

## 7. PELVIC ORGANS/WOMAN'S HEALTH

### Non-Hodgkin's lymphoma

#### **Reproductive factors, exogenous hormone use and risk of B-cell non-Hodgkin lymphoma in a cohort of women from the European Prospective Investigation into Cancer and Nutrition**

American Journal of Epidemiology — Costas L, et al. | November 30, 2018

Researchers intended to gain clarity regarding the role of hormonal factors in lymphoid neoplasms.

They used the European Prospective Investigation into Cancer and Nutrition cohort and using comprehensive data collected at baseline (1992–2000), they acquired information on reproductive factors and exogenous hormone use among 343,458 women, including 1,427 incident B-cell non-Hodgkin lymphomas (NHL) and its major subtypes identified after a mean follow-up of 14 years (through 2015). Findings revealed no statistically significant links between parity, age at first birth, breastfeeding, oral contraceptive use or ever use of postmenopausal hormone therapy and risk of B-cell NHL or its subtypes. A 51% higher risk of B-cell NHL was observed in women who had a surgical menopause vs natural menopause.

These data offer little support for the hypothesis that sex hormones play a role in lymphomagenesis.

### Vaginal progesterone prevention of preterm

#### **Vaginal progesterone, oral progesterone, 17-OHPC, cerclage and pessary for preventing preterm birth in at risk singleton pregnancies: An updated systematic review and network meta-analysis**

BJOG: An International Journal of Obstetrics and Gynaecology — Jarde A, et al. | November 30, 2018

The relative effects of different types and routes of administration of progesterone, cerclage and pessary at preventing preterm birth were determined in at-risk women overall and in specific populations.

Researchers analyzed randomized trials of progesterone, cerclage or pessary for preventing preterm birth in at-risk singleton pregnancies searching Medline, EMBASE, CINAHL, Cochrane CENTRAL, and Web of Science up to January 1st, 2018.

Outcomes support that only vaginal progesterone had consistent effectiveness for preventing preterm birth in singleton at-risk pregnancies overall and in those with a previous preterm birth.

## 8. VISCERA

### Vit D and Hashimoto's

#### **Low vitamin D levels are associated with cognitive impairment in patients with Hashimoto thyroiditis**

- Jun Xiang-yun Zhu, Hui Sun, Xiao-qin Xu, Song-ao Xu, Yuan Suo, Li-jun Cao, Qiang Zhou, Hui-jie Yu and Wei-zhong Cao

*BMC Endocrine Disorders* 2018 **18**:87  
<https://doi.org/10.1186/s12902-018-0314-7>  
Background

Cognitive impairment is commonly observed in patients with Hashimoto thyroiditis (HT). Low levels of vitamin D have been correlated with cognitive impairment in non-HT population. We examined the association of vitamin D levels with cognitive impairment in patients with HT.

#### Methods

We recruited 194 patients with HT and 200 healthy volunteers. Levels of serum 25-hydroxyvitamin D (25(OH)D) were measured using a competitive protein-binding assay. Cognitive function was assessed using Montreal Cognitive Assessment score (MoCA). Subjects with a MoCA scores < 26 are considered as having mild cognitive impairment (MCI). Multivariate analysis was performed using logistic regression models.

#### Results

Fifty-five HT patients (28.4%) were diagnosed as having MCI. Patients with MCI had significantly lower 25(OH)D levels when compared with patients without MCI ( $33.9 \pm 6.2$  vs.  $44.3 \pm 9.6$  nmol/L,  $P < 0.001$ ). Significant differences in 25(OH)D quartiles of HT patients were observed between the patients with MCI and the patients without MCI ( $P < 0.001$ ). In multivariate analyses, serum 25(OH)D levels ( $\leq 34.0$  and  $\geq 47.1$  nmol/L) were significantly associated with cognitive impairment in patients with HT (OR 6.279, 95% CI 2.673–14.834,  $P < 0.001$ ; OR 0.061, 95% CI 0.008–0.491,  $P = 0.009$ , respectively).

#### Conclusion

Our results demonstrate an important association between serum vitamin D levels and cognitive impairment in patients with HT.

**10 A. CERVICAL SPINE****Course of radiculopathies**

Eur Spine J. 2018 Nov;27(11):2710-2719. doi: 10.1007/s00586-018-5777-8. Epub 2018 Oct 16.

**Clinical course and prognostic models for the conservative management of cervical radiculopathy: a prospective cohort study.**

Sleijser-Koehorst MLS<sup>1,2</sup>, Coppeters MW<sup>1,3,4</sup>, Heymans MW<sup>5</sup>, Rooker S<sup>6</sup>, Verhagen AP<sup>7,8</sup>, Scholten-Peeters GGM<sup>9,10,11</sup>.

*PURPOSE:*

To describe the clinical course and develop prognostic models for poor recovery in patients with cervical radiculopathy who are managed conservatively.

