

## 2. LBP

### Disc height

#### **Risk factors for lumbar intervertebral disc height narrowing: a population-based longitudinal study in the elderly.**

Akeda K, et al. BMC Musculoskelet Disord. 2015.

#### **Abstract**

**BACKGROUND:** The progression of disc degeneration is generally believed to be associated with low back pain and/or degenerative lumbar diseases, especially in the elderly. The purpose of this study was to quantitatively evaluate changes in lumbar disc height using radiographic measurements and to investigate risk factors for development of disc height narrowing of the elderly.

**METHODS:** From 1997 to 2007, 197 village inhabitants at least 65 years-old who participated in baseline examinations and more than four follow-up examinations conducted every second year were chosen as subjects for this study. Using lateral lumbar spine radiographs of each subject, L1-L2 to L5-S1 disc heights were measured. The subjects were divided into two groups according to the rate of change in disc height: mildly decreased ( $\leq 20\%$  decrease) and severely decreased ( $>20\%$  decrease). A stepwise multiple logistic regression analysis was used to select those factors significantly associated with disc height narrowing.

**RESULTS:** Disc height at each intervertebral disc (IVD) level decreased gradually over ten years ( $p < 0.01$ , an average 5.8 % decrease of all disc levels). There was no significant difference in the rate of change in disc height among the IVD levels. Female gender, radiographic knee osteoarthritis and low back pain at baseline were associated with increased risk for disc height narrowing.

**CONCLUSIONS:** We conducted the first population-based cohort study of the elderly that quantitatively evaluated lumbar disc height using radiographic measurements. The risk factors identified in this study would contribute to a further understanding the pathology of disc degeneration.

PMID 26552449 [Indexed for MEDLINE] MCID PMC4640385

## 7. PELVIC ORGANS/WOMAN'S HEALTH

## Exercise did not help diastasis rectus

**Effect of a Postpartum Training Program on the Prevalence of Diastasis Recti Abdominis in Postpartum Primiparous Women: A Randomized Controlled Trial**

Sandra L Gluppe; Gunvor Hilde; Merete K Tennfjord; Marie E Engh; Kari Bø

*Physical Therapy*, Volume 98, Issue 4, 1 April 2018, Pages 260–268, <https://doi.org/10.1093/ptj/pzy008>

- Abstract

**Background**

Diastasis recti abdominis affects a significant number of women during the prenatal and postnatal period.

**Objective**

The objective was to evaluate the effect of a postpartum training program on the prevalence of diastasis recti abdominis.

**Design**

The design was a secondary analysis of an assessor-masked randomized controlled trial.

**Methods**

One hundred seventy-five primiparous women (mean age = 29.8 ± 4.1 years) were randomized to an exercise or control group. The interrectus distance was palpated using finger widths, with a cutoff point for diastasis as ≥2 finger widths. Measures were taken 4.5 cm above, at, and 4.5 cm below the umbilicus. The 4-month intervention started 6 weeks postpartum and consisted of a weekly, supervised exercise class focusing on strength training of the pelvic floor muscles. In addition, the women were asked to perform daily pelvic floor muscle training at home. The control group received no intervention. Analyses were based on intention to treat. The Mantel-Haenszel test (relative risk [RR] ratio) and the chi-square test for independence were used to evaluate between-group differences on categorical data.

**Results**

At 6 weeks postpartum, 55.2% and 54.5% of the participants were diagnosed with diastasis in the intervention and control groups, respectively. No significant differences between groups in prevalence were found at baseline (RR: 1.01 [0.77–1.32]), at 6 months postpartum (RR: 0.99 [0.71–1.38]), or at 12 months postpartum (RR: 1.04 [0.73–1.49]).

**Limitations**

The interrecti distance was palpated using finger widths, and the sample included women with and without diastasis.

**Conclusions**

A weekly, postpartum, supervised exercise program, including strength training of the pelvic floor and abdominal muscles, in addition to daily home training of the pelvic floor muscles, did not reduce the prevalence of diastasis.

**Hormone replacement and dementia**

Menopause. 2018 Aug;25(8):870-876. doi: 10.1097/GME.0000000000001140.

**Menopausal hormone therapy and mild cognitive impairment: a randomized, placebo-controlled trial.**

Yoon BK<sup>1</sup>, Chin J<sup>2</sup>, Kim JW<sup>3</sup>, Shin MH<sup>4</sup>, Ahn S<sup>5</sup>, Lee DY<sup>1</sup>, Seo SW<sup>2,6</sup>, Na DL<sup>2,6</sup>.

**OBJECTIVE:**

The aim of the study was to explore the therapeutic potential of menopausal hormone therapy (MHT) in women with mild cognitive impairment (MCI).

**METHODS:**

Thirty-seven postmenopausal women (age range: 57-82 y) with multiple-domain, amnesic subtype MCI were randomly assigned to either placebo (n=18) or MHT (n=19) for 24 months (percutaneous estradiol [E2] gel [0.1%, 2 mg/d] and oral micronized progesterone [MP4] [100mg/d]). All participants received donepezil, and apolipoprotein E genotype was determined. The primary endpoint was general cognitive function: Alzheimer's disease Assessment Scale, cognitive subscale, the Korean version of Mini-Mental State Examination (K-MMSE), and the Korean version of the Montreal Cognitive Assessment (MoCA\_K) were performed in-person every 6 months.

**RESULTS:**

Twenty-one participants (placebo 13, MHT 8) completed the trial (56.8%). Progression rates to dementia were 52.9% (9/17) in the placebo group and 44.4% (8/18) in the MHT group. Within-group analysis showed that all three tests significantly worsened during the trial in the placebo, but not the MHT groups. Analysis adjusted for  $\epsilon 4$  allele demonstrated that MHT significantly reduced deterioration of MoCA\_K score, a sensitive tool for assessing global cognition in MCI (P=0.0261). Compared with the control group, both MoCA\_K (P=0.043; mean difference, 3.85; 95% CI, -0.46 to 8.16) and K-MMSE (P=0.0319; mean difference, 3.26; 95% CI, 0.04-6.48) scores were significantly better at 24 months in the MHT group.

**CONCLUSIONS:**

Long-term MHT using percutaneous E2 gel and oral MP4 might attenuate cognitive decline in postmenopausal women with MCI.

### Diet and breast density

#### Journal Summaries in Obstetrics & Gynecology

##### **Can dietary and physical activity modifications reduce breast density in postmenopausal women?: The DAMA study, a randomized intervention trial in Italy**

Cancer Epidemiology, Biomarkers & Prevention — Masala G, et al. | August 03, 2018

In the randomized 2x2 factorial DAMA trial, researchers assessed the impact of a 24-months dietary and/or physical activity (PA) interventions on mammographic breast density (MBD) in healthy post-menopausal women, aged 50-69 years, non-smokers, with MBD>50% and no recent hormone therapy.

These women were randomized to a dietary intervention focused on plant-foods, with a low glycemic load, low in saturated fats and alcohol; a PA intervention combining daily moderate intensity activities and one weekly supervised session of more strenuous activity; both interventions; general recommendations.

Findings suggested that a 24-months dietary or PA intervention may attenuate MBD in postmenopausal women.

**NSAID use during pregnancy related to neonatal hypertension**

J Clin Hypertens (Greenwich). 2018 Jul 27. doi: 10.1111/jch.13354.

