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## LUMBAR SPINE

### L5 spinous process/Spondylosis

*Clin Orthop Relat Res.* 2012 Nov;470(11):3202-6. doi: 10.1007/s11999-012-2439-8. Epub 2012 Jun 26.

#### **L5 pedicle length is increased in subjects with spondylolysis: an anatomic study of 1072 cadavers.**

Bajwa NS, Toy JO, Ahn NU.

#### **Source**

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#### **Abstract**

##### **BACKGROUND:**

In spondylolisthesis, it is believed that as L5 slips on S1, the pedicle may become elongated in response to the instability in an attempt to bridge the defect. Whether patients with spondylolysis, which is largely developmental, also develop elongation of the pedicles is unknown.

##### **QUESTIONS/PURPOSES:**

The purpose of this study is to evaluate and quantify the increase in L5 pedicle length in subjects with spondylolysis as compared with normal healthy subjects.

##### **METHODS:**

Nine hundred fifty-two human cadaveric specimens without spondylolysis and 120 specimens with spondylolysis from the Hamann-Todd Osteological Collection were examined by a single examiner. Baseline data, including age, sex, and race of specimens, were collected. Digital calipers were used to measure the pedicle lengths at the L5 level. Linear regression analysis was performed to compare the L5 pedicle lengths in healthy patients and patients with spondylolysis.

##### **RESULTS:**

Linear regression showed a significant association of increased L5 pedicle length in subjects with spondylolysis. The average L5 pedicle length in subjects with spondylolysis was greater compared with subjects without spondylolysis. In spondylolytic specimens, pedicles start to elongate after the age of 40 years. The pedicle lengths increase progressively from 5.6 mm at 40 years to 6.7 mm at 80 years with a 1% to 3% increment every decade. The pedicle lengths showed little variation in specimens from healthy subjects.

##### **CONCLUSIONS:**

In spondylolytic specimens, there is progressive elongation of L5 pedicle length after the third decade. An increase in L5 pedicle length in all age groups compared with the specimens from healthy subjects suggests that pathologic changes occur in bony anatomy of L5 vertebrae as early as adolescence when the condition develops. PMID: 22733185

## Outcomes/nonspecific

Phys Ther. 2013 Sep 5. [Epub ahead of print]

### **Prognosis and Course of Disability in Patients With Chronic Nonspecific Low Back Pain: A 5- and 12-Month Follow-up Cohort Study.**

Verkerk K, Luijsterburg PA, Heymans MW, Ronchetti I, Pool-Goudzwaard AL, Miedema HS, Koes BW.

#### **Source**

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#### **Abstract**

##### **BACKGROUND:**

Few data are available on the course of and predictors for disability in patients with chronic nonspecific low back pain (CNSLBP).

##### **OBJECTIVE:**

The purpose of this study was to describe the course of disability and identify clinically important prognostic factors of low-back-pain-specific disability in patients with CNSLBP receiving multidisciplinary therapy.

##### **DESIGN:**

A prospective cohort study was conducted.

##### **METHODS:**

A total of 1,760 patients with CNSLBP who received multidisciplinary therapy were evaluated for their course of disability and prognostic factors at baseline and at 2-, 5-, and 12-month follow-ups. Recovery was defined as 30% reduction in low back pain-specific disability at follow-up compared with baseline and as absolute recovery if the score on the Quebec Back Pain Disability Scale (QBPDS) was  $\leq 20$  points at follow-up. Potential prognostic factors were identified using multivariable logistic regression analysis.

##### **RESULTS:**

Mean patient-reported disability scores on the QBPDS ranged from 51.7 (SD=15.6) at baseline to 31.7 (SD=15.2), 31.1 (SD=18.2), and 29.1 (SD=20.0) at 2, 5, and 12 months, respectively. The prognostic factors identified for recovery at 5 and 12 months were younger age and high scores on disability and on the 36-Item Short-Form Health Survey (SF-36) (Physical and Mental Component Summaries) at baseline. In addition, at 5-month follow-up, a shorter duration of complaints was a positive predictor, and having no comorbidity and less pain at baseline were additional predictors at 12-month follow-up.

##### **LIMITATIONS:**

Missing values at 5- and 12-month follow-ups were 11.1% and 45.2%, respectively.

##### **CONCLUSION:**

After multidisciplinary treatment, the course of disability in patients with CNSLBP continued to decline over a 12-month period. At 5- and 12-month follow-ups, prognostic factors were identified for a clinically relevant decrease in disability scores on the QBPDS. PMID: 23824781

## Classification of LBP

### Research

#### **Evidence-based classification of low back pain in the general population: one-year data collected with SMS Track**

Charlotte Leboeuf-Yde<sup>12\*</sup>, Nadège Lemeunier<sup>23</sup>, Niels Wedderkopp<sup>4</sup> and Per Kjaer<sup>15</sup>

*Chiropractic & Manual Therapies* 2013, **21**:30 doi:10.1186/2045-709X-21-30

### Abstract

#### **Background**

It was previously assumed that low back pain (LBP) is a disorder that can be classified as acute, subacute and chronic. Lately, the opinion seems to have veered towards a concept of it being a more recurrent or cyclic condition. Interestingly, a recent review of the literature indicated that LBP in the general population is a rather stable condition, characterized as either being present or absent. However, only one of the reviewed studies had used frequent data collection, which would be necessary when studying detailed course patterns over time. It was the purpose of this study to see, if it was possible to identify whether LBP, when present, is rather episodic or chronic/persistent. Further, we wanted to see if it was possible to describe any specific course profiles of LBP in the general population.

#### **Methods**

In all, 293 49/50-yr old Danes, who previously participated in a population-based study on LBP were invited to respond to 26 fortnightly text-messages over one year, each time asking them the number of days they had been bothered by LBP in the past two weeks. The course patterns for these individuals were identified through manual analysis, by observing the interplay between non-episodes and episodes of LBP. A *non-episode of LBP* was defined as a period of at least one month without LBP as proposed by de Vet et al. A fortnight with at least one day of pain was defined as a *pain fortnight (FN)*. At least one pain FN surrounded by a non-episode on each side was defined as an *episode of LBP*. After some preliminary observations of the spread of data, episodes were further classified as *brief* (consisting of only one pain FN) or *longer* (if there were at least 2 pain FNs in a row). An episode of at least 6 pain FNs in a row (i.e. 3 months) was defined as a *long-lasting episode*.

#### **Results**

In all, 261 study subjects were included in the analyses, for which 7 distinct LBP subsets could be identified. These could be grouped into three major clusters; those mainly without LBP (35%), those with episodic LBP (30%) and those with persistent LBP (35%). There was a positive association between number of episodes and their duration.

#### **Conclusion**

In this study population, consisting of 50-yr old persons from the general population, LBP, when present, could be classified as either 'episodic' or 'mainly persistent'. About one third was mainly LBP-free throughout the year of study. More information is needed in relation to their relative proportions in various populations and the clinical relevance of these subgroups.

## Rx of LBP

JAMA Intern Med. 2013 Jul 29. doi: 10.1001/jamainternmed.2013.8992.

### **Worsening Trends in the Management and Treatment of Back Pain.**

Mafi JN, McCarthy EP, Davis RB, Landon BE.

#### **Source**

Division of Primary Care and General Internal Medicine, Department of Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts.

#### **Abstract**

**IMPORTANCE** Back pain treatment is costly and frequently includes overuse of treatments that are unsupported by clinical guidelines. Few studies have evaluated recent national trends in guideline adherence of spine-related care.

**OBJECTIVE** To characterize the treatment of back pain from January 1, 1999, through December 26, 2010.

**DESIGN, SETTING, AND PATIENTS** Using nationally representative data from the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey, we studied outpatient visits with a chief symptom and/or primary diagnosis of back or neck pain, as well as those with secondary symptoms and diagnoses of back or neck pain. We excluded visits with concomitant "red flags," including fever, neurologic symptoms, or cancer. Results were analyzed using logistic regression adjusted for patient and health care professional characteristics and weighted to reflect national estimates. We also present adjusted results stratified by symptom duration and whether the health care professional was the primary care physician (PCP).

**MAIN OUTCOMES AND MEASURES** We assessed imaging, narcotics, and referrals to physicians (guideline discordant indicators). In addition, we evaluated use of nonsteroidal anti-inflammatory drugs or acetaminophen and referrals to physical therapy (guideline concordant indicators).

**RESULTS** We identified 23 918 visits for spine problems, representing an estimated 440 million visits. Approximately 58% of patients were female. Mean age increased from 49 to 53 years ( $P < .001$ ) during the study period. Nonsteroidal anti-inflammatory drug or acetaminophen use per visit decreased from 36.9% in 1999-2000 to 24.5% in 2009-2010 (unadjusted  $P < .001$ ). In contrast, narcotic use increased from 19.3% to 29.1% ( $P < .001$ ). Although physical therapy referrals remained unchanged at approximately 20%, physician referrals increased from 6.8% to 14.0% ( $P < .001$ ). The number of radiographs remained stable at approximately 17%, whereas the number of computed tomograms or magnetic resonance images increased from 7.2% to 11.3% during the study period ( $P < .001$ ). These trends were similar after stratifying by short-term vs long-term presentations, visits to PCPs vs non-PCPs, and adjustment for age, sex, race/ethnicity, PCP status, symptom duration, region, and metropolitan location.

**CONCLUSIONS AND RELEVANCE** Despite numerous published clinical guidelines, management of back pain has relied increasingly on guideline discordant care. Improvements in the management of spine-related disease represent an area of potential cost savings for the health care system with the potential for improving the quality of care.

## High blood pressure/LBP

Eur J Pain. 2013 Sep 9. doi: 10.1002/j.1532-2149.2013.00398.x.

### **Does high blood pressure reduce the risk of chronic low back pain? The Nord-Trøndelag Health Study.**

Heuch I, Heuch I, Hagen K, Zwart JA.

#### **Source**

Department of Neurology and FORMI, Oslo University Hospital, Norway.

#### **Abstract**

##### **BACKGROUND:**

Epidemiological studies have suggested inverse relationships between blood pressure and prevalence of conditions such as migraine and headache. It is not yet clear whether similar relationships can be established for back pain in particular in prospective studies.

##### **METHODS:**

Associations between blood pressure and chronic low back pain were explored in the cross-sectional HUNT 2 survey of a Norwegian county in 1995-1997, including 39,872 individuals who never used antihypertensive medication. A prospective study, comprising 17,209 initially back pain-free individuals and 5740 individuals reporting low back pain, was established by re-examinations in the HUNT 3 survey in 2006-2008. Associations were assessed by logistic regression with respect to systolic, diastolic and pulse pressure, with adjustment for education, work status, physical activity, smoking, body mass and lipid levels.

##### **RESULTS:**

In the cross-sectional study, all three blood pressure measures showed inverse relationships with prevalence of low back pain in both sexes. In the prospective study of disease-free women, baseline pulse pressure and systolic pressure were inversely associated with risk of low back pain [odds ratio (OR) 0.93 per 10 mm Hg increase in pulse pressure, 95% confidence interval (CI) 0.89-0.98,  $p = 0.007$ ; OR 0.95 per 10 mm Hg increase in systolic pressure, 95% CI 0.92-0.99,  $p = 0.005$ ]. Results among men were equivocal. No associations were indicated with the occurrence of pain in individuals with low back pain at baseline.

##### **CONCLUSIONS:**

Results for low back pain are consistent with the theory of hypertension-associated hypalgesia, predicting diminished pain sensitivity with increasing blood pressure, possibly with modified reactions in people suffering from long-lasting pain.

© 2013 European Federation of International Association for the Study of Pain Chapters. PMID: 24019262

## **Fear/performance/LBP**

Spine J. 2013 Apr 24. pii: S1529-9430(13)00237-4. doi: 10.1016/j.spinee.2013.02.037.

### **Relationship between different measures of pain-related fear and physical capacity of the spine in patients with chronic low back pain.**

Demoulin C, Huijnen IP, Somville PR, Grosdent S, Salamun I, Crielaard JM, Vanderthommen M, Volders S.

#### **BACKGROUND CONTEXT:**

It has been controversially stated that pain-related fear is a more important determining factor for disability in chronic low back pain (CLBP) than pain or physical impairment in itself. So far, the relationship between psychological and physiological determinants of chronic pain, that is, pain-related fear and physiological abilities, remains unclear.

#### **PURPOSE:**

To evaluate whether pain-related fear assessed by different tools (both task specific and non task specific) is related to physical capacity measured by specific spine tests and, secondarily, to explore the relationship between different pain-related fear assessment tools.

#### **STUDY DESIGN/SETTING:**

Cross-sectional study.

#### **PATIENT SAMPLE:**

Fifty patients with CLBP (50% women; mean age [standard deviation]: 44.2 [9.5 years]).

#### **OUTCOME MEASURES:**

Physical capacity by means of three specific spine tests, that is, the finger-floor distance test (flexibility), a maximal isometric strength test of trunk extensor muscles (strength), and the Sorensen test (endurance). Pain-related fear by means of self-report measures, that is, the Tampa Scale for Kinesiophobia (TSK), the Photograph Series of Daily Activities (PHODA), and a fear visual analog scale (FVAS) tailored to the spine tests.

#### **METHODS:**

Participants were asked to complete the TSK and PHODA and to perform the three spine tests. Right before performing each of the spine tests, an FVAS was filled out. Linear regression analyses controlling for gender and age were performed to study the association between the pain-related fear measurements and the results of the spine tests. To investigate the relationship between the pain-related fear measurements, correlation tests were performed.

#### **RESULTS:**

The linear regression analyses revealed that neither the TSK and PHODA scores nor the FVAS scores were significantly related to the physical capacity measurements. The correlational tests showed no significant correlation between the PHODA, TSK, and FVAS scores.

#### **CONCLUSIONS:**

The present study shows that neither the task-specific tool (FVAS) nor the non task-specific questionnaires (TSK and PHODA) were significantly correlated to the spine tests in patients with CLBP. This is contrary to earlier evidence according to which physical capacity is inversely related to the level of pain-related fear, and it suggests that one should not draw conclusions about physical capacity based on pain-related fear scores. Furthermore, the different assessment tools for pain-related fear were surprisingly not correlated with each other.

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Disc **LBP/INJECTIONS**

## Surgery/LBP

### Patient perception of results

#### The assessment of complications after spine surgery: time for a paradigm shift?

The Spine Journal 13 (2013) 615–624

**BACKGROUND CONTEXT:** Recent years have witnessed a shift in the assessment of spine surgical outcomes with a greater focus on the patient's perspective. However, this approach has not been widely extended to the assessment of complications.

**PURPOSE:** The present study sought to quantify the patient-rated impact/ severity of complications of spine surgery and directly compare the incidences of surgeon-rated and patient-reported complications.

**STUDY DESIGN:** Prospective study of patients undergoing surgery for painful degenerative lumbar disorders, being operated in the Spine Center of an orthopedic hospital.

**PATIENT SAMPLE:** A total of 2,303 patients (mean [standard deviation] age, 61.9 [15.1] years; 1,136 [49.3%] women and 1,167 [50.7%] men).

**OUTCOME MEASURES:** Patients: Core Outcome Measures Index, self-rated complications, bothersomeness of complications, global treatment outcome, and satisfaction. Surgeons: Spine Tango surgery and follow-up documentation forms registering surgical details and complications.

**METHODS:** Patients completed questionnaires before and 3 months after surgery. Surgeons documented complications before discharge and at the first postoperative follow-up, 6 to 12 weeks after surgery.

**RESULTS:** In total, 615 out of 2,303 (27%) patients reported complications, with "bothersomeness" ratings of 1%, not at all; 22%, slightly; 26%, moderately; 34%, very; and 17%, extremely bothersome. Patients most commonly

reported sensory disturbances (35% of those reporting a complication) or ongoing/new pain (27%) followed by wound healing problems (11%) and motor disturbances (8%). The surgeons documented complications in 19% of patients. There was a minimal overlap regarding the presence or absence of complications in any given patient.

**CONCLUSIONS:** Most complications reported by the patient are perceived to be at least moderately bothersome and are, hence, not inconsequential. Surgeons reported lower complication rates than the patients did, and there was only moderate agreement between the ratings of the two. As with treatment outcome, complications and their severity should be assessed from both the patient's and the surgeon's perspectives.

## Spondylolisthesis

### **No correlation between slip reduction in low-grade spondylolisthesis or change in neuroforaminal morphology and clinical outcome**

BMC Musculoskeletal Disorders 2013, 14:245

In instrumented posterolateral fusion reduction of a spondylolisthesis is appealing on theoretical grounds since this may lead to indirect decompression of the entrapped nerve roots. However, there is no consensus in the literature whether a beneficial effect of reduction on outcome can be expected. The objective of the current study was to evaluate whether a correlation between the extent of listhesis reduction and clinical improvement could be established.

**Methods:** From two ongoing prospective studies 72 patients with a single- level instrumented posterolateral lumbar fusion for low-grade spondylolisthesis (isthmic/degenerative 51/21) were evaluated. Radiographs and clinical outcome scores were available at baseline, 6 weeks and 1 year after surgery. Changes in neuroforaminal morphology were measured on calibrated radiographs. These changes in radiographic parameters were correlated to clinical outcome (Visual Analogue Score (VAS) leg pain, Oswestry Disability Index (ODI)). Fusion status was assessed on Computed Tomography-scan at one year.

**Results:** A mean spondylolisthesis of 25 percent was reduced to 15 percent at 6 weeks with some loss of reduction to 17 percent at one year. The VAS and ODI significantly improved at both time intervals after surgery ( $p < 0.001$ ). No significant correlations could be established between the extent of slip reduction and improvement in VAS or ODI (Pearson's correlation  $-0.2$  and  $0.07$  respectively at one year); this also accounted for the other radiographic parameters. A fusion rate of 64 percent was seen on CT-scan.

**Conclusions:** Clinical outcome was not related to the obtained radiographic reduction of the slipped vertebra in patients with a lumbar fusion for low grade spondylolisthesis. Loss of reduction or non-union on CT-scans had no effect on the clinical outcome. Reduction of a low-grade spondylolisthesis in spinal fusion is appealing, however, there is no evidence that it positively affects clinical outcome on the short term.

## Pelvic Girdle

### Inflammation

*Clin Rheumatol.* 2013 Aug 7. [Epub ahead of print]

**Association of biomarkers of inflammation, cartilage and bone turnover with gender, disease activity, radiological damage and sacroiliitis by magnetic resonance imaging in patients with early spondyloarthritis.**

Almodóvar R, Ríos V, Ocaña S, Gobbo M, Casas ML, Zarco-Montejo P, Juanola X.

#### Source

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#### Abstract

To assess the association between biomarkers of inflammation, cartilage and bone turnover with gender, Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Spondylitis Disease Activity Score (ASDAS) and bone marrow oedema in resonance magnetic imaging (MRI) of sacroiliac joints (SIJs) and radiological damage in early spondyloarthritis (SpA).

Cross-sectional study of 60 patients (56.7 % females; mean age, 32.4 years) with early SpA. Sociodemographic data, clinical features, serum matrix metalloproteinase 3 (MMP-3), high sensitivity C-reactive protein (hsCRP), C-terminal cross-linking telopeptides of type I collagen (CTX-I) and urinary deoxypyridinoline, ASDAS, BASDAI, BASFI, BASRI and MRI of the SIJs were collected. The mean (SD) disease duration was 12.4 (6.8 months). Twenty-two (68.7 %) of the 32 patients had active sacroiliitis by MRI. MMP-3 and CTX I correlated with swollen joint ( $r = 0.515$ ,  $r = 0.386$ ,  $p = 0.01$ ). hsCRP correlated with ESR ( $r = 0.303$ ,  $p = 0.05$ ), with CRP ( $r = 0.455$ ,  $p = 0.01$ ) and with total BASRI ( $r = 0.95$ ,  $p = 0.05$ ). Biomarkers were unrelated with the rest of variables. Levels of MMP-3 ( $44.3 \pm 52.4$  vs  $24.7 \pm 33.4$ ,  $p < 0.05$ ) and CTX-I ( $0.53 \pm 0.45$  vs  $0.24 \pm 0.38$ ;  $p < 0.05$ ) were higher in men.

