

7. PELVIC ORGANS/WOMAN'S HEALTH

Diet influences breast CA

Associations between dietary patterns and the risk of breast cancer: A systematic review and meta-analysis of observational studies

Breast Cancer Research

Xiao Y, et al. | January 31, 2019

Researchers analyzed 32 eligible articles, including 14 cohort and 18 case-control studies (34 Western and 35 prudent studies), to assess the relationship between different dietary patterns and the risk of breast cancer. They noted an association of increased breast cancer risk of 14% with a Western dietary pattern, especially postmenopausal females, and an 18% decline in risk of breast cancer with a prudent dietary pattern, particularly among premenopausal females. They also found a link between hormone receptor-positive tumors and increased risk of breast cancer.

Hormone replacement and stroke

Hormone therapy in postmenopausal women associated with risk of stroke and venous thromboembolism

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Menopause: February 2019 - Volume 26 - Issue 2 - p 197–202

doi: 10.1097/GME.0000000000001182

Objective: The aim of the study was to evaluate the risks and benefits of hormone therapy (HT) in postmenopausal women in Taiwan.

Methods: A retrospective cohort study was conducted using the Taiwan National Health Insurance Research Database, a population-based healthcare claims dataset. Eligible women, aged 40 to 65, were matched 1:1 by age and menopause year to avoid confounding through imbalanced baseline characteristics among the two groups (2,491 pairs). The primary outcomes were acute coronary syndrome (ACS), venous thromboembolism (VTE), and ischemic stroke (IS).

Results: Mean follow-up in the HT group was 30 months. Mean age of the HT group was 50 years. After adjusting for age, statin and anticoagulant use, hyperlipidemia, diabetes, and hypertension, the hazard ratios (95% CIs) for the HT group were increased: ACS, 3.73 (2.01-6.91); IS, 3.51 (2.41-5.11); and VTE, 2.51 (1.15-5.47).

Conclusions: In postmenopausal Taiwanese women, HT may be associated with an increased risk of cardiovascular disease. Although the women in our population receiving HT were near menopausal age, their risk of cardiovascular disease was still higher than in the non-HT group.

Hormone replacement and melanoma

Int J Cancer. 2019 Jan 22. doi: 10.1002/ijc.32150.

Postmenopausal hormone use and cutaneous melanoma risk: A French prospective cohort study.

Cervenka I^{1,2}, Al Rahmoun M^{1,2}, Mahamat Saleh Y^{1,2}, Savoye I^{1,2}, Boutron-Ruault MC^{1,2}, Fournier A^{1,2}, Kvaskoff M^{1,2}.

Cutaneous melanoma has been suspected to be influenced by female hormones. Several studies reported a positive association between menopausal hormone therapy (MHT) use and melanoma risk; however, previous findings were conflicting.

We sought to explore the associations between MHT use and melanoma risk in a prospective cohort of women in France, where a particularly wide variety of MHT formulations are available. E3N is a prospective cohort of 98,995 French women aged 40-65 years in 1990. MHT use was assessed through biennial self-administered questionnaires. We used Cox proportional hazards regression models adjusted for age and skin cancer risk factors. Over 1990-2008, 444 melanoma cases were ascertained among 75,523 postmenopausal women. Ever use of MHT was associated with a higher melanoma risk (hazard ratio (HR)=1.35, 95% confidence intervals (CI)=1.07-1.71). The association was strongest among past users (HR=1.55, CI=1.17-2.07, homogeneity for past vs. recent use: P=0.11), and users of MHT containing norepregnane derivatives (HR=1.59, CI=1.11-2.27), although with no heterogeneity across types of MHT (P=0.13). Among MHT users, the association was similar across durations of use. However, a higher risk was observed when treatment onset occurred shortly after menopause (<6 months: HR=1.55, CI=1.16-2.07 vs. ≥2 years).

Associations between MHT use and melanoma risk were similar after adjustment for UV exposure, although MHT users were more likely to report sunscreen use than non-users. Our data do not support a strong association between MHT use and melanoma risk. Further investigation is needed to explore potential effect modification by UV exposure on this relationship

Caffeine and impact on fetus

Am J Clin Nutr. 2018 Dec 1;108(6):1301-1308. doi: 10.1093/ajcn/nqy219.

Associations of maternal caffeine intake with birth outcomes: results from the Lifeways Cross Generation Cohort Study.

Chen LW¹, Fitzgerald R², Murrin CM¹, Mehegan J¹, Kelleher CC¹, Phillips CM¹; Lifeways Cross Generation Cohort Study.

BACKGROUND:

Maternal caffeine intake is associated with adverse birth outcomes, but in most studies the primary caffeine source is coffee; the influence of tea caffeine remains unclear.

OBJECTIVE:

The aim of the study was to examine the association between maternal caffeine intake and birth outcomes in a population with tea as the predominant caffeine source.

DESIGN:

Data from 941 Irish mother-child pairs of the Lifeways Cross Generation Cohort Study were examined. Maternal dietary intakes in early pregnancy were assessed using a validated food-frequency questionnaire. Caffeine intake was derived from coffee, tea, soft drinks, and cocoa-containing foods and beverages. Associations of maternal caffeine intake with continuous (birth weight, birth length, and gestational age) and binary [low birth weight (LBW) (<2500 g) and preterm birth (PB) (<37 wk gestational age)] birth outcomes were investigated using multiple linear and logistic regressions, respectively, with adjustment for potential confounders.

RESULTS:

Tea was the predominant caffeine source (48%), followed by coffee (39%). In the fully adjusted model, maternal caffeine intake was associated with lower birth weight [β (95% CI): -71.9 (-105.4, -38.4) g · 100 mg-1 · d-1 caffeine increment], shorter birth length [-0.30 (-0.49, -0.11) cm], smaller head circumference [-0.12 (-0.24, -0.01) cm], and shorter gestational age [-0.13 (-0.25, -0.02) wk]; higher risks for LBW [OR (95% CI): 1.47 (1.14, 1.90)] and PB [1.36 (1.07, 1.74)] were also observed (all $P < 0.05$). The associations were robust to the exclusion of participants with pregnancy complications and in never smokers. Similar higher risks of adverse birth outcomes were observed for the highest caffeine intake categories from coffee [ORLBW: 3.10 (1.08, 8.89); ORPB: 2.74 (1.05, 7.16)] and tea [ORLBW: 2.47 (1.02, 6.01); ORPB: 2.56 (1.14, 5.75)], compared with the lowest intake categories (all $P < 0.05$).

CONCLUSIONS:

Maternal caffeine intake from both coffee and tea is associated with adverse birth outcomes. This prospective observational study was registered at ISRCTN Registry as ISRCTN16537904.

Hormone replacement and prolapses

Postmenopausal hormone therapy is accompanied by elevated risk for uterine prolapse

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doi: 10.1097/GME.0000000000001173

Objective: Receptors for estrogen and progesterone are present in the pelvic floor, and therefore, postmenopausal hormone therapy may affect its function. We compared the former use of estradiol-progestogen postmenopausal hormone therapy in nonhysterectomized women with a uterine prolapse surgery (N = 12,072) and control women (N = 33,704).

Methods: The women with a history of uterine prolapse operation were identified from the Finnish National Hospital Discharge Register, and the control women from the Finnish Central Population Register. The use of hormone therapy was traced from the national drug reimbursement register, and the odd ratios with 95% CIs for prolapse were calculated by using the conditional logistic regression analysis.

