

## ABSTRACTS

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## 2. LBP

### Cost effectiveness of LBP

Appl Health Econ Health Policy. 2016 Aug 22.

#### **Cost-Effectiveness of Non-Invasive and Non-Pharmacological Interventions for Low Back Pain: a Systematic Literature Review.**

Andronis L<sup>1</sup>, Kinghorn P<sup>2</sup>, Qiao S<sup>2</sup>, Whitehurst DG<sup>3,4,5</sup>, Durrell S<sup>6</sup>, McLeod H<sup>2</sup>.

#### **BACKGROUND:**

Low back pain (LBP) is a major health problem, having a substantial effect on peoples' quality of life and placing a significant economic burden on healthcare systems and, more broadly, societies. Many interventions to alleviate LBP are available but their cost effectiveness is unclear.

#### **OBJECTIVES:**

To identify, document and appraise studies reporting on the cost effectiveness of non-invasive and non-pharmacological treatment options for LBP.

#### **METHODS:**

Relevant studies were identified through systematic searches in bibliographic databases (EMBASE, MEDLINE, PsycINFO, Cochrane Library, CINAHL and the National Health Service Economic Evaluation Database), 'similar article' searches and reference list scanning. Study selection was carried out by three assessors, independently. Study quality was assessed using the Consensus on Health Economic Criteria checklist. Data were extracted using customized extraction forms.

#### **RESULTS:**

Thirty-three studies were identified. Study interventions were categorised as: (1) combined physical exercise and psychological therapy, (2) physical exercise therapy only, (3) information and education, and (4) manual therapy. Interventions assessed within each category varied in terms of their components and delivery. In general, combined physical and psychological treatments, information and education interventions, and manual therapies appeared to be cost effective when compared with the study-specific comparators. There is inconsistent evidence around the cost effectiveness of physical exercise programmes as a whole, with yoga, but not group exercise, being cost effective.

#### **CONCLUSIONS:**

The identified evidence suggests that combined physical and psychological treatments, medical yoga, information and education programmes, spinal manipulation and acupuncture are likely to be cost-effective options for LBP.

### New injectable helps

#### Low back pain sufferers experience relief with UK researcher's new treatment

University of Kentucky Research News, 08/31/2016

Millions of Americans suffering from low back pain could soon have a quick, cost-effective and permanent solution for the debilitating ailment.

The solution, an injectable liquid called Rejuve, was pioneered by University of Kentucky researcher Tom Hedman and has received promising early results from a recent clinical study. Rejuve, a product of Intralink–Spine Inc. and the focus of Hedman's research at UK, is an injectable orthopaedic device that mechanically strengthens the spinal disc and stabilizes the spinal joint. A key to Rejuve's effectiveness is the device's ability to promote crosslinking of fibrous proteins including collagen, which rejuvenates the spinal disk area. According to an Intralink–Spine news release, one patient reported that he played 18 holes of golf three days after the Rejuve procedure and another climbed the Sydney Harbor Bridge a few days post procedure. Hedman also said both the cost of Rejuve and the 15–20-minute image-guided delivery procedure are considerably less than current and emerging treatments. The company is hopeful that patients will experience permanent low back pain relief with just one or two Rejuve injections.

Currently, many low back pain sufferers receive numerous epidural steroid injections each year. "The excitement of seeing technology that you've tested and developed for over 18 years, at long last, reach the clinical stage of testing is indescribable," Hedman said. Hedman and the company are now planning a larger multisite clinical study.

**LBP and work environments**

J Manipulative Physiol Ther. 2016 Aug 25. pii: S0161-4754(16)30134-8. doi: 10.1016/j.jmpt.2016.07.004

**Low Back Pain Prevalence and Related Workplace Psychosocial Risk Factors: A Study Using Data From the 2010 National Health Interview Survey.**

Yang H<sup>1</sup>, Haldeman S<sup>2</sup>, Lu ML<sup>3</sup>, Baker D<sup>4</sup>.

**OBJECTIVES:**

The objectives of this study were to estimate prevalence of low back pain, to investigate associations between low back pain and a set of emerging workplace risk factors, and to identify worker groups with an increased vulnerability for low back pain in the United States.

**METHODS:**

The data used for this cross-sectional study came from the 2010 National Health Interview Survey, which was designed to collect data on health conditions and related risk factors from the US civilian population. The variance estimation method was used to compute weighted data for prevalence of low back pain. Multivariable logistic regression analyses stratified by sex and age were performed to determine the odds ratios (ORs) and the 95% confidence interval (CI) for low back pain. The examined work-related psychosocial risk factors included work-family imbalance, exposure to a hostile work environment, and job insecurity. Work hours, occupation, and other work organizational factors (nonstandard work arrangements and alternative shifts) were also examined.

**RESULTS:**

The prevalence of self-reported low back pain in the previous 3 months among workers in the United States was 25.7% in 2010. Female or older workers were at increased risk of experiencing low back pain. We found significant associations between low back pain and a set of psychosocial factors, including work-family imbalance (OR 1.27, CI 1.15-1.41), exposure to hostile work (OR 1.39, CI 1.25-1.55), and job insecurity (OR 1.44, CI 1.24-1.67), while controlling for demographic characteristics and other health-related factors. Older workers who had nonstandard work arrangements were more likely to report low back pain. Women who worked 41 to 45 hours per week and younger workers who worked >60 hours per week had an increased risk for low back pain. Workers from several occupation groups, including male health care practitioners, female and younger health care support workers, and female farming, fishing, and forestry workers, had an increased risk of low back pain.

**CONCLUSIONS:**

This study linked low back pain to work-family imbalance, exposure to a hostile work environment, job insecurity, long work hours, and certain occupation groups. These factors should be considered by employers, policymakers, and health care practitioners who are concerned about the impact of low back pain in workers.

**Hip or knee OA increases severity of LBP**

Arch Phys Med Rehabil. 2016 Aug 9. pii: S0003-9993(16)30403-8. doi: 10.1016/j.apmr.2016.06.022.

**The impact of comorbid knee and hip osteoarthritis on longitudinal clinical and health care use outcomes in older adults with new visits for back pain.**

Rundell SD<sup>1</sup>, Goode AP<sup>2</sup>, Suri P<sup>3</sup>, Heagerty PJ<sup>4</sup>, Comstock BA<sup>4</sup>, Friedly JL<sup>5</sup>, Gold LS<sup>6</sup>, Bauer Z<sup>6</sup>, Avins AL<sup>7</sup>, Nedeljkovic SS<sup>8</sup>, Nerenz DR<sup>9</sup>, Kessler L<sup>10</sup>, Jarvik JG<sup>11</sup>.

**OBJECTIVE:**

To examine if a comorbid diagnosis of knee or hip osteoarthritis (OA) in older adults with new back pain visits is associated with long-term patient-reported outcomes (PROs) and back-related healthcare use.

**DESIGN:**

Prospective cohort study SETTING: Three integrated health systems forming the Back pain Outcomes using Longitudinal Data cohort.

**PARTICIPANTS:**

5,155 of 5,239 older adults ( $\geq 65$  years old) with a new visit for back pain and complete electronic health record data.

**INTERVENTIONS:**

Not applicable. We obtained OA diagnoses using diagnostic codes in the electronic health record 12 months prior to the new back pain visit.

**MAIN OUTCOME MEASURES:**

The Roland Morris Disability Questionnaire (RDQ) and the EQ-5D were key PROs. Health care use, measured by Relative Value Units (RVUs), was summed for the 12 months after the initial visit. We used generalized estimating equations to model PROs. We also used generalized linear models to test the association between comorbid knee or hip OA and total back-related RVUs.

**RESULTS:**

368 (7.1%) of 5155 participants had a comorbid knee OA diagnosis and 94 (1.8%) had a hip OA diagnosis. 4711 (91.4%) had neither knee nor hip OA. In adjusted models, 12-month RDQ was 1.29 points higher (95% CI: 0.78, 1.80) for patients with knee OA and 1.20 points higher (95% CI: 0.18, 2.22) for those with hip OA compared to those without knee or hip OA, respectively. Lower EQ-5D was found among participants with knee OA (0.02 lower ((95% CI: -0.04, -0.01)) and hip OA diagnoses (0.03 lower (95% CI: -0.06, -0.01)) compared to those without knee or hip OA, respectively. Comorbid knee or hip OA was not significantly associated with total 12-month back-related resource use.

**CONCLUSION:**

Comorbid knee or hip OA in older adults with a new back pain visit was associated with modestly worse long-term disability and health-related quality-of-life.

**Illicit drug use**

Spine (Phila Pa 1976). 2016 Sep;41(17):1372-7. doi: 10.1097/BRS.0000000000001702.

**Illicit Substance Use in US Adults With Chronic Low Back Pain.**

Shmagel A<sup>1</sup>, Krebs E, Ensrud K, Foley R.

**STUDY DESIGN:**

A population-based cross-sectional survey.

**OBJECTIVE:**

The aim of this study was to compare the prevalence of illicit drug use among US adults with and without chronic low back pain (cLBP).

**SUMMARY OF BACKGROUND DATA:**

Although addictive medications, such as opioids and benzodiazepines, are frequently prescribed to patients with cLBP, little is known about illicit drug use among Americans with cLBP.

**METHODS:**

We used data from the back pain survey, administered to a representative sample of US adults aged 20 to 69 years (N=5103) during the 2009 to 2010 cycle of the National Health and Nutrition Examination Survey (NHANES). Participants with pain in the area between the lower posterior margin of the ribcage and the horizontal gluteal fold for at least 3 months were classified as having cLBP (N=700). The drug use questionnaire was self-administered in a private setting, and included data on lifetime and current use of marijuana or hashish, cocaine, heroin, and methamphetamine. Chi-square tests, one-way analysis of variance, and logistic regression, adjusted for age, gender, race, and level of education, were used for comparisons.

**RESULTS:**

About 46.5% of US adults with cLBP used marijuana versus 42% of those without cLBP [Adjusted odds ratio (aOR) 1.36, 95% confidence interval (95% CI) 1.06-1.74]. About 22% versus 14% used cocaine (aOR 1.80, 95% CI 1.45-2.24), 9% versus 5% used methamphetamine (aOR 2.03, 95% CI 1.30-3.16), and 5% versus 2% used heroin (aOR 2.43, 95% CI 1.44-4.11). Subjects with cLBP who reported lifetime illicit drug use were more likely to have an active prescription for opioid analgesics than those without illicit drug use history: 22.5% versus 15.3%, P=0.018.

**CONCLUSION:**

cLBP in community-based US adults was associated with higher odds of using marijuana, cocaine, heroin, and methamphetamine. Prescription opioid analgesic use was more common in cLBP sufferers with a history of illicit drug use.

**LEVEL OF EVIDENCE:**

2.

PMID: [27438382](https://pubmed.ncbi.nlm.nih.gov/27438382/)

## 4. INJECTIONS

### Impact of injections

Spine J. 2016 Aug 20. pii: S1529-9430(16)30886-5. doi: 10.1016/j.spinee.2016.08.024.

#### **The efficacy of interlaminar epidural steroid administration in multilevel intervertebral disc disease with chronic low back pain; a randomized, blinded, prospective study.**

Ökmen K<sup>1</sup>, Metin Ökmen B<sup>2</sup>.

#### **BACKGROUND CONTEXT:**

Epidural steroid injection is commonly used in patients with chronic low back pain. Applying a mixture of alocal anesthetic (LA) and steroid using the interlaminar (IL), transforaminal (TF), and caudal techniques is a preferred approach.

#### **PURPOSE:**

The present study aims to investigate the efficacy of IL epidural steroid (LES) administration in patients with multi-level lumbar disc pathology (LDP), and to assess the possible correlation of the procedure success with age and body mass index (BMI).

#### **STUDY DESIGN:**

a randomized-controlled trial (RCT) PATIENT SAMPLE: We administered ILES to a total of 98 patients with multi-level LDP.

#### **OUTCOME MEASURES:**

The Visual Analogue Scale (VAS) and Oswestry Disability Index (ODI) scoring were performed on the study population at pretreatment (PRT), posttreatment (PST), and one, three, six, and 12 PRT months. A possible correlation of BMI and age with the procedure success was evaluated.

#### **METHODS:**

The LA group (Group L, n=50) received 10 ml 0.25% bupivacaine, while the steroid + LA group (Group S, n=48) received 10 ml 0.25% bupivacaine+40 mg methylprednisolone at L4-L5 intervertebral space in prone position under the guidance of the C-arm scopy.

#### **RESULTS:**

There was no statistical difference in the PRT VAS and ODI scores between the groups ( $p<0.05$ ), while the VAS and ODI scores at one, three, six, and 12 PST months were higher in Group L, compared to Group S ( $p<0.05$ ). Age and BMI were not found to be related with the success of the procedure.

#### **CONCLUSIONS:**

Our study results showed that the VAS and ODI scores were lower in patients with multi-level LDP receiving steroid, following the administration of IL epidural injection. However, further studies are required to establish a robust conclusion on the dispersion of IL epidural injections in the epidural area and the dose of steroid.

## 7. PELVIC ORGANS/WOMAN'S HEALTH

### Endometriosis and pregnancy

Arch Gynecol Obstet. 2016 Sep;294(3):647-55. doi: 10.1007/s00404-016-4136-4. Epub 2016 Jun 14.

#### **The effects of surgery for endometriosis on pregnancy outcomes following in vitro fertilization and embryo transfer: a systematic review and meta-analysis.**

Rossi AC<sup>1</sup>, Prefumo F<sup>2</sup>.

#### **PURPOSE:**

To review the literature about the effect of endometriosis on in vitro-fertilization and embryo-transfer (IVF-ET).

#### **METHODS:**

A search in EMBASE, MEDLINE, ClinicalTrial.gov, reference lists from 2000 to 2013 was conducted. Inclusion criteria were: endometriosis confirmed with histologic examination, women undergoing IVF-ET, endometriosis treated or diagnosed by surgery. Women undergoing IVF-ET after surgical removal of endometriotic implants, or a surgical diagnosis of endometriosis without its removal, were compared to women without endometriosis. Main outcomes were clinical pregnancy and delivery rates.

