports Traumatol Arthrosc. 2016 Mar 12.

**Athletic performance and career longevity following anterior cruciate ligament reconstruction in the National Basketball Association.**

Kester BS<sup>1,2</sup>, Behery OA<sup>3</sup>, Minhas SV<sup>3,4</sup>, Hsu WK<sup>4</sup>.

Author information

**Abstract****PURPOSE:**

To identify the impact of anterior cruciate ligament (ACL) reconstruction on performance and career longevity for National Basketball Association (NBA) players.

**METHODS:**

Seventy-nine players (80 knees) with acute ACL tears in the NBA between the 1984-2014 seasons, and 112 age, height, weight, and performance-matched controls were identified. Pre- and post-injury performance outcomes including seasons played, games played, games started, minutes per game, points per game, field goals, 3-point shots, rebounds, assists, steals, blocks, turnovers, personal fouls, usage percentage and player efficiency ratings were compared between cases and controls using independent samples t tests and Fisher's exact tests.

**RESULTS:**

Sixty-eight of seventy-nine players (86.1 %) returned to play in the NBA following ACL reconstruction. Mean length of post-operative play was 1.84 years shorter than matched controls ( $P = 0.001$ ). There was a significantly higher rate of attrition from professional basketball for players with a history of ACL reconstruction ( $P = 0.014$ ). In the first full season following surgery, players started in 15.5 fewer games ( $P = 0.001$ ), they played in 17.3 fewer games ( $P < 0.001$ ), and had combined player efficiency ratings 2.35 points lower ( $P = 0.001$ ) when compared to matched controls. Over the length of their careers, players competed in 22.2 fewer games per season ( $P = 0.009$ ).

**CONCLUSIONS:**

There is a high rate of return to sport in the NBA following ACL reconstruction, although playing time, games played, player efficiency ratings and career lengths are significantly impacted in the post-operative period. These data should be used to manage patients' expectations regarding their abilities to return to elite levels of athletic performance.

**KEYWORDS:** ACL; Anterior cruciate ligament; NBA; National Basketball League; Return to sport

PMID: 26971105

### 33. MENISCUS

#### Changes in gait

Knee. 2016 Mar 12. pii: S0968-0160(15)00238-0. doi: 10.1016/j.knee.2015.10.007.

#### **Three-dimensional knee kinematics in patients with discoid lateral meniscus during gait.**

Harato K<sup>1</sup>, Sakurai A<sup>2</sup>, Kudo Y<sup>2</sup>, Nagura T<sup>3</sup>, Masumoto K<sup>4</sup>, Otani T<sup>5</sup>, Niki Y<sup>6</sup>.

Author information\

Abstract

#### **BACKGROUND:**

To date, the knee kinematics of discoid lateral meniscus (DLM) has not been elucidated. The aim was to investigate the three-dimensional knee kinematics in DLM using gait analysis.

#### **METHODS:**

Ten patients (mean: 14years) diagnosed with bilateral DLM and unilaterally symptomatic snapping as well as 10 healthy controls (mean: 23years) participated in the study. Each patient with DLM had unilaterally snapping knee in full extension and deep flexion. The three-dimensional gait analysis was performed with the point cluster technique. All subjects were asked to walk on a level floor at the speed of their choice. In the sagittal plane, knee excursion was separately evaluated during the weight acceptance phase and the mid-stance phase. In the axial plane, knee excursion during the stance phase was assessed. Finally, knee excursion during the whole gait cycle was evaluated in the frontal plane. Statistical comparison was conducted between groups, and between both sides in the DLM group.

#### **RESULTS:**

In the sagittal plane, knee excursions during the weight acceptance phase and the mid-stance phase were significantly smaller in the DLM group than in the control group; in addition, these were smaller on the symptomatic side than on the asymptomatic side in the DLM group. In the axial plane, knee excursion was also significantly smaller on the symptomatic side than on the asymptomatic side in the DLM group, whereas the frontal knee motion did not differ significantly.

#### **CONCLUSION:**

Less knee motion in the sagittal plane may prevent snapping during extension and flexion in patients with DLM.

#### **LEVEL OF EVIDENCE:** III.

**KEYWORDS:** Discoid lateral meniscus; Gait analysis; Knee kinematics; Stiffening strategy  
PMID:26979382

**34. PATELLA****Exercise helps**

Clin Biomech (Bristol, Avon). 2016 Mar 11;34:22-29. doi: 10.1016/j.clinbiomech.2016.03.002.

**Effect of exercise therapy on neuromuscular activity and knee strength in female adolescents with patellofemoral pain-An ancillary analysis of a cluster randomized trial.**

Rathleff MS1, Samani A2, Olesen JL3, Roos EM4, Rasmussen S5, Madeleine P2.

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

Female adolescents with patellofemoral pain are characterized by altered neuromuscular knee control and reduced maximal quadriceps torque. The purpose of this study is to investigate whether exercise therapy and patient education are associated with larger improvements in neuromuscular knee control and maximal quadriceps torque compared with patient education alone.

**METHODS:**

This is an ancillary analysis of a cluster randomized controlled trial investigating the effect of patient education and exercise therapy on self-reported recovery in 121 adolescents with patellofemoral pain. A random subsample of 57 female adolescents was included and tested at baseline and after 3 months. Neuromuscular control of the knee was quantified as the complexity of surface electromyography of the vastus lateralis and vastus medialis during stair descent. Secondary outcomes were complexity of knee flexion/extension kinematics and maximal quadriceps torque.

**FINDINGS:**

There was an 8-15% greater decrease in the complexity of surface electromyography suggesting an improvement in neuromuscular knee control among those randomized to exercise therapy ( $0.08 < p < 0.30$ ). Adolescents randomized to exercise therapy had a 0.28-Nm/kg (95% CI: 0.05-0.52;  $p=0.02$ ) larger increase in maximal quadriceps torque.

**INTERPRETATION:**

Female adolescents randomized to patient education and exercise therapy had a significantly larger increase in maximal quadriceps torque and greater improvement in neuromuscular knee control during stair descent than those receiving patient education alone. This suggests that exercise therapy has an effect not only on self-reported outcome measures but also on objective measures of thigh muscle function in female adolescents with patellofemoral pain.

**KEYWORDS:** Adolescents; Exercise therapy; Knee pain; Surface EMG

**35. KNEE/TOTAL****Central sensitization**

Eur J Pain. 2016 Mar 31. doi: 10.1002/ejp.878.

**The effects of total knee replacement and non-surgical treatment on pain sensitization and clinical pain.**

Skou ST<sup>1,2,3,4</sup>, Roos EM<sup>2</sup>, Simonsen O<sup>1,4,5</sup>, Laursen MB<sup>1,4,5</sup>, Rathleff MS<sup>4</sup>, Arendt-Nielsen L<sup>4</sup>, Rasmussen S<sup>1,4,5</sup>.

Author information

Abstract

**BACKGROUND:**

The objective was to compare the effect of total knee replacement (TKR) followed by a 3-month non-surgical treatment with the non-surgical treatment alone in reducing pain sensitization and other pain-related measures in patients with knee osteoarthritis.

**METHODS:**

One hundred patients were randomized to (1) TKR followed by a non-surgical treatment of neuromuscular exercise, education, diet, insoles and pain medication or (2) the non-surgical treatment alone. Outcomes assessed at baseline and after 3 months were as follows: (1) pain sensitization assessed as pressure-pain thresholds (PPTs) at the knee (localized sensitization) and the lower leg (spreading sensitization), (2) peak pain intensity during the previous 24 h, (3) pain intensity after 30 min of walking, (4) pain location and pattern, (5) spreading of pain on a region-divided body chart and (6) the usage of pain medication.

**RESULTS:**

There was a statistical significant mean difference (95% CI) in change in PPTs from baseline to 3 months between groups in the crude analysis of 71 kPa (21-121) and of 75 kPa (33-117) when adjusting for baseline PPT, age, gender and body mass index, favouring the group having TKR. There were no significant between-group differences in change in the pain-related measures from baseline to 3 months ( $p = 0.15-0.27$ ). Both groups improved in most of the pain-related measures ( $p < 0.05$ ).

**CONCLUSIONS:**

At 3 months, TKR followed by non-surgical treatment is more effective in reducing localized and spreading pain sensitization than non-surgical treatment alone. Both treatments are equally efficacious in reducing the pain-related measures of this study. WHAT DOES THIS STUDY ADD?: Knee replacement followed by non-surgical treatment is more effective in reducing pain sensitization, but not other pain-related measures, as compared to non-surgical treatment alone at 3 months.

PMID: 27029553

**37. OSTEOARTHRITIS/KNEE****Early onset**

Knee Surg Sports Traumatol Arthrosc. 2016 Mar 21.