Results: The women with uterine prolapse had used hormone therapy more often than control women (N = 4,127; 34.2% vs N = 9,189; 27.3%; P < 0.005). The use of hormone therapy was accompanied by significant (23%-53%) elevations in the risk for prolapse, being higher with longer exposure. The risk elevations (33%-23%) were comparable between sole norethisteroneacetate-estradiol and sole medroxyprogesteroneacetate-estradioltherapy. The use of estradiol in combination with a levonorgestrel releasing intrauterine device was accompanied by a 52% elevation.

Conclusions: The postmenopausal use of estradiol in combination with various progestogen regimens may weaken the pelvic floor, resulting in uterine prolapse. This data should be incorporated into the information given to the users of estradiol-progestogen hormone therapy.

C section guidelines

The frequency of intrapartum cesarean section use with the WHO partograph vs Zhang's guideline in the Labour Progression Study (LaPS): A multicentre, cluster-randomized controlled trial

The Lancet Bernitz S, et al. | January 28, 2019

Authors comparatively studied the rate of intrapartum cesarean section (ICS) in reference to the WHO partograph and Zhang's guideline for labor progression. They found an overall drop in ICS due to close focus on valuing labor progress as compared to the use of the guidelines.

In this multicentre, cluster-randomised controlled trial at obstetric units in Norway, each site was needed to deliver more than 500 babies per annum to be eligible for inclusion.

- Nulliparous females who had a singleton, full-term fetus with cephalic presentation, and who entered spontaneous active labor were involved.
- They treated the obstetric units as clusters, and women treated within the clusters were given the same treatment.
- These clusters were stratified by size and number of previous cesarean sections.
- The clusters containing the obstetric units were then randomly assigned in 1:1 ratio ie, to the control group (adhered to the WHO partograph) and to the intervention group (adhered to Zhang's guideline).
- The randomisation was computer-generated and was done in the Unit of Biostatistics and Epidemiology, Oslo University Hospital, Oslo, Norway, with no further involvement investigators in this unit.
- The researchers assessing the data were masked to group allocation but were unable to mask the candidates or health-care providers.
- They noted the use of ICS during active labour (cervical dilatation of 4–10 cm) in all participating females as the primary outcome.

Results

From Aug 1, 2014 to Sept 1, 2014, they enrolled 14 clusters in the LaPS trial, and on Sept 11, 2014, a sum of 7 obstetric units were randomly assigned to the control group (adhering to the WHO partograph) and 7 obstetric units to the intervention group (adhering to Zhang's guideline).

- Between Dec 1, 2014, and Jan 31, 2017, they judged 11,615 eligible women for recruitment in the trial, which comprised 5421 (46.7%) females in the control group units and 6194 (53.3%) in the intervention group units.
- In the control group, 2100 (38.7%) of 5421 women were not agreed to participate and 16 (0.3%) were abstained from participation.
- In the intervention group, 2181 (35.2%) of 6194 women did not give signed consent to participate and 41 (0.7%) women abstained from participation.
- A total of 7277 (62.7%) females were hence involved in the analysis of the primary endpoint.
- A fraction of 3305 (45.4%) candidates were in an obstetric unit, randomly assigned to the control group (adhering to the WHO partograph) whereas 3972 (54.6%) participants were in an obstetric unit, randomly assigned to the intervention group (adhering to Zhang's guideline).
- No women dropped out during the trial.
- Before the initiation of the trial, ICS was implemented in 9.5% of parturition in the control group and in 9.3% of intervention group obstetric units.
- They observed no difference in the the frequency of ICS between the 2 groups (adjusted relative risk 1.17, 95% CI 0.98–1.40; p=0.08; adjusted risk difference 1.00%, 95% CI –0.1 to 2.1).
- They recorded 196 (5.9%) ICS deliveries in women in the control group (WHO partograph) and 271 (6.8%) ICS deliveries in women in the intervention group (Zhang's guideline).
- No maternal or neonatal deaths were observed during the trial.

8. VISCERA

Periodontal disease and kidney disease

Nephrology (Carlton). 2019 Feb;24(2):202-212. doi: 10.1111/nep.13225.

Periodontal and chronic kidney disease association: A systematic review and meta-analysis.

Kapellas K¹, Singh A^{1,2}, Bertotti M³, Nascimento GG⁴, Jamieson LM¹;

AIM:

Chronic kidney disease (CKD) and kidney failure is increasing globally and evidence from observational studies suggest periodontal disease may contribute to kidney functional decline.

METHODS:

Electronic searches of the PubMed, EMBASE, Web of Science, Scopus and Cochrane Library databases were conducted for the purposes of conducting a systematic review. Hand searching of reference lists was also performed. Meta-analysis of observational studies involving periodontal disease and chronic kidney disease in adults was performed.

RESULTS:

A total of 17 studies was selected from an initial 4055 abstracts. Pooled estimates indicated the odds of having CKD were 60% higher among patients with periodontitis: pooled OR 1.60 (95% CI 1.44-1.79, I^2 35.2%, $P = 0.11$) compared to those without. Conversely, a similar magnitude but non-significant higher odds of having periodontal disease was found among people with CKD 1.69 (95% CI: 0.84, 3.40, $I^2 = 89.8%$, $P < 0.00$) versus non-CKD. Meta-regression revealed study quality based on the Newcastle-Ottawa Scale and statistical adjustment for potential confounders explained almost 35% of the heterogeneity in the studies investigating the association between CKD and periodontitis.

CONCLUSIONS:

Moderate evidence for a positive association between periodontitis and CKD exists. Evidence for the opposite direction is extremely weak based on significant heterogeneity between studies.

Allergies and CA

Allergies and the subsequent risk of cancer among elderly adults in the United States

Monica D'Arcy, Donna R Rivera, Andrew Grothen and Eric A. Engels

DOI: 10.1158/1055-9965.EPI-18-0887

Background: Allergic conditions may prevent some cancers by promoting immune surveillance. We examined associations of allergic rhinitis, asthma, and eczema with cancer risk among elderly Americans.

Methods: We used Surveillance, Epidemiology, and End Results (SEER)-Medicare linked data to perform a case-control study. Cases were individuals with first cancer diagnosed in SEER registries (1992-2013, ages 66-99; N=1,744,575). Cancer-free controls (N=100,000) were randomly selected from Medicare, matched on sex, age and selection year. Allergic conditions were identified using Medicare claims, and logistic regression was used to estimate adjusted odds ratios (aORs) with significance gauged with a Bonferroni p-value cutoff ($p < 0.00034$).

Results: Allergic rhinitis, asthma, and eczema were present in 8.40%, 3.45%, and 0.78% of controls, respectively. For allergic rhinitis, strong inverse associations (aORs 0.66-0.79) were observed for cancers of the hypopharynx, esophagus (squamous cell), cervix, tonsil/oropharynx, and vagina/vulva. More modest but significant inverse associations were noted for cancers of the esophagus (adenocarcinoma), stomach, colon, rectosigmoid/rectum, liver, gallbladder, lung, uterus, bladder, and miscellaneous sites. Associations were stronger in analyses requiring a dispensed medication to confirm the presence of allergic rhinitis. Asthma was associated with reduced risk of liver cancer (aOR 0.82, 95%CI 0.75-0.91), while eczema was associated with elevated risk of T-cell lymphoma (aOR 4.12, 3.43-4.95).

