## 2. LBP

High rate of LBP among dentist

European Spine Journal pp 1–7

**Back pain prevalence, intensity and associated factors in French dentists: a national study among 1004 professionals**


- Gabriel Fernandez de Grado Julien Denni Anne-Marie Musset Damien Offner



Objectives

Back pains are the most frequent musculoskeletal disorders among dentists, exposed to many work-related risk factors. We aimed to assess the prevalence and intensity of back pains as well as the impact of some work behaviors among a large sample of dentists.

Materials and methods

Data from 1004 French dentists were collected via an Internet questionnaire. Neck, upper back and lower back pains prevalence, intensity (0–10 scale) and consequences on work were studied, as well as sex, age, years of practice, working position, type of seat, stretching on work days.

Results

Dentists were 77.9% to report chronic back pains, with intensity from 3.9 to 4.3 according to location. Women reported more frequent and intense pains than men in neck and upper back (OR 1.5). Age and years of practice were associated with more intense pains (OR up to 3.9), dentists alternating standing and sitting positions reported more frequent and more intense pains in upper and lower back (OR up to 1.5) than those with a fixed position, be it sitting or standing.

Conclusions

Prevalence and intensity of back pain are important among dentists and increase greatly over working life. Preventive methods such as ergonomics exist and awareness should be raised among dentists and dental student.

## 7. PELVIC ORGANS/WOMAN'S HEALTH

Antibiotic use and asthma

**August 2019**Volume 123, Issue 2, Pages 186–192.e9

**Association between early-childhood antibiotic exposure and subsequent asthma in the US Medicaid population**

Ezra Fishman, PhD[*,**,] Geoffrey Crawford, MD[†] ndrea DeVries, PhD[*] Jesse Hackell, MD[‡]
Kevin Haynes, PharmD, MSCE[*] Mark Helm, MD[§] Eric Wall, MD[‖] biy Agiro, PhD[*]
DOI: https://doi.org/10.1016/j.anai.2019.05.018

**Background**

Although socioeconomically disadvantaged children have an increased risk of asthma, the association between early-childhood antibiotics and the incidence of asthma among such children has had limited study.

**Objective**

To examine the association between antibiotic fills in the first 2 years of life and risk of developing asthma among children enrolled in Medicaid plans.

**Methods**

This retrospective cohort study of children with continuous medical and pharmacy coverage from birth to 2.5 years of age was performed from July 1, 2012, to November 31, 2018. We excluded children with a diagnosis of asthma before 2.5 years of age. Hazard ratios (HRs) and 95% CIs were estimated from Cox proportional hazards regression models. Covariates included sex, preterm birth, cesarean delivery, and mother's asthma status.

**Results**

There were 79,582 children in the study cohort of whom 29,931 (37.6%) had 0 antibiotic prescriptions filled, 27,403 (34.4%) had 1 or 2 prescriptions filled, and 22,248 (28.0%) had 3 or more prescriptions filled. A total of 2381 new cases of asthma were observed in 89,545 person-years of follow-up. After adjustment, receipt of 1 or 2 antibiotics was associated with an increased risk of developing asthma, relative to 0 antibiotics (HR, 1.34; 95% CI, 1.21-1.49), and receipt of 3 or more antibiotics was associated with greater increased risk relative to 0 antibiotics (HR, 1.71; 95% CI, 1.54-1.90). After adjustment, the absolute risk of developing asthma by age 4.0 years increased from 2.7% (0 antibiotics) to 3.6% (1-2 antibiotics) and 4.5% (≥3 antibiotics).

**Conclusion**

Antibiotic prescriptions filled in the first 2 years of life were associated with an increased risk of asthma diagnosis from 2.5 to 5 years of age in a Medicaid population.

# ABSTRACTS

Nut consumption improves male sex life

**Men's sexual function may benefit from daily nut consumption**
Healthline/Medical News Today | July 29, 2019
Men participating in a clinical trial who added two handfuls of nuts a day to their regular diet reported improvements in sexual function.

The 14-week trial compared a group of men who added a daily dose of certain nuts to a Western style diet with an equivalent group of men who ate the same diet but without nuts. The daily dose of nuts comprised 60 grams (g)—the equivalent of about two handfuls—of almonds, hazelnuts, and walnuts.

The investigators, who hail from research centers in Spain, believe that this is the first study to show that eating nuts can benefit sexual function. They report their findings in a paper that features in the journal *Nutrients*.

A 2018 analysis of the trial data had already reported that daily consumption of these nuts appeared to improve sperm quality. The recent analysis uses the same trial data but focuses on the effect of nut consumption on sexual and erectile function. The findings suggest that adding nuts to a Western style diet can improve orgasm quality and sexual desire.

The researchers used two sources of data to assess changes in erectile function: participant responses to questionnaires and biomarkers in blood samples.

**Erectile dysfunction and risk factors**

Erectile dysfunction (ED) is the inability to get an erection and keep it long enough to have satisfactory sexual intercourse. The condition is more likely to affect older men than younger men. According to the National Institute of Diabetes and Digestive and Kidney Diseases, which is one of the National Institutes of Health (NIH), ED is common in the United States, where it affect ts about 30 million men.

Nocturnia

Neurourol Urodyn. 2019 Jul 23. doi: 10.1002/nau.24126.

**Low and high body mass index values are associated with female nocturia.**

Ito H[1], Aoki Y[1], Oe H[1], Taga M[1], Tsuchiyama K[1], Yokoyama O[1].

**AIMS:**
We evaluated the relationship between body mass index (BMI), including low BMI, and nocturia in Japanese women.

**METHODS:**
We collected data on 18 952 women who participated in a multiphasic health screening in Fukui, Japan, in 2006. The participants were asked to report any current or previous disease. Self-reported current body weight and height were used to calculate the BMI. We analyzed the relationship between nocturia, as assessed by a questionnaire, and other variables including age, BMI, and comorbidities.

**RESULTS:**
The participants' mean age was 60.6 years. Overall, the prevalence of nocturia (two or more voids/night) was 4.3% and increased in an age-dependent manner. BMI did not affect nocturia in the young participants. The prevalence of nocturia was higher in the high-BMI women (>25.0 kg/m $^2$ ) in their fifth and sixth decades, but the prevalence was higher in the low-BMI (<18.5 kg/m $^2$ ) in the women more than 80-years old. A multivariate analysis revealed a significant association between nocturia and the following: age, BMI, sleep disturbance, arteriosclerosis, cerebrovascular disease, chronic pulmonary disease, diabetes mellitus, and hypertension. Not only high BMI (which is already reported as a risk of nocturia) but also low BMI was a factor related to nocturia.