*METHODS:*

Sixty-one consecutive adults with cervical radiculopathy who were referred for conservative management were included in a prospective cohort study, with 6- and 12-month follow-up assessments. Exclusion criteria were the presence of known serious pathology or spinal surgery in the past. Outcome measures were perceived recovery, neck pain intensity and disability level. Multiple imputation analyses were performed for missing values. Prognostic models were developed using multivariable logistic regression analyses, with bootstrapping techniques for internal validation.

*RESULTS:*

About 55% of participants reported to be recovered at 6 and 12 months. All multivariable models contained 2 baseline predictors. Longer symptoms duration increased the risk of poor perceived recovery, whereas the presence of paresthesia decreased this risk. A higher neck pain intensity and a longer duration of symptoms increased the risk of poor relief of neck pain. A higher disability score increased the risk of poor relief of disability, and larger active range of rotation toward the affected side decreased this risk. Following bootstrapping, the explained variance of the models varied between 0.22 and 0.30, and the median area under the curve varied between 0.75 and 0.79.

*CONCLUSIONS:*

The clinical course of cervical radiculopathy appears to be long, with most of the reduction in symptoms occurring within the first 6 months. All prognostic models showed an adequate predictive performance with modest diagnostic accuracy and explained variance. These slides can be retrieved under Electronic Supplementary Material.

## 16. CONCUSSIONS

### Changes as a result

#### Changes in Measures of Cervical Spine Function, Vestibulo-ocular Reflex, Dynamic Balance, and Divided Attention Following Sport-Related Concussion in Elite Youth Ice Hockey Players

**Authors:** Kathryn J. Schneider, PT, PhD<sup>1-3</sup>, Willem H. Meeuwisse, MD, PhD<sup>1</sup>, Luz Palacios-Derflingher, PhD<sup>1,4</sup>, Carolyn A. Emery, PT, PhD<sup>1-4</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2018 **Volume:**48 **Issue:**12 **Pages:**974–981 **DOI:**10.2519/jospt.2018.8258

#### Background

Concussion is a commonly occurring injury. The extent to which the cervical spine, vestibulo-ocular reflex (VOR), dynamic balance, and divided attention are affected following concussion is not well understood.

#### Objectives

To evaluate acute changes in measures of (1) cervical spine function, (2) VOR function, (3) dynamic balance, and (4) tasks of divided attention in elite youth ice hockey players following a sport-related concussion.

#### Methods

In this prospective cohort study, elite 13- to 17-year-old ice hockey players completed cervical spine measures (cervical flexor endurance test, head perturbation test, anterolateral strength, cervical flexion rotation test, joint position error), VOR function tests (head thrust test, dynamic visual acuity [clinical and computerized]), dynamic balance tests (Functional Gait Assessment), and divided-attention tasks (walking-while-talking test) both in the preseason and following concussion.

#### Results

At least 1 test was completed by 69 of 97 (71%) players (a maximum of 55 for any 1 test) at both preseason and immediately following concussion (median, 4 days post concussion). After Bonferroni corrections ( $\alpha = .00625$ ), using Wilcoxon signed-rank tests, cervical spine measures were significantly worse following concussion compared to baseline (cervical flexor endurance test:  $z = -5.20$ ,  $P < .001$ ; anterolateral neck strength:  $z_{\text{left}} = -5.36$ ,  $P < .001$  and  $z_{\text{right}} = -5.45$ ,  $P < .001$ ; and head perturbation test:  $z = -4.36$ ,  $P < .001$ ). Time taken to complete a complex task of divided attention relative to normal walking speed was faster (improved) compared to the preseason ( $z = -2.59$ ,  $P < .01$ ). There was no change in VOR or dynamic balance following concussion.

#### Conclusion

Measures of cervical spine function and divided attention were altered following concussion. However, tests of VOR and dynamic balance were not significantly different from baseline. Future research to evaluate the mechanism underlying these changes is warranted. *J Orthop Sports Phys Ther* 2018;48(12):974–981. Epub 27 Jul 2018. doi:10.2519/jospt.2018.8258

## 27. HIP

## Exercise helps hip tendinopathy

Br J Sports Med. 2018 Nov;52(22):1464-1472. doi: 10.1136/bjsports-2018-k1662rep.

**Education plus exercise versus corticosteroid injection use versus a wait and see approach on global outcome and pain from gluteal tendinopathy: prospective, single blinded, randomised clinical trial.**

Mellor R<sup>1</sup>, Bennell K<sup>2</sup>, Grimaldi A<sup>3</sup>, Nicolson P<sup>2</sup>, Kasza J<sup>4</sup>, Hodges P<sup>5</sup>, Wajswelner H<sup>6</sup>, Vicenzino B<sup>1</sup>.

**OBJECTIVE:** To compare the effects of a programme of load management education plus exercise, corticosteroid injection use, and no treatment on pain and global improvement in individuals with gluteal tendinopathy.