**Early osteoarthritis of the knee.**

Madry H<sup>1,2</sup>, Kon E<sup>3</sup>, Condello V<sup>4</sup>, Peretti GM<sup>5,6</sup>, Steinwachs M<sup>7</sup>, Seil R<sup>8</sup>, Berruto M<sup>9</sup>, Engebretsen L<sup>10</sup>, Filardo G<sup>11</sup>, Angele P<sup>12,13</sup>.

Author information

**Abstract**

There is an increasing awareness on the importance in identifying early phases of the degenerative processes in knee osteoarthritis (OA), the crucial period of the disease when there might still be the possibility to initiate treatments preventing its progression. Early OA may show a diffuse and ill-defined involvement, but also originate in the cartilage surrounding a focal lesion, thus necessitating a separate assessment of these two entities. Early OA can be considered to include a maximal involvement of 50 % of the cartilage thickness based on the macroscopic ICRS classification, reflecting an OARSI grade 4. The purpose of this paper was to provide an updated review of the current status of the diagnosis and definition of early knee OA, including the clinical, radiographical, histological, MRI, and arthroscopic definitions and biomarkers. Based on current evidence, practical classification criteria are presented. As new insights and technologies become available, they will further evolve to better define and treat early knee OA. Level of evidence IV.

**KEYWORDS:**

Biomarkers; Cartilage; Classification; Focal cartilage defect; Meniscus; OA; Osteochondral unit; Pain; Subchondral bone; Traumatic lesion

PMID:27000393

## OA progression related to inflammation

Arthritis Res Ther. 2016 Apr 1;18(1):81. doi: 10.1186/s13075-016-0976-3.

**Association between biomarkers of tissue inflammation and progression of osteoarthritis: evidence from the Rotterdam study cohort.**

Saberi Hosnijeh F<sup>1</sup>, Siebuhr AS<sup>2</sup>, Uitterlinden AG<sup>1,3</sup>, Oei EH<sup>4</sup>, Hofman A<sup>3</sup>, Karsdal MA<sup>2</sup>, Bierma-Zeinstra SM<sup>5,6</sup>, Bay-Jensen AC<sup>2</sup>, van Meurs JB<sup>7</sup>.

Author information

Abstract

**BACKGROUND:**

We aimed to investigate the prognostic value of two biomarkers of tissue inflammation, matrix metalloproteinase-dependent degradation of C-reactive protein (CRPM) and connective tissue type I collagen turnover (C1M), on the incidence and progression of radiographic osteoarthritis (OA) in the Rotterdam Study, a prospective cohort. Moreover, the independent effect of these biomarkers with respect to the established biomarkers of OA progression, like urinary type II collagen degradation (uCTX-II) and serum cartilage oligomeric protein (COMP), was evaluated.

**METHODS:**

Serum levels of C1M, CRPM, COMP and CRP of 1335 participants aged >55 years were measured in fasting serum using ELISA. The commercial ELISA detecting CTX-II was used in urine. Radiographs at baseline and 5-year follow-up were scored for OA stage by Kellgren-Lawrence grade. The associations between progression and incidence of OA and the baseline biomarkers were examined using logistic regression and generalized estimating equations adjusted for age, sex, BMI, and possible other confounders.

**RESULTS:**

The uCTX-II, COMP, and CRP concentrations were associated with the incidence and progression of OA. Moreover, OA progression was positively associated with CRPM (OR = 1.3, p = 0.01) and CRP (OR = 1.3, p = 0.01) levels with similar effect size as uCTX-II (OR = 1.3, p = 0.01) and COMP (OR = 1.2, p = 0.02). CRPM had prognostic value for progression of OA independent from the uCTX-II and COMP.

**CONCLUSIONS:**

Our study confirmed the associations between uCTX-II and COMP concentrations and OA progression. Importantly, we showed for the first time that CRPM predicts the risk of OA progression independent of the established biomarkers uCTX-II and COMP.

**KEYWORDS:** Biomarker; CRP; Inflammation; Osteoarthritis; Prospective cohort  
PMID: 27039382

**Limited activities**

Clin Rheumatol. 2016 Apr 4.

**Knee pain during activities of daily living and its relationship with physical activity in patients with early and severe knee osteoarthritis.**

Fukutani N<sup>1</sup>, Iijima H<sup>2,3</sup>, Aoyama T<sup>2</sup>, Yamamoto Y<sup>4</sup>, Hiraoka M<sup>4</sup>, Miyanobu K<sup>4</sup>, Jinnouchi M<sup>5</sup>, Kaneda E<sup>4,5</sup>, Tsuboyama T<sup>2</sup>, Matsuda S<sup>6</sup>.

Author information

**Abstract**

This study aimed to investigate whether knee pain during various activities of daily living (ADLs) is associated with physical activity in patients with early and severe knee osteoarthritis (OA). We hypothesized that the painful ADLs associated with decreased physical activity differ according to disease severity. This cross-sectional study enrolled 270 patients with medial knee OA, assigned to either the early (Kellgren Lawrence [K/L] grade 1-2) or the severe group (K/L grade 3-4). Physical activity was assessed using a pedometer. Knee pain during six ADLs (waking up in the morning, walking on a flat surface, ascending stairs, etc.) was evaluated using a questionnaire. We performed multiple regression and quantile regression analysis to investigate whether knee pain during each ADL was associated with physical activity. In the early group, the more knee pain they experienced while ascending stairs, the lower their physical activity was (75th regression coefficient = -1033.70, P = 0.018). In the severe group, the more knee pain they experienced while walking on a flat surface or bending to the floor or standing up, the lower their physical activity was (unstandardized coefficients = -1850.87, P = 0.026; unstandardized coefficients = -2640.35, P = 0.010). Knee pain while ascending stairs and while walking on a flat surface or bending to the floor or standing up was a probable limiting factor for physical activity in early and severe knee OA, respectively.

These findings suggested that a reduction in task-specific knee pain according to disease severity could improve physical activity levels.

**KEYWORDS:** Activities of daily living (ADLs); Early; Knee osteoarthritis; Knee pain; Physical activity; Severe

PMID: 27041381

**39 A. ORTHOTICS****Us of**

BMC Musculoskelet Disord. 2005 Dec 20;6:61.

**Comparison of foot orthoses made by podiatrists, pedorthists and orthotists regarding plantar pressure reduction in The Netherlands.**

Guldemond NA1, Leffers P, Schaper NC, Sanders AP, Nieman FH, Walenkamp GH.

**Abstract****BACKGROUND:**

There is a need for evidence of clinical effectiveness of foot orthosis therapy. This study evaluated the effect of foot orthoses made by ten podiatrists, ten pedorthists and eleven orthotists on plantar pressure and walking convenience for three patients with metatarsalgia. Aims were to assess differences and variability between and within the disciplines. The relationship between the importance of pressure reduction and the effect on peak pressure was also evaluated.

**METHODS:**

Each therapist examined all three patients and was asked to rate the 'importance of pressure reduction' through a visual analogue scale. The orthoses were evaluated twice in two sessions while the patient walked on a treadmill. Plantar pressures were recorded with an in-sole measuring system. Patients scored walking convenience per orthosis. The effects of the orthoses on peak pressure reduction were calculated for the whole plantar surface of the forefoot and six regions: big toe and metatarsal one to five.

**RESULTS:**

Within each discipline there was an extensive variation in construction of the orthoses and achieved peak pressure reductions. Pedorthists and orthotists achieved greater maximal peak pressure reductions calculated over the whole forefoot than podiatrists: 960, 1020 and 750 kPa, respectively ( $p < .001$ ). This was also true for the effect in the regions with the highest baseline peak pressures and walking convenience rated by patients A and B. There was a weak relationship between the 'importance of pressure reduction' and the achieved pressure reduction for orthotists, but no relationship for podiatrists and pedorthotists.

**CONCLUSION:**

The large variation for various aspects of foot orthoses therapy raises questions about a consistent use of concepts for pressures management within the professional groups.

**40. ANKLE SPRAINS AND INSTABILITY****Fascial changes****Long-term impact of ankle sprains on postural control and fascial densification**

Leonid Kalichman, PT, PhD Hila Lachman, BPT Naama Freilich, BPT

**Summary****Objective**

To evaluate the effect of a past ankle sprain (AS) on postural control and fascial changes in the adjacent body segment.

**Methods**

20 young, healthy subjects with a history ( $\geq 6$  months) of significant (Grades 2, 3) lateral ASs and 20 controls with no history of AS were recruited to cross-sectional case-control study. All subjects performed the Star Excursion Balance Test (SEBT). The Stecco method was used to evaluate fascial densification in the calf and upper foot areas.

**Results**

The leg with the AS in the study group vs. the right leg in the control group exhibited significant differences (lower scores of SEBT test in the AS group) for the following directions: anterior ( $p < 0.001$ ), antero-lateral ( $p < 0.001$ ), posterior ( $P = 0.028$ ), postero-medial ( $P = 0.001$ ), medial ( $P = 0.001$ ), antero-medial ( $p < 0.001$ ). A comparison between the leg with an AS in the study group and the right leg in the control group showed a significantly high prevalence of fascial densification for the talus internal rotation ( $p = 0.014$ ), talus retromotion ( $p = 0.001$ ), talus lateral ( $p = 0.040$ ) and pes external rotation ( $p = 0.060$ ) points.