**CONCLUSION:**
Our findings indicate that in addition to obesity, low BMI is a factor of nocturia in women.

## 8. VISCERA

Fecal implant

### Fecal Transplants Do Not Reduce Symptoms of Diarrhea-Predominant Irritable Bowel Syndrome

The Lancet Gastroenterology & Hepatology

TAKE-HOME MESSAGE

- In this trial, researchers randomized 48 patients with diarrhea-predominant irritable bowel syndrome (IBS-D) to either fecal microbiota transplant or placebo. At 12 weeks, the primary outcome of difference in IBS Symptom Severity Scores did not differ between the two groups (mean, 221 [transplant] vs 236 [placebo]; P=.65). Adverse events were similar as well, without any significant associated serious adverse events.Fecal microbiota transplant appeared to be safe but did not induce symptom relief in IBS-D patients.

BACKGROUND Faecal microbiota transplantation (FMT) has shown promise in alleviating the symptoms of irritable bowel syndrome (IBS); however, controlled data on this technique are scarce. The aim of this clinical trial was to assess the efficacy of FMT in alleviating diarrhoea-predominant IBS (IBS-D).

METHODS We did a double-blind, randomised, placebo-controlled crossover trial in patients aged 18-65 years with moderate-to-severe IBS-D defined by an IBS-Symptom Severity Score (IBS-SSS) of more than 175, recruited from three US centres. Patients were randomly assigned (1:1) in blocks of four with a computer-generated randomisation sequence to receive FMT capsules followed by identical-appearing placebo capsules, or placebo capsules followed by FMT capsules. All participants and study team members were masked to randomisation. An independent staff member assigned the treatments according to consecutive numbers. Patients received either 75 FMT capsules (each capsule contained approximately 0·38 g of minimally processed donor stool) or 75 placebo capsules over 3 days (25 capsules per day). All patients crossed over to the alternate treatment at 12 weeks. The primary outcome was difference in IBS-SSS between the groups at 12 weeks. Intention-to-treat analyses were done and all patients who received study drug were included in an adverse events analysis. The trial was terminated during recruitment because results from an interim analysis revealed futility. The study is registered with ClinicalTrials.gov, number NCT02328547.

FINDINGS From May 28, 2015, to April 21, 2017, 48 patients were randomly assigned to receive FMT first (n=25) or placebo first (n=23). Three participants were lost to follow-up in the FMT group. IBS-SSS did not differ between FMT recipients (mean 221 [SD 105]) and placebo recipients (236 [95]) at 12 weeks (p=0·65), after adjustment for baseline scores. The most common drug-related adverse events included abdominal pain (five [10%] of the 48 participants while receiving FMT capsules vs four [8%] while receiving placebo), nausea (four [8%] vs two [4%]), and exacerbation of diarrhoea (three [6%] vs eight [17%]). One serious adverse event that was unrelated to study drug (acute cholecystitis) was reported in a patient while receiving placebo capsules.

INTERPRETATION FMT was safe, but did not induce symptom relief at 12 weeks compared with placebo. Additional studies are needed to determine the efficacy of FMT for IBS-D.

Vit D helps UC

**Oral Nano Vitamin D Supplementation Reduces Disease Activity in Ulcerative Colitis A Double-Blind Randomized Parallel Group Placebo-controlled Trial**

Ahamed Z, Rizwan MD, DM[*]; Dutta, Usha MD, DM, MSc[*]; Sharma, Vishal MD, DM[*]; Prasad, Kaushal Kishor MD[*]; Popli, Priyanka MSc[*]; Kalsi, Dimple MSc[*]; Vaishnavi, Chetana MSc, PhD[*]; Arora, Sunil MSc, PhD[*,†]; Kochhar, Rakesh MD, DM[*]

Journal of Clinical Gastroenterology: July 26, 2019 - Volume Publish Ahead of Print - Issue - p
doi: 10.1097/MCG.0000000000001233

Introduction: Vitamin D possesses anti-inflammatory properties and could be beneficial in ulcerative colitis (UC).
Methods: We studied the effect of oral nano vitamin D3 supplementation on disease activity in active UC [ulcerative colitis disease activity index (UCDAI)≥3]. Patients with active UC and vitamin D <40 ng/mL were randomized to receive either oral nano vitamin D (60,000 IU/d×8 d) or placebo. They were evaluated for disease activity (UCDAI scores, C-reactive protein, erythrocyte sedimentation rate, and fecal calprotectin) at baseline and reassessed at 4 weeks. The response was defined as a 3-point reduction in UCDAI score at 4 weeks and reduction in inflammatory markers.
Results: The median vitamin D levels increased from 15.4 to 40.83 mg/dL in vitamin D group (P≤0.001) and marginally from 13.45 to 18.85 mg/dL (P=0.027) in controls. The 3-point reduction in UCDAI was seen more often in vitamin D group as compared with the control (53% vs. 13%; P=0.001). Increase in vitamin D levels correlated with reduction in UCDAI score (P≤0.001; ρ=−0.713), C-reactive protein (P≤0.001; ρ=−0.603), and calprotectin(P=0.004; ρ=−0.368). Patients who achieved target vitamin D of >40 ng/mL (n=17) more often had a 3-point reduction in UCDAI (80% vs. 20%; P≤0.001) and reduction in grade of severity from 60% to 35% (P=0.038). Vitamin D administration (odds ratio, 9.17; 95% confidence interval, 2.02-41.67) and baseline histologic activity (odds ratio, 1.92; 95% confidence intervals, 1.2-3.08) independently predicted response.
Conclusions: Oral nano vitamin D supplementation in active UC is associated with a reduction in disease activityand severity grade and is seen more often in those who achieved a target vitamin D level of 40 ng/mL.

## 12 B. CERVICAL SURGERIES

Good 5 year follow up of arthroplasties

European Spine Journalpp 1–9|

**Clinical and radiological evaluation of cervical disc arthroplasty with 5-year follow-up: a prospective study of 384 patients**


- T. Dufour J. Beaurain J. Huppert P. Dam-Hieu P. Bernard J. P. Steib



**Background**

Cervical total disc replacement was developed to avoid known complications of cervical fusion. The purpose of this paper was to provide 5-year follow-up results of an ongoing prospective study after implantation of cervical disc prosthesis.

**Methods**

Three hundred and eighty-four patients were treated using Mobi-C cervical disc (Zimmer Biomet, Troyes, France) and included in a prospective multicentre study. Routine clinical and radiological examinations were reported preoperatively and postoperatively with up to 5-year follow-up. Complications and revision surgeries were also explored.

**Results**

Results at 5 years showed significant improvement in all clinical outcomes (NDI, VAS for arm and neck pain, SF-36 PCS and MCS). Motion at index level increased significantly from 6.0° preoperatively to 8.0°, and 72.1% of the implanted segments were still mobile (referring to threshold of ROM > 3°). Proximal and distal adjacent discs showed no significant change in average motion 5 years after surgery compared to baseline. Ossification resulting in complete fusion was observed in 16.4% of the implanted segments. Distal and proximal adjacent disc degeneration occurred in 42.2% and 39.1% of patients, respectively. Complications rate was 8.9%, and 1.5% of the patients had reoperation at the index level. Surgery rate of adjacent discs was 2.9%. An increased percentage of working patients and a decrease in medication consumption were observed. At 5 years, 93.3% patients were satisfied regarding the overall outcome.