**Antenatal exposure to nonsteroidal anti-inflammatory drugs and risk of neonatal hypertension.**

Habli M<sup>1,2</sup>, Clifford CC<sup>3,4</sup>, Brady TM<sup>5</sup>, Rodriguez Z<sup>6</sup>, Eschenbacher M<sup>7</sup>, Wu M<sup>8</sup>, DeFranco E<sup>9,10</sup>, Gresh J<sup>8</sup>, Kamath-Rayne BD<sup>9,11</sup>.

Nonsteroidal anti-inflammatory drugs (NSAIDs) are used as tocolytics, which are medications that suppress uterine contractions for preterm birth prevention.

Their effect on cerebral/systemic vascular beds poses the question of whether antenatal NSAID exposure is associated with neonatal hypertension. We performed a retrospective case-control study in a tertiary neonatal intensive care unit, including 40 hypertension cases (hospitalized neonates  $\geq 35$  weeks with systolic BP  $> 100$  mm Hg on three consecutive days) compared to 134 controls matched by gestational age at delivery, plurality, and delivery date. Cases and controls were compared by antenatal NSAID exposure, other common tocolytics, and maternal/neonatal characteristics and complications. Multivariable logistic regression was used to estimate the odds of hypertension among those with prenatal exposure to NSAIDs versus those without exposure. Newborns with hypertension had a lower gestational age at delivery and increased incidence of neonatal complications, including respiratory distress syndrome, bronchopulmonary dysplasia, surfactant administration, longer duration of ventilation, and history of umbilical artery catheterization. Days of indomethacin exposure were positively associated with greater odds of neonatal hypertension (OR 1.17 [1.00 to 1.38],  $P = 0.055$ ), even after adjustment for other factors associated with neonatal hypertension. Newborns with hypertension were less likely to have been exposed to calcium channel blockers as a tocolytic.

The results of our study suggest an association between prenatal exposure to nonsteroidal anti-inflammatory drugs and neonatal hypertension. Furthermore, our data suggest that prenatal calcium channel blocker exposure may protect against the development of neonatal hypertension. Future multicenter studies are needed to understand the risks of tocolytics and subsequent consequences in preterm infants.

**Second hand smoke and cleft palate**

Paediatr Perinat Epidemiol. 2018 Jul 26. doi: 10.1111/ppe.12497.

**Secondhand smoke during the periconceptional period increases the risk for orofacial clefts in offspring.**

Pi X<sup>1,2</sup>, Li Z<sup>1,2</sup>, Jin L<sup>1,2</sup>, Liu J<sup>1,2</sup>, Zhang Y<sup>1,2</sup>, Zhang L<sup>1,2</sup>, Wang L<sup>1,2</sup>, Ren A<sup>1,2</sup>.

**BACKGROUND:**

To examine whether exposure to secondhand smoke (SHS) during the periconceptional period among nonsmoking women is associated with an increased risk for orofacial clefts (OFCs) in offspring in a population with low rates of maternal active smoking but high rates of SHS exposure.

**METHODS:**

We recruited 240 women with OFC-affected pregnancies and 1420 women who delivered healthy infants from a population-based case-control study in northern China during 2002 and 2016. Data including self-reported SHS exposure were collected by trained health care workers through face-to-face interviews. Odds ratios (ORs) with 95% confidence intervals (95% CIs) were used to estimate the association between SHS exposure and OFC risk.

**RESULTS:**

The unadjusted ORs for OFCs and cleft lip with or without cleft palate (CL±P) in association with SHS exposure were both 1.6 (95% CI 1.2, 2.1). After adjusting for maternal fever or flu, farming occupation, infant sex, and history of pregnancy affected by birth defects, the adjusted ORs were both 1.6 (95% CI 1.2, 2.2). Frequent SHS exposure (>6 times/week) was associated with an even higher risk for OFCs (adjusted OR 2.6, 95% CI 1.8, 3.8) and for CL±P (adjusted OR 2.5, 95% CI 1.7, 3.7).

**CONCLUSIONS:**

Maternal SHS exposure during the periconceptional period increases the risk for OFCs in offspring among nonsmoking mothers.

### Vit. D and pregnancy loss

#### vJournal Summaries in Allergy/Immunology

##### **Recurrent pregnancy loss and vitamin D: A review of the literature**

American Journal of Reproductive Immunology — Goncalves DR, et al. | August 01, 2018

Researchers explored the link between vitamin D (VD) deficiency [VDD] and recurrent pregnancy loss (RPL) by systematically reviewing data for women with 2 or more spontaneous abortion (SA) included in 11 studies. Given that the effects of VDD in pregnancy have been associated with preeclampsia, gestational diabetes, fetal growth restriction, preterm labor, and sporadic SA.

Based on the findings, a beneficial role for VD supplementation in RPL can be speculated. In women with RPL, vitamin D receptor (VDR) and CYP27B1 expression in endometrium did not seem to be different but a decreased expression of VDR and, perhaps, a decreased expression of CYP27B1, appeared in villous and decidual tissues.

## 8. VISCERA

### Heart defects alters brain development

Dev Med Child Neurol. 2018 Jul 20. doi: 10.1111/dmcn.13975

#### **Structural brain abnormalities in adolescents and young adults with congenital heart defect: a systematic review.**

Bolduc ME<sup>1,2</sup>, Lambert H<sup>2</sup>, Ganeshamoorthy S<sup>1</sup>, Brossard-Racine M<sup>1,2,3,4</sup>.

#### **AIM:**

The primary objective of this systematic review is to define and quantify brain structural abnormalities present in adolescents and young adults with complex congenital heart defect (CHD). We also aim to evaluate the extent to which these structural abnormalities are associated with functional outcomes.

#### **METHOD:**

A search of studies examining brain structure by magnetic resonance imaging in adolescents and young adults with complex CHD was performed in Embase, MEDLINE, and Web of Science. A meta-analysis was conducted to determine the odds of brain abnormalities in young people with CHD. Results not included in the meta-analysis were collated using descriptive statistics.

#### **RESULTS:**

Two hundred and fifty-four studies were identified through the literature search. Among these, 14 original studies were included in the review. The odds of brain abnormalities in young people with CHD were 7.9 times higher ( $p < 0.001$ ) than in typically developing comparison individuals. Focal and multifocal lesions were the most common types of abnormality (odds ratio 22.5 [ $p < 0.001$ ]). Preliminary evidence from volumetric, cortical, and microstructural integrity measurements suggests that brain abnormalities are associated with poorer neurocognitive outcomes.

#### **INTERPRETATION:**

This review provides strong evidence that adolescents and young adults with CHD are at increased risk of presenting with structural brain abnormalities and highlights the contribution of advanced quantitative magnetic resonance imaging techniques to identify the subtle but frequent brain alterations in this population. However, more studies are needed to clarify how these abnormalities relate to function. What this paper adds There is a high prevalence of brain abnormalities in young people with congenital heart defect (CHD). Brain volumes, cortical measurements, and white matter microstructure are altered in young people with CHD. Brain abnormalities are associated with poorer function in young people with CHD.



**Gut disorders and prebiotics and Fodmaps**

Gastroenterology. 2018 Jun 28. pii: S0016-5085(18)34687-0. doi: 10.1053/j.gastro.2018.06.045.

