

## ABSTRACTS

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## 1. LUMBAR SPINE

### Trunk muscle strength and fx

Curr Osteoporos Rep. 2016 Apr 4.

#### **The Role of Trunk Musculature in Osteoporotic Vertebral Fractures: Implications for Prediction, Prevention, and Management.**

Mokhtarzadeh H<sup>1,2,3</sup>, Anderson DE<sup>4,5</sup>.

This review examines the current evidence for associations between vertebral fractures (VFX), the most common type of fracture in older adults, and trunk muscles, which are intimately tied to spinal loading and function. Individuals with prevalent VFXs have more fat infiltration in the trunk muscles, lower trunk extension strength, and altered muscle activation patterns. However, no longitudinal studies have examined whether assessment of trunk muscle can contribute to prediction of fracture risk. A few studies report that exercise interventions targeting the trunk muscles can reduce the risk of VFX, improve trunk strength and endurance in patients who have had a VFX, and reduce the risk of falling, a common cause of VFX, but the quality of evidence is low.

Trunk muscles likely have an important role to play in prediction, prevention, and management of VFX, but additional longitudinal studies and randomized controlled trials are needed to clarify this role.

**KEYWORDS:** Aging; Imaging; Muscle function; Osteoporosis; Trunk muscle; Vertebral fracture

PMID: 27040104

### 3. DISC

#### Resolution of HD

Clin Rehabil. 2015 Feb;29(2):184-95. doi: 10.1177/0269215514540919. Epub 2014 Jul 9.

#### **The probability of spontaneous regression of lumbar herniated disc: a systematic review.**

Chiu CC<sup>1</sup>, Chuang TY<sup>2</sup>, Chang KH<sup>1</sup>, Wu CH<sup>3</sup>, Lin PW<sup>1</sup>, Hsu WY<sup>4</sup>.

Abstract

#### **OBJECTIVE:**

To determine the probability of spontaneous disc regression among each type of lumbar herniated disc, using a systematic review.

#### **DATA SOURCES:**

Medline, Cochrane Library, CINAHL, and Web of Science were searched using key words for relevant original articles published before March 2014. Articles were limited to those published in English and human studies.

#### **REVIEW METHODS:**

Articles had to: (1) include patients with lumbar disc herniation treated conservatively; (2) have at least two imaging evaluations of the lumbar spine; and (3) exclude patients with prior lumbar surgery, spinal infections, tumors, spondylolisthesis, or spinal stenosis. Two reviewers independently extracted study details and findings. Thirty-one studies met the inclusion criteria. Furthermore, if the classification of herniation matched the recommended classification of the combined Task Forces, the data were used for combined analysis of the probability of disc regression of each type. Nine studies were applicable for probability calculation.

#### **RESULTS:**

The rate of spontaneous regression was found to be 96% for disc sequestration, 70% for disc extrusion, 41% for disc protrusion, and 13% for disc bulging. The rate of complete resolution of disc herniation was 43% for sequestered discs and 15% for extruded discs.

#### **CONCLUSIONS:**

Spontaneous regression of herniated disc tissue can occur, and can completely resolve after conservative treatment. Patients with disc extrusion and sequestration had a significantly higher possibility of having spontaneous regression than did those with bulging or protruding discs. Disc sequestration had a significantly higher rate of complete regression than did disc extrusion.

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#### **KEYWORDS:**

Low back pain; disc herniation; probability; regression of hernation; systematic review

PMID: 25009200

**Annular changes**

Spine J. 2016 Mar 17. pii: S1529-9430(16)00483-6. doi: 10.1016/j.spinee.2016.03.026.

**miR-221 attenuates the osteogenic differentiation of human annulus fibrosus cells.**

Yeh CH<sup>1</sup>, Jin L<sup>2</sup>, Shen F<sup>3</sup>, Balian G<sup>4</sup>, Li X<sup>5</sup>.

Abstract

**BACKGROUND:**

In the moderate and end stages of intervertebral disc (IVD) degeneration, endochondral ossifications are found in the IVD.

**PURPOSE:**

To investigate whether endochondral ossification in the late stages of disc degeneration is due to the differentiation of resident progenitor cell in the annulus fibrosus (AF) and the potential signaling pathways in vitro.

**STUDY DESIGN:**

An in vitro study of AF cell osteogenic differentiation and possible mechanisms METHODS: Normal AF (NAF) and degenerated AF (DAF) cells were isolated from tissue removed surgically from juvenile patients with idiopathic scoliosis and adult patients with degenerative scoliosis. Osteogenic differentiation was investigated using quantitative RT-PCR and histology. Effects of miR-221 on osteogenesis were measured by overexpression of miR-221 with lentivirus. BMP2 and phospho-Smad protein were detected by Western blotting.

**RESULTS:**

Both NAF and DAF cells underwent osteogenic differentiation, which, was confirmed by detecting mineralization of the cell cultures and by an increase in the expression mRNAs for BMP2, Runx2, ALP, and Osteocalcin. DAF cells exhibited increased osteogenic differentiation potential over the NAF cells. By contrast to the elevated phospho-Smads, the basal level of miR-221 significantly decreased in DAF cells compared with NAF cells. Cultures of both cell types in osteogenic medium showed a decrease in miR-221 expression while overexpression of miR-221 markedly decreased the level of BMP2, phospho-Smads and the expression of osteogenic genes in DAF cells. The osteogenic potential of DAF cells diminished by the overexpression of miR-221.

**CONCLUSION:**

Compared to NAF cells, AF cells from degenerated discs have a greater tendency for osteogenic differentiation, which involves the BMP-Smad pathways and can be regulated by miR-221. These observations may be developed into a therapeutic to prevent the endochondral ossification.

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**KEYWORDS:**

BMP,; annulus fibrosus,; intervertebral disc,; miR-221,; osteogenesis

PMID: 26997108

**Disc herniation resolution**

Ann R Coll Surg Engl. 2010 Mar;92(2):147-53. doi: 10.1308/003588410X12518836438840.  
Epub 2009 Nov 2.

**Conservatively treated massive prolapsed discs: a 7-year follow-up.**

Benson RT<sup>1</sup>, Tavares SP, Robertson SC, Sharp R, Marshall RW.

***INTRODUCTION:***

The natural history of a lumbar hernia of the nucleus pulposus (HNP) is not fully known and clear indications for operative intervention cannot be established from the literature. Several studies have shown that the largest discs appear to have the greatest tendency to resolve. The aim of this study was to investigate whether massive prolapsed discs can be safely managed conservatively once clinical improvement has occurred.

***PATIENTS AND METHODS:***

Thirty-seven patients were studied by clinical assessments and serial magnetic resonance imaging (MRI) over 2 years. Patients had severe sciatica at first, but began to show clinical improvement despite the large disc herniations. Clinical assessment included the Lasegue test and neurological appraisal. The Oswestry Disability Index was used to measure function and changes in function. Serial MRI studies allowed measurement of volume changes of the herniated disc material over a period of time.

***RESULTS:***

Initial follow-up at an average of 23.2 months revealed that 83% had a complete and sustained recovery at the initial follow-up. Only four patients required a discectomy. The average Oswestry disability index improved from 58% to 15%. Volumetric analysis of serial MRI scans found an average reduction of 64% in disc size. There was a poor correlation between clinical improvement and the extent of disc resolution.

***CONCLUSIONS:***

A massive disc herniation can pursue a favourable clinical course. If early progress is shown, the long-term prognosis is very good and even massive disc herniations can be treated conservatively.

PMID: 19887021

## 7. PELVIC ORGANS/WOMAN'S HEALTH

### Breast CA and inflammation

#### Association between dietary inflammatory potential and breast cancer incidence and death: Results from the Women's Health Initiative

British Journal of Cancer, 04/25/2016

Tabung FK, et al.

In the Women's Health Initiative, authors investigated associations between a dietary inflammatory index (DII) and invasive breast cancer incidence and death. Future studies are needed to examine the inflammatory potential of postDIAGNOSIS diet given the suggestion from the current study that dietary inflammatory potential before diagnosis is related to breast cancer death.

#### Methods

- The DII was calculated from a baseline food frequency questionnaire in 122788 postmenopausal women, enrolled from 1993 to 1998 with no prior cancer, and followed until 29 August 2014.
- With median follow-up of 16.02 years, there were 7495 breast cancer cases and 667 breast cancer deaths.
- They used Cox regression to estimate multivariable-adjusted hazards ratios (HRs) and 95% confidence intervals (95% CIs) by DII quintiles (Q) for incidence of overall breast cancer, breast cancer subtypes, and deaths from breast cancer.
- The lowest quintile (representing the most anti-inflammatory diet) was the reference.

#### Results

- The DII was not associated with incidence of overall breast cancer ( $HR_{Q5vsQ1}$ , 0.99; 95% CI, 0.91–1.07;  $P_{trend}=0.83$  for overall breast cancer).
- In a full cohort analysis, a higher risk of death from breast cancer was associated with consumption of more pro-inflammatory diets at baseline, after controlling for multiple potential confounders ( $HR_{Q5vsQ1}$ , 1.33; 95% CI, 1.01–1.76;  $P_{trend}=0.03$ ).

**Episiotomy**

Neurourol Urodyn. 2016 Apr 5. doi: 10.1002/nau.22995.

**Does episiotomy influence vaginal resting pressure, pelvic floor muscle strength and endurance, and prevalence of urinary incontinence 6 weeks postpartum?**

Bø K<sup>1,2</sup>, Hilde G<sup>2</sup>, Tennfjord MK<sup>1</sup>, Engh ME<sup>2,3</sup>.

**AIMS:**

The aim of the present study was to compare vaginal resting pressure (VRP), pelvic floor muscle (PFM) strength and endurance, and prevalence of urinary incontinence (UI) at 6 weeks postpartum, in women with and without lateral or mediolateral episiotomy.

**METHODS:**

Two hundred and thirty-eight nulliparous pregnant women, mean age 28.5 years (SD 4.2) and pre-pregnancy BMI 23.8 (SD 4.0) participated in the study. Lateral or mediolateral episiotomy was only performed for indications such as fetal distress or imminent risk of severe perineal tear. At 6 weeks postpartum, a vaginal balloon connected to a high precision pressure transducer was used to measure VRP (cm H<sub>2</sub> O), PFM strength (cm H<sub>2</sub> O), and endurance (cm H<sub>2</sub> O sec). All women completed the International Classification of Urinary Incontinence Short Form (ICIQ-UI-SF) by means of an electronic questionnaire.

**RESULTS:**

No statistically significant differences were found in VRP (mean difference 0.0 cm H<sub>2</sub> O, 95%CI: -2.1 to 2.1), PFM strength (mean difference 1.3 cm H<sub>2</sub> O, 95%CI: -1.9 to 4.6), or PFM endurance (mean difference 12.1 cm H<sub>2</sub> O sec, 95%CI: -11.0 to 35.1) between women with or without episiotomy. No significant differences were found in prevalence of UI (37.5% vs. 46.6%) or SUI (23.6% vs. 35.6%), between women with or without episiotomy, respectively.

**CONCLUSIONS:**

PFM function and/or prevalence of post-partum UI were not affected by a lateral or mediolateral episiotomy. Neurourol. Urodynam. © 2016 Wiley Periodicals, Inc.

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**KEYWORDS:**

episiotomy; pelvic floor muscles; strength; urinary incontinence; vaginal resting pressure

PMID: 27059092

**Low Vit D and impact on fetus**

Am J Clin Nutr. 2016 Apr 20. pii: ajcn123752.

**Maternal vitamin D concentrations during pregnancy, fetal growth patterns, and risks of adverse birth outcomes.**

Miliku K<sup>1</sup>, Vinkhuyzen A<sup>2</sup>, Blanken LM<sup>3</sup>, McGrath JJ<sup>2</sup>, Eyles DW<sup>2</sup>, Burne TH<sup>2</sup>, Hofman A<sup>4</sup>, Tiemeier H<sup>5</sup>, Steegers EA<sup>6</sup>, Gaillard R<sup>1</sup>, Jaddoe VW<sup>7</sup>.