**Conclusions**

In this study, favourable 5-year follow-up clinical and radiological outcomes were observed with a low rate of adjacent level surgery.

## 14. HEADACHES

Shunts with foramen Ovale

### Right-to-Left Shunt and the Clinical Features of Migraine with Aura: Earlier but Not More

Altamura C. · Paolucci M. · Costa C.M. · Brunelli N. · Cascio Rizzo A. · Cecchi G. · Vernieri F.

Keywords: Migraine with auraRight-to-left shuntMigraine and stroke
https://doi.org/10.1159/000501544

***Background:*** The causal relationship between patent foramen ovale (PFO) and migraine with aura (MA) is controversial. We aimed at exploring whether attack clinical features relate to the presence of right-to-left shunt (RLS) in MA patients.

***Methods:*** We retrospectively examined a cohort of consecutive patients diagnosed with MA in our headache center and undergoing transcranial doppler (TCD) for RLS detection. We collected from our clinical electronic dossiers, clinical features of MA attacks (type, frequency, duration of aura phenomenon, trigger factors, onset age), family history for MA, thrombophilia genotypes, and the response to preventive treatments. RLS was stratified for severity according to the results of the TCD examination.

***Results:*** We found 111 patients. Binary logistic regression analysis showed that among features of MA attacks, only onset age was associated with the presence of RLS ($p < 0.0001$). Patients with RLS presented the first MA attack at a younger age ($p < 0.0001$). The greater RLS severity, the younger was onset age ($p < 0.00001$) and the presence of atrial septal aneurysms (ASA) was associated with a further decrease in onset age ($\rho = –539$, $p < 0.00001$). Family history for MA was associated with the presence of RLS (chi-square $p = 0.022$). Response to preventive treatments was not influenced by the type of treatment (antiplatelet compared with no antiplatelet drugs), comorbidity with migraine without aura, RLS presence, or by their double interactions (Logistic regression, consistently $p > 0.05$).

***Conclusion:*** Our findings support the hypothesis that although PFO does not influence MA attack frequency, it is not merely a bystander in MA physiopathology, as RLS, its severity, and the presence of ASA possibly make a difference in the disease history.

## 30 A. HIP IMPINGEMENT

PT helps

**ORIGINAL RESEARCH**

# SHORT-TERM OUTCOMES OF CONSERVATIVE TREATMENT FOR FEMOROACETABULAR IMPINGEMENT: A SYSTEMATIC REVIEW AND META-ANALYSIS

**Emma Mallets, PT[1] Ann Turner, PT[1] Jeremy Durbin, PT[1] Alexander Bader, SPT[1] Leigh Murray, PT, PhD[1]**

*The International Journal of Sports Physical Therapy | Volume 14, Number 4 | August 2019 | Page 514 DOI: 10.26603/ijspt20190514*

Background: Femoroacetabular Impingement (FAI) is becoming increasingly more common with noted impairments in physical function, increased pain, and decreased quality of life. Typically, a conservative approach is used through physical therapy or intra-articular injections before an invasive surgical approach is utilized. Identifying the proper course of conservative care by the clinician will aid in improving outcomes.
Purpose: The purpose of this systematic review and meta-analysis was to investigate short-term effects of conserva- tive physical therapy and intra-articular injections on pain and physical function measures in patients with FAI.
Study Design: Systematic Review & Meta-Analysis.
Methods: A systematic review and meta-analysis were completed using Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines and registered with the International Prospective Registry of Systematic Reviews. A literature review was performed in May 2018 using Pubmed, CINAHL, Proquest, and Scopus. Inclusion criteria included humans classified as having femoroacetabular impingement, conservative rehabilitation, and utili- zation of outcome measures in the domains of pain or function. Exclusion criteria included absence of skilled interac- tion and study protocols that were not completed.
Results: Seven studies were included that summarized physical therapy or intra-articular injection outcomes for femoroacetabular impingement management. Results showed that conservative interventions for short-term periods are effective in reducing pain and improving function for femoroacetabular impingement. Overall, physical therapy revealed moderate to large effect sizes and statistically significant differences in both pain (SMD, 0.91, CI: 0.07, 1.76, p=0.030) and function (SMD, 0.80, CI: 0.34, 1.28, p=0.001) for femoroacetabular impingement. Intra-articular injec- tion demonstrated small effect sizes for pain outcomes (SMD, 0.29, CI: -1.25, 1.83, p = 0.710) and small to moderate effect size for improvement in function (SMD, 0.49, CI: 0.03, 0.96, p = 0.040).
Conclusions: Physical therapy demonstrated positive results to self-reported pain and function and may hold more promise than intra-articular injection alone. Common treatments that were associated with improved outcomes were patient education, activity modification, manual therapy, and strengthening. There are a limited number of high- quality articles on this topic, which should be addressed in future research.
Level of Evidence: 1a.

Single leg squats

J Orthop Sports Phys Ther. 2019 Jul 23:1-33. doi: 10.2519/jospt.2019.8356.

**Hip Biomechanics During a Single-Leg Squat: Five Key Differences Between People With Femoroacetabular Impingement Syndrome and Those Without Hip Pain.**

Malloy P[1,2], Neumann DA[1], Kipp K[1,3].

*STUDY DESIGN:*
Cross-sectional, case-controlled, laboratory-based study.

*BACKGROUND:*
People with femoroacetabular impingement (FAI) syndrome have different hip joint biomechanics than hip-healthy people during a double-leg squat. However, information on biomechanics during a single-leg squat is limited.

*OBJECTIVES:*
To compare hip joint biomechanics between people with FAI syndrome and people without hip pain during double-leg and single-leg squats.

*METHODS:*
Fourteen people with FAI syndrome (cam, n=7; pincer, n=1; mixed, n = 6) and 14 people without hip pain participated in this study. Three-dimensional biomechanics data were collected while all participants performed a double-leg and a single-leg squat. Two-way mixed model analyses of variance (ANOVAs) were used to assess GROUP by TASK interactions for hip joint angles, thigh and pelvis segment angles, hip joint internal moments, and squat performance variables. Post-hoc analyses for all variables with a significant GROUP by TASK interaction were performed to identify between GROUP differences for each task.

*RESULTS:*
There were significant GROUP by TASK interactions for peak hip joint ($P = 0.014$, $\eta^2 = 0.211$) and thigh segment ($P = 0.009$, $\eta^2 = 0.233$) adduction angles, and for peak hip joint abduction ($P = 0.002$, $\eta^2 = 0.308$) and extension ($P = 0.016$, $\eta^2 = 0.203$) internal moments. There were no significant GROUP by TASK interactions for squat performance variables.

*CONCLUSION:*
Biomechanical differences at the hip between people with FAI syndrome and without hip pain were exaggerated during a single-leg squat compared to a double-leg squat task.