Conclusions: Inverse associations with allergic rhinitis are present for multiple cancers and require etiologic investigation. Impact: Understanding of mechanisms by which allergic conditions reduce cancer risk may advance cancer prevention and treatment.

Wheat and fatty liver disease

A 12-wk whole-grain wheat intervention protects against hepatic fat: the Graandioos study, a randomized trial in overweight subjects

Sophie Schutte Diederik Esser Femke P M Hoevenaars Guido J E J Hooiveld Marion G Priebe Roel J Vonk Suzan Wopereis Lydia A Afman
The American Journal of Clinical Nutrition, Volume 108, Issue 6, 1 December 2018, Pages 1264–1274, <https://doi.org/10.1093/ajcn/nqy204>

Background

Whole-grain wheat (WGW) is described as nutritionally superior to refined wheat (RW) and thus advocated as the healthy choice, although evidence from intervention studies is often inconsistent. The liver, as the central organ in energy metabolism, might be an important target organ for WGW interventions.

Objective

The aim of this study was to investigate the potential benefits of WGW consumption compared with RW consumption on liver health and associated parameters.

Design

We performed a double-blind, parallel trial in which 50 overweight 45- to 70-y-old men and postmenopausal women were randomly allocated to a 12-wk intervention with either WGW (98 g/d) or RW (98 g/d) products. Before and after the intervention we assessed intrahepatic triglycerides (IHTGs) and fat distribution by proton magnetic resonance spectroscopy/magnetic resonance imaging, fecal microbiota composition, adipose tissue gene expression, and several fasting plasma parameters, as well as postprandial plasma lipids after a mixed meal.

Results

Fasting plasma cholesterol, triglycerides, nonesterified fatty acids, and insulin were not affected by RW or WGW intervention. We observed a substantial increase of 49.1% in IHTGs in the RW when compared with the WGW group ($P = 0.033$). Baseline microbiota composition could not predict the increase in IHTGs after RW, but gut microbiota diversity decreased in the RW group when compared with the WGW group ($P = 0.010$). In the WGW group, we observed increased postprandial triglyceride levels compared with the RW group ($P = 0.020$). In addition, the WGW intervention resulted in a trend towards lower fasting levels of the liver acute-phase proteins serum amyloid A ($P = 0.057$) and C-reactive protein ($P = 0.064$) when compared to the RW intervention.

Conclusions

A 12-wk RW intervention increases liver fat and might contribute to the development of nonalcoholic fatty liver disease, whereas a 12-wk 98-g/d WGW intervention prevents a substantial increase in liver fat. Our results show that incorporating feasible doses of WGW in the diet at the expense of RW maintains liver health. The study was registered at clinicaltrials.gov as NCT02385149.

13 B. TMJ/ORAL**Periodontal disease and relationship to Kidney disease**

Nephrology (Carlton). 2019 Feb;24(2):202-212. doi: 10.1111/nep.13225.

Periodontal and chronic kidney disease association: A systematic review and meta-analysis.

Kapellas K¹, Singh A^{1,2}, Bertotti M³, Nascimento GG⁴, Jamieson LM¹;

AIM:

Chronic kidney disease (CKD) and kidney failure is increasing globally and evidence from observational studies suggest periodontal disease may contribute to kidney functional decline.

METHODS:

Electronic searches of the PubMed, EMBASE, Web of Science, Scopus and Cochrane Library databases were conducted for the purposes of conducting a systematic review. Hand searching of reference lists was also performed. Meta-analysis of observational studies involving periodontal disease and chronic kidney disease in adults was performed.

RESULTS:

A total of 17 studies was selected from an initial 4055 abstracts. Pooled estimates indicated the odds of having CKD were 60% higher among patients with periodontitis: pooled OR 1.60 (95% CI 1.44-1.79, I^2 35.2%, $P = 0.11$) compared to those without. Conversely, a similar magnitude but non-significant higher odds of having periodontal disease was found among people with CKD 1.69 (95% CI: 0.84, 3.40, $I^2 = 89.8%$, $P < 0.00$) versus non-CKD. Meta-regression revealed study quality based on the Newcastle-Ottawa Scale and statistical adjustment for potential confounders explained almost 35% of the heterogeneity in the studies investigating the association between CKD and periodontitis.

CONCLUSIONS:

Moderate evidence for a positive association between periodontitis and CKD exists. Evidence for the opposite direction is extremely weak based on significant heterogeneity between studies.

Gingivitis and Alzheimer's

***Porphyromonas gingivalis* in Alzheimer's disease brains: Evidence for disease causation and treatment with small-molecule inhibitors**Stephen S. Dominy^{1,*},[†], Mike Dragnow^{11,13} and Jan Potempa^{2,5,*}*Science Advances* 23 Jan 2019: Vol. 5, no. 1, eaau3333 DOI: 10.1126/sciadv.aau3333

Porphyromonas gingivalis, the keystone pathogen in chronic periodontitis, was identified in the brain of Alzheimer's disease patients.

Toxic proteases from the bacterium called gingipains were also identified in the brain of Alzheimer's patients, and levels correlated with tau and ubiquitin pathology. Oral *P. gingivalis* infection in mice resulted in brain colonization and increased production of A β 1–42, a component of amyloid plaques. Further, gingipains were neurotoxic in vivo and in vitro, exerting detrimental effects on tau, a protein needed for normal neuronal function.

To block this neurotoxicity, we designed and synthesized small-molecule inhibitors targeting gingipains. Gingipain inhibition reduced the bacterial load of an established *P. gingivalis* brain infection, blocked A β 1–42 production, reduced neuroinflammation, and rescued neurons in the hippocampus. These data suggest that gingipain inhibitors could be valuable for treating *P. gingivalis* brain colonization and neurodegeneration in Alzheimer's disease.

13 D. SLEEP**Music and sleep**

J Sleep Res. 2019 Jan 24:e12817. doi: 10.1111/jsr.12817.

A randomized controlled trial of bedtime music for insomnia disorder.

Jespersen KV¹, Otto M², Kringelbach M^{1,3}, Van Someren E^{4,5}, Vuust P¹.

Music is often used as a self-help tool to alleviate insomnia.

To evaluate the effect of bedtime music listening as a strategy for improving insomnia, we conducted an assessor-blinded randomized controlled trial. Fifty-seven persons with insomnia disorder were included and randomized to music intervention (n = 19), audiobook control (n = 19) or a waitlist control group (n = 19). The primary outcome measure was the Insomnia Severity Index. In addition, we used polysomnography and actigraphy to evaluate objective measures of sleep, and assessed sleep quality and quality of life.

The results showed no clear effect of music on insomnia symptoms as the group × time interaction only approached significance (effect size = 0.71, p = .06), though there was a significant improvement in insomnia severity within the music group. With regard to the secondary outcomes, we found a significant effect of the music intervention on perceived sleep improvement and quality of life, but no changes in the objective measures of sleep.

In conclusion, music listening at bedtime appears to have a positive impact on sleep perception and quality of life, but no clear effect on insomnia severity.

Music is safe and easy to administer, but further research is needed to assess the effect of music on different insomnia subtypes, and as an adjunctive or preventive intervention.

20 A. ROTATOR CUFF

Prone exercise

Neuromuscular Adaptions Following A Daily Strengthening Exercise in Individuals With Rotator Cuff Related Shoulder Pain: A Pilot Case-Control Study

Authors: Seitz AL, Podlecki LA, Melton ER, Uhl TL

The goal of therapeutic exercise is to facilitate a neuromuscular response by increasing or decreasing muscular activity in order to reduce pain and improve function. It is not clear what dosage of exercise will create a neuromuscular response.

