

## 2. LBP

### Slump sitting stretch

Pain Med. 2018 Dec 24. doi: 10.1093/pm/pny208

#### **Effectiveness of Slump Stretching on Low Back Pain: A Systematic Review and Meta-analysis.**

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#### **BACKGROUND:**

The slump test is a type of neurodynamic test that is believed to evaluate the mechanosensitivity of the neuromeningeal structures within the vertebral canal. The objective of this review was to investigate the effectiveness of slump stretching on back pain and disability in patients with low back pain (LBP).

#### **METHODS:**

We searched eight electronic databases (PubMed/Medline, Scopus, Ovid, CINAHL, Embase, PEDro, Google Scholar, CENTRAL). The publication language was restricted to English, and we searched the full time period available for each database, up to October 2017. Our primary outcomes were pain and disability, and the secondary outcome was range of motion (ROM).

#### **RESULTS:**

We identified 12 eligible studies with 515 LBP patients. All included studies reported short-term follow-up. A large effect size (standardized mean difference [SMD] = -2.15, 95% confidence interval [CI] = -3.35 to -0.95) and significant effect were determined, favoring the use of slump stretching to decrease pain in patients with LBP. In addition, large effect sizes and significant results were also found for the effect of slump stretching on disability improvement (SMD = -8.03, 95% CI = -11.59 to -4.47) in the LBP population. A qualitative synthesis of results showed that slump stretching can significantly increase straight leg raise and active knee extension ROM.

#### **CONCLUSIONS:**

There is very low to moderate quality of evidence that slump stretching may have positive effects on pain in people with LBP. However, the quality of evidence for the benefits of slump stretching on disability was very low. Finally, it appears that patients with nonradicular LBP may benefit most from slump stretching compared with other types of LBP.

Gabapentin better than Pregabalin

**Effect of gabapentin vs pregabalin on pain intensity in adults with chronic sciatica: A randomized clinical trial**

JAMA — Robertson K, et al. | January 15, 2019

Researchers investigated gabapentin (GBP) vs pregabalin (PGB) head to head for the treatment of chronic sciatica (CS). As per findings, both pregabalin and GBP were significantly efficacious. However, fewer and less severe adverse events noted with GBP support its superiority. They recommend initiating gabapentin before PGB to permit optimal crossover of medicines.

Methods

- In a single-center, tertiary referral public hospital, researchers performed a preplanned interim analysis of a randomized, double-blind, double-dummy crossover trial of PGB vs GBP for management of CS at half the estimated final sample size.
- From March 2016 to March 2018, randomization was done of a total of 20 patients; 2 were excluded with 1 lost to follow-up and the other requiring urgent surgery unrelated to the study.
- They recruited patients attending a specialist neurosurgery clinic with unilateral CS in this trial.
- They defined chronic sciatica as pain lasting for at least 3 months radiating into 1 leg only to, at, or below the knee level.
- The trial clinician determined the imaging (magnetic resonance imaging with or without computed tomography) corroborating a root-level lesion concordant with symptoms and/or signs.
- Patients who had not used GBP and PGB and were 18 years or older were eligible for inclusion.
- They performed intention to treat analysis that began in February 2018.
- Participants were randomly assigned to receive GBP (400 mg to 800 mg 3 times a day) then PGB (150 mg to 300 mg twice daily) or vice versa, each taken for 8 weeks.
- Crossover followed a 1-week washout.
- Pain intensity (10-point visual analog scale) at baseline and 8 weeks was assessed as the primary outcome.
- Disability (using the Oswestry Disability Index) and severity/frequency of adverse events were assessed as the secondary outcomes.

Results

- Mostly men (11 [61%]) comprised the total trial population (N = 18) with a mean (SD) age of 57 (16.5) years.
- In this cohort, about one third of the participants were smokers (5 [28%]), and more than half consumed alcohol (12 [67%]).
- Compared to PGB, gabapentin was superior with fewer and less severe adverse events.
- Both GBP (mean [SD], 7.54 [1.39] to 5.82 [1.72];  $P < .001$ ) and PGB (mean [SD], 7.33 [1.30] to 6.38 [1.88];  $P = .002$ ) led to a marked reduction in visual analog pain intensity scale and Oswestry Disability Index (mean [SD], 59.22 [16.88] to 48.54 [15.52];  $P < .001$  for both).
- Head to head, superior visual analog pain intensity scale reduction (mean [SD], GBP: 1.72 [1.17] vs PGB: 0.94 [1.09];  $P = .035$ ) was evident with GBP irrespective of sequence order; however, Oswestry Disability Index reduction was unchanged.
- PGB led to more frequent adverse events (PGB, 31 [81%] vs GBP, 7 [19%];  $P = .002$ ) especially when it was taken first.

## 7. PELVIC ORGANS/WOMAN'S HEALTH

### Assisted reproduction side effects

#### **Medically assisted reproduction and birth outcomes: A within-family analysis using Finnish population registers**

The Lancet

Goisis A, et al. | January 16, 2019

In this study, investigators assessed the children conceived by medically assisted reproduction and observed an elevated risk of adverse birth consequences among them. Although, they noticed that this increased hazard was widely related to determinants other than the medically assisted reproduction treatment.

#### Methods

- They collected data from Finnish administrative registers covering a 20% random sample of households with at least one child (aged 0–14 years at the end of 2000) (n=65,723).
- They estimated gestational age, birth weight, the risk of low birth weight, and risk of preterm birth among kids conceived by medically assisted reproduction and naturally, both.
- Using standard multivariate methods that controlled for observed factors like multiple births, birth order, and parental sociodemographic characteristics, they first calculated variations in birth consequences by mode of conception in the general population.
- Then, they used a sibling-comparison approach which had not used before in medically assisted reproduction research.
- Children conceived by medically assisted reproduction were then compared with siblings conceived naturally and, thus, controlled for all observed and unobserved determinants shared by siblings.

#### Results

- A sum of 2776 (4%) children in were conceived by medically assisted reproduction and 1245 kids were included in the sibling comparison between 1995 and 2000.
- They observed worse outcomes in children conceived by medically assisted reproduction as compared to those conceived naturally, even after adjusting for observed child and parental characteristics such as difference in birthweight of –60 g (95% CI –86 to –34) and 2·15 percentage point (95% CI 1·07 to 3·24) higher risk of preterm labor.
- They noticed attenuated gap in birth consequences in the sibling comparison such that the association between medically assisted reproduction and adverse birth outcomes was statistically and substantively weak for all outcomes like difference in birthweight of –31 g (95% CI –85 to 22) and 1·56 percentage point (95% CI –1·26 to 4·38) greater risk of preterm delivery.

**Diastasis Rectus rx****Noninvasive Treatment of Postpartum Diastasis Recti Abdominis: A Pilot Study**

Tuttle, Lori J.; Fasching, Jennifer; Keller, Allison; Patel, Milan; Saville, Chelsea; Schlaff, Rose; Walker, Alicia; Mason, Maureen; Gombatto, Sara P. Less

**Journal of Women's Health Physical Therapy.** 42(2):65-75, May/August 2018.

**Objective:**

To examine the effectiveness of physical therapy intervention for treating diastasis recti abdominis (DRA) in the postpartum population, with emphasis on transverse abdominis (TRA) exercise and kinesiotaping.

**Study Design:**

Pilot randomized controlled trial.

**Background:**

DRA may be linked to lumbopelvic and gynecological health problems, and there is limited evidence describing effective noninvasive treatments of DRA in postpartum women.

**Methods and Measures:**

Thirty women, 6 to 12 weeks postpartum with a palpable separation of the rectus abdominis muscles ( $32.03 \pm 4.33$  years old; number of births =  $2.30 \pm 1.34$ ), were randomly assigned to TRA exercise intervention ( $n = 10$ ), kinesiotaping intervention ( $n = 8$ ), TRA exercise and kinesiotaping combination intervention ( $n = 5$ ), or control ( $n = 7$ ). The primary outcome was inter-recti distance (IRD), measured via ultrasound imaging. Secondary outcomes of low back pain and pelvic floor dysfunction were measured via validated questionnaires (Pelvic Floor Distress Inventory [PFDI-20] and Roland-Morris Disability Questionnaire). Data are presented as means  $\pm$  standard deviation.

**Results:**

The largest changes in IRD were observed for the TRA exercise-only and TRA exercise + taping groups. There was no statistical difference in IRD change between the TRA exercise-only and TRA exercise + taping groups. Both groups with TRA exercise components were statistically different from the taping-only group and the control group in IRD change.

**Conclusions:**

Based on our preliminary data, exercise targeting the TRA may be an effective treatment method for reducing IRD. Further studies that include a larger patient population, particularly those with low back pain and pelvic floor dysfunction, are needed to replicate these findings and to establish a standardized exercise protocol for DRA.