Our study shows that CTX-I and MMP-3 are a marker of peripheral disease activity in early SpA. Male gender had higher levels of CTX-I and MMP-3, which may indicate higher disease activity. Higher hsCRP levels trended towards correlation with more baseline radiographic damage. Therefore, these biomarkers may help identify a subgroup of patients who will need closer monitoring and more intensive treatment. PMID: 23917391

## VISCERA

### IBS

*Neurogastroenterol Motil.* 2013 Aug 29. doi: 10.1111/nmo.12220.

#### **Characterization of symptoms in irritable bowel syndrome with mixed bowel habit pattern.**

Su AM, Shih W, Presson AP, Chang L.

#### **Source**

Feinberg School of Medicine, Northwestern University, Chicago, IL, USA; Department of Medicine, Stanford University, Stanford, CA, USA.

#### **Abstract**

##### **BACKGROUND:**

Irritable bowel syndrome (IBS) with mixed bowel habits (IBS-M) is a heterogeneous subtype with varying symptoms of constipation and diarrhea, and has not been well characterized. We aimed to characterize gastrointestinal (GI) and non-GI symptoms in IBS-M patients from a US patient population, and to compare them with IBS with constipation (IBS-C) and diarrhea (IBS-D).

##### **METHODS:**

Subjects answering community advertisements and meeting Rome III criteria for IBS completed symptom questionnaires.

##### **KEY RESULTS:**

Of the initial 289 IBS patients identified, one third ( $n = 51$ , 32.5%) who met Rome III criteria for IBS-M endorsed having either loose stools or hard stools due to medication. These patients had more severe symptoms and longer duration of flares compared to the rest of the IBS-M group ( $p = 0.014$ ,  $p = 0.005$ ). Excluding IBS-M patients with medication-related extremes in stool form who could not be reclassified by medical history, 247 IBS patients were assessed. IBS-M was the most common (44.1%), followed by IBS-C (27.9%), IBS-D (26.3%), and IBS-U (unsubtyped, 1.6%). While IBS-M shared symptoms with both IBS-C and IBS-D, there were significant differences in the prevalence of bowel habit symptoms ( $p$ -value range:  $<0.001$ - $0.002$ ). IBS-M patients reported most bothersome symptoms that were more similar to IBS-D, with the most common being irregular bowel habits (27.5%), bloating (26.6%), and abdominal pain (20.2%). There were no differences in non-GI symptoms between subtypes.

##### **CONCLUSIONS & INFERENCES:**

IBS-M is a heterogeneous symptom group and thus requires that subclassification criteria be better defined. Use of laxative/antidiarrheal medications adds to the diagnostic complexity in a potentially more severe subset of IBS-M and should be assessed for accurate subclassification.

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##### **KEYWORDS:**

abdominal pain, constipation, diarrhea, irritable bowel syndrome, mixed bowel habits PMID: 23991913

## THORACIC SPINE

## CERVICAL SPINE

### Myelopathy

Eur Spine J. 2013 Sep 5. [Epub ahead of print]

**A summary of assessment tools for patients suffering from cervical spondylotic myelopathy: a systematic review on validity, reliability and responsiveness.**

Singh A, Tetreault L, Casey A, Laing R, Statham P, Fehlings MG.

#### Source

Department of Neurosurgery, Toronto Western Hospital, University of Toronto, 399 Bathurst St. W, 4F412, Toronto, ON, M5T 2S8, Canada.

#### Abstract

##### **PURPOSE:**

One of the objectives of this review is to summarize the important features of a good scale. A second aim is to conduct a systematic review to identify scales that can detect the presence of cervical myelopathy and to determine their psychometric properties including validity, reliability and responsiveness.

##### **METHODS:**

A thorough literature search was performed using MEDLINE, MEDLINE in process, EMBASE, and Cochrane Central Register of Controlled Trials. Articles were included in this study if they compared scale measurements between a control and a myelopathic patient population or if they discussed any psychometric property of a scale.

##### **RESULTS:**

An ideal scale should be one that is quantifiable, valid, sensitive, responsive and easy to perform, has high inter/intra-rater reliability, internal consistency and a suitable distribution, and is one-dimensional and relevant. In the context of cervical spondylotic myelopathy, it is essential that the scale also addresses the pathophysiology, its key signs and symptoms as well as its natural history. For the systematic review, the search yielded 5,745 citations. Of these, 37 met inclusion criteria, 10 explored the ability of a scale to detect myelopathy, 23 examined validity by assessing correlation between scales, 10 reported reliability, 8 analyzed responsiveness, and 6 discussed internal consistency. The most frequently reported scale was short form-36 (n = 16) followed by Nurick grade (n = 14), Japanese Orthopaedic Association (n = 13), (modified) Japanese Orthopaedic Association (n = 7) and grip and release test (n = 6). Four studies each presented results on the Cooper, Harsh and 30-m walking test.

##### **CONCLUSION:**

This review summarizes outcome measures used to assess the presence and severity of cervical myelopathy. It includes several validation studies as well as those that have reported the responsiveness and reliability of various measures. PMID: 24005994

## **Fascia/C spine**

Surg Radiol Anat. 2013 Aug 23.

### **Ultrasonography in myofascial neck pain: randomized clinical trial for diagnosis and follow-up.**

Stecco A, Meneghini A, Stern R, Stecco C, Imamura M.

#### **Source**

Department of Internal Medicine, University of Padova, Padua, Italy.

#### **Abstract**

##### **OBJECTIVE:**

A definitive diagnosis of chronic neck pain (CNP) is sometimes not possible. The aim of this study was to understand the possible role of the deep fasciae in CNP and the utility of the ultrasonography in the diagnosis of myofascial neck pain.

##### **METHODS:**

The morphometric and clinical data of 25 healthy subjects and 28 patients with CNP were compared. For all subjects, the active and passive cervical range of motion (ROM) was analyzed and the neck pain disability questionnaire (NDPQ) was administered. The fascial thickness of the sternal ending of the sternocleidomastoid and medial scalene muscles was also analyzed by ultrasonography.

##### **RESULTS:**

There were significant differences between healthy subjects and patients with CNP in the thickness of the upper side of the sternocleidomastoid fascia and the lower and upper sides of the right scalene fascia both at the end of treatment as during follow-up. A significant decrease in pain and thickness of the fasciae were found. Analysis of the thickness of the sub-layers showed a significant decrease in loose connective tissue, both at the end of treatment and during follow-up.

##### **CONCLUSIONS:**

The data support the hypothesis that the loose connective tissue inside the fasciae may play a significant role in the pathogenesis of CNP. In particular, the value of 0.15 cm of the SCM fascia was considered as a cut-off value which allows the clinician to make a diagnosis of myofascial disease in a subject with CNP. The variation of thickness of the fascia correlated with the increase in quantity of the loose connective tissue but not with dense connective tissue.

**UPPER C SPINE  
CRANIUM/TMJ**

## HEADACHES

### Migraines

Headache. 2013 Aug 28. doi: 10.1111/head.12201.

#### **Impact of NSAID and Triptan Use on Developing Chronic Migraine: Results From the American Migraine Prevalence and Prevention (AMPP) Study.**

Lipton RB, Serrano D, Nicholson RA, Buse DC, Runken MC, Reed ML.

#### **OBJECTIVES:**

To assess the influence of triptan or nonsteroidal anti-inflammatory drug (NSAID) use on the likelihood of developing chronic migraine (CM) among persons with episodic migraine (EM).

#### **BACKGROUND:**

CM is common in tertiary headache care, and relative to EM, CM is associated with a number of deleterious outcomes, including higher headache-related disability, reduced health-related quality of life, and increased direct and indirect costs. Symptomatic medication use has emerged as an important risk factor for the development of CM. Limited evidence based on a single year of follow up suggests that the association between NSAID and triptan use with the onset of CM varies in a dose-dependent manner that interacts with headache frequency. However, this interaction has never been explicitly studied. Herein, we evaluate results from a large-scale, 5-year, population-based observational study to characterize these relationships and test the hypothesis that NSAID use may modify the effect of triptan use on CM onset.

#### **METHODS:**

In the American Migraine Prevalence and Prevention (AMPP) study, 11,249 participants had EM in 2005 and provided up to 5 years of annual follow-up data. We analyzed the characteristics of persons with EM 1 year that predicted new onset CM in the subsequent year, focusing on treatment with NSAIDs and triptans as exposures. These adjacent years of data provide the basis for analysis and are termed "couplets." Repeated measures logistic regression with a subject-specific random intercept was used to model the likelihood of transition from EM to CM as a function of NSAID or triptan dose while controlling for a number of covariates including headache features, use of other medications, and the number of couplets per individual.

#### **RESULTS:**

The analysis included 9031 individuals with EM contributing up to 5 years of data and up to 4 couplets each. Results indicated that on average, 55% of the participants used NSAIDs in any given year and 2% transitioned to CM over subsequent years. Among the 20% using triptans, 3% per year transitioned to CM. Among persons with less than 10 headache days per month, frequency of NSAID use was associated with dose-dependent reductions in risk of CM onset. Among those with 10-14 headache days per month, increasing days per month of NSAID use was associated with increasing risk of CM onset. Increasing days per month of triptan use was associated with increased risk of transitioning to CM. Combination use of NSAIDs and triptans was not protective against transition to CM, but was also not statistically significantly associated with increased risk of CM onset.

**CONCLUSION:** Triptan use in EM is associated with an increased risk of CM onset that increases with days of medication use. For NSAIDs, effects depend on headache days per month. NSAIDs are protective in individuals with less than 10 headache days per month but associated with increased risk with 10 or more headache days per month. Combining a triptan and NSAID was not associated with a statistically significant increased risk of CM onset, whereas increased risk of CM onset was significantly associated with triptan monotherapy. MID: 23992516

## HA/White Matter

Neurology. 2013 Aug 23.

### **Migraine and white matter hyperintensities: The ARIC MRI study.**

Hamedani AG, Rose KM, Peterlin BL, Mosley TH, Coker LH, Jack CR, Knopman DS, Alonso A, Gottesman RF.

#### **Source**

From the Department of Neurology (A.G.H., B.L.P., R.F.G.), Johns Hopkins School of Medicine, Baltimore; Department of Epidemiology (A.G.H., R.F.G.), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD; Department of Epidemiology (K.M.R.), Gillings School of Global Public Health, University of North Carolina at Chapel Hill; Department of Medicine-Geriatrics (T.H.M.), University of Mississippi Medical Center, Jackson, MS; Department of Social Sciences and Health Policy (L.H.C.), Division of Public Health Services, Wake Forest School of Medicine, Winston-Salem, NC; Departments of Radiology (C.R.J.) and Neurology (D.S.K.), Mayo Clinic, Rochester, MN; and Division of Epidemiology and Community Health (A.A.), School of Public Health, University of Minnesota, St. Paul.

#### **Abstract**

##### **OBJECTIVE:**

Migraine is associated with white matter hyperintensities (WMH) cross-sectionally, but its effect on WMH progression is uncertain.

##### **METHODS:**

Participants in the Atherosclerosis Risk in Communities cohort study (n = 10,924) completed a standardized headache questionnaire between 1993 and 1995. A subset of participants (n = 1,028) received 2 MRIs 8 to 12 years apart: once at the time of headache ascertainment, and again from 2004 to 2006. WMH were quantified using both a visually graded score (0-9) and semiautomated volumetric analysis. Linear and logistic regression models adjusted for age, sex, and other vascular risk factors were constructed.

##### **RESULTS:**

Individuals who had migraine without aura were cross-sectionally associated with an 87% greater odds of having a WMH score  $\geq 3$  than individuals without headache (adjusted odds ratio = 1.87; 95% confidence interval [CI]: 1.04, 3.37). Participants with migraine had an average of 2.65 cm<sup>3</sup> more WMH than those without headache (95% CI: 0.06, 5.24). However, there was no significant difference in WMH progression over the study period between individuals with and without migraine (1.58 cm<sup>3</sup> more progression for individuals with migraine compared to those without; 95% CI: -0.37, 3.53).

##### **CONCLUSION:**

Migraine is associated with WMH volume cross-sectionally but not with WMH progression over time. This suggests that the association between migraine and WMH is stable in older age and may be primarily attributable to changes occurring earlier in life, although further work is needed to confirm these findings. PMID: 23975874

#### **Vestibular**

## CONCUSSIONS

### Sleep deprivation

Clin J Sport Med. 2013 Sep;23(5):343-348.

#### **The Effects of Sleep Quality and Sleep Quantity on Concussion Baseline Assessment.**

Mihalik JP, Lengas E, Register-Mihalik JK, Oyama S, Begalle RL, Guskiewicz KM.

#### **Source**

\*Matthew Gfeller Sport-Related Traumatic Brain Injury Research Center, Department of Exercise and Sport Science, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; †Curriculum in Human Movement Science and the Department of Allied Health Sciences, School of Medicine, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; ‡Injury Prevention Research Center, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; §Clinical Research Unit, Emergency Services Institute, WakeMed Health and Hospitals, Raleigh, North Carolina; and ¶Department of Health and Kinesiology, University of Texas at San Antonio, San Antonio, Texas.

#### **Abstract**

##### **OBJECTIVE::**

Proper concussion assessment is imperative for properly caring for athletes who sustain traumatic brain injuries. Decreased sleep quality and sleep quantity affect cognition and may threaten the validity of clinical measures often used as a part of the concussion assessment. The purpose of this study was to determine if sleep quality or sleep quantity affects performance on clinical measures of concussion.

##### **DESIGN::**

Prospective cohort design.

##### **SETTING::**

Clinical research center.

##### **PARTICIPANTS::**

One hundred fifty-five college student-athletes (57 females, 98 males; age =  $18.8 \pm 0.8$  years; mass =  $78.4 \pm 19.6$  kg; height =  $177.4 \pm 12.3$  cm).

##### **INTERVENTIONS::**

We performed preseason baseline testing by using a well-accepted and multifaceted protocol inclusive of neurocognition, balance performance, and symptom reporting. Information related to sleep quality and sleep quantity was also collected during preseason baseline testing.

##### **MAIN OUTCOME MEASURES::**

The CNS Vital Signs battery (computerized neurocognitive test), Sensory Organization Test (computerized dynamic posturography), and a Graded Symptom Checklist (symptom evaluation) were used.

##### **RESULTS::**

Subjects with a low sleep quantity the night before baseline reported both a greater number of symptoms and higher total symptom severity score. No clinically significant effects for sleep quality were observed.

##### **CONCLUSIONS::**

Sleep-deprived athletes reporting for baseline testing should be rescheduled for testing after a normal night's sleep. PMID: 23917732

## SHOULDER GIRDLE

## CLAVICAL

### Fx

Arthroscopy. 2013 Aug 29. pii: S0749-8063(13)00812-8. doi: 10.1016/j.arthro.2013.07.257.

### **Impact of Tunnels and Tenodesis Screws on Clavicle Fracture: A Biomechanical Study of Varying Coracoclavicular Ligament Reconstruction Techniques.**

Dumont GD, Russell RD, Knight JR, Hotchkiss WR, Pierce WA, Wilson PL, Robertson WJ.

#### **Source**

University of Texas Southwestern Medical Center. Electronic address: gddumont@gmail.com.

#### **Abstract**

##### **PURPOSE:**

The purpose of this study was to compare the load to fracture of distal clavicles with no tunnels, one tunnel, or 2 tunnels and to evaluate the effect of inserting tenodesis screws in the tunnels on load to fracture of the distal clavicle.

##### **METHODS:**

Fifty right sawbone clavicles were obtained and divided into 5 groups (n = 10): group 1, normal clavicle; group 2, one tunnel, no tenodesis screw; group 3, 2 tunnels, no tenodesis screws; group 4, one tunnel with tenodesis screw; and group 5, 2 tunnels with 2 tenodesis screws. Tunnels were created using a 5-mm-diameter reamer, and 5.5 × 10 mm polyethyl ethyl ketone tenodesis screws were used. A 4-point bending load was applied to the distal clavicles. Load to failure was noted for each specimen.

##### **RESULTS:**

Load to failure in clavicles without tunnels was significantly higher (1,157.18 ± 147.10 N) than in all other groups (P < .0005). No statistical differences were noted between groups 2, 3, 4, and 5. Load to failure was not statistically different in clavicles with one versus 2 tunnels. In addition, the use of tenodesis screws in the tunnels did not affect the load required to fracture.

##### **CONCLUSIONS:**

The use of tunnels in the clavicle for coracoclavicular (CC) ligament reconstruction significantly reduces the load required to fracture the distal clavicle. The addition of tenodesis screws does not appear to significantly increase the strength of the clavicle in this construct.

##### **CLINICAL RELEVANCE:**

CC ligament reconstruction techniques commonly use tunnels in the distal clavicle, which may render the clavicle more susceptible to fracture. This study helps quantify the effect of these tunnels on the strength of the distal clavicle.

## GLENOHUMERAL/SHOULDER

### MRI/Physician owned

#### Health Care Policy and Quality

#### Original Research

### JOURNAL CLUB: Shoulder MRI Utilization: Relationship of Physician MRI Equipment Ownership to Negative Study Frequency

Timothy J. Amrhein<sup>1</sup>, Matthew P. Lungren<sup>2</sup>, Ben E. Paxton<sup>2</sup>, Ramesh Srinivasan<sup>3</sup>, Sin-Ho Jung<sup>4</sup>, Miao Yu<sup>5</sup>, James D. Eastwood<sup>2</sup> and Ramsey K. Kilani<sup>2</sup>

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#### ABSTRACT :

**OBJECTIVE.** The purpose of this article is to determine whether ownership of MRI equipment by ordering physicians influences the frequency of negative shoulder MRI scans.

**MATERIALS AND METHODS.** A retrospective review was performed of 1140 consecutive shoulder MRI scans ordered by two separate referring physician groups serving the same geographic community. The first group (financially incentivized) owned the scanners used and received technical fees for their use. The second group (non-financially incentivized) did not own the scanners used and had no direct financial interest. All examinations were performed with identical protocols and were interpreted by a single radiologist group without financial interest in the imaging equipment used. The frequency of negative examinations and the number of abnormalities in each positive study was tabulated for each group.

**RESULTS.** A total of 1140 shoulder MRI scans met inclusion criteria; 255 were negative (142 for the financially incentivized group and 113 for the non-financially incentivized group). There were 25.6% more negative scans in the financially incentivized group ( $p = 0.047$ ). There was no statistically significant difference in the average number of lesions per positive scan (1.67 for the financially incentivized group and 1.71 for the non-financially incentivized group;  $p = 0.34$ ). No statistically significant difference was found in the frequency of 19 of 20 examined lesions.

**CONCLUSION.** Shoulder MRI examinations referred by physicians with a financial interest in the imaging equipment used were significantly more likely to be negative. Positive examinations exhibited no statistically significant difference in the number of lesions per scan or in the frequency of 19 of 20 lesion subtypes. This finding suggests a highly similar distribution and severity of disease among the two patient groups.

## ROTATOR CUFF

### Function with symptomatic tear

#### **Differences in muscle activities during shoulder elevation in patients with symptomatic and asymptomatic rotator cuff tears: analysis by positron emission tomography** □

Journal of Shoulder and Elbow Surgery, 09/06/2013 Evidence Based Medicine

Shinozaki N et al.

#### Background

Differences in muscle activity patterns between patients with symptomatic and asymptomatic full-thickness rotator cuff tears have not yet been fully clarified. The purpose of this study was to investigate the muscle activity pattern by use of positron emission tomography (PET) in patients with symptomatic and asymptomatic rotator cuff tears.