#### **RESULTS:**

Thirteen studies were selected, including 980 women with endometriosis and 5934 controls. Clinical pregnancy rate was lower in women with endometriosis than in controls (OR 0.65; 95 % CI 0.44-0.96), but delivery rate was similar (OR 1.17; 95 % CI 0.69-1.98). When surgery was operative, clinical pregnancy rate after IVF-ET was lower in endometriosis than controls (OR 0.54; 95 % CI 0.34-0.85), but delivery rate was similar (OR 1.12; 95 % CI 0.60-2.07). When surgery was diagnostic, clinical pregnancy (OR 1.15; 95 % CI 0.46-2.84) and delivery rates (OR 1.65; 95 % CI 0.36-7.45) did not differ between the groups. Site of endometriosis was not related to IVF-ET outcomes. Clinical pregnancy rates were similar between stage I-II and controls (OR 0.99; 95 % CI 0.63-1.56) but lower in stage III-IV than controls (OR 0.45; 95 % CI 0.29-0.70), whereas delivery rate was not associated with stage.

#### **CONCLUSIONS:**

In the presence of endometriosis, the clinical pregnancy rate after IVF-ET is lower than in controls. The prognosis is better for mild endometriosis compared with more advanced stages. Even after surgical removal of endometriosis, IVF-ET results remain worse than in controls.

**Hot flashes**

Menopause. 2016 Sep;23(9):942-9. doi: 10.1097/GME.0000000000000662.

**Anxiety as a risk factor for menopausal hot flashes: evidence from the Penn Ovarian Aging cohort.**

Freeman EW<sup>1</sup>, Sammel MD.

**OBJECTIVE:**

The aim of this study was to identify temporal associations of anxiety dimensions with menopausal hot flashes in women progressing through the menopausal transition. We hypothesized that associations of both somatic and affective dimensions of anxiety with hot flashes increased in the menopausal transition, and that somatic anxiety was an independent risk factor for menopausal hot flashes.

**METHODS:**

Hot flashes, anxiety symptoms, hormone levels, and other psychosocial variables were assessed annually for 14 years of follow-up. The 233 women were premenopausal at baseline and continued through 1 year or more after the final menstrual period. Anxiety dimensions were assessed with the Zung Anxiety Scale, a validated measure of affective anxiety and somatic anxiety. Summed item scores were divided by the number of items rated, so that ranges of the two dimensions were comparable.

**RESULTS:**

Seventy-two percent of the sample reported moderate/severe hot flashes during the 14-year interval. There was no significant interaction between anxiety dimensions and menopausal stages. When adjusted for menopausal stage, the magnitude of association between somatic anxiety and hot flashes, however, dramatically increased (odds ratio [OR], 3.03; 95% CI, 2.12-4.32;  $P < 0.001$ ), whereas the association between affective anxiety and hot flashes increased to a lesser extent (OR, 1.27; 95% CI, 1.03-1.57;  $P = 0.024$ ). Women with high levels of somatic anxiety (top third of the sample) had the greatest risk of hot flashes ( $P < 0.001$ ). When the anxiety dimensions were considered in combination, the additive effect of high affective anxiety symptoms was minimal, with no significant difference between the group with high affective/low somatic symptoms and the low symptom group in incident hot flashes at each menopausal stage ( $P = 0.54$ ). In multivariable analysis, somatic anxiety increased the risk of hot flashes more than three times (OR, 3.13; 95% CI, 2.16-4.53;  $P < 0.001$ ), but affective anxiety was not significantly associated with hot flashes after adjustment for other study variables (OR, 1.19; 95% CI, 0.96-1.48;  $P = 0.117$ ). Time-lagged somatic anxiety scores significantly predicted hot flashes, with a 71% increase in risk (OR, 1.71; 95% CI, 1.21-2.41;  $P = 0.002$ ). Time-lagged affective anxiety scores did not predict hot flashes (OR, 1.06; 95% CI, 0.87-1.31;  $P = 0.58$ ).

**CONCLUSIONS:**

This study showed a strong predictive association of somatic anxiety with the risk of menopausal hot flashes. The temporal associations suggest that somatic anxiety is not simply a redundant measure of hot flashes but predicts the risk of menopausal hot flashes and may be a potential target in clinical management of perimenopausal women.

**Acupressure and dysmenorrhea****Comparison of the effects of acupressure and self-care behaviors training on the intensity of primary dysmenorrhea based on McGill pain questionnaire among Shiraz University students**

Journal of Research in Medical Sciences, 08/30/2016

Behbahani BM, et al.

This study meant to think about the impacts of acupressure at Guan yuan (RN-4) and Qu gu (RN-2) acupoints, self-care behaviors training, and ibuprofen on the intensity of primary dysmenorrhea based on McGill pain questionnaire. Training and acupressure were more viable than ibuprofen in the decrease of dysmenorrhea. Along these lines, they can be considered as trainable strategies without side effects in adolescent girls.

**Methods**

- A sum of 120 females aged some where around 18–25 years old with primary dysmenorrhea haphazardly chose from five dormitories of Shiraz University, Shiraz, Iran.
- In this randomized clinical trial all females were screened and randomized into acupressure group, in that pressure was applied for 20 min over the 1st 2 days of menstruation for two cycles.
- In the second group, the training group participated in four educational sessions each going on 60–90 min and control group got ibuprofen 400 mg.
- The intensity of pain before and after the intervention was measured utilizing short-form McGill pain survey.
- The information were gone into the SPSS statistical software (version 16) and analyzed utilizing Kruskal–Wallis test, paired t-test, and Chi-square test.

**Results**

- In all the 3 study groups a significant distinction was found in the mean intensity of pain prior and then afterward the intervention.
- The mean score of pain intensity was  $10.65 \pm 5.71$  in the training group,  $19 \pm 5.41$  in the control group, and  $14.40 \pm 6.87$  in the acupressure group after the intervention.
- The consequences of Kruskal–Wallis test uncovered that both interventions were more viable contrasted with intake of ibuprofen.

**Infant Vit. D**

J Nutr. 2016 Aug 24. pii: jn236679.

**High-Dose Monthly Maternal Cholecalciferol Supplementation during Breastfeeding Affects Maternal and Infant Vitamin D Status at 5 Months Postpartum: A Randomized Controlled Trial.**

Wheeler BJ<sup>1</sup>, Taylor BJ<sup>2</sup>, Herbison P<sup>3</sup>, Haszard JJ<sup>2</sup>, Mikhail A<sup>2</sup>, Jones S<sup>2</sup>, Harper MJ<sup>4</sup>, Houghton LA<sup>4</sup>.

**BACKGROUND:**

Many countries recommend daily infant vitamin D supplementation during breastfeeding, but compliance is often poor. A monthly, high-dose maternal regimen may offer an alternative strategy, but its efficacy is unknown.

**OBJECTIVE:**

The objective of the study was to determine the effect of 2 different monthly maternal doses of cholecalciferol on maternal and infant 25-hydroxyvitamin D [25(OH)D] status during the first 5 mo of breastfeeding.

**METHODS:**

With the use of a randomized, double-blind, placebo-controlled design, women who were planning to exclusively breastfeed for 6 mo (n = 90; mean age: 32.1 y; 71% exclusively breastfeeding at week 20) were randomly assigned to receive either cholecalciferol (50,000 or 100,000 IU) or a placebo monthly from week 4 to week 20 postpartum. The treatment effects relative to placebo were estimated as changes in maternal and infant serum 25(OH)D from baseline to week 20 postpartum by using a linear fixed-effects regression model. Additional secondary analyses, adjusted for potential confounders such as season of birth, vitamin D-fortified formula intake, and infant or maternal skin color, were also conducted.

**RESULTS:**

After 16 wk of supplementation, changes in maternal serum 25(OH)D were significantly higher in the 50,000-IU/mo (12.8 nmol/L; 95% CI: 0.4, 25.2 nmol/L) and 100,000-IU/mo (21.5 nmol/L; 95% CI: 9.2, 33.8 nmol/L) groups than in the placebo group (P = 0.43 and P < 0.001, respectively). For infants, the unadjusted mean changes in serum 25(OH)D were 4.5 nmol/L (95% CI: -16.2, 25.0 nmol/L) for the 50,000-IU/mo group and 15.8 nmol/L (95% CI: -4.7, 36.4 nmol/L) for the 100,000-IU/mo group, but the changes did not differ from the placebo reference group. However, after adjustment for season of birth, vitamin D-fortified formula intake, and infant skin color, the mean change effect size for the 100,000-IU/mo group was 19.1 nmol/L (95% CI: 2.5, 35.6 nmol/L; P = 0.025) higher than that in the placebo group.

**CONCLUSIONS:**

Maternal cholecalciferol supplementation at a dose of 100,000 IU/mo during the first 5 mo of breastfeeding potentially benefits infant vitamin D status. Further studies are required to determine optimum dose and dosing frequency. This trial was registered at [www.anzctr.org.au](http://www.anzctr.org.au) as ACTRN12611000108910

**Acetaminophen and behavioral problems**

Original Investigation | August 15, 2016

**Association of Acetaminophen Use During Pregnancy With Behavioral Problems in Childhood Evidence Against Confounding**Evie Stergiakouli, PhD<sup>1</sup>; Anita Thapar, FRCPsych, PhD<sup>2</sup>; George Davey Smith, MD, DSc<sup>1</sup>*JAMA Pediatr.* Published online August 15, 2016. doi:10.1001/jamapediatrics.2016.1775

**Importance** Acetaminophen (paracetamol) is used by a large proportion of pregnant women. Research suggests that acetaminophen use in pregnancy is associated with abnormal fetal neurodevelopment. However, it is possible that this association might be confounded by unmeasured behavioral factors linked to acetaminophen use.

**Objective** To examine associations between offspring behavioral problems and (1) maternal prenatal acetaminophen use, (2) maternal postnatal acetaminophen use, and (3) partner's acetaminophen use.

**Design, Setting, and Participants** From February 2015 to March 2016, we collected and analyzed data from the Avon Longitudinal Study of Parents and Children (ALSPAC), a prospective birth cohort. We studied 7796 mothers enrolled in ALSPAC between 1991 and 1992 along with their children and partners.

**Exposures** Acetaminophen use was assessed by questionnaire completion at 18 and 32 weeks of pregnancy and when the child was 61 months old.

**Main Outcomes and Measures** Maternal reports of behavioral problems using the Strengths and Difficulties Questionnaire (SDQ) when the children were 7 years old. We estimated risk ratios for behavioral problems in children after prenatal, postnatal, and partner's exposure to acetaminophen and mutually adjusted each association.

**Results** Maternal prenatal acetaminophen use at 18 (n = 4415; 53%) and 32 weeks of pregnancy (n = 3381; 42%) was associated with higher odds of having conduct problems (risk ratio [RR], 1.42; 95% CI, 1.25-1.62) and hyperactivity symptoms (RR, 1.31; 95% CI, 1.16-1.49), while maternal acetaminophen use at 32 weeks was also associated with higher odds of having emotional symptoms (RR, 1.29; 95% CI, 1.09-1.53) and total difficulties (RR, 1.46; 95% CI, 1.21-1.77). This was not the case for maternal postnatal (n = 6916; 89%) or partner's (n = 3454; 84%) acetaminophen use. We found the associations between maternal prenatal acetaminophen use and all the SDQ domains unchanged even after adjusting for maternal postnatal or partner's acetaminophen use.

**Conclusions and Relevance** Children exposed to acetaminophen prenatally are at increased risk of multiple behavioral difficulties, and the associations do not appear to be explained by unmeasured behavioral or social factors linked to acetaminophen use insofar as they are not observed for postnatal or partner's acetaminophen use. Although these results could have implications for public health advice, further studies are required to replicate the findings and to understand mechanisms.

Labor helped with lavender and

**The effect of aromatherapy with lavender essence on severity of labor pain and duration of labor in primiparous women**

Mansoreh Yazdkhasti Arezoo Pirak

DOI: <http://dx.doi.org/10.1016/j.ctcp.2016.08.008>

**Abstract**

**Objective**

The aim of this study was to investigate the effect of Lavender essence inhalation on severity of labor pain and duration of labor.

**Methods and materials**

This single-blind, randomized clinical trial was conducted on 120 pregnant women in two groups. The experimental group received 2 drops of Lavender essence inhaled at three stages (4–5, 6–7, 8–9 cm cervical dilation) and severity of the labor pain and duration of labor was measured before and after intervention. The control group was treated with distilled water as a placebo in the similar ways, too.

**Results**

The results showed that difference in the labor pain before and after intervention in two groups was significant ( $P = 0/001$ ). But there was no difference in mean duration of the active phase and the second stage of labor between the two groups.

**Conclusion**

Lavender essence aromatherapy may be an effective therapeutic option for pain management for women in labor.

## 8. VISCERA

### Smoking and bowel disorders

#### Smokers prone to bowel condition relapses

University of Edinburgh College of Medicine News, 08/31/2016

Smoking is strongly linked to relapse of a serious bowel condition, research has confirmed.

People with Crohn's disease are more likely to experience a recurrence after surgery if they continue to smoke, the study found. Doctors recommend people with the condition stop smoking to avoid their illness worsening. The researchers also assessed whether a drug treatment that is commonly used in treating the disease is effective at preventing it from coming back after surgery. They found that the therapy had limited beneficial effects for non-smokers in preventing relapse after surgery. It did, however, offer protection for smokers. The team says people who are unable to quit smoking may be offered the therapy immediately after surgery but the evidence does not justify the use of the drug in non-smokers. Researchers led by the University of Edinburgh conducted a UK-wide trial of the therapy involving 240 people with Crohn's disease. Patients were monitored for three years after they had undergone surgery. Some 128 patients were treated with a drug from the thiopurine family called mercaptopurine and 122 were given a dummy medicine. Only three of 29 smokers treated with the therapy experienced a relapse compared with 12 of 26 who received the dummy drug.

The rate of relapse in the non-smoking group was much lower and was unaffected by treatment with the medicine. The study was published in *The Lancet Gastroenterology and Hepatology* journal.