## PGP postpartum

**Disability, Pelvic Girdle Pain, and Depressive Symptoms in the First 3 Months Postpartum**

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Journal of Women's Health Physical Therapy: September/December 2018 - Volume 42 - Issue 3 - p 139–147

doi: 10.1097/JWH.000000000000105

**Objective:** This study explored associations among disability, pelvic girdle pain (PGP), and postpartum depressive symptoms and cutoff scores for disability in the postpartum population with PGP.

**Study Design:** A prospective, observational cohort study.

**Background:** Women experience significant physiological and emotional changes during recovery from pregnancy and delivery. PGP, disability, and depressive symptoms have yet to be investigated in the first 3 months postpartum.

**Methods and Measures:** Women were surveyed at 4, 8, and 12 weeks postpartum using the Oswestry Low Back Pain Disability Questionnaire, a pain questionnaire, and the Edinburgh Postnatal Depression Scale. Analyses included nonparametric group comparisons,  $\chi^2$ , correlation, and receiver operating characteristic curve.

**Results:** Twenty-one women were enrolled and 57% reported PGP. Oswestry Disability Index (ODI) scores significantly correlated with PGP ( $P < .05$ ) and predicted PGP at 4 weeks (area under the curve [AUC] = 0.938, SE = 0.54,  $P = .004$ , 95% confidence interval [CI] = 0.831–1.0) and at 12 weeks (AUC = 0.934, SE = 0.06,  $P = .008$ , 95% CI = 0.825–1.0) with 100% sensitivity using ODI cutoff scores of 15% and 7%, respectively. PGP at 4 weeks was associated with a history of low back pain ( $\chi^2$  (1, N = 21) = 6.43,  $P = .03$ ), cesarean section ( $\chi^2$  (1, N = 21) = 4.89,  $P = .05$ ), and depressive symptoms ( $r = 0.43$ ,  $P = .055$ ). Approximately 20% of participants reported self-harming thoughts.

**Conclusion:** ODI scores significantly correlated with PGP and were higher than those of the general population with lumbopelvic pain. Results highlight the importance of screening for suicidal ideation and should be reproduced in larger, more diverse cohorts.

### HPV involved in vaginal CA

#### **Human papillomavirus and p16 in squamous cell carcinoma and intraepithelial neoplasia of the vagina**

International Journal of Cancer

Bertoli HK, et al. | January 15, 2019

Authors classified studies published between 1986 and 2017 using PCR-based or Hybrid Capture 2 tests to estimate the presence of HPV DNA and/or using any method to identify p16 overexpression in vaginal intraepithelial neoplasia (VaIN), vaginal squamous cell carcinoma (VaSCC), or other types of vaginal cancer. They used  $I^2$  statistic to evaluate the heterogeneity. They noted pooled HPV prevalences in VaSCC and VaIN, 66.7% and 85.2%, respectively. They observed HPV16, followed by HPV33, and HPV45 (in VaIN) and HPV18, and HPV33 (in VaSCC) as the most prevalent HPV type among the HPV positive VaSCC and VaIN cases.

They noted that 38.9% of HPV negative and 89.9% of HPV positive vaginal cancers were positive for p16 overexpression. They suggested that a substantial proportion of vaginal neoplasia could be prevented by vaccination against HPV.

**Pelvic girdle pain in pregnancy****Understanding Clinical Decision Making: Pregnancy-Related Pelvic Girdle Pain**

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Journal of Women's Health Physical Therapy: September/December 2018 - Volume 42 - Issue 3 - p 120–127

doi: 10.1097/JWH.000000000000100

**Background:** Pregnancy-related pelvic girdle pain (PGP) represents a common condition with implications for persistence. Currently, a practice gap appears to exist related to the assessment and management of pregnancy-related PGP. This study explores how Canadian publicly funded physiotherapists working in both tertiary care and primary care settings make clinical decisions regarding pregnancy-related PGP.

**Methods:** A 4-step process was used to develop a valid survey designed to determine how Canadian physiotherapists make clinical decision regarding pregnancy-related PGP. Physiotherapists from 2 different publicly funded practice settings (tertiary care and primary care) were invited to participate in a telephone or electronic survey.

**Results:** The resulting survey contained 28 items in 4 domains. Of the 63 invited, 17 participated (tertiary care: n = 8; primary care: n = 9). Participants' practice patterns were not congruent with current evidence regarding pregnancy-related PGP. However, 100% of participants acknowledged the importance of using clinical practice guidelines to support decision making.

**Conclusions:** Pregnancy-related PGP is a specific category of PGP impacting women in the perinatal period and differs in etiology as it is related to pregnancy and associated biopsychosocial influences. Awareness and enactment of best practices regarding pregnancy-related PGP were lacking among our sample. Knowledge translation efforts to support the provision of evidence-informed care are needed.

## 8. VISCERA

### Mediterranean diet and improved cardiac condition

#### **Mediterranean-style diet improves systolic blood pressure and arterial stiffness in older adults: Results of a 1-year European multi-center trial**

Hypertension

Jennings A, et al. | January 16, 2019

In this study reporting on the results of a 1-year European multicenter trial, researchers determined whether a Mediterranean-style diet, individuals to meet the dietary recommendations for older adults, has any impact on blood pressure levels and arterial stiffness.

Blood pressure levels were measured and recorded for 1,294 participants (aged 65-79 years) of the NU-AGE trial, and arterial stiffness was measured and recorded in a subset of 225 participants. Those assigned to the intervention group were given individually tailored standardized dietary guidance and commercially available foods to increase adherence to a Mediterranean-style diet. Those in the control group maintained their normal daily diet and were given current national dietary advice. A total of 1,142 participants completed the trial. According to results 1 year following the intervention, male participants saw a significant decrease in their systolic blood pressure levels. Diastolic blood pressure level reduction post-intervention, on the other hand, did not reach statistical significance. Augmentation index, which is a measure of arterial stiffness, did improve following the intervention, with no change in pulse wave velocity, in the subset of 225 participants. The investigators also noted increased 24-hour urinary potassium levels post-intervention, as well as a reduction in pulse pressure and 24-hour urinary sodium for male participants.

Overall, a Mediterranean-style diet resulted in clinically relevant reductions in blood pressure and arterial stiffness and showed efficacy in improving cardiovascular health.

### Fecal transplantation in UC

#### **Effect of fecal microbiota transplantation on 8-week remission in patients with ulcerative colitis: A randomized clinical trial**

JAMA

Costello, SP, et al. | January 16, 2019

In this multicenter, randomized, double-blind clinical trial that was conducted across three Australian tertiary referral centers between June 2013 and June 2016, researchers evaluated 73 individuals to assess the efficiency of short-duration fecal microbiota transplantation (FMT) therapy to induce remission in ulcerative colitis (UC) using anaerobically prepared stool.

The primary endpoint was steroid-free remission of UC (Mayo score  $\leq 2$  with an endoscopic Mayo score  $\leq 1$  at week 8), which was achieved in 12 of the 38 study participants who received pooled donor FMT vs 3 of the 35 participants who received autologous FMT. The investigators observed three serious adverse events in the donor FMT group and two in the autologous FMT group.

Approximately 42% of the study participants who achieved the primary end point at week 8 following donor FMT were able to maintain remission at 12 months.

## Saturated fats and mortality

**Dietary Fats in Relation to Total and Cause-Specific Mortality in a Prospective Cohort of 521,120 Individuals with 16 Years of Follow-Up****Pan Zhuang Yu Zhang Wei He Xiaoqian Chen Jingnan Chen Lilin He Lei Mao Fei Wu Jingjing Jiao**<https://doi.org/10.1161/CIRCRESAHA.118.314038>

**Rationale:** Evidence linking saturated fat intake with cardiovascular health is controversial. The associations of unsaturated fats with total and cardiovascular disease (CVD) mortality remain inconsistent and data regarding non-CVD mortality are limited.

**Objective:** To assess dietary fat intake in relation to total and cause-specific mortality.

**Methods and Results:** We analyzed data of 521,120 participants aged 50-71 years from the NIH-AARP Diet and Health Study with 16 years of follow-up. Intakes of saturated fatty acids (SFAs), trans-fatty acids (TFAs), monounsaturated fatty acids (MUFAs), and polyunsaturated fatty acids (PUFAs) were assessed via food frequency questionnaires. Hazard ratios (HRs) and 95% confidence intervals (CIs) were estimated using the Cox proportional hazards model. Overall, 129,328 deaths were documented during 7.3 million person-years of follow-up. In the replacement of carbohydrates, multivariable-adjusted HRs of total mortality comparing extreme quintiles were 1.29 (95% CI, 1.25-1.33) for SFAs, 1.03 (1.00-1.05) for TFAs, 0.98 (0.94-1.02) for MUFAs, 1.09 (1.06-1.13) for animal MUFAs (A-MUFAs), 0.94 (0.91-0.97) for plant MUFAs (P-MUFAs), 0.93 (0.91-0.95) for PUFAs, 0.92 (0.90-0.94) for marine omega-3 PUFAs, 1.06 (1.03-1.09) for  $\alpha$ -linolenic acid (ALA), 0.88 (0.86-0.91) for linoleic acid (LA), and 1.10 (1.08-1.13) for arachidonic acid (AA). CVD mortality was inversely associated with marine omega-3 PUFA intake ( $P$ -trend<0.0001), whereas it was positively associated with SFA, TFA, and AA intake. Isocalorically replacing 5% of the energy from SFAs with P-MUFAs was associated with 15%, 10%, 11%, and 30% lower total mortality, CVD, cancer, and respiratory disease mortality, respectively. Isocaloric replacement of SFA with LA (2%) was associated with lower total (8%), CVD (6%), cancer (8%), respiratory disease (11%), and diabetes (9%) mortality.