#### Methods

Ten shoulders of 9 patients with full-thickness rotator cuff tears were divided into 2 groups by a numerical pain rating scale (0-10), symptomatic ( $\geq 2$ ) and asymptomatic (0 or 1), with 5 shoulders each. Scaption exercise of bilateral arms (200 repetitions in 10 minutes) with a weight of 0.25 kg each was performed before and after injection of fluorodeoxyglucose. After PET examination, the standardized uptake value of each muscle was calculated to quantify its activity and compared between the two groups.

#### Results

The activity of the anterior and middle deltoid was significantly decreased in the symptomatic group compared with the asymptomatic group (anterior deltoid,  $P = .02$ ; middle deltoid,  $P = .03$ ). In contrast, the activity of the superior trapezius was significantly increased in the symptomatic group compared with the asymptomatic group ( $P = .02$ ).

#### Conclusion

In patients with a symptomatic tear, the deltoid activity was decreased and the trapezius activity was increased. It is likely that they might have moved the painful glenohumeral joint less and instead moved the painless scapulothoracic joint more during the prescribed exercise. We conclude that patients with painful rotator cuff tears use the parascapular muscles more than those without pain do during arm elevation.

## Anterior instability

*J Shoulder Elbow Surg.* 2013 Sep 2. pii: S1058-2746(13)00282-6. doi: 10.1016/j.jse.2013.06.005.

### **Sensorimotor control deficiency in recurrent anterior shoulder instability assessed with a stabilometric force platform.**

Edouard P, Gasq D, Calmels P, Degache F.

#### **Source**

Department of Clinical and Exercise Physiology, Sports Medicine Unit, University Hospital of Saint-Etienne, Faculty of Medicine, Saint-Etienne, France; Laboratory of Exercise Physiology (LPE EA 4338), University of Lyon, Saint-Etienne, France; Department of Physical Medicine and Rehabilitation, University Hospital of Saint-Etienne, Saint-Etienne, France. Electronic address: Pascal.Edouard42@gmail.com.

#### **Abstract**

##### **BACKGROUND:**

Deficiencies in both afferent proprioceptive information and efferent motor responses have been independently reported in patients with recurrent anterior shoulder instability. We used a validated force platform method to analyze the association between the stabilometric parameters of the upper limb as representative of the shoulder's sensorimotor control and clinical glenohumeral joint instability.

##### **METHODS:**

We enrolled 32 patients with unilateral recurrent anterior post-traumatic shoulder dislocation, on the dominant side in 13 patients (DIG) and the non-dominant side in 19 patients (NDIG) and 16 healthy nonathletic subjects (CG). Displacements of the Center of Pressure were measured by a Win-Posturo® Medicauteurs force platform in the upper limb weight-bearing position with the lower limbs resting on a table up to the anterior superior iliac spines. The association between stabilometric values and clinical shoulder instability was analyzed by side-to-side comparisons and comparisons to a control group.

##### **RESULTS:**

For CG and NDIG, there were no side-to-side differences. For DIG, stabilometric values were significantly higher on the dominant pathological shoulder side than on the healthy contralateral non-dominant side ( $P < .01$ ). The percentage of side-to-side differences was higher in DIG than CG ( $P < .01$ ).

##### **CONCLUSION:**

Sensorimotor control deficiency was associated with recurrent anterior shoulder instability, especially in patients with the pathological shoulder on their dominant side. Using a force platform to assess sensorimotor control of the shoulder is feasible in patients with shoulder instability, and can allow assessment of the global sensorimotor control deficiency present in unstable shoulders.

#### **Surgery**

## **ELBOW**

### **Contracture**

J Orthop Sci. 2013 Sep 5.

**Posttraumatic elbow contractures: targeting neuroinflammatory fibrogenic mechanisms.**

Monument MJ, Hart DA, Salo PT, Befus AD, Hildebrand KA.

#### **Source**

Department of Orthopaedic Surgery, Huntsman Cancer Institute, University of Utah, 2000 Circle of Hope, Rm #4260, Salt Lake City, UT, 84112, USA, michael.monument@hci.utah.edu.

#### **Abstract**

Posttraumatic elbow stiffness remains a common and challenging clinical problem. In the setting of a congruent articular surface, the joint capsule is regarded as the major motion-limiting anatomic structure. The affected joint capsule is characterized by irreversible biomechanical and biochemical fibrogenic changes strikingly similar to those observed in many other fibroproliferative human conditions. Studies in humans and preclinical animal models are providing emergent evidence that neuroinflammatory mechanisms are critical upstream events in the pathogenesis of posttraumatic connective tissue fibrogenesis.

Maladaptive recruitment and activation of mast cell infiltrates coupled with the aberrant expression of growth factors such as transforming growth factor-beta, nerve growth factor, and neuropeptides such as substance P are common observations in posttraumatic joint contractures and many other fibroproliferative disorders.

Blockade of these factors is providing promising evidence that if treatment is timed correctly, the fibrogenic process can be interrupted or impeded. This review serves to highlight opportunities derived from these recent discoveries across many aberrant fibrogenic disorders as we strive to develop novel, targeted antifibrotic prevention and treatment strategies for posttraumatic elbow stiffness.

## WRIST AND HAND

### OA

*Osteoarthritis Cartilage*. 2013 Aug 13. pii: S1063-4584(13)00907-2. doi: 10.1016/j.joca.2013.08.004.

#### **Subsets of symptomatic hand osteoarthritis in community-dwelling older adults in the United Kingdom: prevalence, inter-relationships, risk factor profiles and clinical characteristics at baseline and 3-years.**

Marshall M, Peat G, Nicholls E, van der Windt D, Myers H, Dziedzic K.

#### **Source**

Arthritis Research UK Primary Care Centre, Primary Care Sciences, Keele University, Keele, Staffordshire ST5 5BG, United Kingdom. Electronic address: m.marshall@keele.ac.uk.

#### **Abstract**

##### **OBJECTIVE:**

To compare the population prevalence, inter-relationships, risk factor profiles and clinical characteristics of subsets of symptomatic hand osteoarthritis (OA) with a view to understanding their relative frequency and distinctiveness.

##### **METHOD:**

1076 community-dwelling adults with hand symptoms (60% women, mean age 64.7 years) were recruited and classified into pre-defined subsets using physical examination and standardised hand radiographs, scored with the Kellgren & Lawrence (K&L) and Verbruggen-Veys grading systems. Detailed information on selected risk factors was obtained from direct measurement (Body Mass Index (BMI)), self-complete questionnaires (excessive use of hands, previous hand injury) and medical record review (hypertension, dyslipidaemia, type 2 diabetes). Hand pain and disability were self-reported at baseline and 3-year follow-up using Australian/Canadian Osteoarthritis Index (AUSCAN).

##### **RESULTS:**

Crude population prevalence estimates for symptomatic hand OA subsets in the adult population aged 50 years and over were: thumb base OA (22.4%), nodal interphalangeal joint (IPJ) OA (15.5%), generalised hand OA (10.4%), non-nodal interphalangeal OA (4.9%), erosive OA (1.0%). Apart from thumb base OA, there was considerable overlap between the subsets. Erosive OA appeared the most distinctive with the highest female: male ratio, and the most disability at baseline and 3-years. A higher frequency of obesity, hypertension, dyslipidaemia, and metabolic syndrome was observed in this subset.

##### **CONCLUSION:**

Overlap in the occurrence of hand OA subsets poses conceptual and practical challenges to the pursuit of distinct phenotypes. Erosive OA may nevertheless provide particular insight into the role of metabolic and cardiovascular risk factors in the pathogenesis of OA.

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##### **KEYWORDS:**

Epidemiology, Erosive OA, Hand osteoarthritis, Nodal OA, Subsets, Thumb base OA PMID: 23954700

## Carpal tunnel syndrome

### Grip strength

Arthritis Care Res (Hoboken). 2013 Aug 27. doi: 10.1002/acr.22107. [Epub ahead of print]

#### **The effect of carpal tunnel syndrome on grip and pinch strength compared to gender and age matched normative data.**

Baker NA, Moehling KK, Desai AR, Gustafson NP.

#### **Source**

Department of Occupational Therapy, University of Pittsburgh, Pittsburgh, PA.

#### **Abstract**

**Objective:** To compare grip and pinch strength of individuals with CTS to normative values before and after a combined splint/stretching intervention.

**Methods:** Data collected on grip and pinch strength on 124 subjects with CTS was compared to age and gender matched normative data.

**Results:** In general our sample had significantly lower strength than the normative sample at baseline. Although there were significant improvements in strength after 4-weeks of splinting/exercise, subjects continued to have significant deficits in comparison to the normative data.

**Conclusions:** Patients with CTS have moderate to large deficits in grip and pinch strength in comparison to normative data. Splinting/stretching may reduce these deficits; however, CTS patients are often left with residual problems at 4-weeks. © 2013 American College of Rheumatology.

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#### **KEYWORDS:**

Carpal Tunnel Syndrome, Outcome Measures, Physical Function

PMID: 23982986

## **Improvements following surgery**

Skeletal Radiol. 2013 Oct;42(10):1403-12. doi: 10.1007/s00256-013-1670-z. Epub 2013 Jul 11.

### **Diffusion tensor imaging of the median nerve before and after carpal tunnel release in patients with carpal tunnel syndrome: feasibility study.**

Naraghi A, da Gama Lobo L, Menezes R, Khanna M, Sussman M, Anastakis D, White LM.

#### Source

Department of Medical Imaging, University of Toronto, Toronto Western Hospital, 399 Bathurst Street, Toronto, ON, M5T 2S8, Canada, ali.naraghi@uhn.on.ca.

#### Abstract

##### **OBJECTIVES:**

To evaluate diffusion tensor imaging (DTI) indices of the median nerve pre and postoperatively in patients with carpal tunnel syndrome (CTS) to determine whether indices acquired prior to surgery differ from those acquired postoperatively.

##### **METHODS:**

Following IRB approval, ten patients with a diagnosis of CTS were prospectively recruited. Eight patients completed the study (seven women, one man). All had bilateral asymmetric symptoms, with subsequent carpal tunnel release on the more symptomatic side. DTI of both wrists were performed using single-shot spin-echo echo-planar imaging (TR/TE, 7,000/103 ms; b value 1,025 s/mm<sup>2</sup>) preoperatively, 6 weeks and 6 months after carpal tunnel release. Fractional anisotropy (FA) and apparent diffusion coefficient (ADC) of the median nerve at the level of the distal radioulnar joint and pisiform were determined by one investigator blinded to clinical data, side, and time relative to surgery.

##### **RESULTS:**

All patients had resolution of symptoms on the surgical side at 6 months. A significant increase in FA ( $p = 0.018$ ) and decrease in ADC ( $p = 0.017$ ) were found proximally at 6 months compared to baseline on the operative side. A significant increase in FA was observed on the operative side distally at 6 weeks ( $p = 0.012$ ) and 6 months ( $p = 0.017$ ). There was a significant difference in the percentage change in FA values from baseline to 6 months on the operative side in comparison with the non-operative side ( $p = 0.017$ ).

##### **CONCLUSIONS:**

A significant increase in FA and decrease in ADC of the median nerve are seen following decompression surgery in patients with CTS.

## HIP

*Arch Phys Med Rehabil.* 2013 Aug 29. pii: S0003-9993(13)00663-1. doi: 10.1016/j.apmr.2013.08.012.

### **Age-related hip proprioception declines: the effects on postural sway and dynamic balance.**

Wingert JR, Welder C, Foo P.

#### **Source**

Department of Health and Wellness, University of North Carolina Asheville, Asheville, NC.  
Electronic address: jwingert@unca.edu.

#### **Abstract**

##### **OBJECTIVE:**

To evaluate effects of age on hip proprioception, and determine whether age-related hip proprioception declines disrupt balance.

##### **DESIGN:**

Survey of proprioception and balance differences between three age groups.

##### **SETTING:**

University balance laboratory **PARTICIPANTS:** Volunteer sample of independent community-dwelling adults (N = 102) without sensory or other neurological impairments in three age groups, younger (mean age (range): 24.6 years (19-37)), mid-aged (53.3 years (40-64)), and older adults (76.3 years (65-94)).

##### **INTERVENTIONS:**

Not applicable **MAIN OUTCOME MEASURES:** Hip joint position sense (JPS) and kinesthesia were measured using a custom built device. JPS error was determined by the magnitude of matching errors during vision and no-vision conditions. Kinesthesia was evaluated by the ability to detect passive limb rotation without vision. Postural sway was assessed during static stance and measured using root mean square of center of pressure (COP) displacement and velocity of COP displacement. Clinical balance and fear of falling were assessed with the mini-Balance Evaluation Systems Test (mini-BESTest) and Activities-Specific Balance Confidence Scale, respectively.

##### **RESULTS:**

Both older and mid-aged adults had significantly increased JPS error compared to younger adults ( $P < 0.05$ ). Kinesthesia accuracy was significantly decreased in older adults compared to mid-aged and younger adults ( $P \leq 0.01$ ). Both measures of proprioception error correlated with age ( $P \leq 0.001$ ). There were no relationships between hip proprioception error and postural sway during static stance. However, older adults with lower proprioceptive error had significantly higher mini-BESTest scores of dynamic balance abilities ( $P = 0.005$ ).

##### **CONCLUSIONS:**

These results provide the first evidence to date of significant hip proprioception declines with age. Although these declines are not related to increases in postural sway, participants with hip proprioception declines demonstrated disrupted dynamic balance, as indicated by decreased mini-BESTest scores.

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## Cam surgery/femoral head

Arthroscopy. 2013 Aug 29. pii: S0749-8063(13)00809-8. doi: 10.1016/j.arthro.2013.06.021.

### **Cam Lesion Femoral Osteoplasty: In Vitro Biomechanical Evaluation of Iatrogenic Femoral Cortical Notching and Risk of Neck Fracture.**

Wijdicks CA, Ballidin BC, Jansson KS, Stull JD, Laprade RF, Philippon MJ.

#### **Source**

Department of Biomedical Engineering, Steadman Philippon Research Institute, Vail, Colorado, U.S.A.. Electronic address: cwijdicks@sprivail.org.

#### **Abstract**

##### **PURPOSE:**

To investigate the effect of femoral cortical notching at different depths on the peak compressive load and energy required to cause a femoral neck fracture in composite femurs.

##### **METHODS:**

Thirty fourth-generation composite femurs were divided into 5 groups: (1) intact with an inherent alpha angle of 61°, (2) resection of inherent cam lesion by reducing the alpha angle from 61° to 45°, (3) cam resection and cortical notching of a 5.5-mm spherical diameter by 2.00-mm (grade I) depth, (4) cam resection with cortical notching of 4.00-mm (grade II) depth, and (5) cam resection with cortical notching of 6.00-mm (grade III) depth. The specimens were loaded in the position of midstance during gait and tested until failure using a dynamic tensile testing machine at a rate of 6 mm/min.

##### **RESULTS:**

Grade II and grade III cortical notching depths with cam resections resulted in a significant decrease in the ultimate load to failure and energy ( $P < .05$ ) compared with the intact state. The grade II and grade III cortical notching groups with cam resection failed at a significantly lower ultimate load and with significantly lower energy when compared with the cam resection group alone.

##### **CONCLUSIONS:**

The findings of this study demonstrated significant decreases in ultimate load and energy to failure between the intact group and the grade II and grade III femoral cortical notching groups with cam resection.

##### **CLINICAL RELEVANCE:**

Iatrogenic cortical notching may lead to an increased risk of postsurgical complications, specifically femoral neck fracture. Thus, surgical intervention for a cam lesion femoral osteoplasty should strive for precision, especially around the femoral neck.

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## Replacements

OA

## Cartilage

### **Association of cartilage defects, and other MRI findings with pain and function in individuals with mild-moderate radiographic hip osteoarthritis and controls** □

**Osteoarthritis and Cartilage**, 09/06/2013 **Review Article**

Kumar D et al. –

#### Summary

#### Objective

To evaluate the relationship of hip radiographic osteoarthritis (ROA) and MRI findings of cartilage lesions, labral tears, bone marrow edema-like lesions (BMELs) and subchondral cysts with self-reported and physical function.

#### Design

Eighty five subjects were classified as controls ( $n = 55$ , Kellgren–Lawrence (KL) 0, 1) or having mild–moderate ROA ( $n = 30$ , KL 2, 3). T2 weighted MRI images at 3-T were graded for presence of cartilage lesions, labral tears, BMELs and subchondral cysts. Posterior wall sign, cross-over sign, center-edge angle and alpha angle were also recorded. Function was assessed using Hip dysfunction and Osteoarthritis Outcome Score (HOOS), Timed-Up and Go (TUG) test and Y-Balance Test (YBT). Analysis compared function between subjects with and without ROA and those with and without femoral or acetabular cartilage lesions, adjusted for age. Non-parametric correlations were used to assess the relationship between radiographic scores, MRI scores and function.

#### Results

Subjects with acetabular cartilage lesions had worse HOOS (Difference = 5–10%,  $P = 0.036–0.004$ ), but not TUG or YBT, scores. Acetabular cartilage lesions, BMELs and subchondral cysts were associated with worse HOOS scores ( $\rho = 0.23–0.37$ ,  $P = 0.041–0.001$ ). Differences in function between subjects with and without ROA or femoral cartilage lesions were not significant. Other radiologic findings were not associated with function.

#### Conclusions

Acetabular cartilage defects, but not femoral cartilage defects or ROA, were associated with greater self-reported pain and disability. BMELs and subchondral cysts were related to greater hip related self-reported pain and disability. None of the radiographic or MRI features was related to physical function.

## Genetics/OA

Ann Rheum Dis. 2013 Aug 6. doi: 10.1136/annrheumdis-2013-203772.

### **The effect of FTO variation on increased osteoarthritis risk is mediated through body mass index: a mendelian randomisation study.**

Panoutsopoulou K, Metrustry S, Doherty SA, Laslett LL, Maciewicz RA, Hart DJ, Zhang W, Muir KR, Wheeler M, Cooper C, Spector TD, Cicuttini FM, Jones G, Arden NK, Doherty M, Zeggini E, Valdes AM; arcOGEN Consortium.

#### Source

Wellcome Trust Sanger Institute, Wellcome Trust Genome Campus, Hinxton, UK.

#### Abstract

##### OBJECTIVE:

Variation in the fat mass and obesity-associated (FTO) gene influences susceptibility to obesity. A variant in the FTO gene has been implicated in genetic risk to osteoarthritis (OA). We examined the role of the FTO polymorphism rs8044769 in risk of knee and hip OA in cases and controls incorporating body mass index (BMI) information.

##### METHODS:

5409 knee OA patients, 4355 hip OA patients and up to 5362 healthy controls from 7 independent cohorts from the UK and Australia were genotyped for rs8044769. The association of the FTO variant with OA was investigated in case/control analyses with and without BMI adjustment and in analyses matched for BMI category. A mendelian randomisation approach was employed using the FTO variant as the instrumental variable to evaluate the role of overweight on OA.

##### RESULTS:

In the meta-analysis of all overweight (BMI $\geq$ 25) samples versus normal-weight controls irrespective of OA status the association of rs8044769 with overweight is highly significant (OR[CI] for allele G=1.14 [0.08 to 1.19],  $p=7.5\times 10^{-7}$ ). A significant association with knee OA is present in the analysis without BMI adjustment (OR[CI]=1.08[1.02 to 1.14],  $p=0.009$ ) but the signal fully attenuates after BMI adjustment (OR[CI]=0.99[0.93 to 1.05],  $p=0.666$ ). We observe no evidence for association in the BMI-matched meta-analyses. Using mendelian randomisation approaches we confirm the causal role of overweight on OA.

##### CONCLUSIONS:

Our data highlight the contribution of genetic risk to overweight in defining risk to OA but the association is exclusively mediated by the effect on BMI. This is consistent with what is known of the biology of the FTO gene and supports the causative role of high BMI in OA.

## **ID OA/imaging**

Skeletal Radiol. 2013 Oct;42(10):1421-8. doi: 10.1007/s00256-013-1675-7. Epub 2013 Jul 11.