## 10 A. CERVICAL SPINE

### Physical training and ex helps

#### **Does a combination of physical training, specific exercises and pain education improve health-related quality of life in patients with chronic neck pain? A randomised control trial with a 4-month follow up**

Manual Therapy , 09/01/2016

Ris L, et al.

**R**esearchers tried to find out the impact of combining pain education, specific exercises and graded physical activity training compared with pain education alone on physical health-related quality of life (HR-QoL) in chronic neck pain patients. In this randomised control trial, they suggested that this multimodal intervention may be an effective intervention for chronic neck pain patients.

#### Methods

- The authors performed a multicentre randomised controlled trial of 200 neck pain patients receiving pain education.
- The exercise group received additional exercises for neck/shoulder, balance and oculomotor function, plus graded physical activity training.
- They recorded patient-reported outcome measures (Short Form-36 Physical and Mental component summary scores, EuroQol-5D, Beck Depression Inventory-II, Neck Disability Index, Pain Burden Scale, Patient-Specific Functioning Scale, Tampa Scale of Kinesiophobia, Global Perceived Effect) and clinical tests (Astrand Physical Fitness, cervical Range of Motion, Pressure Pain Threshold at infraspinatus, tibialis anterior and cervical spine, Cranio-cervical Flexion, Cervical Extension muscle function, and oculomotion).

#### Results

- The exercise group indicated statistically significant improvement in physical HR-QoL, mental HR-QoL, depression, cervical pressure pain threshold, cervical extension movement, muscle function, and oculomotion.
- Per protocol analyses confirmed these results with additional significant improvements in the exercise group compared with controls

**Cervical relocation test/valid****The reliability of the cervical relocation test on people with and without a history of neck pain**

Sarah Burke, Kristina Lynch, Zakkee Moghul, Craig Young, Kristen Saviola & **Ron Schenk**

JMMT Page 210-214 | Received 31 Mar 2015, Accepted 20 Jul 2015, Published online: 04 Jul 2016

- <http://dx.doi.org/10.1179/2042618615Y.0000000016>

**Background:** Physical therapy intervention is often sought to treat cervical spine conditions and a comprehensive physical therapy examination has been associated with more favourable outcomes. The cervical relocation test (CRT) is one method used to assess joint position sense (PS) integrity of the cervical spine. Previous research has found significant differences in the CRT between symptomatic and asymptomatic subjects. Impaired kinaesthetic awareness in the cervical spine may be associated with degenerative joint disease, chronicity of the complaint and increased susceptibility to re-injury.

**Purpose:** The purpose of this study was to determine the intertester and intratester reliability of cervical relocation using the cervical range of motion instrument (CROM) and an affixed laser (AL) device among subjects with and without a history of neck pain. In addition, it was hypothesised that those individuals with a history of neck pain would have greater difficulty on the CRT.

**Methods:** A total of 50 asymptomatic subjects ( $n = 50$ ) were assigned to two researchers. The CRT was performed for each tester by the subject rotating the cervical spine for three trials to the right and left for the CROM and AL.

**Results:** The results indicate a significant intertester reliability of the CROM (interclass correlation coefficient (ICC) = 0.717[0.502–0.839]; 0.773[0.595–0.873]) for the subjects in this sample.

**Conclusion:** This study demonstrated that the CROM is a reliable device for measuring cervical relocation between different testers. Future research should investigate if the CRT is predictive of prognosis in patients with cervical pathology.

**Children's ROM****A normative study of cervical range of motion measures including the flexion–rotation test in asymptomatic children: side-to-side variability and pain provocation****Kim Budelmann**, Harry von Piekartz & Toby Hall

JMMT Page 185-191 | Published online: 09 Jun 2016

- <http://dx.doi.org/10.1179/2042618612Y.0000000026>

**Objectives:** Cervical movement impairment has been identified as a core component of cervicogenic headache evaluation. However, normal range of motion values in children has been investigated rarely and no study has reported such values for the flexion–rotation test (FRT). The purpose of this study was to identify normal values and side-to-side variation for cervical spine range of motion (ROM) and the FRT, in asymptomatic children aged 6–12 years. Another important purpose was to identify the presence of pain during the FRT.

**Methods:** Thirty-four asymptomatic children without history of neck pain or headache (26 females and 8 males, mean age 125.38 months [SD 13.14]) were evaluated. Cervical spine cardinal plane ROM and the FRT were evaluated by a single examiner using a cervical ROM device.

**Results:** Values for cardinal plane ROM measures are presented. No significant gender difference was found for any ROM measure. Mean difference in ROM for rotation, side flexion, and the FRT were less than one degree. However, intra-individual variation was greater, with lower bound scores of 9.32° for rotation, 5.30° for side flexion, and 10.89° for the FRT. Multiple linear regression analysis indicates that movement in the cardinal planes only explains 19% of the variance in the FRT. Pain scores reported following the FRT were less than 2/10.

**Discussion:** Children have consistently greater cervical spine ROM than adults. In children, side-to-side variation in rotation and side flexion ROM and range recorded during the FRT indicates that the clinician should be cautious when using range in one direction to determine impairment in another. Range recorded during the FRT is independent of cardinal movement variables, which further adds to the importance of the FRT, as a test that mainly evaluates range of movement of the upper cervical spine.

Keywords: [Range of movement](#), [Flexion–rotation test](#), [Cervical spine](#),

### 13. CRANIUM/TMJ

#### Brain activity

#### **Too much activity in one of the brain's key memory regions is bad for your memory and attention**

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University of Nottingham News, 08/29/2016

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Neurons in the brain interact by sending each other chemical messages, so-called neurotransmitters.

Gamma-aminobutyric acid (GABA) is the most common inhibitory neurotransmitter, which is important to restrain neural activity, preventing neurons from getting too trigger-happy and from firing too much or responding to irrelevant stimuli. Researchers led by Dr Tobias Bast in the School of Psychology at The University of Nottingham have found that faulty inhibitory neurotransmission and abnormally increased activity in the hippocampus impairs our memory and attention.

Their latest research – “Hippocampal neural disinhibition causes attentional and memory deficits” – published in the journal *Cerebral Cortex*, has implications for understanding cognitive deficits in a variety of brain disorders, including schizophrenia, age-related cognitive decline and Alzheimer’s, and for the treatment of cognitive deficits

**3 D TMJ**

J Oral Rehabil. 2016 Aug 30. doi: 10.1111/joor.12428.

**Validity of three screening questions (3Q/TMD) in relation to the DC/TMD.**

Lövgren A<sup>1</sup>, Visscher CM<sup>2</sup>, Häggman-Henrikson B<sup>1,3</sup>, Lobbezoo F<sup>2</sup>, Marklund S<sup>1</sup>, Wänman A<sup>1</sup>.

Temporomandibular disorders (TMD) are common but seem to be largely undetected within general dental care.

To improve dentists' awareness of these symptoms, three screening questions (3Q/TMD) have been introduced. Our aim was to validate 3Q/TMD in relation to the diagnostic criteria for TMD (DC/TMD), while taking into account the severity level of the symptoms. The study population consisted of 7831 individuals 20-69 years old, who had their routine dental check-up at the Public Dental Health Service in Västerbotten, Sweden. All patients answered a health declaration, including the 3Q/TMD regarding frequent temporomandibular pain, pain on movement and catching/locking of the jaw. All 3Q-positives (at least one affirmative) were invited for examination in randomised order. For each 3Q-positive, a matched 3Q-negative was invited. In total, 152 3Q-positives and 148 3Q-negatives participated. At examination, participants answered 3Q/TMD a second time, before they were examined and diagnosed according to DC/TMD. To determine symptom's severity, the Graded Chronic Pain Scale and Jaw Functional Limitation Scale-20 (JFLS-20) were used. In total, 74% of 3Q-positives and 16% of 3Q-negatives met the criteria for DC/TMD pain or dysfunction (disc displacements with reduction and degenerative joint disorder were excluded). Fifty-five per cent of 3Q-positives had a TMD diagnosis and CPI score  $\geq 3$  or a JFLS-20 score  $\geq 5$ , compared to 4% of 3Q-negatives.

The results show that the 3Q/TMD is an applicable, cost-effective and valid tool for screening a general adult population to recognise patients in need of further TMD examination and management.

### Sleep disturbances and suicide

Neuropsychiatr Dis Treat. 2007 Dec; 3(6): 735–743.PMCID: PMC2656315

#### **Sleep disturbances and suicide risk: A review of the literature**

Rebecca A Bernert and Thomas E Joiner

A growing body of research indicates that sleep disturbances are associated with suicidal ideation and behaviors.

This article (1) provides a critical review of the extant literature on sleep and suicidality and (2) addresses shared underlying neurobiological factors, biological and social zeitgebers, treatment implications, and future directions for research. Findings indicate that suicidal ideation and behaviors are closely associated with sleep complaints, and in some cases, this association exists above and beyond depression. Several cross-sectional investigations indicate a unique association between nightmares and suicidal ideation, whereas the relationship between insomnia and suicidality requires further study. Underlying neurobiological factors may, in part, account for the relationship between sleep and suicide. Serotonergic neurotransmission appears to play a critical role in both sleep and suicide. Finally, it remains unclear whether or not sleep-oriented interventions may reduce risk for suicidal behaviors. Unlike other suicide risk factors, sleep complaints may be particularly amenable to treatment.

As a warning sign, disturbances in sleep may thus be especially useful to research and may serve as an important clinical target for future suicide intervention efforts.

**Keywords:** suicidality, sleep, nightmares, suicide risk factors

## CPAP and sleep apnea

**EDITORIAL****Cardiovascular Events in Obstructive Sleep Apnea — Can CPAP Therapy SAVE Lives?**

Babak Mokhlesi, M.D., and Najib T. Ayas, M.D., M.P.H.

August 28, 2016 DOI: 10.1056/NEJMe1609704

**BACKGROUND**

Obstructive sleep apnea is associated with an increased risk of cardiovascular events; whether treatment with continuous positive airway pressure (CPAP) prevents major cardiovascular events is uncertain.

**METHODS**

After a 1-week run-in period during which the participants used sham CPAP, we randomly assigned 2717 eligible adults between 45 and 75 years of age who had moderate-to-severe obstructive sleep apnea and coronary or cerebrovascular disease to receive CPAP treatment plus usual care (CPAP group) or usual care alone (usual-care group). The primary composite end point was death from cardiovascular causes, myocardial infarction, stroke, or hospitalization for unstable angina, heart failure, or transient ischemic attack. Secondary end points included other cardiovascular outcomes, health-related quality of life, snoring symptoms, daytime sleepiness, and mood.

**RESULTS**

Most of the participants were men who had moderate-to-severe obstructive sleep apnea and minimal sleepiness. In the CPAP group, the mean duration of adherence to CPAP therapy was 3.3 hours per night, and the mean apnea-hypopnea index (the number of apnea or hypopnea events per hour of recording) decreased from 29.0 events per hour at baseline to 3.7 events per hour during follow-up. After a mean follow-up of 3.7 years, a primary end-point event had occurred in 229 participants in the CPAP group (17.0%) and in 207 participants in the usual-care group (15.4%) (hazard ratio with CPAP, 1.10; 95% confidence interval, 0.91 to 1.32;  $P=0.34$ ). No significant effect on any individual or other composite cardiovascular end point was observed. CPAP significantly reduced snoring and daytime sleepiness and improved health-related quality of life and mood.

**CONCLUSIONS**

Therapy with CPAP plus usual care, as compared with usual care alone, did not prevent cardiovascular events in patients with moderate-to-severe obstructive sleep apnea and established cardiovascular disease.

**Sleep disturbance**

Int Forum Allergy Rhinol. 2016 Aug 23. doi: 10.1002/alr.21843.

**The pain-depression dyad and the association with sleep dysfunction in chronic rhinosinusitis.**

Cox DR<sup>1</sup>, Ashby S<sup>1</sup>, Mace JC<sup>2</sup>, DelGaudio JM<sup>3</sup>, Smith TL<sup>2</sup>, Orlandi RR<sup>1</sup>, Alt JA<sup>1</sup>.

**BACKGROUND:**

Depression, pain, and sleep disturbance is a symptom cluster often found in patients with chronic illness, exerting a large impact on quality of life (QOL). A wealth of literature exists demonstrating a significant association between depression, pain, and sleep dysfunction in other chronic diseases. This relationship has not been described in patients with chronic rhinosinusitis (CRS).

**METHODS:**

Sixty-eight adult patients with CRS were prospectively enrolled. Patients at risk for depression were identified using the Patient Health Questionnaire-2 (PHQ-2) using a cut-off score of  $\geq 1$ . Pain experience was measured using the Brief Pain Inventory Short Form (BPI-SF) and the Short Form McGill Pain Questionnaire (SF-MPQ). Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI).

**RESULTS:**

Forty-seven patients were at risk for depression. Significant positive correlations were found between total PSQI scores and all pain measures ( $R = 0.38-0.61$ ,  $p \leq 0.05$ ) and between total PSQI scores and PHQ-2 scores ( $R = 0.46$ ,  $p < 0.05$ ). For patients at risk for depression, significant, positive correlations were found between pain measures, the total PSQI score, and the 3 PSQI subdomains (sleep latency, sleep quality, and daytime dysfunction;  $R = 0.31-0.61$ ,  $p < 0.05$ ). The relationship between pain and sleep dysfunction scores was not seen in the absence of depression.

**CONCLUSION:**

Depression, pain, and sleep dysfunction are interrelated in patients with CRS. In the absence of depression, significant correlations between pain and sleep are not observed, suggesting that depression plays a key role in this interaction. Further research is needed to investigate the complex relationship between depression, pain, and sleep dysfunction in CRS

## 14. HEADACHES

### Cervico-cephalalgiaphobia

#### Cervico-cephalalgiaphobia: a subtype of phobia in patients with cervicogenic headache and neck pain? A pilot study

**Rob A. B. Oostendorp**, Hans Elvers, Emilia Mikolajewska, Nathalie Roussel, Emiel van Trijffel, Han Samwel, Jo Nijs & William Duquet

JMMT Page 200-209 | Published online: 19 May 2016

- <http://dx.doi.org/10.1179/2042618615Y.0000000015>

#### Abstract

**Objectives:** The term ‘cephalalgiaphobia’ was introduced in the mid-1980s and defined as fear of migraine (attacks). We hypothesized that a specific subtype of cephalalgiaphobia affects patients with cervicogenic headache (CEH). This study aimed to: (1) define the term ‘cervico-cephalalgiaphobia’; (2) develop a set of indicators for phobia relevant to patients with CEH; and (3) apply this set to a practice test in order to estimate the frequency of cervico-cephalalgiaphobia in the Dutch primary care practice of manual physical therapy.