The purpose of this study was to assess the effects following a three-week home program of a daily single exercise, the prone horizontal abduction exercise (PHA), on neuromuscular impairments of motor control as measured by scapular muscle EMG amplitudes, strength, and secondarily outcomes of self-reported pain and function between individuals with and without subacromial pain syndrome. Twenty-five individuals participated; eleven with shoulder pain during active and resistive motions (Penn Shoulder Score: 77 ± 11) and 14 matched healthy controls (Penn Shoulder Score: 99 ± 27) ($p < 0.001$). Participants underwent baseline and follow up testing at three weeks including surface electromyography (EMG) of the serratus anterior, upper, and lower trapezius of the involved (painful group) or matched shoulder (control group) during an elevation task and maximal isometric shoulder strength testing. All participants were instructed in a PHA exercise to be performed daily (3 sets; 10 reps). Subjects logged daily exercise adherence. Neuromuscular adaptations were defined by changes in EMG amplitudes (normalized to MVIC) of serratus anterior, upper trapezius, and lower trapezius and strength. Secondary outcomes of self-reported pain and function were also compared between groups following the three-week intervention. After three weeks of a daily PHA exercise, the painful group demonstrated a greater decrease in baseline-elevated EMG amplitudes in the lower trapezius by 7% (95%CI 2.6-11%) during the concentric phase of the overhead lifting task ($p=0.006$). EMG amplitudes of the healthy control group did not change at three-week follow-up. Additionally, the change in serratus anterior mean EMG amplitude in the painful group -1.6% (IQR -22.9 to 0.8%) was significantly greater ($p=0.033$) than the healthy group change score, 2.5% (IQR -2.3 to 5.7%) during the eccentric phase ($p=0.034$). While the painful group was weaker in abduction and flexion at baseline and follow up, both groups had a significant increase in all strength measures ($p \leq 0.014$). Concurrent with increased strength and normalizing EMG amplitudes, the painful group significantly improved on the Penn Shoulder Score with a mean change 9.8 points (95%CI=7.0, 12.6) ($p < 0.001$).

In this pilot case-control study, a single home exercise performed daily for three weeks demonstrated neuromuscular adaptations with improvements in muscle activity and strength. These were concurrent with modest, yet significant improvements pain and function in individuals with mild rotator cuff related shoulder pain.

Vit D and revision rate

Perioperative Serum 25-Hydroxyvitamin D Levels Affect Revision Surgery Rates After Arthroscopic Rotator Cuff Repair

Jourdan M. Cancienne, M.D. Stephen F. Brockmeier, M.D. Michelle E. Kew, M.D. ,
Brian C. Werner, M.D.

DOI: <https://doi.org/10.1016/j.arthro.2018.09.032>

Purpose

To examine any association between perioperative serum 25-hydroxyvitamin D levels and failure of arthroscopic rotator cuff repair (RCR) requiring revision surgery.

Methods

Using a private-payer national insurance database, patients who underwent arthroscopic RCR with perioperative serum 25-hydroxyvitamin D levels recorded were included. Patients were stratified into groups of (1) serum 25-hydroxyvitamin D deficiency (<20 ng/mL), (2) insufficiency (20-30 ng/mL), or (3) sufficient (>30-<150 ng/mL). The primary outcome measure was ipsilateral revision rotator cuff surgery, including revision repair, debridement, or reverse shoulder arthroplasty. A multivariable logistic regression analysis was used to control for patient demographics and comorbidities during comparisons.

Results

A total of 982 patients were included in the study. The rate of revision rotator cuff surgery was significantly higher in patients in the serum 25-hydroxyvitamin D–deficient group (5.88%) compared with the serum 25-hydroxyvitamin D–sufficient control group (3.7%) (odds ratio [OR], 3.1; 95% confidence interval [CI], 1.6-5.8; $P = .007$). Patients with serum 25-hydroxyvitamin D deficiency (5.88%) also had a significantly higher incidence of revision surgery compared with patients with serum 25-hydroxyvitamin D insufficiency (OR, 2.4; 95% CI, 1.5-3.9; $P = .011$). There was no significant difference in the incidence of revision surgery in the serum 25-hydroxyvitamin D–insufficient group (4.97%) compared with the serum 25-hydroxyvitamin D–sufficient control group (3.7%) (OR, 1.4; 95% CI, 0.8-2.3; $P = .250$). The absolute risk reduction of revision surgery for 25-hydroxyvitamin D–deficient patients compared with controls was 2.2%, corresponding to a number needed to treat to avoid 1 revision surgery of 46 patients, relative risk reduction = 0.59.

Conclusions

Although the present study found a significant statistical association between serum 25-hydroxyvitamin D deficiency and insufficiency and the rate of revision rotator cuff surgery after primary arthroscopic RCR, the absolute differences of these revision rates are minimal and are accompanied with overlapping confidence intervals limiting the clinical significance of these findings.

Level of Evidence

Level III, retrospective cohort study.

28. HIP REPLACEMENTS

Activity after replacements

Arthritis Care Res (Hoboken). 2019 Feb;71(2):207-217. doi: 10.1002/acr.23604.

Participation in Regular Physical Activity After Total Knee or Hip Arthroplasty for Osteoarthritis: Prevalence, Associated Factors, and Type.

Naylor JM¹, Pocovi N², Descallar J¹, Mills KA².

OBJECTIVE:

To describe the rates of participation in regular physical activity presurgery and at 3 years follow-up after knee or hip arthroplasty, and to describe factors associated with participation postsurgery and types of activity undertaken.

METHODS:

A previously acquired multicenter, prospective cohort of knee or hip arthroplasty recipients was followed up for 3 years postsurgery. Regular participation in physical activity was defined as participation in physical activity ≥ 1 time/week, excluding incidental activities. Participants were interviewed about current participation as well as participation in the year presurgery. Joint-specific and health-related quality-of-life scores and information on experience of major complications were obtained. Information about comorbidity and body weight were updated. Factors associated with 3-year physical activity participation were determined using multivariable logistic regression modeling.

RESULTS:

In total, 73.4% of the eligible cohort (1,289 of 1,757) were followed up (718 patients with total knee arthroplasty, and 571 patients with total hip arthroplasty). Participation profiles were similar regardless of the joint replaced. Participation in physical activity increased postsurgery in the combined cohort (from 45.2% to 63.5%; $P < 0.001$). Participation at 3 years was associated with participation presurgery ($P < 0.0001$), better 3-year quality of life ($P < 0.001$), younger age ($P = 0.002$), better 3-year joint scores ($P = 0.01$), >1 lifetime arthroplasty ($P = 0.02$), and higher education level ($P = 0.04$). Low-impact and nonambulatory activities significantly increased postsurgery with no change in high-impact activities.

CONCLUSION:

Participation rates increased postsurgery when recovery was stable, but approximately one-third of arthroplasty recipients did not engage in physical activity at least once per week. Because participation is associated with habitual activity presurgery, a potential role for behavior change interventions is suggested. The increase in nonambulatory activities indicates that current devices measuring ambulatory activity alone are inadequate for capturing physical activity.

29. HIP OA**Hip pain****Non-Operative Management of Individuals with Non-Arthritic Hip Pain: A Literature Review**

Authors: McGovern RP, Martin RL, Kivlan BR, Christoforetti JJ

Non-arthritic hip pain is defined as being related to pathologies of the intra-articular structures of the hip that can be symptomatic. A trial of non-operative management is commonly recommended before consideration of surgery for individuals with non-arthritic hip conditions. There is a need to describe a non-operative or conservative treatment plan for individuals with non-arthritic hip pain.