**Conclusions**

There are long term effects of an AS on postural control and on the sensitivity and movability of the fascia in the calf and foot.

Keywords: Ankle sprain, Fascia, Postural control, Case-control study

**41 B. COMPARTMENT SYNDROME****Fasciotomy**

Am J Sports Med. 2016 Feb 17. pii: 0363546515626540.

**Fasciotomy for Deep Posterior Compartment Syndrome in the Lower Leg: A Prospective Study.**

Winkes MB1, van Zantvoort AP2, de Bruijn JA2, Smeets SJ2, van der Crujisen-Raaijmakers M3, Hoogeveen AR3, Scheltinga MR4.

**Author information****Abstract**

**BACKGROUND:** Patients with exercise-induced lower leg pain may suffer from deep posterior chronic exertional compartment syndrome (dp-CECS). Current evidence for the efficacy of surgery is based on retrospective studies. Effects of fasciotomy on symptoms associated with dp-CECS have not been systematically studied, and reasons for unsuccessful surgery are unknown.

**PURPOSE:** To report the short- and long-term effects of fasciotomy on pain, tightness, and cramps in a prospective cohort of patients with isolated dp-CECS.

**STUDY DESIGN:** Case series; Level of evidence, 4.

**METHODS:** Between September 2011 and January 2015, pain, tightness, cramps, muscle weakness, and diminished sensation were scored (5-item verbal rating scale ranging from very severe [5 points] to absent [1 point]) in patients with dp-CECS before and after fasciotomy. Outcomes were graded as excellent, good, moderate, fair, or poor. Fair and poor cases were again analyzed during a follow-up visit in the outpatient department.

**RESULTS:** Forty-four patients underwent surgery for isolated dp-CECS. Short-term follow-up (median, 4 months; range, 3-7 months) was complete in 42 of the 44 patients (95%; median patient age, 23 years; 23 male; 64 operated legs). Long-term follow-up (median, 27 months; range, 12-42 months) was complete in 34 of 37 eligible patients (92%). Before surgery, exertional pain was very severe (27%) or severe (61%). Fasciotomy improved all symptoms, both in the short term (preoperative vs postoperative pain,  $4.1 \pm 0.6$  vs  $2.3 \pm 1.1$ ;  $P < .001$ ) and the long term (pain,  $4.2 \pm 0.6$  vs  $2.7 \pm 1.3$ ;  $P < .001$ ). Levels of tightness, cramps, muscle weakness, and diminished sensation demonstrated similar significant improvements. Short- and long-term symptom scores did not differ. The short-term outcome was excellent in 29%, good in 29%, moderate in 21%, fair in 12%, and poor in 10% of patients. In the long term, outcomes were similar (excellent, 12%; good, 35%; moderate, 24%; fair, 18%; and poor, 12%). An unsatisfactory outcome (fair or poor) was often caused by alternative types of CECS (eg, anterior or lateral CECS) or to medial tibial stress syndrome. Based on their outcome, 76% of patients would opt for surgery again.

**CONCLUSION:** Fasciotomy was beneficial in 71% of patients with dp-CECS in the lower leg; 47% of study patients experienced a good to excellent outcome. Outcomes were stable in the long term. Persistent complaints were often caused by other untreated conditions.

#### 44. RHUMATOID ARTHRITIS

##### Diet and RA

Curr Rheumatol Rep. 2016 May;18(5):23. doi: 10.1007/s11926-016-0575-y.

##### **Is There a Role for Diet in the Therapy of Rheumatoid Arthritis?**

Tedeschi SK<sup>1</sup>, Costenbader KH<sup>2</sup>.

[Author information](#)

##### Abstract

Patients with rheumatoid arthritis (RA) often inquire about dietary interventions to improve RA symptoms. Although the majority of studies of diet and RA were published prior to the start of the twenty-first century, this review discusses the evidence for a relationship between diet, in particular omega-3 fatty acid supplements, vitamin D supplements, alcohol, and the Mediterranean diet and RA disease activity. We review possible mechanisms by which these dietary intakes may affect RA disease activity. Given the complexity of studying the relationship between diet and RA disease activity, we highlight areas deserving further study before specific recommendations can be made to RA patients.

**KEYWORDS:** Diet; Mediterranean diet; Omega-3; Rheumatoid arthritis; Treatment; Vitamin D  
PMID: 27032786

**45 A. MANUAL THERAPY LUMBAR & GENERAL****Axial rotation**

J Manipulative Physiol Ther. 2016 Apr 5. pii: S0161-4754(16)00067-1. doi: 10.1016/j.jmpt.2016.03.002.

Effects of Axial Torsion on Disc Height Distribution: An In Vivo Study.

Espinoza Orías AA<sup>1</sup>, Mammoser NM<sup>2</sup>, Triano JJ<sup>3</sup>, An HS<sup>4</sup>, Andersson GB<sup>5</sup>, Inoue N<sup>6</sup>.  
Author information

**Abstract****OBJECTIVES:**

Axial rotation of the torso is commonly used during manipulation treatment of low back pain. Little is known about the effect of these positions on disc morphology. Rotation is a three-dimensional event that is inadequately represented with planar images in the clinic. True quantification of the intervertebral gap can be achieved with a disc height distribution. The objective of this study was to analyze disc height distribution patterns during torsion relevant to manipulation in vivo.

**METHODS:**

Eighty-one volunteers were computed tomography-scanned both in supine and in right 50° rotation positions. Virtual models of each intervertebral gap representing the disc were created with the inferior endplate of each "disc" set as the reference surface and separated into 5 anatomical zones: 4 peripheral and 1 central, corresponding to the footprint of the annulus fibrosus and nucleus pulposus, respectively. Whole-disc and individual anatomical zone disc height distributions were calculated in both positions and were compared against each other with analysis of variance, with significance set at  $P < .05$ .

**RESULTS:**

Mean neutral disc height was 7.32 mm (1.59 mm). With 50° rotation, a small but significant increase to 7.44 mm (1.52 mm) ( $P < .0002$ ) was observed. The right side showed larger separation in most levels, except at L5/S1. The posterior and right zones increased in height upon axial rotation of the spine ( $P < .0001$ ), whereas the left, anterior, and central decreased.

**CONCLUSIONS:**

This study quantified important tensile/compressive changes disc height during torsion. The implications of these mutually opposing changes on spinal manipulation are still unknown.

**KEYWORDS:** Computed Tomography; Imaging; Intervertebral Disc; Mechanical; Spinal Manipulation; Three-Dimensional; Torsion

PMID: 27059249

**Muscle responses with LBP**

J Manipulative Physiol Ther. 2016 Apr 5. pii: S0161-4754(16)00058-0. doi: 10.1016/j.jmpt.2016.02.011.

**The Neuromuscular Response to Spinal Manipulation in the Presence of Pain.**

Currie SJ<sup>1</sup>, Myers CA<sup>1</sup>, Durso C<sup>2</sup>, Enebo BA<sup>3</sup>, Davidson BS<sup>4</sup>.  
Author information

Abstract

**OBJECTIVE:**

The purpose of this study was to evaluate differences in muscle activity in participants with and without low back pain during a side-lying lumbar diversified spinal manipulation.

**METHODS:**

Surface and indwelling electromyography at eight muscle locations were recorded during lumbar side-lying manipulations in 20 asymptomatic participants and 20 participants with low back pain. The number of muscle responses and muscle activity onset delays in relation to the manipulation impulse were compared in the 2 pain groups using mixed linear regressions. Effect sizes for all comparisons were calculated using Cohen's d.

**RESULTS:**

Muscle responses occurred in 61.6%  $\pm$  23.6% of the EMG locations in the asymptomatic group and 52.8%  $\pm$  26.3% of the symptomatic group. The difference was not statistically significant but there was a small effect of pain (d = 0.350). Muscle activity onset delays were longer for the symptomatic group at every EMG location except the right side indwelling L5 electrode, and a small effect of pain was present at the left L2, quadratus lumborum and trapezius surface electrodes (d = 0.311, 0.278, and 0.265) respectively. The indwelling electrodes demonstrated greater muscle responses (P  $\leq$  .01) and shorter muscle activity onset delays (P < .01) than the surface electrodes.

**CONCLUSIONS:**

The results revealed trends that indicate participants with low back pain have less muscle responses, and when muscle responses are present they occur with longer onset delays following the onset of a manipulation impulse.