**Methods:** A systematic approach was used to develop a definition and potential indicators for cervico-cephalalgiaphobia. An expert group appraised the definition and the set of indicators (score per indicator: never; sometimes; often/always). An invitation to participate in the practice test was sent to Dutch manual physical therapy practices ( $n = 56$ ) representing 134 manual physical therapists (MPTs). The cut-off point for percentages of scores for coverage of the indicators was set at  $\geq 60\%$ .

**Results:** The expert group agreed with the proposed definition of cervico-cephalalgiaphobia. A set of eight indicators for cervico-cephalalgiaphobia was selected from 10 initial indicators. Thirty-six MPTs provided data from 46 patients diagnosed with CEH. The coverage of ‘often/always’ was substantial for the indicators, ‘Short-term positive results in previous manual physical therapeutic treatment’, ‘Shorter interval between treatment sessions’, ‘Fear of “locked facet joints” of the neck’, ‘More frequent manipulation’, and ‘Fear of increase in headaches’. Coverage was also substantial for ‘never’ regarding ‘Long-term positive results in previous manual physical therapeutic treatment’. ‘Confirmation of “locked facet joints” of the cervical spine by MPT as a cause for increase of CEH’ scored ‘often/always’ in all patients. Coverage for ‘Increased use of medication with insufficient effect’ was substantial, scoring as ‘sometimes’ in 39 (84.8%) patients.

**Discussion:** Cervico-cephalalgiaphobia was defined and a set of eight indicators formulated based on the literature and clinical expertise. The practice test provides valuable information on the frequency of indicators for cervico-cephalalgiaphobia in the Dutch manual physical therapy practice, suggesting that cervico-cephalalgiaphobia is common in patients with CEH.

**Cognitive dysfunctions**

J Headache Pain. 2016 Dec;17(1):76. doi: 10.1186/s10194-016-0667-0. Epub 2016 Aug 27.

**Cognitive dysfunctions and psychological symptoms in migraine without aura: a cross-sectional study.**

Santangelo G<sup>1,2</sup>, Russo A<sup>3,2</sup>, Trojano L<sup>4,5</sup>, Falco F<sup>1</sup>, Marcuccio L<sup>3,2</sup>, Siciliano M<sup>1,2</sup>, Conte F<sup>3,2</sup>, Garramone F<sup>1</sup>, Tessitore A<sup>3,2</sup>, Tedeschi G<sup>6,7</sup>.

**BACKGROUND:**

The occurrence of cognitive dysfunctions and psychological symptoms, as well as their mutual relationships, in migraine patients are still debated. The aim of the study was to characterize the cognitive profile and psychological symptoms (i.e. depression, anxiety and apathy) in drug-naïve migraine without aura (MwoA) patients.

**METHODS:**

Seventy-two consecutive MwoA patients, referred to the Italian University Headache Clinic and 72 healthy subjects (HCs) were enrolled. Patients, during an attack-free period, and HCs completed Montreal Cognitive Assessment (MoCA), Beck Depression Inventory-II (BDI-II), Self-version of Apathy Evaluation Scale (AES-S) and State and Trait Anxiety Inventory (STAI-Y-1 and 2). Clinical parameters of disease severity (i.e. disease duration, migraine attacks per month, mean pain intensity during migraine attacks, migraine disability and impact on daily life) were recorded.

**RESULTS:**

Although performance of MwoA patients on MoCA was above Italian cut-off threshold (<15.5) suggesting presence of cognitive impairment, MwoA patients achieved significantly lower scores than HCs on total MoCA scale ( $22.3 \pm 2.7$  versus  $25.4 \pm 2.3$ ) and on its attention ( $4.9 \pm 1.1$  versus  $5.6 \pm 0.7$ ), memory ( $1.8 \pm 1.4$  versus  $3.1 \pm 1.3$ ), visuospatial ( $3.2 \pm 0.9$  versus  $3.6 \pm 0.6$ ) and executive subscales ( $2.6 \pm 1.1$  versus  $3.1 \pm 0.8$ ). In addition, we observed significant correlations between MoCA executive domain subscore and the attack-related disability score (MIDAS). As for behavioral profile, the percentage of depressive symptoms (4.2 %), high state and trait anxiety (13.9 and 9.7 %, respectively), and apathy (11.1 %) in MwoA patients were similar to that of HCs. No significant associations of behavioural symptoms with cognitive performance and clinical parameters were found.

**CONCLUSIONS:**

Drug-naïve MwoA patients are characterized by subtle cognitive dysfunctions and low percentage of behavioural symptoms. The results support the importance of searching for subclinical cognitive disturbances in patients with MwoA, who deserve to be followed-up to verify whether they develop clinically relevant disorders over time.

**20 A. ROTATOR CUFF****High altitude increase risk of thromboembolism**

J Shoulder Elbow Surg. 2016 Aug 12. pii: S1058-2746(16)30189-6. doi: 10.1016/j.jse.2016.06.005.

**High altitude is an independent risk factor for venous thromboembolism following arthroscopic rotator cuff repair: a matched case-control study in Medicare patients.**

Cancienne JM<sup>1</sup>, Burrus MT<sup>1</sup>, Diduch DR<sup>1</sup>, Werner BC<sup>2</sup>.

**BACKGROUND:**

Although the risk of venous thromboembolism (VTE) following elective shoulder arthroscopy is low, the large volume of procedures performed each year yields a significant annual burden of patients with thromboembolic complications. The purpose of this study was to evaluate the association of high procedural altitude with the incidence of postoperative VTE following arthroscopic rotator cuff repair.

**METHODS:**

A Medicare database was queried for all patients undergoing arthroscopic rotator cuff repair from 2005 to 2012. All patients with procedures performed at an altitude of 4000 feet or higher were grouped into the "high-altitude" study cohort. Patients with procedures performed at an altitude of 100 feet or lower were then matched to patients in the high-altitude cohort on the basis of age, gender, and medical comorbidities. The rate of VTE was then assessed for both the high-altitude and matched low-altitude cohorts within 90 days postoperatively.

**RESULTS:**

The rates of combined VTE (odds ratio [OR], 2.6;  $P < .0001$ ), pulmonary embolism (OR, 4.3;  $P < .0001$ ), and lower extremity deep venous thrombosis within 90 days (OR, 2.2;  $P = .029$ ) were all significantly higher in patients with procedures performed at high altitude compared with matched patients with the same procedures performed at low altitude.

**CONCLUSIONS:**

Procedural altitude >4000 feet is associated with significantly increased rates of postoperative VTE, including deep venous thrombosis and pulmonary embolism, compared with age-, gender-, and comorbidity-matched patients undergoing the same procedures at altitudes <100 feet.

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## 21. ADHESIVE CAPSULITIS

### MRI signs

J Shoulder Elbow Surg. 2016 Aug 15. pii: S1058-2746(16)30187-2. doi: 10.1016/j.jse.2016.06.003.

### **Characteristics of dynamic magnetic resonance imaging of idiopathic severe frozen shoulder.**

Sasanuma H<sup>1</sup>, Sugimoto H<sup>2</sup>, Fujita A<sup>2</sup>, Kanaya Y<sup>3</sup>, Iijima Y<sup>3</sup>, Saito T<sup>3</sup>, Takeshita K<sup>3</sup>.

#### **BACKGROUND:**

The purpose of this study was to evaluate the effectiveness of current techniques for dynamic 3-dimensional magnetic resonance imaging (MRI) in the diagnosis of idiopathic severe frozen shoulder (FS).

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

Subjects consisted of 5 healthy volunteers and 16 patients with idiopathic severe FS. We defined severe idiopathic FS as follows: range of motion  $\leq 100^\circ$  in forward flexion,  $\leq 10^\circ$  in external rotation, and  $\leq 5^\circ$  in internal rotation. All patients suffered from continued global range of motion loss for at least 6 months. We evaluated the diagnostic characteristics of 3-dimensional dynamic MRI in FS patients compared with those in healthy volunteers.

#### **RESULTS:**

MRI of all FS patients displayed an abnormal intake of blood flow from the acromial arterial network and the branches of circumflex humeral arteries into the axillary pouch and the rotator interval. We named this finding "burning sign." The burning sign was present at all phases of the condition. In the FS group, the patients with enhanced deposition of contrast medium in the axillary pouch in the delayed phase (n = 11) had a statistically significant score for pain during exercise, higher than that of patients with reduced deposition of contrast medium at the same site (n = 5; P = .027).

#### **CONCLUSION:**

Burning sign is an abnormal finding that appears in dynamic MRI of severe FS. Hence, the burning sign may be associated with pain and inflammation in idiopathic FS.

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## 24. ELBOW

### Epicondylitis

#### **Corticosteroid or placebo injection combined with deep transverse friction massage, Mills manipulation, stretching and eccentric exercise for acute lateral epicondylitis: a randomised, controlled trial**

- Morten Olausen Email author, Øystein Holmedal, Ibrahimu Mdala, Søren Brage and
- Morten Lindbæk *BMC Musculoskeletal Disorders* 2015 **16**:122 DOI: 10.1186/s12891-015-0582-6 **Published:** 20 May 2015

#### Background

Lateral epicondylitis of the elbow is a frequent condition with long-lasting symptoms. Corticosteroid injection is increasingly discouraged and there is little knowledge on the combined effect of corticosteroid injection and physiotherapy for acute conditions. We wanted to investigate the efficacy of physiotherapy alone and combined with corticosteroid injection for acute lateral epicondylitis.

#### Methods

A randomized, controlled study with one-year follow-up was conducted in a general practice setting in Sarpsborg, Norway. We included 177 men and women aged 18 to 70 with clinically diagnosed lateral epicondylitis of recent onset (2 weeks to 3 months). They were randomly assigned to one of three treatments: physiotherapy with two corticosteroid injections, physiotherapy with two placebo injections or wait-and-see (control). Physiotherapy consisted of deep transverse friction massage, Mills manipulation, stretching, and eccentric exercises. We used double blind injection of corticosteroid and single blind assessments. The main outcome measure was treatment success defined as patients rating themselves completely recovered or much better on a six-point scale.

#### Results

One hundred fifty-seven patients (89 %) completed the trial. Placebo injection with physiotherapy showed no significant difference compared to control or to corticosteroid injection with physiotherapy at any follow-up. Corticosteroid injection with physiotherapy had a 10.6 times larger odds for success at six weeks (odds ratio 10.60,  $p < 0.01$ ) compared to control (NNT = 3, 99 % CI 1.5 to 4.2). At 12 weeks there was no significant difference between these groups, but at 26 weeks the odds for success were 91 % lower (OR 0.09,  $p < 0.01$ ) compared to control, showing a large negative effect (NNT = 5, 99 % CI 2.1 to 67.4). At 52 weeks there was no significant difference. Both control and placebo injection with physiotherapy showed a gradual increase in success.

#### Conclusions

Acute lateral epicondylitis is a self-limiting condition where 3/4 of patients recover within 52 weeks. Physiotherapy with deep transverse friction massage, Mills manipulation, stretching, and eccentric exercises showed no clear benefit, and corticosteroid injection gave no added effect. Corticosteroid injections combined with physiotherapy might be considered for patients needing a quick improvement, but intermediate (12 to 26 weeks) worsening of symptoms makes the treatment difficult to recommend. Trial registration ClinicalTrials.gov Identifier: NCT00826462

**32 A. KNEE/ACL****ACL braking time**

Arthroscopy. 2016 Aug 25. pii: S0749-8063(16)30367-X. doi: 10.1016/j.arthro.2016.05.043.

**Braking Reaction Time After Right-Knee Anterior Cruciate Ligament Reconstruction: A Comparison of 3 Grafts.**

Wasserman BR<sup>1</sup>, Singh BC<sup>1</sup>, Kaplan DJ<sup>2</sup>, Weinberg M<sup>1</sup>, Meislin R<sup>1</sup>, Jazrawi LM<sup>1</sup>, Strauss EJ<sup>1</sup>.

**PURPOSE:**

To determine when patients recover the ability to safely operate the brakes of an automobile after a right-knee anterior cruciate ligament reconstruction (ACLR).

**METHODS:**

A computerized driving simulator was used to determine braking ability after an isolated right-knee ACLR. Thirty healthy volunteers were tested at 1 visit to determine normal mean values, and 27 treatment subjects were tested at 1 week, 3 weeks, and 6 weeks after ACLR. Nine study subjects were treated with a patella tendon (BPTB) autograft, 9 were treated with a hamstring (HS) autograft, and 9 were treated with a tibialis anterior (TA) allograft. The driving simulator collected data on brake reaction time (BRT), brake travel time (BTT), and total brake time (TBT) at each visit.

**RESULTS:**

The control group generated a BRT of 725 milliseconds, BTT of 2.87 seconds, and TBT of 3.59 seconds. At week 1, all treatment patients had significant differences compared with controls for BRT, BTT, and TBT, except the BTT of the HS group. At week 3, all measures for the allograft group and the BRT for both autograft groups were no longer significantly different compared with controls, but significant differences were found for TBT in the HS and BPTB groups ( $P = .03$ ,  $P = .01$ ). At week 6, BRT, BTT, and TBT were no longer significantly different for either the HS group or BPTB group.

**CONCLUSIONS:**

Patients who underwent a right-knee ACLR with a TA allograft regained normal braking times by week 3 postoperatively. In contrast, those treated with a BPTB or HS autograft demonstrated significantly delayed braking times at 3 weeks but returned to normal braking ability by week 6. Those treated with an autograft had an earlier return of normalized BRT than BTT.