The purpose of this literature review was to systematically examine the literature in order to identify and provide evidence for non-operative or conservative management of individuals with non-arthritic hip pain. A proposed home exercise program is provided for individuals with non-arthritic hip pain. A literature search of PubMed, Medline, SPORTSDiscus, and CINAHL was conducted. Keywords included: "hip" AND "femoroacetabular impingement" OR "labral tear." Studies were included if they described non-operative management for individuals with non-arthritic hip pain. Studies were excluded if they recommended a trial of conservative treatment without specific management or interventions and/or activity modification without specific details for intervention. A total of 49 studies met the eligibility criteria and were included in the review. Rehabilitation recommendations were identified from manuscripts including clinical trials, case series, discussion articles, or systematic reviews related to the non-operative or conservative management of non-arthritic hip pain.

Rehabilitation interventions focused on patient education, activity modification, limitation of aggravating factors, an individualized physical therapy protocol, and use of a home exercise program. Rehabilitation should address biomechanical deficiencies with neuromuscular training of the hip and lumbopelvic regions. While the current literature on non-operative management is limited, future randomized control trials will establish the effectiveness of specific physical therapy protocols for individuals with non-arthritic hip pain.

31. KNEE

Knee hypermobility

Int J Rheum Dis. 2017 Oct 27. doi: 10.1111/1756-185X.13205.

Generalised joint hypermobility and knee joint hypermobility: prevalence, knee joint symptoms and health-related quality of life in a Danish adult population.

Junge T^{1,2}, Henriksen P^{1,2}, Hansen S¹, Østengaard L¹, Golightly YM^{3,4,5,6}, Juul-Kristensen B¹.

AIM:

Several biomechanical factors, such as knee joint hypermobility (KJH), are suggested to play a role in the etiology of knee joint symptoms and knee osteoarthritis. Nevertheless, the prevalence or consequences of KJH solely or included in the classification of generalized joint hypermobility (GJHk) is unknown for a general population. Therefore, the objectives were to report the prevalence of self-reported GJHk and KJH, as well as the association of these conditions to knee joint symptoms, severity and duration of symptoms, and health-related quality of life (HRQoL) in a Danish adult population.

METHOD:

This study is a cross-sectional population-based survey of 2056 Danish adults. Respondents received online questionnaires of GJHk and KJH, knee joint symptoms, the severity and duration of these, as well as HRQoL.

RESULTS:

Total response rate was 49% (n = 1006). The prevalence of self-reported GJHk and KJH was 13% and 23%, mostly representing women. More than half of the respondents with GJHk and KJH had knee joint symptoms. The odds for reporting knee joint symptoms, severity of knee joint symptoms and duration of knee joint symptoms were twice as high for respondents with GJHk and KJH. Respondents with GJHk and KJH reported lower HRQoL.

CONCLUSION:

GJHk and KJH were frequently reported in the Danish adult population, mostly in women. Respondents with GJHk and KJH were two times more likely to report knee joint-related symptoms such as pain, reduced performance of usual activity and lower HRQoL. The impact of these conditions on HRQoL is comparable with knee osteoarthritis.

32 A. KNEE/ACL**Lever sign****Diagnostic Accuracy Of The Lever Sign In Detecting Anterior Cruciate Ligament Tears: A Systematic Review and Meta-Analysis**

Authors: Abruscato K, Browning K, Deleandro D, Menard Q, Wilhelm M, Hassan A

The anterior cruciate ligament (ACL) is one of the most commonly injured ligaments in the knee.

With the prevalence of ACL tears increasing, there is a growing need for clinical tests to rule in and rule out a suspected tear. A new clinical test for detecting ACL tears has been introduced with preliminary studies showing promising results.

The purpose was to systematically review and analyze information from the current literature on the diagnostic accuracy of the Lever Sign Test for the use of diagnosing anterior cruciate ligament (ACL) injuries in a clinical setting. A computerized search of PubMed, Cinahl, Scopus, and Proquest databases as well as a hand-search was completed on all available literature using keywords relating to the diagnostic accuracy of the Lever Sign Test.

A quality assessment was performed on each article included in this review utilizing the Quality Assessment of Diagnostic Accuracy Studies (QUADAS). Eight articles were included, with only three studies exhibiting high quality, however the study samples were heterogenous. Included studies indicated that the Lever Sign test is both sensitive and specific in diagnosing ACL tears. Pooled sensitivity and specificity were 0.77 and 0.90, respectively.

The negative likelihood ratio is 0.22 and the positive likelihood ratio is 6.60. It can be concluded from this review that The Lever Sign test is comparable to other clinical tests used in current practice to detect an ACL rupture. The pooled data from current available literature on the Lever Sign indicate that a positive or negative test should result in a moderate shift in post-test probability. This test may be used in addition to other tests to rule in and rule out the presence of an ACL rupture.

ALL lig protocell

February 2019 Volume 35, Issue 2, Pages 302–303

Anterolateral Ligament of the Knee: Diagnosis, Indications, Technique, Outcomes

Bertrand Sonnery-Cottet, M.D. Thais Dutra Vieira, M.D. Herve Ouanezar, M.D.

DOI: <https://doi.org/10.1016/j.arthro.2018.08.019>

In the context of anterior cruciate ligament reconstruction surgery, anterolateral ligament reconstruction is now recognized as a reliable option to control rotatory instability and should be considered in the knee surgeon's modern armamentarium. By highlighting its daily practical application, this infographic presents the indications for this specific additional lateral augmentation, the anatomic and biomechanical principles that underline its rationale, and the clinical outcomes from recent large series.

In 2013, Claes et al. updated the anterolateral ligament (ALL) concept, and numerous subsequent studies detailed its precise anatomy. It is now accepted that the femoral insertion is located proximal and posterior to the epicondyle. The biomechanical behavior of the ALL during the knee flexion path has been reported to provide control of tibial internal rotation during the pivot shift and with increasing knee flexion angles (>35). Clinically, when a patient presents with an anterior cruciate ligament (ACL) injury, clinical examination (pivot shift test), radiography (Segond fracture), ultrasound, and 3-dimensional magnetic resonance imaging are useful to assess a combined ALL injury.

The following indications for ALL reconstruction are now well established: ACL revision, high-grade pivot shift test, chronic ACL rupture, young patients, pivoting activities, and patients undergoing medial meniscus repair. It has been reported that anatomic and minimally invasive surgical techniques that control anterolateral rotatory instability can achieve successful outcomes without specific complications. Finally, the addition of ALL reconstruction does not delay postoperative rehabilitation, and no modification is required for an early rehabilitation protocol.

ACL outcomes

Combined Anterior Cruciate and Anterolateral Ligament Reconstruction in the Professional Athlete: Clinical Outcomes From the SANTI Group in a Series of 70 Patients With a Minimum Follow-Up of 2 Years

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DOI: <https://doi.org/10.1016/j.arthro.2018.09.020>

Purpose

To evaluate clinical outcomes in professional athletes after combined anterior cruciate ligament (ACL) and anterolateral ligament (ALL) reconstruction at a minimum follow-up of 2 years.