**KEYWORDS:** Biomechanical Phenomena; Chiropractic; Electromyography; Kinetics; Low Back Pain; Manipulation; Reflex; Spinal

PMID: 27059250

**Muscle activation****Methods of Muscle Activation Onset Timing Recorded During Spinal Manipulation**

Stuart J. Currie, DC Casey A. Myers, MS Ashok Krishnamurthy, PhD Brian A. Enebo, DC, PhD Bradley S. Davidson, PhD

**Abstract****Objective**

The purpose of this study was to determine electromyographic threshold parameters that most reliably characterize the muscular response to spinal manipulation and compare 2 methods that detect muscle activity onset delay: the double-threshold method and cross-correlation method.

**Methods**

Surface and indwelling electromyography were recorded during lumbar side-lying manipulations in 17 asymptomatic participants. Muscle activity onset delays in relation to the thrusting force were compared across methods and muscles using a generalized linear model.

**Results**

The threshold combinations that resulted in the lowest Detection Failures were the “8 SD–0 milliseconds” threshold (Detection Failures = 8) and the “8 SD–10 milliseconds” threshold (Detection Failures = 9). The average muscle activity onset delay for the double-threshold method across all participants was  $149 \pm 152$  milliseconds for the multifidus and  $252 \pm 204$  milliseconds for the erector spinae. The average onset delay for the cross-correlation method was  $26 \pm 101$  for the multifidus and  $67 \pm 116$  for the erector spinae. There were no statistical interactions, and a main effect of method demonstrated that the delays were higher when using the double-threshold method compared with cross-correlation.

**Conclusions**

The threshold parameters that best characterized activity onset delays were an 8-SD amplitude and a 10-millisecond duration threshold. The double-threshold method correlated well with visual supervision of muscle activity. The cross-correlation method provides several advantages in signal processing; however, supervision was required for some results, negating this advantage. These results help standardize methods when recording neuromuscular responses of spinal manipulation and improve comparisons within and across investigations.

*Key Indexing Terms:*

Manipulation, Spinal, Chiropractic, Reflex, Electromyography, Biomechanical Phenomena, Kinetics

**Herniation manip**

J Manipulative Physiol Ther. 2016 Mar 28. pii: S0161-4754(16)00060-9. doi: 10.1016/j.jmpt.2016.02.013.

**Symptomatic, MRI Confirmed, Lumbar Disc Herniations: A Comparison of Outcomes Depending on the Type and Anatomical Axial Location of the Hernia in Patients Treated With High-Velocity, Low-Amplitude Spinal Manipulation.**

Ehrler M<sup>1</sup>, Peterson C<sup>2</sup>, Leemann S<sup>3</sup>, Schmid C<sup>3</sup>, Anklin B<sup>3</sup>, Humphreys BK<sup>4</sup>.  
Author information

## Abstract

**OBJECTIVE:**

The purpose of this study was to evaluate whether specific MRI features, such as axial location and type of herniation, are associated with outcomes of symptomatic lumbar disc herniation patients treated with spinal manipulation therapy (SMT).

**METHODS:**

MRI and treatment outcome data from 68 patients were included in this prospective outcomes study. Pain numerical rating scale (NRS) and Oswestry physical disability questionnaire (OPDQ) levels were measured at baseline. The Patients Global Impression of Change scale, the NRS and the OPDQ were collected at 2 weeks, 1, 3, 6 months and 1 year. One radiologist and 2 chiropractic medicine master's degree students analyzed the MRI scans blinded to treatment outcomes.  $\kappa$  statistics assessed inter-rater reliability of MRI diagnosis. The proportion of patients reporting relevant improvement at each time point was compared based on MRI findings using the chi-square test. The t test and ANOVA compared the NRS and OPDQ change scores between patients with various MRI abnormalities.

**RESULTS:**

A higher proportion of patients with disc sequestration reported relevant improvement at each time point but this did not quite reach statistical significance. Patients with disc sequestration had significantly higher reduction in leg pain at 1 month compared to those with extrusion ( $P = .02$ ). Reliability of MRI diagnosis ranged from substantial to perfect ( $K = .733-1.0$ ).

**CONCLUSIONS:**

Patients with sequestered herniations treated with SMT to the level of herniation reported significantly higher levels of leg pain reduction at 1 month and a higher proportion reported improvement at all data collection time points but this did not reach statistical significance.

**KEYWORDS:** Intervertebral Disc Displacement; Lumbar Vertebrae; Magnetic Resonance Imaging; Manipulation; Spinal; Spine  
PMID: 27034106

With Modic changes less improvement

### **Comparison of Outcomes in MRI Confirmed Lumbar Disc Herniation Patients With and Without Modic Changes Treated With High Velocity, Low Amplitude Spinal Manipulation**

Michelé Annen, B.Med. Cynthia Peterson, DC, M.Med.Ed. Serafin Leemann, DC Christof Schmid, DC Bernard Anklin, DC B. Kim Humphreys, DC, PhD

#### **Abstract**

##### **Objective**

The purpose of this study was to determine if there is a difference in outcomes between Modic positive and negative lumbar disc herniation (LDH) patients treated with spinal manipulative therapy (SMT).

##### **Methods**

This prospective outcomes study includes 72 MRI confirmed symptomatic LDH patients treated with SMT. Numerical rating scale (NRS) pain and Oswestry disability data were collected at baseline. NRS, patient global impression of change to assess overall improvement, and Oswestry data were collected at 2 weeks, 1, 3, 6 months and 1 year. MRI scans were analyzed for Modic change present/absent and classified as Modic I or II when present. Chi-squared test compared the proportion of patients reporting relevant 'improvement' between patients with and without Modic changes and those with Modic I vs. II. NRS and Oswestry scores were compared at baseline and change scores at all follow-up time points using the unpaired Student *t* test.

##### **Results**

76.5% of Modic positive patients reported 'improvement' compared to 53.3% of Modic negative patients ( $P = .09$ ) at 2 weeks. Modic positive patients had larger decreases in leg pain ( $P = .02$ ) and disability scores ( $P = .012$ ) at 2 weeks. Modic positive patients had larger reductions in disability levels at 3 ( $P = .049$ ) and 6 months ( $P = .001$ ). A significant difference ( $P = .001$ ) between patients with Modic I vs. Modic II was found at 1 year, where Modic II patients did significantly better.

##### **Conclusion**

Modic positive patients reported higher levels of clinically relevant improvement 2 weeks, 3 and 6 months compared to Modic negative patients. However, at 1 year Modic I patients were significantly less likely to report 'improvement', suggesting they may be prone to relapse.

**Adolescent manip**

J Orthop Sports Phys Ther. 2016 Apr 6:1-30.

**Lumbar Thrust Manipulation and Exercise for the Treatment of Mechanical Low Back Pain in Adolescents: A Case Series.**

Walston Z<sup>1</sup>, Yake D<sup>1</sup>.

Author information

**Abstract**

**Study Design** Case series. **Background** Low back pain (LBP) is an increasing problem in health care. The evidence is minimal for using spinal manipulative therapy to treat pediatric patients with LBP. The treatment of pediatrics with manual therapy, particularly spinal manipulation, is controversial within the medical community primarily with respect to adverse events.

The purpose of this case series is to illustrate the feasibility and safety of lumbar manipulation plus exercise in the adolescent population with mechanical LBP. **Case Description** Three patients; a 13-year old female, 15-year old female, and 13-year old male were treated in an outpatient physical therapy setting for mechanical LBP. All three patients were assessed using a lumbar manipulation clinical prediction rule and treated with side-lying lumbar manipulation and exercise.

**Outcomes** Patients were treated for a total of 10 to 14 visits over a course of 8 to 9 weeks. Pain, as measured by the Numerical Pain Rating Scale, and disability, measured by the Modified Oswestry Disability Index, improved to 0/10 and measured 0%, respectively, in each patient. No adverse reactions to manipulation were reported.

**Discussion** The results of this case series describe the use of lumbar thrust manipulation and exercise for the treatment of mechanical LBP in adolescents. The positive results indicate lumbar manipulation may potentially be a safe adjunct therapy. Further studies, including randomized control trials, are needed to determine effectiveness. **Level of Evidence** Therapy, level 4. J Orthop Sports Phys Ther, Epub 6 Apr 2016. doi:10.2519/jospt.2016.6366.

**KEYWORDS:** manual therapy/spine; pediatric; therapeutic exercise  
PMID: 27049600

**Analysis of manip.**

J Manipulative Physiol Ther. 2016 Mar 28. pii: S0161-4754(16)00056-7. doi: 10.1016/j.jmpt.2016.02.009.

**Development of a Linked Segment Model to Derive Patient Low Back Reaction Forces and Moments During High-Velocity Low-Amplitude Spinal Manipulation.**

Howarth SJ<sup>1</sup>, D'Angelo K<sup>2</sup>, Triano JJ<sup>3</sup>.  
Author information

## Abstract

**OBJECTIVE:**

The purpose of this paper is to present the experimental setup, the development, and implementation of a new scalable model capable of efficiently handling data required to determine low back kinetics during high-velocity low-amplitude spinal manipulation (HVLA-SM).