### **The diagnostic performance of radiography for detection of osteoarthritis-associated features compared with MRI in hip joints with chronic pain.**

Xu L, Hayashi D, Guermazi A, Hunter DJ, Li L, Winterstein A, Bohndorf K, Roemer FW.

#### Source

Quantitative Imaging Center, Department of Radiology, Boston University School of Medicine, FGH Building 3rd Floor, 820 Harrison Avenue, Boston, MA, 02118, USA, lilyshew@gmail.com.

#### Abstract

##### OBJECTIVE:

To evaluate the diagnostic performance of radiography for the detection of MRI-detected osteoarthritis-associated features in various articular subregions of the hip joint.

##### MATERIALS AND METHODS:

Forty-four patients with chronic hip pain (mean age,  $63.3 \pm 9.5$  years), who were part of the Hip Osteoarthritis MRI Scoring (HOAMS) cohort, underwent both weight-bearing anteroposterior pelvic radiography and 1.5 T MRI. The HOAMS study was a prospective observational study involving 52 subjects, conducted to develop a semiquantitative MRI scoring system for hip osteoarthritis features. In the present study, eight subjects were excluded because of a lack of radiographic assessment. On radiography, the presence of superior and medial joint space narrowing, superior and inferior acetabular/femoral osteophytes, acetabular subchondral cysts, and bone attrition of femoral head was noted. On MRI, cartilage, osteophytes, subchondral cysts, and bone attrition were evaluated in the corresponding locations. Diagnostic performance of radiography was compared with that of MRI, and the area under curve (AUC) was calculated for each pathological feature.

##### RESULTS:

Compared with MRI, radiography provided high specificity (0.76-0.90) but variable sensitivity (0.44-0.78) for diffuse cartilage damage (using JSN as an indirect marker), femoral osteophytes, acetabular subchondral cysts and bone attrition of the femoral head, and a low specificity (0.42 and 0.58) for acetabular osteophytes. The AUC of radiography for detecting overall diffuse cartilage damage, marginal osteophytes, subchondral cysts and bone attrition was 0.76, 0.78, 0.67, and 0.82, respectively.

##### CONCLUSIONS:

Diagnostic performance of radiography is good for bone attrition, fair for marginal osteophytes and cartilage damage, but poor for subchondral cysts.

## **ImpingementKNEE**

## Knee/ACL

### Cartilage change in ACL

*Am J Sports Med.* 2013 Sep;41(9):2108-16. doi: 10.1177/0363546513494180. Epub 2013 Jul 5.

#### **Changes in serum biomarkers of cartilage turnover after anterior cruciate ligament injury.**

Svoboda SJ, Harvey TM, Owens BD, Brechue WF, Tarwater PM, Cameron KL.

#### **Source**

Kenneth L. Cameron, ATC, John A. Feagin Jr Sports Medicine Fellowship, Department of Orthopedic Surgery, Keller Army Hospital, 900 Washington Road, West Point, NY 10996. kenneth.l.cameron.civ@mail.mil.

#### **Abstract**

##### **BACKGROUND:**

Biomarkers of cartilage turnover and joint metabolism have a potential use in detecting early degenerative changes after a traumatic knee joint injury; however, no study has analyzed biomarkers before an anterior cruciate ligament (ACL) injury and again after injury or in comparison with a similar group of uninjured controls.

##### **HYPOTHESIS:**

Changes in serum biomarker levels and the ratio of cartilage degradation to synthesis, from baseline to follow-up, would be significantly different between ACL-injured patients and uninjured controls.

##### **STUDY DESIGN:**

Case-control study; Level of evidence, 3.

##### **METHODS:**

This case-control study was conducted to examine changes in serum biomarkers of cartilage turnover following ACL injury in a young athletic population. Specifically, 2 markers for type II collagen and aggrecan synthesis (CPII and CS846, respectively) and 2 markers of types I and II degradation and type II degradation only (C1,2C and C2C, respectively) were studied. Preinjury baseline serum samples and postinjury follow-up samples were obtained for 45 ACL-injured cases and 45 uninjured controls matched for sex, age, height, and weight.

##### **RESULTS:**

Results revealed significant decreases in C1,2C ( $P = .042$ ) and C2C ( $P = .006$ ) over time in the ACL-injured group when compared with the controls. The change in serum concentrations of CS846 from baseline to follow-up was also significantly different between the ACL-injured patients and uninjured controls ( $P = .002$ ), as was the change between groups in the ratio of C2C:CPII over time ( $P = .013$ ). No preinjury differences in the ratio of C1,2C:CPII or C2C:CPII were observed between groups; however, postinjury differences were observed for both ratios.

##### **CONCLUSION:**

Changes in biomarker concentrations after an ACL injury suggest an alteration in cartilage turnover and joint metabolism in those sustaining ACL injuries compared with uninjured matched controls.

##### **KEYWORDS:**

ACL injury, biomarkers, cartilage metabolism, cartilage turnover, posttraumatic osteoarthritis  
PMID: 23831890

## Prehabilitation

Am J Sports Med. 2013 Sep;41(9):2117-27. doi: 10.1177/0363546513493594. Epub 2013 Jul 11.

### **Effect of prehabilitation on the outcome of anterior cruciate ligament reconstruction.**

Shaarani SR, O'Hare C, Quinn A, Moyna N, Moran R, O'Byrne JM.

#### **HYPOTHESIS:**

We hypothesized that a preoperative exercise program would enhance postoperative outcomes after anterior cruciate ligament reconstruction (ACLR).

#### **STUDY DESIGN:**

Randomized controlled clinical trial; Level of evidence, 1.

#### **METHODS:**

Twenty volunteers awaiting ACLR were randomly assigned to a control or exercise intervention group. The exercise group completed a 6-week gym- and home-based exercise program. Assessments include single-legged hop test; quadriceps and hamstring peak torque and magnetic resonance imaging cross-sectional area (CSA); Modified Cincinnati Knee Rating System score; and muscle biopsy of the vastus lateralis muscle completed at baseline, preoperatively, and 12 weeks postoperatively. Myosin heavy chain (MHC) isoforms protein and messenger RNA (mRNA) expression were determined with SDS-PAGE (sodium dodecyl sulfate polyacrylamide gel electrophoresis) and RT-PCR (real-time polymerase chain reaction), respectively; IGF-1 (insulin-like growth factor 1), MuRF-1 (muscle RING-finger protein-1), and MAFbx (muscle atrophy f-box) mRNA expression were determined with quantitative RT-PCR.

#### **RESULTS:**

Following 6 weeks of exercise intervention, the single-legged hop test results improved significantly in the exercise-injured limb compared with baseline ( $P = .001$ ). Quadriceps peak torque in the injured limb improved with similar gains in CSA compared with baseline ( $P = .001$ ). However, this was not significantly increased compared with the control group. Quadriceps and vastus medialis CSA were also larger in the exercise group than in controls ( $P = .0024$  and  $P = .015$ , respectively). The modified Cincinnati score was better in the exercise-injured limb compared with baseline. At 12 weeks postoperatively, the rate of decline in the single-legged hop test was reduced in the exercise group compared with controls ( $P = .001$ ). Similar trends were not seen for quadriceps peak torque and CSA. The vastus medialis CSA had regressed to similar levels as the control group ( $P = .008$ ). The modified Cincinnati score continued to increase in the exercise group compared with controls ( $P = .004$ ). The expression of the hypertrophic IGF-1 gene was significantly increased after the exercise intervention ( $P = .028$ ), with a decrease back to baseline 12 weeks postoperatively ( $P = .012$ ). Atrophic MuRF-1 gene expression was decreased after intervention compared with baseline ( $P = .05$ ) but increased again at 12 weeks postoperatively ( $P = .03$ ). The MAFbx levels did not change significantly in either group and within each time point. On the mRNA level, there was a shift from MHC-IIx isoform to MHC-IIa after exercise, with significant changes compared with control preoperatively ( $P = .028$ ). Protein testing was able to reproduce this increase for MHC-IIa isoform expression only.

#### **CONCLUSION:**

The 6-week progressive prehabilitation program for subjects undergoing ACLR led to improved knee function based on the single-legged hop test and self-reported assessment using the modified Cincinnati score. These effects were sustained at 12 weeks postoperatively. This study supports prehabilitation as a consideration for patients awaiting ACLR; however, further studies are warranted. PMID: 23845398

## Prevention/ACL

Clin Orthop Relat Res. 2012 Oct;470(10):2930-40. doi: 10.1007/s11999-012-2440-2. Epub 2012 Jun 29.

### **The 2012 ABJS Nicolas Andry Award: The sequence of prevention: a systematic approach to prevent anterior cruciate ligament injury.**

Hewett TE, Myer GD, Ford KR, Paterno MV, Quatman CE.

#### **Source**

Department of Physiology & Cell Biology, The Ohio State University Sports Medicine Sports Health & Performance Institute, 2050 Kenny Road, Suite 3100, Columbus, OH 43221-3502, USA. Timothy.Hewett@osumc.edu

#### **Abstract**

##### **BACKGROUND:**

ACL injuries are common, often devastating injuries that lead to short-term disability and long-term sequelae, many of which lack effective treatment, such as osteoarthritis. Therefore, prevention of ACL injury is currently the only effective intervention for these life-altering sequelae, while much of the literature has a rehabilitative focus.

##### **QUESTIONS/PURPOSES:**

The primary long-term purpose of our multidisciplinary collaborative research team has been to develop ACL injury prevention programs by determining which factors related to ACL injury should be altered, followed by how and when they should be altered.

##### **METHODS:**

Our primary study objectives were to determine: (1) modifiable risk factors; (2) how these factors can best be modified; and (3) when is the best time to diminish these risk factors. Throughout the course of various studies, we determined the modifiable factors related to increased ACL injury risk. Our research team then focused on exploring numerous ways to augment these factors to maximize prevention efforts. We developed a sequence of prevention models that provide a framework to monitor progress toward the ultimate goal of preventing ACL injuries.

##### **RESULTS:**

The modifiable factors shown in our work include biomechanical and neuromuscular functionality. When targeted in physical training, we have determined that these factors can be enhanced to effectively aid in the prevention of ACL injuries. Preliminary data have shown that childhood and early adolescence may be valuable periods to implement such training.

##### **CONCLUSIONS:**

Current evidence has led to the evolution of clinical assessment tools for high-risk athletes and interventions for large populations and specific high-risk individuals. Targeted intervention implemented at the specified developmental stage of highest risk may be the final step toward the maximal reduction of ACL injury risk in young athletes.

## Meniscus

### Knee flexion/impact meniscal repairs

Am J Sports Med. 2013 Sep;41(9):2143-50. doi: 10.1177/0363546513496216. Epub 2013 Jul 23.

#### Does high knee flexion cause separation of meniscal repairs?

Lin DL, Ruh SS, Jones HL, Karim A, Noble PC, McCulloch PC.

#### Source

Patrick C. McCulloch, Methodist Center for Sports Medicine, Houston Methodist, 6550 Fannin St, Smith Tower, Suite 2600, Houston, TX 77030. pcm@tmhs.org.

#### Abstract

##### **BACKGROUND:**

Previous clinical studies comparing nonrestrictive and restrictive protocols after meniscal repair have shown no difference in outcomes; however, some surgeons still limit range of motion out of concern that it will place undue stress on the repair.

##### **HYPOTHESIS:**

Large acute medial meniscal tears will gap during simulated open chain exercises at high flexion angles, and a repaired construct with vertical mattress sutures will not gap.

##### **STUDY DESIGN:**

Controlled laboratory study.

##### **METHODS:**

Tantalum beads were implanted in the medial menisci of 6 fresh-frozen cadaveric knees via an open posteromedial approach. Each knee underwent 10 simulated open chain flexion cycles with loading of the quadriceps and hamstrings. Testing was performed on 3 different states of the meniscus: intact, torn, and repaired. Biplanar radiographs were taken of the loaded knee in 90°, 110°, and 135° of flexion for each state. A 2.5-cm tear was created in the posteromedial meniscus and repaired with inside-out vertical mattress sutures. Displacement of pairs of beads spanning the tear was measured in all planes by use of radiostereometric analysis (RSA) with an accuracy of better than 80 µm.

##### **RESULTS:**

With a longitudinal tear, compression rather than gapping occurred in all 3 regions of the posterior horn of the meniscus (mean ± standard deviation for medial collateral ligament [MCL], -321 ± 320 µm; midposterior, -487 ± 256 µm; root, -318 ± 150 µm) with knee flexion. After repair, meniscal displacement returned part way to intact values in both the MCL (+55 ± 250 µm) and root region (-170 ± 123 µm) but not the midposterior region, where further compression was seen (-661 ± 278 µm).

##### **CONCLUSIONS:**

Acute posteromedial meniscal tears and repairs with vertical mattress sutures do not gap, but rather compress in the transverse plane at higher flexion angles when subjected to physiologic loads consistent with active, open kinetic chain range of motion rehabilitation exercises. The kinematics of the repaired meniscus more closely resemble that of the intact meniscus than that of the torn meniscus in regions adjacent to the MCL and the root but not in the midposterior region, where meniscal repair led to increased compression across the tear plane.

##### **CLINICAL RELEVANCE:**

This study supports the idea that nonrestrictive unresisted open chain range of motion protocols do not place undue stress on meniscal repairs. PMID: 23880404

**Patella**

[Knee/total](#)

[Smoking/total knee](#)

**Smoking and primary total hip or knee replacement due to osteoarthritis in 54,288 elderly men and women** *Full Text*

**BMC Musculoskeletal Disorders, 09/06/2013 Evidence Based Medicine**

Mnatzaganian G et al. – The reported association of smoking with risk of undergoing a total joint replacement (TJR) due to osteoarthritis (OA) is not consistent. Authors evaluated the independent association between smoking and primary TJR in a large cohort. The strengths of the inverse association between smoking and TJR, the temporal relationship of the association, together with the consistency in the findings warrant further investigation about the role of smoking in the pathogenesis of osteoarthritis causing TJR.

## Simultaneous bilateral replacements

[J Bone Joint Surg Am.](#) 2013 Aug 21;95(16):1441-9. doi: 10.2106/JBJS.L.00373.

### **A cost-utility analysis comparing the cost-effectiveness of simultaneous and staged bilateral total knee arthroplasty.**

Odum SM, Troyer JL, Kelly MP, Dedini RD, Bozic KJ.

#### **Source**

OrthoCarolina Research Institute Inc., 2001 Vail Avenue, Suite 300, Charlotte, NC 28207. E-mail address: Susan.Odum@orthocarolina.com.

#### **Abstract**

##### **BACKGROUND:**

The safety and efficacy of simultaneous or staged bilateral total knee arthroplasty have long been debated among orthopaedic surgeons. Advocates for simultaneous bilateral total knee arthroplasty posit that the benefits of decreased costs and recovery time, with no difference in functional outcomes, outweigh the economic costs of potential complications. The purpose of the study was to conduct a cost-utility analysis comparing simultaneous bilateral total knee arthroplasty with staged bilateral total knee arthroplasty.

##### **METHODS:**

A Markov model was designed to compare the cost-effectiveness of simultaneous bilateral total knee arthroplasty with that of staged bilateral total knee arthroplasty. Nationwide Inpatient Sample data sets from 2004 to 2007 were used to identify 24,574 simultaneous and 382,496 unilateral procedures. On the basis of the codes of the International Classification of Diseases, Ninth Revision, Clinical Modification, perioperative complications were categorized as minor, major, and mortality, and respective probability values were calculated. Nationwide Inpatient Sample data were used to determine hospital costs conditional on procedure type and complications. Rehabilitation costs, anesthesia costs, and health utilities were estimated from the literature. To minimize selection bias, propensity score matching was used to match the groups on comorbid conditions, socioeconomic variables, and hospital characteristics.

##### **RESULTS:**

Using the matched sample, all complication rates were higher for the staged group. The estimated mean cost (in 2012 U.S. dollars) was \$43,401 for simultaneous bilateral total knee arthroplasty compared with \$72,233 for staged bilateral total knee arthroplasty. The quality-adjusted life years gained were 9.31 for simultaneous bilateral total knee arthroplasty and 9.29 for staged bilateral total knee arthroplasty. On the basis of these matched results, simultaneous bilateral total knee arthroplasty dominated staged bilateral total knee arthroplasty with lower costs and better outcomes.

##### **CONCLUSIONS:**

On the basis of this analysis, simultaneous bilateral total knee arthroplasty is more cost-effective than staged bilateral total knee arthroplasty, with lower costs and better outcomes for the average patient. These data can inform shared medical decision-making when bilateral total knee arthroplasty is indicated.

## **KNEE/EXERCISE**

## OSTEOARTHRITIS/KNEE

### MRI evaluation

Ann Rheum Dis. 2013 Jul 25. doi: 10.1136/annrheumdis-2013-203631.

#### **What is the predictive value of MRI for the occurrence of knee replacement surgery in knee osteoarthritis?**

Pelletier JP, Cooper C, Peterfy C, Reginster JY, Brandi ML, Bruyère O, Chapurlat R, Cicuttini F, Conaghan PG, Doherty M, Genant H, Giacobelli G, Hochberg MC, Hunter DJ, Kanis JA, Kloppenburg M, Laredo JD, McAlindon T, Nevitt M, Raynauld JP, Rizzoli R, Zilkens C, Roemer FW, Martel-Pelletier J, Guermazi A.

#### **Source**

Osteoarthritis Research Unit, University of Montreal Hospital Research Centre (CRCHUM), Notre-Dame Hospital, Montreal, Quebec, Canada.

#### **Abstract**

Knee osteoarthritis is associated with structural changes in the joint. Despite its many drawbacks, radiography is the current standard for evaluating joint structure in trials of potential disease-modifying osteoarthritis drugs. MRI is a non-invasive alternative that provides comprehensive imaging of the whole joint. Frequently used MRI measurements in knee osteoarthritis are cartilage volume and thickness; others include synovitis, synovial fluid effusions, bone marrow lesions (BML) and meniscal damage. Joint replacement is considered a clinically relevant outcome in knee osteoarthritis; however, its utility in clinical trials is limited. An alternative is virtual knee replacement on the basis of symptoms and structural damage. MRI may prove to be a good alternative to radiography in definitions of knee replacement.

One of the MRI parameters that predicts knee replacement is medial compartment cartilage volume/thickness, which correlates with radiographic joint space width, is sensitive to change, and predicts outcomes in a continuous manner. Other MRI parameters include BML and meniscal lesions. MRI appears to be a viable alternative to radiography for the evaluation of structural changes in knee osteoarthritis and prediction of joint replacement.

#### **KEYWORDS:**

Knee Osteoarthritis, Magnetic Resonance Imaging, Outcomes research

PMID: 23887285

## Synovial markers

*Osteoarthritis Cartilage*. 2013 Aug 11. pii: S1063-4584(13)00917-5. doi: 10.1016/j.joca.2013.08.014. [Epub ahead of print]

### **Synovial fluid levels of bradykinin correlate with biochemical markers for cartilage degradation and inflammation in knee osteoarthritis.**

Bellucci F, Meini S, Cucchi P, Catalani C, Nizzardo A, Riva A, Guidelli GM, Ferrata P, Fioravanti A, Maggi CA.

#### **Source**

Menarini Ricerche S.p.A., Department of Pharmacology, Florence, Italy. Electronic address: chimfarm@menarini-ricerche.it.

#### **Abstract**

##### **OBJECTIVE:**

To determine the content of bradykinin (BK) and markers of cartilage degradation and inflammation in the synovial fluid (SF) of patients with knee osteoarthritis (OA), and to evaluate correlations with biomarkers or clinical parameters.

##### **METHODS:**

SFs were obtained from 30 patients with knee OA. Levels of basal and generated BK, cartilage oligomeric matrix protein (COMP), interleukin (IL) 1, IL-6, IL-8 and matrix metalloprotease (MMP) 1, MMP-3, MMP-13 and sulfated glycosaminoglycans (GAGs) were measured by enzyme-linked immunosorbent assay (ELISA) or colorimetric assays.