*LEVEL OF EVIDENCE:*
Diagnosis, level 4. *J Orthop Sports Phys Ther, Epub 23 Jul 2019. doi:10.2519/jospt.2019.8356.*

## 32 A. KNEE/ACL

ACL and meniscal root injuries

### Anatomic risk factor for meniscal lesion in association with ACL rupture

Romain Gaillard, Robert Magnussen, Cecile Batailler, Philippe Neyret, Sebastien Lustig & Elvire Servien

*Journal of Orthopaedic Surgery and Research*__volume 14__,

**Background**

To assess anatomic risk factors for meniscal lesions in association with acute ACL rupture. The primary hypothesis was that tibiofemoral anatomic measures will be different in those with and without concomitant meniscus tears.

**Methods**

A retrospective review of patients who underwent acute ACL reconstruction in the department was performed. All patients underwent a postoperative CT scan. The concavity and/or convexity on the femur and the tibia were measured by two blinded observers on the sagittal plane with different ratios, and these measures were compared in patients with and without meniscus tears in each compartment. Intra- and inter-rater reliabilities were assessed.

**Results**

Four hundred twelve patients (268 males and 144 females) were included from October 2012 to February 2015. One hundred sixty-seven patients had a medial meniscal tear (119 males/48 females), and 100 had a lateral meniscal tear (80 males/20 females). The mean time from injury to surgery was 3 months. The average ICC for all measurements was 0.87 (range 0.82–0.98) indicating good reliability. The medial femoral condyle was noted to be significantly longer than the medial tibial plateau in the sagittal plane in patients with a medial meniscal tear ($p = 0.04$), and the lateral femoral condyle was noted to be significantly longer than the lateral tibial plateau in the sagittal plane in patients with a lateral meniscal tear ($p < 0.001$). In addition, a less convex lateral tibial plateau was statistically correlated with a higher risk of lateral meniscal tear ($p = 0.001$).

**Conclusions**

A greater anteroposterior length of the medial/lateral femoral condyle relative to the medial/lateral tibial plateau is associated with an increased risk of meniscal lesions in association with acute ACL rupture. The lateral compartment in the male population appears to be the most at risk.

ACL rehab on different surfaces

## THE EFFECT OF TRAINING ON A COMPLIANT SURFACE ON MUSCLE ACTIVATION AND CO-CONTRACTION AFTER ANTERIOR CRUCIATE LIGAMENT INJURY

**Zakariya H. Nawasreh, PT, MSc, PhD[1] Adam R. Marmon, PhD[3] David Logerstedt, MPT,hD[2,3] Lynn Snyder-Mackler, PT, ScD, FAPTA[3]**

***Background:*** Performing physical activities on compliant surfaces alters joints kinematics by decreasing joint motions. However, the effect of administering a training program on a compliant surface on muscle activities after anterior cruciate ligament (ACL) injury is unknown.

***Hypothesis/Purpose:*** To compare the effects of training on a compliant surface and manual perturbation training on individual muscle activation and muscle co-contraction indexes after an ACL injury. It was hypothesized that patients who received training on the compli- ant surface would demonstrate higher individual and combined muscle activities compared to the manual group.

***Method:*** Sixteen patients (participated in level I/II sports) who sustained an ACL injury and had not undergone reconstructive surgery participated in this preliminary study. Eight patients received training on a compliant surface (Compliant group) and data of eight patients matched by age and sex from a previous study who received manual perturbation training were used as a control group (Manual group). Patients in both groups completed standard three-dimensional gait motion analysis with surface electromyography (EMG) of several lower extremity muscles during gait. Muscle co-contraction index and individual muscle activations were computed during weight acceptance (WA) and mid-stance (MS) intervals. A 2x2 analysis of variance (ANOVA) was used with an alpha level of $p<0.10$ to account for the high EMG variability.

***Results:*** The compliant group significantly increased muscle co-contraction of vastus lateralis-lateral hamstring (VL-LH), vastus medialis- gastrocnemius medialis (VM-MG), and vastus lateralis (VL) muscle activity during WA ($p \leq 0.035$) and manual group significantly decreased VM-MG muscle co-contraction during WA ($p=0.099$) after training.

***Conclusion:*** Administering training on a compliant surface provides different effects on muscle activation compared to manual perturba- tion training after an ACL injury. Training on a compliant surface caused increased muscle co-contraction indexes and individual muscle activation, while manual perturbation training decreased the VM-MG muscle co-contraction index.

***Level of evidence:*** 2b ***Keywords:*** ACL rehabilitation, compliant surface, EMG, Mechanical perturbation, Movement system, Muscle co-contraction.

*The International Journal of Sports Physical Therapy | Volume 14, Number 4 | August 2019 | Page 554 DOI: 10.26603/ijspt20190554*

Prox joint stiffness impact on knee

J Orthop Sports Phys Ther. 2019 May 26:1-45. doi: 10.2519/jospt.2019.8248.

**Anterior Cruciate Ligament Injury Mechanisms and the Kinetic Chain Linkage: The Effect of Proximal Joint Stiffness on Distal Knee Control During Bilateral Landings.**

Cannon J[1,2], Cambridge EDJ[2], McGill SM[2].

*STUDY DESIGN:*
Cross-sectional.

*BACKGROUND:*
Neuromuscular deficits at the trunk and hip may contribute to dynamic knee valgus and anterior cruciate ligament (ACL) injury mechanisms. However, comprehensive examination of neuromuscular patterns and their mechanical influence are lacking.

*OBJECTIVE:*
To investigate the influence of lumbar spine joint rotational stiffness (JRS), and gluteal musculature contribution to hip JRS, on dynamic knee valgus.

*METHODS:*
Eighteen university-aged women completed a drop vertical jump while we measured kinematics, kinetics, and twenty-four channels of electromyography spanning the trunk and hip musculature. We classified each limb as high or low valgus based on frontal plane knee displacement magnitude. We used anatomically-detailed EMG-driven biomechanical models to quantify lumbar spine JRS and muscle contributions to hip JRS.

*RESULTS:*
Low valgus limbs generated greater gluteus medius frontal JRS (p=0.002, ES=1.3) and gluteus maximus transverse JRS (p=0.003, ES=1.2) compared to high valgus limbs. Participants with bilateral high valgus collapse had substantially reduced lumbar spine sagittal JRS compared to the group with low valgus on both limbs (p=0.05, ES=5.1). Those who displayed low valgus on both limbs also displayed a peak lumbar spine flexion angle of 24 ± 4$^{o}$ compared to the bilateral high valgus group's angle of 38 ± 10$^{o}$(p=0.09, ES=1.8).

*CONCLUSION:*
This is the first work of its kind to specifically characterize lumbar spine and hip neuromuscular mechanisms that may be responsible for dynamic valgus in a drop vertical jump, beyond EMG analysis of limited muscles. Participants who avoided high medial knee displacement utilized greater proximal JRS. *J Orthop Sports Phys Ther, Epub 26 May 2019. doi:10.2519/jospt.2019.8248*.