**METHODS:**

The model was implemented in Visual3D software. All contact forces and moments between the patient and the external environment (2 clinician hand contact forces, 1 contact force between the patient and the treatment table), the patient upper body kinematics, and inertial properties were used as input. Spine kinetics and kinematics were determined from a single HVLA-SM applied to one healthy participant in a right side-lying posture to demonstrate the model's utility. The net applied force was used to separate the spine kinetic and kinematic time-series data from the HVLA-SM into preload as well as early and late impulse phases.

**RESULTS:**

Time-series data obtained from the HVLA-SM procedure showed that the participant's spine underwent left axial rotation, combined with extension, and a reduction in left lateral bending during the procedure. All components of the reaction force, as well as the axial twist and flexion/extension reaction moments demonstrated a sinusoidal pattern during the early and late impulse phases. During the early impulse phase, the participant's spine experienced a leftward axial twisting moment of 37.0 Nm followed by a rightward moment of -45.8 Nm. The lateral bend reaction moment exhibited a bimodal pattern during the early and late impulse phases.

**CONCLUSION:**

This model was the first attempt to directly measure all contact forces acting on the participant/patient's upper body, and integrate them with spine kinematic data to determine patient low back reaction forces and moments during HVLA-SM in a side-lying posture. Advantages of this model include the brevity of data collection (<1 hour), and adaptability for different patient anthropometries and clinician-patient contacts.

**KEYWORDS:** Biomechanics; Chiropractic; Key Indexing Terms; Low Back Pain; Lumbar Region  
PMID: 27034108

### 45 B. MANUAL THERAPY CERVICAL

#### Thalamic pain

Thalamic pain misdiagnosed as cervical disc herniation

The Korean Journal of Pain, 04/07/2016Lim TH, et al.

**T**halamic pain is a primary cause of central post-stroke pain (CPSP). Clinical symptoms vary depending on the location of the infarction and frequently accompany several pain symptoms. A 45-year-old-male patient experiencing a tingling sensation in his right arm was referred to our pain clinic under the diagnosis of cervical disc herniation. This patient also complained of right cramp-like abdominal pain. After further evaluations, he was diagnosed with an acute thalamic infarction. Therefore detailed history taking should be performed and examiners should always be aware of other symptoms that could suggest a more dangerous disease

**Manipulations**

J Manipulative Physiol Ther. 2016 Mar 31. pii: S0161-4754(16)00051-8. doi: 10.1016/j.jmpt.2016.02.004.

**Symptomatic, Magnetic Resonance Imaging-Confirmed Cervical Disk Herniation Patients: A Comparative-Effectiveness Prospective Observational Study of 2 Age- and Sex-Matched Cohorts Treated With Either Imaging-Guided Indirect Cervical Nerve Root Injections or Spinal Manipulative Therapy.**

Peterson CK<sup>1</sup>, Pfirrmann CW<sup>2</sup>, Hodler J<sup>3</sup>, Leemann S<sup>4</sup>, Schmid C<sup>4</sup>, Anklin B<sup>4</sup>, Humphreys BK<sup>5</sup>.  
Author information

Abstract

**OBJECTIVE:**

The purpose of this study was to compare the outcomes of overall improvement, pain reduction, and treatment costs in matched patients with symptomatic, magnetic resonance imaging-confirmed cervical disk herniations treated with either spinal manipulative therapy (SMT) or imaging-guided cervical nerve root injection blocks (CNRI).

**METHODS:**

This prospective cohort comparative-effectiveness study included 104 patients with magnetic resonance imaging-confirmed symptomatic cervical disk herniation. Fifty-two patients treated with CNRI were age and sex matched with 52 patients treated with SMT. Baseline numerical rating scale (NRS) pain data were collected. Three months after treatment, NRS pain levels were recorded and overall "improvement" was assessed using the Patient Global Impression of Change scale. Only responses "much better" or "better" were considered "improved." The proportion of patients "improved" was calculated for each treatment method and compared using the  $\chi^2$  test. The NRS and NRS change scores for the 2 groups were compared at baseline and 3 months using the unpaired t test. Acute and subacute/chronic patients in the 2 groups were compared for "improvement" using the  $\chi^2$  test.

**RESULTS:**

"Improvement" was reported in 86.5% of SMT patients and 49.0% of CNRI patients ( $P = .0001$ ). Significantly more CNRI patients were in the subacute/chronic category (77%) compared with SMT patients (46%). A significant difference between the proportion of subacute/chronic CNRI patients (37.5%) and SMT patients (78.3%) reporting "improvement" was noted ( $P = .002$ ).

**CONCLUSION:**

Subacute/chronic patients treated with SMT were significantly more likely to report relevant "improvement" compared with CNRI patients. There was no difference in outcomes when comparing acute patients only.

**KEYWORDS:** Cervical Spine; Comparative-Effectiveness Research; Disk Herniation; Injections; Manipulation, Spinal; Nerve Root; Outcomes Assessment; Radiculopathy  
PMID: 27040033

**Expectations for MT**

Eur J Pain. 2016 Mar 31. doi: 10.1002/ejp.861.

**Expectations of recovery: A prognostic factor in patients with neck pain undergoing manual therapy treatment.**

Palmlöf L<sup>1</sup>, Holm LW<sup>1</sup>, Alfredsson L<sup>1,2</sup>, Skillgate E<sup>1,3</sup>.

[Author information](#)

**Abstract****BACKGROUND:**

Expectations have been investigated in populations seeking care for neck pain, however not considering potential confounding factors. The aim of this study was to investigate if pretreatment expectations of recovery is a prognostic factor for recovery from neck pain at 7 weeks follow-up in patients seeking manual therapy treatment.

**METHOD:**

The study was based on the Stockholm Manual Intervention Trial, a randomized controlled trial investigating efficiency of three combinations of manual therapy. The patients with neck pain were included in this study (n = 716). Expectations of recovery was measured at baseline; 'How likely is it, according to your judgment, that you are completely recovered from your neck/back problems in 7 weeks'. Patients answered on a 11-point scale, further categorized into low, moderate and high expectations. The outcome was measured at 7 weeks follow-up by a modified version of the Global Perceived Recovery Question. Potential effect measure modifiers and confounders were measured at baseline. Multivariable log binomial regression models were used to analyse the association between expectations and recovery, presented as relative risks and 95% confidence intervals (CI).

**RESULTS:**

High expectations of recovery yielded a 47% increased probability of being recovered at 7 weeks follow-up. High expectations of recovery yielded improved recovery in both men and women separately, but moderate expectations yielded improved recovery only among men.

**CONCLUSION:**

Our results suggest that expectations of recovery is a prognostic factor for recovery in patients with neck pain seeking manual therapy treatment. WHAT DOES THIS STUDY ADD?: We found that high expectations of recovery yielded a higher probability of recovery compared to having low expectations, also when considering potential confounding factors. Expectations seemed to have a more distinct influence on recovery among men.

PMID:27030661

**48 A. STM****Pelvic floor fascia****Hip and groin pain in a cyclist resolved after performing *pelvic floor fascial mobilization***

Sivan Navot, BPT Leonid Kalichman, PT, PhD

**Abstract**

Pelvic floor muscle assessment in situations of hip/groin pain in both male and female patients can be a key element in treatment success. We present herein, a 32 year old male professional cyclist, exhibiting right hip and groin pain during cycling and prolonged sitting. The pain commenced after the patient suffered a right hip severe contusion in 2013 causing a tear in the tensor fascia lata and gluteus medius muscle. The patient did not complain of pelvic floor dysfunctions. After receiving several series of conventional physical therapy for the hip/groin pain, the patient experienced partial pain relief and slight improvement of hip range of motion. His pelvic floor muscles and fascia involvement were subsequently assessed. Two sessions of *Pelvic Floor Fascial Mobilization (PFFM)* were performed and the patient fully recovered. The authors believe that *PFFM*, a new fascial-oriented manual therapy of the pelvic floor approach, can be used for both hip/groin and pelvic floor pain or dysfunction.

*Keywords:*

Pelvic floor fascial mobilization, Hip and groin pain, Pelvic floor, Fascial manipulation

## 51. CFS/BET

### Lifting

High load lifting and low load motor control exercise as interventions for patients with mechanical low back pain: A randomized controlled trial with 24-month follow-up.

Journal of Rehabilitation Medicine, 04/14/2016 Michaelson P, et al.

The aim of this study was to compare the effects of a high load lifting exercise with low load motor control exercises on pain intensity, disability and health-related quality of life for patients with mechanical low back pain. No difference was observed between the high low load lifting and low load motor control interventions. Both interventions included retraining of movement patterns and pain education, which might explain the positive results over time.

#### Methods

- A randomized controlled trial.
- Patients with mechanical lowback pain as their dominating pain mechanism.
- The intervention programme consisted of a high load lifting exercise, while the control group received low load motor control exercises over 8 weeks (12 sessions) with pain education included in both intervention arms.
- The primary outcome was pain intensity and disability, and the secondary outcome was health-related quality of life.