**DESIGN:** Prospective, three arm, single blinded, randomised clinical trial.

**SETTING:** Brisbane and Melbourne, Australia.

**PARTICIPANTS:** Individuals aged 35-70 years, with lateral hip pain for more than 3 months, at least 4/10 on the pain numerical rating scale, and gluteal tendinopathy confirmed by clinical diagnosis and MRI; and with no corticosteroid injection use in previous 12 months, current physiotherapy, total hip replacement, or neurological conditions.

**INTERVENTIONS:** A physiotherapy led education and exercise programme of 14 sessions over 8 weeks (EDX; n=69), one corticosteroid injection (CSI; n=66), and a wait and see approach (WS; n=69).

**MAIN OUTCOMES:** Primary outcomes were patient reported global rating of change in hip condition (on an 11 point scale, dichotomised to success and non-success) and pain intensity in the past week (0=no pain, 10=worst pain) at 8 weeks, with longer term follow-up at 52 weeks.

**RESULTS:** Of 204 randomised participants (including 167 women; mean age 54.8 years (SD 8.8)), 189 (92.6%) completed 52 week follow-up. Success on the global rating of change was reported at 8 weeks by 51/66 EDX, 38/65 CSI, and 20/68 WS participants. EDX and CSI had better global improvement scores than WS (risk difference 49.1% (95% CI 34.6% to 63.5%), number needed to treat 2.0 (95% CI 1.6 to 2.9); 29.2% (13.2% to 45.2%), 3.4 (2.2 to 7.6); respectively). EDX had better global improvement scores than CSI (19.9% (4.7% to 35.0%); 5.0 (2.9 to 21.1)). At 8 weeks, reported pain on the numerical rating scale was mean score 1.5 (SD 1.5) for EDX, 2.7 (2.4) for CSI, and 3.8 (2.0) for WS. EDX and CSI participants reported less pain than WS (mean difference -2.2 (95% CI -2.89 to -1.54); -1.2 (-1.85 to -0.50); respectively), and EDX participants reported less pain than CSI (-1.04 (-1.72 to -0.37)). Success on the global rating of change was reported at 52 weeks by 51/65 EDX, 36/63 CSI, and 31/60 WS participants; EDX was better than CSI (20.4% (4.9% to 35.9%); 4.9 (2.8 to 20.6)) and WS (26.8% (11.3% to 42.3%); 3.7 (2.4 to 8.8)). Reported pain at 52 weeks was 2.1 (2.2) for EDX, 2.3 (1.9) for CSI, and 3.2 (2.6) for WS; EDX did not differ from CSI (-0.26 (-1.06 to 0.55)), but both treatments did better than WS (1.13 (-1.93 to -0.33); 0.87 (-1.68 to -0.07); respectively).

**CONCLUSIONS:** For gluteal tendinopathy, education plus exercise and corticosteroid injection use resulted in higher rates of patient reported global improvement and lower pain intensity than no treatment at eight weeks. Education plus exercise performed better than corticosteroid injection use. At 52 week follow-up, education plus exercise led to better global improvement than corticosteroid injection use, but no difference in pain intensity. These results support EDX as an effective management approach for gluteal tendinopathy.

**30 A. IMPINGEMENT**

Am J Sports Med. 2018 Nov 6:363546518804805. doi: 10.1177/0363546518804805.

**Nonoperative Management of Femoroacetabular Impingement: A Prospective Study.**

Pennock AT<sup>1,2,3</sup>, Bomar JD<sup>1</sup>, Johnson KP<sup>1,2</sup>, Randich K<sup>1,2</sup>, Upasani VV<sup>1,3</sup>.

**BACKGROUND::**

The literature has given little attention to the nonoperative management of femoroacetabular impingement (FAI) syndrome despite a rapidly expanding body of research on the topic.

**PURPOSE::**

To perform a prospective study utilizing a nonoperative protocol on a consecutive series of patients presenting to our clinic with FAI syndrome.

**STUDY DESIGN::**

Cohort study; Level of evidence, 2.

**METHODS::**

Between 2013 and 2016, patients meeting the following criteria were prospectively recruited in a nonoperative FAI study: no prior hip surgery, groin-based pain, a positive impingement test, and radiographic FAI syndrome. The protocol consisted of an initial trial of rest, physical therapy, and activity modification. Patients who remained symptomatic were then offered an image-guided intra-articular steroid injection. Patients with recurrent symptoms were then offered arthroscopic treatment. Outcome scores were collected at 12 and 24 months. Statistical analysis was performed to identify risk factors for the need for operative treatment and to determine patient outcomes based on FAI type and treatment.