**Effects of Prebiotics vs a Diet Low in Fodmaps in Patients with Functional Gut Disorder.**

Huaman JW<sup>1</sup>, Mego M<sup>2</sup>, Manichanh C<sup>2</sup>, Cañellas N<sup>3</sup>, Cañueto D<sup>4</sup>, Seguro H<sup>5</sup>, Jansana M<sup>6</sup>, Malagelada C<sup>2</sup>, Accarino A<sup>2</sup>, Vulevic J<sup>7</sup>, Tzortzis G<sup>7</sup>, Gibson G<sup>8</sup>, Saperas E<sup>9</sup>, Guarner F<sup>2</sup>, Azpiroz F<sup>10</sup>.

Prebiotics and diets low in fermentable residues (low-FODMAP diet) might reduce symptoms in patients with functional gastrointestinal disorders, despite reports that some non-absorbable, fermentable meal products (prebiotics) provide substrates for colonic bacteria and thereby increase gas production.

We performed a randomized, parallel, double-blind study of patients with functional gastrointestinal disorders with flatulence. We compared the effects of a prebiotic supplement (2.8 g/day Bimuno containing 1.37g B-GOS) plus a placebo (Mediterranean-type diet; prebiotic group, n=19) vs a placebo supplement (2.8 g glucose) plus a diet low in fermentable oligo-, di-, mono-saccharides and polyols (low-FODMAP group, n=21) for 4 weeks; patients were then followed for 2 weeks. The primary outcome was effects on composition of the fecal microbiota, analyzed by 16S sequencing. Secondary outcomes were intestinal gas production and digestive sensations. After 4 weeks, we observed opposite effects on microbiota in each group-particularly in relation to the abundance of *Bifidobacterium* sequences (increase in the prebiotic group and decrease in the low-FODMAP group; P=.042), and *Bilophila wadsworthia* (decrease in the prebiotic group and increase in the low-FODMAP group; P=.050).

After 4 weeks, both groups had statistically significant reductions in all symptom scores, except reductions in flatulence and borborygmi were not significant in the prebiotic group. Although the decrease in symptoms persisted for 2 weeks after patients discontinued prebiotic supplementation, symptoms reappeared immediately after patients discontinued the low-FODMAP diet. Intermittent prebiotic administration might therefore be an alternative to dietary restrictions for patients with functional gut symptoms. ClinicalTrials.gov no: NCT02210572.

**Proton pump increases risk of death**

BMJ Open. 2017 Jul 4;7(6):e015735. doi: 10.1136/bmjopen-2016-015735.

**Risk of death among users of Proton Pump Inhibitors: a longitudinal observational cohort study of United States veterans.**

Xie Y<sup>1</sup>, Bowe B<sup>1</sup>, Li T<sup>1,2</sup>, Xian H<sup>1,3</sup>, Yan Y<sup>1,4</sup>, Al-Aly Z<sup>1,2,5,6</sup>.

**OBJECTIVE:**

Proton pump inhibitors (PPIs) are widely used, and their use is associated with increased risk of adverse events. However, whether PPI use is associated with excess risk of death is unknown. We aimed to examine the association between PPI use and risk of all-cause mortality.

**DESIGN:**

Longitudinal observational cohort study.

**SETTING:**

US Department of Veterans Affairs.

**PARTICIPANTS:**

Primary cohort of new users of PPI or histamine H2 receptor antagonists (H2 blockers) (n=349 312); additional cohorts included PPI versus no PPI (n=3 288 092) and PPI versus no PPI and no H2 blockers (n=2 887 030).

**MAIN OUTCOME MEASURES:**

Risk of death.

**RESULTS:**

Over a median follow-up of 5.71 years (IQR 5.11-6.37), PPI use was associated with increased risk of death compared with H2 blockers use (HR 1.25, CI 1.23 to 1.28). Risk of death associated with PPI use was higher in analyses adjusted for high-dimensional propensity score (HR 1.16, CI 1.13 to 1.18), in two-stage residual inclusion estimation (HR 1.21, CI 1.16 to 1.26) and in 1:1 time-dependent propensity score-matched cohort (HR 1.34, CI 1.29 to 1.39). The risk of death was increased when considering PPI use versus no PPI (HR 1.15, CI 1.14 to 1.15), and PPI use versus no PPI and no H2 blockers (HR 1.23, CI 1.22 to 1.24). Risk of death associated with PPI use was increased among participants without gastrointestinal conditions: PPI versus H2 blockers (HR 1.24, CI 1.21 to 1.27), PPI use versus no PPI (HR 1.19, CI 1.18 to 1.20) and PPI use versus no PPI and no H2 blockers (HR 1.22, CI 1.21 to 1.23). Among new PPI users, there was a graded association between the duration of exposure and the risk of death.

**CONCLUSIONS:**

The results suggest excess risk of death among PPI users; risk is also increased among those without gastrointestinal conditions and with prolonged duration of use. Limiting PPI use and duration to instances where it is medically indicated may be warranted.

## Gerd

Clin Gastroenterol Hepatol. 2018 Jun 15. pii: S1542-3565(18)30628-1. doi: 10.1016/j.cgh.2018.06.018.

**Most Patients With Gastroesophageal Reflux Disease Who Failed Proton Pump Inhibitor Therapy Also Have Functional Esophageal Disorders.**

Abdallah J<sup>1</sup>, George N<sup>1</sup>, Yamasaki T<sup>1</sup>, Ganocy S<sup>2</sup>, Fass R<sup>3</sup>.

**BACKGROUND & AIMS:**

As many as 45% of patients with gastroesophageal reflux disease (GERD) still have symptoms after receiving once-daily proton pump inhibitor (PPI) therapy. We aimed to compare reflux characteristics and patterns between responders and non-responders to once-daily PPI therapy using combined impedance-pH monitoring.

**METHODS:**

Patients who reported heartburn and/or regurgitation at least twice per week for 3 months while receiving standard-dose PPI therapy were assigned to the PPI failure group (n=16). Patients who reported a complete resolution of symptoms on once-daily PPIs for at least 4 weeks were assigned to the PPI success group (n=13). We collected demographic data and subjects completed the short-form 36 and the GERD health-related quality of life questionnaires. Patients then underwent upper endoscopy and combined esophageal impedance-pH monitoring while on PPI therapy.

**RESULTS:**

Four patients in the PPI success group (31%) and 4 patients in the PPI failure group (25%) had abnormal results from the pH test (P=1.00). Most of the patients in the PPI failure group (75%) were found to have either functional heartburn or reflux hypersensitivity with GERD. Impedance and pH parameters did not differ significantly between the PPI failure and success group.

**CONCLUSION:**

We found no difference in reflux characteristics between patients with GERD who had successful vs failed once-daily PPI therapy. Most patients in the PPI failure group (75%) had functional esophageal disorders.

## GERD

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**Hyaluronic acid and liver disease**

Aliment Pharmacol Ther. 2018 Jul 4. doi: 10.1111/apt.14897.

**Index serum hyaluronic acid independently and accurately predicts mortality in patients with liver disease.**

Plevris N<sup>1</sup>, Sinha R<sup>2</sup>, Hay AW<sup>3</sup>, McDonald N<sup>4</sup>, Plevris JN<sup>2</sup>, Hayes PC<sup>5</sup>.