#### Results

- Each intervention arm included 35 participants, analysed following 2-, 12- and 24-month follow-up.
- There was no significant difference between the high load lifting and low load motor control interventions for the primary or secondary outcome measures.
- Between 50% and 80% of participants reported a decrease in perceived pain intensity and disability for both short- and long-term follow-up.

## 55. SCOLIOSIS

### Measurement of

Eur J Orthop Surg Traumatol. 2016 Mar 21.

#### **Relationship between the different torsion-related thoracic deformity parameters of adolescent idiopathic scoliosis.**

Pizones J<sup>1</sup>, Zúñiga L<sup>2</sup>, Sánchez-Mariscal F<sup>2</sup>, Izquierdo E<sup>2</sup>.

Author information

Abstract

#### **INTRODUCTION:**

Torsion has recently become essential in curve evaluation, not only to assess the degree of clinical deformity that can influence decision making, but also to predict curve progression. Since torsion cannot be currently measured using plain X-rays, our aim was to study the relationships between the different torsion-related parameters measured on 2D radiographs that can indirectly guide the clinician about the torsion of a given curve.

#### **METHODS:**

This is a cross-sectional study analyzing prospectively registered data of a consecutive cohort of 113 AIS patients with progressive main thoracic deformity. Demographic data, the Adams test and eight radiographic torsion-related coronal and sagittal deformity parameters [apical vertebral rotation (AVR)-Stokes method, Mehta angle (RVAD), main thoracic Cobb side-bending, T5-T12 kyphosis, T5-T8 kyphosis, T9-T12 kyphosis, kyphotic change and double rib contour sign (rib index)] were correlated between each other and with the main thoracic Cobb angle (MTCobb). Univariate linear regression and multiple linear stepwise regression analyses were performed as well.

#### **RESULTS:**

The radiographically measurable deformity parameters that best correlated with the MTCobb angle in idiopathic curves were: side-bending, RVAD, AVR and the Adams test. Sagittal variables were correlated the least with MTCobb. Coronal parameters as AVR, RVAD, side-bending and Adam test are highly intercorrelated. Sagittal variables are related between each other but are not directly related to coronal parameters.

#### **CONCLUSIONS:**

There is a strong relationship between the Cobb angle, curve bending, the Mehta angle and the apical vertebral rotation. Together with the clinical Adams test, these are the most important radiographic torsion-related parameters to measure when assessing scoliosis in 2D.

#### **LEVEL OF EVIDENCE: 3.**

**KEYWORDS:** Adolescent idiopathic scoliosis; Apical vertebral rotation; Radiographic torsion parameters; Scoliosis assessment; Scoliotic torsion; Torsion-related parameters

PMID:27001224

**Impact of surgery**

Spine (Phila Pa 1976). 2016 Mar;41(6):E359-63. doi: 10.1097/BRS.0000000000001258.

**Lumbar Lordosis Minus Thoracic Kyphosis: Remain Constant in Adolescent Idiopathic Scoliosis Patients Before and After Correction Surgery.**

Yang M<sup>1</sup>, Yang C, Chen Z, Wei X, Chen Y, Zhao J, Shao J, Zhu X, Li M.

Author information

Abstract

**STUDY DESIGN:**

A retrospective study.

**OBJECTIVE:**

To explore the relationship between the change of lumbar lordosis (LL) and thoracic kyphosis (TK) in AIS patients after correction surgery.

**SUMMARY OF BACKGROUND DATA:**

TK tends to decrease in Lenke 1 and Lenke 2 AIS patients after correction surgery using pedicle screws, with the compensation of LL decrease. We hypothesize that lumbar lordosis minus thoracic kyphosis (LL-TK) remains constant after correction surgery to achieve the sagittal balance in AIS patients.

**METHODS:**

Medical records of Lenke 1 or Lenke 2 AIS patients who received posterior correction surgery using pedicle screws in our hospital from January 2010 to January 2013 were reviewed. General characters of patients and radiological parameters were evaluated before the surgery and at two years' follow-up. Correlation analysis between TK and LL was conducted. LL-TK and the change of LL and TK were analyzed at preoperation and final follow-up.

**RESULTS:**

A total of 76 Lenke 1 and Lenke 2 AIS patients were included. Both TK and LL decreased significantly after correction surgery ( $P=0.019$  and  $P=0.040$ , respectively). There were significant correlations between TK and LL before and after surgery, respectively (preoperative:  $r=0.234$ ,  $P=0.042$ ; postoperative:  $r=0.310$ ,  $P=0.006$ ). Preoperative and postoperative LL-TK was  $23.80^\circ$  and  $25.09^\circ$ , respectively, and no significant difference of LL-TK was observed ( $P=0.372$ ). The same tendency was observed in the change of LL and TK, and significant correlation was also found between the change of TK and LL ( $r=0.626$ ,  $P=0.002$ ).

**CONCLUSION:**

The same change of LL and TK and no significant difference in LL-TK indicated that LL-TK might be an important compensatory mechanism in keeping sagittal balance.

**LEVEL OF EVIDENCE:** 4.

PMID: 26536436

## 56. ATHLETICS

## Balance training

Sports Med. 2016 Mar 18.

**Specificity of Balance Training in Healthy Individuals: A Systematic Review and Meta-Analysis.**

Kümmel J<sup>1</sup>, Kramer A<sup>2</sup>, Giboin LS<sup>2</sup>, Gruber M<sup>2</sup>.

Author information

Abstract

**BACKGROUND:** It has become common practice to incorporate balance tasks into the training program for athletes who want to improve performance and prevent injuries, in rehabilitation programs, and in fall prevention programs for the elderly. However, it is still unclear whether incorporating balance tasks into a training program increases performance only in these specific tasks or if it affects balance in a more general way.

**OBJECTIVES:** The objective of this systematic literature review and meta-analysis was to determine to what extent the training of balance tasks can improve performance in non-trained balance tasks.

**DATA SOURCES:** A systematic literature search was performed in the online databases EMBASE, PubMed, SPORTDiscus and Web of Science. Articles related to balance training and testing in healthy populations published between January 1985 and March 2015 were considered.

**STUDY ELIGIBILITY CRITERIA:** A total of 3093 articles were systematically evaluated. Randomized controlled trials were included that (i) used only balance tasks during the training, (ii) used at least two balance tests before and after training, and (iii) tested performance in the trained balance tasks and at least one non-trained balance task. Six studies with a total of 102 subjects met these criteria and were included into the meta-analysis.

**STUDY APPRAISAL AND SYNTHESIS METHODS:** The quality of the studies was evaluated by means of the Physiotherapy Evidence Database (PEDro) scale. A random effect model was used to calculate the between-subject standardized mean differences ( $SMD_{bs}$ ) in order to quantify the effect of balance training on various kinds of balance measures relative to controls. The tested balance tasks in each study were classified into tasks that had been trained and tasks that had not been trained. For further analyses, the non-trained balance tasks were subdivided into tasks with similar or non-similar body position and similar or non-similar balance perturbation direction compared to the trained task.

**RESULTS:** The effect of balance training on the performance of the trained balance tasks reached an  $SMD_{bs}$  of 0.79 [95 % confidence interval (CI) 0.48-1.10], indicating a high effect in favor for the trained task, with no notable heterogeneity ( $I^2 = 0\%$ ). The  $SMD_{bs}$  in non-trained categories reached values between -0.07 (95 % CI -0.53 to 0.38) and 0.18 (95 % CI -0.27 to 0.64), with non-notable to moderate heterogeneity ( $I^2 = 0-32\%$ ), indicating no effect of the balance training on the respective non-trained balance tasks.

**LIMITATIONS:** With six studies, the number of studies included in this meta-analysis is rather low. It remains unclear how the limited number of studies with considerable methodological diversity affects the outcome of the SMD calculations and thus the general outcome of the meta-analysis.

**CONCLUSION:** In healthy populations, balance training can improve the performance in trained tasks, but may have only minor or no effects on non-trained tasks. Consequently, therapists and coaches should identify exactly those tasks that need improvement, and use these tasks in the training program and as a part of the test battery that evaluates the efficacy of the training program. Generic balance tasks-such as one-leg stance-may have little value as overall balance measures or when assessing the efficacy of specific training interventions.

## Martial arts

Sports Med. 2016 Mar 18.

**Towards a Determination of the Physiological Characteristics Distinguishing Successful Mixed Martial Arts Athletes: A Systematic Review of Combat Sport Literature.**

James LP<sup>1</sup>, Haff GG<sup>2</sup>, Kelly VG<sup>3,4</sup>, Beckman EM<sup>3</sup>.