**RESULTS::**

Ninety-three hips (n = 76 patients: mean age, 15.3 years; range, 10.4-21.4 years) were included in this study and followed for a mean  $\pm$  SD 26.8  $\pm$  8.3 months. Sixty-five hips (70%) were managed with physical therapy, rest, and activity modification alone. Eleven hips (12%) required a steroid injection but did not progress to surgery. Seventeen hips (18%) required arthroscopic management. All 3 groups saw similar improvements in modified Harris Hip Score (P = .961) and nonarthritic hip score (P = .975) with mean improvements of 20.3  $\pm$  16.8 and 13.2  $\pm$  15.5, respectively. Hips with cam impingement and combined cam-pincer impingement were 4.0 times more likely to meet the minimal clinically important difference in modified Harris Hip Score (P = .004) and 4.4 times more likely to receive surgical intervention (P = .05) than patients with pincer deformities alone. Participants in team sports were 3.0 times more likely than individual sport athletes to return to competitive activities (P = .045).

**CONCLUSION::**

A majority (82%) of adolescent patients presenting with FAI syndrome can be managed nonoperatively, with significant improvements in outcome scores at a mean follow-up of 2 years.

**CLINICAL RELEVANCE::**

A nonoperative approach should be the first-line treatment for young active patients with symptomatic FAI syndrome.

**32 A. KNEE/ACL****Alterations in running mechanics****Bilateral Alterations in Running Mechanics and Quadriceps Function Following Unilateral Anterior Cruciate Ligament Reconstruction**

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**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2018 **Volume:**48 **Issue:**12 **Pages:**960–967 **DOI:**10.2519/jospt.2018.8170

**Background**

Following anterior cruciate ligament reconstruction (ACLR), individuals have quadriceps muscle impairments that influence gait mechanics and may contribute to an elevated risk of knee osteoarthritis.

**Objectives**

To compare running mechanics and quadriceps function between individuals who have undergone ACLR and those in a control group, and to evaluate the association between quadriceps function and running mechanics.

**Methods**

In this controlled, cross-sectional laboratory study, 38 individuals who previously underwent primary unilateral ACLR (mean  $\pm$  SD time since reconstruction, 48.0  $\pm$  25.0 months) were matched to 38 control participants based on age, sex, and body mass index, and underwent assessments of quadriceps muscle performance and running biomechanics. Quadriceps muscle performance was assessed via isokinetic and isometric knee extension peak torque and rate of torque development (RTD) over 2 time frames: 0 to 100 milliseconds (RTD100) and 0 to 200 milliseconds (RTD200). Running evaluation included assessment of the knee flexion angle (KFA), knee extension moment (KEM), rate of knee extension moment (RKEM), vertical instantaneous loading rate, and vertical impact peak.

**Results**

On average, there was a smaller KFA ( $P = .016$ ) in the involved limb compared to the uninvolved limb in the ACLR group. Compared to limbs in the control group, involved limbs in the ACLR group had lower RTD100 ( $P = .015$ ), lower peak torque at 60°/s ( $P = .007$ ), lower peak torque at 180°/s ( $P = .016$ ), smaller KFA ( $P < .001$ ), lower KEM ( $P = .001$ ), lower RKEM ( $P = .004$ ), and higher vertical instantaneous loading rate ( $P = .016$ ). Compared to limbs in the control group, uninvolved limbs in the ACLR group had lower RTD100 ( $P = .003$ ), lower peak torque at 60°/s ( $P = .017$ ), and smaller KFA ( $P = .01$ ). For the involved limbs in the ACLR group, there was a low correlation between isokinetic peak torque at 180°/s and RKEM ( $r = 0.38$ ,  $P = .01$ ), and a negligible correlation between RTD100 and RKEM ( $r = 0.26$ ,  $P < .05$ ). No differences were found in isometric strength for any comparison.

**Conclusion**

Individuals who have undergone ACLR have bilateral alterations in running mechanics that are weakly associated with diminished quadriceps muscle performance. *J Orthop Sports Phys Ther* 2018;48(12):960–967. Epub 22 Jul 2018. doi:10.2519/jospt.2018.8170

## Return to sports

**Perceptions of Rehabilitation and Return to Sport Among High School Athletes With Anterior Cruciate Ligament Reconstruction: A Qualitative Research Study**

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**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2018 **Volume:**48 **Issue:**12 **Pages:**951–959 **DOI:**10.2519/jospt.2018.8277

**Background**

Adolescent athletes struggle to return to sport following anterior cruciate ligament reconstruction (ACLR) for physical and psychosocial reasons. The ability to integrate contextual evidence obtained directly from patients with the growing body of quantitative rehabilitation research may aid clinicians in taking an evidence-based approach to rehabilitation and return to sport within the adolescent population.

**Objectives**

To assess perceived barriers to return to sport, as well as positive and negative factors influencing recovery, among high school athletes with recent history of ACLR.

**Methods**

This phenomenographic cross-sectional study included a sample of 10 high school-aged individuals (7 female, 3 male; mean  $\pm$  SD age, 16.8  $\pm$  1.1 years; time since surgery, 5.5  $\pm$  1.4 months) who underwent ACLR and had not returned to sports. Participants completed a semi-structured interview focused on attitudes related to return to sport, perceived physical or psychosocial barriers to physical activity and return to sport, and rehabilitation characteristics that may facilitate or hinder return to sport.