**Conclusions:** Intakes of SFAs, TFAs, A-MUFAs, ALA, and AA were associated with higher mortality. Dietary intake of marine omega-3 PUFAs and replacing SFAs with P-MUFAs or LA were associated with lower total, CVD, and certain cause-specific mortality.

## 10 B. CERVICAL EXERCISES

### Eccentric upper traps helps

Clin J Pain. 2019 Jan;35(1):65-76. doi: 10.1097/AJP.0000000000000656.

#### **Clinical Outcomes and Central Pain Mechanisms are Improved After Upper Trapezius Eccentric Training in Female Computer Users With Chronic Neck/Shoulder Pain.**

Heredia-Rizo AM<sup>1,2,3</sup>, Petersen KK<sup>2</sup>, Madeleine P<sup>3</sup>, Arendt-Nielsen L<sup>2,4</sup>.

#### **OBJECTIVES:**

The effects of eccentric exercises on clinical outcomes and central pain mechanisms are unclear in neck/shoulder pain (NSP). The aims were to: (1) evaluate the clinical impact of unilateral eccentric training in female computer users with chronic NSP; (2) compare pressure pain sensitivity, temporal summation of pain (TSP); and conditioned pain modulation (CPM) in female office workers with and without NSP; and (3) assess sensitization and central pain responses after training.

#### **METHODS:**

In part A, 20 females with NSP were compared with 20 controls. In part B, the NSP group underwent a 5-week upper trapezius eccentric training program. Participants reported their pain intensity and completed the Neck Disability Index, and the Disabilities of the Arm, Shoulder and Hand questionnaire. Pressure pain thresholds (PPTs) were assessed over the neck and forearm. Cuff algometry identified pain detection threshold (PDT) and pain tolerance thresholds (PTT). TSP was evaluated by visual analog scale pain scores during 10 repetitive cuff stimulations. CPM was calculated as the difference in PDT with and without a conditioning painful stimulus. Outcomes were measured at baseline and after intervention. Pain intensities were collected at 3- and 6-month follow-up.

#### **RESULTS:**

Pain and disability decreased after intervention ( $P < 0.05$ ) and at follow-ups ( $P = 0.002$ ). The NSP group showed reduced PTT ( $P \leq 0.02$ ), but no differences in TSP ( $P = 0.947$ ) or CPM ( $P = 0.059$ ) compared with controls. After training, participants with NSP had improved CPM, PPTs, and PTT at the nontreated side ( $P < 0.05$ ).

#### **DISCUSSION:**

Eccentric training improved pain and disability, reduced sensitization, and enhanced CPM efficiency in female computer users with NSP.

**13 D. SLEEP****Obstructive pulmonary disease**

J Clin Sleep Med. 2019 Jan 3. pii: jc-18-00147.

**Poor Outcomes Among Patients With Chronic Obstructive Pulmonary Disease With Higher Risk for Undiagnosed Obstructive Sleep Apnea in the LOTT Cohort.**

Donovan LM, Feemster LC, Udris EM, Griffith MF, Spece LJ, Palen BN, He K, Parthasarathy S, Strohl KP, Kapur VK, Au DH.

*STUDY OBJECTIVES:*

Evaluate consequences of intermediate to high risk of undiagnosed obstructive sleep apnea (OSA) among individuals with chronic obstructive pulmonary disease (COPD).

*METHODS:*

Using data from the Long Term Oxygen Treatment Trial (LOTT), we assessed OSA risk at study entry among patients with COPD. We compared outcomes among those at intermediate to high risk (modified STOP-BANG score  $\geq 3$ ) relative to low risk (score  $< 3$ ) for OSA. We compared risk of mortality or first hospitalization with proportional hazard models, and incidence of COPD exacerbations using negative binomial regression. We adjusted analyses for demographics, body mass index, and comorbidities. Last, we compared St. George Respiratory Questionnaire and Quality of Well-Being Scale results between OSA risk groups.

*RESULTS:*

Of the 222 participants studied, 164 (74%) were at intermediate to high risk for OSA based on the modified STOP-BANG score. Relative to the 58 low-risk individuals, the adjusted hazard ratio of mortality or first hospitalization was 1.61 (95% confidence interval 1.01-2.58) for those at intermediate to high risk of OSA. Risk for OSA was also associated with increased frequency of COPD exacerbations (adjusted incidence rate ratio: 1.78, 95% confidence interval 1.10-2.89). Respiratory symptoms by St. George Respiratory Questionnaire were 5.5 points greater ( $P = .05$ ), and Quality of Well-Being Scale scores were .05 points lower ( $P < .01$ ) among those at intermediate to high risk for OSA, indicating more severe respiratory symptoms and lower quality of life.

*CONCLUSIONS:*

Among individuals with COPD, greater risk for undiagnosed OSA is associated with poor outcomes. Increased recognition and management of OSA in this group could improve outcomes.

**REM in Alzheimer****Reduced non-rapid eye movement sleep is associated with tau pathology in early Alzheimer's disease**

Science Translational Medicine

Lucey BP, et al. | January 15, 2019

In Alzheimer's disease (AD), deposition of insoluble amyloid- $\beta$  ( $A\beta$ ) is followed by intracellular aggregation of tau in the neocortex and subsequent neuronal cell loss, synaptic loss, brain atrophy, and cognitive impairment.

By the time even the earliest clinical symptoms are detectable,  $A\beta$  accumulation is close to reaching its peak and neocortical tau pathology is frequently already present. The period in which AD pathology is accumulating in the absence of cognitive symptoms represents a clinically relevant time window for therapeutic intervention. Sleep is increasingly recognized as a potential marker for AD pathology and future risk of cognitive impairment. Previous studies in animal models and humans have associated decreased non-rapid eye movement (NREM) sleep slow wave activity (SWA) with  $A\beta$  deposition. In this study, we analyzed cognitive performance, brain imaging, and cerebrospinal fluid (CSF) AD biomarkers in participants enrolled in longitudinal studies of aging. In addition, we monitored their sleep using a single-channel electroencephalography (EEG) device worn on the forehead.

After adjusting for multiple covariates such as age and sex, we found that NREM SWA showed an inverse relationship with AD pathology, particularly tauopathy, and that this association was most evident at the lowest frequencies of NREM SWA. Given that our study participants were predominantly cognitively normal, this suggested that changes in NREM SWA, especially at 1 to 2 Hz, might be able to discriminate tau pathology and cognitive impairment either before or at the earliest stages of symptomatic AD.

## OSA and heart

**Obstructive sleep apnea is associated with nonsustained ventricular tachycardia in patients with hypertrophic obstructive cardiomyopathy.**

Wang S<sup>1</sup>, Cui H<sup>2</sup>, Song C<sup>3</sup>, Zhu C<sup>1</sup>, Wu R<sup>1</sup>, Meng L<sup>1</sup>, Yu Q<sup>1</sup>, Huang X<sup>3</sup>, Wang S<sup>4</sup>.

*BACKGROUND:*

Hypertrophic cardiomyopathy (HCM) is associated with arrhythmias and cardiovascular death. Obstructive sleep apnea (OSA) is highly prevalent and independently associated with atrial fibrillation in patients with HCM.

*OBJECTIVE:*

The purpose of this study was to determine the relationship between nonsustained ventricular tachycardia (NSVT) and OSA in hypertrophic obstructive cardiomyopathy (HOCM).

*METHODS:*

One hundred thirty consecutive patients with a confirmed diagnosis of HOCM in Fuwai Hospital between September 2017 and May 2018 were included. Polysomnography and Holter electrocardiography were performed in all patients.