**BACKGROUND:**

Maternal vitamin D deficiency during pregnancy may affect fetal outcomes.

**OBJECTIVE:**

The objective of this study was to examine whether maternal 25-hydroxyvitamin D [25(OH)D] concentrations in pregnancy affect fetal growth patterns and birth outcomes.

**DESIGN:**

This was a population-based prospective cohort in Rotterdam, Netherlands in 7098 mothers and their offspring. We measured 25(OH)D concentrations at a median gestational age of 20.3 wk (range: 18.5-23.3 wk). Vitamin D concentrations were analyzed continuously and in quartiles. Fetal head circumference and body length and weight were estimated by repeated ultrasounds, and preterm birth (gestational age <37 wk) and small size for gestational age (less than the fifth percentile) were determined.

**RESULTS:**

Adjusted multivariate regression analyses showed that, compared with mothers with second-trimester 25(OH)D concentrations in the highest quartile, those with 25(OH)D concentrations in the lower quartiles had offspring with third-trimester fetal growth restriction, leading to a smaller head circumference, shorter body length, and lower body weight at birth (all  $P < 0.05$ ). Mothers who had 25(OH)D concentrations in the lowest quartile had an increased risk of preterm delivery (OR: 1.72; 95% CI: 1.14, 2.60) and children who were small for gestational age (OR: 2.07; 95% CI: 1.33, 3.22). The estimated population attributable risk of 25(OH)D concentrations <50 nmol/L for preterm birth or small size for gestational age were 17.3% and 22.6%, respectively. The observed associations were not based on extreme 25(OH)D deficiency, but presented within the common ranges.

**CONCLUSIONS:**

Low maternal 25(OH)D concentrations are associated with proportional fetal growth restriction and with an increased risk of preterm birth and small size for gestational age at birth. Further studies are needed to investigate the causality of these associations and the potential for public health interventions.

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**KEYWORDS:**

25(OH)D; birth weight; fetal growth; pediatrics; pregnancy; preterm birth; small-size for gestational age; vitamin D

PMID: 27099250



**Estrogen and ovarian CA**

Obstet Gynecol. 2016 May;127(5):828-36. doi: 10.1097/AOG.0000000000001387.

**Association Between Menopausal Estrogen-Only Therapy and Ovarian Carcinoma Risk.**

Lee AW<sup>1</sup>, Ness RB, Roman LD, Terry KL, Schildkraut JM, Chang-Claude J, Doherty JA, Menon U, Cramer DW, Gayther SA, Risch H, Gentry-Maharaj A, Goodman MT, Modugno F, Eilber U, Moysich KB, Berchuck A, Rossing MA, Jensen A, Wicklund KG, Cushing-Haugen KL, Hogdall E, Rudolph A, Thompson PJ, Wilkens LR, Kjaer SK, Carney ME, Stram DO, Ramus SJ, Wu AH, Pike MC, Pearce CL; Ovarian Cancer Association Consortium.

**OBJECTIVE:**

To describe the association between postmenopausal estrogen-only therapy use and risk of ovarian carcinoma, specifically with regard to disease histotype and duration and timing of use.

**METHODS:**

We conducted a pooled analysis of 906 women with ovarian carcinoma and 1,220 women in a control group; all 2,126 women included reported having had a hysterectomy. Ten population-based case-control studies participating in the Ovarian Cancer Association Consortium, an international consortium whose goal is to combine data from many studies with similar methods so reliable assessments of risk factors can be determined, were included. Self-reported questionnaire data from each study were harmonized and conditional logistic regression was used to examine estrogen-only therapy's histotype-specific and duration and recency of use associations.

**RESULTS:**

Forty-three and a half percent of the women in the control group reported previous use of estrogen-only therapy. Compared with them, current or recent estrogen-only therapy use was associated with an increased risk for the serous (51.4%, odds ratio [OR] 1.63, 95% confidence interval [CI] 1.27-2.09) and endometrioid (48.6%, OR 2.00, 95% CI 1.17-3.41) histotypes. In addition, statistically significant trends in risk according to duration of use were seen among current or recent postmenopausal estrogen-only therapy users for both ovarian carcinoma histotypes (Ptrend<.001 for serous and endometrioid). Compared with women in the control group, current or recent users for 10 years or more had increased risks of serous ovarian carcinoma (36.8%, OR 1.73, 95% CI 1.26-2.38) and endometrioid ovarian carcinoma (34.9%, OR 4.03, 95% CI 1.91-8.49).

**CONCLUSION:**

We found evidence of an increased risk of serous and endometrioid ovarian carcinoma associated with postmenopausal estrogen-only therapy use, particularly of long duration. These findings emphasize that risk may be associated with extended estrogen-only therapy use.

PMID: 27054934

**High fructose not good**

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

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

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

**BACKGROUND:**

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

**OBJECTIVE:**

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

**STUDY DESIGN:**

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

**RESULTS:**

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

**CONCLUSION:**

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

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KEYWORDS:fructose; metabolism; mice; offspring; pregnancy PMID: 2706042

## 8. VISCERA

### Factors of IBS

Intern Med J. 2016 Apr 5. doi: 10.1111/imj.13094.

#### **Influence of food and lifestyle on the risk of developing Inflammatory Bowel Disease.**

Niewiadomski O<sup>1</sup>, Studd C<sup>2</sup>, Wilson J<sup>3</sup>, Williams J<sup>1</sup>, Hair C<sup>4</sup>, Knight R<sup>4</sup>, Prewett E<sup>4</sup>, Dabkowski P<sup>4</sup>, Alexander S<sup>4</sup>, Allen B<sup>4</sup>, Dowling D<sup>4</sup>, Connell W<sup>1</sup>, Desmond P<sup>5</sup>, Bell S<sup>1</sup>.

#### **BACKGROUND:**

The Barwon area in Australia has one of the highest incidence rates of inflammatory bowel disease (IBD) and therefore is an ideal location to study the impact of environmental exposures on disease development.

#### **AIM:**

To study these exposures prior to the development of IBD in a population based cohort.

#### **METHOD:**

132 incident cases (81 Crohn's Disease, CD, and 51 Ulcerative Colitis, UC) from an IBD registry and 104 controls replied to the IOIBD (International Organization of Inflammatory Bowel Diseases) environmental questionnaire. This included 87 questions about pre-illness exposures that included childhood illnesses, vaccinations, breastfeeding, house amenities, pets and swimming, diet and smoking.

#### **RESULTS:**

The factors associated with CD included smoking (OR 1.42, CI 1-2.02, p = 0.029), childhood events including tonsillectomy (OR 1.74, CI 1.15-2.6, p = 0.003) and chicken pox infection (OR 3.89, CI 1.61-9.4, p = 0.005), and pre-diagnosis intake of frequent fast food (OR 2.26, CI 1.76-4.33, p = 0.003). In UC, the risk factors included smoking (OR 1.39, CI 1.1- 1.92, p = 0.026), pre-diagnosis intake of frequent fast food (OR 2.91, CI 1.54-5.58, p < 0.001) and high caffeine intake was protective (OR 0.51, 95% CI 0.3-0.87, p = 0.002). Other protective exposures for UC included high fruit intake (OR 0.59, CI 0.4-0.88, p = 0.003) and having pets as a child (OR 0.36, CI 0.2-0.79, p = 0.001).

#### **CONCLUSION:**

This first Australian population based study of environmental risk factors confirms that smoking, childhood immunologic events and dietary factors play a role in IBD development; while high caffeine intake and pet ownership offer a protective effect.

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#### **KEYWORDS:**

Crohn's disease; Inflammatory bowel disease; Ulcerative colitis; aetiology; environmental factors; epidemiology

PMID: 27059169

**Hearing loss with IBS**

Dig Dis Sci. 2016 Apr 5.

**Hearing Loss in Patients with Inflammatory Bowel Disease.**

Wengrower D<sup>1</sup>, Koslowsky B<sup>2</sup>, Peleg U<sup>3</sup>, Mazuz B<sup>1</sup>, Cohen L<sup>4</sup>, Ben-David A<sup>5</sup>, Gross M<sup>4</sup>, Goldin E<sup>1</sup>, Shaul C<sup>3</sup>.

**BACKGROUND AND AIMS:**

Inflammatory bowel disease (IBD) has many characteristics of autoimmune diseases. Sensorineural hearing loss has been reported in many autoimmune diseases. Little is known about hearing loss in patients with IBD.

**METHODS:**

A prospective blinded comparative study was conducted over a 3-year period. IBD patients and controls underwent a complete otorhinolaryngeal examination and eudiometry test.

**RESULTS:**

Altogether 105 participants (76 patients and 29 controls) took part in this study. Mean age was 36, 51 % were males, and 40 % of the patients were presently hospitalized due to IBD exacerbation. Audiometric examination revealed that any hearing loss (mild to severe) was found in 29 (38 %) of the IBD population, compared to 4 (14 %) of the control group ( $p = 0.02$ ). Extraintestinal manifestation (EIM) was present in 33/76 (43 %) of IBD patients. Any hearing loss and moderate to severe hearing loss were found in 17/33 (52 %) and 7/33 (21 %) in the EIM-positive group compared to 12/43 (28 %) and 4/43 (9 %) in the EIM-negative group ( $p = 0.036$  and  $p = 0.14$ , respectively). Out of patients over the age of 40 with other EIMs, all 11/11 (100 %) of patients had any hearing loss compared to 8/12 (66 %) of patients over the age of 40 without other EIMs,  $p = 0.035$ .

**CONCLUSIONS:**

Hearing loss may be another EIM of IBD. It is found in 38 % of IBD patients and in up to 52 % of patients with other EIMs and increases over the age of 40. Early hearing evaluation should be recommended to these high-risk IBD patients.

**KEYWORDS:**

Audiometric examination; Extraintestinal manifestations; Hearing loss; Inflammatory bowel disease

PMID: 27048450

**Celiac disease**

J Clin Gastroenterol. 2016 May-Jun;50(5):393-7. doi: 10.1097/MCG.0000000000000433.

**Quality of Life in Screen-detected Celiac Disease Patients in the United States.**

Mahadev S<sup>1</sup>, Gardner R, Lewis SK, Lebwohl B, Green PH.

**BACKGROUND AND AIMS:**

Celiac disease (CD) is increasingly diagnosed through screening of at-risk groups (relatives of individuals and associated autoimmune disorders). The impact of diagnosis and treatment on screen-detected CD patients is poorly studied, particularly in the United States. We therefore compared the quality of life (QOL) between screen-detected and symptom-detected CD patients.

**METHODS:**

Patients with a known diagnosis of CD were invited to complete 3 validated survey instruments: the CD Quality of Life (CDQOL), the CD Adherence Test for dietary adherence and the general Psychological General Well-Being index. In addition, demographic details, mode of presentation, and compliance with gluten-free diet (GFD) were assessed.

**RESULTS:**

The overall response rate was high at 69%. Of 226 responses received, 211 were eligible for inclusion; the median age was 47, and the median duration of GFD was 4 years. One third of the sample (71, 34%) was screen detected. Of these, 57 (80%) had a relative diagnosed with CD, whereas 14 (20%) had an associated condition. Despite being screen detected, 49 (69%) reported symptoms before diagnosis. GFD adherence was excellent and did not differ between groups. Overall, there were no significant differences between screen-detected and symptom-detected patients with regard to CDQOL, CD Adherence Test, and Psychological General Well-Being scores.

**CONCLUSIONS:**

Screen-detected and symptom-detected CD patients do not differ with regard to QOL or disease adherence as measured by validated disease-specific instruments. A high proportion of screen-detected patients reported symptoms before diagnosis, which often improve with GFD.