**LEVEL OF EVIDENCE:**

Level III, case-control series.

**Skier's muscle function changes**

Med Sci Sports Exerc. 2016 Aug 17.

**Asymmetry and Thigh Muscle Coactivity in Fatigued ACL-Reconstructed Elite Skiers.**

Jordan MJ<sup>1</sup>, Aagaard P, Herzog W.

**PURPOSE:**

The acute effects of fatigue on functional inter-limb asymmetry and quadriceps/hamstring muscle activity levels including preparatory co-activation during squat jump takeoff and landing was evaluated in elite alpine ski racers with/without anterior cruciate ligament (ACL) reconstruction (ACLR).

**METHODS:**

Twenty-two elite ski racers (ACLR: n=11; Control: n=11) performed an 80-second repeated squat jump test (jump-test) on a dual force plate system with simultaneous electromyography (EMG) recordings in vastus lateralis (VL), vastus medialis (VM), semitendinosus (ST) and biceps femoris (BF). Asymmetry indices (AI) and jump height (HBCM) were calculated from the ground reaction force. The normalized EMG amplitudes were obtained at takeoff, the 25 ms interval pre-landing, and post-landing for the ACLR limb (Affected Limb), contralateral limb and limbs of the control subjects (Control Limb).

**RESULTS:**

HBCM decreased with fatigue for both groups, and ACLR skiers demonstrated elevated AI in the late-phase vs. early-phase of the jumping takeoff and landing-phase [ $P<0.0001$ ]. No fatigue-induced changes in AI were found. The Affected Limb of ACLR skiers showed lower normalized quadriceps EMG activity at takeoff, pre-landing and post-landing along with increased hamstring activity pre-landing and post-landing compared to the Contralateral Limb and Control Limb [ $P<0.001$ ]. The Affected Limb, Contralateral Limb and Control Limb all demonstrated increased quadriceps and decreased hamstring activity with fatigue [ $P<0.001$ ].

**CONCLUSIONS:**

Functional asymmetry indices were not changed with fatigue and the Affected Limb of ACLR skiers who successfully returned to sport demonstrated more hamstring dominant landings compared to the Contralateral Limb and uninjured control limbs. Skiers with/without ACLR demonstrated more quadriceps dominant landings with fatigue.

### 35. KNEE/TOTAL

#### Balance post

#### **Standing balance post total knee arthroplasty: Sensitivity to change analysis from four to twelve weeks in 466 patients**

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Osteoarthritis and Cartilage , 08/30/2016

Clark RA, et al.

**T**his study avouch the presence of extented high velocity medial–lateral (ML) sway at four compared to 12 weeks post–TKA.

Expanded difficulties to the postural control framework at once harmonizing with lessened quality levels, due to this augmented rapid sway, which could have suggestions for physical capacity amid exercises of every day living

**37. OSTEOARTHRITIS/KNEE****Pain sensitivity**

Pain. 2016 Sep;157(9):1988-99. doi: 10.1097/j.pain.0000000000000603.

**Pain sensitivity profiles in patients with advanced knee osteoarthritis.**

Frey-Law LA<sup>1</sup>, Bohr NL, Sluka KA, Herr K, Clark CR, Noiseux NO, Callaghan JJ, Zimmerman MB, Rakel BA.

The development of patient profiles to subgroup individuals on a variety of variables has gained attention as a potential means to better inform clinical decision making.

Patterns of pain sensitivity response specific to quantitative sensory testing (QST) modality have been demonstrated in healthy subjects. It has not been determined whether these patterns persist in a knee osteoarthritis population. In a sample of 218 participants, 19 QST measures along with pain, psychological factors, self-reported function, and quality of life were assessed before total knee arthroplasty. Component analysis was used to identify commonalities across the 19 QST assessments to produce standardized pain sensitivity factors. Cluster analysis then grouped individuals who exhibited similar patterns of standardized pain sensitivity component scores. The QST resulted in 4 pain sensitivity components: heat, punctate, temporal summation, and pressure. Cluster analysis resulted in 5 pain sensitivity profiles: a "low pressure pain" group, an "average pain" group, and 3 "high pain" sensitivity groups who were sensitive to different modalities (punctate, heat, and temporal summation). Pain and function differed between pain sensitivity profiles, along with sex distribution; however, no differences in osteoarthritis grade, medication use, or psychological traits were found. Residualizing QST data by age and sex resulted in similar components and pain sensitivity profiles.

Furthermore, these profiles are surprisingly similar to those reported in healthy populations, which suggests that individual differences in pain sensitivity are a robust finding even in an older population with significant disease.

**Inflammation and increase in women**

Osteoarthritis Cartilage. 2016 Aug 19. pii: S1063-4584(16)30230-8. doi: 10.1016/j.joca.2016.08.001

**Systemic inflammation and painful joint burden in osteoarthritis: a matter of sex?**

Perruccio AV<sup>1</sup>, Chandran V<sup>2</sup>, Power JD<sup>3</sup>, Kapoor M<sup>4</sup>, Mahomed NN<sup>5</sup>, Gandhi R<sup>6</sup>.

**OBJECTIVE:**

We investigated the association between serum levels of C-reactive protein (CRP) and the extent of multijoint pain among individuals with hip/knee osteoarthritis (OA) and determined whether the association differs by sex.

**DESIGN:**

Serum CRP and cartilage oligomeric matrix protein (COMP) were determined by ELISA in 189 individuals (101 female, 88 male) scheduled for total hip/knee arthroplasty for OA. Patients indicated on a homunculus all painful joints; a summed count was derived. A series of negative binomial regression models was used to investigate the cross-sectional association between painful joint count (outcome) and serum CRP concentrations, adjusting for age, sex, body mass index (BMI), comorbidity count and COMP. An interaction between sex and these biomarkers was tested.

**RESULTS:**

Mean age: 66 among women, 65 among men. Women had higher mean joint count (3.7 vs 2.5,  $P < 0.01$ ; 4+ joint count reported by 37% women, 25% men). Median CRP concentration was higher in women (15.4 mg/l vs 9.3,  $P = 0.07$ ). From adjusted analyses, the effects of both  $\ln(\text{CRP})$  and  $\ln(\text{COMP})$  were modified by sex ( $P < 0.05$ ). Increasing  $\ln(\text{CRP})$  was associated with greater painful joint count among women, but not men.

**CONCLUSIONS:**

There may be a dose-response association between painful joint burden in OA and systemic inflammation, and it appears the association is sex-specific, which may in part explain inconsistent findings in the literature. Our results underline the importance of showing sex-specific associations in OA, especially when studying the influence of inflammation.

**Deterioration of**

Arthritis Care Res (Hoboken). 2016 Aug 26. doi: 10.1002/acr.23005

**Knee extensor strength and risk of structural, symptomatic and functional decline in knee osteoarthritis: A systematic review and meta-analysis.**

Culvenor AG<sup>1,2</sup>, Ruhdorfer A<sup>1</sup>, Juhl C<sup>3,4</sup>, Eckstein F<sup>1</sup>, Elin Øiestad B<sup>5</sup>.

**OBJECTIVE:**

To perform a systematic review and meta-analysis on the association between knee extensor strength and the risk of structural, symptomatic, or functional deterioration in individuals with or at risk of knee osteoarthritis (KOA).

**METHODS:**

We systematically identified and methodologically appraised all longitudinal studies ( $\geq 1$ -year follow-up) reporting an association between knee extensor strength and structural (tibiofemoral, patellofemoral), symptomatic (self-reported, knee replacement), or functional (subjective, objective) decline in individuals with or at risk of radiographic or symptomatic KOA. Results were pooled for each of the above associations using meta-analysis, or if necessary, summarized according to a best-evidence synthesis.

**RESULTS:**

Fifteen studies were included, evaluating  $>8,000$  participants (51% female), with a follow-up time between 1.5 and 8 years. Meta-analysis revealed that lower knee extensor strength was associated with an increased risk of symptomatic (WOMAC-Pain: odds ratio [OR] 1.35, 95% confidence interval [CI] 1.10, 1.67) and functional decline (WOMAC-Function: OR 1.38, 95% CI 1.00, 1.89; chair-stand task: OR 1.03, 95% CI 1.03, 1.04), but not increased risk of radiographic tibiofemoral joint space narrowing (JSN) (OR 1.15, 95% CI 0.84, 1.56). No trend in risk was observed for KOA status (present vs. absent). Best-evidence synthesis showed inconclusive evidence for lower knee extensor strength being associated with increased risk of patellofemoral deterioration.

**CONCLUSION:**

Meta-analysis showed that lower knee extensor strength is associated with an increased risk of symptomatic and functional deterioration, but not tibiofemoral JSN. The risk of patellofemoral deterioration in the presence of knee extensor strength deficits is inconclusive. This article is protected by copyright. All rights reserved.

**Location specific evaluation****Location-independent analysis of structural progression of osteoarthritis - taking it all apart, and putting the puzzle back together makes the difference**

Felix Eckstein Robert Buck Wolfgang Wirth

DOI: <http://dx.doi.org/10.1016/j.semarthrit.2016.08.016>**Abstract****Objective**

The metric accepted by regulatory bodies for determining structural progression in clinical trials of knee osteoarthritis (OA) remains change in radiographic joint space width in the medial femorotibial compartment. However, magnetic resonance imaging has revealed that cartilage loss is spatially heterogeneous, and that it is enigmatic which knee will lose cartilage at which location. Whereas previous reviews have focused on imaging in general, the purpose of this particular perspective is to highlight availability and applications of location-independent analysis methodology in measuring structural progression in epidemiological and interventional clinical trials, and to highlight its specific advantages over existing methodologies.

**Methods**

Narrative review/perspective based on a Pubmed search of original articles from 2009 to current.

**Results**

Ordering longitudinal change in subregion cartilage thickness by magnitude and direction, and averaging such ordered values or sums of negative and positive changes across knees. is shown to be superior in detecting risk factors and interventional effects on structural progression of knee OA. Further, the methodology permits exploration of cartilage loss and gain simultaneously, phenomena that are missed when measurements are confined to cartilage volume or thickness loss in plates or compartments.

**Conclusions**

Given spatial heterogeneity of cartilage loss in knee OA, location-independent analysis by MRI may provide opportunity for a paradigm shift. The authors recommend use of a location-independent metrics as the structural endpoints in epidemiological and intervention trials, particularly when examining anabolic and catabolic drug effects. Location-independent methods may be translated to analysis of cartilage composition and other articular tissues

**Tailored exercise**

Arthritis Care Res (Hoboken). 2016 Aug 26. doi: 10.1002/acr.23013. [

**Efficacy of tailored exercise therapy on physical functioning in patients with knee osteoarthritis and comorbidity: A randomized controlled trial.**

de Rooij M<sup>1</sup>, van der Leeden M<sup>1,2</sup>, Cheung J<sup>3</sup>, van der Esch M<sup>1</sup>, Häkkinen A<sup>4</sup>, Haverkamp D<sup>3</sup>, Roorda LD<sup>1</sup>, Twisk J<sup>5</sup>, Vollebregt J<sup>1</sup>, Lems WF<sup>6</sup>, Dekker J<sup>7</sup>.

**OBJECTIVE:**

To evaluate the efficacy on physical functioning and safety of tailored exercise therapy in patients with knee osteoarthritis (KOA) and comorbidities.

**METHOD:**

In a randomized controlled trial, 126 participants were included with a clinical diagnosis of KOA and at least one of the following target comorbidities: coronary disease, heart failure, type 2 diabetes, chronic obstructive pulmonary disease or obesity (body mass index  $\geq 30\text{kg/m}^2$ ), with severity score  $\geq 2$  on the Cumulative Illness Rating Scale. The intervention group received a 20-week, individualized, comorbidity-adapted exercise program consisting of aerobic and strength training. The control group received their current medical care for KOA and were placed on a waiting list for exercise therapy. Primary outcome measures were Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) subscale physical functioning and 6-minute walking test (6-MWT). Measurements were performed at baseline, after 20 weeks (post-treatment) and at 3 months post-treatment.

**RESULTS:**

Statistically significant physical functioning differences over time were found between the intervention and control group (WOMAC;  $B = -7.43$ , 95% CI  $-9.99$  to  $-4.87$ ,  $p < 0.001$  and 6-MWT;  $B = 34.16$ , 95% CI  $17.68$  to  $50.64$ ,  $p < 0.001$ ) in favor of the intervention group. At 3-months follow, the mean improvements in the intervention group were 33% on the WOMAC scale and 15% on the 6-MWT. These improvements are of clinical relevance. No serious adverse events occurred during the intervention.

**CONCLUSION:**

This is the first study showing that tailored exercise therapy is efficacious in improving physical functioning and safe in patients with KOA and severe comorbidities. This article is protected by copyright. All rights reserved.

**Serum and PF problems**

Arthritis Res Ther. 2016 Aug 26;18(1):193.

**Serum levels of interleukin-17 and adiponectin are associated with infrapatellar fat pad volume and signal intensity alteration in patients with knee osteoarthritis.**

Wang K<sup>1,2</sup>, Xu J<sup>1</sup>, Cai J<sup>1</sup>, Zheng S<sup>1</sup>, Han W<sup>2</sup>, Antony B<sup>2</sup>, Ding C<sup>3,4</sup>.

**BACKGROUND:**

In the present study, we sought to generate hypotheses regarding the associations of serum levels of interleukin (IL)-17, adiponectin, and resistin with magnetic resonance imaging-measured infrapatellar fat pad (IPFP) size and signal intensity alterations in patients with knee osteoarthritis (OA).

**METHODS:**

A total of 170 subjects with symptomatic knee OA (mean age 55.4 years, range 34-74, 88.2 % females) were included. IPFP volume was measured on T1-weighted spoiled gradient-recalled acquisition in the steady state images and was computed by using a software program. IPFP high signal intensity (grades 0-3) was assessed on T2-weighted fast spin echo images. Serum IL-17, adiponectin, and resistin levels were measured using an enzyme-linked immunosorbent assay.