Methods

A retrospective analysis of prospectively collected data from the SANTI Study Group database was performed. All professional athletes who underwent primary combined ACL and ALL reconstruction between January 2011 and March 2016 were included. Patient assessment included physical examination, pre- and postoperative subjective and objective International Knee Documentation Committee (IKDC), Tegner activity scale, and Lysholm scores.

Results

Seventy-two professional athletes underwent primary ACL and ALL reconstruction; 70 (97%) were available, with a mean follow-up of 3.9 years (range, 2-7). The preoperative side-to-side anteroposterior laxity difference was 7.1 ± 1.4 mm, and this decreased significantly after surgery to 0.4 ± 0.9 mm ($P < .0001$). Pivot-shift grade evolved from 16 grade I (22.8%) and 54 grade II or III (77.2%) preoperatively, to 66 absent pivot shift (94.3%) and 4 grade I (5.7%; $P < .001$). By 1-year postoperatively, 60 athletes (85.7%) returned to professional sport, with a mean time interval of 7.9 months (range, 5-12). Preoperatively, the mean subjective IKDC was 56.1 ± 12.3 , the Lysholm score was 48.4 ± 12.5 , and the Tegner score was 9.3 ± 1 . At final follow-up, the mean subjective IKDC was 90.5 ± 7.6 ($P < .0001$), the Lysholm score was 94.4 ± 7.5 ($P < .0001$), and the Tegner score was 8.8 ± 1.5 ($P < .004$). The objective IKDC evolved from 39 grade C (55.7%) and 31 grade D (44.3%) preoperatively to 65 grade A (92.9%) and 5 grade B (7.1%) ($P < .0001$). Eleven Patients (15.7%) underwent a subsequent ipsilateral reoperation including 4 (5.7%) revision ACL reconstructions. The risk of graft rupture was significantly higher in female patients (13.6% vs 2.1% in male patients; $P = .048$).

Conclusions

Combined ACL and ALL reconstruction is associated with excellent outcomes in professional athletes with respect to graft rupture rates, return to sport, knee stability, and reoperation rates after injury.

Level of Evidence Level IV, case series.

33. MENISCUS

Meniscal mobilization

The Effects of Posterior Tibial Mobilization on Meniscal Movement: An In-Situ Investigation

Authors: Lilly S, Seeber GH, Smith MP, McGaugh JM, James CR, Brismee JM, Sizer PS

Anterior knee pain during knee extension may be related to a meniscal movement restriction and increased meniscal load during function.

One method of treatment for hypomobility involves the use of manual posterior mobilization of the tibia to specifically target the meniscotibial interface of the knee joint.

The purpose of this study was to measure motion at a cadaveric medial meniscus anterior horn during a posterior tibial mobilization. Eight unembalmed cadaveric knee specimens were mounted in a custom apparatus and markers were placed in the medial meniscus, tibia and femur. The tibia was posteriorly mobilized in two randomized knee positions (0 degrees and 25 degrees) using three randomly assigned loads (44.48N, 88.96N, and 177.93N). Markers were photographed and digitally measured and analyzed. All load x position conditions produced anterior displacement of the meniscus on the tibia, where the displacement was significant [$t(7) = -3.299$; $p = 0.013$] at 0 degrees loaded with 177.93N (mean 0.41 ± 0.35 mm). The results of 2(position) x 3(load) repeated measures ANOVA for meniscotibial displacement produced no significant main effects for load [$F(2,14) = 2.542$; $p = .114$] or position [$F(1,7) = 0.324$, $p = .587$]. All load x position conditions produced significant posterior tibial and meniscal displacement on the femur. The 2(position) x 3(load) repeated measures ANOVA revealed a significant main effect for load for both femoral marker displacement relative to the tibial axis [$F(2,14) = 77.994$; $p < .001$] and meniscal marker displacement relative to the femoral marker [$F(2,14) = 83.620$; $p < .001$].

The use of a mobilization technique to target the meniscotibial interface appears to move the meniscus anteriorly on the tibia. It appears that this technique may be most effective at the end range position.

Tears repair information**One-Third of Meniscal Tears Are Repairable: An Epidemiological Study Evaluating Meniscal Tear Patterns in Stable and Unstable Knees**

Alejandro Espejo-Reina, M.D., M.Sc. José Aguilera, Sc.D. aría Josefa Espejo-Reina, M.D. , María Pilar Espejo-Reina, M.D., M.Sc. Alejandro Espejo-Baena, M.D.

DOI: <https://doi.org/10.1016/j.arthro.2018.08.051>

Purpose

To analyze, in a long series of patients with knee injuries, the meniscal tear patterns in both stable and unstable knees to ascertain the exact proportion of such injuries that could have been repaired.

Methods

A descriptive cross-sectional study was undertaken by reviewing the clinical reports of arthroscopic knee operations carried out in 1 hospital. A total of 2,066 consecutive patients were included in the study. An analysis of clinical and anatomical data of knee lesions, including the shape of the meniscal tears and the surrounding injuries, was performed.

Results

Out of all meniscal tears, 34.9% were found to be repairable, a figure that rose to 55.6% in those tears accompanied by anterior cruciate ligament injuries; 37% of meniscal tears in male patients were repairable, and 28% in their female counterparts; 38.2% of medial meniscal tears were repairable and 30.6% in their lateral counterparts. The most frequently encountered injury was the complex tear (46.9%).

Conclusions

Our study concludes that, according to current standard indications, 34.9% of all meniscal injuries offer the potential for repair. Where the injury is also accompanied by anterior cruciate ligament damage, the proportion of repairable tears rises to 55.6%. This information should increase the interest for meniscal preservation in the future.

Level of Evidence Level IV, case series.

34. PATELLA

PF pain and OA

Comparison of Patella Alignment and Cartilage Biomarkers in Young Adult Females with and Without Patellofemoral Pain: A Pilot Study

Authors: Bolgla LA, Gordon R, Sloan G, Pretlow LG, Lyon M, Fulzele S

Evidence suggests that individuals with patellofemoral pain (PFP) may develop patellofemoral joint osteoarthritis (PFJOA). Limited data exist regarding an absolute association between PFP and PFJOA. Understanding this relationship will support the need for early interventions to manage PFP.

This study was conducted to determine if females with PFP have a patella position and cartilage biomarkers similar to individuals with PFJOA. It was hypothesized that females with PFP and excessive patella lateralization would have higher cartilage biomarker levels than controls. It also was hypothesized that a significant association would exist between pain and cartilage biomarker levels in subjects with excessive patella lateralization. Pain was assessed using a 10-cm visual analog scale (VAS) for activity pain over the previous week. Patella offset position (RAB angle) was measured using diagnostic ultrasound. Urine was collected and cartilage biomarkers quantified by analyzing C-telopeptide fragments of type II collagen (uCTX-II). Independent t-tests were used to determine between-group differences for RAB angle and uCTX-II. Bivariate correlations were used to determine associations between VAS and uCTX-II for females with PFP. Subjects (age range 20 to 30 years) had similar RAB angles ($p = 0.21$) and uCTX-II ($p = 0.91$). A significant association only existed between VAS scores and uCTX-II for females with PFP who had a RAB angle $> 13^\circ$ ($r = 0.86$; $p = 0.003$). Comparison of uCTX-II in the 25-to-30-year-old females with PFP and excessive patella lateralization in the current study to published normative data showed that this cohort had elevated biomarkers.

These findings support that a certain cohort of individuals with PFP have features similar to individuals with confirmed PFJOA (patella lateralization and elevated biomarkers). Additional studies are needed to determine if interventions can reverse not only pain but biomarker levels.