ACL and meniscal root

Knee. 2019 Jun;26(3):537-544. doi: 10.1016/j.knee.2019.04.013. Epub 2019 May 15.

**Relationship between anterior cruciate ligament and anterolateral meniscal root bony attachment: High-resolution 3-T MRI analysis.**

Oshima T[1], Leie M[2], Grasso S[3], Parker DA[3].

**BACKGROUND:**
The tibial bony attachments of the anterior cruciate ligament (ACL) and the anterolateral meniscal root (ALMR) are very close, and drilling the tibial tunnel in ACL reconstruction may damage the ALMR attachment. This study investigated the relationship between the tibial attachment of the ACL and ALMR using high-resolution 3-T magnetic resonance imaging (MRI).

**METHODS:**
Twenty healthy subjects (35.8 ± 13.0 years) had 20 knees scanned using high resolution 3-T MRI. The tibial bony attachments of ACL, ALMR, and the tibia were segmented and three-dimensional models were created. The shape, area, and location of each attachment were evaluated using this model.

**RESULTS:**
The ACL tibial attachment was elliptical in nine knees (45%), C-shaped in nine knees (45%) and triangle in two knees (10%). The mean values of the ACL vs ALMR tibial attachments were as follows: area, 106.2 ± 21.3 vs 56.2 ± 21.3 $mm^2$; length, 16.8 ± 2.0 vs 11.0 ± 1.8 mm; and width, 6.9 ± 1.3 vs 6.6 ± 1.0 mm. The location of the ACL vs ALMR attachment centres was 46.5 ± 1.7% vs 56.5 ± 1.9% in the medial-lateral direction and 36.3 ± 3.6% vs 36.7 ± 3.5% in the anterior-posterior direction. The distance between the ACL and ALMR centres was 8.1 ± 1.3 mm.

**CONCLUSIONS:**
ACL and ALMR tibial attachments were individually distinguished using high resolution 3-T MRI. The short distance between both centres of the attachments may suggest that ALMR can be damaged when the tibial tunnel is drilled in ACL reconstruction.

## 37. OSTEOARTHRITIS/KNEE

PRP helped

Nagoya J Med Sci. 2018 Feb;80(1):39-51. doi: 10.18999/nagjms.80.1.39.

**Intra-articular platelet-rich plasma (PRP) injections for treating knee pain associated with osteoarthritis of the knee in the Japanese population: a phase I and IIa clinical trial.**

Taniguchi Y[1], Yoshioka T[1,2], Kanamori A[1], Aoto K[1], Sugaya H[1,2], Yamazaki M[1].

Intra-articular platelet-rich plasma (PRP) injection has been found to be effective for treating osteoarthritis in patients from Western countries; however, the safety and efficacy of PRP have not been sufficiently investigated in Japanese patients.

The present study aimed to evaluate the safety and feasibility of intra-articular PRP injection in Japanese patients with knee osteoarthritis. PRP without white blood cells was prepared using a single-spin centrifuge (PRGF-Endoret; BTI Biotechnology Institute, Vitoria, Spain). A 6-mL PRP volume was injected in the knee joint three times at 1 week intervals. All patients were prospectively evaluated before intervention and at 1, 3, and 6 months after the treatment. Adverse events, the Visual Analog Scale (VAS) pain score, Japanese Knee Osteoarthritis Measure (JKOM) score and Japanese Orthopedic Association score were evaluated. Ten patients (all women; average age, 60.6 years) were treated. Only minor adverse events after injection were noted, and symptoms resolved within 48 hours after the injection.

The average VAS pain scores were 71.6 mm and 18.4 mm at baseline and the 6-month follow-up, respectively ($P < 0.05$). At the 6-month follow-up, 80% of patients had a decrease in the VAS pain score of 50% or more. The average JKOM scores were 35.2 and 14.3 at baseline and at the 1-month follow-up, respectively ($P < 0.05$). Intra-articular PRP injection likely represents a safe treatment option for Japanese patients with mild-to-moderate knee osteoarthritis, and has the potential to relieve pain for up to 6 months, but further study is needed to verify the efficacy.

## 38 A. FOOT AND ANKLE

Measuring dorsiflexion in weight bearing

J Orthop Sports Phys Ther. 2019 Jul 23:1-29. doi: 10.2519/jospt.2019.8697.

**How Much Does the Talocrural Joint Contribute to Ankle Dorsiflexion Range of Motion During the Weight-Bearing Lunge Test? A Cross-Sectional Radiographic Validity Study.**

Smith MD[1], Lee D[1], Russell T[1], Matthews M[2], MacDonald D[3], Vicenzino B[1].

*BACKGROUND:*
Ankle dorsiflexion ROM is commonly measured during the weight-bearing lunge test (WBLT) as horizontal knee distance travelled or tibial inclination. These measures are assumed to represent talocrural dorsiflexion, yet have not been validated against radiographic images.

*OBJECTIVES:*
To determine the: a) contribution of the talocrural joint to tibial inclination during the WBLT; b) validity of inclinometer and photographic measures of tibial inclination compared to radiographic images; and c) association between tibial inclination and horizontal distance measures.

*METHODS:*
Tibial inclination using an inclinometer, horizontal distance via a ruler, radiographic and photographic images were recorded on 20 participants in standing and end-range WBLT. Two assessors used computer software to measure talar rotation and tibial inclination from digital radiographs and photographs. Limits of agreements (LoA) between photographic and inclinometer measures against radiograph measures, and correlation between measures were calculated.

*RESULTS:*
At end-range WBLT, 91.8% of motion occurred at the talocrural joint with 8.2% occurring distally. There were very strong correlations (all $r=0.88$, $p<0.001$) between end range radiographic and photographic measures, radiographic and inclinometer measures, and radiographic, inclinometer, photographic measures of tibial inclination and horizontal lunge distance. Calculation of LoA indicated unacceptable agreement between inclinometer and radiograph measures (-7.84, 5.92) and acceptable agreement between photographic and radiographic measures (-2.17, 2.49).