**Results**

Participants reported psychosocial barriers to return to sport with greater consistency than physical barriers. Consistently reported barriers included the feeling that sport-based activities were now associated with injury, a persistent sense of uncertainty regarding full recovery, and the sense that comparison to others with ACLR by parents or coaches hindered their ability to make progress in rehabilitation.

**Conclusion**

Early identification of athletes at risk for persistent psychosocial barriers, such as fear of reinjury and uncertainty regarding full recovery, and establishment of peer mentoring groups to facilitate psychosocial support throughout the rehabilitation process may be key components of a gradual, patient-centered approach to improving mental and physical readiness for return to sport. *J Orthop Sports Phys Ther* 2018;48(12):951–959. Epub 22 Jun 2018. doi:10.2519/jospt.2018.8277

## Non operative return to sports

*Knee Surg Sports Traumatol Arthrosc.* 2018 Nov 1. doi: 10.1007/s00167-018-5258-y.

**Nearly 90% participation in sports activity 12 years after non-surgical management for anterior cruciate ligament injury relates to physical outcome measures.**

Keays SL<sup>1,2</sup>, Newcombe P<sup>3</sup>, Keays AC<sup>4</sup>.

*PURPOSE:*

Traditionally reconstructive surgery is recommended for patients planning to return to sport (RTS), especially to pivoting sports after anterior cruciate (ACL) rupture. Recent trends focus on delaying or avoiding surgery as some studies have found similar rates of RTS following both surgical and conservative management. This study aimed to establish long-term RTS levels in ACL-ruptured individuals treated conservatively, and to investigate the relationship between outcome measures and RTS, in particular, pivoting sports.

*METHOD:*

Fifty-five patients from a cohort of 132 ACL-deficient patients were followed-up for 12 (IQR 8,19) years post injury. Mean-aged 42 years, 22 patients were females and 33 males, 35 had meniscal injuries. Patients were treated with physiotherapy focussing on strength and dynamic stability training and not reconstructive surgery. Return to sport was measured on a 6-point scale. Outcome measures included: objective stability, subjective stability, quadriceps and hamstring strength. Spearman's rho and Chi-square tests were used to assess the relationship between RTS and outcome measures.

*RESULTS:*

Eighty-nine percent of ACL-deficient patients were currently participating in sport despite a 38% increase in anterior translation ( $p < 0.001$ ) and a 7.5% loss of quadriceps strength ( $p = 0.004$ ) compared to the contralateral side. Six patients (11%) did not RTS, ten (18%) returned to safe sports, five (9%) returned to running and 16 (29%) to non-strenuous sports involving limited twisting. Eighteen patients (33%) returned to pivoting sports, 12(22%) at recreational level and six (11%) at competitive level. The level of RTS was related to subjective stability ( $p = 0.002$ ), and to quadriceps and hamstring strength of the injured leg ( $p < 0.001$ ). Patients able to return to pivoting sports differed significantly from those not doing so in outcome measures including objective ( $p = 0.022$ ) and subjective stability ( $p = 0.035$ ), and quadriceps strength ( $p = 0.044$ ).

*CONCLUSIONS:*

Eighty-nine percent of ACL-ruptured individuals treated conservatively lead an active sporting life. One-third returned to pivoting sports. Overall RTS was related to subjective and objective stability and quadriceps and to a lesser extent hamstring strength. This finding reinforced the importance of dynamic stability training as an initial treatment option in most cases.

*LEVEL OF EVIDENCE: III.*

## 35. KNEE/TOTAL

### Importance of patella location

Archives of Orthopaedic and Trauma Surgery pp 1–6|

#### **Suboptimal patellofemoral alignment is associated with poor clinical outcome scores after primary total knee arthroplasty**

- Rapeepat Narkbunnam Ali J. Electricwala James I. HuddlestonIII William J. Maloney  
Stuart B. Goodman Derek F. Amanatullah

#### **Background**

Proper patellofemoral alignment is an important goal in total knee arthroplasty (TKA). Acceptable patellar alignment is defined as patellar tilt less than or equal to 5° and patellar displacement less than or equal to 5 mm. Previous studies reported an incidence of post-operative patellar malalignment in TKA from 7 to 35%. However, correlation between patellar malalignment and clinical outcome after TKA remains unclear. The purpose of the present study was to evaluate the effect of patellar tilt and displacement on the clinical outcome of TKA.

#### **Methods**

A retrospective review of 138 primary TKAs with a minimum of 2 year follow-up is reported. Pre-operative and post-operative mechanical axis, patellar tilting angle and patellar displacement were measured. Clinical outcomes were evaluated by the knee functional scores including the Knee Society Score (KSS), Knee injury and Osteoarthritis Outcome Score (KOOS), and Western Ontario McMaster University Osteoarthritis Index (WOMAC) at final follow-up.