PMID: 26501877

### 13. CRANIUM/TMJ

#### Laser and ex therapy

Lasers Med Sci. 2016 Apr 16.

#### **Effects of oral motor exercises and laser therapy on chronic temporomandibular disorders: a randomized study with follow-up.**

Machado BC<sup>1,2</sup>, Mazzetto MO<sup>3</sup>, Da Silva MA<sup>2,3</sup>, de Felício CM<sup>4,5</sup>.

This study investigated the efficacy of combining low-level laser therapy (LLLT) with oral motor exercises (OM-exercises) for rehabilitation of patients with chronic temporomandibular disorders (TMDs).

Eighty-two patients with chronic TMD and 20 healthy subjects (control group) participated in the study. Patients were randomly assigned to treatment groups: GI (LLLT + OM exercises), GII (orofacial myofunctional therapy-OMT-which contains pain relief strategies and OM-exercises), and GIII (LLLT placebo + OM-exercises) and GIV (LLLT). LLLT (AsGaAl; 780-nm wavelength; average power of 60 mW, 40 s, and  $60 \pm 1.0 \text{ J/cm}^2$ ) was used to promote analgesia, while OM-exercises were used to reestablish the orofacial functions. Evaluations at baseline (T1), after treatment immediate (T2), and at follow-up (T3) were muscle and joint tenderness to palpation, TMD severity, and orofacial myofunctional status. There was a significant improvement in outcome measures in all treated groups with stability at follow-up (Friedman test,  $P < 0.05$ ), but GIV did not show difference in orofacial functions after LLLT ( $P > 0.05$ ). Intergroup comparisons showed that all treated groups had no difference in tenderness to palpation of temporal muscle compared to GC at follow-up (Kruskal-Wallis test,  $P < 0.01$ ). Moreover, GI, GII, and GIII showed no difference from GC in orofacial functional condition (T2 and T3) while they differed significantly from GIV ( $P < 0.01$ ).

In conclusion, LLLT combined with OM-exercises was more effective in promoting TMD rehabilitation than LLLT alone was. Similar treatment results were verified with the OMT protocol.

#### **KEYWORDS:**

Low-level laser therapy; Oral motor therapy; Orofacial functions; Rehabilitation; Temporomandibular disorders

PMID: 27085322

**Cranberry juice anti inflammatory**

Arch Oral Biol. 2016 Apr 20;68:88-96. doi: 10.1016/j.archoralbio.2016.04.005

**Effects of cranberry components on IL-1 $\beta$ -stimulated production of IL-6, IL-8 and VEGF by human TMJ synovial fibroblasts.**

Tipton DA<sup>1</sup>, Christian J<sup>2</sup>, Blumer A<sup>3</sup>.

**OBJECTIVE:**

Osteoarthritis (OA) in the TMJ is characterized by deterioration of articular cartilage and secondary inflammatory changes. Interleukin-1 $\beta$  (IL-1 $\beta$ ) stimulates IL-6, IL-8, and vascular endothelial growth factor (VEGF) in synovial fluid of TMJ with internal derangement and bony changes. The cranberry (*Vaccinium macrocarpon*) contains polyphenolic compounds that inhibit production of pro-inflammatory molecules by gingival cells in response to several stimulators. This study examined effects of cranberry components on IL-1 $\beta$ -stimulated IL-6, IL-8, and VEGF production by human TMJ synovial fibroblast-like cells.

**DESIGN:**

Cranberry high molecular weight non-dialyzable material (NDM) was derived from cranberry juice. Human TMJ synovial fibroblast-like cells from joints with degenerative OA and an ankylosed TMJ without degeneration were incubated with IL-1 $\beta$  (0.001-1nM) $\pm$ NDM (25-250 $\mu$ g/ml) (2h preincubation). Viability was assessed via activity of a mitochondrial enzyme. IL-6, IL-8, and VEGF in culture supernatants were measured by ELISA; NF- $\kappa$ B and AP-1 transcription factors were measured in nuclear extracts via binding to specific oligonucleotides.

**DATA ANALYSIS:**

ANOVA and Scheffe's F procedure for post hoc comparisons.

**RESULTS:**

NDM did not affect cell viability but inhibited IL-1 $\beta$  stimulated IL-6, IL-8, and VEGF production in all cell lines ( $p < 0.05$ ). NDM partially reduced nuclear levels of NF- $\kappa$ B and AP-1 ( $p < 0.04$ ), depending upon cell line and time of exposure to IL-1 $\beta$ +NDM.

**CONCLUSION:**

Cranberry NDM inhibition of IL-1 $\beta$ -stimulated IL-6, IL-8, and VEGF production by TMJ synovial fibroblast-like cells suggests that cranberry components may be useful as a host modulatory therapeutic agent to prevent or treat inflammatory arthropathies of the TMJ.

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**KEYWORDS:**

Cranberry; Cytokine; IL-1 $\beta$ ; Synovial fibroblast; TMJ

PMID: 27107382

**Malocclusion****A New Classification of Mandibular Asymmetry and Evaluation of Surgical-Orthodontic Treatment Outcomes in Class III Malocclusion**

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DOI: <http://dx.doi.org/10.1016/j.jcms.2016.03.011>

**Introduction**

Facial asymmetry is a common manifestation in patients with Class III malocclusion. The aims of this study were to classify mandibular asymmetry in Class III patients and to evaluate treatment outcomes according to different characteristics of asymmetry.

**Materials and methods**

Three dimensional cone-beam CT images of 38 patients were analyzed for menton deviation and discrepancies between bilateral structures of mandibular ramus and body. The patients were classified into 3 groups. Groups 1 and 2 exhibited a larger distance of ramus to midsagittal plane on menton-deviated side. In group 1, menton deviation was greater than ramus asymmetry and the condition was reversed for group 2. Group 3 had menton deviation contralateral to the side with larger transverse ramus distance. The features of asymmetry were delineated and the outcomes after surgical-orthodontic treatment were analyzed.

**Results**

Group 1 exhibited a roll rotation of mandibular structures. Mandibular deviation of group 2 patients was more of a horizontal shift nature rather than rotation. Group 3 patients displayed a yaw rotation of mandible to the side with lesser growth in body and ramus. After treatment, menton deviation and body asymmetry were significantly improved in all 3 groups, but the effect of therapy on ramus asymmetry was less predictable, especially for group 3.

**Conclusions**

The classification system is simple and clinically useful and could form a base for future studies on facial asymmetry.

**Keywords:**

Class III malocclusion, Mandibular asymmetry, Bilateral sagittal split osteotomy, Menton deviation, Ramus asymmetry



**14. HEADACHES****Brain metabolites****A ‘complex’ of brain metabolites distinguish altered chemistry in the cingulate cortex of episodic migraine patients**

L. Becerra, R. Veggeberga A. Prescott, 1, J.E. Jensen, P. Renshaw, J. S. Scrivani, E.L.H. Spiering, R. Bursteini, D. Borsooka,

doi:10.1016/j.nicl.2016.03.020

**Highlights**

- 3 T MRI was used to acquire 2D J-resolved proton magnetic resonance spectroscopy.
- Metabolite alterations are reported in the anterior cingulate cortex of episodic migraineurs.
- The complex of metabolites may reflect multiple chemical changes in migraineurs.
- The observed chemical changes support the theory that the brain of migraineurs is hyperexcitable.

**Abstract**

Despite the prevalence of migraine, the pathophysiology of the disease remains unclear. Current understanding of migraine has alluded to the possibility of a hyperexcitable brain. The aim of the current study is to investigate human brain metabolite differences in the anterior cingulate cortex (ACC) during the interictal phase in migraine patients. We hypothesized that there may be differences in levels of excitatory neurotransmitters and/or their derivatives in the migraine cohort in support of the theory of hyperexcitability in migraine. 2D J-resolved proton magnetic resonance spectroscopy (1H-MRS) data were acquired on a 3 Tesla (3 T) MRI from a voxel placed over the ACC of 32 migraine patients (MP; 23 females, 9 males, age  $33 \pm 9.6$  years) and 33 healthy controls (HC; 25 females, 8 males, age  $32 \pm 9.6$  years). Amplitude correlation matrices were constructed for each subject to evaluate metabolite discriminability. ProFit-estimated metabolite peak areas were normalized to a water reference signal to assess subject differences. The initial analysis of variance (ANOVA) was performed to test for group differences for all metabolites/creatine (Cre) ratios between healthy controls and migraineurs but showed no statistically significant differences. In addition, we used a multivariate approach to distinguish migraineurs from healthy subjects based on the metabolite/Cre ratio. A quadratic discriminant analysis (QDA) model was used to identify 3 metabolite ratios sufficient to minimize minimum classification error (MCE). The 3 selected metabolite ratios were aspartate (Asp)/Cre, N-acetyl aspartate (NAA)/Cre, and glutamine (Gln)/Cre.

These findings are in support of a ‘complex’ of metabolite alterations, which may underlie changes in neuronal chemistry in the migraine brain. Furthermore, the parallel changes in the three-metabolite ‘complex’ may confer more subtle but biological processes that are ongoing. The data also support the current theory that the migraine brain is hyperexcitable even in the interictal state.

**Keywords** Magnetic resonance spectroscopy (MRS); Excitatory neurotransmitters; Interictal migraine; Anterior cingulate cortex (ACC); 2D J-resolved; Central sensitization

**Cerebellar changes**

Cephalalgia. 2016 Apr 7. pii: 0333102416643527.

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

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

**OBJECTIVE:**

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

**METHODS:**

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

**RESULTS:**

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

**CONCLUSIONS:**

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

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**KEYWORDS:** *Migraine; cerebellum; hemiplegic migraine; infarcts; magnetic resonance imaging PMID: 27059879*

**Emotion impact on adolescents**

J Headache Pain. 2016 Dec;17(1):39. doi: 10.1186/s10194-016-0640-y. Epub 2016 Apr 19.

**Alexithymia and psychopathological symptoms in adolescent outpatients and mothers suffering from migraines: a case control study.**

Cerutti R<sup>1</sup>, Valastro C<sup>1</sup>, Tarantino S<sup>2</sup>, Valeriani M<sup>2</sup>, Faedda N<sup>3</sup>, Spensieri V<sup>1</sup>, Guidetti V<sup>4</sup>.

**BACKGROUND:**

Headache is a common disorder affecting a growing number of children and adolescents. In recent years, there has been an increase in scientific interest in exploring the relationship between migraine and emotional regulation, and in particular, the impact of emotional dysregulation on mental and physical health. The present study aims to explore the relationship between migraine and alexithymia among adolescents and their mothers as well as the impact of this association on mental health. An additional aim is to verify whether alexithymia may be a predictor of psychopathological symptoms in adolescents and mothers with migraines.

**METHODS:**

A total of 212 subjects were involved in this study. The sample was divided into (a) Experimental Group (EG) consisting of 106 subjects (53 adolescents and 53 mothers) with a diagnosis of migraine according to International Classification of Headache Disorders (ICHD-3) and (b) Control Group (CG) including 106 subjects (53 adolescents and 53 mothers) without a diagnosis of migraine. All participants completed the Toronto Alexithymia Scale to assess alexithymia and the Symptom Checklist-90-R to assess psychopathological symptoms.

**RESULTS:**

Higher rates of alexithymia were found in the adolescents and mothers of the EG in comparison to the adolescents and mothers of the CG. Furthermore, adolescents and mothers experiencing both migraine and alexithymia, demonstrated a higher risk of psychopathology.

**CONCLUSIONS:**

Findings from this study provide evidence that the co-occurrence of migraine and alexithymia increases the risk of psychopathology for both adolescents and their mothers.

**KEYWORDS:**

Adolescents; Alexithymia; Migraine; Mothers; Psychopathological risk

PMID: 27093870

**Trigeminal nerve in HA**

J Headache Pain. 2016 Dec;17(1):35. doi: 10.1186/s10194-016-0637-6. Epub 2016 Apr 16.