**BACKGROUND:**

Hyaluronic acid is a recognised noninvasive marker of liver fibrosis. However, its prognostic ability has not been extensively studied.

**AIMS:**

To investigate the ability of an index serum hyaluronic acid measurement to independently predict transplant-free survival in patients with liver disease of varying aetiology and severity.

**METHODS:**

This was a retrospective single-centre cohort study. Serum hyaluronic acid was measured at the discretion of the attending clinicians, in patients attending the liver clinic, to assess disease severity. Patients with a hyaluronic acid measurement between 1995 and 2010 were identified. Patient characteristics at the point of hyaluronic acid measurement were recorded from medical records. Follow-up was from date of index hyaluronic acid measurement to date of death, date of transplant or censor date (July 01, 2015). Primary outcomes were all-cause and liver-related mortality. Kaplan-Meier analysis was used to compare survival in 3 patient groups with hyaluronic acid levels of <100 µg/L, 100-300 µg/L and >300 µg/L. Survival models were constructed using Cox proportional hazard and prediction accuracy was assessed by Harrell's C-statistic.

**RESULTS:**

Five hundred and eighty nine patients fulfilled inclusion criteria. Median follow-up was 5.6 years (range 0.1-19.7). Transplant-free survival was significantly different between patients with hyaluronic acid <100 µg/L, 100-300 µg/L and >300 µg/L for liver-related as well as all-cause mortality ( $P < 0.001$ ). Hyaluronic acid level was an independent predictor of survival (liver-related: HR 1.39, 95% CI 1.20-1.60,  $P < 0.001$ ; all-cause: HR 1.04, 95% CI 1.02-1.06,  $P = 0.001$ ). The liver-related prediction accuracy of hyaluronic acid was 0.74 (Standard error 0.03).

**CONCLUSION:**

Index hyaluronic acid measurement can accurately and independently predict liver-related and all-cause mortality in patients with liver disease.

**Fatty liver index helps ID CV disease possibility**

Eur J Gastroenterol Hepatol. 2018 Sep;30(9):1047-1054. doi: 10.1097/MEG.0000000000001183.

**Association of fatty liver index with the risk of incident cardiovascular disease and acute myocardial infarction.**

Olubamwo OO<sup>1</sup>, Virtanen JK<sup>1</sup>, Voutilainen A<sup>1</sup>, Kauhanen J<sup>1</sup>, Pihlajamäki J<sup>1,2</sup>, Tuomainen TP<sup>1</sup>.

**BACKGROUND:**

Fatty liver disease (FLD) has been identified as constituting cardiometabolic risk. However, evidence on the association of fatty liver index (FLI) with cardiovascular disease (CVD) is largely cross-sectional, with limited evidence on the predictability of incident CVD, and specifically, acute myocardial infarction (AMI). Therefore, we aimed to investigate the prospective associations between fatty liver as estimated by FLI and incident CVD, and specifically AMI, in the Kuopio Ischaemic Heart Disease Risk Factor Study cohort.

**PATIENTS AND METHODS:**

Our patients were 1205 middle-aged men free of CVD at baseline. The associations of baseline FLI with incident CVD and incident AMI were analyzed using multivariable-adjusted Cox regression models.

**RESULTS:**

During a median follow-up of 17 years, a total of 690 incident cases of CVD and 269 cases of AMI were recorded through Finnish registries. For incident CVD, for the high (FLI $\geq$ 60) versus the low ( $\leq$ 30) FLI category, the hazard ratio (HR) was 1.77 [95% confidence interval (CI): 1.46-2.14] in the minimally adjusted model. With increasing adjustment, the association was attenuated progressively. In the most adjusted model, the HR was 1.41 (95% CI: 1.10-1.79). For incident AMI, for the high FLI category, the HR was 1.65 (95% CI: 1.22-2.23) in the minimally adjusted model, but in most comprehensive models when we included metabolic factors, the HR was not significant (HR=1.136, 95% CI: 0.777-1.662).

**CONCLUSION:**

FLI can predict incident CVD. However, the predictability of AMI using FLI is subject to interactions of metabolic factors. Individuals with FLI in the moderate to high category should be evaluated and monitored for subclinical or overt cardiovascular (including coronary) disease.

### Fumes of gasoline increases risk of kidney CA

#### Journal Summaries in Family Medicine

##### **Occupational exposure to diesel and gasoline engine exhausts and the risk of kidney cancer in Canadian men**

The Annals of Occupational Hygiene — Peters CE, et al. | August 01, 2018

The relationship between occupational gasoline and diesel engine exhausts and the risk of kidney cancer was investigated in men via conducting the National Enhanced Cancer Surveillance System (NECSS), a Canadian population-based case–control study, in 1994–1997. Evidence was gained suggesting an increased risk of kidney cancer in association with occupational gasoline, and to a lesser extent, with diesel exhaust exposure.

Men with high cumulative exposure to both gasoline and diesel exhaust showed a 76% increased odds of kidney cancer.

**Alcohol use and CR CA**

Eur J Cancer Prev. 2018 Sep;27(5):433-437. doi: 10.1097/CEJ.0000000000000355.

**Association between alcohol consumption and colorectal cancer risk: a case-control study in the Han Chinese population.**

Wang Y<sup>1</sup>, Yang H<sup>2</sup>, Shen CJ<sup>3</sup>, Ge JN<sup>4</sup>, Lin J<sup>1</sup>.

Many epidemiologic studies have reported that alcohol is a risk factor for colorectal cancer.

To further evaluate the association, we carried out a case-control study in the Han Chinese population. From February 2008 to February 2013, we carried out a hospital-based case-control study on colorectal cancer. Information was collected using a questionnaire. Cases were 310 patients with colorectal cancer; 620 healthy matched controls were also recruited. Multiple logistic regression was used to estimate the odds ratios (OR) and the corresponding 95% confidence intervals.

Alcohol consumption was associated with increased colorectal cancer risk, but OR was significant only among heavy drinkers (OR=2.18, for  $\geq 21$  drinks/week). Colorectal cancer risk was 4.01-fold higher in heavy smokers ( $\geq 20$  cigarettes/day) and heavy drinkers ( $\geq 21$  drinks/week) in comparison with never smokers who consumed less than 7 drinks/week. The relationship was strengthened by stratified studies of sex. Among former drinkers, the excess of risk disappeared in those who had quit for at least 10 years (OR=0.86).

Our study confirmed that heavy alcohol consumption was associated with an increasing risk of colorectal cancer; smoking modified this relationship, especially heavy smokers. Further data from large cohorts are desirable for conclusive confirmation.



**13 C. AIRWAYS/SWALLOWING/SPEECH****Cognitive decline****The influence of childhood intelligence, social class, education and social mobility on memory and memory decline in late life**

R T Staff M J Hogan L J Whalley

*Age and Ageing*, afy111, <https://doi.org/10.1093/ageing/afy111>**Abstract**

In an observational longitudinal study of a sub-sample of the Aberdeen 1936 birth cohort, from age 62 to 77 years, we investigated childhood intelligence, social class, education, life-course social mobility, memory test performance and memory decline in late life.