##### **RESULTS:**

The mean concentration of basal BK (in the presence of peptidase and protease inhibitors to avoid degradation and de novo formation of BK) was 422 pg/ml (95% confidence interval, CI, 281-563) whereas that of in vitro generated BK (in the presence of peptidase inhibitors SFs were incubated 60 min at 37°C to measure the potential capability to generate BK) was 3427 pg/ml (2591-4264). The content of MMP-13, IL-1 $\alpha$ , and IL-1 $\beta$  was under assay sensitivity. Basal BK levels positively correlated (Spearman's rank correlation) with GAGs (40  $\mu$ g/ml, 26-54,  $r = 0.4834$ ,  $P = 0.0308$ ) and IL-6 (553 pg/ml, 171-935,  $r = 0.3946$ ,  $P = 0.0377$ ) similarly to the generated BK (GAGs,  $r = 0.4563$ ,  $P = 0.0431$ ; IL-6,  $r = 0.5605$ ,  $P = 0.0019$ ). Statistical analysis of basal BK and biomarkers was significant ( $P = 0.0483$ ). When applying a stepwise logistic regression analysis considering biomarkers together with clinical parameters, results indicated that K/L radiographic OA grade and COMP improved the model ( $P = 0.0032$ ).

##### **CONCLUSION:**

The presence of BK in the knee OA SF and its correlations with cartilage degradation and inflammation markers of OA support its participation in OA pathology.

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##### **KEYWORDS:**

Biomarkers, Bradykinin, COMP, Interleukin 6, Osteoarthritis, Synovial fluid PMID: 23942063

## OA

PLoS One. 2013 Aug 22;8(8):e71253. doi: 10.1371/journal.pone.0071253.

### **Altered Visual and Feet Proprioceptive Feedbacks during Quiet Standing Increase Postural Sway in Patients with Severe Knee Osteoarthritis.**

Hirata RP, Jørgensen TS, Rosager S, Arendt-Nielsen L, Bliddal H, Henriksen M, Graven-Nielsen T.

#### **Source**

Center for Sensory-Motor Interaction (SMI), Department of Health Science and Technology, Faculty of Medicine, Aalborg University, Aalborg, Denmark.

#### **Abstract**

##### **OBJECTIVE:**

The objective was to investigate how postural control in knee osteoarthritis (KOA) patients, with different structural severities and pain levels, is reorganized under different sensory conditions.

##### **METHODS:**

Forty-two obese patients (BMI range from 30.1 to 48.7 kg\*m(-2), age range from 50 to 74 years) with KOA were evaluated. One minute of quiet standing was assessed on a force platform during 4 different sensory conditions, applied 3 times at random: Eyes open (EO) and eyes closed (EC) standing on firm and soft (foam) surfaces (EO-soft and EC-soft). Centre of pressure (Cop) standard deviation, speed, range and Cop mean position in both directions (anterior-posterior and medial-lateral) were extracted from the force platform data. Structural disease severity was assessed from semiflexed standing radiographs and graded by the Kellgren and Lawrence (KL) score. Pain intensity immediately before the measurements was assessed by numeric rating scale (range: 0-10).

##### **RESULTS:**

The patients were divided into "less severe" (KL 1 and 2, n=24) and "severe" (KL>2, n=18) group. The CoP range in the medial-lateral direction was larger in the severe group when compared with the less severe group during EC-soft condition (P<0.01). Positive correlation between pain intensity and postural sway (range in medial-lateral direction) was found during EC condition, indicating that the higher the pain intensity, the less effective is the postural control applied to restore an equilibrium position while standing without visual information.

##### **CONCLUSION:**

THE RESULTS SUPPORT THAT: (i) the postural reorganization under manipulation of the different sensory information is worse in obese KOA patients with severe degeneration and/or high pain intensity when compared with less impaired patients, and (ii) higher pain intensity is related to worse body balance in obese KOA patients. PMID: 23990940

## FOOT AND ANKLE

### Eccentric exercise

*Med Sci Sports Exerc.* 2013 Aug 30. [Epub ahead of print]

#### **Eccentric Exercise Leads to Performance Decrease and Insulin Signaling Impairment.**

Pereira BC, Pauli JR, DE Souza CT, Ropelle ER, Cintra DE, Freitas EC, Silva AS.

#### **Source**

1 School of Physical Education and Sport of Ribeirão Preto, University of São Paulo (USP), Ribeirão Preto, São Paulo, Brazil. The authors from this affiliation did not present conflict of interest. 2 Sport Sciences Course, Faculty of Applied Sciences, State University of Campinas (UNICAMP), Limeira, São Paulo, Brazil. The authors from this affiliation did not present conflict of interest. 3 Exercise Biochemistry and Physiology Laboratory Postgraduate Program in Health Sciences, Health Sciences Unit, University of Southern Santa Catarina, Criciúma, Santa Catarina, Brazil. The author from this affiliation did not present conflict of interest.

#### **Abstract**

##### **PURPOSE:**

To evaluate the effects of an overtraining (OT) protocol based on eccentric exercise (EE) sessions on the insulin and inflammatory signalling pathways in skeletal muscles of Swiss mice.

##### **METHODS:**

Rodents were divided into control (C; sedentary mice), trained (TR; performed the aerobic training protocol) and overtrained (OTR; performed the OT protocol). The incremental load test (ILT) and exhaustive test (ET) were used to measure performances before and after exercise protocols. 24h after the exhaustive test performed at the end of week 8, the extensor digitorum longus (EDL) and soleus muscles were removed for subsequent protein analysis by immunoblotting.

##### **RESULTS:**

The phosphorylation of insulin receptor beta (pIRbeta; Tyr1146) diminished for EDL and soleus in OTR compared to C. The phosphorylation of insulin receptor substrate 1 (pIRS-1; Ser307) increased for EDL and soleus in OTR compared to C and TR. The phosphorylation of protein kinase B (pAkt; Ser473) diminished for EDL and soleus in OTR compared to C and TR. The phosphorylation of IκB kinase alpha and beta (pIKKalpha/beta; Ser176/180), stress-activated protein kinases/Jun amino-terminal kinases (pSAPK-JNK; Thr183/Tyr185) and the protein levels of suppressor of cytokine signaling 3 (SOCS3) increased for EDL and soleus in OTR compared to C and TR.

##### **CONCLUSION:**

In summary, the current used OT protocol based on EE sessions impaired the insulin signalling pathway with concomitant increases of IKK, SAPK/JNK and SOCS 3 protein levels. PMID: 24002347

## Talar

Active ankle motion may result in changes to the talofibular interval in individuals with chronic ankle instability and ankle sprain copers: a preliminary study

**Authors:** Croy, Theodore<sup>1</sup>; Cosby, Nicole L<sup>2</sup>; Hertel, Jay<sup>3</sup>

**Source:** [Journal of Manual & Manipulative Therapy](#), Volume 21, Number 3, 2013 , pp. 127-133(7)

**Publisher:** [Maney Publishing](#)

### Introduction:

Alterations in talocrural joint arthrokinematics related to repositioning of the talus or fibula following ankle sprain have been reported in radiological and clinical studies. It is unclear if these changes can result from normal active ankle motion. The study objective was to determine if active movement created changes in the sagittal plane talofibular interval in ankles with a history of lateral ankle sprain and instability.

### Methods:

Three subject groups [control ( $n = 17$ ), ankle sprain copers ( $n = 20$ ), and chronic ankle instability ( $n = 20$ )] underwent ultrasound imaging of the anterolateral ankle gutter to identify the lateral malleolus and talus over three trials. Between trials, subjects actively plantar and dorsiflexed the ankle three times. The sagittal plane talofibular interval was assessed by measuring the anteroposterior distance (mm) between the lateral malleolus and talus from an ultrasound image. Between group and trial differences were analyzed with repeated measures analysis of variance and *post-hoc t*-tests.

### Results:

Fifty-seven subjects participated. A significant group-by-trial interaction was observed ( $F_{4,108} = 3.5$ ;  $P = 0.009$ ). The talofibular interval was increased in both copers [ $2.4 \pm 3.6$  mm; 95% confidence interval (CI):  $0.73 \square 4.1$ ;  $P = 0.007$ ] and chronic ankle instability ( $4.1 \pm 4.6$  mm; 95% CI:  $1.9 \square 6.2$ ;  $P = 0.001$ ) at trial 3 while no changes were observed in control ankle talar position ( $0.06 \pm 2.8$  mm; 95% CI:  $-1.5 \square 1.4$ ;  $P = 0.93$ ).

### Discussion:

The talofibular interval increased only in subjects with a history of lateral ankle sprain with large clinical effect sizes observed. These findings suggest that an alteration in the position of the talus or fibula occurred with non-weight bearing sagittal plane motion. These findings may have diagnostic and therapeutic implications for manual therapists.

**Keywords:** [Arthrokinematics](#); [Instability](#); [Talocrural](#); [Ultrasound](#)

## **Gout/tendons**

Ann Rheum Dis. 2013 Sep 1;72(9):1545-8. doi: 10.1136/annrheumdis-2012-202786. Epub 2013 Jan 19.

### **Tendon involvement in the feet of patients with gout: a dual-energy CT study.**

Dalbeth N, Kalluru R, Aati O, Horne A, Doyle AJ, McQueen FM.

#### Source

Bone and Joint Research Group, Department of Medicine, Faculty of Medical and Health Sciences, University of Auckland, , Auckland, New Zealand.

#### Abstract

##### **OBJECTIVES:**

To examine the frequency and patterns of monosodium urate (MSU) crystal deposition in tendons and ligaments in patients with gout using dual-energy CT (DECT).

##### **METHODS:**

Ninety-two patients with tophaceous gout had DECT scanning of both feet. Two readers scored the DECT scans for MSU crystal deposition at 20 tendon/ligament sites and 42 bone sites (total 1840 tendon/ligament sites and 3864 bone sites).

##### **RESULTS:**

MSU crystal deposition was observed by both readers in 199/1840 (10.8%) tendon/ligament sites and in 399/3864 (10.3%) bone sites ( $p=0.60$ ). The Achilles tendon was the most commonly involved tendon/ligament site (39.1% of all Achilles tendons), followed by the peroneal tendons (18.1%). Tibialis anterior and the extensor tendons were involved less commonly (7.6-10.3%), and the other flexor tendons, plantar fascia and deltoid ligaments were rarely involved (<5%) ( $p<0.0001$  between sites). Involvement of the enthesis alone was more common in the Achilles tendon (OR (95% CI) 74.5 (4.4 to 1264),  $p<0.0001$ ), as was any involvement of the enthesis (OR (95% CI) 6.8 (3.6 to 13.0),  $p<0.0001$ ).

##### **CONCLUSIONS:**

Tendons are commonly affected by MSU crystal deposition in patients with tophaceous gout. The patterns of MSU crystal deposition suggest that biomechanical strain or other local factors may contribute to deposition of MSU crystals.

## **Tendon function**

Skeletal Radiol. 2013 Oct;42(10):1393-402. doi: 10.1007/s00256-013-1650-3. Epub 2013 Jul 3.

### **Correlation of morphologic and pathologic features of the various tendon groups around the ankle: MR imaging investigation.**

Cabral P, Paulino C, Takahashi R, Clopton P, Resnick D.

#### Source

Department of Radiology, Prof. Doutor Fernando Fonseca Hospital, IC 19 - Venteira, 2720-276, Amadora, Portugal, pvaldezpt@yahoo.com.

#### Abstract

##### **OBJECTIVE:**

To determine if a statistical association exists between abnormalities in one ankle tendon group (i.e., peroneal, medial flexor, or Achilles) and those in another.

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

A retrospective analysis of 1.5-T and 3-T MR ankle examinations in 100 patients conducted between November 1, 2011 and April 1, 2012 was performed. The cross-sectional areas and diameters of the ankle tendons-Achilles (ACH), peroneus brevis (PB) and longus (PL), tibialis posterior (TP), flexor digitorum longus (FDL), and flexor halluc longus (FHL)-were measured, and the results were correlated to determine any association with the presence of qualitative abnormalities (tenosynovitis, tendinosis, and tendon tearing).

##### **RESULTS:**

Subjects with larger diameters of the ACH tendon also revealed larger PL, TP, FDL, and FHL tendon diameters and sectional areas. Furthermore, subjects with larger PL tendons generally revealed larger flexor tendons and the same was also true when medial compartment tendons were individually assessed and measurements compared among the three of them. There was a statistically significant association with regard to the presence of tendon abnormalities (tendinosis, tenosynovitis, and tearing) in both the peroneal and medial flexor tendons. The presence of an abnormality in the ACH tendon correlated strongly with increasing diameters and areas of all the other ankle tendons except for the PB tendon.

##### **CONCLUSIONS:**

There is an association between quantitative and qualitative abnormalities of one group of tendons when compared with the others with respect to the ACH, medial flexor, and peroneal tendons of the ankle, which is perhaps explained by a retinacular and fascial complex that anatomically connects the three groups.

## Orthotics/shoes

### Shoe soles

Gait Posture. 2013 Aug 19. pii: S0966-6362(13)00440-2. doi: 10.1016/j.gaitpost.2013.07.116.

#### **Effects of shoe sole hardness on plantar pressure and comfort in older people with forefoot pain.**

Lane TJ, Landorf KB, Bonanno DR, Raspovic A, Menz HB.

#### **Source**

Department of Podiatry, Faculty of Health Sciences, La Trobe University, Bundoora, Victoria 3086 Australia.

#### **Abstract**

Plantar forefoot pain is common in older people and is related to increased peak pressures under the foot during gait. Variations in the hardness of the shoe sole may therefore influence both the magnitude of loading under the foot and the perceived comfort of the shoe in this population. The aim of this investigation was to determine the effect of varying shoe sole hardness on plantar pressures and comfort in older people with forefoot pain. In-shoe plantar pressures under the forefoot, midfoot and rearfoot were recorded from 35 older people (mean age 73.2, SD 4.5 years) with current or previous forefoot pain using the pedar-X® system. Participants walked at their normal comfortable speed along an 8m walkway in shoes with three different levels of sole hardness: soft (Shore A25), medium (Shore A40) and hard (Shore A58). Shoe comfort was measured on a 100mm visual analogue scale. There were statistically significant differences in peak pressure of between 5% and 23% across the forefoot, midfoot and rearfoot ( $p < 0.01$ ).

The hard-soled shoe registered the highest peak pressures and the soft-soled shoe the lowest peak pressures. However, no differences in comfort scores across the three shoe conditions were observed. These findings demonstrate that as shoe sole hardness increases, plantar pressure increases, however this does not appear to have a significant effect on shoe comfort.

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**KEYWORDS:** Aged, Footwear, Gait, Kinetics PMID: 23968972

## **ANKLE/INSTABILITY MRI**

### **Original Research**

#### **Ankle Laxity: Stress Investigation Under MRI Control**

Christian J. Seebauer<sup>1</sup>, Hermann J. Bail<sup>2</sup>, Jens C. Rump<sup>3</sup>, Bernd Hamm<sup>3</sup>, Thula Walter<sup>3</sup> and Ulf K. M. Teichgräber<sup>3</sup>

**Citation:** American Journal of Roentgenology. 2013;201: 496-504. 10.2214/AJR.12.8553

#### **ABSTRACT :**

**OBJECTIVE.** The purpose of this study was to examine the advantages of MRI-guided ankle stress examinations in the detection of chronic ankle instability.

**SUBJECTS AND METHODS.** An MRI-compatible stress device was developed and tested for MRI safety. Bilateral MRI stress examinations were performed on 50 volunteers with and without clinically evident subjective instability of the ankle joints (72 subjective stable ankle joints in 37 subjects, 28 ankles in 15 subjects with chronic ankle instability). Both the inversion test and the anterior drawer test were performed under axial, coronal, 45° paraxial, and sagittal T2-weighted fast spin-echo image control. MR images were assessed for talar tilt, subtalar tilt, anterior talus translation, anterior calcaneus translation, medial talocalcaneal translation, and the diameters of the lateral ankle ligaments (anterior talofibular ligament, calcaneofibular ligament, and posterior talofibular ligament).

**RESULTS.** The MRI stress device was found suitable and safe for use in the MRI environment. The talocrural and subtalar joints could be assessed simultaneously. Significant differences between groups A and B ( $p \leq 0.05$ ) were found in talar tilt, subtalar tilt, anterior talus translation, anterior calcaneus translation, medial talocalcaneal translation, and decrease in diameters of calcaneofibular and posterior talofibular ligaments. Also found were sex differences in talar tilt, subtalar tilt, anterior talus translation, and diameters of the anterior talofibular, calcaneofibular, and posterior talofibular ligaments. Significant relations were found between talar tilt and anterior talus translation, subtalar tilt

and anterior calcaneus translation, subtalar tilt and medial talocalcaneal translation, and between anterior calcaneus translation and medial talocalcaneal translation in groups A and B.

**CONCLUSION.** Stress examination under MRI control has advantages in the assessment of mechanical ankle instability. Additional diagnostic and clinically relevant information is obtained through direct imaging of the ligaments and assessment of additional parameters of ankle laxity (subtalar tilt, anterior calcaneus translation, medial talocalcaneal translation). The main advantages are objective imaging and measurement of abnormal looseness of the lower ankle joint and its direct simultaneous comparison with the upper ankle joint.

## **Ankle instability/training program**

Clin J Sport Med. 2013 Sep;23(5):384-91. doi: 10.1097/JSM.0b013e318291d22d.

### **Six-week combined vibration and wobble board training on balance and stability in footballers with functional ankle instability.**

Cloak R, Nevill A, Day S, Wyon M.

#### **Source**

\*Research Center for Sport, Exercise and Performance, University of Wolverhampton, Walsall, United Kingdom; †University of Wolverhampton, Walsall, United Kingdom; ‡University of Wolverhampton, Walsall, United Kingdom; and §Department of Exercise and Sport Science, Manchester Metropolitan University, Cheshire, United Kingdom.

#### **Abstract**

##### **OBJECTIVE:**

To compare the effectiveness of a combination of vibration and wobble board training against wobble board training alone in footballers suffering from functional ankle instability (FAI).

##### **DESIGN:**

A 2 × 3 prefactorial-postfactorial design.

##### **SETTING:**

University research laboratory.

##### **PARTICIPANTS:**

Thirty-three male semiprofessional footballers with self-reported unilateral FAI were randomly assigned in 3 groups: vibration and wobble board (mean age 22.2 years), wobble board (mean age 22.7 years), and control (mean age 23.1 years).

##### **INTERVENTIONS:**

Participants in each intervention group performed a 6-week progressive rehabilitation program using a wobble board, either with or without the addition of vibration stimulus.

##### **MAIN OUTCOME MEASURES:**

Absolute center of mass (COM) distribution during single-leg stance, modified star excursion balance test (SEBT) reach distances, and single-leg triple hop for distance (SLTHD) were measured before and after 6-week intervention.

##### **RESULTS:**

Combined vibration and wobble board training resulted in reduced COM distribution [ $P \leq 0.001$ , effect size (ES) = 0.66], increased SEBT reach distances ( $P \leq 0.01$  and  $P \leq 0.002$ , ES = 0.19 and 0.29, respectively), and increased SLTHD ( $P \leq 0.001$ , ES = 0.33) compared with wobble board training alone during the course of the 6-week training intervention.

##### **CONCLUSIONS:**

Combined vibration and wobble board training improves COM distribution, modified SEBT scores, and SLTHD among footballers suffering FAI compared with wobble board training alone. PMID: 23657122

**Achilles Tendon**

**Plantar surface**

**Hallux Valgus**

**MANUAL THERAPY**

## STM/STRETCHING/MUSCLES

Journal: **International Journal of General Medicine** September 2013 Volume 2013:6 Pages 733 - 741

### **The effectiveness of massage therapy for the treatment of nonspecific low back pain: a systematic review of systematic reviews**

**Authors: Kumar S, Beaton K, Hughes T**

**Published Date**

**Published:** 04 September

**d:** 2013

<sup>1</sup>International Centre for Allied Health Evidence, School of Health Sciences, University of South Australia, Adelaide, South Australia, Australia; <sup>2</sup>Australian Association of Massage Therapists, Adelaide, South Australia, Australia

**Introduction:** The last decade has seen a growth in the utilization of complementary and alternative medicine therapies, and one of the most popular and sought-after complementary and alternative medicine therapies for nonspecific low back pain is massage. Massage may often be perceived as a safe therapeutic modality without any significant risks or side effects. However, despite its popularity, there continues to be ongoing debate on the effectiveness of massage in treating nonspecific low back pain. With a rapidly evolving research evidence base and access to innovative means of synthesizing evidence, it is time to reinvestigate this issue.