**Differences in central facilitation between episodic and chronic migraineurs in nociceptive-specific trigeminal pathways.**

Sohn JH<sup>1</sup>, Kim CH<sup>2</sup>, Choi HC<sup>2</sup>.

**BACKGROUND:**

The trigeminal nociceptive system plays a pivotal role in the pathophysiology of migraines. The present study investigated whether there are differences between patients with episodic migraine (EM) and patients with chronic migraine (CM) in trigeminal pain processing at the brainstem and cortical levels using the nociceptive blink reflex (nBR) and pain-related evoked potentials (PREP).

**METHODS:**

This study assessed 68 female migraineurs (38 EM patients and 30 CM patients) and 40 age-matched controls using simultaneous recordings of nBR and PREP during the interictal period.

**RESULTS:**

In terms of the nBR, EM patients displayed significantly decreased latencies and larger amplitudes and area-under-the-curve (AUC) values for the R2 component, whereas CM patients showed significantly prolonged latencies and smaller amplitudes and AUC values for the R2 component ( $p < 0.05$ ). In terms of PREP, both the EM and CM patients had decreased latencies (N1, P1), with larger amplitude compared with the controls ( $p < 0.05$ ), which indicates facilitation at the cortical level. Additionally, the amplitude and AUC values of the R2 component exhibited a negative correlation, whereas the latency of the R2 component for the nBR showed a positive correlation, with the frequency of headaches in migraineurs ( $p < 0.01$ ).

**CONCLUSIONS:**

In the present study, the facilitation in the trigeminal nociceptive pathway of the EM group suggests the occurrence of migraine-specific hyperexcitability. Additionally, the suppression of R2 at the brainstem level in the CM group may relate to impaired or dysfunctional descending pain modulation. These findings suggest that there are adaptive or maladaptive responses due to the chronification of migraine attacks.

**KEYWORDS:**

Chronic migraine; Episodic migraine; Nociceptive blink reflex; Pain-related evoked potential; Trigeminal pathway

PMID: 27084694

**Progressive relaxation and HA relief**

J Headache Pain. 2016 Dec;17(1):37. doi: 10.1186/s10194-016-0630-0. Epub 2016 Apr 18.

**Progressive muscle relaxation reduces migraine frequency and normalizes amplitudes of contingent negative variation (CNV).**

Meyer B<sup>1</sup>, Keller A<sup>2</sup>, Wöhlbier HG<sup>2</sup>, Overath CH<sup>3</sup>, Müller B<sup>2</sup>, Kropp P<sup>2</sup>.

**BACKGROUND:**

Central information processing, visible in evoked potentials like the contingent negative variation (CNV) is altered in migraine patients who exhibit higher CNV amplitudes and a reduced habituation. Both characteristics were shown to be normalized under different prophylactic migraine treatment options whereas Progressive Muscle Relaxation (PMR) has not yet been examined. We investigated the effect of PMR on clinical course and CNV in migraineurs in a quasi-randomized, controlled trial.

**METHODS:**

Thirty-five migraine patients and 46 healthy controls were examined. Sixteen migraineurs and 21 healthy participants conducted a 6-week PMR-training with CNV-measures before and after as well as three months after PMR-training completion. The remaining participants served as controls. The clinical course was analyzed with two-way analyses of variance (ANOVA) with repeated measures. Pre-treatment CNV differences between migraine patients and healthy controls were examined with t-tests for independent measures. The course of the CNV-parameters was examined with three-way ANOVAs with repeated measures.

**RESULTS:**

After PMR-training, migraine patients showed a significant reduction of migraine frequency. Preliminary to the PMR-training, migraine patients exhibited higher amplitudes in the early component of the CNV (iCNV) and the overall CNV (oCNV) than healthy controls, but no differences regarding habituation. After completion of the PMR-training, migraineurs showed a normalization of the iCNV amplitude, but neither of the oCNV nor of the habituation coefficient.

**CONCLUSIONS:**

The results confirm clinical efficacy of PMR for migraine prophylaxis. The pre-treatment measure confirms altered cortical information processing in migraine patients. Regarding the changes in the iCNV after PMR-training, central nervous mechanisms of the PMR-effect are supposed which may be mediated by the serotonin metabolism.

**KEYWORDS:**

Contingent negative variation; Cortical preactivation; Migraine; Migraine prophylaxis; Progressive muscle relaxation

PMID: 27090417

**Frontoparietal modulation**

Cephalalgia. 2016 Apr 5. pii: 0333102416641665.

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

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

**AIMS:**

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

**METHODS:**

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

**RESULTS:**

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

**CONCLUSION:**

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

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**KEYWORDS:**

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

PMID: 27053062

**Brain activity in Migraines**

J Headache Pain. 2016 Dec;17(1):38. doi: 10.1186/s10194-016-0636-7. Epub 2016 Apr 18.

**Multi-frequency analysis of brain connectivity networks in migraineurs: a magnetoencephalography study.**

Wu D<sup>1</sup>, Zhou Y<sup>1</sup>, Xiang J<sup>2</sup>, Tang L<sup>1</sup>, Liu H<sup>1</sup>, Huang S<sup>1</sup>, Wu T<sup>3</sup>, Chen Q<sup>3</sup>, Wang X<sup>4</sup>.

**BACKGROUND:**

Although alterations in resting-state neural network have been previously reported in migraine using functional MRI, whether this atypical neural network is frequency dependent remains unknown. The aim of this study was to investigate the alterations of the functional connectivity of neural network and their frequency specificity in migraineurs as compared with healthy controls by using magnetoencephalography (MEG) and concepts from graph theory.

**METHODS:**

Twenty-three episodic migraine patients with and without aura, during the interictal period, and 23 age- and gender-matched healthy controls at resting state with eye-closed were studied with MEG. Functional connectivity of neural network from low (0.1-1 Hz) to high (80-250 Hz) frequency ranges was analyzed with topographic patterns and quantified with graph theory.

**RESULTS:**

The topographic patterns of neural network showed that the migraineurs had significantly increased functional connectivity in the slow wave (0.1-1 Hz) band in the frontal area as compared with controls. Compared with the migraineurs without aura (MwoA), the migraineurs with aura (MwA) had significantly increased functional connectivity in the theta (4-8 Hz) band in the occipital area. Graph theory analysis revealed that the migraineurs had significantly increased connection strength in the slow wave (0.1-1 Hz) band, increased path length in the theta (4-8 Hz) and ripple (80-250 Hz) bands, and increased clustering coefficient in the slow wave (0.1-1 Hz) and theta (4-8 Hz) bands. The clinical characteristics had no significant correlation with interictal MEG parameters.

**CONCLUSIONS:**

Results indicate that functional connectivity of neural network in migraine is significantly impaired in both low- and high-frequency ranges. The alteration of neural network may imply that migraine is associated with functional brain reorganization.

**KEYWORDS:**

Functional connectivity; Graph theory; Magnetoencephalography (MEG); Migraine; Multi-frequency; Neural network

PMID: 27090418

### 16. CONCUSSIONS

#### IMPACT TEST

Sports Med. 2016 Apr 12.

#### Validity of the Immediate Post Concussion Assessment and Cognitive Testing (ImPACT).

Alsalaheen B<sup>1</sup>, Stockdale K<sup>2</sup>, Pechumer D<sup>2</sup>, Broglio SP<sup>3</sup>.

#### BACKGROUND:

The immediate post concussion assessment and cognitive testing (ImPACT) is the most widely used concussion assessment tool. Despite its popularity, it is unclear if validation studies for the ImPACT test covered all aspects of validity to support its widespread use in research and clinical practice.

#### OBJECTIVE:

The purpose of this report is to review literature surrounding the validity and the utility of the ImPACT test.

#### DATA SOURCES AND APPRAISAL:

A systematic review of relevant studies in PubMed, CINAHL, and PsycINFO was carried out. Studies were evaluated using the STROBE (strengthening the reporting of observational studies in epidemiology) or the STARD (standards for reporting of diagnostic accuracy) criteria.

#### RESULTS:

The literature search yielded 5968 studies. Sixty-nine studies met the inclusion criteria and were included in the qualitative review. Although the convergent validity of ImPACT was supported, evidence of discriminant and predictive validity, diagnostic accuracy and responsiveness was inconclusive. The utility of the ImPACT test after acute symptom resolution was sparse. The review found many factors influenced the validity and utility of ImPACT scores.

#### CONCLUSION:

Clinicians must consider the benefit of ImPACT testing for their patients on a case-by-case scenario and must take the psychometric properties of the test into account when interpreting results.

PMID: 27071989



**19. GLENOHUMERAL/SHOULDER****Recovery**

Am J Sports Med. 2016 Apr;44(4):972-80. doi: 10.1177/0363546515625043. Epub 2016 Feb 5.

**Recovery of Muscle Strength After Intact Arthroscopic Rotator Cuff Repair According to Preoperative Rotator Cuff Tear Size.**

Shin SJ<sup>1</sup>, Chung J<sup>2</sup>, Lee J<sup>2</sup>, Ko YW<sup>2</sup>.

**BACKGROUND:**

The recovery of muscle strength after arthroscopic rotator cuff repair based on the preoperative tear size has not yet been well described.

**PURPOSE/HYPOTHESIS:**

The purpose of this study was to evaluate the recovery period of muscle strength by a serial assessment of isometric strength after arthroscopic rotator cuff repair based on the preoperative tear size. The hypothesis was that muscle strength in patients with small and medium tears would recover faster than that in those with large-to-massive tears.

**STUDY DESIGN:**

Cohort study; Level of evidence, 3.

**METHODS:**

A total of 164 patients who underwent arthroscopic rotator cuff repair were included. Isometric strength in forward flexion (FF), internal rotation (IR), and external rotation (ER) was evaluated preoperatively and at 6, 12, 18, and 24 months after surgery. Preoperative magnetic resonance imaging scans were assessed to evaluate the quality of the rotator cuff muscle, including fatty infiltration, occupation ratio, and tangent sign. Patient satisfaction as well as visual analog scale (VAS) for pain, American Shoulder and Elbow Surgeons (ASES), and Constant scores were assessed at every follow-up.

**RESULTS:**

Muscle strength demonstrated the slowest recovery in pain relief and the restoration of shoulder function. To reach the strength of the uninjured contralateral shoulder in all 3 planes of motion, recovery took 6 months in patients with small tears and 18 months in patients with medium tears. Patients with large-to-massive tears showed continuous improvement in strength up to 18 months; however, they did not reach the strength of the contralateral shoulder at final follow-up. At final follow-up, mean strength in FF, IR, and ER was 113.0%, 118.0%, and 112.6% of the contralateral shoulder in patients with small tears, respectively; 105.0%, 112.1%, and 102.6% in patients with medium tears, respectively; and 87.6%, 89.5%, and 85.2% in patients with large-to-massive tears, respectively. Muscle strength in any direction did not significantly correlate with postoperative patient satisfaction ( $P = .374, .515, \text{ and } .692$  for FF, IR, and ER, respectively), whereas it highly correlated with preoperative quality of the muscle.

**CONCLUSION:**

The recovery of muscle strength after arthroscopic repair was poorly correlated with patient satisfaction. This study recommends that regardless of pain relief and improved shoulder function, patients with larger than medium tears should be encouraged to continue with rehabilitation for the maximal restoration of muscle strength beyond 1 year postoperatively.

**KEYWORDS:** muscle strength; recovery; rehabilitation; rotator cuff PMID: 26851272

**22 A. IMPINGMENT****Surgical and conservative care**

Knee Surg Sports Traumatol Arthrosc. 2016 Apr 4.

**Implementation of conservative treatment prior to arthroscopic subacromial decompression of the shoulder.**

Dørum IH<sup>1</sup>, Heir S<sup>2</sup>, Solheim E<sup>3,4</sup>, Magnussen LH<sup>5,6</sup>.