*CONCLUSION:*
Tibial inclination during the WBLT primarily occurs at the talocrural joint. While inclinometer and photographic measures of tibial inclination can reliably be used clinically to measures dorsiflexion ROM during the WBLT, inclinometer results will differ slightly than those obtained from radiographs. *J Orthop Sports Phys Ther, Epub 23 Jul 2019. doi:10.2519/jospt.2019.8697.*

## 46 B. LOWER LIMB NEUROMOILIZATION

Neuromobilizion improves LE performance

### ACUTE EFFECTS OF NEURAL GLIDING ON ATHLETIC PERFORMANCE

**Andy Waldhelm, PT, PhD[1] Marissa Gacek[1] Hannah Davis[1] Christy Saia[1]**

**Brock Kirby[1]**

Background: Neural mobilization has been used to treat individuals with musculoskeletal and neuromuscular pathol- ogies, but research on neural mobilization in sports rehabilitation is scarce. Furthermore, there have been no studies investigating the effects of neural gliding on sport performance.
Purpose/Hypothesis: The purpose of this study was to examine the differences between the acute effects of sciatic nerve gliding and lower extremity dynamic stretching exercises on hamstring flexibility and athletic performance.
Study Design: A cross-sectional, quasi-experimental design with block assignment was used.
Methods: Twenty-seven (16 males, 11 females, age: 23.6 ± 2.65, height (m): 1.74 ± 0.12, weight (kg): 73.73 ± 16.09) healthy college students volunteered for the study. The neural gliding group had 14 subjects and the dynamic stretch- ing group had 13 subjects. Participants performed a jogging or walking up stairs warm up at a self-selected pace prior to testing. Baseline data was obtained for each of the following measurements: bilateral hamstring flexibility using the active straight leg raise test measured by a digital inclinometer, vertical jump height, 20-yard shuttle run and 10 and 20-yard dash sprint. The participants then performed one of the assigned five-minute stretching protocol, bilateral sciatic neural gliding or dynamic stretching of the lower extremities, followed by the post-test data collection of the same measures.
Results: There were no significant group by time interaction for any of the six measurements (2 x 2 repeated mea- sures ANOVA). However, significant time differences, pre-test vs post-test for all participants as one group, for right hamstring length ($p = .001$), left hamstring length ($p = .002$) and vertical jump ($p = .028$) were observed. Post hoc paired t-tests found a significant increase between the pre and post-tests in right hamstring flexibility, ($p = .011$) in the dynamic stretching group and left hamstring flexibility of participants in the neural gliding condition, ($p = .004$). When analyzing the groups individually, pre-test vs post-test, a significant difference in vertical jump was not observed in either group.
Conclusion: Similar improvement in hamstring flexibility with both dynamic stretching and neural gliding exercises without a negative effect on three sports performance tests was demonstrated. Therefore, athletic performance will not be negatively affected by a pre-participation warm-up which includes neural gliding, but more research is needed.
Level Of Evidence: Level 3

*The International Journal of Sports Physical Therapy | Volume 14, Number 4 | August 2019 | Page 603 DOI: 10.26603/ijspt20190603*

## 52. EXERCISE

Hamstring ex

J Orthop Sports Phys Ther. 2019 Mar 26:1-37. doi: 10.2519/jospt.2019.8801.

**Impact of Hip Flexion Angle on Unilateral and Bilateral Nordic Hamstring Exercise Torque and High-Density Electromyography Activity.**

Hegyi A[1], Lahti J[2], Giacomo JP[3], Gerus P[2], Cronin NJ[1], Morin JB[2].

*BACKGROUND:*
In the bilateral Nordic hamstring exercise (NHE), hamstrings operate at relatively short lengths, which may limit this exercise's efficacy in hamstring injury prevention.

*OBJECTIVES:*
To examine knee flexion torque, and biceps femoris long head (BFlh) and semitendinosus (ST) high-density electromyography (HD-EMG) activity during unilateral and bilateral NHE performed with either neutral (NHE0) or 90° flexed (NHE90) hips.

*METHODS:*
Exercises were performed on a novel device at eccentric 1-repetition maximum load defined for 90-15° knee range of motion. Torque and EMG signals normalised to maximal voluntary isometric activity were compared in different phases of the exercises with Statistical Parametric Mapping.

*RESULTS:*
Lower EMG levels were observed in NHE90 than in NHE0, mainly in the second half of the movement. Knee flexor eccentric torque was higher in NHE90 than in NHE0 from the beginning until 87% of the bilateral movement, and over the entire unilateral movement. In NHE0, ST activity was higher compared to BFlh during the initial movement phase, but lower close to knee extension. Torque and EMG activity were generally similar in the bilateral and unilateral modes.

*CONCLUSION:*
If performed with neutral hips, NHE selectively activates BFlh near full knee extension. Performing NHE with hips flexed to 90° is preferable when higher passive torque and ST selectivity are targeted at a longer muscle length. Performing these exercises unilaterally could help to train each limb separately with a similar torque and EMG output to the bilateral conditions. Adaptations to these exercises should be examined. J Orthop Sports Phys Ther, Epub 26 Mar 2019. doi:10.2519/jospt.2019.8801.

## 53. CORE

LE injury reduces core endurance

**ORIGINAL RESEARCH**

# A COMPARATIVE STUDY OF CORE MUSCULATURE ENDURANCE AND STRENGTH BETWEEN SOCCER PLAYERS WITH AND WITHOUT LOWER EXTREMITY SPRAIN AND STRAIN INJURY

**Amira A. Abdallah, PhD[1] Nabil A. Mohamed, PhD[1] Mostafa A. Hegazy, PhD[2]**

*The International Journal of Sports Physical Therapy | Volume 14, Number 4 | June 2019 | Page 525 DOI: 10.26603/ijspt20190525*

Background: Lower extremity sprain and strain injury constitutes a large percentage of lower extremity injuries experienced by soccer players. Yet, very limited data exists on the association between core strength and endurance and this injury.
Purpose: The purpose of this study was to compare core muscle endurance and hip muscle strength between soccer players who experienced non-contact lower extremity sprain and/or strain injury during their season and those who did not. Additionally, the frequency of injury was correlated with core muscle endurance and hip strength, and endur- ance was used for predicting the risk for injury.
Study Design: Prospective cohort
Methods: Twenty-one (35.59%) athletes experienced non-contact lower extremity sprain and/or strain injury during the season. Fifty-nine male athletes (mean age 20.92±4.08 years, mass 77.34±12.02 kg and height 1.79±0.06m) were tested. Prior to the start of the season, prone-bridge, side-bridge, trunk flexion and horizontal back extension hold times were recorded for endurance assessment and peak hip abductor and external rotator isokinetic torques for strength assessment.
Results: Prone-bridge and side-bridge hold times were significantly longer in the non-injured players when compared with the times of the injured players (p=0.043 & 0.008 for the prone-bridge and side-bridge, respectively). There were significant negative correlations between the frequency of injury and both prone-bridge (r=-0.324, p=0.007) and side-bridge (r=-0.385, p=0.003) hold times. Logistic regression analysis revealed that side-bridge hold time was a significant predictor of injury (OR=0.956, CI=0.925-0.989).
**Conclusion:** Soccer players with non-contact lower extremity sprain and/or strain have less core endurance than non-injured players. Reduced core endurance is associated with increased incidence of injury. Improving side-bridge hold time, specifically, may reduce the risk for injury.
Level of evidence: 1b
Keywords: Core endurance; hip strength, soccer; sprain and strain injuries