**Methods:** A systematic, step-by-step approach, underpinned by best practice in reviewing the literature, was utilized as part of the methodology of this umbrella review. A systematic search was conducted in the following databases: Embase, MEDLINE, AMED, ICONDA, Academic Search Premier, Australia/New Zealand Reference Centre, CINAHL, HealthSource, SPORTDiscus, PubMed, The Cochrane Library, Scopus, Web of Knowledge/Web of Science, PsycINFO, and ProQuest Nursing and Allied Health Source, investigating systematic reviews and meta-analyses from January 2000 to December 2012, and restricted to English-language documents. Methodological quality of included reviews was undertaken using the Centre for Evidence Based Medicine critical appraisal tool.

**Results:** Nine systematic reviews were found. The methodological quality of the systematic reviews varied (from poor to excellent) although, overall, the primary research informing these systematic reviews was generally considered to be weak quality. The findings indicate that massage may be an effective treatment option when compared to placebo and some active treatment options (such as relaxation), especially in the short term. There is conflicting and contradictory findings for the effectiveness of massage therapy for the treatment of nonspecific low back pain when compared against other manual therapies (such as mobilization), standard medical care, and acupuncture.

**Conclusion:** There is an emerging body of evidence, albeit small, that supports the effectiveness of massage therapy for the treatment of non-specific low back pain in the short term. Due to common methodological flaws in the primary research, which informed the systematic reviews, recommendations arising from this evidence base should be interpreted with caution.

**Keywords:** massage therapy, systematic review, evidence-based practice, complementary and alternative medicine

## **C spine/fascia**

Surg Radiol Anat. 2013 Aug 23. [Epub ahead of print]

### **Ultrasonography in myofascial neck pain: randomized clinical trial for diagnosis and follow-up.**

Stecco A, Meneghini A, Stern R, Stecco C, Imamura M.

#### **Source**

Department of Internal Medicine, University of Padova, Padua, Italy.

#### **Abstract**

##### **OBJECTIVE:**

A definitive diagnosis of chronic neck pain (CNP) is sometimes not possible. The aim of this study was to understand the possible role of the deep fasciae in CNP and the utility of the ultrasonography in the diagnosis of myofascial neck pain.

##### **METHODS:**

The morphometric and clinical data of 25 healthy subjects and 28 patients with CNP were compared. For all subjects, the active and passive cervical range of motion (ROM) was analyzed and the neck pain disability questionnaire (NDPQ) was administered. The fascial thickness of the sternal ending of the sternocleidomastoid and medial scalene muscles was also analyzed by ultrasonography.

##### **RESULTS:**

There were significant differences between healthy subjects and patients with CNP in the thickness of the upper side of the sternocleidomastoid fascia and the lower and upper sides of the right scalene fascia both at the end of treatment as during follow-up. A significant decrease in pain and thickness of the fasciae were found. Analysis of the thickness of the sub-layers showed a significant decrease in loose connective tissue, both at the end of treatment and during follow-up.

##### **CONCLUSIONS:**

The data support the hypothesis that the loose connective tissue inside the fasciae may play a significant role in the pathogenesis of CNP. In particular, the value of 0.15 cm of the SCM fascia was considered as a cut-off value which allows the clinician to make a diagnosis of myofascial disease in a subject with CNP. The variation of thickness of the fascia correlated with the increase in quantity of the loose connective tissue but not with dense connective tissue.

**STM**  
**Muscles**  
**Stretching**  
**BET**

## Exercise

### Osteoporosis/exercise

BMC Musculoskeletal Disorders 2013, 14:253 doi:10.1186/1471-2474-14-253

#### **The effect of regular physical activity on bone mineral density in post-menopausal women aged 75 and over: a retrospective analysis from the Canadian multicentre osteoporosis study**

Jeffrey M Muir<sup>15\*</sup>, Chenglin Ye<sup>12</sup>, Mohit Bhandari<sup>13</sup>, Jonathan D Adachi<sup>4</sup> and Lehana Thabane<sup>1</sup>

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#### Abstract

##### Background

Physical activity is known to benefit many physiological processes, including bone turnover. There are; however, currently no clinical guidelines regarding the most appropriate type, intensity and duration of activity to prevent bone loss.

##### Methods

To help address this gap in the literature, we performed a retrospective analysis of data from the Canadian Multicentre Osteoporosis Study (CaMos), a prospective cohort of 9423 adult patients, to determine the relationship between the amount of regular daily physical activity performed and bone mineral density. A total of 1169 female participants aged 75 and over provided information regarding their daily activity levels, including the amount of time spent each week performing physical activity at varying levels of intensity. Multiple and linear regression analyses were used to determine the effect of increasing amounts of this regular physical activity on bone mineral density.

##### Results

The results indicate that a step increase in the amount of physical activity performed each day resulted in a positive effect on bone mineral density at the hip, Ward's triangle, trochanter and femoral neck ( $B = 0.006$  to  $0.008$ ,  $p < 0.05$ ). Possible confounding factors such as the use of anti-resorptive therapy, body mass index and age were included in the analysis and suggested that age had a negative effect on bone density while body mass index had a positive effect. Anti-resorptive therapy provided a protective effect against loss of bone density.

##### Conclusions

The data indicate that a step increase in the amount of daily activity, using simple, daily performed tasks, can help prevent decreases in post-menopausal bone mineral density.

**Core  
Posture  
Scoliosis**

## **ATHLETICS**

### **Reaction time/concussion**

#### **Effect of acute exercise on clinically measured reaction time in collegiate athletes □**

Medicine and Science in Sports and Exercise, 09/04/2013 **Clinical Article**

Reddy S et al.

#### **Abstract**

**PURPOSE:** We have developed a reliable and valid clinical test of reaction time (RTclin) that is sensitive to the acute effects of concussion. If RTclin is to be used as a sideline concussion assessment tool then the acute effects of exercise on RTclin may need to be controlled for. The purpose of this study is therefore to determine the effect of exercise on RTclin.

**METHODS:** A gender balanced group of 42 collegiate athletes were assigned to an exercise (n=28) and a control (n=14) group using 2:1 block randomization. The exercise group completed a graded 4-stage exercise protocol on a stationary bicycle (100W x 5min; 150W x 5min; 200W x 5min; sprint x 2min) while the control group was tested at identical time periods without exercising. Mean RTclin was calculated over 8 trials as the fall time of a vertically-suspended rigid shaft after its release by the examiner before being caught by the athlete; RTclin was measured at baseline and after each of the 4 stages.

**RESULTS:** As both heart rate and rate of perceived exertion significantly increased over the 4 stages in the exercise group ( $p < .001$ ), mean RTclin showed a significant overall decline during repeated test administration ( $p < .008$ ). However, there were no significant group (exercise vs. control,  $p = 0.822$ ) or group-by-stage interaction ( $p = 0.169$ ) effects on RTclin as assessed by repeated measures analysis of variance.

**CONCLUSION:** Exercise did not appear to affect RTclin performance in this study. This suggests that RTclin measured during a sideline concussion assessment does not need to be adjusted to account for the acute effects of exercise.

(C) 2013 American College of Sports Medicine

## Football/disc degeneration

*J Sports Med.* 2013 Sep;41(9):2059-64. doi: 10.1177/0363546513495173. Epub 2013 Jul 10.

### **Risk Factors for Lumbar Disc Degeneration in High School American Football Players: A Prospective 2-Year Follow-up Study.**

Nagashima M, Abe H, Amaya K, Matsumoto H, Yanaihara H, Nishiwaki Y, Toyama Y, Matsumoto M.

#### **Source**

Morio Matsumoto, Department of Orthopaedic Surgery, Keio University School of Medicine, 35 Shinanomachi, Shinjuku-ku, Tokyo 160-8582, Japan. morio@a5.keio.jp or Hitoshi Abe, MD, Department of Orthopaedic Surgery, Kitasato Institute Hospital, Kitasato University, 5-9-1 Shirokane, Minato-ku, Tokyo 108-8642, Japan (e-mail: hit-abe@insti.kitasato-u.ac.jp).

#### **Abstract**

##### **BACKGROUND:**

Several risk factors have been proposed for intervertebral disc degeneration (DD) among adolescent athletes. However, the causes of DD are not well understood, and there have been few prospective studies evaluating DD in adolescents.

##### **PURPOSE:**

To identify risk factors for DD among adolescent American football (AF) players.

##### **STUDY DESIGN:**

Cohort study (prevalence); Level of evidence, 2.

##### **METHODS:**

This study investigated the relationships between the progression of DD and the following factors: lumbar spine abnormalities on baseline radiographs, body mass index, AF position played (lineman or other), and length of playing career (2 full competitive AF seasons or <2 seasons). Included were 192 students who joined a top-ranked high school AF team from 2004 to 2008. Of these, 160 played for 2 full competitive AF seasons. The remaining 32 players, who stopped before completing 2 seasons, were used as a control group. Baseline radiographs and lumbar magnetic resonance imaging (MRI) scans were obtained when the players enrolled in the AF team in May, and follow-up lumbar MRI scans were obtained 2 years later at the end of their second academic year in March. Disc degeneration was measured by the signal intensity of the nucleus pulposus, and its progression was evaluated by multiple regression analysis of decreases in signal intensity. Also analyzed was the relationship between DD and low back pain (LBP).

##### **RESULTS:**

The mean decrease in signal intensity of the nucleus pulposus was  $4.30\% \pm 11.63\%$  in players who completed 2 AF seasons and  $1.41\% \pm 10.03\%$  in those who did not ( $P = .12$ ). Mean visual analog scale scores for LBP at follow-up were significantly higher ( $P = .001$ ) in players who had played for 2 full seasons ( $2.67 \pm 2.81$ ) than in those with a shorter career ( $0.99 \pm 1.61$ ). Decreases in signal intensity of the nucleus pulposus after 2 years of playing AF related significantly to playing a lineman position (partial regression coefficient, 3.47%), the presence of Schmorl nodes (partial regression coefficient, 3.58%), and disc herniation (partial regression coefficient, 4.09%).

##### **CONCLUSION:**

Significant risk factors for DD progression in high school AF players included playing a lineman position, the presence of Schmorl nodes, and disc herniation. Continuing to play AF through 2 years of high school was a risk factor for the onset of LBP. PMID: 23841993

## **NFL/C Spine/Disc**

Am J Sports Med. 2013 Sep;41(9):2054-8. doi: 10.1177/0363546513493247. Epub 2013 Jun 20.

### **Operative and nonoperative treatment of cervical disc herniation in national football league athletes.**

Meredith DS, Jones KJ, Barnes R, Rodeo SA, Cammisa FP, Warren RF.

#### **Source**

Dennis S. Meredith, Spine Service, Department of Orthopedic Surgery, Hospital for Special Surgery, 535 E 70th St, New York, NY 10021. dsm@stanfordalumni.org.

#### **Abstract**

##### **BACKGROUND:**

Limited evidence exists to guide clinical decision making regarding cervical disc herniations in professional athletes playing for the National Football League (NFL) in the United States.

##### **PURPOSE:**

To describe the presentation and treatment outcomes of cervical disc herniations in NFL athletes with a focus on safety and return to sport.

##### **STUDY DESIGN:**

Case series; Level of evidence, 4.

##### **METHODS:**

The records of a single NFL team and its consulting physicians were reviewed from 2000 to 2011. Only athletes with magnetic resonance imaging (MRI)-proven disc herniation concordant with the reported symptoms were included.

##### **RESULTS:**

A total of 16 athletes met inclusion criteria. Linemen, linebackers, and defensive backs were the most represented positions (13/16 athletes; 81%). The most common presentation was radiculopathy after a single traumatic event (9/16 athletes; 56%). Three players had transient paresis. Three players underwent one-level anterior cervical discectomy and fusion. These 3 players had failed nonoperative therapy and had evidence of spinal cord compression with signal change on MRI, but only 1 returned to sport. Three players received epidural steroid injections, which provided transient symptomatic relief. Five players were treated nonoperatively and did not return to sport. Two of these 5 athletes had cord compression with signal change and retired rather than undergo surgery. The other 3 were cleared but were released by the team. Eight players were treated nonoperatively and returned to sport. Three of these 8 athletes had evidence of disc material abutting the cord without cord signal change but had a normal examination finding and returned to sport after resolution of their symptoms and repeat MRI that demonstrated no cord compression. Five of the 8 players had evidence of root compression and were treated symptomatically. There were no subsequent traumatic spinal cord injuries at a minimum of 1-year follow-up.

##### **CONCLUSION:**

Data regarding the treatment of this unique population are limited but suggest that NFL athletes can safely return to sport after the treatment of cervical disc herniations. In the treatment algorithm for this study, cord compression with signal change in the cord on MRI was a consistent operative indication. Discs abutting the cord can be treated nonoperatively but do not allow for return to sport until symptoms have improved and repeat imaging demonstrates no cord compression. Isolated nerve root compression has a more favorable prognosis. It can be treated symptomatically and return to sport allowed when symptoms permit. PMID: 23788681

## Soccer/ACL

*Clin J Sport Med.* 2013 Sep;23(5):407-8. doi: 10.1097/01.jsm.0000433153.51313.6b.

### **Neuromuscular training to prevent knee injuries in adolescent female soccer players.**

Wingfield K.

#### **DESIGN:**

Cluster randomized (by team) controlled trial, stratified by geographical district. Sample size was calculated (n = 8118) with 80% power to show a reduction of 50% in an estimated 1.15% annual incidence of anterior cruciate ligament (ACL) injury at  $P \leq 0.05$ .

#### **SETTING:**

Clubs in 8 regional districts of the Swedish Football Association, during the 2009 season (April through October).

#### **PARTICIPANTS:**

Female under-14 to under-18 football clubs (ages 12-17 years) were recruited. Reasons for the exclusion of clubs were lack of response, <2 training sessions per week, and the current use of an injury prevention program.

#### **INTERVENTION:**

The clubs were randomized to a neuromuscular warm-up intervention (Knäkontroll, SISU Idrottsböcker, Sweden, 2005) or to a control group, who were instructed to continue with their usual training and playing practices. The neuromuscular training program included 6 exercises that focused on knee control and core stability (1- and 2-legged knee squats, a pelvic lift, the bench, the lunge, and jump/landing). The exercises were to be done twice per week and were to take about 15 minutes, after a brief running warm-up. They progressed through 4 levels of difficulty. The team coaches supervised the program after instruction from study therapists.

#### **MAIN OUTCOME MEASURES:**

The primary outcome was the rate of ACL injuries. Diagnosis was confirmed, as appropriate, by a physician and by magnetic resonance imaging. Secondary outcomes were the rates of serious knee injury and any acute knee injury, defined as those with sudden onset during play that led to a player being unable to participate in training or competition. Severe injuries were those that caused absences of >4 weeks. Two study therapists evaluated the injuries. The coaches recorded data, including when the intervention was performed, any injuries, individual playing times, and periods of absence. Assessment of the primary outcome was done by physicians blinded to group assignment. **MAIN RESULTS:**

During 278 298 hours of play, 96 knee injuries occurred in 92 players (intervention group 48, control group 44). The rate did not differ between groups. Of the 21 ACL injuries, 7 occurred in the intervention group and 14 in the control group, giving a rate ratio (RR) of 0.36 (95% confidence interval [CI] 0.15-0.85;  $P = 0.02$ ). Severe injuries (intervention group 26, control group 31) did not differ between groups. They included 22 collateral or capsular sprains, 21 ACL injuries, 7 patella dislocations or subluxations, 6 meniscal or chondral lesions, and 1 tibial plateau fracture. Compliant players (those who performed  $\geq 1$  exercise session per week; 1303 players) had a lower rate of ACL injury (RR, 0.17; 95% CI, 0.05-0.57), of severe knee injury (RR, 0.18; 95% CI, 0.07-0.45), and of any acute knee injury (RR, 0.53; 95% CI, 0.30-0.94) than the control group.

**CONCLUSIONS:** A short weekly neuromuscular exercise program reduced the rate of ACL injuries among adolescent female football (soccer) players. Those who were compliant with the intervention had fewer severe knee injuries and fewer injuries overall. PMID: 23989384

## Concussion/undiagnosed/athletes

Clin J Sport Med. 2013 Sep;23(5):339-342.

### The Prevalence of Undiagnosed Concussions in Athletes.

Meehan WP 3rd, Mannix RC, O'Brien MJ, Collins MW.

#### Source

\*Sports Concussion Clinic, Division of Sports Medicine, Department of Orthopaedics, Boston Children's Hospital, Boston, Massachusetts; †The Micheli Center for Sports Injury Prevention, Boston, Massachusetts; ‡Brain Injury Center, Boston Children's Hospital, Boston, Massachusetts; §Division of Emergency Medicine, Department of Medicine, Boston Children's Hospital, Boston, Massachusetts; and ¶Sports Medicine Concussion Program, Department of Orthopaedics, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania.

#### Abstract

##### OBJECTIVE::

Previous studies suggest athletes underreport concussions. We sought to determine whether athletes in our clinics have sustained previous concussions that went undiagnosed.

##### DESIGN::

Multicentered cross sectional study.

##### SETTING::

Two sport concussion clinics.

##### PATIENTS::

Patients diagnosed with sport-related concussions or concussions with injury mechanisms and forces similar to those observed in sports were included.

##### MAIN OUTCOME MEASURES::

The proportion of patients who answered "yes" to the following question were defined as having a previously undiagnosed concussion: "Have you ever sustained a blow to the head which was NOT diagnosed as a concussion but was followed by one or more of the signs and symptoms listed in the Post Concussion Symptom Scale?"

##### RESULTS::

Of the 486 patients included in the final analysis, 148 (30.5%) patients reported a previously undiagnosed concussion. Athletes reporting previously undiagnosed concussions had a higher mean Post Concussion Symptom Scale (PCSS) score (33 vs 25;  $P < 0.004$ ) and were more likely to have lost consciousness (31% vs 22%;  $P = 0.038$ ) with their current injury than athletes without previously undiagnosed concussions.

##### CONCLUSIONS::

Nearly one-third of athletes have sustained previously undiagnosed concussions, defined as a blow to the head followed by the signs and symptoms included in the PCSS. Furthermore, these previously undiagnosed concussions are associated with higher PCSS scores and higher loss of consciousness rates when future concussions occur.

##### CLINICAL RELEVANCE::

Many athletes have sustained previous blows to the head that result in the signs and symptoms of concussion but have not been diagnosed with a concussion. These injuries are associated with increased rates of loss of consciousness and higher symptom scale scores with future concussions.

PMID: 23727697

## Soccer/Concussions/Headers

Radiology. 2013 Sep;268(3):850-7. doi: 10.1148/radiol.13130545. Epub 2013 Jun 11.

### **Soccer heading is associated with white matter microstructural and cognitive abnormalities.**

Lipton ML, Kim N, Zimmerman ME, Kim M, Stewart WF, Branch CA, Lipton RB.

#### **Source**

Gruss Magnetic Resonance Research Center, Department of Radiology, Department of Psychiatry & Behavioral Sciences, the Dominick P. Purpura Department of Neuroscience, the Saul R. Korey Department of Neurology, Department of Epidemiology and Population Health, and Department of Physiology and Biophysics, Albert Einstein College of Medicine of Yeshiva University, 1300 Morris Park Ave, Bronx, NY 10461; Department of Radiology, Montefiore Medical Center, Bronx, NY.