**RESULTS:**

In multivariable analyses, serum IL-17 was negatively associated with IPFP volume ( $\beta = -0.185$ , 95 % CI -0.337 to -0.034) but positively associated with the severity of IPFP signal intensity alteration (OR 1.23, 95 % CI 1.06-1.42) after adjustment for age, sex, weight, and height. Serum adiponectin was positively associated with IPFP volume ( $\beta = 0.016$ , 95 % CI 0.001-0.032) but negatively associated with IPFP signal intensity alteration (OR 0.99, 95 % CI 0.98-1.00) after adjustment for covariates. Resistin was positively associated with IPFP signal intensity alteration (OR 1.13, 95 % CI 1.04-1.23) but not with IPFP volume. The significant associations of adiponectin or resistin disappeared after further adjustment for IL-17; in contrast, the significant associations of IL-17 remained after further adjustment for adiponectin.

**CONCLUSIONS:**

While serum IL-17 and resistin were associated with reduced IPFP volume and/or increased abnormal signal intensity alteration, serum adiponectin had opposite associations that were largely through IL-17. These findings suggest that serum adipocytokines may have a role to play in IPFP changes of knee OA.

**Changes in strength and vibration sense**

Arthritis Rheumatol. 2016 Aug 26. doi: 10.1002/art.39821.

**The association of vibratory perception and muscle strength with the incidence and worsening of knee instability: the Multicenter Osteoarthritis Study.**

Shakoor N<sup>1</sup>, Felson DT<sup>2,3</sup>, Niu J<sup>2</sup>, Nguyen US<sup>4</sup>, Segal NA<sup>5</sup>, Singh JA<sup>6</sup>, Nevitt MC<sup>7</sup>.

**OBJECTIVE:**

To examine neuromuscular risk factors for the incidence and progression of knee instability symptoms in older adults with or at high risk for knee osteoarthritis.

**METHODS:**

At the 60-month clinic visit of the Multicenter Osteoarthritis Study participants underwent evaluation of quantitative vibratory sense at the knee and isokinetic quadriceps muscle strength. Participants were also asked about knee buckling and sensations of knee shifting or slipping without buckling in the past 3 months at this 60 month visit and then asked the same questions at the 72 and 84 month follow up visits. We performed a person-based analyses using Poisson regression with robust error variance to estimate adjusted relative risk for the association of vibratory sense and muscle strength with the incidence and worsening of knee slipping/shifting, buckling, and overall knee instability symptoms (either buckling or knee shifting/slipping), with adjustment for relevant confounders.

**RESULTS:**

1803 participants (61% women) were included. Approximately one-third reported incident or worsening of instability symptoms over the study period. Adjusting for relevant confounders, better vibratory acuity (adjusted RR:0.78, 95%CI: 0.56,1.09),  $p=0.020$  for trend) and greater quadriceps strength (adjusted RR:0.53, 95%CI:0.38,0.75,  $p<0.001$ ) protected against incident knee instability symptoms. Greater quadriceps strength (adjusted RR:0.73, 95%CI:0.58,0.92,  $p=0.008$ ) also protected against worsening of knee instability symptoms.

**CONCLUSION:**

Vibratory acuity and quadriceps muscle strength are important predictors of knee instability incidence and worsening over 2 years. These neuromuscular factors are potentially modifiable and should be considered in interventional studies of instability in persons with or at risk for knee osteoarthritis. This article is protected by copyright. All rights reserved.

**39 A. ORTHOTICS**

Do they help mechanics?

**RESEARCH REPORT****The Influence of a Prefabricated Foot Orthosis on Lower Extremity Mechanics During Running in Individuals With Varying Dynamic Foot Motion**

**Authors:** Thomas G. Almonroeder, DPT<sup>1</sup>, Lauren C. Benson, MS<sup>1</sup>, Kristian M. O'Connor, PhD<sup>1</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*,  
2016 **Volume:**46 **Issue:**9 **Pages:**749–755 **DOI:**10.2519/jospt.2016.6253

**Study Design**

Controlled laboratory study, cross-sectional.

**Background**

Orthotic prescription is often based on the premise that the mechanical effects will be more prominent in individuals with greater calcaneal eversion.

**Objective**

To compare the effects of a prefabricated foot orthosis on lower extremity kinematics and kinetics between recreational athletes with high and low calcaneal eversion during running.

**Methods**

Thirty-one recreational athletes were included in this study. Three-dimensional kinematic and kinetic data were collected while running with and without a foot orthosis. Participants were grouped based on the degree of calcaneal eversion during the running trials relative to a standing trial (dynamic foot motion). The effects of the orthosis on the frontal and transverse plane angles and moments of the hip and knee were compared between the 10 participants with the greatest and least amount of dynamic foot motion.

**Results**

There were no significant interactions (group by orthotic condition) for any of the kinematic or kinetic variables of interest.

**Conclusion**

The effects of an orthosis on the mechanics of the hip and knee do not appear to be dependent on an individual's dynamic foot motion. *J Orthop Sports Phys Ther* 2016;46(9):749–755. Epub 5 Aug 2016. doi:10.2519/jospt.2016.6253

Keyword: biomechanics, injury, patellofemoral pain

**40. ANKLE SPRAINS AND INSTABILITY**

Feedback and forward changes

**RESEARCH REPORT****Feedback and Feedforward Control During Walking in Individuals With Chronic Ankle Instability**

**Authors:** Sheng-Che Yen, PT, PhD<sup>1</sup>, Marie B. Corkery, DPT<sup>1</sup>, Amy Donohoe, DPT<sup>1</sup>, Maddison Grogan, DPT<sup>1</sup>, Yi-Ning Wu, PhD<sup>2</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2016 **Volume:**46 **Issue:**9 **Pages:**775–783 **DOI:**10.2519/jospt.2016.6403

**Study Design**

Controlled laboratory study.

**Background**

Recurrent ankle sprains associated with chronic ankle instability (CAI) occur not only in challenging sports but also in daily walking. Understanding whether and how CAI alters feedback and feedforward controls during walking may be important for developing interventions for CAI prevention or treatment.

**Objective**

To understand whether CAI is associated with changes in feedback and feedforward control when individuals with CAI are subjected to experimental perturbation during walking.

**Methods**

Twelve subjects with CAI and 12 control subjects walked on a treadmill while adapting to external loading that generated inversion perturbation at the ankle joint. Ankle kinematics around heel contact during and after the adaptation were compared between the 2 groups.

**Results**

Both healthy and CAI groups showed an increase in eversion around heel contact in early adaptation to the external loading. However, the CAI group adapted back toward the baseline, while the healthy controls showed further increase in eversion in late adaptation. When the external loading was removed in the postadaptation period, healthy controls showed an aftereffect consisting of an increase in eversion around heel contact, but the CAI group showed no aftereffect.

**Conclusion**

The results provide preliminary evidence that CAI may alter individuals' feedback and feedforward control during walking. *J Orthop Sports Phys Ther* 2016;46(9):775–783. Epub 5 Aug 2016. doi:10.2519/jospt.2016.6403 Keyword: adaptation, ankle instability, feedback, feedforward, gait

## 45 A. MANUAL THERAPY LUMBAR &amp; GENERAL

McKenzie

## RESEARCH REPORT

**Effect of Adding McKenzie Syndrome, Centralization, Directional Preference, and Psychosocial Classification Variables to a Risk-Adjusted Model Predicting Functional Status Outcomes for Patients With Lumbar Impairments**

**Authors:** Mark W. Werneke, PT, MSc, Dip MDT<sup>1</sup>, Susan Edmond, PT, DSc, OCS<sup>2</sup>, Daniel Deutscher, PT, PhD<sup>3</sup>, Jason Ward, MPT, Cert MDT<sup>4</sup>, David Grigsby, MPT, Cert MDT<sup>4</sup>, Michelle Young, PT, Cert MDT<sup>5</sup>, Troy McGill, PT, Dip MDT<sup>6</sup>, Brian McClenahan, PT, OCS, FAAOMPT, Dip MDT<sup>7</sup>, Jon Weinberg, PT, Dip MDT<sup>8</sup>, Amy L. Davidow, PhD<sup>9</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*,  
016 Volume:46 Issue:9 Pages:726–741 DOI:10.2519/jospt.2016.6266

**Background**

Patient-classification subgroupings may be important prognostic factors explaining outcomes.

**Objectives** To determine effects of adding classification variables (McKenzie syndrome and pain patterns, including centralization and directional preference; Symptom Checklist Back Pain Prediction Model [SCL BPPM]; and the Fear-Avoidance Beliefs Questionnaire subscales of work and physical activity) to a baseline risk-adjusted model predicting functional status (FS) outcomes.

**Methods** Consecutive patients completed a battery of questionnaires that gathered information on 11 risk-adjustment variables. Physical therapists trained in Mechanical Diagnosis and Therapy methods classified each patient by McKenzie syndromes and pain pattern. Functional status was assessed at discharge by patient-reported outcomes. Only patients with complete data were included. Risk of selection bias was assessed. Prediction of discharge FS was assessed using linear stepwise regression models, allowing 13 variables to enter the model. Significant variables were retained in subsequent models. Model power ( $R^2$ ) and beta coefficients for model variables were estimated.

**Results** Two thousand sixty-six patients with lumbar impairments were evaluated. Of those, 994 (48%), 10 (<1%), and 601 (29%) were excluded due to incomplete psychosocial data, McKenzie classification data, and missing FS at discharge, respectively. The final sample for analyses was 723 (35%). Overall  $R^2$  for the baseline prediction FS model was 0.40. Adding classification variables to the baseline model did not result in significant increases in  $R^2$ . McKenzie syndrome or pain pattern explained 2.8% and 3.0% of the variance, respectively. When pain pattern and SCL BPPM were added simultaneously, overall model  $R^2$  increased to 0.44. Although none of these increases in  $R^2$  were significant, some classification variables were stronger predictors compared with some other variables included in the baseline model.

**Conclusion**

The small added prognostic capabilities identified when combining McKenzie or pain-pattern classifications with the SCL BPPM classification did not significantly improve prediction of FS outcomes in this study. Additional research is warranted to investigate the importance of classification variables compared with those used in the baseline model to maximize predictive power.

**Level of Evidence** Prognosis, level 4. *J Orthop Sports Phys Ther* 2016;46(9):726–741. Epub 31 Jul 2016. doi:10.2519/jospt.2016.6266

**Manual therapy over conventional PT in LBP****Spinal mobilization vs conventional physiotherapy in the management of chronic low back pain due to spinal disk degeneration: a randomized controlled trial**

**Georgios Krekoulas**, Ioannis D. Gelalis, Theodoros Xenakis, Georgios Gioftsos, Zacharias Dimitriadis & Vasiliki Sakellari

JMMT Page 1-10 | Published online: 23 Jun 2016

- <http://dx.doi.org/10.1080/10669817.2016.1184435>

**Abstract**

**Objectives:** The aim of the study was to examine the efficacy of spinal mobilization in subjects with low back pain (LBP) and associated spinal disk degeneration.

**Methods:** Seventy-five subjects suffering from chronic LBP (>3 months) were randomly allocated into 3 groups of 25 subjects each. Each group received five treatment sessions with the first group receiving manual therapy (MT) (spinal mobilization), the second a sham treatment, and the third conventional physiotherapy (CP) (stretching exercises, transcutaneous electrical nerve stimulation, and massage). Subjects were assessed for their pain intensity using the numerical pain rating scale and for their self-reported disability using the Oswestry and Roland-Morris Questionnaire at baseline and after the completion of the five treatment sessions.

**Results:** Paired *t*-tests showed a significant improvement for all outcome measures in the MT and CP group ( $p < 0.05$ ). Analysis of covariance revealed that the MT group had significant improvement in all outcome measures in comparison with the sham and CP group ( $p < 0.05$ ), whereas no significant difference was observed between the sham and CP group ( $p > 0.05$ ).

**Discussion:** MT is preferable to CP in order to reduce the pain intensity and disability in subjects with chronic LBP and associated disk degeneration. The findings of this study may lead to the establishment of spinal mobilization as one of the most preferable approaches for the management of LBP due to disk degeneration.

**Level of evidence:** 1b.

**46 A. UPPER LIMB NEUROMOBILIZATION****Median nerve****Differential Diagnosis and Intervention of Proximal Median Nerve Entrapment: A Resident's Case Problem**

**Authors:** Marcus R. Bair, DPT, OCS<sup>1</sup>, Michael T. Gross, PT, PhD, FAPTA<sup>2</sup>, Jennifer R. Cooke, DPT<sup>2</sup>, Carla H. Hill, DPT, OCS, Cert MDT<sup>2</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2016 **Volume:**46 **Issue:**9 **Pages:**800–808 **DOI:**10.2519/jospt.2016.6723

**Study Design**

Resident's case problem.

**Background**

Entrapment neuropathies represent a diagnostic challenge and require a comprehensive understanding of the nerve's path and the anatomical structures that may cause compression of the nerve. This resident's case problem details the evaluation and differential diagnosis process for median nerve entrapment resulting from forceful and repetitive pronation/supination motions.

**Diagnosis**

Median nerve compression syndromes include pronator syndrome, anterior interosseous nerve syndrome, and carpal tunnel syndrome. A cluster of clinical special tests were performed to determine the anatomical site of median nerve entrapment. Based on the patient's history and clinical test results, a diagnosis of pronator syndrome was determined. Provocation testing specific to pronator syndrome assisted with further localizing the site of entrapment to the pronator teres muscle, which guided effective management strategies.

**Discussion**

This resident's case problem illustrates the importance of detailed anatomical knowledge and a differential diagnostic process when evaluating a patient with signs and symptoms of an entrapment neuropathy of the median nerve. Electrodiagnostic studies are useful in ruling out carpal tunnel and anterior interosseous nerve syndromes, but are often inconclusive in cases of pronator syndrome. Therefore, a diagnosis of pronator syndrome in this case problem was based on a detailed understanding of median nerve anatomy, potential sites of compression, and unique clinical features associated with this condition.