*RESULTS:*

Of 130 patients, 72 (55.4%) were diagnosed with OSA, including 38 with mild, 21 with moderate, and 13 with severe OSA, and 27 patients (20.8%) had NSVT. The prevalence of NSVT increased with the severity of OSA (none, mild, moderate, and severe: 12.1%, 15.8%, 33.3%, and 53.8%, respectively;  $P < .001$  for trend). Compared to patients without NSVT, the apnea-hypopnea index was significantly higher in patients with NSVT among the different OSA groups (mild, moderate, and severe: 11.9 [10.9-13.4] vs 6.7 [5.8-8.0],  $P = .001$ ; 24.3 [22.2-28.4] vs 18.5 [16.7-22.12],  $P = .01$ ; and 54.3 [41.4-61.9] vs 33.9 [31.0-39.2],  $P = .008$ ). In multivariate logistic regression analysis, family history of HCM or sudden cardiac death (odds ratio 6.11; 95% confidence interval 1.72-21.73;  $P = .005$ ) and apnea-hypopnea index (odds ratio 1.07; 95% confidence interval 1.02-1.12;  $P = .001$ ) were the only factors associated with NSVT after adjustment for age, sex, and body mass index.

*CONCLUSION:*

The presence and severity of OSA in patients with HOCM is independently associated with NSVT, which is a risk factor for sudden cardiac death and cardiovascular death in this population.

**Coronary syndrome**

J Am Heart Assoc. 2019 Jan 22;8(2):e010826. doi: 10.1161/JAHA.118.010826.

**Association of Obstructive Sleep Apnea With Cardiovascular Outcomes in Patients With Acute Coronary Syndrome.**

Fan J<sup>1</sup>, Wang X<sup>1</sup>, Ma X<sup>1,2</sup>, Somers VK<sup>3</sup>, Nie S<sup>1</sup>, Wei Y<sup>4</sup>.

**Background** The prognostic significance of obstructive sleep apnea ( OSA ) in patients with acute coronary syndrome ( ACS ) in the contemporary era is unclear. We performed a large, prospective cohort study and did a landmark analysis to delineate the association of OSA with subsequent cardiovascular events after ACS onset.

**Methods and Results** Between June 2015 and May 2017, consecutive eligible patients admitted for ACS underwent cardiorespiratory polygraphy during hospitalization. OSA was defined as an apnea-hypopnea index  $\geq 15$  events  $\cdot h^{-1}$ . The primary end point was major adverse cardiovascular and cerebrovascular event ( MACCE ), including cardiovascular death, myocardial infarction, stroke, ischemia-driven revascularization, or hospitalization for unstable angina or heart failure. OSA was present in 403 of 804 (50.1%) patients. During median follow-up of 1 year, cumulative incidence of MACCE was significantly higher in the OSA group than in the non- OSA group (log-rank,  $P=0.041$ ). Multivariate analysis showed that OSA was nominally associated with incidence of MACCE (adjusted hazard ratio, 1.55; 95% CI, 0.94-2.57;  $P=0.085$ ). In the landmark analysis, patients with OSA had 3.9 times the risk of incurring a MACCE after 1 year (adjusted hazard ratio, 3.87; 95% CI, 1.20-12.46;  $P=0.023$ ), but no increased risk was found within 1-year follow-up (adjusted hazard ratio, 1.18; 95% CI, 0.67-2.09;  $P=0.575$ ). No significant differences were found in the incidence of cardiovascular death, myocardial infarction, and ischemia-driven revascularization, except for a higher rate of hospitalization for unstable angina in the OSA group than in the non- OSA group (adjusted hazard ratio, 2.10; 95% CI, 1.09-4.05;  $P=0.027$ ).

**Conclusions** There was no independent correlation between OSA and 1-year MACCE after ACS . The increased risk associated with OSA was only observed after 1-year follow-up. Efficacy of OSA treatment as secondary prevention after ACS requires further investigation.

**Sleep and artery health**

Journal of the American College of Cardiology

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**Association of Sleep Duration and Quality With Subclinical Atherosclerosis**

Fernando Domínguez, Valentín Fuster, Juan Miguel Fernández-Alvira, Leticia Fernández-Friera, Beatriz López-Melgar, Ruth Blanco-Rojo, Antonio Fernández-Ortiz, Pablo García-Pavía, Javier Sanz, José M. Mendiguren, Borja Ibañez, Héctor Bueno, Enrique Lara-Pezzi and José M. Ordovás

**Background** Sleep duration and quality have been associated with increased cardiovascular risk. However, large studies linking objectively measured sleep and subclinical atherosclerosis assessed in multiple vascular sites are lacking.

**Objectives** The purpose of this study was to evaluate the association of actigraphy-measured sleep parameters with subclinical atherosclerosis in an asymptomatic middle-aged population, and investigate interactions among sleep, conventional risk factors, psychosocial factors, dietary habits, and inflammation.

**Methods** Seven-day actigraphic recording was performed in 3,974 participants (age  $45.8 \pm 4.3$  years; 62.6% men) from the PESA (Progression of Early Subclinical Atherosclerosis) study. Four groups were defined: very short sleep duration <6 h, short sleep duration 6 to 7 h, reference sleep duration 7 to 8 h, and long sleep duration >8 h. Sleep fragmentation index was defined as the sum of the movement index and fragmentation index. Carotid and femoral 3-dimensional vascular ultrasound and cardiac computed tomography were performed to quantify noncoronary atherosclerosis and coronary calcification.

**Results** When adjusted for conventional risk factors, very short sleep duration was independently associated with a higher atherosclerotic burden with 3-dimensional vascular ultrasound compared to the reference group (odds ratio: 1.27; 95% confidence interval: 1.06 to 1.52;  $p = 0.008$ ). Participants within the highest quintile of sleep fragmentation presented a higher prevalence of multiple affected noncoronary territories (odds ratio: 1.34; 95% confidence interval: 1.09 to 1.64;  $p = 0.006$ ). No differences were observed regarding coronary artery calcification score in the different sleep groups.

**Conclusions** Lower sleeping times and fragmented sleep are independently associated with an increased risk of subclinical multiterritory atherosclerosis. These results highlight the importance of healthy sleep habits for the prevention of cardiovascular disease.

### 14. HEADACHES

#### Cluster HA's helped by O2

##### **Effectiveness of oxygen and other acute treatments for cluster headache: Results from the cluster headache questionnaire, an international survey**

Headache: The Journal of Head and Face Pain

Pearson SM, et al. | January 15, 2019

Researchers evaluated acute cluster headache medications in a large international sample, including recommended treatments such as oxygen, commonly used medications such as opioids, and emerging medications such as intranasal ketamine, in terms of their effectiveness and adverse effects.

They particularly focussed on a large subset of respondents 65 years of age or older. Data from the Cluster Headache Questionnaire, with respondents from over 50 countries and with the vast majority from the United States, the United Kingdom, and Canada, were presented. In the questionnaire, a total of 3251 subjects participated, of which 2193 respondents met criteria for this study (1604 cluster headache and 589 probable cluster headache).

As per survey respondents, oxygen is a highly effective treatment with few complications in cluster headache in a large international sample, including those 65 years or over. In addition, triptans were identified as very effective with some side effects.

Findings suggest that patients with probable cluster headache and those with a full diagnosis of a cluster headache may respond similarly to acute medications.

## 17. SHOULDER GIRDLE

### Submaximal isometrics better than stronger for winged scapula

Clin Biomech (Bristol, Avon). 2018 Dec 21;61:199-204. doi: 10.1016/j.clinbiomech.2018.12.018.

#### **Electromyographic activity of the serratus anterior and pectoralis major during isometric scapular protraction at different resistance intensities in subjects with and without a winged scapula.**

Kim JS<sup>1</sup>, Ahn DH<sup>2</sup>, Park DH<sup>3</sup>, Oh JS<sup>4</sup>.

#### *BACKGROUND:*

During maximal isometric protraction, it is important to determine the optimal resistance intensity in subjects with a winged scapula, for inducing isolated activity of the serratus anterior against the pectoralis major, which is activated as a synergistic muscle. The aim of the present study was to determine electromyographic activities of the serratus anterior and pectoralis major muscles during isometric shoulder protraction at different levels in subjects with and without a winged scapula.

#### *METHODS:*

Thirty male subjects performed isometric shoulder protraction in a sitting position at different resistance intensity levels (100%, 80%, and 60% of maximal protraction strength). Surface electromyographic data of the serratus anterior and pectoralis major muscles were gathered simultaneously using fixed instrumentation to measure isometric shoulder protraction.

#### *FINDINGS:*

Muscle activity of the serratus anterior in subjects without a winged scapula was significantly greater than that of subjects with a winged scapula across all three conditions, whereas muscle activity of the pectoralis major was lower in subjects without a winged scapula. In addition, winged scapula muscle activity corresponding to maximal protraction was significantly greater than that in the submaximal condition.

#### *INTERPRETATION:*

In a clinical setting, submaximal resistance can be more optimal than maximal effort during isometric shoulder protraction in individuals with a winged scapula.