We examined 388 local residents who had attended school in Aberdeen in 1947 and measured Auditory-Verbal Learning Test (AVLT) at recruitment age about 64 years and up to five times until age about 77 years. Better performance at age about 64 on AVLT was predicted by early socioeconomic status (SES), social mobility and childhood intelligence. The trajectory of AVLT decline was steeper in those who had received less education.

This relationship was independent of childhood ability, sex, SES in childhood and social mobility. The protection of memory by education suggests that education supports resilience to age-related cognitive impairment. Upward social mobility does not enhance this effect, suggesting that resilience to age-related decline may be established in early life.

**Sleep and fitness in adolescents**

Research report

**Sleeping habits of adolescents in relation to their physical activity and exercise output: results from the ELSPAC study**

1. Jan Máchal<sup>1</sup>, Filip Zlámal<sup>2</sup>, Lubomír Kukla<sup>2</sup>, Jan Švancara<sup>2,3</sup>, Hynek Pikhart<sup>2,4</sup>, Julie Bienertová-Vašků<sup>2</sup>

**Background** Little is known about the effects of physical activity and fitness on sleep timing parameters in adolescence.

**Methods** We investigated the development of sleep timing between age 8 and 15 and its association with physical fitness at age 15 in 787 adolescents (408 males, 379 females). Physical fitness was measured using the physical work capacity (PWC) protocol. Information on sport activity was collected at ages 11 and 15. Finally, the contribution of other covariates (sex, body mass index (BMI), parental education and occupational skill level) to the association between sleep parameters and physical fitness was evaluated. The correlation of BMI and physical fitness was assessed separately.

**Results** Mild correlation of sleep duration at ages 8 and 15 was observed ( $r=0.08-0.16$ ). Higher sport activity participation and physical fitness were found to be mildly associated with delayed bedtime and reduced sleep duration; the association with bedtime was significant after adjustment for all covariates. Sport activity at age 11 was not associated with sleep timing at age 15. Interestingly, higher BMI was linked to delayed bedtime and higher physical fitness.

**Conclusion** Our findings do not support existing hypotheses suggesting the association of low physical activity and fitness with shorter sleep duration and high BMI in a generally non-obese adolescent population without severe sleep restriction.

**20 A. ROTATOR CUFF****Scapula substitution after cuff repair**

The International Journal of Sports Physical Therapy | Volume 13, Number 4 | August 2018 |  
Page 687

**ORIGINAL RESEARCH****SCAPULAR SUBSTITUTION AFTER ROTATOR CUFF REPAIR CORRELATES WITH POSTOPERATIVE PATIENT OUTCOME**

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Matthew J Zens, DPT, SCS, MS, ATC<sup>1</sup> Elizabeth A Helsper, MD<sup>2</sup>

**ABSTRACT**

**Background:** Scapular substitution is an alteration of scapulohumeral kinematics that may occur when patients have shoulder pain or dysfunction. These abnormal scapular kinematic patterns have been recognized in patients with rotator cuff tears. It remains unknown if 1) normal scapular kinematics can be restored with rehabilitation after rotator cuff repair surgery and 2) abnormal scapular kinematics are associated with inferior patient-determined outcome scores, range of motion, or strength.

**Purpose:** The purpose of this study was to determine 1) if scapular substitution can be decreased or improved with rehabilitation after rotator cuff repair surgery and 2) if the presence or amount of scapular substitution was correlated with patient-determined outcome scores, range of motion, or strength after rotator cuff repair surgery.

**Study Design:** Retrospective review of prospectively collected data (LOE IV)

**Methods:** Forty-eight patients who underwent post-operative rehabilitation after an arthroscopic rotator cuff repair were reviewed for this study. The outcomes measures of interest included: patient-determined outcome scores (WORC, Simple Shoulder Test, the ASES Score, the Shoulder Activity Score, and the SANE rating), identification and quantification of scapular substitution, active range of motion, and strength. Outcomes were prospectively collected up to 12 months after surgery and assessed retrospectively.

**Results:** As patients progress through their first year of rehabilitation from a rotator cuff repair, the amount of scapular substitution decreases but remains statistically significantly greater than the contralateral, asymptomatic side. At all post-operative time points, patients with scapular substitution, (determined subjectively by a physical therapist), had 1) inferior WORC, ASES, SANE, and SST scores, 2) inferior flexion, abduction, and external rotation range of motion, and 3) inferior scaption strength compared to those patients without subjective scapular substitution.

**Conclusions:** Rehabilitation decreases but does not normalize the amount of scapular substitution up to one year after rotator cuff repair. Subjective identification of scapular substitution is associated with inferior patient-determined outcome scores, range of motion, and strength.

**Level of Evidence:** 4 – Prognosis study

**Keywords:** Patient outcomes; rotator cuff repair; scapular kinematics; scapular substitution

**Injection therapies help****Comparative Effectiveness of Injection Therapies in Rotator Cuff Tendinopathy: A Systematic Review, Pairwise and Network Meta-analysis of Randomized Controlled Trials**

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Yu-Kang Tu, DDS, M.Sc., Ph.D Tyng-Guey Wang, MD

PlumX Metrics

DOI: <https://doi.org/10.1016/j.apmr.2018.06.028>

**Objective**

To compare the effectiveness of diverse injections in patients with rotator cuff tendinopathy using pairwise and network meta-analysis.

**Data Sources**

PubMed, EMBASE, Scopus and Cochrane Library were searched for studies published up to September 31, 2017.

**Study Selection**

We included all published or unpublished randomized controlled trials (RCTs) comparing diverse injections including corticosteroid, nonsteroidal anti-inflammatory drugs, hyaluronic acid, botulinum toxin, platelet-rich plasma (PRP), and prolotherapy in patients with rotator cuff tendinopathy. Among the 1495 records screened, 18 studies were included in the meta-analysis.

**Data Extraction**

The quality of RCTs was assessed with Cochrane Risk of Bias Tool by two independent raters. The primary outcome was pain reduction, and the secondary outcome was functional improvement.

**Data Synthesis**

Standardized mean difference (SMD) was utilized for pairwise and network meta-analysis. In pairwise meta-analysis, corticosteroid was more effective only in the short-term in both pain reduction and functional improvement. Network meta-analysis indicated that prolotherapy significantly reduced pain compared with placebo in the long-term [over 24 weeks, SMD: 2.63, 95% confidence interval (CI): 1.88–3.38]; meanwhile PRP significantly improved shoulder function compared with placebo in the long-term (over 24 weeks, SMD: 0.44, 95% CI: 0.05–0.84).

**Conclusions**

For patients with rotator cuff tendinopathy, corticosteroid plays a role in the short-term (3-6 weeks) but not in long-term (over 24 weeks) pain reduction and functional improvement. By contrast, PRP and prolotherapy may yield better outcomes in the long-term (over 24 weeks). On account of heterogeneity, interpreting these results with caution is warranted.

**24. ELBOW****Injections therapies**

Am J Sports Med. 2013 Jun;41(6):1435-46. doi: 10.1177/0363546512458237. Epub 2012 Sep 12.

**Comparative effectiveness of injection therapies in lateral epicondylitis: a systematic review and network meta-analysis of randomized controlled trials.**

Krogh TP<sup>1</sup>, Bartels EM, Ellingsen T, Stengaard-Pedersen K, Buchbinder R, Fredberg U, Bliddal H, Christensen R.