#### **Abstract**

**Purpose:** To investigate the association of soccer heading with subclinical evidence of traumatic brain injury.

**Materials and Methods:** With institutional review board approval and compliance with HIPAA guidelines, 37 amateur soccer players (mean age, 30.9 years; 78% [29] men, 22% [eight] women) gave written informed consent and completed a questionnaire to quantify heading in the prior 12 months and lifetime concussions. Diffusion-tensor magnetic resonance (MR) imaging at 3.0 T was performed (32 directions; b value, 800 sec/mm<sup>2</sup>; 2 × 2 × 2-mm voxels). Cognitive function was measured by using a computerized battery of tests. Voxelwise linear regression (heading vs fractional anisotropy [FA]) was applied to identify significant regional associations. FA at each location and cognition were tested for a nonlinear relationship to heading by using an inverse logit model that incorporated demographic covariates and history of concussion.

**Results:** Participants had headed 32-5400 times (median, 432 times) over the previous year. Heading was associated with lower FA at three locations in temporo-occipital white matter with a threshold that varied according to location (885-1550 headings per year) (P < .00001). Lower levels of FA were also associated with poorer memory scores (P < .00001), with a threshold of 1800 headings per year. Lifetime concussion history and demographic features were not significantly associated with either FA or cognitive performance.

**Conclusion:** Heading is associated with abnormal white matter microstructure and with poorer neurocognitive performance. This relationship is not explained by a history of concussion. © RSNA, 2013.

PMID: 23757503

## GAIT

### Knee OA/changes

*Osteoarthritis Cartilage*. 2013 Aug 12. pii: S1063-4584(13)00910-2. doi: 10.1016/j.joca.2013.08.007.

#### **Varus thrust and knee frontal plane dynamic motion in persons with knee osteoarthritis.**

Chang AH, Chmiel JS, Moisio KC, Almagor O, Zhang Y, Cahue S, Sharma L.

#### **Source**

Department of Physical Therapy and Human Movement Sciences, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA. Electronic address: hsini@northwestern.edu.

#### **Abstract**

##### **OBJECTIVE:**

Varus thrust visualized during walking is associated with a greater medial knee load and an increased risk of medial knee osteoarthritis (OA) progression. Little is known about how varus thrust presence determined by visual observation relates to quantitative gait kinematic data. We hypothesized that varus thrust presence is associated with greater knee frontal plane dynamic movement during the stance phase of gait.

##### **METHODS:**

Participants had knee OA in at least one knee. Trained examiners assessed participants for varus thrust presence during ambulation. Frontal plane knee motion during ambulation was captured using external passive reflective markers and an 8-camera motion analysis system. To examine the cross-sectional relationship between varus thrust and frontal plane knee motion, we used multivariable regression models with the quantitative motion measures as dependent variables and varus thrust (present/absent) as predictor; models were adjusted for age, gender, body mass index (BMI), gait speed, and knee static alignment.

##### **RESULTS:**

236 persons [mean BMI: 28.5 kg/m<sup>2</sup> (standard deviation (SD) 5.5), mean age: 64.9 years (SD 10.4), 75.8% women] contributing 440 knees comprised the study sample. 82 knees (18.6%) had definite varus thrust. Knees with varus thrust had greater peak varus angle and greater peak varus angular velocity during stance than knees without varus thrust (mean differences 0.90° and 6.65°/s, respectively). These patterns remained significant after adjusting for age, gender, BMI, gait speed, and knee static alignment.

##### **CONCLUSION:**

Visualized varus thrust during walking was associated with a greater peak knee varus angular velocity and a greater peak knee varus angle during stance phase of gait.

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##### **KEYWORDS:**

Gait analysis, Instability, Knee osteoarthritis, Varus thrust PMID: 23948980

## RUNNING

### Rearfoot/forefoot

Medicine and Science in Sports and Exercise, 09/04/2013

#### Rearfoot Striking Runners Are More Economical than Midfoot Strikers

Ogueta-Alday, Ana; Rodríguez-Marroyo, José Antonio; García-López, Juan

##### Abstract

**Purpose:** To analyze the influence of foot strike pattern on running economy and biomechanical characteristics in sub-elite runners with a similar performance level.

**Methods:** Twenty sub-elite long-distance runners participated and were divided into two groups according to their foot strike pattern: rearfoot (RF, n= 10) and midfoot strikers (MF, n= 10). Anthropometric characteristics were measured (height, body mass, BMI, skinfolds, circumferences and lengths); physiological ( $\dot{V}O_2\text{max}$ , anaerobic threshold and running economy) and biomechanical characteristics (contact and flight times, step rate and step length) were registered during both incremental and submaximal tests on a treadmill.

**Results:** There were no significant intergroup differences in anthropometrics,  $\dot{V}O_2\text{max}$  or anaerobic threshold measures. RF strikers were 5.4, 9.3 and 5.0% more economical than MF at submaximal speeds (11, 13 and 15 km $\cdot$ h<sup>-1</sup> respectively, though the difference was not significant at 15 km $\cdot$ h<sup>-1</sup>, p=0.07). Step rate and step length were not different between groups, but RF showed longer contact time (p<0.01) and shorter flight time (p<0.01) than MF at all running speeds.

**Conclusions:** The present study showed that habitually rearfoot striking runners are more economical than midfoot strikers. Foot strike pattern affected both contact and flight times, which may explain the differences in running economy.

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## **Mechanics/minimalist**

PM R. 2013 Aug 30. pii: S1934-1482(13)01033-2. doi: 10.1016/j.pmrj.2013.08.602.

### **Short term changes in running mechanics and foot strike pattern following introduction to minimalistic footwear.**

Willson JD, Bjorhus JS, Williams B 3rd, Butler RJ, Porcari JP, Kernozek TW.

#### **Source**

Department of Physical Therapy, East Carolina University, Greenville, NC, 27834. Electronic address: willsonj@ecu.edu.

#### **Abstract**

##### **OBJECTIVE:**

Minimalistic footwear has garnered widespread interest in the running community based largely on the premise that the footwear may reduce certain running-related injury risk factors through adaptations in running mechanics and foot strike pattern. The purpose of this study is to examine short term adaptations in running mechanics among runners who typically run in conventional cushioned heel running shoes as they transition to minimalistic footwear.

##### **DESIGN:**

2-week prospective observational study **SETTING:** movement science laboratory

**PARTICIPANTS:** Nineteen female runners with a rear foot strike (RFS) pattern who usually train in conventional running shoes.

##### **METHODS:**

Participants trained for 20 minutes, three times per week, for two weeks using minimalistic footwear. Three-dimensional lower extremity running mechanics were analyzed before and after this two week period.

##### **MAIN OUTCOME MEASUREMENTS:**

Hip, knee, and ankle joint kinematics at initial contact, step length, stance time, peak ankle joint moment and joint work, impact peak, vertical ground reaction force loading rate, and foot strike pattern preference were evaluated before and after the intervention.

##### **RESULTS:**

Knee flexion angle at initial contact increased 3.8° ( $p < .01$ ), but ankle and hip flexion angle at initial contact did not change after training. No changes in ankle joint kinetics or running temporal-spatial parameters were observed. The majority (71%) of participants demonstrated a RFS pattern while running in minimalistic footwear before the intervention. The proportion of runners with a RFS pattern did not decrease after two weeks ( $P = .25$ ). Those runners who chose a RFS pattern in minimalistic shoes experienced a vertical loading rate that was 3 times greater than those who chose to run with a non-RFS pattern.

##### **CONCLUSIONS:**

Few systematic changes in running mechanics were observed among participants following 2 weeks of training in minimalistic footwear. The majority of participants continued to utilize a RFS pattern following training in minimalistic footwear, and these participants experienced higher vertical loading rates. Continued exposure to these greater loading rates may have detrimental effects over time.

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##### **KEYWORDS:**

ground reaction force, joint kinematics, kinetics, training PMID: 23999160

## **Marathon/ heart attack**

*Clin J Sport Med.* 2013 Sep;23(5):409-10. doi: 10.1097/01.jsm.0000433155.97054.c8.

### **Marathon-related cardiac arrest.** Hart L.

#### **OBJECTIVE:**

To investigate the incidence and assess the outcomes of cardiac arrest occurring in the context of participation in marathon or half-marathon races.

#### **PARTICIPANTS:**

All participants were registered entrants in the long-distance races. Participation statistics (sex, participant identity numbers, and race distance) were publicly accessible from Running USA.

#### **ASSESSMENT OF RISK FACTORS:**

Data on possible risk factors for cases were obtained retrospectively through computer searches (age, sex, location of cardiac arrest, publicly released cause of death). Three attempts were made to obtain information from survivors or from the next-of-kin of deceased cases. This information included demographic characteristics, exercise and running history, and personal and family medical history.

#### **MAIN OUTCOME MEASURES:**

The main outcome measures were the incidence and characteristics of cases of cardiac arrest that occurred during the race, at the finish-line, or  $\leq 1$  hour after completion of a marathon or half marathon. Cardiac arrests were defined by a medical professional as an unconscious state and an absence of spontaneous respirations and pulse. Successful resuscitation and discharge from hospital defined a survivor, whereas a nonsurvivor was a person who was not successfully resuscitated in the field or who died before hospital discharge. Cases of cardiac arrest had to be independently identified in 3 separate sources of data or confirmed with official race medical staff. Further information, including details of the cardiac arrest, was obtained from medical records and autopsies and the survivors or next of kin.

#### **MAIN RESULTS:**

Among 10.9 million registered race participants there were 40 cardiac arrests in marathons and 19 in half marathons (overall incidence, 0.54 per 100 000; 95% confidence interval [CI], 0.41-0.70). The mean age of runners with cardiac arrest was 42 (SD 13) years and 86% were men. The incidence per 100 000 was higher in marathons (1.01; 95% CI, 0.72-1.38) than in half marathons (0.27; 95% CI, 0.17-0.43; and among men (0.90; 95% CI, 0.67-1.18) than among women (0.16; 95% CI, 0.07-0.31). More runners died than survived the cardiac arrest (42 [71%] vs 17[29%]); the incidence of sudden death was 0.39 per 100 000 participants (95% CI, 0.28-0.52). The mean age of the nonsurvivors was younger than that of the survivors (39 vs 49 years;  $P = 0.002$ ). Complete clinical information on cause of death was available for 23 runners. The most common confirmed or possible cause of death was hypertrophic cardiomyopathy (15 cases, of whom 9 had an additional clinical factor). Among the 8 survivors with complete information, ischemic heart disease was the cause of cardiac arrest in 5. The survivors were older than nonsurvivors (53 vs 40 years), had completed more long-distance races, and were more likely to have known cardiac risk factors. The strongest predictors of survival were initiation of cardiopulmonary resuscitation by bystanders ( $P = 0.01$ ) and an underlying diagnosis other than hypertrophic cardiomyopathy ( $P = 0.01$ )

**CONCLUSIONS::** The incidence of cardiac arrest and sudden death per 100 000 runner hours was 0.2 and 0.14. Risk factors for cardiac arrest were full marathon and male sex. Younger age and no previous knowledge of cardiovascular risk were associated with sudden death. PMID: 23989386

## **PAIN**

### **Memory deficits/chronic pain**

#### **Evidence for working memory deficits in chronic pain: A systematic review and meta-analysis**

PAIN Volume 154, Issue 8 , Pages 1181-1196, August 2013

People with chronic pain commonly report impaired cognitive function. However, to date, there has been no systematic evaluation of the body of literature concerning cognitive impairment and pain. Nor have modern meta-analytical methods been used to verify and clarify the extent to which cognition may be impaired. The objective of this study was to systematically evaluate and critically appraise the literature concerning working memory function in people with chronic pain. The study was conducted along Cochrane collaboration and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement guidelines. A sensitive search strategy was designed and conducted with the help of an expert librarian using 6 databases. Twenty-four observational studies evaluating behavioral and/or physiological outcomes in a chronic pain group and a control group met the inclusion criteria. All studies had a high risk of bias, owing primarily to lack of assessor blinding to outcome. High heterogeneity within the field was found with the inclusion of 24 papers using 21 different working memory tests encompassing 9 different working memory constructs and 9 different chronic pain populations. Notwithstanding high heterogeneity, pooled results from behavioral outcomes reflected a consistent, significant moderate effect in favor of better performance by healthy controls and, with the exception of one study, pooled results from physiological outcomes reflected no evidence for an effect. Future research would benefit from the use of clearly defined constructs of working memory, as well as standardized methods of testing.

## **Torture/soft tissue/memory**

Eur J Pain. 2013 Sep 9. doi: 10.1002/j.1532-2149.2013.00394.x.

### **The long-term impact of tissue injury on pain processing and modulation: A study on ex-prisoners of war who underwent torture.**

Defrin R, Ginzburg K, Mikulincer M, Solomon Z.

#### **Source**

Department of Physical Therapy, School of Allied Health Professions, Sackler Medical School, Tel-Aviv University, Israel.

#### **Abstract**

##### **BACKGROUND:**

Tissue injury may, in some instances, induce chronic pain lasting for decades. Torture survivors suffer from high rates of chronic pain and hypersensitivity in the previously injured regions. Whether torture survivors display generalized alterations in pain perception and modulation, and whether such alterations underlie their chronic pain is unknown. We aimed at exploring the long-term alterations in pain perception and modulation in torture survivors.

##### **METHODS:**

In order to address these questions, a systematic quantitative somatosensory evaluation was performed in individuals (n = 60) who suffer from chronic pain, and who, decades previously, were tortured, resulting in substantial tissue damage. These individuals were compared with age- and sex-matched individuals (n = 44) of similar background. Testing included the measurement of pain threshold and pain tolerance, perceived suprathreshold stimuli, conditioned pain modulation (CPM) and temporal summation of pain (TSP) in intact body regions.

##### **RESULTS:**

Chronic pain was found highly prevalent (86.6%) among torture survivors, who exhibited higher suprathreshold pain ratings ( $p < 0.05$ ), poorer CPM ( $p < 0.0001$ ) and stronger TSP ( $p < 0.0001$ ) than controls. Significant differences in CPM and TSP were also found between torture survivors and controls with chronic pain. Chronic pain intensity among torture survivors correlated negatively with the magnitude of CPM ( $r = -0.47$ ,  $p < 0.01$ ).

##### **CONCLUSIONS:**

Torture appears to induce generalized dysfunctional pain modulation that may underlie the intense chronic pain experienced by torture survivors decades after torture. The results may be generalized to instances where chronic pain exists for decades after severe injury in non-tortured populations and emphasize the importance of preventive care.

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## Sexual assault/pain

Eur J Pain. 2013 Sep 10. doi: 10.1002/j.1532-2149.2013.00395.x.

### **Pain and somatic symptoms are sequelae of sexual assault: Results of a prospective longitudinal study.**

Ulirsch JC, Ballina LE, Soward AC, Rossi C, Hauda W, Holbrook D, Wheeler R, Foley KA, Batts J, Collette R, Goodman E, McLean SA.

#### **Source**

TRYUMPH Research Program, University of North Carolina, Chapel Hill, USA.

#### **Abstract**

##### **BACKGROUND:**

Cross-sectional studies have shown that chronic musculoskeletal pain and somatic symptoms are frequently reported by sexual assault (SA) survivors; however, prospective studies examining pain and somatic symptoms in the months after SA have not been performed.

##### **METHODS:**

Women SA survivors 18 years of age or older who presented for care within 48 h of SA were recruited. Pain in eight body regions (head and face, neck, breast, arms, abdomen, back, genital and pelvic, and legs) and 21 common somatic symptoms (e.g., headache, nausea, insomnia, persistent fatigue) were assessed (0-10 numeric rating scale in each body region) at the time of presentation, 1-week, 6-week and 3-month interview. Post-traumatic stress disorder (PTSD) symptoms were assessed at the 6-week and 3-month interview.

##### **RESULTS:**

Clinically significant new or worsening pain (CSNWP) symptoms were common among study participants 6 weeks after SA [43/74, 58% (95% CI, 47-69%)] and 3 months after SA [40/67, 60% (95% CI, 48-71%)] and generally occurred in regions not experiencing trauma. Women SA survivors also experienced an increased burden of many common somatic symptoms: 8/21 (38%) and 11/21 (52%) common somatic symptoms showed a significant increase in severity 6 weeks and 3 months after SA, respectively. Correlations between PTSD, CSNWP and somatic symptoms were only low to moderate, suggesting that these outcomes are distinct.

##### **CONCLUSIONS:**

New and/or clinically worsening pain and somatic symptoms, lasting at least 3 months, are sequelae of SA. Further studies investigating pain and somatic symptoms after SA are needed.

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## **Eccentric ex/sensitivity**

### **Pain sensitivity is normalized after a repeated bout of eccentric exercise**

Eur J Appl Physiol □

The purpose of this study was to investigate the effect of repeated bouts of eccentric exercise on the nociceptive withdrawal reflex (NWR) threshold, a measure of sensitivity in the spinal nociceptive system.

Methods: Sixteen healthy students (age  $25.7 \pm 0.6$  years, BMI  $24.8 \pm 1$  kg m<sup>-2</sup>) participated in this randomized, controlled, crossover study. Two identical bouts of high-intensity eccentric exercises were performed on the tibialis anterior muscle 7 days apart. Control sessions involving no exercise were performed 4 weeks apart the exercise sessions. Pressure pain thresholds (PPT) and the NWR threshold were recorded before, immediately after, and 1 day after both bouts of exercise.

Results: Pressure pain thresholds decreased significantly at two of the muscle belly sites on the day after initial bout compared with baseline. NWR threshold decreased by  $25 \pm 4$  % immediately after initial bout and by  $30 \pm 5$  % the next day ( $p < 0.05$ ) as an indication of generalized pain hypersensitivity. On the contrary, no changes were found in both pain thresholds after second bout of eccentric exercise indicating that both localized and generalized pain sensitivity were normalized.

Conclusion: In conclusion, this study for the first time documented that an initial bout of unaccustomed high-intensity eccentric exercise, which results in muscle soreness can induce central sensitization. A repeated bout of exercise, however, facilitates inherent protective spinal mechanisms against the development of muscle soreness.

## **Pain/Brain**

J Psychosom Obstet Gynaecol. 2013 Sep;34(3):139-43. doi: 10.3109/0167482X.2013.829033.

### **Labour pain: from the physical brain to the conscious mind.**

Whitburn LY.

#### **Source**

School of Public Health and Human Biosciences, Faculty of Health Sciences and.

#### **Abstract**

The study of pain goes well beyond the study of anatomy and physiology. To fully understand a phenomenon such as pain, one must consider the realm in which it exists - the conscious mind. This paper aims to explore the concept of the conscious mind and its relevance to the human experience of labour pain. Understanding the interactions between the mind, brain, body, social environment and natural world on the experience of pain enables a more comprehensive conception of labour pain. Reaffirming that pain is an embodied subjective experience is important during this current era in pain science research that seems to lean towards neuroreductionism and conceptualises pain as a pathological by-product of disease. Labour pain, however, is a clear demonstration that pain is not always a signal of bodily disorder.

The experience of pain is generated by the brain and is realised through the conscious mind. Thus, the study of pain - particularly complex pains such as labour pain - should focus not just on the physical body and neural processes in the brain but must aim to include, and be capable of capturing, all elements that constitute it; the mind, brain, body and the environment.

## Pain lasting impact

Pain. 2013 Aug 8. pii: S0304-3959(13)00441-7. doi: 10.1016/j.pain.2013.08.005.

### **Does severe acute pain provoke lasting changes in attentional and emotional mechanisms of pain-related processing? A longitudinal study.**

Dimova V, Horn C, Parthum A, Kunz M, Schöfer D, Carbon R, Griessinger N, Sittl R, Lautenbacher S.

#### **Source**

Physiological Psychology, Otto-Friedrich University, Bamberg, Germany; Pain Center, Friedrich-Alexander University, Erlangen, Germany. Electronic address: violeta.dimova@uni-bamberg.de.