#### **Results**

Forty-two (30%) primary TKAs had suboptimal patellofemoral alignment with a patellar tilt angle greater than 5° or lateral patellar displacement of more than 5 mm. There was no statistical difference in pre-operative mechanical axis, pre-operative patellar tilt angle, or pre-operative lateral patellar displacement between the primary TKAs with proper patellofemoral alignment and those with suboptimal alignment. Patients with post-operative patellar tilt or displacement had clinically significant reductions in KSS, KOOS, and WOMAC when compared with patients without post-operative patellar tilt or displacement. The odds of having a fair or poor post-operative result, an odds ratio of 3.4 (95% CI 1.6–7.2) for KSS, 6.4 (95% CI 2.9–14.2) for KOOS, and 5.9 (95% CI 2.6–13.5) for WOMAC, were associated with suboptimal patellofemoral alignment.

#### **Conclusion**

Establishing proper patellofemoral alignment remains an essential goal of primary TKA. There is a strong association between suboptimal post-operative patellofemoral alignment and poor clinical outcome scores after primary TKA.

**37. OSTEOARTHRITIS/KNEE****Exercise and inflammatory biomarkers**

Arthritis Care Res (Hoboken). 2018 Oct 15. doi: 10.1002/acr.23786.

**Impact of exercise therapy on molecular biomarkers related to cartilage and inflammation in people at risk of, or with established, knee osteoarthritis: a systematic review and meta-analysis of randomized controlled trials.**

Bricca A<sup>1</sup>, Struglics A<sup>2</sup>, Larsson S<sup>2</sup>, Steultjens M<sup>3</sup>, Juhl CB<sup>1,4</sup>, Roos EM<sup>1</sup>.

**OBJECTIVE:**

To investigate the impact of exercise therapy on molecular biomarkers related to cartilage and inflammation in people at risk of, or with established, knee osteoarthritis by conducting a systematic review of randomized controlled trials (RCTs).

**METHODS:**

Literature search up to September 2017 in five major databases with no restriction on publication year or language. Data were extracted from the first available follow-up time point and we performed a narrative synthesis for the effect of exercise therapy on molecular biomarkers related to cartilage and inflammation. A subset of studies reporting sufficient data was combined in a meta-analysis, using an adjusted random effects model.

**RESULTS:**

Twelve RCTs, involving 57 study comparisons at 4 to 24 weeks following an exercise therapy intervention were included. Exercise therapy decreased molecular biomarkers in 17 (30%) study comparisons, had no effect in 36 (63%), and increased molecular biomarkers in four (7%) study comparisons. Meta-analyses of nine biomarkers showed that exercise therapy was associated with non-significant reductions of C-reactive protein, C-terminal crosslinking telopeptide of type II collagen, tumor necrosis factor alpha (TNF- $\alpha$ ), soluble TNF- $\alpha$  receptor-1 and -2, C2C neoepitope of type II collagen and cartilage oligomeric matrix protein compared to non-exercising control groups and had no effect on interleukin-6 and soluble interleukin 6 receptor.

**CONCLUSIONS:**

Exercise therapy is not harmful, as it does not increase the concentration of molecular biomarkers related to cartilage turnover and inflammation, implicated in osteoarthritis progression. The overall quality of evidence was downgraded to low because of the limited number of RCTs available. This article is protected by copyright. All rights reserved.

## Exercise and OA

Semin Arthritis Rheum. 2018 Oct 16. pii: S0049-0172(18)30421-9. doi: 10.1016/j.semarthrit.2018.10.014.

**Effects of long-term exercise therapy on knee joint structure in people with knee osteoarthritis: A systematic review and meta-analysis.**

Van Ginckel A<sup>1</sup>, Hall M<sup>2</sup>, Dobson F<sup>3</sup>, Calders P<sup>4</sup>.

**OBJECTIVE:**

To investigate effects of long-term exercise therapy for people with knee osteoarthritis (OA) on radiographic disease severity and cartilage integrity (primary outcomes) as well as severity of bone marrow lesions (BMLs), synovitis and/or effusion (secondary outcomes).

**METHODS:**

We sourced randomized controlled trials in people with clinical and/or radiographic OA investigating the effect of land-based exercise therapy of > 6 months on radiographic disease severity and magnetic resonance imaging outcomes of cartilage integrity (morphology or composition) as well as BML, synovitis and/or effusion severity, when compared to no exercise. Two independent reviewers extracted data and assessed risk of bias. Random-effects meta-analysis was used to pool standardised mean differences (SMD) (95% confidence intervals (CI)) or odds ratios (OR) (95% CI) and estimate heterogeneity ( $I^2$ , %). Quality of the pooled body of evidence was rated implementing the GRADE approach. Studies unsuitable for meta-analysis were summarized in a best-evidence synthesis.