## 54. POSTURE

Posture and asymmetries

**ORIGINAL RESEARCH**

# THE EFFECTS OF POSTURAL AND ANATOMICAL ALIGNMENT ON SPEED, POWER, AND ATHLETIC PERFORMANCE IN MALE COLLEGIATE ATHLETES: A RANDOMIZED CONTROLLED TRIAL

**Leah R. Jackson, PT, DPT[1] Jackson Purvis[1] Taylor Brown[1]**

*The International Journal of Sports Physical Therapy | Volume 14, Number 4 | August 2019 | Page 623 DOI: 10.26603/ijspt20190623*

Background: Many human beings are strongly influenced by right-sided dominance. This may cause potentially pathologic or dysfunctional asymmetries within the innominates of the pelvis, which in turn influences movement throughout the body including the glenohumeral (GH), vertebral, femoral acetabular (FA), sacroiliac, and costovertebral joints. Techniques based upon the science of Postural Restoration® may help correct these asymmetries and improve multiple physiological and mechanical aspects of sports performance.
Purpose: To examine difference between non-manual, Postural Restoration® exercises and traditional postural interventions on anatomical alignment, available range of motion and symmetry, and speed and power in active college-aged males.
Study Design: Randomized control trial, pretest-posttest control group design
Methods: 25 male collegiate students (age = 21± 3 years) who met the ACSM guidelines to be considered physically active were chosen to participate. Participants completed a vertical jump test using a power analyzer (Tendo Sport, Lexington, SC, USA) and the pro agility test. Anatomical alignment was assessed through an adduction drop test, extension drop test, and standard goniometric measurements including femoral acetabular external rotation (ER), internal rotation (IR), flexion, and abduction, and glenohumeral internal rotation. Participants were randomly assigned to either non-manual, Postural Resto- ration® techniques or traditional posture improvement exercises. Following a four-week intervention period, participants were reassessed using the same aforementioned outcomes completed pre-intervention.
Results: Participants who completed the non-manual, Postural Restoration® techniques demonstrated significant improve- ments in pro-agility scores (-0.03 ± 0.10 seconds; p=0.0005). Neither set of interventions improved vertical jump scores (Treatment: +35.7 ± 288.02 W, p=0.1000; Control: -10.08 ± 301.04 W, p=0.381). Areas of anatomical alignment that dem- onstrated significant change included the treatment group for FA IR (p=0.010) and FA abduction (p=0.035) symmetry and the left adduction drop test (p=0.039).
Conclusion: Non-manual exercise techniques based upon the science of Postural Restoration® may equalize asymmetries present in FA internal rotation and hip abduction. Improvements in symmetry of joint motion may indicate a restoration of neutrality of the pelvis and femoroacetabular joints. By improving anatomical alignment, through establishing a neutral pelvis, athletes may demonstrate improved neuromechanical efficiency, and kinesthetic control of multi-directional motions required for enhanced sports performance markers.
Level of Evidence: 1b

Muscle stiffness in LBP

Clin Spine Surg. 2019 Aug;32(7):E346-E352. doi: 10.1097/BSD.0000000000000793.

**Association of Pain History and Current Pain With Sagittal Spinal Alignment and Muscle Stiffness and Muscle Mass of the Back Muscles in Middle-aged and Elderly Women.**

Masaki M[1,2], Ikezoe T[3], Yanase K[3], Ji X[3], Umehara J[3], Aoyama J[4], Minami S[5], Fukumoto Y[6], Watanabe Y[7], Kimura M[8], Ichihashi N[3].

**STUDY DESIGN:** A cross-sectional study.

**OBJECTIVE:** To investigate the association of low back pain history (LBPH) and LBP with sagittal spinal alignment, stiffness assessed using ultrasonic shear wave elastography, and mass of the back muscle in community-dwelling middle-aged and elderly women.

**SUMMARY OF BACKGROUND DATA:** The association of LBPH and LBP with sagittal spinal alignment, stiffness, and mass of the back muscles remains unclear in middle-aged and elderly women.

**PARTICIPANTS AND METHODS:**

The study comprised 19 asymptomatic middle-aged and elderly women [control (CTR) group], 16 middle-aged and elderly women with LBPH (LBPH group), and 23 middle-aged and elderly women with LBP (LBP group). Sagittal spinal alignment in the standing and prone positions (kyphosis angle in the thoracic spine, lordosis angle in the lumbar spine, and anterior inclination angle in the sacrum) was measured using a Spinal Mouse. The stiffness of the back muscles (lumbar erector spinae and multifidus) in the prone position was measured using ultrasonic shear wave elastography. The mass of the back muscles (thoracic and lumbar erector spinae, lumbar multifidus, and quadratus lumborum) was also measured.

**RESULTS:**

Multiple logistic regression analysis with a forward selection method showed that the stiffness of the lumbar multifidus muscle was a significant and independent factor of LBPH. The stiffness of the lumbar multifidus muscle was significantly higher in the LBPH group than in the CTR group. Multiple logistic regression analysis also indicated that lumbar lordosis angle in the standing position was a significant and independent factor of LBP. The lumbar lordosis angle was significantly smaller in the LBP group than in the CTR group.

**CONCLUSIONS:**

Our results suggest that LBPH is associated with increased stiffness of the lumbar multifidus muscle in the prone position, and that LBP is associated with the decreased lumbar lordosis in the standing position in community-dwelling middle-aged and elderly women

## 56. ATHLETICS

Golfers movement patterns

**orIGINAL RESEARCH**

**FUNDAMENTAL MOVEMENT AND DYNAMIC BALANCE DISPARITIES AMONG VARYING SKILL LEVELS IN GOLFERS**

**Sean Krysak[1,2] Christopher R. Harnish, MS, PhD, CSCS[3] Phillip J. Plisky, PT, DSc, OCS, ATC, CSCS[4] Amy M. Knab, PhD[1] Garrett S. Bullock, PT, DPT[5,6]**