Author information

## Abstract

**BACKGROUND:** Mixed martial arts (MMA) is a combat sport underpinned by techniques from other combat disciplines, in addition to strategies unique to the sport itself. These sports can be divided into two distinct categories (grappling or striking) based on differing technical demands. Uniquely, MMA combines both methods of combat and therefore appears to be physiologically complex requiring a spectrum of mechanical and metabolic qualities to drive performance. However, little is known about the physiological characteristics that distinguish higher- from lower-level MMA athletes. Such information provides guidance for training interventions, performance testing and talent identification. Furthermore, while MMA incorporates techniques from both grappling and striking sports, it is unknown precisely how these disciplines differ physiologically. Understanding the relationship between higher-level competitors in grappling and striking combat sports can provide further insight into the development of the optimal performance profile of a higher-level MMA athlete.

**OBJECTIVE:** This article aims to analyse the scientific literature on MMA and the primary combat sports underpinning it to determine the physiological adaptations that distinguish superior competitors, with a view to defining the optimal physiological profile for higher-level MMA performance. Furthermore, this article will explore the differences in these capabilities between grappling- and striking-based combat sports in the context of MMA.

**METHODS:** A literature search was undertaken via PubMed, Web of Science, SportDiscus and Google Scholar. The following sports were included for systematic review based on their relevance to MMA: mixed martial arts, boxing, Brazilian jiu-jitsu, judo, karate, kickboxing, Muay Thai and wrestling. The inclusion criteria allowed studies that compared athletes of differing competition levels in the same sport using a physiological performance measure. Only male, adult (aged 17-40 years), able-bodied competitors were included. The search history spanned from the earliest record until September 2015.

**RESULTS:** Of the eight combat sports searched for, five were represented across 23 studies. Sixteen investigations described maximal strength or neuromuscular power variables, while 19 articles reported anaerobic or aerobic measures. The results indicate that a number of strength, neuromuscular power and anaerobic variables distinguished higher- from lower-level combat sport athletes. However, these differences were less clear when groups were stratified within, rather than between competition grades. Greater aerobic power was generally not present amongst superior combat sport competitors.

**CONCLUSION:** There appear to be differing physiological profiles between more successful grappling and striking combat sport athletes. This is represented by high-force demands of grappling sports causing an upwards shift of the entire force-velocity relationship driven by an increase in maximal strength. In comparison, smaller increases in maximal force production with more notable enhancements in lighter load, higher velocity actions may better identify superior performance in striking sports. Anaerobic capabilities largely distinguished higher- from lower-level combat sport athletes. In particular, longer-term anaerobic efforts seem to define successful grappling-based athletes, while superior competitors in striking sports tend to show dominance in shorter-term measures when compared with their lower-level counterparts. Given the demand for both forms of combat in MMA, a spectrum of physiological markers may characterize higher-level competitors. Furthermore, the performance profile of successful MMA athletes may differ based on combat sport history or competition strategy.

**57. GAIT****Varying speed****From Normal to Fast Walking: Impact of Cadence and Stride Length on Lower Extremity Joint Moments**

Marzieh M Ardestani<sup>1\*</sup>, Christopher Ferrigno<sup>2,4</sup>, Mehran Moazen<sup>3</sup>, Markus A Wimmer<sup>4</sup>  
Ardestani MM et al.

Gait and Posture.(2016)

**Abstract**

This study aimed to clarify the influence of various speeding strategies (i.e. adjustments of cadence and stride length) on external joint moments. This study investigated the gait of 52

Page 2 of 24 healthy subjects who performed self-selected normal and fast speed walking trials in a motion analysis laboratory. Subjects were classified into three separate groups based on how they increased their speed from normal to fast walking: (i) subjects who increased their cadence, (ii) subjects who increased their stride length and (iii) subjects who simultaneously increased both stride length and cadence. Joint moments were calculated using inverse dynamics and then compared between normal and fast speed trials within and between three groups using spatial parameter mapping. Individuals who increased cadence, but not stride length, to walk faster did not experience a significant increase in the lower limb joint moments. Conversely, subjects who increased their stride length or both stride length and cadence, experienced a significant increase in all joint moments. Additionally, our findings revealed that increasing the stride length had a higher impact on joint moments in the sagittal plane than those in the frontal plane. However, both sagittal and frontal plane moments were still more responsive to the gait speed change than transverse plane moments. This study suggests that the role of speed in altering the joint moment patterns depends on the individual's speed-regulating strategy, i.e. an increase in cadence or stride length. Since the confounding effect of walking speed is a major consideration in human gait research, future studies may investigate whether stride length is the confounding variable of interest.

**Keywords:** Gait, Speed, Cadence, Stride Length, External Joint Moments

**Speed changes**

Scand J Med Sci Sports. 2016 Feb 16. doi: 10.1111/sms.12656.

**The effect of cadence on the muscle-tendon mechanics of the gastrocnemius muscle during walking.**

Brennan SF1, Cresswell AG1, Farris DJ1,2, Lichtwark GA1.

**Author information****Abstract**

Humans naturally select a cadence that minimizes metabolic cost at a constant walking velocity. The aim of this study was to examine the effects of cadence on the medial gastrocnemius (MG) muscle and tendon interaction, and examine how this might influence lower limb energetics. We hypothesized that cadences higher than preferred would increase MG fascicle shortening velocity because of the reduced stride time. Furthermore, we hypothesized that cadences lower than preferred would require greater MG fascicle shortening to achieve increased muscle work requirements. We measured lower limb kinematics and kinetics, surface electromyography of the triceps surae and MG fascicle length, via ultrasonography, during walking at a constant velocity at the participants' preferred cadence and offsets of  $\pm 10\%$ ,  $\pm 20\%$ , and  $\pm 30\%$ . There was a significant increase in MG fascicle shortening with decreased cadence. However, there was no increase in the MG fascicle shortening velocity at cadences higher than preferred. Cumulative MG muscle activation per minute was significantly increased at higher cadences. We conclude that low cadence walking requires more MG shortening work, while MG muscle and tendon function changes little for each stride at higher cadences, driving up cumulative activation costs due to the increase in steps per minute.

**KEYWORDS:**

Human; locomotion; power; work

**59. PAIN****Central inhibition and chronic pain**

Is motor cortical excitability altered in people with chronic pain? a systematic review and meta-analysis

Brain Stimulation, 04/13/2016

Parker RS, et al. – The aim of this study is to systematically review studies examining corticospinal and intracortical excitability using transcranial magnetic stimulation in people with chronic pain compared to healthy controls and to provide a meta-analysis of study outcomes. There is evidence of motor cortex disinhibition in chronic pain populations, suggestive of a disruption cortical GABA-mediated inhibition. Disinhibition was more pronounced in populations with neuropathic pain. These findings provide new insights into the relationship between chronic pain and motor cortex excitability, which may have meaningful implications for the future treatment of chronic pain conditions.

Methods

- Databases were searched for controlled studies evaluating corticospinal and intracortical excitability in chronic pain conditions.
- Outcome measure data were entered into separate meta-analyses and effect sizes calculated.
- A subgroup analysis based on the type of chronic pain population was also performed.

Results

- Forty-three studies were included, encompassing a pooled total of 1009 people with chronic pain and 658 control participants.
- Significant effect sizes ( $P < 0.05$ ) indicated that in chronic pain populations the duration of the silent period and the extent of short-interval intracortical inhibition were both reduced and short-interval intracortical facilitation was enhanced.
- The subgroup analysis revealed that only the neuropathic pain group exhibited significant effect sizes for these outcome measures.
- Effect sizes for the remaining outcome measures were not significant

**Pain gestures**

Patient Educ Couns. 2016 Mar 15. pii: S0738-3991(16)30111-2. doi: 10.1016/j.pec.2016.03.007.

**I see how you feel: Recipients obtain additional information from speakers' gestures about pain.**

Rowbotham SJ<sup>1</sup>, Holler J<sup>2</sup>, Wearden A<sup>3</sup>, Lloyd DM<sup>4</sup>.

Author information

Abstract

**OBJECTIVE:**

Despite the need for effective pain communication, pain is difficult to verbalise. Co-speech gestures frequently add information about pain that is not contained in the accompanying speech. We explored whether recipients can obtain additional information from gestures about the pain that is being described.

**METHODS:**

Participants (n=135) viewed clips of pain descriptions under one of four conditions: 1) Speech Only; 2) Speech and Gesture; 3) Speech, Gesture and Face; and 4) Speech, Gesture and Face plus Instruction (short presentation explaining the pain information that gestures can depict). Participants provided free-text descriptions of the pain that had been described. Responses were scored for the amount of information obtained from the original clips.

**FINDINGS:**

Participants in the Instruction condition obtained the most information, while those in the Speech Only condition obtained the least (all comparisons  $p < 0.001$ ).

**CONCLUSIONS:**

Gestures produced during pain descriptions provide additional information about pain that recipients are able to pick up without detriment to their uptake of spoken information.

**PRACTICE IMPLICATIONS:**

Healthcare professionals may benefit from instruction in gestures to enhance uptake of information about patients' pain experiences.