**BACKGROUND:**

Injection therapy with glucocorticoids has been used since the 1950s as a treatment strategy for lateral epicondylitis (tennis elbow). Lately, several novel injection therapies have become available.

**PURPOSE:**

To assess the comparative effectiveness and safety of injection therapies in patients with lateral epicondylitis.

**STUDY DESIGN:**

Systematic review and meta-analysis.

**METHODS:**

Randomized controlled trials comparing different injection therapies for lateral epicondylitis were included provided they contained data for change in pain intensity (primary outcome). Trials were assessed using the Cochrane risk of bias tool. Network (random effects) meta-analysis was applied to combine direct and indirect evidence within and across trial data using the final end point reported in the trials, and results for the arm-based network analyses are reported as standardized mean differences (SMDs).

**RESULTS:**

Seventeen trials (1381 participants; 3 [18%] at low risk of bias) assessing injection with 8 different treatments-glucocorticoid (10 trials), botulinum toxin (4 trials), autologous blood (3 trials), platelet-rich plasma (2 trials), and polidocanol, glycosaminoglycan, prolotherapy, and hyaluronic acid (1 trial each)-were included. Pooled results (SMD [95% confidence interval]) showed that beyond 8 weeks, glucocorticoid injection was no more effective than placebo (-0.04 [-0.45 to 0.35]), but only 1 trial (which did not include a placebo arm) was at low risk of bias. Although botulinum toxin showed marginal benefit (-0.50 [-0.91 to -0.08]), it caused temporary paresis of finger extension, and all trials were at high risk of bias. Both autologous blood (-1.43 [-2.15 to -0.71]) and platelet-rich plasma (-1.13 [-1.77 to -0.49]) were also statistically superior to placebo, but only 1 trial was at low risk of bias. Prolotherapy (-2.71 [-4.60 to -0.82]) and hyaluronic acid (-5.58 [-6.35 to -4.82]) were both more efficacious than placebo, whereas polidocanol (0.39 [-0.42 to 1.20]) and glycosaminoglycan (-0.32 [-1.02 to 0.38]) showed no effect compared with placebo. The criteria for low risk of bias were only met by the prolotherapy and polidocanol trials.

**CONCLUSION:**

This systematic review and network meta-analysis of randomized controlled trials found a paucity of evidence from unbiased trials on which to base treatment recommendations regarding injection therapies for lateral epicondylitis.

**32 A. KNEE/ACL****Prevention of non-contact ACL injuries**

The International Journal of Sports Physical Therapy | Volume 13, Number 4 | August 2018 | Page 575

**SYSTEMATIC REVIEW****RISK FACTORS ASSOCIATED WITH NON-CONTACT ANTERIOR CRUCIATE LIGAMENT INJURY: A SYSTEMATIC REVIEW**

Craig E. Pfeifer, PhD, ATC1 Paul F. Beattie, PhD2 mRyan S. Sacko, PhD, ATC, CSCS3 Amy Hand, MA, SCAT, ATC2

**ABSTRACT**

**Background:** With the increasing number of individuals participating in sports every year, injury - specifically anterior cruciate ligament (ACL) injury - remains an inherent risk factor for participants. The majority of ACL injuries occur from a non-contact mechanism, and there is a high physical and financial burden associated with injury. Understanding the risk factors for ACL injury may aid in the development of prevention efforts.

**Purpose:** The purpose of this review was to synthesize and appraise existing literature for risk factors associated with non-contact anterior cruciate ligament (ACL) injury in both sexes.

**Study Design:** Systematic review.

**Methods:** An electronic literature search was conducted utilizing the MEDLINE database and The Cochrane library for articles available through February 2016. All titles and abstracts were reviewed and full text articles meeting eligibility criteria were assessed in detail to determine inclusion or exclusion. Articles reviewed in full text were reviewed for scientific evidence of risk factors for ACL injury. Results from studies were extracted and initially classified as either intrinsic or extrinsic risk factors, and then further categorized based upon the evidence presented in the studies meeting inclusion criteria. Data extracted from eligible studies included general study characteristics (study design, sample characteristics), methodology, and results for risk factors included.

**Results:** Principal findings of this systematic review identified the following risk factors for ACL injury in both sexes: degrading weather conditions, decreased intercondylar notch index or width, increased lateral or posterior tibial plateau slope, decreased core and hip strength, and potential genetic influence.

**Conclusions:** Neuromuscular and biomechanical risk factors may be addressed through neuromuscular preventative training programs. Though some extrinsic and other inherent physiological factors tend to be non-modifiable, attempts to improve upon those modifiable factors may lead to a decreased incidence of ACL injury.

**Level of Evidence:** 2a.

**Key Words:** anterior cruciate ligament, ACL, risk factor, injury, rupture.

## Ratio of quads to hams

Archives of Orthopaedic and Trauma Surgery pp 1–8| Cite as

**The hamstring/quadriceps ratio is an indicator of function in ACL-deficient, but not in ACL-reconstructed knees**

Erik Hohmann    Kevin Tetsworth Vaida Glatt

**Purpose**

The purpose of this study was to investigate the isokinetic, eccentric and isometric hamstring/quadriceps (HQ) ratios in patients before and after ACL reconstruction (ACLR) using bone–patellar tendon grafts and to establish the relationships between HQ ratio and knee function.

**Methods**

Forty-four patients (mean age of 26.6 years) underwent isokinetic testing of quadriceps and hamstring muscles before and after ACLR and HQ ratios were calculated. Lysholm, IKDC and Cincinnati Scores were used to assess function. Isokinetic concentric and eccentric peak torque (Nm/kg) was measured at three different speeds: 60, 120, and 180°/s. Isometric strength was tested at 30° and 60° of knee flexion.

**Results**

For the isometric tests, the HQ ratio between the involved and non-involved limb was not different for the ACLD knee ( $p = 0.28$ ) at 30° knee flexion, but significant at the 60° flexion angle ( $p = 0.02$ ) and for the ACLR knees at 30° and 60° ( $p = 0.02$ ). For the isokinetic tests, the ratio between involved and non-involved limb was significant for ACL-deficient knees at both 60 ( $p = 0.039$ ) and 120°/s ( $p = 0.05$ ). There were significant differences between limbs for all speeds in ACLR knees ( $p = 0.0003$ – $0.01$ ). For the eccentric tests, the HQ ratio between the involved and non-involved limbs was not significant for both the ACLD ( $p = 0.19$ ) and ACLR knees ( $p = 0.29$ ) at the speed of 60°/s. At 120 and 180°/s, there were significant differences between limbs for both the ACLD ( $p = 0.02$ ) and ACLR knees ( $p = 0.003$ ). Linear regression did not reveal significant relationships between Cincinnati, Lysholm, and IKDC scores and HQ ratios in the ACLD ( $R^2 = 0.35$ ,  $p = 0.58$ ;  $R^2 = 0.34$ ,  $p = 0.63$ ;  $R^2 = 0.38$ ,  $p = 0.49$ ). In contrast, there were significant correlations between the Lysholm and IKDC scores and HQ ratios in the ACLR knees ( $R^2 = 0.84$ ,  $p = 0.002$ ;  $R^2 = 0.86$ ,  $p = 0.001$ ).

**Conclusions**

The findings of this study suggest that the HQ ratio in ACLD patients was not a predictor, but an indicator of patient-perceived knee function following ACLR.