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#### *KEYWORDS:*

Isometric shoulder protraction; Pectoralis major; Serratus anterior; Winged scapula

PMID: 30594768 DOI: 10.1016/j.clinbiomech.2018.12.018

**20 A. ROTATOR CUFF****PT helps rotator cuff pathology**

J Shoulder Elbow Surg. 2018 Dec 13. pii: S1058-2746(18)30732-8. doi: 10.1016/j.jse.2018.10.001.

**Physical therapy versus natural history in outcomes of rotator cuff tears: the Rotator Cuff Outcomes Workgroup (ROW) cohort study.**

Dickinson RN<sup>1</sup>, Ayers GD<sup>2</sup>, Archer KR<sup>3</sup>, Fan R<sup>2</sup>, Page C<sup>4</sup>, Higgins LD<sup>5</sup>, Kuhn JE<sup>1</sup>, Baumgarten KM<sup>6</sup>, Matzkin E<sup>5</sup>, Jain NB<sup>7</sup>.

*BACKGROUND:*

We compared the outcomes of patients who performed physical therapy versus those who did not in a longitudinal cohort of patients undergoing nonoperative treatment of rotator cuff tears. We also assessed whether there was a dose effect in which the pain and functional outcomes in patients performing physical therapy plateaued.

*METHODS:*

From February 2011 to June 2015, a multicenter cohort of patients with rotator cuff tears undergoing nonoperative treatment completed a detailed health and demographic questionnaire and the Shoulder Pain and Disability Index (SPADI) at baseline and 3, 6, 12, and 18 months. Longitudinal mixed models were used to assess whether physical therapy in the first 3 months predicted SPADI scores and dose effect.

*RESULTS:*

Among the 55 patients in our cohort, the performance of physical therapy within the first 3 months predicted better SPADI scores versus nonperformance of physical therapy at 3 months ( $P = .02$ ). Scores were similar between groups at 6, 12, and 18 months. A threshold of 16 physical therapy sessions was observed for pain and functional improvement during follow-up, after which significant improvement was not seen.

*CONCLUSIONS:*

Patients who performed physical therapy within the first 3 months had statistically significant improvements in pain and function as measured by the SPADI score at 3 months compared with patients who did not report performing physical therapy. Depending on the minimal clinically important difference used for the SPADI score, our results could be interpreted as meeting the minimal clinically important difference threshold or not. Improvement in outcomes was observed up to 16 sessions of physical therapy, after which outcomes plateaued.

### 24. ELBOW

#### Steroid injections increase bone spurs

##### **Association of steroid injection with soft-tissue calcification in lateral epicondylitis**

Journal of Shoulder and Elbow Surgery

Park HB, et al. | January 17, 2019

From February 2016 to October 2017, authors examined 110 subjects (110 elbows) to estimate the relationship of both, a history of steroid injection and the number of steroid injections with the types of calcification found in lateral epicondylitis (LE). They classified calcifications observed on standard elbow radiographs as enthesophytes/soft-tissue calcifications using the classification of Shillito et al. They noticed a significant association of the visual analog scale pain score, a history of steroid injection, and the number of steroid injections with soft-tissue calcification in the univariate analysis.

But, a history of steroid injection and the number of steroid injections were found significantly associated with soft-tissue calcification in the multivariable analysis. They implied soft-tissue calcification in LE, an iatrogenic complication of steroid injection.

## 27. HIP

### Hip shape and age of walking

J Bone Miner Res. 2018 Nov 29. doi: 10.1002/jbmr.3627.

#### **Age at Onset of Walking in Infancy Is Associated With Hip Shape in Early Old Age.**

Ireland A<sup>1</sup>, Saunders FR<sup>2</sup>, Muthuri SG<sup>3</sup>, Pavlova AV<sup>2</sup>, Hardy RJ<sup>3</sup>, Martin KR<sup>2</sup>, Barr RJ<sup>2,4</sup>, Adams JE<sup>5</sup>, Kuh D<sup>3</sup>, Aspden RM<sup>2</sup>, Gregory JS<sup>2</sup>, Cooper R<sup>3</sup>.

Bones' shapes and structures adapt to the muscle and reaction forces they experience during everyday movements.

Onset of independent walking, at approximately 12 months, represents the first postnatal exposure of the lower limbs to the large forces associated with bipedal movements; accordingly, earlier walking is associated with greater bone strength. However, associations between early life loading and joint shape have not been explored. We therefore examined associations between walking age and hip shape at age 60 to 64 years in 1423 individuals (740 women) from the MRC National Survey of Health and Development, a nationally representative British birth cohort. Walking age in months was obtained from maternal interview at age 2 years. Ten modes of variation in hip shape (HM1 to HM10), described by statistical shape models, were ascertained from DXA images. In sex-adjusted analyses, earlier walking age was associated with higher HM1 and HM7 scores; these associations were maintained after further adjustment for height, body composition, and socioeconomic position. Earlier walking was also associated with lower HM2 scores in women only, and lower HM4 scores in men only. Taken together, this suggests that earlier walkers have proportionately larger (HM4) and flatter (HM1, HM4) femoral heads, wider (HM1, HM4, HM7) and flatter (HM1, HM7) femoral necks, a smaller neck-shaft angle (HM1, HM4), anteversion (HM2, HM7), and early development of osteophytes (HM1).

These results suggest that age at onset of walking in infancy is associated with variations in hip shape in older age. Early walkers have a larger femoral head and neck and smaller neck-shaft angle; these features are associated with reduced hip fracture risk, but also represent an osteoarthritic-like phenotype. Unlike results of previous studies of walking age and bone mass, associations in this study were not affected by adjustment for lean mass, suggesting that associations may relate directly to skeletal loading in early life when joint shape changes rapidly.

## 28. HIP REPLACEMENTS

Perform hip replacement before lumbar fusion

### **Does Timing of Primary Total Hip Arthroplasty Prior to or After Lumbar Spine Fusion Have an Effect on Dislocation and Revision Rates?**

Arthur Malkani, MD Daniel Berry, MD

DOI: <https://doi.org/10.1016/j.arth.2019.01.009>

#### Background

Patients undergoing primary THA following lumbar spine fusion have an increased incidence of dislocation compared to those without prior lumbar fusion. Purpose of this study was to determine if timing of THA prior to or after lumbar fusion would have an effect on dislocation and revision incidence in patients with both hip and lumbar spine pathology.

#### Methods

100% Medicare inpatient claims data from 2005-2015 was used to compare dislocation and revision risks in patients with primary THA with pre-existing lumbar spine fusion versus THA with subsequent lumbar spine fusion within 1, 2 and 5 years after the index THA. Total of 42,300 patients met inclusion criteria, 28,668 patients of which underwent THA with pre-existing LSF and 13,632 patients who had prior THA and subsequent LSF. Patients who had THA first followed by LSF were further stratified based on interval between index THA and subsequent LSF (1, 2, and 5 years) making 4 total groups for comparison. Multivariate cox regression analysis was performed adjusting for age, socioeconomic status, race, census region, gender, Charlson score, preexisting conditions, discharge status, length of stay and hospital characteristics.

#### Results

Patients with prior LSF undergoing THA had a 106% increased risk of dislocation compared to those with LSF done 5 years after THA ( $p < 0.001$ ). Risk of revision THA was greater in the preexisting LSF group by 43%, 41%, and 49% at 1, 2 and 5 years post THA compared to the groups with THA done first with subsequent LSF. Dislocation was the most common etiology for revision THA in all groups, but significantly higher in the prior LSF group (26.6%).

#### Conclusion

Results of this study demonstrate that sequence of surgical intervention for concomitant lumbar and hip pathology requiring LSF and THA respectively significantly impacts the fate of the THA performed. Patients with prior LSF undergoing THA are at significantly higher risk of dislocation and subsequent revision compared to those with THA first followed by delayed LSF.

**34. PATELLA**

## Functional stabilization

**RESEARCH REPORT****Effects of Functional Stabilization Training on Pain, Function, and Lower Extremity Biomechanics in Women With Patellofemoral Pain: A Randomized Clinical Trial**

**Authors:** Rodrigo De Marche Baldon, PT, MS<sup>1</sup>, Fábio Viadanna Serrão, PT, PhD<sup>1</sup>, Rodrigo Scattone Silva, PT, MS<sup>1</sup>, Sara Regina Piva, PT, PhD<sup>2</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2014 **Volume:**44 **Issue:**4 **Pages:**240–A8 **DOI:**10.2519/jospt.2014.4940

**Study Design** Randomized clinical trial.

**Objectives** To compare the effects of functional stabilization training (FST) versus standard training on knee pain and function, lower-limb and trunk kinematics, trunk muscle endurance, and eccentric hip and knee muscle strength in women with patellofemoral pain.

**Background** A combination of hip- and knee-strengthening exercise may be more beneficial than quadriceps strengthening alone to improve pain and function in individuals with patellofemoral pain. However, there is limited evidence of the effectiveness of these exercise programs on the biomechanics of the lower extremity.