35. KNEE/TOTAL**Carbo restrictions help****Perioperative Dietary Restriction of Carbohydrates in the Management of Blood Glucose Levels in Patients Undergoing Total Knee Replacement**

Hannah Ferrera, B.A. Wolfgang Fitz, M.D.

DOI: <https://doi.org/10.1016/j.arth.2019.01.049>

Background

Approximately 75% of the US population over 65 years has prediabetes or diabetes. Despite current evidence for the efficacy of carbohydrate restriction in managing blood glucose, this practice has not been implemented as part of routine perioperative blood sugar management. We hypothesize that a carbohydrate reduced hospital diet (CRD) of 135 grams per day may improve blood sugar levels following total knee arthroplasty (TKA) compared to a non-carbohydrate reduced hospital diet (NCRD).

Methods

We randomized non-insulin dependent prediabetic and diabetic patients undergoing TKA to either a NCRD or a CRD. 64 patients were enrolled in the study and two were excluded, leading to 62 patients in the final analysis. The NCRD group included 14 females (47%) and 16 males (53%), with mean age 68.5 years (± 6.3 years). The CRD group included 16 females (50%) and 16 males (50%), with mean age 68.0 years (± 8.0 years). For HbA_{1c}, the NCRD group had mean 5.8% ($\pm 0.6\%$) and the CRD group had mean 5.7% ($\pm 0.8\%$). For BMI, the NCRD group had mean 29.3 kg/m² (± 6.3 kg/m²) and the CRD group 32.7 kg/m² (± 5.0 kg/m²). The primary outcome measure was mean blood glucose.

Results

Mean blood sugar values during hospital stay were significantly lower in the CRD group with 121.5 mg/dL (± 17.1 mg/dL) compared to the NCRD group 141.2 mg/dL (± 31.3 mg/dL), $p=0.0031$.

Conclusions

Blood sugar levels after surgery can be significantly reduced with a CRD. Further research is necessary to study the effect of reduced blood sugar levels on complications and infection rates following TKA surgery.

51. CFS/BET

No identified risk with sterilization

Seven-year outcomes after hysteroscopic and laparoscopic sterilizations

Obstetrics and Gynecology

Mao J, et al. | January 28, 2019

Via this observational cohort study of women undergoing hysteroscopic and laparoscopic sterilizations in outpatient and ambulatory surgical settings in New York State, researchers evaluated 7-year outcomes after hysteroscopic and laparoscopic sterilizations, including subsequent tubal interventions and hysterectomies.

They identified 10,143 and 53,206 women who underwent interval hysteroscopic and laparoscopic sterilizations, respectively. Findings revealed hysteroscopic sterilization to be associated with an increased risk of additional tubal intervention within 7 years when compared with laparoscopic sterilization.

The most pronounced difference was noted during the first year after the procedures. During the study period, they identified no increased risk of hysterectomy or any cancer after hysteroscopic sterilization despite a limited follow-up time.

Adolescent back pack weight**Prevalence of low Back pain among adolescents in relation to the weight of school bags**

Fatemah Akbar, Muneera AlBesharah, Jumana Al-Baghli, Farah Bulbul, Dana Mohammad, Bann Qadoura and Abdullah Al-Taiar

BMC Musculoskeletal Disorders 2019 **20**:37

<https://doi.org/10.1186/s12891-019-2398-2>

Background

The association between the weight of school bag and Low Back Pain (LBP) amongst students remains under intense debate worldwide. This study aimed to estimate the prevalence of LBP amongst public high school students (14 to 19 years) in Kuwait and to investigate the association between LBP and the weight of school bags.

Methods

An analytical cross-sectional study using multistage cluster random sampling with probability proportional to size was conducted on a total of 950 public high school students from all governorates. Data on LBP were collected through face-to-face interviews using a structured questionnaire. A 0–10 Numeric Pain Rating Scale was used to rate the intensity of LBP. The students' height and weight in addition to the weight of their school bags were measured using appropriate weight and height scales. Logistic regression was used to investigate the association between the weight of school bags and LBP while adjusting for potential confounders.

Results

The estimated lifetime, 6-month, and 1-month prevalence of LBP were 70.3% (95% CI: 67.30–73.21%), 49.1% (95% CI: 45.83–52.28%), and 30.8% (95% CI: 27.81–33.78%) respectively, with significantly higher prevalence amongst females compared to males ($p < 0.001$). The absolute weight of school bag was not significantly associated with LBP neither in univariable nor multivariable analysis. The relative weight of school bag (as a percentage of the body weight) was significantly associated with LBP in univariable analysis but not in multivariable analysis. The perceived heaviness of school bag, however, was found to be significantly associated with LBP throughout the analysis ($p < 0.001$).

Conclusion

In conclusion, LBP amongst high school students in Kuwait seems to be very common with a prevalence resembling that of high-income countries. Our data suggest that the perceived heaviness of school bag is far more important than the actual bag weight. Current recommendations about the weight of school bags, which are not supported by evidence, should be revised to take into account the students' perceived heaviness of school bag.

54. POSTURE

Landing lumbar posture in gymnast

Investigation of Optimal Lumbar Spine Posture during a Simulated Landing Task in Elite Gymnasts

Authors: Sonvico L, Spensor SM, Fawcett L, Bucke J, Heneghan NR, Rushton A

Lumbar spine range of motion (ROM) is a key component of injury prevention and normative data has not currently been determined for an elite gymnastics population.

In current clinical practice, it is commonplace to measure sagittal spinal alignment, during 'high-load, low-dynamic' control tasks, subjectively, while also only considering the lumbar spine as a single segment. The purpose of this study was to develop normative data for total lumbar spine ROM and ROM during a simulated landing task (SLT) in an elite gymnastics population, evaluating findings in the context of the existing biomechanical literature. Lumbar spine and low lumbar spine (LLS) ROM during a SLT were measured, using the Dorsa Vi: Vi Perform™ system in asymptomatic male and female elite gymnasts. Values for maximal ROM and LLS angle during the SLT were collated and descriptively analyzed. Lumbar ROM and posture was evaluated in relation to the current biomechanical literature and a proposed Conceptual Compressive Lumbar Load Distribution Model (CCLLDM). Thirty elite gymnasts (15 male, 15 female), participated. Participants were members of the British Artistic Gymnastics elite senior and junior training program and were between the ages of 16 to 30 years. Mean (SD) maximal lumbar spinal movements were 64.23° (6.34°) for flexion and 25.89° (11.14°) for extension.

During the SLT, participants performed lumbar spine flexion of 15.96° (8.80°), when considered as a single segment. When considering the lumbar spine as a two segment model the LLS position during the SLT was towards end range anterior pelvic tilt, suggesting LLS extension.

These data provide a baseline for asymptomatic lumbar spine movements in an elite gymnastics population and provides insight into upper and lower lumbar spine movement during a SLT. The data and newly developed CCLLDM provide clinicians with a potential framework to identify sporting skills that may be associated with increased spinal tissue load.

56. ATHLETICS**Pitching volume****The Relationship Between Pitching Volume and Arm Soreness in Collegiate Baseball Pitchers**

Authors: Lazu AL, Love SD, Butterfield TA, English R, Uhl TL

Excessive baseball pitch volume has been associated with increased risk of injury in adolescents. However, many collegiate athletes report non-time loss injuries over the course of the season. It is unknown how pitch volume throughout a collegiate baseball season affects arm soreness.