**37. OSTEOARTHRITIS/KNEE****Weight distribution into LE affected in OA**

Arthritis Care Res (Hoboken). 2018 Jul 13. doi: 10.1002/acr.23704.

**Association Between Knee Load and Pain: Within-Patient, Between-Knees, Case-Control Study in Patients with Knee Osteoarthritis.**

Birmingham TB<sup>1,2,3</sup>, Marriott KA<sup>1,2,3</sup>, Leitch KM<sup>1,3</sup>, Moyer RF<sup>4</sup>, Lorbergs AL<sup>1,3</sup>, Walton DM<sup>2,3,5</sup>, Willits K<sup>1,3,6</sup>, Litchfield RB<sup>1,3,6</sup>, Getgood A<sup>1,3,6</sup>, Fowler PJ<sup>1,3,6</sup>, Giffin JR<sup>1,3,6</sup>.

**OBJECTIVE:**

The association between knee loading and pain in patients with knee osteoarthritis (OA) is reported to be low and of questionable importance, but may be confounded by several factors that differ between patients. We aimed to elucidate the association between dynamic knee load and pain by minimizing confounding using a within-patient, between-knees study design.

**METHODS:**

265 patients with knees discordant for pain (530 knees) rated the pain in each knee before and after walking 6 minutes, then underwent three-dimensional gait analysis.

**RESULTS:**

The peak knee adduction moment and knee adduction impulse (proxies for medial knee loading) were associated with increased pain (odds ratio 2.43, 95% confidence interval 1.77 to 3.33; and 6.62, 3.46 to 12.7, respectively) and remained significant after controlling for radiographic disease severity. When split into quartiles, knees in the highest loading quartile had 4.7 (2.3 to 9.5; peak adduction moment) and 9.0 (4.0 to 20.1; knee adduction impulse) times greater odds of experiencing increased pain with walking compared to knees in the lowest loading quartile.

**CONCLUSION:**

When between-patient confounding is minimized, there is a strong association between medial knee load and increased knee pain during walking. This article is protected by copyright. All rights reserved.



**46 A. UPPER LIMB NEUROMOBILIZATION****Treatment of Allodynia****Neural Mobilization Attenuates Mechanical Allodynia and Decreases Proinflammatory Cytokine Concentrations in Rats With Painful Diabetic Neuropathy**

Guan-Cheng Zhu Kun-Ling Tsai Yu-Wen Chen Ching-Hsia Hung

*Physical Therapy*, Volume 98, Issue 4, 1 April 2018, Pages 214–

222, <https://doi.org/10.1093/ptj/pzx124>

**Background**

Painful diabetic neuropathy (PDN) is a common complication in patients with diabetes. It is related to ischemic nerve damage and the increase in the levels of proinflammatory mediators, such as tumor necrosis factor  $\alpha$  (TNF- $\alpha$ ) and interleukin 1 $\beta$  (IL-1 $\beta$ ). Neural mobilization may have the potential to alleviate PDN, but it has not yet been tested. Also, the physiological mechanism of neural mobilization is unclear.

**Objective**

The objective of this study was to investigate treatment effect and physiological mechanism of neural mobilization.

**Design**

This was an experimental study using rats with streptozocin (or streptozotocin)-induced type 1 diabetes.

**Methods**

Three groups were used in the study, the control group (vehicle), the diabetes group (PDN group), and the neural mobilization treatment group (PDN-NM group) (n = 6). Rats in the vehicle group were healthy rats. Rats in the PDN and PDN-NM groups were rats with diabetes. Rats in the PDN-NM group received treatment in the right sciatic nerve, whereas rats in the PDN group did not. Mechanical pain sensitivity and the levels of IL-1 $\beta$  and TNF- $\alpha$  in the sciatic nerve branches and trunk, the L4 to L6 dorsal horn ganglion, and the spinal cord dorsal horn were measured.

**Results**

Mechanical allodynia was alleviated after treatment, but the effect was limited to the treatment side. The concentrations of proinflammatory cytokines were decreased in the nerves that received treatment compared with those on the other side, indicating that neural mobilization may reduce mechanical sensitivity by decreasing the concentrations of local sensitizing agents.

**Limitations**

A limitation of this study was that no direct measurement of nerve blood flow was done.

**Conclusions**

The results of this study showed that neural mobilization effectively alleviated mechanical allodynia in rats with PDN. The side that received treatment had lower concentrations of TNF- $\alpha$  and IL-1 $\beta$  in the sciatic nerve branches and sciatic nerve trunk; this result may have been related to the alleviation of mechanical allodynia.

**52. EXERCISE****Clam are best for gluteals**

The International Journal of Sports Physical Therapy | Volume 13, Number 4 | August 2018 |  
Page 668

**ORIGINAL RESEARCH****ELECTROMYOGRAPHIC ANALYSIS OF GLUTEUS MAXIMUS, GLUTEUS MEDIUS, AND TENSOR FASCIA LATAE DURING THERAPEUTIC EXERCISES WITH AND WITHOUT ELASTIC RESISTANCE**

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Jay Greenstein, DC1

Jena L. Etnoyer-Slaski, MEd, ATC1 Heidi Sterling, BSN, RN2

Robert Topp, PhD, RN2

**ABSTRACT**

**Background:** Strengthening and activation of the gluteus maximus and gluteus medius while minimizing the contribution of the tensor fascia latae are important components in the treatment of many lower limb injuries. Previous researchers have evaluated a myriad of exercises that activate the gluteus maximus (GMax) and gluteus medius (GMed), however, limited research has been performed describing the role of the addition of elastic resistance to commonly used exercises.

**Purpose:** The primary purpose of this study was to determine the gluteal-to-tensor fascia latae muscle activation (GTA index) and compare electromyographic muscle activation of the GMax, GMed, and TFL while performing 13 commonly prescribed exercises designed to target the GMax and GMed. The secondary purpose of this study was to compare muscle activation of the GMax, GMed, and TFL while performing a subgroup of three matched exercises with and without elastic resistance.

**Study Design:** Repeated measures cohort study

**Methods:** A sample of 11 healthy, physically active male and females, free of low back pain and lower extremity injuries, were recruited for the study. Surface electromyography was used to quantify the normalized EMG activation of the gluteus maximus, gluteus medius, and tensor fascia latae while performing 13 exercises. Three of these exercises were performed with and without elastic resistance. The maximal voluntary isometric contraction was established for each muscle and order in which the exercises were performed was randomized to minimize the effect of fatigue.

**Results:** The relative activation of the gluteal muscles were compared to the tensor fascia latae and expressed as the GTA index. Clams with and without resistance, running man gluteus maximus exercise on the stability trainer, and bridge with resistance, generated the highest GTA index respectively. Significant differences in activation of the TFL occurred between clams with and without resistance.

**Conclusions:** The findings are consistent with those of previous investigators who reported that the clam exercise optimally activated the gluteal muscles while minimizing tensor fascia latae activation.