**Methods**

Thirty-one women were randomized to either the FST group or standard-training group. Patients attended a baseline assessment session, followed by an 8-week intervention, and were reassessed at the end of the intervention and at 3 months after the intervention. Assessment measures were a 10-cm visual analog scale for pain, the Lower Extremity Functional Scale, and the single-leg triple-hop test. A global rating of change scale was used to measure perceived improvement. Kinematics were assessed during the single-leg squat. Outcome measures also included trunk endurance and eccentric hip and knee muscle strength assessment.

**Results**

The patients in the FST group had less pain at the 3-month follow-up and greater global improvement and physical function at the end of the intervention compared to those in the standard-training group. Lesser ipsilateral trunk inclination, pelvis contralateral depression, hip adduction, and knee abduction, along with greater pelvis anteversion and hip flexion movement excursions during the single-leg squat, were only observed in the FST group after the intervention. Only those in the FST group had greater eccentric hip abductor and knee flexor strength, as well as greater endurance of the anterior, posterior, and lateral trunk muscles, after training.

**Conclusion**

An intervention program consisting of hip muscle strengthening and lower-limb and trunk movement control exercises was more beneficial in improving pain, physical function, kinematics, and muscle strength compared to a program of quadriceps-strengthening exercises alone.

**Level of Evidence** Therapy, level 2b-. *J Orthop Sports Phys Ther* 2014;44(4):240–A8. Epub 25 February 2014. doi:10.2519/jospt.2014.4940

**35. KNEE/TOTAL****Pre-operative strength does determine outcomes**

Knee. 2018 Dec 29. pii: S0968-0160(18)30768-3. doi: 10.1016/j.knee.2018.12.005.

**Preoperative quadriceps weakness preferentially predicts postoperative aberrant movement patterns during high-demand mobility following total knee arthroplasty.**

Christensen JC<sup>1</sup>, Mizner RL<sup>2</sup>, Bo Foreman K<sup>3</sup>, LaStayo PC<sup>4</sup>, Peters CL<sup>5</sup>, Pelt CE<sup>6</sup>.

**BACKGROUND:**

Nearly all patients with total knee arthroplasty show aberrant movement patterns during tasks requiring greater joint demand compared to matched peers. Greater movement compensation leads to increased loading onto other joints, decreased functional capacity and limited reserve for independence later in life. Understanding how preoperative predictors contribute to postoperative aberrant movement patterns is needed to make better decisions for patients considering total knee arthroplasty.

**METHODS:**

Forty-seven patients were tested preoperatively and six months following primary total knee arthroplasty. Demographic (age, sex, body mass), self-reported (knee pain, perception of physical performance, physical activity level), physical performance (quadriceps strength, lower limb power and timed stair climbing) and surgical metrics were collected as predictor variables. Three-dimensional models based on joint mechanic asymmetry during a decline walking task were collected at six months postoperatively. Decline walking is a preferred means to assess the surgical knee's contribution to limb performance during high-demand tasks. Bootstrap inclusion fraction was employed to compare the stability of each predictor variable prior to the final regression model.

**RESULTS:**

Preoperative quadriceps strength ( $\beta = 0.33$ ;  $p = 0.04$ ) showed a significant relationship with knee extensor angular impulse during loading phase. No other predictor variable had any meaningful relationship with aberrant movement patterns ( $p > 0.05$ ).

**CONCLUSION:**

Our findings highlight patients' preoperative quadriceps strength as a meaningful predictor of postoperative performance. Preoperative quadriceps strength should be addressed when considering the knee's ability to contribute to higher demanding mobility tasks following surgery.

**41 A. ACHILLES TENDON AND CALF****Protocols for tears****Protocol for treatment of Achilles tendon ruptures; a systematic review with network meta-analysis**

Brad Meulenkamp Dawn Stacey, Dean Fergusson, Brian Hutton, Risa Shorr MLIS and Ian D. Graham

<https://doi.org/10.1186/s13643-018-0912-5>

**Background**

Achilles tendon ruptures are a common injury and are increasing in incidence. Several management strategies exist for both non-operative and operative care, with each strategy offering unique risks and benefits. Traditional pairwise meta-analyses have been performed to compare management strategies; however, all treatment options have never been integrated in a single analysis. Network meta-analysis (NMA) is a generalization of pairwise meta-analysis, which allows for the comparison of multiple interventions based on all available direct and indirect evidence. The objectives of this review are to synthesize the evidence on the management options for acute Achilles tendon rupture and identify which treatment gives the best functional outcomes.

**Methods**

A systematic review with NMA is planned. An electronic literature search will be performed in conjunction with an experienced information specialist in MEDLINE, EMBASE, CINAHL, PEDro, and the Cochrane Central Register of Controlled Trials. We will include randomized controlled trials with a minimum 6-month follow-up. Two independent reviewers will screen citations for eligibility, extract study data, and perform risk of bias assessments. The primary outcome will be disease-specific functional outcome scores (AOFAS, Leppilahti, modified Leppilahti) at 1 year. Secondary outcomes will include complications (re-rupture, sural nerve injury, wound complications, deep infection, secondary surgeries), strength, range of motion, return to work, return to sport, and quality-of-life measures (including the SF-36 questionnaire). Traditional pairwise meta-analyses will be performed for all direct comparisons where evidence is available, and NMAs will subsequently be performed where possible to compare all management strategies.

**Discussion**

The data generated from this review will provide health-care providers with a clear evidence synthesis of all Achilles tendon rupture management strategies. Additionally, these data will be incorporated into the development of a patient decision aid to assist patients and clinicians in making a preference-based decision when faced with an Achilles tendon rupture

**45 A. MANUAL THERAPY LUMBAR & GENERAL****Responders vs non-responders**

Eur Spine J. 2019 Jan 2. doi: 10.1007/s00586-018-5851-2.

**Differential patient responses to spinal manipulative therapy and their relation to spinal degeneration and post-treatment changes in disc diffusion.**

Wong AYL<sup>1,2</sup>, Parent EC<sup>3</sup>, Dhillon SS<sup>4</sup>, Prasad N<sup>5</sup>, Samartzis D<sup>6</sup>, Kawchuk GN<sup>3</sup>.

*PURPOSE:*

Our prior study revealed that people with non-specific low back pain (LBP) who self-reported a > 30% improvement in disability after SMT demonstrated significant post-treatment improvements in spinal stiffness, dynamic muscle thickness and disc diffusion, while those not having self-reported improvement did not have these objective changes. The mechanism underlying this differential post-SMT response remains unknown. This exploratory secondary analysis aimed to determine whether persons with non-specific LBP who respond to spinal SMT have unique lumbar magnetic resonance imaging (MRI) findings compared to SMT non-responders.

*METHODS:*

Thirty-two participants with non-specific LBP received lumbar MRI before and after SMT on Day 1. Resulting images were assessed for facet degeneration, disc degeneration, Modic changes and apparent diffusion coefficient (ADC). SMT was provided again on Day 4 without imaging. SMT responders were classified as having a  $\geq 30\%$  reduction in their modified Oswestry disability index at Day 7. Baseline MRI findings between responders and non-responders were compared. The associations between SMT responder status and the presence/absence of post-SMT increases in ADC values of discs associated with painful/non-painful segments as determined by palpation were calculated. In this secondary analysis, a statistical trend was considered as a P value between 0.05 and 0.10.

*RESULTS:*

Although there was no significant between-group difference in all spinal degenerative features (e.g. Modic changes), SMT responders tended to have a lower prevalence of severely degenerated facets ( $P = 0.05$ ) and higher baseline ADC values at the L4-5 disc when compared to SMT non-responders ( $P = 0.09$ ). Post hoc analyses revealed that 180 patients per group should have been recruited to find significant between-group differences in the two features. SMT responders were also characterized by significant increases in post-SMT ADC values at discs associated with painful segments identified by palpation ( $P < 0.01$ ).

*CONCLUSIONS:*

The current secondary analysis suggests that the spines of SMT responders appear to differ from non-responders with respect to degeneration changes in posterior joints and disc diffusion. Although this analysis was preliminary, it provides a new direction to investigate the mechanisms underlying SMT and the existence of discrete forms of treatment-specific LBP. These slides can be retrieved under Electronic Supplementary Material.

**45 B. MANUAL THERAPY CERVICAL****Endocrine changes with manipulation**

Eur J Phys Rehabil Med. 2019 Jan 8. doi: 10.23736/S1973-9087.19.05475-3.

**Endocrine response after cervical manipulation and mobilization in people with chronic mechanical neck pain: a randomized controlled trial.**

Valera-Calero A<sup>1</sup>, Lluch E<sup>2,3,4</sup>, Gallego-Izquierdo T<sup>1</sup>, Malfliet A<sup>5,3,6</sup>, Pecos-Martín D<sup>1</sup>.