The primary purpose of this study was to determine the relationship between pitch volume and self-reported arm soreness. A secondary purpose was to determine the relationship between change in pitch volume and change in arm soreness over the course of the season for collegiate baseball pitchers. Seven collegiate baseball pitchers volunteered to participate in a yearlong prospective study. The seven pitchers reported daily pitch volume and level of soreness from the fall through spring collegiate baseball season during practices and games. The athletic trainer, a member of the research team, tracked athletic exposures and injuries for the entire season. Frequency counts of athletic exposures were categorized by game, practice, conditioning and injury status. Frequency counts of pitch volume was categorized by game, game bullpen, practice bullpen, flat ground, long toss and warm-up pitches. The pitch volume and soreness levels for each athlete were used to determine the relationship between these two variables using a Pearson correlation. The seven pitchers were involved with 1,256 athletic exposures and a total of 54,151 throws, averaging 7,735 throws per player for the entire season.

The pitch volume and self-reported arm soreness for the entire season revealed a correlation of $r = .72$ ($p = .004$). The relationship between change in pitch volume and change in arm soreness was $r = .635$ ($p = .001$) over the season. There was a moderate significant correlation between arm soreness and pitch volume across the whole season. This relationship was maintained when evaluating weekly changes.

Volleyball shoulder injuries**Volleyball Overhead Swing Volume and Injury Frequency Over the Course of a Season**

Authors: Wolfe H, Poole K, Tezanos AGV, English R, Uhl TL

Overuse injuries are common in volleyball; however, few studies exist that quantify the workload of a volleyball athlete in a season. The relationship between workload and shoulder injury has not been extensively studied in women's collegiate volleyball athletes.

This study aims to quantify shoulder workloads by counting overhead swings during practice and matches. The purpose of the current study is to provide a complete depiction of typical overhead swings, serves, and hits, which occur in both practices and matches. Researchers observed practice and match videos and counted overhead serves and attacks of 19 women's collegiate volleyball players for two seasons. Serves, overhead hits, and total swings (serves + hits) were the dependent variables; event (matches and practice) along with position (defensive specialists, setter, outside hitter, and middle blocker) were the independent variables. The season was divided into pre-season and season accounting in order to examine musculoskeletal injury frequency and swing volume workload. Across all positions except outside hitters twice as many total swings occurred in practices compared to matches ($p=.002$) resulting in an average of 19 (CI95 16.5, 21.5) more swings in practice than in matches.

The average number of total swings during the pre-season 47.1 (CI95 44.1, 50.1) was significantly greater than average swings per session during the competitive season 37.7 (CI95 36.4, 38.9) ($p < 0.001$) resulting in a mean difference of 9.4 (CI95 6.1, 12.7) swings. The number of athletes limited in participation or out due to a musculoskeletal injury during the pre-season (2.9%) was greater than during the season (1.1%) ($p=0.042$).

These findings indicate that women's collegiate volleyball athletes swing more during practices than in matches. The higher average number of serves in the pre-season and the greater frequency of musculoskeletal injuries requiring participation restriction or removal from participation suggest that a concordant relationship may exist between workload and injury variables.

Lumbar spine position**Investigation of Optimal Lumbar Spine Posture during a Simulated Landing Task in Elite Gymnasts**

Authors: Sonvico L, Spensor SM, Fawcett L, Bucke J, Heneghan NR, Rushton A

Lumbar spine range of motion (ROM) is a key component of injury prevention and normative data has not currently been determined for an elite gymnastics population.

In current clinical practice, it is commonplace to measure sagittal spinal alignment, during 'high-load, low-dynamic' control tasks, subjectively, while also only considering the lumbar spine as a single segment. The purpose of this study was to develop normative data for total lumbar spine ROM and ROM during a simulated landing task (SLT) in an elite gymnastics population, evaluating findings in the context of the existing biomechanical literature. Lumbar spine and low lumbar spine (LLS) ROM during a SLT were measured, using the Dorsa Vi: Vi Perform™ system in asymptomatic male and female elite gymnasts. Values for maximal ROM and LLS angle during the SLT were collated and descriptively analyzed. Lumbar ROM and posture was evaluated in relation to the current biomechanical literature and a proposed Conceptual Compressive Lumbar Load Distribution Model (CCLLDM). Thirty elite gymnasts (15 male, 15 female), participated. Participants were members of the British Artistic Gymnastics elite senior and junior training program and were between the ages of 16 to 30 years. Mean (SD) maximal lumbar spinal movements were 64.23° (6.34°) for flexion and 25.89° (11.14°) for extension.

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These data provide a baseline for asymptomatic lumbar spine movements in an elite gymnastics population and provides insight into upper and lower lumbar spine movement during a SLT. The data and newly developed CCLLDM provide clinicians with a potential framework to identify sporting skills that may be associated with increased spinal tissue load.

62 A. NUTRITION/VITAMINS**Plant based fatty acids****Associations of Monounsaturated Fatty Acids from Plant and Animal Sources with Total and Cause-Specific Mortality in Two US Prospective Cohort Studies****Marta Guasch-Ferre Geng Zong Walter C Willett Peter Zock
Anne J Wanders Frank B Hu , and Qi Sun**

<https://doi.org/10.1161/CIRCRESAHA.118.313996>

Rationale: Dietary monounsaturated fatty acids (MUFAs) can come from both plant and animal sources with divergent nutrient profiles that may potentially obscure the associations of total MUFAs with chronic diseases.

Objective: To investigate the associations of cis-MUFA intake from plant (MUFA-P) and animal (MUFA-A) sources with total and cause-specific mortality.

Methods and Results: We followed 63,412 women from the Nurses' Health Study (1990-2012) and 29,966 men from the Health Professionals Follow-Up Study (1990-2012). MUFA-Ps and MUFA-As were calculated based on data collected through validated food frequency questionnaires administered every 4-years and updated food composition databases. During 1,896,864 person-years of follow-up, 20,672 deaths occurred. Total MUFAs and MUFA-Ps were inversely associated with total mortality after adjusting for potential confounders, whereas MUFA-As were associated with higher mortality. When MUFA-Ps were modeled to iso-calorically replace other macronutrients, hazard ratios [HRs, 95% confidence intervals (95% CIs)] of total mortality were 0.84 (0.77, 0.92; P<0.001) for replacing saturated fatty acids (SFAs; 5% of energy); 0.86 (0.82, 0.91; P<0.001) for replacing refined carbohydrates (5% energy); 0.91 (0.85, 0.97; P<0.001) for replacing trans fats (2% energy), and 0.77 (0.71, 0.82; P<0.001) for replacing MUFA-As (5% energy). For iso-calorically replacing MUFA-As with MUFA-Ps, HRs (95% CIs) were 0.74 (0.64, 0.86; P<0.001) for cardiovascular mortality; 0.73 (0.65, 0.82; P<0.001) for cancer mortality, and 0.82 (0.73, 0.91; P<0.001) for mortality due to other causes.

Conclusions: Higher intake of MUFA-Ps was associated with lower total mortality, and MUFA-As intake was associated with higher mortality. Significantly lower mortality risk was observed when SFAs, refined carbohydrates, or trans fats were replaced by MUFA-Ps, but not MUFA-As. These data suggest that other constituents in animal foods, such as SFAs, may confound the associations for MUFAs when they are primarily derived from animal products. More evidence is needed to elucidate the differential associations of MUFA-Ps and MUFA-As with mortality.