**Levels of Evidence:** Level 2b

**Key Words:** Elastic resistance, electromyography, gluteus maximus, gluteus medius

**56. ATHLETICS****Golf swing stance altering**

The International Journal of Sports Physical Therapy | Volume 13, Number 4 | August 2018 |  
Page 588

**ORIGINAL RESEARCH****MODIFYING STANCE ALTERS THE PEAK KNEE ADDUCTION MOMENT DURING A GOLF SWING**

Quenten L. Hooker<sup>1,2</sup> Robert Shapiro<sup>1</sup> Terry Malone<sup>3</sup> Michael B. Pohl<sup>4</sup>

**ABSTRACT**

**Background:** The knee joint is one of the most frequently injured regions in the game of golf, and the loads experienced by the knee during the golf swing are typically greater than during other activities of daily living. Altering movement patterns is a common strategy that can be used to reduce loading on the knee joint but has received little attention during studies of the golf swing. The primary aim of this study was to examine the effect altering golf stance has on the lead limb peak external knee adduction moment.

**Study Design:** Laboratory based, quasi-experimental

**Methods:** Twenty healthy participants were recruited for a 3-dimensional biomechanical analysis wherein participants hit three golf shots with a driver using the following stance conditions: self-selected, bilateral 0° foot angle, bilateral 30° foot angle, wide stance width, and narrow stance width.

**Results:** Both the 30° foot angle ( $0.80 \pm 0.51$  Nm) and wide stance width ( $0.89 \pm 0.49$  Nm) conditions significantly decreased ( $p < 0.001$ ) the lead limb peak external knee adduction moment compared to the self-selected ( $1.15 \pm 0.58$  Nm) golf stance. No significant differences ( $p = 0.109$ ) in swing speed were found between any of the stance conditions.

**Conclusion:** The externally rotated foot position and wider stance width decreased the lead limb peak external knee adduction moment without hindering swing speed. Modifying stance could be a viable option for golfers who wish to continue playing the sport at a high level, while reducing potentially detrimental loads at the knee joint.

**Levels of Evidence:** 2b-Individual cohort study

**Keywords:** Biomechanics, golf, injury, knee, osteoarthritis

**58. RUNNING****Leg length and MS problems in runners**

The International Journal of Sports Physical Therapy | Volume 13, Number 4 | August 2018 | Page 643

**ORIGINAL RESEARCH****LEG-LENGTH INEQUALITY AND RUNNING-RELATED INJURY AMONG HIGH SCHOOL RUNNERS**

Mitchell J. Rauh, PT, PhD, MPH, FACSM1

**ABSTRACT**

**Background:** Participation in high school cross-country continues to increase with over 492,000 participants during the 2016-17 cross-country season. Several studies have indicated a high incidence of running-related injuries (RRI) in high school cross-country runners. Risk factors for RRI can be divided between intrinsic and extrinsic risk factors. Intrinsic risk factors such as structural asymmetries have received less attention in recent years.

**Purpose:** The primary purposes of the current study were to (1) describe the prevalence of leg-length inequality among female and male high school cross-country runners, and (2) to determine whether leg-length inequality was associated with increased RRI in female and male high school cross-country runners.

**Study Design:** Prospective observational cohort study.

**Methods:** Three hundred ninety-three (222 males, 171 females) athletes competing in high school cross-country running were followed, prospectively. The runners' right and left leg-lengths were measured with a standard cloth tape measure in a supine position. Incidence of low back/lower extremity RRI during practices or competitive events was monitored using the Daily Injury Report.

**Results:** A similar percentage of leg-length inequality greater than 0.5 cm was found among female (19.3%) and male (22.1%) runners. No statistically significant associations were found between leg-length inequality and (RRI) for female or male runners, with the exception that after adjusting for BMI, males with a leg-length inequality >1.5 cm were over seven times more likely to incur a lower leg RRI (Adjusted Odds Ratio=7.47; 95%CI: 1.5, 36.9; p=0.01) than males with a leg-length inequality <0.5 cm. Side of RRI was not associated with side of longer limb length.

**Conclusions:** While leg-length inequality was not associated with RRI, in general, males with a leg-length inequality >1.5 cm were at greater likelihood of sustaining a lower leg RRI.

**Level of Evidence:** 2b

**Keywords:** Asymmetry, Leg-length, High school, Cross-country running, Prospective, Running-related injury

## 59. PAIN

## Placebo effect

**Placebo Effects on the Neurologic Pain Signature A Meta-analysis of Individual Participant Functional Magnetic Resonance Imaging Data**

Matthias Zunhammer, PhD<sup>1</sup>; Ulrike Bingel, MD<sup>1</sup>; Tor D. Wager, PhD<sup>2</sup>; et al for the Placebo

## Key Points

**Question** How do placebo treatments affect pain processing in the brain? **Findings** This systematic meta-analysis of single-participant functional magnetic resonance imaging data of 603 healthy participants from 20 studies found that placebo treatments against experimental pain have moderate effects on pain reports, but very small effects on the neurologic pain signature, a cerebral measure of nociceptive pain.

**Meaning** Placebo analgesia seems to be predominantly mediated by networks different from those underlying the primary processing of noxious stimuli.

## Abstract

**Importance** Placebo effects reduce pain and contribute to clinical analgesia, but after decades of research, it remains unclear whether placebo treatments mainly affect nociceptive processes or other processes associated with pain evaluation. **Objective** We conducted a systematic, participant-level meta-analysis to test the effect of placebo treatments on pain-associated functional neuroimaging responses in the neurologic pain signature (NPS), a multivariate brain pattern tracking nociceptive pain. **Data Sources** Medline (PubMed) was searched from inception to May 2015; the search was augmented with results from previous meta-analyses and expert recommendations.

**Study Selection** Eligible studies were original investigations that were published in English in peer-reviewed journals and that involved functional neuroimaging of the human brain with evoked pain delivered under stimulus intensity-matched placebo and control conditions. The authors of all eligible studies were contacted and asked to provide single-participant data.

**Data Extraction and Synthesis** Data were collected between December 2015 and November 2017 following the Preferred Reporting Items for Systematic Review and Meta-Analyses of individual participant data guidelines. Results were summarized across participants and studies in a random-effects model.

**Main Outcomes and Measures** The main, a priori outcome was NPS response; pain reports were assessed as a secondary outcome.

**Results** We obtained data from 20 of 28 identified eligible studies, resulting in a total sample size of 603 healthy individuals. The NPS responses to painful stimulation compared with baseline conditions were positive in 575 participants (95.4%), with a very large effect size ( $g = 2.30$  [95% CI, 1.92 to 2.69]), confirming its sensitivity to nociceptive pain in this sample. Placebo treatments showed significant behavioral outcomes on pain ratings in 17 of 20 studies (85%) and in the combined sample ( $g = -0.66$  [95% CI,  $-0.80$  to  $-0.53$ ]). However, placebo effects on the NPS response were significant in only 3 of 20 studies (15%) and were very small in the combined sample ( $g = -0.08$  [95% CI,  $-0.15$  to  $-0.01$ ]). Similarly, analyses restricted to studies with low risk of bias ( $g = -0.07$  [95% CI,  $-0.15$  to  $0.00$ ]) indicated very small effects, and analyses of just placebo responders ( $g = -0.22$  [95% CI,  $-0.34$  to  $-0.11$ ]) indicated small effects, as well.

**Conclusions and Relevance** Placebo treatments have moderate analgesic effects on pain reports. The very small effects on NPS, a validated measure that tracks levels of nociceptive pain, indicate that placebo treatments affect pain via brain mechanisms largely independent of effects on bottom-up nociceptive processing.