**BACKGROUND:**

Most of the research on the effects of spinal manipulation on endocrine function has been done on healthy subjects and has yielded contradictory results. The potential role of cervical manual therapy intervention in order to induce changes in the endocrine system has not yet been investigated.

**AIM:**

To compare the effects on salivary cortisol levels and clinical outcomes of cervical manipulation versus cervical mobilization or sham manipulation in patients with chronic mechanical neck pain.

**SETTING:**

University of Alcalá de Henares: outpatient (referrals from office workers).

**DESIGN:**

Randomized controlled trial.

**POPULATION:**

A total of 83 patients with chronic mechanical neck pain.

**METHODS:**

Participants were randomized to receive one session of cervical manipulation, cervical mobilization, or sham manipulation. The measured variables were salivary cortisol levels, neck pain and disability, pressure pain thresholds (PPT), and cervical range of motion (ROM). They were obtained at baseline, immediately after treatment (except neck disability), and at one-week follow-up (except cortisol).

**RESULTS:**

A significant and comparable increase in cortisol levels was observed immediately after cervical manipulation and mobilization (both  $p < 0.001$ ). Neck disability improved to a similar degree in the cervical manipulation and mobilization groups at the one-week follow-up (both  $p < 0.001$ ). Neck pain was reduced immediately after cervical manipulation ( $p < 0.001$ ), cervical mobilization ( $p = 0.001$ ), and sham manipulation ( $p < 0.001$ ). There were no significant changes in most ROM directions after either treatment. No significant interaction effect was observed for PPT.

**CONCLUSIONS:**

Cervical manipulation and mobilization resulted in a similar increase in cortisol concentrations immediately post-treatment in people with chronic mechanical neck pain. Supraspinal mechanisms may thus play a role in the hypoalgesic effects that follow the application of both interventions.

## 46 A. UPPER LIMB NEUROMOBILIZATION

### Effectiveness in CTS

#### **Diagnostic accuracy of upper limb neurodynamic tests for the assessment of peripheral neuropathic pain: A systematic review**

Konstantinos Koulidis Yannis Veremis Christina Anderson Nicola R. Heneghan

DOI: <https://doi.org/10.1016/j.msksp.2019.01.001>

#### **Highlights**

- Diagnostic accuracy of ULNT in carpal tunnel syndrome is limited.
- Evidence supports ULNTs in cervical radiculopathy only as a “ruling out” strategy.
- NCS may not be adequate to determine diagnostic accuracy of ULNTs.
- Integrating QST with ULNT may enhance classification of patients with PNP.

**Background** Upper limb neurodynamic tests (ULNTs) are used to identify a neuropathic pain component in patients' presenting with arm and/or neck pain. Clinical tests with established diagnostic accuracy are required to not only to inform clinical management but also minimise costs associated with expensive medical investigations.

#### **Objective**

To evaluate the role of ULNTs in assessment of peripheral neuropathic pain and to inform their value in clinical practice when assessing patients with arm and/or neck symptoms.

#### **Design**

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

#### **Method**

Key databases were searched up to 21/11/2017. Inclusion criteria: Patient population experiencing arm and/or neck symptoms with suspected peripheral neuropathic involvement, studies that compared ULNT to a reference standard, any study design using primary diagnostic accuracy data. Two reviewers independently assessed risk of bias (ROB) using QUADAS-2. The overall quality of evidence was evaluated using GRADE.

#### **Results**

Of eight included studies (n = 579), four were assessed as low ROB, although all had concerns regarding applicability. For carpal tunnel syndrome, ULNT1 sensitivity values ranged 0.4–0.93, specificity 0.13–0.93, positive likelihood ratio 0.86–3.67 and negative likelihood ratio 0.5–1.9. For cervical radiculopathy ULNT1 and the combined use of four ULNTs had sensitivity of 0.97 (95%CI 0.85–1.00) whereas the ULNT3 was the most specific (0.87, 95%CI 0.62–0.98). Positive likelihood ratio ranged 0.58–5.68 and negative likelihood ratio 0.12–1.62.

#### **Conclusion**

Based on the available evidence ULNTs cannot be utilised as a stand-alone test for the diagnosis of CTS. Limited evidence suggests that ULNTs may be clinically relevant for the diagnosis of CR, but only as a “ruling out” strategy. However, the overall quality of the body of evidence after applying the GRADE approach was low to very low across studies. Further higher quality research is needed to establish firm conclusions.

**48 A. STM****Muscle energy and TP for neck pain**

J Pain Res. 2018 Dec 12;11:3151-3160. doi: 10.2147/JPR.S172711. eCollection 2018.

**Controlled intervention to compare the efficacies of manual pressure release and the muscle energy technique for treating mechanical neck pain due to upper trapezius trigger points.**

Kashyap R<sup>1</sup>, Iqbal A<sup>2</sup>, Alghadir AH<sup>2</sup>.

*PURPOSE:*

This study aimed at comparing the clinical efficacies of two manual therapies to determine the most beneficial result-oriented physiotherapeutic approach for treating nonspecific neck pain due to myofascial trigger points (MTrPs).

*METHODS:*

This was a randomized, controlled pretest-posttest experimental study that compared manual pressure release (MPR), the muscle energy technique (MET), and a control condition. These techniques were compared using a convenience sample of 45 female participants with neck pain due to MTrPs (mean age $\pm$ SD=21.49 $\pm$ 3.66; age range=18-30 years). The visual analog scale, pressure pain threshold, Neck Disability Index Questionnaire, and a standardized measuring tape were used to assess the participants' neck pain, muscle tenderness, functional disability due to neck pain, and range of neck rotation, respectively, at baseline (day 0), day 1, and day 5 postintervention and at days 10 and 15 during follow-up. All groups were given postural advice and at-home neck exercises. Repeated-measures ANOVA and one-way ANOVA were used to analyze the data.

*RESULTS:*

The within-group analyses showed significant improvement ( $P<0.05$ ) in all outcome measures at days 1 and 5 postintervention and at days 10 and 15 during the follow-up for all groups. The between-group analyses confirmed nonsignificant differences ( $P>0.05$ ) between all groups for all variables.

*CONCLUSION:*

MPR and the MET are equally effective for reducing pain and muscle tenderness and for improving neck disability and range of rotation in patients with nonspecific neck pain. Furthermore, advice promoting postural correction can be an adjunct to physiotherapeutic interventions for reducing neck pain and its symptoms. A combination of these manual therapies with postural advice might be a good treatment option for nonspecific pain in physiotherapy clinics.

## STM C section scar tissue

**Soft Tissue Mobilization Techniques Are Effective in Treating Chronic Pain Following Cesarean Section: A Multicenter Randomized Clinical Trial**

Wasserman, Jennifer B.; Abraham, Karen; Massery, Mary; More

**Journal of Women's Health Physical Therapy.** 42(3):111-119, September/December**Abstract:****Objective:**

To determine whether soft tissue mobilization (STM) will reduce chronic pain and improve impaired function and mobility resulting from cesarean section (C-section) surgery.

**Study Design:**

Multicenter randomized clinical trial.

**Background:**

More than 1.27 million C-sections are performed annually in the United States. Of these, 6% to 18% will result in significant chronic pain.

**Methods and Measures:**

In total, 28 subjects reporting chronic pain following C-section underwent 4 treatment sessions. Subjects were randomly assigned to one of 2 groups. Group 1 received superficial abdomen and lumbothoracic massage and superficial skin rolling of the painful scar. Group 2 received the same treatment plus abdominal myofascial release and direct deep scar mobilizations. Outcomes included pressure pain threshold (PPT), scar mobility, Oswestry Disability Index (ODI), Global Rating of Change (GROC), and Numeric Pain Rating Scale. Two baseline measures were collected 4 weeks apart to demonstrate stability of symptoms, then at 2 weeks postintervention, and again at 10 weeks.

**Results:**

Pain, PPT, ODI, and scar mobility all showed statistically significant improvements ( $P < .002$ ) in both groups. There were no significant differences between treatment groups on any outcome, with both showing improvement. There was no change in any outcome during the baseline period. GROC was 5.06/7 ("quite a bit better").

**Conclusions:**

This study demonstrates that 4 sessions of STM techniques are effective in reducing stable chronic pain following C-section. These findings support the use of STM interventions as a valuable and cost-effective treatment option for the many patients with chronic C-section-related pain.