**Level of Evidence**

Differential diagnosis, level 4. *J Orthop Sports Phys Ther* 2016;46(9):800–808. Epub 5 Aug 2016. doi:10.2519/jospt.2016.6723

**46 B. LOWER LIMB NEUROMOILIZATION****Safety of****Safety of lower extremity neurodynamic exercises in adults with diabetes mellitus: a feasibility study**

**Benjamin S. Boyd**, Robert J. Nee & Betty Smoot  
JMMT Page 1-9 | Published online: 17 Jun 2016

- <http://dx.doi.org/10.1080/10669817.2016.1180772>

## Abstract

**Objectives:** Neurodynamic exercises aim to improve neural mechanosensitivity in order to promote pain-free movement and function. People with diabetes mellitus (DM) may be candidates for neurodynamic exercises to address common DM-related impairments such as reduced lower extremity range of motion (ROM) and altered neural mechanosensitivity. However, no studies have examined the safety and immediate effects of neurodynamic exercise in people with DM. This study aims to determine the feasibility of applying neurodynamic exercises in adults with DM by evaluating the rate of adverse events and quantifying immediate changes in straight leg raise (SLR) ROM.

**Methods:** This quasi-experimental study included 20 people with DM who performed a series of neurodynamic exercises on their right leg. Their left leg was used as an internal control. SLR testing was performed before and immediately after these exercises. Adverse events were monitored, including provocation of their neuropathy symptoms or discomfort or pain.

**Results:** All participants completed the neurodynamic exercises without provocation of their neuropathy symptoms. No pain was reported and only one participant had minor discomfort with one exercise; a <30-s calf cramp. The right SLR ROM increased by an average of 5.2°–5.3° ( $p < 0.01$ ) with no change on the left.

**Discussion:** This study demonstrated that lower extremity neurodynamic exercises are safe in adults with DM and may create small immediate improvements in SLR testing. Further research is indicated to investigate the safety and efficacy of neurodynamic exercises performed over multiple sessions.

**Level of evidence:** 3b

**Keywords:** Nerve, Neurodynamics, Mechanosensitivity, Diabetes mellitus, Straight leg raise, Safety, Feasibility,

## SLR in normals

**Effect of leg dominance, gender and age on sensory responses to structural differentiation of straight leg raise test in asymptomatic subjects: a cross-sectional study****Eva Sierra-Silvestre**, María Torres Lacomba & Pedro de la Villa Polo

JMMT Page 1-7 | Published online: 27 Jun 2016

- <http://dx.doi.org/10.1080/10669817.2016.1200216>

**Abstract****Study design:** Cross-sectional study.**Objectives:** To assess the effect of structural differentiation on sensory responses of asymptomatic individuals to standard neurodynamic tests of straight leg raise (SLR) and to evaluate the relevance of leg dominance, gender, and age.**Background:** SLR test is a well-known neurodynamic test among physical therapists; no studies to date have investigated the influence of gender, age, and leg dominance to the sensory responses of this neurodynamic test and its structured differentiating maneuver.**Methods:** Thirty (16 women) asymptomatic individuals enrolled in this study. Dominancy test was performed for each participant. Pain intensity using visual analogue scale (VAS), symptoms location in a body chart, nature of symptoms evoked, and hip range of motion (ROM) were recorded and compared at ankle neutral position (N-SLR) and dorsiflexion (DF-SLR) in both legs at the point of pain tolerance during SLR (P2). In addition, hip ROM was recorded at the onset of pain (P1).**Results:** There was a statistically significant sex main effect for P1 and P2 between N-SLR and DF-SLR ( $p < 0.05$ ). Mean hip ROM during the SLR was more than  $10^\circ$  greater in women than men. There was no statistically significant interaction between leg dominance and age group in N-SLR, DF-SLR, and VAS. Pain intensity was moderate for each SLR test. Symptoms most often described were stretch (96.7%), followed by tightness (70%) in the posterior thigh and leg.**Conclusions:** SLR hip ROM is influenced by sex in asymptomatic individuals, leading to a greater hip ROM in SLR in women. Age and limb dominance are not relevant to SLR hip ROM or pain intensity.

**48 B. TRIGGER POINTS NEEDLING/ACUPUNCTURE**

Neck patients with stretching

**Dry needling of the trapezius muscle in office workers with neck pain: a randomized clinical trial**

**Ester Cerezo-Téllez**, María Torres Lacomba, Isabel Fuentes-Gallardo, Orlando Mayoral del Moral, Beatriz Rodrigo-Medina & Carlos Gutiérrez Ortega

JMMT Page 223-232 | Received 30 Aug 2014, Accepted 01 Mar 2015, Published online: 27 May 2016

- <http://dx.doi.org/10.1179/2042618615Y.0000000004>

**Abstract****Background:**

Neck pain is a frequent complaint in office workers. This pain can be caused by myofascial trigger points (MTrPs) in the trapezius muscle. This study aimed to determine the effectiveness of deep dry needling (DDN) of active MTrPs in the trapezius muscle.

**Methods:**

A randomized, single blinded clinical trial was carried out at the Physical Therapy Department at Physiotherapy in Women's Health Research Group at Physical Therapy Department of University of Alcalá, in Alcalá de Henares, Madrid, Spain. Forty-four office workers with neck pain and active MTrPs in the trapezius muscle were randomly allocated to either the DDN or the control group (CG). The participants in the DDN group were treated with DDN of all MTrPs found in the trapezius muscle. They also received passive stretch of the trapezius muscle. The CG received the same passive stretch of the trapezius muscle only. The primary outcome measure was subjective pain intensity, measured using a visual analogue scale (VAS). Secondary outcomes were pressure pain threshold (PPT), cervical range of motion (CROM) and muscle strength. Data were collected at baseline, after interventions and 15 days after the last treatment.

**Results:**

Differences were found between the DDN group and the CG for the VAS ( $P < 0.001$ ), PPT ( $P < 0.001$ ), range of motion (AROM) ( $P < 0.05$ ) and strength ( $P < 0.05$ ) after intervention and at the 15-day follow-up.

**Discussion:**

Deep dry needling and passive stretch seems to be more effective than passive stretch only. The effects are maintained in the short term. The results support the use of DDN in the management of trapezius muscle myofascial pain syndrome in neck pain.

Keywords: Myofascial pain syndromes, Physical therapy, Muscle stretching exercises, Neck pain, Dry needling, Myofascial trigger point,

**52. EXERCISE****Glut maximus portions****Comparison of Electromyographic Activity of the Superior and Inferior Portions of the Gluteus Maximus Muscle During Common Therapeutic Exercises**

**Authors:** David M. Selkowitz, PT, PhD, DPT, OCS, DAAPM<sup>1</sup>, George J. Beneck, PT, PhD, OCS, KEMG<sup>2</sup>, Christopher M. Powers, PT, PhD, FACSM, FAPTA<sup>3</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*,  
2016 **Volume:**46 **Issue:**9 **Pages:**794–799 **DOI:**10.2519/jospt.2016.6493

**Study Design**

Controlled laboratory study, repeated-measures design.

**Background**

Previous studies have reported that the superior and inferior portions of the gluteus maximus have different functional roles. Knowledge of how the different portions of the gluteus maximus are activated during therapeutic exercise may lead to more specific exercise prescription.

**Objective**

To compare muscle activation of the superior and inferior portions of the gluteus maximus during commonly used therapeutic exercises.

**Methods**

Twenty healthy persons participated. Electromyographic (EMG) signals were obtained from the superior and inferior portions of the gluteus maximus using fine-wire electrodes. Normalized EMG signal amplitudes were compared between the superior and inferior gluteus maximus across 11 exercises using a 2-way repeated-measures analysis of variance.

**Results**

The superior portion of the gluteus maximus had significantly greater relative EMG activity than the inferior portion of the gluteus maximus during exercises that incorporated elements of hip abduction and/or external rotation (5 of 11 exercises evaluated). There was no significant difference in activation between the superior and inferior portions of the gluteus maximus during the remaining 6 exercises.

**Conclusion**

The results of the present study demonstrate preferential activation of the superior portion of the gluteus maximus during exercises that incorporate elements of hip abduction and/or external rotation. In contrast, exercises that primarily involve hip extension target both portions of the gluteus maximus to a similar extent. *J Orthop Sports Phys Ther* 2016;46(9):794–799. Epub 5 Aug 2016. doi:10.2519/jospt.2016.6493

Keyword: electromyography, exercise therapy, gluteal muscles, hip

## 53. CORE

## LBP and multifidus

**Multifidi Muscle Characteristics and Physical Function among Older Adults with and without Chronic Low Back Pain**

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James M. Elliott, PhD, PT Gregory E. Hicks, PhD, PT

DOI: <http://dx.doi.org/10.1016/j.apmr.2016.07.027>

**Highlights**

- Greater intramuscular fat is found among older adults with chronic low back pain.
- Multifidi quality is associated with physical function in adults with back pain.
- Multifidi muscle size is not associated with physical function in older adults.

**Objective** The purpose of this study was to determine if multifidi size and/or intramuscular fat were associated with self-reported and performance-based physical function in older adults with and without chronic LBP.

**Design** Case-control study

**Setting** Individuals participated in a standardized evaluation in a clinical laboratory and underwent magnetic resonance imaging (MRI) of the lumbar spine at a nearby facility.

**Patient Sample** A volunteer sample of 106 community-dwelling older adults, aged 60-85 years, with (n=57) and without (n=49) chronic LBP were included in this secondary data analysis.

**Intervention** Average right-left, L5 multifidi relative, i.e. total, cross-sectional area (rCSA); muscle-fat infiltration index (MFI), i.e. a measure of intramuscular fat; and relative muscle cross-sectional area (rmCSA), i.e. total CSA minus intramuscular fat CSA, were determined from MRIs. Linear regression modeling was performed with physical function measures as the dependent variables. Age, sex, and body mass index were entered as covariates. The main effects of L5 multifidi MFI and rmCSA, as well as their interaction with group assignment, were compared as independent variables.

**Main Outcome Measures** Short Form-36 Health Survey Physical Functioning subscale (SF-36 PFS), Timed Up and Go (TUG), gait speed, and fast stair descent performance.

**Results** Interaction terms between L5 multifidi MFI and group assignment were found to be significant contributors to the variance explained in all physical function measures ( $p \leq .012$ ). Neither the main effect, nor the interaction with group assignment for L5 multifidi rmCSA, significantly contributed to the variance explained in any of the physical function measures ( $p > .012$ ).

**Conclusions** Among older adults with chronic LBP of at least moderate intensity, L5 multifidi muscle composition, but not size, may help to explain physical function.

**56. ATHLETICS**

## Limiting pitches

**Am J Sports Med.** 2016 Jul 11. pii: 0363546516643813.

**Should We Limit Innings Pitched After Ulnar Collateral Ligament Reconstruction in Major League Baseball Pitchers?**

**Erickson BJ<sup>1</sup>, Cvetanovich GL<sup>2</sup>, Bach BR Jr<sup>2</sup>, Bush-Joseph CA<sup>2</sup>, Verma NN<sup>2</sup>, Romeo AA<sup>2</sup>.**

**BACKGROUND:**

Ulnar collateral ligament reconstruction (UCLR) has become a common procedure among Major League Baseball (MLB) pitchers. It is unclear if a limit on innings pitched after UCLR should be instituted to prevent revision UCLR.

**HYPOTHESIS:**

Number of innings pitched and number of pitches thrown after UCLR will not affect whether a pitcher requires a revision UCLR.

**STUDY DESIGN:**

Descriptive laboratory study.

**METHODS:**

All MLB pitchers between 1974 and 2015 who pitched at least 1 full season after UCLR were included in this study. Pitch counts and innings pitched for the first full season after UCLR as well as total pitch count and total innings pitched were recorded. Pitch counts and innings pitched were compared among players who required revision UCLR and those who did not.

**RESULTS:**

Overall, 154 pitchers were included. Of these, 135 pitchers did not require revision UCLR while 19 underwent revision UCLR. No significant difference existed between pitchers who underwent revision UCLR and those who did not when comparing number of innings pitched in the season after UCLR ( $79.4 \pm 46.7$  vs  $90.1 \pm 58.6$ ;  $P = .9016$ ), number of pitches thrown in the season after UCLR ( $1233.2 \pm 710.4$  vs  $1449.2 \pm 904.1$ ;  $P = .7337$ ), number of innings pitched in the pitcher's career after UCLR ( $357.4 \pm 312.0$  vs  $399.3 \pm 446.4$ ;  $P = .6945$ ), and number of pitches thrown in the pitcher's career after UCLR ( $5632.7 \pm 4583.9$  vs  $5674.7 \pm 5755.4$ ;  $P = .4789$ ), respectively. Furthermore, no difference existed in revision rate between pitchers who pitched more or less than 180 innings in the first full season after UCLR ( $P = .6678$ ).

**CONCLUSION:**

The number of innings pitched and number of pitches thrown in the first full season as well as over a player's career after UCLR are not associated with an increased risk of a pitcher requiring revision UCLR.

**57. GAIT****Hip angles and posture****February 2015** Volume 20, Issue 1, Pages 176–182**Effect of posture on hip angles and moments during gait**

Cara L. Lewis Shirley A. Sahrman

DOI: <http://dx.doi.org/10.1016/j.math.2014.08.007>

Anterior hip pain is common in young, active adults.

Clinically, we have noted that patients with anterior hip pain often walk in a swayback posture, and that their pain is reduced when the posture is corrected. The purpose of this study was to investigate a potential mechanism for the reduction in pain by testing the effect of posture on movement patterns and internal moments during gait in healthy subjects. Fifteen subjects were instructed to walk while maintaining three postures: 1) natural, 2) swayback, and 3) forward flexed. Kinematic and force data were collected using a motion capture system and a force plate. Walking in the swayback posture resulted in a higher peak hip extension angle, hip flexor moment and hip flexion angular impulse compared to natural posture. In contrast, walking in a forward flexed posture resulted in a decreased hip extension angle and decreased hip flexion angular impulse.

Based on these results, walking in a swayback posture may result in increased forces required of the anterior hip structures, potentially contributing to anterior hip pain. This study provides a potential biomechanical mechanism for clinical observations that posture correction in patients with hip pain is beneficial.