#### **Abstract**

Pain experiences, learning, and genetic factors have been proposed to shape attentional and emotional processes related to pain. We aimed at investigating whether a singular major pain experience also changes cognitive-emotional processing. The influence of acute postoperative pain after cosmetic surgery of the thorax was tested in 80 preoperatively pain-free male individuals. Acute pain was measured as independent variable during the first week postsurgery by pain intensity ratings and the requested analgesic boluses (PCEA). Pain catastrophizing (PCS), pain anxiety (PASS), pain hypervigilance (PVAQ), and attentional biases to emotionally loaded stimuli (including pain) in a dot-probe task were assessed 1 week, 3 months, and 6 months postsurgery as dependent variables. Hierarchical regression analyses were performed to test whether the 2 acute pain parameters can predict these cognitive-emotional variables. As a rigorous test, significant prediction was required in addition to the prediction of the dependent variables by themselves with lag-1. Acute pain (mainly the pain ratings) appeared to be a significant predictor for PCS, PASS, and PVAQ 1 week after surgery ( $\Delta R^2 = [8.7\% \text{ to } 11.3\%]$ ). In contrast, the attentional biases in the dot-probe task could not be predicted by the pain ratings. The levels of pain catastrophizing and pain hypervigilance increased in the acute phase after surgery when influenced by acute pain and declined, along with pain anxiety, during the next 3 months. In conclusion, a one-time intense pain experience, such as acute postoperative pain, appeared to produce at least short-lived changes in the attentional and emotional processing of pain.

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#### **KEYWORDS:**

Acute pain, Dot-probe task, Pain catastrophizing, Pain hypervigilance, Pain-related anxiety, Postoperative pain PMID: 23933182

## Complex regional Pain

### **The rubber hand illusion in complex regional pain syndrome: Preserved ability to integrate a rubber hand indicates intact multisensory integration**

PAIN Volume 154, Issue 9 , Pages 1519- 1527, September 2013

In patients with complex regional pain syndrome (CRPS) type 1, processing of static tactile stimuli is impaired, whereas more complex sensory integration functions appear preserved. This study investigated higher order multisensory integration of body-relevant stimuli using the rubber hand illusion in CRPS patients. Subjective self-reports and skin conductance responses to watching the rubber hand being harmed were compared among CRPS patients (N = 24), patients with up- per limb pain of other origin (N = 21, clinical control group), and healthy subjects (N =

24). Additionally, the influence of body representation (body plasticity [Trinity Assessment of Body Plasticity], neglect-like severity symptoms), and clinical signs of illusion strength were investigated. For statistical analysis, 1-way analysis of variance, t test, Pearson correlation, with  $\alpha = 0.05$  were used.

CRPS patients did not differ from healthy subjects and the control group with regard to their illusion strength as assessed by subjective reports or skin conductance response values. Stronger left-sided rubber hand illusions were reported by healthy subjects and left-side- affected CRPS patients. Moreover, for this subgroup, illness duration and illusion strength were negatively correlated. Overall, severity of neglect-like symptoms and clinical signs were not related to illusion strength. However, patients with CRPS of the right hand reported significantly stronger neglect-like symptoms and significantly lower illusion strength of the affected hand than patients with CRPS of the left hand. The weaker illusion of CRPS patients with strong neglect-like symptoms on the affected hand supports the role of top- down processes modulating body ownership. Moreover, the intact ability to perceive illusory ownership confirms the notion that, despite impaired processing of proprioceptive or tactile input, higher order multisensory integration is unaffected in CRPS.

## Fibromyalgia

### Economic evaluation

#### **Cost-Utility of a Psychoeducational Intervention in Fibromyalgia Patients Compared With Usual Care: An Economic Evaluation Alongside a 12-Month Randomized Controlled Trial**

Clinical Journal of Pain August 2013 - Volume 29 - Issue 8 - p 702-711

**Objective:** To determine the effectiveness of adding psychoeducational treatment implemented in general practice to usual care for patients with fibromyalgia (FM), and to analyze the cost-utility of the intervention from health care and societal perspectives.

**Methods:** Twelve-month randomized controlled trial. A total of 216 primary care patients meeting the American College of Rheumatology criteria for FM participated in the study. The intervention included 9, 2-hour sessions of psychoeducation (5 sessions of education about the illness+4 sessions of autogenic relaxation) added to usual care provided by a multidisciplinary group in general practice was compared to usual care in the public health system.

**Results:** At 12-month follow-up, patients who received psychoeducation showed greater improvement in global functional status (Cohen  $d=0.36$ ;  $-2.49$  to  $3.81$ ), physical functioning (Cohen  $d=0.56$ ;  $0.08$  to  $1.00$ ), days feeling well (Cohen  $d=0.40$ ;  $-0.16$  to  $1.02$ ), pain (Cohen  $d=0.35$ ;  $-0.04$  to  $0.80$ ), morning fatigue (Cohen  $d=0.24$ ;  $-0.20$  to  $0.76$ ), stiffness (Cohen  $d=0.34$ ;  $-0.10$  to  $0.87$ ), and depression (Cohen  $d=0.30$ ;  $-0.26$  to  $0.93$ ). Mean incremental cost per person receiving the intervention was € $-215.49$  ( $-615.13$  to  $287.81$ ) from the health care perspective, and € $-197.32$  ( $-785.12$  to  $395.74$ ) from the societal perspective. The incremental gain in quality-adjusted life-years per person was  $0.12$  ( $0.06$  to  $0.19$ ), yielding a “dominant” intervention from both perspectives. The sensitivity analysis suggested that the intervention was cost-effective even imputing all missing data.

**Discussion:** Our findings demonstrate the long-term clinical effectiveness of a psychoeducational treatment program for FM implemented at primary care level and the cost-utility from a health care and societal perspective.

## **PTSD/Fibromyalgia**

### **Posttraumatic stress disorder in fibromyalgia syndrome: Prevalence, temporal relationship between posttraumatic stress and fibromyalgia symptoms, and impact on clinical outcome**

PAIN Volume 154, Issue 8 , Pages 1216-1223, August 2013

A link between fibromyalgia syndrome (FMS) and posttraumatic stress disorder (PTSD) has been suggested because both conditions share some similar symptoms. The temporal relationships between traumatic experiences and the onset of PTSD and FMS symptoms have not been studied until now. All consecutive FMS patients in 8 study centres of different specialties were assessed from February 1 to July 31, 2012. Data on duration of chronic widespread pain (CWP) were based on patients' self-reports. Potential traumatic experiences and year of most burdensome traumatic experience were assessed by the trauma list of the Munich Composite International Diagnostic Interview. PTSD was diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders IV symptom criteria by the Posttraumatic Diagnostic Scale. Age- and sex-matched persons of a general population sample were selected for controls. Three hundred ninety-five of 529 patients screened for eligibility were analysed (93.9% women, mean age 52.3 years, mean duration since chronic widespread pain 12.8 years); 45.3% of FMS patients and 3.0% of population controls met the criteria for PTSD.

Most burdensome traumatic experience and PTSD symptoms antedated the onset of CWP in 66.5% of patients. In 29.5% of patients, most burdensome traumatic experience and PTSD symptoms followed the onset of CWP. In 4.0% of patients' most burdensome traumatic experience, PTSD and FMS symptoms occurred in the same year. FMS and PTSD are linked in several ways: PTSD is a potential risk factor of FMS and vice versa. FMS and PTSD are comorbid conditions because they are associated with common antecedent traumatic experiences.

## **Fibromyalgia update**

J Am Osteopath Assoc. 2013 Sep;113(9):680-9. doi: 10.7556/jaoa.2013.034.

### **Fibromyalgia: a clinical update.**

Hawkins RA.

#### **Source**

Department of Medical Education, Kettering Medical Center 4NW, 3535 Southern Blvd, Kettering, OH 45429-1221. bob.hawkins@khnetwork.org.

#### **Abstract**

Fibromyalgia is a common chronic syndrome defined by core symptoms of widespread pain, fatigue, and sleep disturbance. Other common symptoms include cognitive difficulty, headache, paresthesia, and morning stiffness. Fibromyalgia is increasingly understood as 1 of several disorders that are referred to as central sensitivity syndromes; these disorders share underlying causes and clinical features. Tender points are often detected in patients with fibromyalgia and were formerly required for diagnosis. Newly proposed criteria, however, rely on patients' reports of widespread pain and other somatic symptoms to establish the diagnosis of fibromyalgia. The management of fibromyalgia requires a multidimensional approach including patient education, cognitive behavioral therapy, exercise, and pharmacologic therapy. The present review provides an update on these various aspects of treating a patient with fibromyalgia.

PMID: 24005088

## Natural course of neck and low back pain

### Natural course of acute neck and low back pain in the general population: The HUNT study

PAIN Volume 154, Issue 8 , Pages 1237-1244, August 2013 □

In this prospective cohort study we aimed to describe the natural course of acute neck and low back pain in a general population of Norway. We screened 9056 subjects aged 20–67 years who participated in a general health survey for a new episode of neck or low back pain the previous month. The screening identified 219 subjects who formed the cohort for this study. Pain intensity was reported on a numeric rating scale (0–10) at 1, 2, 3, 6, and 12 months after start of the new pain episode. The course of pain was described for neck and low back pain, different baseline pain levels, age groups, and number of pain sites at baseline. Use of medication and health care was described and associations between pain intensity and seeking health care were estimated. Pain declined rapidly within 1 month after a new pain episode, with a reduction of 0.91 (95% confidence interval [CI] 0.50–1.32) for neck pain and 1.40 (95% CI 0.82–1.99) for low back pain with little change thereafter. However, pain remained □ unchanged over the follow-up year for those with equal pain in the neck and low back □ areas at baseline and for those reporting 4 or more pain sites at baseline. Only 1 in 5 □ sought health care for their complaints. Still, the course of pain was comparable to □ effect sizes reported in interventional studies. This study thus contributes natural □ course reference data for comparisons of pain outcome in clinical trials and practice.

## Parents/Adolescents

### **The Interplay of Parent and Adolescent Catastrophizing and Its Impact on Adolescents' Pain, Functioning, and Pain Behavior**

Clinical Journal of Pain August 2013 - Volume 29 - Issue 8 - p 681-688

**Objectives:** Catastrophizing is a coping style linked to poorer patient outcomes. Little attention has focused on the parent-adolescent dyad and catastrophizing as a shared coping style. The purpose of this study was to: (1) examine the effects of adolescent and parent pain catastrophizing on adolescent functioning and (2) explore concordance in catastrophizing in parent-adolescent dyads, with equal interest in outcomes of dyads with discordant coping styles.

**Methods:** Pain intensity, catastrophizing, depressive symptoms, quality of life, and pain behaviors were assessed in adolescents (ages 11 to 17) presenting to a pediatric chronic pain clinic (N=240).

**Results:** Significant correlations between (1) parent and adolescent catastrophizing; (2) catastrophizing and pain behaviors; and (3) catastrophizing and adolescent outcomes were found. Parents and adolescents were classified into concordant or discordant dyads based on catastrophizing with a majority of dyads (>70%) showing concordant coping styles. Among discordant dyads, functional disability and depressive symptoms were significantly higher in a dyad with a high catastrophizing adolescent and low catastrophizing parent.

**Discussion:** Results provide further support for catastrophizing being a maladaptive coping strategy for adolescents with pain and their parents. Greater adolescent catastrophizing was related to increased pain behaviors and poorer adolescent functioning. Parent catastrophizing also seems related to poorer adolescent outcomes, and most parent-adolescent dyads showed concordance in use of catastrophizing, which may suggest a shared tendency for adaptive or maladaptive styles of coping with pain. Future research should investigate pain coping at a dyadic or family level to explore how family coping styles magnify distress and disability or buffer adolescents from such problems.

## Hypersensitivity

### **Do Central Hypersensitivity and Altered Pain Modulation Predict the Course of Chronic Low Back and Neck Pain?**

Clinical Journal of Pain August 2013 - Volume 29 - Issue 8 - p 673-680

**Objectives:** Widespread central hypersensitivity and altered conditioned pain modulation (CPM) have been documented in chronic pain conditions. Information on their prognostic values is limited. This study tested the hypothesis that widespread central hypersensitivity (WCH) and altered CPM, assessed during the chronic phase of low back and neck pain, predict poor outcome.

**Methods:** A total of 169 consecutive patients with chronic low back or neck pain, referred to the pain clinic during 1 year, were analyzed. Pressure pain tolerance threshold at the second toe and tolerance time during cold pressor test at the hand assessed WCH. CPM was measured by the change in pressure pain tolerance threshold (test stimulus) after cold pressor test (conditioning stimulus). A structured telephone interview was performed 12 to 15 months after testing to record outcome parameters. Linear regression models were used, with average and maximum pain intensity of the last 24 hours at follow-up as endpoints. Multivariable analyses included sex, age, catastrophizing scale, Beck Depression Inventory, pain duration, intake of opioids, and type of pain syndrome.

**Results:** Statistically significant reductions from baseline to follow-up were observed in pain intensity ( $P < 0.001$ ). No evidence for an association between the measures of WCH or CPM and intensity of chronic pain at follow-up was found.

**Discussion:** A major predictive value of the measures that we used is unlikely. Future studies adopting other assessment modalities and possibly standardized treatments are needed to further elucidate the prognostic value of WCH and altered CPM in chronic pain.

## ANKYLOSING SPONDYLITIS

### Articular changes

Ann Rheum Dis. 2013 Sep 2. doi: 10.1136/annrheumdis-2013-203582.

### **Prevalence of extra-articular manifestations in patients with ankylosing spondylitis: a systematic review and meta-analysis.**

Stolwijk C, van Tubergen A, Castillo-Ortiz JD, Boonen A.

#### **Source**

Department of Medicine, Division of Rheumatology, Maastricht University Medical Center, Maastricht, The Netherlands.

#### **Abstract**

##### **OBJECTIVES:**

Uveitis, psoriasis and inflammatory bowel disease (IBD) are common extra-articular manifestations (EAM) in patients with ankylosing spondylitis (AS); however, summary data of reported prevalence are lacking. The aim of the present study was to summarise the prevalence of EAMs among patients with AS and to identify underlying factors to explain potential heterogeneity of prevalence.

##### **METHODS:**

A systematic literature search was performed (Medline, Embase and Cochrane Library) to identify relevant articles. Risk of bias was assessed and data were extracted. Pooled prevalences were calculated. Potential sources of any observed clinical or methodological heterogeneity in the estimates were explored by subgroup and metaregression analysis.

##### **RESULTS:**

In the 156 selected articles, 143 reported the prevalence of uveitis (44 372 patients), 56 of psoriasis (27 626 patients) and 69 of IBD (30 410 patients). Substantial heterogeneity was observed in prevalence estimates among all EAMs ( $I^2=84-95\%$ ). The pooled prevalence of uveitis was 25.8% (95% CI 24.1% to 27.6%), and was positively associated in multivariable metaregression with disease duration ( $\beta$  0.05, 95% CI 0.03 to 0.08) and random selection of patients ( $\beta$  -0.24, 95% CI -0.43 to -0.04). The pooled prevalence of psoriasis was 9.3% (95% CI 8.1% to 10.6%). The pooled prevalence of IBD was 6.8% (95% CI 6.1% to 7.7%) and was positively associated with the percentage of women in the studies ( $\beta$  0.02, 95% CI 0.00 to 0.03). Geographical area was associated in multivariable metaregressions with prevalence of all EAMs.

##### **CONCLUSIONS:**

EAMs are common in patients with AS. The large heterogeneity between studies can be partly explained by differences in clinical as well as methodological characteristics.

##### **KEYWORDS:**

Ankylosing Spondylitis, Epidemiology, Spondyloarthritis PMID: 23999006

## NUTRITION/VITAMINS

### Trameel

Int J Clin Pract. 2013 Jul 25. doi: 10.1111/ijcp.12219.

#### **Traumeel vs. diclofenac for reducing pain and improving ankle mobility after acute ankle sprain: A multicentre, randomised, blinded, controlled and non-inferiority trial.**

de Vega CG, Speed C, Wolfarth B, González J.

#### **Source**

MEDYR Clinic, Sports Medicine & Rehabilitation, Madrid, Spain.

#### **Abstract**

##### **BACKGROUND:**

Acute ankle sprains are common and activity limiting injuries, and topical diclofenac gel has proven efficacy in alleviating pain and restoring function. This trial aimed to compare a topical natural agent, Traumeel with topical diclofenac gel (1%) in the management of acute ankle sprain.

##### **METHODS:**

This prospective, multicentre, randomised, blinded, active-control and non-inferiority study involved 449 physically active adults sustaining unilateral grade 1 or 2 ankle sprain within the past 24 h. Participants were randomised to receive 2 g of Traumeel ointment (T-O) (n = 152) or Traumeel gel (T-G) (n = 150) or diclofenac gel (D-G) (n = 147), administered topically to the ankle three times a day for 14 days, with 6-weeks follow up.

##### **RESULTS:**

Day 7 median percentage reductions in Visual Analogue Scale pain score were 60.6%, 71.1% and 68.9% for the T-O, T-G and D-G groups, respectively. Total pain relief was reported by 12 (8.5%), 7 (5.0%) and 8 (5.9%) participants in each group, respectively. Median improvements in Foot and Ankle Ability Measure Activities of Daily Living subscale score were 26.2, 26.2 and 25.0 points for T-O, T-G and D-G groups, respectively. Mann-Whitney effect sizes and lower bound confidence intervals demonstrated non-inferiority of Traumeel vs. diclofenac for reducing pain and functional improvement. At 6 weeks, participants reported total pain relief and normal functioning. Adverse events (n = 43) were reported by 31/447 participants (6.9%). Treatments were equally well tolerated.

##### **CONCLUSIONS:**

T-O and T-G decreased pain and improved joint function to the same extent as D-G in acute ankle sprain, and were well tolerated.

## PHARMACOLOGY

### Anti-inflammatory

Pain Pract. 2013 Aug 14. doi: 10.1111/papr.12100.

#### Nonsteroidal Anti-Inflammatory Drugs, Gastroprotection, and Benefit-Risk.

Moore RA, Derry S, Simon LS, Emery P.

#### Source

Pain Research and Nuffield Division of Anaesthetics, University of Oxford, Oxford, U.K.

#### Abstract

##### BACKGROUND:

Gastroprotective agents (GPA) substantially reduce morbidity and mortality with long-term nonsteroidal anti-inflammatory drugs (NSAIDs) and aspirin.

##### OBJECTIVE:

To evaluate efficacy of NSAIDs, protection against NSAID-induced gastrointestinal harm, and balance of benefit and risk.

##### METHODS:

Free text searches of PubMed (December 2012) supplemented with "related citation" and "cited by" facilities on PubMed and Google Scholar for patient requirements, NSAID effectiveness, pain relief benefits, gastroprotective strategies, adherence to gastroprotection prescribing, and serious harm with NSAIDs and GPA.

##### RESULTS:

Patients want 50% reduction in pain intensity and improved fatigue, distress, and quality of life. Meta-analyses of NSAID trials in musculoskeletal conditions had bimodal responses with good pain relief or little. Number needed to treat (NNTs) for good pain relief were 3 to 9. Proton pump inhibitors (PPI) and high-dose histamine-2 receptor antagonists (H2 RA) provided similar gastroprotection, with no conclusive evidence of greater PPI efficacy compared with high-dose H2 RA. Prescriber adherence to guidance on use of GPA with NSAIDs was 49% in studies published since 2005; patient adherence was less than 100%. PPI use at higher doses over longer periods is associated with increased risk of serious adverse events, including fracture; no such evidence was found for H2 RA. Patients with chronic conditions are more willing to accept risk of harm for successful treatment than their physicians.

##### CONCLUSION:

Guidance on NSAIDs use should ensure that patients have a good level of pain relief and that gastroprotection is guaranteed for the NSAID delivering good pain relief. Fixed-dose combinations of NSAID plus GPA offer one solution

**ELECTROTHERAPY**  
**NEUROLOGICAL CONDITONS**