**PURPOSE:**

The aim of the study was to investigate to what extent patients undergo evidence-based conservative treatment prior to arthroscopic subacromial decompression of the shoulder.

**METHODS:**

One hundred and twenty patients (65 women, 55 men, median age 53.5 years (range 28-70), referred to arthroscopic subacromial decompression at two hospitals in Norway, were consecutively included in the study. The patients completed a self-administered questionnaire including questions concerning the quantity and nature of preoperative treatment as well as the QuickDASH score. They were specifically asked for the extent of evidence-based conservative treatment, i.e. the combination of strengthening and stretching exercises at a minimum weekly amount and total duration.

**RESULTS:**

One hundred and nine patients (91 %) reported having received conservative treatment guided by a physiotherapist preoperatively. The patients' main reasons for not seeing a physiotherapist were lack of trust in the treatment (N = 7) and the assumption that surgery would provide faster relief of symptoms (N = 6). Of those visiting a physiotherapist, 80 % received specific shoulder exercises. Forty-five per cent did both strengthening and stretching exercises, only 32 % did the exercises three times per week more than 2 months, and 24 % did more than 3 months as recommended. Seventy-six per cent of the patients who discontinued the prescribed exercise programme did this due to increasing pain.

**CONCLUSIONS:**

Most of the patients in the current study reported having visited a physiotherapist before surgery. However, less than half of them underwent evidence-based exercise treatment, and increased pain was the main reason for not completing the prescribed exercise treatment. The results might be of clinical relevance for physiotherapists treating patients with SAPS, but also for orthopaedic surgeons doing preoperative evaluations.

**LEVEL OF EVIDENCE:**

Case series, IV.

**KEYWORDS:** Acromioplasty; Exercise therapy; Physiotherapy; Shoulder arthroscopy; Subacromial decompression; Subacromial pain syndrome **PMID: 27043344**

**24. ELBOW****Lateral epicondylitis and neuromuscular control**

Sports Med. 2016 Apr 22.

**Forearm Muscle Activity in Lateral Epicondylalgia: A Systematic Review with Quantitative Analysis.**

Heales LJ<sup>1,2</sup>, Bergin MJ<sup>1</sup>, Vicenzino B<sup>1</sup>, Hodges PW<sup>3</sup>.

**BACKGROUND:**

Lateral epicondylalgia (LE) refers to pain at the lateral elbow and is associated with sensory and motor impairments that may impact on neuromuscular control and coordination.

**OBJECTIVE:**

This review aimed to systematically identify and analyse the literature related to the comparison of neuromuscular control of forearm muscles between individuals with and without LE.

**METHODS:**

A comprehensive search of electronic databases and reference lists using keywords relating to neuromuscular control and LE was undertaken. Studies that investigated electromyography (EMG) measures of forearm muscles in individuals with symptoms of LE were included if the study involved comparison with pain-free controls. The Epidemiological Appraisal Instrument was used to assess study quality. Data extracted from each study were used to calculate the standardised mean difference and 95 % confidence intervals to investigate differences between groups.

**RESULTS:**

The search revealed a total of 1920 studies, of which seven were included from 44 that underwent detailed review. Due to differences in outcome measures and tasks assessed, meta-analysis was not possible. The seven included studies used 60 different EMG outcomes, of which 16 (27 %) revealed significant differences between groups. Two were properties of motor unit potentials during wrist extension. Four were measures of increased time between recruitment of wrist extensor muscles and onset of grip force. Seven were measures of amplitude of EMG during tennis strokes. Three were measures of motor cortex organisation.

**CONCLUSION:**

Features of neuromuscular control differ between individuals with LE and pain-free controls. This implies potential central nervous system involvement and indicates that rehabilitation may be enhanced by consideration of neuromuscular control in addition to other treatments.

PMID: 27106557

**Valgus instability**

Am J Sports Med. 2016 Apr;44(4):989-94. doi: 10.1177/0363546515624916. Epub 2016 Feb 1.

**Alteration of Stress Distribution Patterns in Symptomatic Valgus Instability of the Elbow in Baseball Players: A Computed Tomography Osteoabsorptiometry Study.**

Funakoshi T<sup>1</sup>, Furushima K<sup>2</sup>, Momma D<sup>3</sup>, Endo K<sup>3</sup>, Abe Y<sup>3</sup>, Itoh Y<sup>2</sup>, Fujisaki K<sup>4</sup>, Tadano S<sup>5</sup>, Iwasaki N<sup>3</sup>.

**BACKGROUND:**

Repetitive valgus stress applied during a throwing motion can lead to various elbow disturbances, including ulnar collateral ligament (UCL) injury. Subchondral bone density reportedly reflects the cumulative force on a joint surface under actual loading conditions.

**PURPOSE:**

(1) To evaluate the distribution of subchondral bone density across the elbow joint in asymptomatic baseball pitchers and symptomatic valgus instability pitchers and (2) to clarify the alterations in stress distribution pattern associated with symptomatic UCL insufficiency pitching activities.

**STUDY DESIGN:**

Controlled laboratory study.

**METHODS:**

Computed tomography (CT) imaging data were collected from the dominant-side elbow of 7 nonathletic volunteers (controls), 12 asymptomatic pitchers (asymptomatic group), and 12 symptomatic valgus instability pitchers with UCL insufficiency (symptomatic group). Bone mineral density across the elbow joint was measured with CT osteoabsorptiometry. A 2-dimensional mapping model was divided into 4 areas of the distal end of the humerus and 5 areas of the ulna with the radial head. The locations and percentages of high-density areas on the articular surface were quantitatively analyzed.

**RESULTS:**

High-density areas in the asymptomatic and symptomatic groups were found in the anterolateral and posteromedial parts of the humerus and in the radial head, posteromedial to the ulna. The high-density areas in the anterior and posteromedial of the humerus, the radial head, and the posteromedial part of the ulna in the controls were smaller than those in the baseball group. In the symptomatic group, the percentages of high-density areas in the anterolateral part of the humerus (mean, 36.3%; 95% CI, 31.9%-40.7%) and the anterolateral part of the ulna (mean, 31.7%; 95% CI, 24.3%-39.1) were significantly greater than those in the asymptomatic group ( $P = .047$  and  $P < .0001$ , respectively).

**CONCLUSION:**

Symptomatic UCL insufficiency was associated with characteristic high-stress distribution patterns on the anterolateral part of the capitellum and the anterolateral part of the ulna. The current results indicate that symptomatic UCL insufficiency produces excessive and cumulative stress in the elbow joint.

**CLINICAL RELEVANCE:**

The information obtained from the CT images can be useful for early detection of overuse conditions of the elbow joint.

**KEYWORDS:** T osteoabsorptiometry; elbow; stress distribution; ulnar collateral ligament  
PMID: 2683163

### 30 A. IMPINGEMENT

#### Management options

#### Management options for femoroacetabular impingement: A systematic review of symptom and structural outcomes

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Osteoarthritis and Cartilage , 04/22/2016

Fairley J, et al.

The aim of this systematic review was to examine the evidence for surgical and non-surgical treatment of femoroacetabular impingement (FAI) on symptom and structural outcomes. This review highlights the lack of evidence for use of surgery in FAI. Given that hip geometry may be modified by non-surgical factors, clarifying the role of non-surgical approaches versus surgery for the management of FAI is warranted.

## Arthroscopic rx

Am J Sports Med. 2016 Apr;44(4):1017-23. doi: 10.1177/0363546515624682. Epub 2016 Feb 1.

**Outcomes After Arthroscopic Treatment of Femoroacetabular Impingement for Patients With Borderline Hip Dysplasia.**

Nawabi DH<sup>1</sup>, Degen RM<sup>2</sup>, Fields KG<sup>1</sup>, McLawhorn A<sup>1</sup>, Ranawat AS<sup>1</sup>, Sink EL<sup>1</sup>, Kelly BT<sup>1</sup>.

**BACKGROUND:**

The outcomes of hip arthroscopy in the treatment of dysplasia are variable. Historically, arthroscopic treatment of severe dysplasia (lateral center-edge angle [LCEA] <18°) resulted in poor outcomes and iatrogenic instability. However, in milder forms of dysplasia, favorable outcomes have been reported.

**PURPOSE:**

To compare outcomes after hip arthroscopy for femoroacetabular impingement (FAI) in borderline dysplastic (BD) patients compared with a control group of nondysplastic patients.

**STUDY DESIGN:**

Cohort study; Level of evidence, 3 METHODS: Between March 2009 and July 2012, a BD group (LCEA, 18°-25°) of 46 patients (55 hips) was identified. An age- and sex-matched control group of 131 patients (152 hips) was also identified (LCEA, 25°-40°). Patient-reported outcome scores, including the modified Harris Hip Score (mHHS), the Hip Outcome Score-Activities of Daily Living (HOS-ADL) and Sport-Specific Subscale (HOS-SSS), and the International Hip Outcome Tool (iHOT-33), were collected preoperatively and at 1 and 2 years postoperatively.

**RESULTS:**

The mean LCEA was 22.4° ± 2.0° (range, 18.4°-24.9°) in the BD group and 31.0° ± 3.1° (range, 25.4°-38.7°) in the control group (P < .001). The mean preoperative alpha angle was 66.3° ± 9.9° in the BD group and 61.7° ± 13.0° in the control group (P = .151). Cam decompression was performed in 98.2% and 99.3% of cases in the BD and control groups, respectively; labral repair was performed in 69.1% and 75.3% of the BD and control groups, respectively, with 100% of patients having a complete capsular closure performed in both groups. At a mean follow-up of 31.3 ± 7.6 months (range, 23.1-67.3 months) in unrevised patients and 21.6 ± 13.3 months (range, 4.7-40.6 months) in revised patients, there was significant improvement (P < .001) in all patient-reported outcome scores in both groups. Multiple regression analysis did not identify any significant differences between groups. Importantly, female sex did not appear to be a predictor for inferior outcomes. Two patients (4.3%) in the BD group and 6 patients (4.6%) in the control group required revision arthroscopy during the study period.

**CONCLUSION:**

Favorable outcomes can be expected after the treatment of impingement in patients with borderline dysplasia when labral refixation and capsular closure are performed, with comparable outcomes to nondysplastic patients. Further follow-up in larger cohorts is necessary to prove the durability and safety of hip arthroscopy in this challenging group and to further explore potential sex-related differences in outcome.

**KEYWORDS:** dysplasia; femoroacetabular impingement; hip arthroscopy; outcomes  
PMID: 2683163

**Hockey players and CAM**

Am J Sports Med. 2016 Apr;44(4):1024-30. doi: 10.1177/0363546515624671. Epub 2016 Jan 28.

**Prevalence of Cam-Type Morphology in Elite Ice Hockey Players.**

Lerebours F<sup>1</sup>, Robertson W<sup>2</sup>, Neri B<sup>3</sup>, Schulz B<sup>4</sup>, Youm T<sup>5</sup>, Limpisvasti O<sup>6</sup>.

**BACKGROUND:**

Femoroacetabular impingement (FAI) has been increasingly recognized as a cause of hip pain in athletes at all levels of competition, specifically ice hockey players.

**PURPOSE/HYPOTHESIS:**

The purpose of this study was to define the prevalence of cam and pincer radiographic deformity in elite ice hockey players. The hypothesis was that elite hockey players will have a higher prevalence of radiographic hip abnormalities compared with the general population.

**STUDY DESIGN:**

Cross-sectional study; Level of evidence, 3.

**METHODS:**

Anteroposterior and frog-leg lateral radiographs on 137 elite ice hockey players were prospectively obtained during the 2014-2015 preseason entrance examinations. Study participants included National Hockey League roster players as well as the respective farm team members. Demographic data were collected, including age, position, shooting side, and any history of hip pain or hip surgery. Patients with a history of hip surgery were excluded from the analysis. A single sports medicine fellowship-trained orthopaedic surgeon used standard radiographic measurements to assess for the radiographic presence of cam or pincer deformity. Radiographs with an alpha angle  $\geq 55^\circ$  on a frog-leg lateral view were defined as cam-positive. Each participant underwent a preseason physical examination with an assessment of hip range of motion and impingement testing.