## 53. CORE

## Post-partum core

**Fatigability of the Lumbopelvic Stabilizing Muscles in Women 8 and 26 Weeks Postpartum**

Deering, Rita E., DPT, PhD<sup>1</sup>; Senefeld, Jonathon, PhD<sup>1</sup>; Pashibin, Tatyana, BS<sup>1</sup>; Neumann, Donald A., PT, PhD, FAPTA<sup>1</sup>; Cruz, Meredith, MD, MBA/MPH<sup>2</sup>; Hunter, Sandra K., PhD<sup>1</sup>

Journal of Women's Health Physical Therapy: September/December 2018 - Volume 42 - Issue 3 - p 128–138

doi: 10.1097/JWH.000000000000109

**Background:** Pregnancy and childbirth are associated with lumbopelvic pain and instability. Fatigability of the lumbopelvic stabilizing muscles after childbirth is unknown, and no clinical tests exist to assess this important metric of muscle function.

**Objectives:** To compare fatigability of the lumbopelvic stabilizing muscles in postpartum and nulligravid (control) women using the Active Straight Leg Raise (ASLR) Fatigue Task, and to determine whether fatigability is associated with interrecti distance (IRD), physical function, and pain/disability.

**Study design:** A longitudinal case-control study.

**Methods:** Twenty-nine nulligravid ( $25.4 \pm 9.1$  years) and 31 postpartum women ( $31.4 \pm 5.2$  years; vaginal delivery  $n = 18$ ) were tested at 2 time points, 16 weeks apart (postpartum women tested at 8-10 and 24-26 weeks postpartum). Muscular function was assessed with manual muscle testing (MMT), the ASLR test, and a new ASLR Fatigue Task. Other measures included IRD, rectus abdominis thickness, physical activity, and 6-minute walk distance.

**Results:** Postpartum women were 23% more fatigable ( $P = .028$ ) and were weaker (MMT) ( $P < .001$ ) than controls up to 26 weeks postpartum. The ASLR Fatigue Task (time-to-failure) was associated with smaller IRD, greater rectus abdominis thickness, higher physical activity levels, greater MMT strength, and further distance walked in 6 minutes ( $P < .05$ ).

**Conclusion:** Postpartum women (up to 6 months) had greater fatigability of the lumbopelvic stabilizing muscles and lower physical function than nulligravid women, suggesting core muscle function and fatigability should be assessed after pregnancy and childbirth. The ASLR Fatigue Task could be a clinically useful tool to determine fatigability of the lumbopelvic stabilizing muscles in women postpartum.

**62 A. NUTRITION/VITAMINS****Fruits and vegetables****The Associations of Fruit and Vegetable Intakes with Burden of Diseases: A Systematic Review of Meta-Analyses**

Cynthia Sau Chun Yip, PhD Wendy Chan, PhD Richard Fielding, PhD

DOI: <https://doi.org/10.1016/j.jand.2018.11.007>

**Background**

Low fruit and vegetable intakes are recognized risk factors for noncommunicable diseases. This systematic review summarizes published meta-analyses of global burden of diseases attributable to low fruit and vegetable intakes, and the best relative risk estimates.

**Methods**

A published novel assessment process combining Cochrane Review measures, Assessing the Methodological Quality of Systematic Reviews checklist, and Newcastle-Ottawa Quality Assessment Scale was employed.

**Results**

Sixty-four reports investigating 98 risk–disease pairs were included in the systematic review. Fifty-six pairs from 39 reports were assessed as statistically significant, involving 29 burden of diseases. Dose responses were identified for 31 negative and two positive associations. High against low intake relative risks were identified for 22 negative and one positive association. The highest identified linear dose response for each 100 g/day increase in fruit intakes was 0.56 (95% CI 0.42 to 0.74) for esophageal cancer, followed by 0.72 (95% CI 0.59 to 0.87) for mouth, pharynx, and larynx cancer; nonlinear dose response for the first 100 g/day of fruit intakes were 0.86 (95% CI 0.84 to 0.88) for stroke, followed by 0.89 (95% CI 0.88 to 0.90) for all-cause mortality. The highest identified linear dose response for each 100 g/day increase in vegetable intakes was 0.88 (95% CI 0.80 to 0.95) for renal cell cancer, followed by 0.89 (95% CI 0.84 to 0.95) for non-Hodgkin lymphoma; nonlinear dose responses for the first 100 g/day of vegetable intake were 0.86 (95% CI 0.84 to 0.89) for coronary heart disease, followed by 0.87 (95% CI 0.84 to 0.90) for all-cause mortality. For nonlinear associations, clear increases in protective associations were observed with the first 200 g/day of intakes, whereas little further increase or even decrease in protective associations were reported beyond 300 g/day intakes. Canned fruit intakes were positively associated with all-cause and cardiovascular disease mortality, and pickled vegetable intakes were positively associated with stomach cancer.

**Conclusions**

This systematic review supports existing recommendations for fruit and vegetable intakes. Current comparative risk assessments might significantly underestimate the protective associations of fruit and vegetable intakes.

**Health benefits of fruits and vegetables****The Associations of Fruit and Vegetable Intakes with Burden of Diseases: A Systematic Review of Meta-Analyses**

Cynthia Sau Chun Yip, PhD Wendy Chan, PhD Richard Fielding, PhD

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This systematic review supports existing recommendations for fruit and vegetable intakes. Current comparative risk assessments might significantly underestimate the protective associations of fruit and vegetable intakes.

### CA intake increases vertebra size

#### **Dairy- and supplement-based calcium intake in adulthood and vertebral dimensions in midlife: The Northern Finland Birth Cohort 1966 Study**

Osteoporosis International

Oura P, et al. | January 18, 2019

Researchers assessed the association of dairy and supplement-based calcium intake in adulthood with vertebral size in midlife. Study participants included 1,064 individuals from the Northern Finland Birth Cohort 1966 who had undergone lumbar MRI at 46 years of age, and had provided self-reported data on diet and calcium intake at ages 31 and 46. After adjusting for body mass index, diet, vitamin D intake, education, leisure-time physical activity, and smoking, the investigators used a generalized estimating equation and linear regression models to evaluate the link between calcium intake and vertebral cross-sectional area (CSA).

They found that women with insufficient calcium intake over the follow-up period had 3.8% smaller midlife vertebral CSA vs women with sufficient calcium intake. Overall, inadequate calcium consumption from ages 31-46 predicted small vertebral size and consequential decreased spine resilience among middle-aged women.

**High protein helps Calcium in bones – density****Effect of a hypocaloric, nutritionally complete, higher-protein meal plan on bone density and quality in older adults with obesity: a randomized trial**

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**Background**

Dietary protein and micronutrients are important to the maintenance of bone health and may be an effective countermeasure to weight-loss-associated bone loss.

**Objectives**

We aimed to determine the effect of a 6-mo hypocaloric, nutritionally complete, higher-protein meal plan on change in bone density and quality as compared with weight stability in older adults using a randomized post-test design. We hypothesized that participants randomly assigned to this meal plan would maintain similar bone density and quality to weight-stable controls, despite significant reductions in body mass.

**Methods**

Ninety-six older adults (aged  $70.3 \pm 3.7$  y, 74% women, 27% African American) with obesity [body mass index ( $\text{kg}/\text{m}^2$ ):  $35.4 \pm 3.3$ ] were randomly assigned to a 6-mo hypocaloric, nutritionally complete, higher-protein meal plan targeting  $\geq 1.0$  g protein  $\cdot$  kg body weight<sup>-1</sup>  $\cdot$  d<sup>-1</sup> [weight-loss (WL) group;  $n = 47$ ] or to a weight-stability (WS) group targeting 0.8 g protein  $\cdot$  kg body weight<sup>-1</sup>  $\cdot$  d<sup>-1</sup>, the current Recommended Dietary Allowance ( $n = 49$ ). The primary outcome was total hip bone mineral density (BMD), with femoral neck BMD, lumbar spine BMD, and lumbar spine trabecular bone score (TBS) as secondary outcomes, all assessed at baseline and 3 and 6 mo with dual-energy X-ray absorptiometry.

**Results**

Baseline total hip, femoral neck, and lumbar spine BMDs were  $1.016 \pm 0.160$ ,  $0.941 \pm 0.142$ , and  $1.287 \pm 0.246$  g/cm<sup>2</sup>, respectively; lumbar TBS was  $1.398 \pm 0.109$ . Despite significant weight loss achieved in the WL group ( $6.6 \pm 0.4$  kg;  $8.6\% \pm 0.4\%$  of baseline weight), 6-mo regional BMD estimates were similar to those in the WS group (all  $P > 0.05$ ). Lumbar spine TBS significantly increased at 6 mo in the WL group (mean: 1.421; 95% CI: 1.401, 1.441) compared with the WS group (1.390; 95% CI: 1.370, 1.409;  $P = 0.02$ ).

**Conclusions**

Older adults following a hypocaloric, nutritionally complete, higher-protein meal plan maintained similar bone density and quality to weight-stable controls. Our data suggest that adherence to this diet does not produce loss of hip and spine bone density in older adults and may improve bone quality. This trial was registered at [clinicaltrials.gov](https://clinicaltrials.gov) as NCT02730988.