**KEYWORDS:** Co-speech gesture; Nonverbal communication; Pain communication  
PMID: 26996051

## Impact of CP on position sense

### Position sense in chronic pain: Separating peripheral and central mechanisms in proprioception in unilateral limb pain

Anthony J. Tsay Melita J. Giummarra

#### Highlights

- -Peripheral and central mechanisms of position sense were assessed in unilateral chronic pain patients.
- -A muscular contraction or stretch prior to a position sense measurement was used to modulate muscle spindle activity.
- -The unilateral chronic pain groups produced position errors comparable to healthy controls.
- -Both painful and non-painful limbs are involved in limb matching.
- -Lateralised pain, whether in the arm or leg, does not influence forearm position sense.

#### Abstract

Awareness of limb position is derived primarily from muscle spindles and higher-order body representations. Although chronic pain appears to be associated with motor and proprioceptive disturbances, it is not clear if this is due to disturbances to position sense, muscle spindle function or central representations of the body. This study examined position sense errors, as an indicator of spindle function, in participants with unilateral chronic limb pain. The sample included 15 individuals with upper-limb pain, 15 with lower-limb pain, and 15 sex- and age-matched pain-free controls. A two-limb forearm matching task in blindfolded participants, and a single-limb pointer task, with the reference limb hidden from view, assessed forearm position sense. Position sense was determined after muscle contraction or stretch, intended to induce a high or low spindle activity in the painful and non-painful limbs, respectively. Both unilateral upper- and lower-limb chronic pain groups produced position errors comparable to healthy controls for position matching and pointer tasks. The results indicate that both the painful and non-painful limb are involved in limb matching. Lateralised pain, whether in the arm or leg, does not influence forearm position sense.

#### Perspectives

Both the painful and non-painful limbs are involved in bilateral limb matching. Muscle spindle function appears to be preserved in the presence of chronic pain.

**Keywords:** Position sense, chronic pain, muscle spindles, proprioception, thixotropy

### Emerging therapies

*Curr Pain Headache Rep.* 2016 May;20(5):33. doi: 10.1007/s11916-016-0563-y.

New Chronic Pain Treatments in the Outpatient Setting: Review Article.

Grandhe R<sup>1</sup>, Souzalnitski D<sup>2</sup>, Gritsenko K<sup>3</sup>.

[Author information](#)

### Abstract

Chronic pain is an issue encountered by many health care providers in their routine clinical practice. In addition to generalized patient suffering, this condition has significant clinical, psychological, and socioeconomic impact due to its widespread occurrence. The landscape of chronic pain management has been changing rapidly with an array of treatment innovations, better understanding of established therapies, and care coordination across specialties. In this article, we have reviewed emerging new modalities as well as transformation of established therapies by interventional, pharmacologic, rehabilitative, psychological, complimentary, and interdisciplinary approaches.

PMID: 27038972

**Alternative therapies for chronic pain**

Curr Pain Headache Rep. 2016 May;20(5):29. doi: 10.1007/s11916-016-0562-z.

**Role of Alternative Therapies for Chronic Pain Syndromes.**

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Author information

**Abstract**

There is increasing interest in the use of complimentary and alternative medicine (CAM) for the treatment of chronic pain. This review examines alternative and complimentary therapies, which can be incorporated as part of a biopsychosocial approach in the treatment of chronic pain syndromes. In the present investigation, literature from articles indexed on PubMed was evaluated including topics of alternative therapies, complimentary therapies, pain psychology, biofeedback therapy, physical exercise therapies, acupuncture, natural and herbal supplements, whole-body cryotherapy, and smartphone technologies in the treatment of chronic pain syndromes. This review highlights the key role of psychology in the treatment of chronic pain. Cognitive behavior therapy appears to be the most impactful while biofeedback therapy has also been shown to be effective for chronic pain. Exercise therapy has been shown to be effective in short-, intermediate-, and long-term pain states. When compared to that in sham controls, acupuncture has shown some benefit for neck pain immediately after the procedure and in the short term and improvement has also been demonstrated in the treatment of headaches. The role of smartphones and whole-body cryotherapy are new modalities and further studies are needed. Recent literature suggests that several alternate therapies could play a role in the treatment of chronic pain, supporting the biopsychosocial model in the treatment of pain states.

**KEYWORDS:** Alternative medicine; Biofeedback; Chronic pain; Complimentary and alternative medicine; Cryotherapy

PMID: 27038968

**62 A. NUTRITION/VITAMINS****Milk and inflammation**

Nutr J. 2016 Apr 2;15(1):35.

**Effects of milk containing only A2 beta casein versus milk containing both A1 and A2 beta casein proteins on gastrointestinal physiology, symptoms of discomfort, and cognitive behavior of people with self-reported intolerance to traditional cows' milk.**

Jianqin S<sup>1</sup>, Leiming X<sup>2</sup>, Lu X<sup>3</sup>, Yelland GW<sup>4,5</sup>, Ni J<sup>6</sup>, Clarke AJ<sup>7</sup>.

Author information

Abstract

**BACKGROUND:**

Cows' milk generally contains two types of  $\beta$ -casein, A1 and A2 types. Digestion of A1 type can yield the peptide  $\beta$ -casomorphin-7, which is implicated in adverse gastrointestinal effects of milk consumption, some of which resemble those in lactose intolerance. This study aimed to compare the effects of milk containing A1  $\beta$ -casein with those of milk containing only A2  $\beta$ -casein on inflammation, symptoms of post-dairy digestive discomfort (PD3), and cognitive processing in subjects with self-reported lactose intolerance.

**METHODS:**

Forty-five Han Chinese subjects participated in this double-blind, randomized, 2  $\times$  2 crossover trial and consumed milk containing both  $\beta$ -casein types or milk containing only A2  $\beta$ -casein. Each treatment period was 14 days with a 14-day washout period at baseline and between treatment periods. Outcomes included PD3, gastrointestinal function (measured by smart pill), Subtle Cognitive Impairment Test (SCIT), serum/fecal laboratory biomarkers, and adverse events.

**RESULTS:**

Compared with milk containing only A2  $\beta$ -casein, the consumption of milk containing both  $\beta$ -casein types was associated with significantly greater PD3 symptoms; higher concentrations of inflammation-related biomarkers and  $\beta$ -casomorphin-7; longer gastrointestinal transit times and lower levels of short-chain fatty acids; and increased response time and error rate on the SCIT. Consumption of milk containing both  $\beta$ -casein types was associated with worsening of PD3 symptoms relative to baseline in lactose tolerant and lactose intolerant subjects. Consumption of milk containing only A2  $\beta$ -casein did not aggravate PD3 symptoms relative to baseline (i.e., after washout of dairy products) in lactose tolerant and intolerant subjects.

**CONCLUSIONS:**

Consumption of milk containing A1  $\beta$ -casein was associated with increased gastrointestinal inflammation, worsening of PD3 symptoms, delayed transit, and decreased cognitive processing speed and accuracy. Because elimination of A1  $\beta$ -casein attenuated these effects, some symptoms of lactose intolerance may stem from inflammation it triggers, and can be avoided by consuming milk containing only the A2 type of beta casein.

**TRIAL REGISTRATION:**

ClinicalTrials.gov/[NCT02406469](https://clinicaltrials.gov/ct2/show/study/NCT02406469).

### Coffee and tea and the liver

Coffee and tea consumption in relation with non-alcoholic fatty liver and metabolic syndrome: A systematic review and meta-analysis of observational studies

Clinical Nutrition, 04/04/2016 Marventano S, et al.

The authors aimed to systematically review and perform quantitative analyses of results from observational studies on coffee/tea consumption and non-alcoholic fatty liver disease (NAFLD) or metabolic syndrome (MetS). Studies on coffee and NAFLD suggest that coffee consumption could have a protective role on fibrosis. Both coffee and tea consumption are associated with less likelihood of having MetS but further research with better designed studies is needed.

#### Methods

- A Medline and Embase search was performed to retrieve articles published up to March 2015.
- The authors used a combination of the keywords “coffee”, “caffeine”, “tea”, “non-alcoholic fatty liver disease”, “non-alcoholic steatohepatitis”, “metabolic syndrome”.
- Pooled risk ratios (RRs) and 95% confidence intervals (CIs) were calculated by random-effects model.

#### Results

- Seven studies assessed coffee consumption in NAFLD patients.
- Fibrosis scores were reported in four out of seven; all four studies revealed an inverse association of coffee intake with fibrosis severity, although the lack of comparable exposure and outcomes did not allow to perform pooled analysis.
- Seven studies met the inclusion criteria to be included in the meta-analysis on coffee consumption and MetS.
- Individuals consuming higher quantities of coffee were less like to have MetS (RR = 0.87, 95% CI: 0.79–0.96).
- However, the association of coffee and individual components of MetS was not consistent across the studies.
- Pooled analysis of six studies exploring the association between tea consumption and MetS resulted in decreased odds of MetS for individuals consuming more tea (RR = 0.83, 95% CI: 0.73–0.95).