**RESULTS:**

A total of 130 elite ice hockey players were included in the analysis; 180 (69.4%) hips met radiographic criteria for cam-type deformity. The prevalence in right and left hips was 89 (69.5%) and 91 (70.0%), respectively; 70 (60.8%) players demonstrated bilateral involvement. Hips with cam deformity had a mean alpha angle of  $67.7^\circ \pm 8.3^\circ$  on the right and  $68.9^\circ \pm 9.0^\circ$  on the left. Of the patients with alpha angles  $\geq 55^\circ$ , 5.6% (5/89) had a positive anterior impingement test of the right hip, while 11% (10/91) had positive anterior impingement test of the left. Players with radiologic cam deformity had a statistically significant deficit in external rotation of the right hip, as well as in both internal and external rotation of the left hip, compared with those with normal alpha angles. When assessing for crossover sign, 64 of 107 (59.8%) had a positive radiographic finding. Forty-one players (38.3%) had evidence of a crossover sign of the right hip and 42 (39.3%) of the left. When comparing position players, goalies had the highest prevalence of cam-type deformity (93.8%) and the least acetabular coverage.

**CONCLUSION:**

The study data suggest that elite ice hockey players have a significantly higher prevalence of radiographic cam deformity in comparison to what has been reported for the general population.

**KEYWORDS:** FAI; elite athletes; femoroacetabular impingement; ice hockey  
PMID: 26823452

**32 A. KNEE/ACL****Drop test not valid**

Am J Sports Med. 2016 Apr;44(4):874-83. doi: 10.1177/0363546515625048. Epub 2016 Feb 11.

**The Vertical Drop Jump Is a Poor Screening Test for ACL Injuries in Female Elite Soccer and Handball Players: A Prospective Cohort Study of 710 Athletes.**

Krosshaug T<sup>1</sup>, Steffen K<sup>2</sup>, Kristianslund E<sup>2</sup>, Nilstad A<sup>2</sup>, Mok KM<sup>2</sup>, Myklebust G<sup>2</sup>, Andersen TE<sup>2</sup>, Holme I<sup>2</sup>, Engebretsen L<sup>2</sup>, Bahr R<sup>2</sup>.

**BACKGROUND:**

The evidence linking knee kinematics and kinetics during a vertical drop jump (VDJ) to anterior cruciate ligament (ACL) injury risk is restricted to a single small sample. Still, the VDJ test continues to be advocated for clinical screening purposes.

**PURPOSE:**

To test whether 5 selected kinematic and kinetic variables were associated with future ACL injuries in a large cohort of Norwegian female elite soccer and handball players. Furthermore, we wanted to assess whether the VDJ test can be recommended as a screening test to identify players with increased risk.

**STUDY DESIGN:** Cohort study; Level of evidence, 2.

**METHODS:**

Elite female soccer and handball players participated in preseason screening tests from 2007 through 2014. The tests included marker-based 3-dimensional motion analysis of a drop-jump landing. We followed a predefined statistical protocol in which we included the following candidate risk factors in 5 separate logistic regression analyses, with new ACL injury as the outcome: (1) knee valgus angle at initial contact, (2) peak knee abduction moment, (3) peak knee flexion angle, (4) peak vertical ground-reaction force, and (5) medial knee displacement.

**RESULTS:**

A total of 782 players were tested (age, 21 ± 4 years; height, 170 ± 7 cm; body mass, 67 ± 8 kg), of which 710 were included in the analyses. We registered 42 new noncontact ACL injuries, including 12 in previously ACL-injured players. Previous ACL injury (relative risk, 3.8; 95% CI, 2.1-7.1) and medial knee displacement (odds ratio, 1.40; 95% CI, 1.12-1.74 per 1-SD change) were associated with increased risk for injury. However, among the 643 players without previous injury, we found no association with medial knee displacement. A receiver operating characteristic curve analysis of medial knee displacement showed an area under the curve of 0.6, indicating a poor-to-fair combined sensitivity and specificity of the test, even when including previously injured players.

**CONCLUSION:**

Of the 5 risk factors considered, medial knee displacement was the only factor associated with increased risk for ACL. However, receiver operating characteristic curve analysis indicated a poor combined sensitivity and specificity when medial knee displacement was used as a screening test for predicting ACL injury. For players with no previous injury, none of the VDJ variables were associated with increased injury risk.

**CLINICAL RELEVANCE:**

VDJ tests cannot predict ACL injuries in female elite soccer and handball players.

**KEYWORDS:** anterior cruciate ligament; biomechanics; female; football; handball; screening; soccer; vertical drop jump PMID: 2686793



### 33. MENISCUS

#### Asymptomatic meniscal damage

Sports Med. 2016 Apr 13.

#### **The Prevalence of Meniscal Pathology in Asymptomatic Athletes.**

Beals CT<sup>1,2</sup>, Magnussen RA<sup>1,2</sup>, Graham WC<sup>3</sup>, Flanigan DC<sup>4,5</sup>.

#### **BACKGROUND:**

Meniscal pathology is a commonly seen orthopedic condition that can affect a wide age range of patients. Athletes subject their menisci to an increased amount of stress during their careers and may increase their risk of meniscal pathology.

#### **OBJECTIVE:**

The purpose of this systematic review is to evaluate the prevalence of isolated meniscal pathology in asymptomatic athletes.

#### **METHODS:**

A systematic review was undertaken to determine the prevalence of meniscal pathology in asymptomatic athletes. A search of multiple databases was conducted. Recreational and higher-level athletes were included. Fourteen articles including 295 athletes (208 male, 87 female) were identified for inclusion (age range 14-66 years, mean 31.2 years). Meniscal pathology was visualized with magnetic resonance imaging and graded on a 1-4 scale (grades 1 and 2 indicating intrasubstance damage, grades 3 and 4 indicating a tear).

#### **RESULTS:**

There was an overall prevalence of 27.2 % (105/386) of knees with intrasubstance meniscal damage (grades 1 and 2), and 3.9 % (15/386) of knees with a tear (grades 3 and 4). When athletes were split into those who participate in pivoting sports versus non-pivoting sports, pivoting athletes showed an overall prevalence of 15.3 % (31/202) of knees with intrasubstance meniscal pathology and 2.5 % (5/202) of knees with a tear. Non-pivoting athletes showed a prevalence of 54.5 % (61/112) of knees with intrasubstance meniscal pathology and 5.4 % (6/112) of knees with a tear.

#### **CONCLUSION:**

The overall prevalence of isolated meniscal pathology in asymptomatic athletes was 31.1 % (27.2 % with intrasubstance meniscal damage and 3.9 % with a meniscal tear). More studies of age-comparable, non-athletic populations are necessary for direct comparison with these groups.

PMID: 2707532

**Meniscectomy and OA**

Knee Surg Sports Traumatol Arthrosc. 2016 Apr 16.

**The role of meniscal tissue in joint protection in early osteoarthritis.**

Verdonk R<sup>1</sup>, Madry H<sup>2</sup>, Shabshin N<sup>3,4</sup>, Dirisamer F<sup>5</sup>, Peretti GM<sup>6,7</sup>, Pujol N<sup>8</sup>, Spalding T<sup>9</sup>, Verdonk P<sup>10</sup>, Seil R<sup>11</sup>, Condello V<sup>12</sup>, Di Matteo B<sup>13</sup>, Zellner J<sup>14</sup>, Angele P<sup>15,16</sup>.

It is widely accepted that partial meniscectomy leads to early onset of osteoarthritis (OA).

A strong correlation exists between the amount and location of the resected meniscus and the development of degenerative changes in the knee. On the other hand, osteoarthritic changes of the joint alter the structural and functional integrity of meniscal tissue. These alterations might additionally compromise the limited healing capacity of the meniscus. In young, active patients without cartilage damage, meniscus therapy including partial meniscectomy, meniscus suture, and meniscus replacement has proven beneficial effects in long-term studies. Even in an early osteoarthritic milieu, there is a relevant regenerative potential of the meniscus and the surrounding cartilage.

This potential should be taken into account, and meniscal surgery can be performed with the correct timing and the proper indication even in the presence of early OA. Level of evidence IV.

**KEYWORDS:** Allograft; Early OA; Meniscal repair; Meniscus; Partial meniscectomy; Scaffold  
PMID: 27085362

**35. KNEE/TOTAL****Impact on gait****Knee Kinematic and Clinical Outcomes Evolution before, Three Months and One Year Following Total knee Arthroplasty**

Alice Bonnefoy-Mazure Stéphane Armand Yoshisama Sagawa Junior Domizio Suvà  
Hermes Miozzari Katia Turcot

DOI: <http://dx.doi.org/10.1016/j.arth.2016.03.050>

**Background**

The aim of this study was to describe the evolution of kinematic and clinical outcomes of a large patient cohort with knee osteoarthritis from before surgery (V1) to three months (V2) and one year (V3) after a total knee arthroplasty (TKA).

**Methods**

The patients were evaluated at each visit (118 patients at V1, 93 patients at V2 and 79 patients at V3) during a clinical gait analysis and were compared with a matched control group of healthy adults (CG). The kinematic parameters, the Western Ontario and MacMaster Osteoarthritis Index (WOMAC), quality of life and patient satisfaction were assessed. Gait velocity and knee range of motion (ROM) as well as clinical parameters were compared at each visit with CG was based on the unpaired-samples t-test. To determine changes in the data at baseline, three months and one year after surgery in the patient groups, repeated-measure ANOVA was conducted ( $p < 0.05$ ). Pearson correlation was used to examine relationships between clinical and biomechanical outcomes.

**Results**

One year after TKA compared to V1 and V2, the ROM of the operated knee during gait was significantly improved (V1:  $44.2 \pm 8.8^\circ$  vs. V3:  $47.5 \pm 7.1^\circ$ ,  $p < 0.001$  and V2:  $42.2 \pm 9.3^\circ$  vs. V3:  $47.5 \pm 7.1^\circ$ ,  $p = 0.001$ ), as was the gait velocity (V1 and V2:  $1.1 \pm 0.2$  m/s vs. V3:  $1.3 \pm 0.2$  m/s,  $p < 0.001$ ). WOMAC, SF-12 and knee pain were significantly better one year after TKA. No strong relationships have been found between clinical parameters and knee kinematics.

**Conclusion**

This study showed that one year after TKA, patients exhibited improved gait velocity and ROM and experienced a significant decrease in the level of pain and an increased clinical score (although different from CG).

**Keywords:**

osteoarthritis (OA), total knee arthroplasty (TKA), knee kinematic, gait, longitudinal study

**37. OSTEOARTHRITIS/KNEE****Gait changes**

BMC Musculoskelet Disord. 2016 Apr 12;17(1):157. doi: 10.1186/s12891-016-1013-z.

**Gender differences in gait kinematics for patients with knee osteoarthritis.**

Phinyomark A<sup>1</sup>, Osis ST<sup>1,2</sup>, Hettinga BA<sup>1,2</sup>, Kobsar D<sup>1</sup>, Ferber R<sup>3,4,5</sup>.

**BACKGROUND:**

Females have a two-fold risk of developing knee osteoarthritis (OA) as compared to their male counterparts and atypical walking gait biomechanics are also considered a factor in the aetiology of knee OA. However, few studies have investigated sex-related differences in walking mechanics for patients with knee OA and of those, conflicting results have been reported. Therefore, this study was designed to examine the differences in gait kinematics (1) between male and female subjects with and without knee OA and (2) between healthy gender-matched subjects as compared with their OA counterparts.