**58. RUNNING****Treadmill running****RESEARCH REPORT****Effect of Body-Weight-Support Running on Lower-Limb Biomechanics**

**Authors:** Michael Neal, MSc<sup>1</sup>, Neil Fleming, PhD<sup>2</sup>, Lindsey Eberman, PhD<sup>1</sup>, Kenneth Games, PhD<sup>1</sup>, Jeremiah Vaughan, MSc<sup>3</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2016 **Volume:**46 **Issue:**9 **Pages:**784–793 **DOI:**10.2519/jospt.2016.6503

**Study Design**

Controlled laboratory study.

**Background**

Body-weight-support (BWS) running is increasing in popularity, despite limited evidence of its effects on running mechanics.

**Objectives**

To determine the effect of increasing BWS on lower-limb biomechanics during lower-body positive-pressure (LBPP) treadmill running.

**Methods**

Fourteen male recreational runners completed 15 randomized trials on an LBPP treadmill at 5 levels of BWS and 3 velocities (1-minute trials with 3-minute recovery). Knee and ankle kinematic data were recorded continuously via electrogoniometry. Synchronous in-shoe plantar-pressure data identified stride onset and quantified foot-segment forces. Data were recorded during the final 30 seconds of each trial and averaged over 10 consecutive stride cycles.

**Results**

Higher levels of BWS resulted in significantly ( $P<.001$ ) increased stride duration, reduced stride frequency, and reduced ground contact time (GCT). In addition, normalized GCT (GCT/stride duration) was significantly reduced ( $P<.001$ ), indicating increased flight time. Increasing BWS resulted in significant reductions ( $P<.001$ ) in peak knee flexion and dorsiflexion and reduced overall knee and ankle range of motion during the stance phase.

**Conclusion**

Running on an LBPP treadmill alters lower-limb kinematics, resulting in reduced ankle and knee joint range of motion. In addition, increased BWS alters stride characteristics, resulting in shorter GCT and longer flight time. Clinicians must be aware of lower-limb kinematic alterations to provide safe and effective parameters for rehabilitation involving LBPP treadmills. *J Orthop Sports Phys Ther* 2016;46(9):784–793. doi:10.2519/jospt.2016.6503

Keyword: kinematics, kinetics, rehabilitation, running

**59. PAIN****Neuropathic pain**

Drugs Aging. 2016 Aug 10.

**An Algorithm for Neuropathic Pain Management in Older People.**

Pickering G<sup>1,2,3</sup>, Marcoux M<sup>4</sup>, Chapiro S<sup>5</sup>, David L<sup>6</sup>, Rat P<sup>7</sup>, Michel M<sup>8</sup>, Bertrand I<sup>9</sup>, Voute M<sup>4</sup>, Wary B<sup>10</sup>.

Neuropathic pain frequently affects older people, who generally also have several comorbidities.

Elderly patients are often poly-medicated, which increases the risk of drug-drug interactions. These patients, especially those with cognitive problems, may also have restricted communication skills, making pain evaluation difficult and pain treatment challenging. Clinicians and other healthcare providers need a decisional algorithm to optimize the recognition and management of neuropathic pain. We present a decisional algorithm developed by a multidisciplinary group of experts, which focuses on pain assessment and therapeutic options for the management of neuropathic pain, particularly in the elderly. The algorithm involves four main steps: (1) detection, (2) evaluation, (3) treatment, and (4) re-evaluation. The detection of neuropathic pain is an essential step in ensuring successful management. The extent of the impact of the neuropathic pain is then assessed, generally with self-report scales, except in patients with communication difficulties who can be assessed using behavioral scales.

The management of neuropathic pain frequently requires combination treatments, and recommended treatments should be prescribed with caution in these elderly patients, taking into consideration their comorbidities and potential drug-drug interactions and adverse events. This algorithm can be used in the management of neuropathic pain in the elderly to ensure timely and adequate treatment by a multidisciplinary team.

**Expectations**

Eur J Pain. 2016 Aug 26. doi: 10.1002/ejp.928.

**Expectation influences the interruptive function of pain: Behavioural and neural findings.**

Sinke C<sup>1,2</sup>, Schmidt K<sup>1,3</sup>, Forkmann K<sup>3</sup>, Bingel U<sup>1,3</sup>.

**BACKGROUND:**

Expectations can dramatically influence the perception of pain, as has been shown in placebo analgesia or nocebo hyperalgesia. Here, we investigated the role of expectation on the interruptive function of pain - the negative consequences of pain on cognitive task performance - in 42 healthy human subjects.

**METHODS:**

Verbal and written instructions were used to manipulate the subjects' expectation of how pain would influence their task performance in an established visual categorization task which was performed with or without concomitant painful thermal stimulation during 3T fMRI scanning. The categorization task was followed by a surprise recognition task.

**RESULTS:**

We observed a significant interaction between stimulation (pain/no pain) and expectancy (positive expectation/negative expectation): categorization accuracy decreased during painful stimulation in the negative expectancy group (N = 21), while no difference was observed in the positive expectancy group (N = 21). On the neural level, the positive expectancy group showed stronger activity in the anterior cingulate cortex (ACC) and hippocampus during painful stimulation compared to the negative group. Moreover, we detected a decrease in connectivity between ACC and fusiform gyrus during painful stimulation in the negative expectancy group, which was absent in the positive expectancy group.

**CONCLUSION:**

Taken together, our data show that expectation can modulate the effect of pain on task performance and that these expectancy effects on the interruptive function of pain are mediated by activity and connectivity changes in brain areas involved in pain processing and task performance. The possibility of changing cognitive task performance by verbal information in clinical population warrants further investigation.

**SIGNIFICANCE:**

We show that the interruptive function of pain on concurrent visual task performance is influenced by expectation. Positive expectation can abolish the detrimental effects of pain on cognition. These expectancy effects on the interruptive function of pain are mediated by changes in functional connectivity between rostral ACC, posterior fusiform cortex and the hippocampus.

**Pre-school stress**

Pain. 2016 Sep;157(9):1918-32. doi: 10.1097/j.pain.0000000000000590.

**Predicting preschool pain-related anticipatory distress: the relative contribution of longitudinal and concurrent factors.**

Racine NM<sup>1</sup>, Pillai Riddell RR, Flora DB, Taddio A, Garfield H, Greenberg S.

Anticipatory distress prior to a painful medical procedure can lead to negative sequelae including heightened pain experiences, avoidance of future medical procedures, and potential noncompliance with preventative health care, such as vaccinations.

Few studies have examined the longitudinal and concurrent predictors of pain-related anticipatory distress. This article consists of 2 companion studies to examine both the longitudinal factors from infancy as well as concurrent factors from preschool that predict pain-related anticipatory distress at the preschool age. Study 1 examined how well preschool pain-related anticipatory distress was predicted by infant pain response at 2, 4, 6, and 12 months of age. In study 2, using a developmental psychopathology framework, longitudinal analyses examined the predisposing, precipitating, perpetuating, and present factors that led to the development of anticipatory distress during routine preschool vaccinations. A sample of 202 caregiver-child dyads was observed during their infant and preschool vaccinations (the Opportunities to Understand Childhood Hurt cohort) and was used for both studies. In study 1, pain response during infancy was not found to significantly predict pain-related anticipatory distress at preschool. In study 2, a strong explanatory model was created whereby 40% of the variance in preschool anticipatory distress was explained. Parental behaviours from infancy and preschool were the strongest predictors of child anticipatory distress at preschool. Child age positively predicted child anticipatory distress.

This strongly suggests that the involvement of parents in pain management interventions during immunization is one of the most critical factors in predicting anticipatory distress to the preschool vaccination.

**62 A. NUTRITION/VITAMINS****Fish intake**

**J Affect Disord.** 2016 Aug 16;205:269-281. doi: 10.1016/j.jad.2016.08.011.

**Dietary n-3 PUFA, fish consumption and depression: A systematic review and meta-analysis of observational studies.**

**Grosso G<sup>1</sup>, Micek A<sup>2</sup>, Marventano S<sup>3</sup>, Castellano S<sup>4</sup>, Mistretta A<sup>5</sup>, Pajak A<sup>2</sup>, Galvano F<sup>4</sup>.**

**BACKGROUND:**

Fish consumption and n-3 polyunsaturated fatty acids (PUFA) have been hypothesized to exert preventive effects toward depressive disorders, but findings are contrasting. We aimed to systematically review and perform meta-analysis of results from observational studies exploring the association between fish, n-3 PUFA dietary intake, and depression.

**METHODS:**

A search on the main bibliographic source of the observational studies up to August 2015 was performed. Random-effects models of the highest versus the lowest (reference) category of exposure and dose-response meta-analysis were performed.

**RESULTS:**

A total of 31 studies including 255,076 individuals and over 20,000 cases of depression, were examined. Analysis of 21 datasets investigating relation between fish consumption and depression resulted in significant reduced risk (RR=0.78, 95% CI: 0.69, 0.89), with a linear dose-response despite with moderate heterogeneity. Pooled risk estimates of depression for extreme categories of both total n-3 PUFA and fish-derived n-3 PUFA [eicosapentaenoic acid (EPA)+docosahexaenoic acid (DHA)] resulted in decreased risk for the highest compared with the lowest intake (RR=0.78, 95% CI: 0.67, 0.92 and RR=0.82, 95% CI: 0.73, 0.92, respectively) and dose-response analysis revealed a J-shaped association with a peak decreased risk for 1.8g/d intake of n-3 PUFA (RR=0.30, 95% CI: 0.09, 0.98).

**LIMITATION:**

Design of the studies included and confounding due to lack adjustment for certain variables may exist.

**CONCLUSIONS:**

The present analysis supports the hypothesis that dietary n-3 PUFA intake are associated with lower risk of depression.

**Red meat intake**

**Am J Clin Nutr.** 2016 Aug 24. pii: ajcn135335.

**High red meat intake and all-cause cardiovascular and cancer mortality: is the risk modified by fruit and vegetable intake?**

**Bellavia A<sup>1</sup>, Stilling F<sup>2</sup>, Wolk A<sup>2</sup>.**

**BACKGROUND:**

High red meat consumption is associated with a shorter survival and higher risk of cardiovascular disease (CVD), cancer, and all-cause mortality. Fruit and vegetable (FV) consumption is associated with a longer survival and lower mortality risk. Whether high FV consumption can counterbalance the negative impact of high red meat consumption is unknown.

**OBJECTIVE:**

We evaluated 2 large prospective cohorts of Swedish men and women (the Swedish Mammography Cohort and the Cohort of Swedish Men) to determine whether the association between red meat consumption and the risk of all-cause, CVD, and cancer-specific mortality differs across amounts of FV intake.

**DESIGN:**

The study population included 74,645 Swedish men and women. Red meat and FV consumption were assessed through a self-administered questionnaire. We estimated HRs of all-cause, CVD, and cancer mortality according to quintiles of total red meat consumption. We next investigated possible interactions between red meat and FV consumption and evaluated the dose-response associations at low, medium, and high FV intake.

**RESULTS:**

Compared with participants in the lowest quintile of total red meat consumption, those in the highest quintile had a 21% increased risk of all-cause mortality (HR: 1.21; 95% CI: 1.13, 1.29), a 29% increased risk of CVD mortality (HR: 1.29; 95% CI: 1.14, 1.46), and no increase in the risk of cancer mortality (HR: 1.00; 95% CI: 0.88, 1.43). Results were remarkably similar across amounts of FV consumption, and no interaction between red meat and FV consumption was detected.

**CONCLUSION:**

High intakes of red meat were associated with a higher risk of all-cause and CVD mortality. The increased risks were consistently observed in participants with low, medium, and high FV consumption. The Swedish Mammography Cohort and the Cohort of Swedish Men were registered at clinicaltrials.gov as [NCT01127698](#) and [NCT01127711](#), respectively.

**Low fat cheese does not help LDL**

Am J Clin Nutr. 2016 Aug 24. pii: ajcn134932.

**High intake of regular-fat cheese compared with reduced-fat cheese does not affect LDL cholesterol or risk markers of the metabolic syndrome: a randomized controlled trial.**

Raziani F<sup>1</sup>, Tholstrup T<sup>2</sup>, Kristensen MD<sup>2</sup>, Svanegaard ML<sup>2</sup>, Ritz C<sup>2</sup>, Astrup A<sup>2</sup>, Raben A<sup>2</sup>.

**BACKGROUND:**

Regular-fat cheese contains a high amount of saturated fat. Therefore, dietary guidelines in many countries recommend the consumption of reduced-fat cheese as opposed to regular-fat cheese. However, the negative effect of regular-fat cheese is still under debate.

**OBJECTIVES:**

The aim was to compare the effects of regular-fat cheese with an equal amount of reduced-fat cheese and an isocaloric amount of carbohydrate-rich foods on LDL cholesterol and risk factors for the metabolic syndrome (MetS).

**DESIGN:**

The study was a 12-wk randomized parallel intervention preceded by a 2-wk run-in period. A total of 164 subjects with  $\geq 2$  MetS risk factors were randomly allocated to 1 of 3 intervention groups: regular-fat cheese (REG), reduced-fat cheese (RED), or a no-cheese, carbohydrate control (CHO) group. Subjects in the REG and RED groups replaced part of their daily habitual diet with 80 g cheese/10 MJ, whereas subjects in the CHO group did the same with bread and jam corresponding to 90 g and 25 g/10 MJ, respectively.

**RESULTS:**

A total of 139 subjects completed the intervention. The primary outcome, LDL cholesterol, was not significantly different between the REG and RED diets or between the REG and CHO diets. There was no significant difference in HDL cholesterol between the REG and RED diets, but HDL cholesterol tended to be higher with the REG diet than with the CHO diet ( $0.06 \pm 0.03$  mmol/L;  $P = 0.07$ ). Insulin, glucose, and triacylglycerol concentrations as well as blood pressure and waist circumference did not differ significantly between the 3 diets.

**CONCLUSION:**

A high daily intake of regular-fat cheese for 12 wk did not alter LDL cholesterol or MetS risk factors differently than an equal intake of reduced-fat cheese or an isocaloric amount of carbohydrate-rich foods. This trial was registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) as [NCT02616471](https://clinicaltrials.gov/ct2/show/study/NCT02616471).