**RESULTS:**

Meta-analysis showed moderate quality evidence of no treatment effect on tibiofemoral radiographic disease severity ((SMD) 95% (CI): 0.06 (-0.07, 0.20),  $I^2 = 0\%$ ) and low-quality evidence of no effect on tibiofemoral cartilage morphology (SMD (95%): 0.06 (-0.20, 0.36),  $I^2 = 0\%$ ). Low quality evidence revealed no treatment effect on the odds of change in synovitis ((OR) (95% CI): 0.90 (0.51, 1.60),  $I^2 = 0\%$ ) and effusion ((OR (95% CI): 0.88 (0.64, 1.20),  $I^2 = 0\%$ ), but greater odds of tibiofemoral BMLs worsening (OR (95% CI): 1.90 (1.11, 3.26),  $I^2 = 0\%$ ). In best-evidence synthesis, limited evidence was found for changes in patellar cartilage composition following exercise in women with mild knee OA compared to no exercise, but not for tibiofemoral cartilage.

**CONCLUSION:**

Long-term exercise therapy did not change tibiofemoral radiographic disease severity, cartilage morphology or synovitis/effusion, but may slightly increase the likelihood for increased BML severity. Overall, meta-analysis findings were limited in directness and precision and restricted to relatively imprecise effect estimates in people who were obese on average. Limited evidence suggested some protective effects on patellar cartilage composition.

**Central sensitization in OA**

Disabil Rehabil. 2018 Nov;40(23):2836-2845. doi: 10.1080/09638288.2017.1358770. Epub 2017 Aug 2.

**Clinical descriptors for the recognition of central sensitization pain in patients with knee osteoarthritis.**

Lluch E<sup>1,2,3</sup>, Nijs J<sup>2,3</sup>, Courtney CA<sup>4</sup>, Rebbeck T<sup>5</sup>, Wylde V<sup>6</sup>, Baert I<sup>3,7</sup>, Wideman TH<sup>8</sup>, Howells N<sup>9,10</sup>, Skou ST<sup>11,12</sup>.

**BACKGROUND:**

Despite growing awareness of the contribution of central pain mechanisms to knee osteoarthritis pain in a subgroup of patients, routine evaluation of central sensitization is yet to be incorporated into clinical practice.

**AIM:**

The objective of this perspective is to design a set of clinical descriptors for the recognition of central sensitization in patients with knee osteoarthritis that can be implemented in clinical practice.

**METHODS:**

A narrative review of original research papers was conducted by nine clinicians and researchers from seven different countries to reach agreement on clinically relevant descriptors.

**RESULTS:**

It is proposed that identification of a dominance of central sensitization pain is based on descriptors derived from the subjective assessment and the physical examination. In the former, clinicians are recommended to inquire about intensity and duration of pain and its association with structural joint changes, pain distribution, behavior of knee pain, presence of neuropathic-like or centrally mediated symptoms and responsiveness to previous treatment. The latter includes assessment of response to clinical test, mechanical hyperalgesia and allodynia, thermal hyperalgesia, hypoesthesia and reduced vibration sense.

**CONCLUSIONS:**

This article describes a set of clinically relevant descriptors that might indicate the presence of central sensitization in patients with knee osteoarthritis in clinical practice. Although based on research data, the descriptors proposed in this review require experimental testing in future studies. Implications for Rehabilitation Laboratory evaluation of central sensitization for people with knee osteoarthritis is yet to be incorporated into clinical practice. A set of clinical indicators for the recognition of central sensitization in patients with knee osteoarthritis is proposed. Although based on research data, the clinical indicators proposed require further experimental testing of psychometric properties.

**Avoiding sensitization in OA**

Arthritis Rheumatol. 2018 Oct 11. doi: 10.1002/art.40752.

**Pain Susceptibility Phenotypes in Those Free of Knee Pain with or at Risk of Knee Osteoarthritis: The Multicenter Osteoarthritis Study.**

Carlesso LC<sup>1</sup>, Segal NA<sup>2</sup>, Frey-Law L<sup>3</sup>, Zhang Y<sup>4</sup>, Lu N<sup>4</sup>, Nevitt M<sup>5</sup>, Lewis CE<sup>6</sup>, Neogi T<sup>4</sup>.

**OBJECTIVES:**

Why some individuals develop pain with knee osteoarthritis (OA) is not clear. We sought to identify pain susceptibility phenotypes (PSPs) and their relation to incident persistent knee pain (PKP) 2 years later.

**METHODS:**

We identified individuals free of PKP from the Multicenter Osteoarthritis Study, a longitudinal cohort of older adults with or at risk of knee OA. Latent class analysis was used to determine PSPs that may contribute to development of PKP apart from structural pathology: widespread pain, poor sleep, psychological factors and quantitative sensory tests (QST) (i.e., pressure pain threshold and temporal summation (TS)). We evaluated the association of sociodemographic factors with PSPs and the relation of PSPs to developing PKP over two years with logistic regression.