**METHODS:**

One hundred subjects with knee OA (45 males and 55 females) and 43 healthy subjects (18 males and 25 females) participated in this study. Three-dimensional kinematic data were collected during treadmill-walking and analysed using (1) a traditional approach based on discrete variables and (2) a machine learning approach based on principal component analysis (PCA) and support vector machine (SVM) using waveform data.

**RESULTS:**

OA and healthy females exhibited significantly greater knee abduction and hip adduction angles compared to their male counterparts. No significant differences were found in any discrete gait kinematic variable between OA and healthy subjects in either the male or female group. Using PCA and SVM approaches, classification accuracies of 98-100 % were found between gender groups as well as between OA groups.

**CONCLUSIONS:**

These results suggest that care should be taken to account for gender when investigating the biomechanical aetiology of knee OA and that gender-specific analysis and rehabilitation protocols should be developed.

**KEYWORDS:**

Biomechanics; Gait; Kinematics; Knee; Osteoarthritis; Principal component analysis; Sex differences; Support vector machine

PMID: 27072641

**44. RHUMATOID ARTHRITIS****Non-inflammatory pain**

Curr Rheumatol Rep. 2016 Jun;18(6):30. doi: 10.1007/s11926-016-0581-0.

**Non-inflammatory Causes of Pain in Patients with Rheumatoid Arthritis.**

Boyden SD<sup>1</sup>, Hossain IN<sup>1</sup>, Wohlfahrt A<sup>1</sup>, Lee YC<sup>2</sup>.

Although pain in rheumatoid arthritis (RA) is frequently thought to be inflammatory in nature, the association between measures of inflammation and pain intensity is low.

This observation is likely due to the multifactorial nature of pain. In addition to pain from joint inflammation, RA patients may also have pain due to structural damage or central etiologies, such as aberrancies in the central nervous system (CNS) pain regulatory pathways. These CNS pathways include mechanisms that facilitate pain, as well as mechanisms that inhibit pain. Other factors, such as sleep disturbances, depression, anxiety, and catastrophizing, may also impact the perception of pain in RA patients.

Since pain is frequently used as a proxy for inflammation in the assessment of RA disease activity, it is important that patients and physicians recognize that not all pain is inflammatory, and alternative management strategies, other than escalating disease-modifying antirheumatic drug treatment, may need to be considered.

**KEYWORDS:**

Central nervous system; Chronic pain; Fibromyalgia; Pain measurement; Pain threshold; Rheumatoid arthritis

PMID: 27097817

**45 A. MANUAL THERAPY LUMBAR & GENERAL****Muscular response to Manip.**

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

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

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

**OBJECTIVE:**

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

**METHODS:**

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

**RESULTS:**

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

**CONCLUSIONS:**

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

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**KEYWORDS:**

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

PMID: 27059250

**50 A. MOTOR CONTROL****Lateral epicondylitis and neuromuscular control**

Sports Med. 2016 Apr 22.

**Forearm Muscle Activity in Lateral Epicondylalgia: A Systematic Review with Quantitative Analysis.**

Heales LJ<sup>1,2</sup>, Bergin MJ<sup>1</sup>, Vicenzino B<sup>1</sup>, Hodges PW<sup>3</sup>.

Abstract

**BACKGROUND:**

Lateral epicondylalgia (LE) refers to pain at the lateral elbow and is associated with sensory and motor impairments that may impact on neuromuscular control and coordination.

**OBJECTIVE:**

This review aimed to systematically identify and analyse the literature related to the comparison of neuromuscular control of forearm muscles between individuals with and without LE.

**METHODS:**

A comprehensive search of electronic databases and reference lists using keywords relating to neuromuscular control and LE was undertaken. Studies that investigated electromyography (EMG) measures of forearm muscles in individuals with symptoms of LE were included if the study involved comparison with pain-free controls. The Epidemiological Appraisal Instrument was used to assess study quality. Data extracted from each study were used to calculate the standardised mean difference and 95 % confidence intervals to investigate differences between groups.

**RESULTS:**

The search revealed a total of 1920 studies, of which seven were included from 44 that underwent detailed review. Due to differences in outcome measures and tasks assessed, meta-analysis was not possible. The seven included studies used 60 different EMG outcomes, of which 16 (27 %) revealed significant differences between groups. Two were properties of motor unit potentials during wrist extension. Four were measures of increased time between recruitment of wrist extensor muscles and onset of grip force. Seven were measures of amplitude of EMG during tennis strokes. Three were measures of motor cortex organisation.

**CONCLUSION:**

Features of neuromuscular control differ between individuals with LE and pain-free controls. This implies potential central nervous system involvement and indicates that rehabilitation may be enhanced by consideration of neuromuscular control in addition to other treatments.

PMID: 27106557

**56. ATHLETICS****Early OA**

Knee Surg Sports Traumatol Arthrosc. 2016 Apr 4.

**Sport and early osteoarthritis: the role of sport in aetiology, progression and treatment of knee osteoarthritis.**

Vannini F<sup>1</sup>, Spalding T<sup>2</sup>, Andriolo L<sup>3</sup>, Berruto M<sup>4</sup>, Denti M<sup>5</sup>, Espregueira-Mendes J<sup>6,7,8,9,10</sup>, Menetrey J<sup>11</sup>, Peretti GM<sup>12,13</sup>, Seil R<sup>14</sup>, Filardo G<sup>3</sup>.

Sports activities are considered favourable for general health; nevertheless, a possible influence of sports practice on the development of early osteoarthritis (OA) is a cause for concern. A higher incidence of OA in knees and ankles of former high-impact sports players than in those of the normal population has been shown and it is still debatable whether the cause is either to be recognized generically in the higher number of injuries or in a joint overload.

The possibility to address knee OA in its early phases may be strictly connected to the modification of specific extrinsic or intrinsic factors, related to the patient in order to save the joint from further disease progression; these include sport practice, equipment and load. Non-surgical therapies such as continuative muscles reinforce and training play a strong role in the care of athletes with early OA, particularly if professional.

There is an overall agreement on the need of an early restoring of a proper meniscal, ligament and cartilage integrity in order to protect the knee and resume sports safely, whereas alignment is a point still strongly debatable especially for professional athletes. Remaining questions still to be answered are the risks of different sports in relation to one another, although an actual protective effect of low-impact sports, such as walking, swimming or cycling, has been recognized on the appearance or worsening of OA, the effect of continuing or ceasing to practice a sport on the natural history of early OA, and even following appropriate treatment is still unknown.

**KEYWORDS:**

Cartilage; Degeneration; Early osteoarthritis; Knee; Sport

PMID: 27043343



## Heat adaption

Sports Med. 2016 Apr 22.

**The Effects of Heat Adaptation on Physiology, Perception and Exercise Performance in the Heat: A Meta-Analysis.**

Tyler CJ<sup>1</sup>, Reeve T<sup>2</sup>, Hodges GJ<sup>3</sup>, Cheung SS<sup>3</sup>.

**BACKGROUND:** Exercise performance and capacity are impaired in hot, compared to temperate, conditions. Heat adaptation (HA) is one intervention commonly adopted to reduce this impairment because it may induce beneficial exercise performance and physiological and perceptual adaptations. A number of investigations have been conducted on HA but, due to large methodological differences, the effectiveness of different HA regimens remain unclear.

**OBJECTIVES:** (1) To quantify the effect of different HA regimens on exercise performance and the physiological and perceptual responses to subsequent heat exposure. (2) To offer practical HA recommendations and suggestions for future HA research based upon a systematic and quantitative synthesis of the literature. **DATA SOURCE:** PubMed was searched for original research articles published up to, and including, 16 February 2016 using appropriate first- and second-order search terms. **STUDY SELECTION:** English-language, peer-reviewed, full-text original articles using human participants were reviewed using the four-stage process identified in the PRISMA statement.

**DATA EXTRACTION:** Data for the following variables were obtained from the manuscripts by at least two of the authors: participant sex, maximal oxygen consumption and age; HA duration, frequency, modality, temperature and humidity; exercise performance and capacity; core and skin temperature; heart rate, stroke volume, cardiac output, skin blood flow, sweat onset temperature, body mass loss, sweat rate, perception of thirst, volitional fluid consumption, plasma volume changes; sweat concentrations of sodium, chloride and potassium; aldosterone, arginine vasopressin, heat shock proteins (Hsp), ratings of perceived exertion (RPE) and thermal sensation.

**DATA GROUPING:** Data were divided into three groups based upon the frequency of the HA regimen. Performance and capacity data were also divided into groups based upon the type of HA used.

**DATA ANALYSES:** Hedges' *g* effect sizes and 95 % confidence intervals were calculated. Correlations were run where appropriate.

**RESULTS:** Ninety-six articles were reviewed. The most common duration was 7-14 days and the most common method of HA was the controlled work-rate approach. HA had a moderately beneficial effect on exercise capacity and performance in the heat irrespective of regimen; however, longer regimens were more effective than shorter approaches. HA had a moderate-to-large beneficial effect on lowering core body temperature before and during exercise, maintaining cardiovascular stability, and improving heat-loss pathways. Data are limited but HA may reduce oxygen consumption during subsequent exercise, improve glycogen sparing, increase the power output at lactate threshold, reduce lactate concentrations during exercise, have a trivial effect on increasing extracellular concentrations of Hsp, and improve perceived ratings of exertion and thermal sensation.

**CONCLUSION:** HA regimens lasting <14 days induce many beneficial physiological and perceptual adaptations to high ambient temperatures, and improve subsequent exercise performance and capacity in the heat; however, the extent of the adaptations is greatest when HA regimens lasting longer than 14 days are adopted. Large methodological differences in the HA literature mean that there is still uncertainty regarding the magnitude and time course of potential adaptation for a number of physiological and perceptual variables.

**Vit E help post exercise damage**

J Hum Nutr Diet. 2016 Apr 8. doi: 10.1111/jhn.12361.

**Vitamin E supplementation inhibits muscle damage and inflammation after moderate exercise in hypoxia.**

Santos SA<sup>1</sup>, Silva ET<sup>1</sup>, Caris AV<sup>2</sup>, Lira FS<sup>3</sup>, Tufik S<sup>2</sup>, Dos Santos RV<sup>1,2</sup>.

**BACKGROUND:**

Exercise under hypoxic conditions represents an additional stress in relation to exercise in normoxia. Hypoxia induces oxidative stress and inflammation as mediated through tumour necrosis factor (TNF)- $\alpha$  release that might be exacerbated through exercise. In addition, vitamin E supplementation might attenuate oxidative stress and inflammation resulting from hypoxia during exercise. The present study aimed to evaluate the effects of vitamin E supplementation (250 mg) on inflammatory parameters and cellular damage after exercise under hypoxia simulating an altitude of 4200 m.

**METHODS:**

Nine volunteers performed three sessions of 60 min of exercise (70% maximal oxygen uptake) interspersed for 1 week under normoxia, hypoxia and hypoxia after vitamin E supplementation 1 h before exercise. Blood was collected before, immediately after and at 1 h after exercise to measure inflammatory parameters and cell damage.

**RESULTS:**

Percentage oxygen saturation of haemoglobin decreased after exercise and recovered 1 h later in the hypoxia + vitamin condition ( $P < 0.05$ ). Supplementation decreased creatine kinase (CK)-TOTAL, CK-MB and lactate dehydrogenase 1 h after exercise ( $P < 0.05$ ). The exercise in hypoxia increased interleukin (IL)-6, TNF- $\alpha$ , IL-1ra and IL-10 immediately after exercise ( $P < 0.05$ ). Supplementation reversed the changes observed after exercise in hypoxia without supplementation ( $P < 0.05$ ).

**CONCLUSIONS:**

We conclude that 250 mg of vitamin E supplementation at 1 h before exercise reduces cell damage markers after exercise in hypoxia and changes the concentration of cytokines, suggesting a possible protective effect against inflammation induced by hypoxia during exercise.