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Background: Sports medicine professionals have instituted easy to use on field screening tests to determine physical readiness and identify athletes who may have increased injury risk. Currently there is little research on fundamental movement and dynamic balance abilities in golfers.
Purpose: To examine differences in fundamental movement patterns and dynamic balance in varying competition levels in golfers.
Study Design: Cross-sectional Cohort
Methods: The Functional Movement ScreenTM (FMS), and Y-Balance Test Upper Quarter and Lower Quarter (YBT-LQ/UQ) were performed on middle school (MS), high school (HS), college (COL), and professional (PRO) golfers. The FMSTM was assessed for individual tests and composite score. The YBT-LQ/UQ reaches were averaged normalized to limb length. Statistical analysis was completed with a series of Kruskall-Wallis tests with Dunn's post hoc for the FMSTM and YBT-LQ/UQ asymmetries, and a series of ANOVAs, with Tukey's post hoc for the YBT-LQ/UQ reaches ($p<0.05$). Effect Size Indices (ESI) were also calculated to determine clinical relevance.
Results: A total of 53 MS, 129 HS, 207 COL, and 29 PRO golfers were included in this study. Significant differences were observed between COL and HS in two FMSTM tests (push up; $p=0.001$), active straight leg raise; $p=0.0019$). PRO golfers YBT-LQ posteromedial reaches were greater than MS ($p=0.0127$, ESI = 4.3552). PRO YBT-UQ medial reaches were greater than COL ($p<0.0001$, ESI = 0.8915), HS ($p<0.0001$, ESI = 1.2640) and MS ($p<0.001$, ESI = 1.4218). PRO inferolateral (IL) and superoloateral (SL) reaches were greater [IL: COL ($p=0.0427$, ESI = 0.4413), HS ($p=0.0002$, ESI = 0.5851)], [SL: COL ($p=0.0005$, ESI = 0.5990), HS ($p=0.0004$, ESI= 0.6068)]. YBT-UQ composite scores were greater for PRO compared to COL ($p<0.0001$, ESI = 0.7657), HS ($p<0.0001$, ESI =0.8161) and MS ($p<0.0001$, ESI = 1.085).
**Conclusions:** Differences were observed in golfer's fundamental movement patterns in relationship to competition level. These data can be utilized to design personalized training programs that focus to improve movement quality.
Level of Evidence: 2b
Key Words: Functional Movement ScreenTM, Movement System, Normative Data, Y-Balance Test

Overhead athletes lumbopelvic control

**SYSTEMATIC REVIEW - META ANALYSIS**
**The Impact of Lumbopelvic Control on Overhead Performance and Shoulder Injury in Overhead Athletes: A Systematic Review.**
*Authors: Cope T, Wechter S, Stucky M, Thomas C, Wilhelm M*

*The International Journal of Sports Physical Therapy | Volume 14, Number 4 | August 2019 | Page 500 DOI: 10.26603/ijspt20190500*

The lumbopelvic region is utilized in almost all functional tasks and has been proposed to provide dynamic stability to distal extremities.

The purpose of this review was to systematically evaluate the current literature that has examined the effect of lumbopelvic control on overhead performance and shoulder injury in overhead athletes. A comprehensive systematic electronic search revealed 3,312 total articles and 45 full text articles were reviewed. Fifteen full-text articles ultimately met inclusion criteria. Effect sizes ranged from trivial (0.10) to large (0.86), indicating a varying degree of positive effects on performance and shoulder injuries. The majority of included articles concluded that individuals with greater lumbopelvic control demonstrated improved performance and decreased occurrence of injury.

The results of this review suggest that improved lumbopelvic control relates to improved athletic performance and decreased shoulder injury. Additional higher quality research is needed to further support these findings, establish a standard measure for lumbopelvic control, and determine preventative factors for injury, pain, and disability.

## 63. PHARMACOLOGY

Pre-operative opioid use

**Preoperative Opioid Use Among Patients Undergoing Shoulder Arthroplasty Predicts Prolonged Postoperative Opioid Use**

Berglund, Derek D. MD; Rosas, Samuel MD; Kurowicki, Jennifer MD; Horn, Brandon DO; Mijic, Dragomir DO; Levy, Jonathan C. MD

JAAOS - Journal of the American Academy of Orthopaedic Surgeons: August 01, 2018 - Volume 27 - Issue 15 - p e691–e695
doi: 10.5435/JAAOS-D-18-00008

Introduction: This study determines the incidence of opioid use before shoulder arthroplasty and analyzes its influence on postoperative use.
Methods: A retrospective analysis of patients undergoing shoulder arthroplasty with at least 2-year follow-up was performed. Then, at pre- and postoperative appointments, the patients were asked “Do you take narcotic pain medication (codeine or stronger)?”
Results: Among 490 patients included in the study, 35.5% reported preoperative opioid use. These patients had higher incidence of opioid use at 1-year follow-up (29.1% versus 4.9%; odds ratio, 8.320; $P < 0.001$) and at final follow-up (35.1% versus 7.3%; odds ratio, 6.877; $P < 0.001$). Opioid usage did not change markedly from 1 year follow-up to final follow-up ($P > 0.18$).
Discussion: Approximately one-third of patients used opioids preoperatively and were seven times more likely to continue opioid use postoperatively. Opioid usage did not change from 1 year follow-up to final follow-up, suggesting that patients still using opioids at their 1-year appointment were likely to continue opioid use.
Level of Evidence: Level III

## 65. NEUROLOGICAL CONDITIONS

Hyperbaric therapy

**A single session of hyperbaric oxygen therapy demonstrates acute and long-lasting neuroplasticity effects in humans: a replicated, randomized controlled clinical trial**
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Anna M Wahl,[1] Daniel Bidstrup,[1] Isabel G Smidt-Nielsen,[1]Mads U Werner,[2] Ole Hyldegaard,[1,3] Per Rotbøll-Nielsen

**Purpose:** Animal studies have demonstrated anti-inflammatory, and anti-nociceptive properties of hyperbaric oxygen therapy (HBOT). However, physiological data are scarce in humans. In a recent experimental study, the authors used the burn injury (BI) model observing a decrease in secondary hyperalgesia areas (SHA) in the HBOT-group compared to a control-group. Surprisingly, a long-lasting neuroplasticity effect mitigating the BI-induced SHA-response was seen in the HBOT-preconditioned group. The objective of the present study, therefore, was to confirm our previous findings using an examiner-blinded, block-randomized, controlled, crossover study design.
**Patients and methods:** Nineteen healthy subjects attended two BI-sessions with an inter-session interval of ≥28 days. The BIs were induced on the lower legs by a contact thermode (12.5 $cm,^2$ 47C°, 420 s). The subjects were block-randomized to receive HBOT (2.4 ATA, 100% $O_2$, 90 min) or ambient conditions ([AC]; 1 ATA, 21% $O_2$), dividing cohorts equally into two sequence allocations: HBOT-AC or AC-HBOT. All sensory assessments performed during baseline, BI, and post-intervention phases were at homologous time points irrespective of sequence allocation. The primary outcome was SHA, comparing interventions and sequence allocations.
**Results:** Data are mean (95% CI). During HBOT-sessions a mitigating effect on SHA was demonstrated compared to AC-sessions, ie, 18.8 (10.5–27.0) $cm^2$ vs 32.0 (20.1–43.9) $cm^2$ ($P$=0.021), respectively. In subjects allocated to the sequence AC-HBOT a significantly larger mean difference in SHA in the AC-session vs the HBOT-session was seen 25.0 (5.4–44.7) $cm^2$ ($P$=0.019). In subjects allocated to the reverse sequence, HBOT-AC, no difference in SHA between sessions was observed ($P$=0.55), confirming a preconditioning, long-lasting (≥28 days) effect of HBOT.
**Conclusion:** Our data demonstrate that a single HBOT-session compared to control is associated with both acute and long-lasting mitigating effects on BI-induced SHA, confirming central anti-inflammatory, neuroplasticity effects of hyperbaric oxygen therapy.