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**KEYWORDS:**

altitude; cellular damage; inflammation; physical exercise; supplementation; vitamin E

PMID: 27062041

**Compressive clothing**

Sports Med. 2016 Apr 22.

**Is There Evidence that Runners can Benefit from Wearing Compression Clothing?**

Engel FA<sup>1</sup>, Holmberg HC<sup>2</sup>, Sperlich B<sup>3</sup>.

**BACKGROUND:**

Runners at various levels of performance and specializing in different events (from 800 m to marathons) wear compression socks, sleeves, shorts, and/or tights in attempt to improve their performance and facilitate recovery. Recently, a number of publications reporting contradictory results with regard to the influence of compression garments in this context have appeared.

**OBJECTIVES:**

To assess original research on the effects of compression clothing (socks, calf sleeves, shorts, and tights) on running performance and recovery.

**METHOD:**

A computerized research of the electronic databases PubMed, MEDLINE, SPORTDiscus, and Web of Science was performed in September of 2015, and the relevant articles published in peer-reviewed journals were thus identified rated using the Physiotherapy Evidence Database (PEDro) Scale. Studies examining effects on physiological, psychological, and/or biomechanical parameters during or after running were included, and means and measures of variability for the outcome employed to calculate Hedges'g effect size and associated 95 % confidence intervals for comparison of experimental (compression) and control (non-compression) trials.

**RESULTS:**

Compression garments exerted no statistically significant mean effects on running performance (times for a (half) marathon, 15-km trail running, 5- and 10-km runs, and 400-m sprint), maximal and submaximal oxygen uptake, blood lactate concentrations, blood gas kinetics, cardiac parameters (including heart rate, cardiac output, cardiac index, and stroke volume), body and perceived temperature, or the performance of strength-related tasks after running. Small positive effect sizes were calculated for the time to exhaustion (in incremental or step tests), running economy (including biomechanical variables), clearance of blood lactate, perceived exertion, maximal voluntary isometric contraction and peak leg muscle power immediately after running, and markers of muscle damage and inflammation. The body core temperature was moderately affected by compression, while the effect size values for post-exercise leg soreness and the delay in onset of muscle fatigue indicated large positive effects.

**CONCLUSION:**

Our present findings suggest that by wearing compression clothing, runners may improve variables related to endurance performance (i.e., time to exhaustion) slightly, due to improvements in running economy, biomechanical variables, perception, and muscle temperature. They should also benefit from reduced muscle pain, damage, and inflammation.

PMID: 27106555

**59. PAIN****Multidisciplinary treatment of CP**

Musculoskeletal Care. 2016 Apr 21. doi: 10.1002/msc.1141.

**Long-Term Outcomes of Multidisciplinary Rehabilitation for Chronic Musculoskeletal Pain.**

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**OBJECTIVES:**

Evidence for the effectiveness of multidisciplinary rehabilitation for chronic musculoskeletal pain (CMP) has been reported but its outcomes in the longer term and in mixed groups of chronic pain patients are largely unknown. The aim of the present study was to describe the two-year outcomes of a 15-week multidisciplinary pain rehabilitation programme in patients with mixed CMP in terms of pain, activities, participation and healthcare usage.

**METHODS:**

Data were recorded routinely at admission, discharge, and at three, 12 and 24 months' follow-up for all consecutive patients with CMP referred to a rehabilitation programme over a 21-month period. The 15-week multidisciplinary rehabilitation programme consisted of cognitive behavioural therapy and exercise, as well as individual and group sessions with additional treatment modalities. Assessments included the Pain Disability Index (PDI), the Pain Catastrophizing Scale (PCS), the Multidimensional Pain Inventory (MPI) and numerical scales for pain and fatigue. Moreover, the RAND-36-Item Health Survey ('RAND-36') and questions on healthcare usage and work status were administered at admission, and at 12 and/or 24 months. Paired t-tests, Wilcoxon signed-rank tests, McNemar tests and mixed-model analyses were used to analyse changes over time.

**RESULTS:**

A total of 165 patients were included initially [mean age 44.1 (standard deviation 12.9) years], 143 of whom (87%) were women, with data from 125 (76%) and 120 (73%) patients being available at 12 and 24 months' follow-up, respectively. All outcomes showed statistically significant improvements between admission and discharge, and at three, 12 and 24 months' follow-up ( $p < 0.05$ ). At 24 months, the median number of different healthcare providers visited in the previous year had decreased significantly compared with that at admission [from a median of 4 (range 1-13) to a median of 2 (range 0-9)], and within the group of patients working at admission (50%), the proportion of those working 25 hours or more per week had increased significantly from 16% to 48%.

**CONCLUSIONS:**

Improvements in pain and functioning seen directly after a 15-week multidisciplinary treatment programme for patients with CMP were maintained, health care usage decreased and the number of working hours among working patients increased at 24 months' follow-up. Future studies are needed to examine if additional interventions after discharge can enhance further the favourable results.

**Pain and sleep and medication use**

Clin J Pain. 2015 Jul 24.

**Sleep Quality Among People Living with Chronic Non-cancer Pain: Findings from the Pain and Opioids IN Treatment (POINT) Cohort.**

Lintzeris N<sup>1</sup>, Moodley R, Campbell G, Larance B, Bruno R, Nielsen S, Degenhardt L.

***STUDY OBJECTIVES:***

To examine sleep disturbances in the POINT cohort study consisting of participants prescribed long-term opioids for chronic non-cancer pain (CNCP), and to examine the relationship between sleep and measures of pain, physical and mental health, substance use and medication use at the baseline interview.

***METHODS:***

A convenience sample of 1243 participants with current CNCP and prescription opioid use were recruited from community settings and underwent a structured interview examining subjective sleep symptoms (Medical Outcomes Study (MOS) Sleep Scale and the Sleep Problems Index (SLP-9)), pain severity and interference using the Brief Pain Inventory, mental and physical health symptoms, recent substance and medication use. Linear regression models assessed independent predictors of SLP-9 scores.

***RESULTS:***

Median hours of sleep per night was 6 (IQR 5-7.5) with 26% reporting optimal sleep (seven to eight hours), and a mean SLP-9 score of 47.3 (SD 20.9). On multivariate analysis, age, frequent/severe headaches, total BPI pain severity and pain interference scores, moderate to severe anxiety or depression, daily tobacco use and past week benzodiazepine use were significant predictors of SLP-9 scores and sleep quality. Higher MOS respiratory impairment was observed in males, those with high BMI, frequent/severe headaches, high pain interference scores and in patients taking anticonvulsants and antipsychotic medications. Opioid use was not associated with SLP-9 or respiratory sleep impairment.

***CONCLUSIONS:***

High levels of sleep problems were reported in this community sample of CNCP patients, and were associated with mental health problems and increased medication use. Non-medication approaches to addressing sleep problems should be prioritised in this population.

PMID: 26218004

**Mental defeat related to suicide in CPP**

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**Mental Defeat Is Associated With Suicide Intent in Patients With Chronic Pain.**

Tang NK<sup>1</sup>, Beckwith P, Ashworth P.

**OBJECTIVE:**

Mental defeat has been implicated in precipitating suicide with effects not explained by depression. It has also been found to be elevated in people who are most distressed and disabled by chronic pain. This study examined the role of mental defeat in predicting suicide intent among chronic pain patients and compared the predictive value of mental defeat with other established pain and psychological constructs.

**METHODS:**

Sixty-two chronic pain patients attended a semistructured interview to assess pain characteristics and suicidality (present and worst-ever) and completed self-report measures of anxiety, depression, hopelessness, self-efficacy, pain catastrophizing, and mental defeat.

**RESULTS:**

A total of 22.6% of people reported a history of suicide attempt (1 attempt=12.9%;  $\geq 2$  attempts=9.7%). The wish to die was reportedly moderate to strong for 63.3% of those who attempted suicide. No significant correlations were found for hopelessness and self-efficacy with suicide intent in this sample. Hierarchical regression analyses suggested that pain intensity was a significant predictor of worst-ever suicidal intent ( $R=0.11$ ), and mental defeat significantly improved the prediction even when the effect of pain intensity was accounted for ( $\Delta R=0.12$ ). Anxiety, depression, and pain catastrophizing were significant correlates of suicide intent, but they did not add to the prediction of worst-ever suicide intent after the effect of pain intensity was controlled for.

**DISCUSSION:**

Mental defeat may be a key indicator for heightened suicide risk. Therapeutic interventions targeting mental defeat offer a novel avenue for reducing suicide risk in chronic pain patients.

PMID: 26201013

**Virtual walking and neuropathic pain**

Am J Phys Med Rehabil. 2016 May;95(5):390-6. doi: 10.1097/PHM.0000000000000417.

**Effects of Virtual Walking Treatment on Spinal Cord Injury-Related Neuropathic Pain: Pilot Results and Trends Related to Location of Pain and at-level Neuronal Hypersensitivity.**

Jordan M<sup>1</sup>, Richardson EJ.

Previous studies have shown that virtual walking to treat spinal cord injury-related neuropathic pain (SCI-NP) can be beneficial, although the type of SCI-NP that may benefit the most is unclear.

This study's aims were to (1) determine the effect of location of SCI-NP on pain outcomes after virtual walking treatment and (2) examine the potential relationship between neuronal hyperexcitability, as measured by quantitative sensory testing, and pain reduction after virtual walking treatment. Participants were recruited from a larger ongoing trial examining the benefits of virtual walking in SCI-NP. Neuropathic pain was classified according to location of pain (at- or below-level). In addition, quantitative sensory testing was performed on a subset of individuals at a nonpainful area corresponding to the level of their injury before virtual walking treatment and was used to characterize treatment response. These pilot results suggest that when considered as a group, SCI-NP was responsive to treatment irrespective of the location of pain ( $F_{1, 44} = 4.82$ ,  $P = 0.03$ ), with a trend for the greatest reduction occurring in at-level SCI-NP ( $F_{1, 44} = 3.18$ ,  $P = 0.08$ ).

These pilot results also potentially implicate cold, innocuous cool, and pressure hypersensitivity at the level of injury in attenuating the benefits of virtual walking to below-level pain, suggesting certain SCI-NP sensory profiles may be less responsive to virtual walking.

PMID: 26544859

**Pain and sleep**

Pain. 2016 Apr;157(4):957-63. doi: 10.1097/j.pain.0000000000000466.

**Sleep problems and pain: a longitudinal cohort study in emerging adults.**

Bonvanie IJ<sup>1</sup>, Oldehinkel AJ, Rosmalen JG, Janssens KA.

Sleep and pain are thought to be bidirectional related on a daily basis in adolescents with chronic pain complaints. In addition, sleep problems have been shown to predict the long-term onset of musculoskeletal pain in middle-aged adults. Yet, the long-term effects of sleep problems on pain duration and different types of pain severity in emerging adults (age: 18-25) are unknown.

This study investigated the cross-sectional and longitudinal relationship between sleep problems and chronic pain, and musculoskeletal pain, headache, and abdominal pain severity in a general population of emerging adults. We studied whether these relationships were moderated by sex and whether symptoms of anxiety and depression, fatigue, or physical inactivity mediated these effects. Data of participants from the longitudinal Dutch TRacking Adolescents' Individual Lives Survey were used. Follow-up data were collected in 1753 participants who participated in the fourth (N = 1668, mean age: 19.0 years [SD = 0.6]) and/or fifth (N = 1501, mean age: 22.3 years [SD = 0.6]) assessment wave. Autoregressive cross-lagged models were used for analyses. Sleep problems were associated with chronic pain, musculoskeletal pain, headache and abdominal pain severity, and predicted chronic pain and an increase in musculoskeletal pain severity at 3 years of follow-up.

This prospective effect was stronger in females than in males and was mediated by fatigue but not by symptoms of anxiety and depression or physical inactivity. Only abdominal pain had a small long-term effect on sleep problems. Our results suggest that sleep problems may be an additional target for treatment in female emerging adults with musculoskeletal pain complaints.

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