**RESULTS:**

852 participants were included (mean age 67; BMI 29.5 kg/m<sup>2</sup>, 55% women). Four PSPs were identified, primarily characterized by varying proportions (low/absent, moderate, or high) of the presence of pressure pain sensitivity and of facilitated TS, reflecting different measures of sensitization. The PSP with high proportion of pressure pain sensitivity + moderate proportion of facilitated TS was twice as likely to develop incident PKP over 2 years OR 2.11 (95% CI 1.06 4.22) compared with the PSP having low proportion of sensitization by both measures.

**CONCLUSIONS:**

Four PSPs were identified, of which three were predominated by QST evidence of sensitization, and one was associated with developing PKP 2 years later. Prevention or amelioration of sensitization may be a novel approach to preventing onset of persistent knee pain in OA. This article is protected by copyright. All rights reserved.

**Hip Strengthening**

J Geriatr Phys Ther. 2018 Nov 6. doi: 10.1519/JPT.0000000000000214.

**Hip Muscle Strengthening for Knee Osteoarthritis: A Systematic Review of Literature.**

Neelapala YVR<sup>1</sup>, Bhagat M<sup>1</sup>, Shah P<sup>1</sup>.

*BACKGROUND AND PURPOSE:*

Osteoarthritis (OA) of the knee joint results in chronic pain and functional decline among older adults. Hip muscle weakness has been observed in persons with knee OA and is claimed to increase the medial compartment loading on the knee joint. Although individual studies are available, no review has yet integrated the literature on the benefits of hip muscle strengthening for persons with knee OA. This review aims to systematically summarize the current evidence on the effectiveness of hip muscle strengthening on knee pain, lower extremity function, and biomechanical measures of the knee in persons with knee OA.

*METHODS:*

An extensive electronic literature search was conducted in the databases PubMed, Scopus, Cumulative Index to Nursing and Allied Health (CINAHL), Cochrane Central Register of Controlled Trials (CENTRAL), and Physiotherapy Evidence Database (PEDro) to identify the published trials in the English language from January 1990 to August 2017. Randomized controlled trials that studied the effectiveness of hip muscle strengthening in persons with knee OA on knee pain, physical function, and biomechanical measures of the knee were considered for inclusion. The key word combinations were knee osteoarthritis, degenerative arthritis, arthralgia, muscle strengthening, and resistance training using the Boolean operators AND, OR. Two reviewers independently performed the study selection, and a third reviewer intervened when the consensus was not attained. Quality assessment of the included studies was carried out using the PEDro scale.

*RESULTS AND DISCUSSION:*

The search produced 774 results, among which 81 full-text articles were studied. Five randomized controlled trials of good methodological quality, including 331 participants, were included in the review. The effectiveness of hip muscle strengthening was assessed in isolation, combination, and comparison with other lower extremity exercise. Overall, the studies reported clear benefits of hip muscle strengthening on knee pain, physical function, and hip muscle strength. However, hip muscle strengthening was ineffective in improving the biomechanical measures such as dynamic alignment and knee adduction (also known as valgus) moment.

*CONCLUSION:*

The current review identified strong, high-quality evidence to recommend hip muscle strengthening in the conservative management of persons with knee OA. Further research is needed to establish the underlying mechanisms for the clinical benefits.

**38 A. FOOT AND ANKLE****Foot exercises**

Phys Ther Sport. 2018 Nov;34:216-226. doi: 10.1016/j.ptsp.2018.10.015. Epub 2018 Oct 24.

**Effects of a therapeutic foot exercise program on injury incidence, foot functionality and biomechanics in long-distance runners: Feasibility study for a randomized controlled trial.**

Taddei UT<sup>1</sup>, Matias AB<sup>2</sup>, Ribeiro FIA<sup>3</sup>, Inoue RS<sup>4</sup>, Bus SA<sup>5</sup>, Sacco ICN<sup>6</sup>.

**BACKGROUND:**

The goal was to examine the feasibility of a randomized controlled trial (RCT) on the effect of a therapeutic foot-ankle training program to prevent injury in long-distance runners. First, we evaluated (i) the access to participants and recruitment success; (ii) participants' satisfaction and adherence to the program; (iii) the effect of the training program to improve foot muscle strength and change foot biomechanics; and, second, we used the collected data for a post hoc sample size calculation.

**METHODS/DESIGN:**

We randomized 31 healthy long-distance recreational runners to either an 8-week foot-ankle muscle strength-training program (intervention) or a stretching protocol (control). The recruitment rate was the number of eligible participants per week of recruitment; recruitment success, the ratio between scheduled baseline visits and initially eligible participants. Participant satisfaction was assessed by a questionnaire, and adherence to the training program was recorded in a Web-based software, both at the 8-week mark. Program effect was assessed by hallux and toe muscle strength using a pressure platform, foot muscle cross-sectional area using magnetic resonance imaging and foot kinematics during running using 3D gait analysis; assessments were done at baseline and after 8 and 16 weeks. A post hoc power analysis was performed on foot strength and the biomechanical data was collected.

**RESULTS:**

In two weeks of recruitment, 112 initially eligible subjects were screened, 81 of whom were deemed eligible and 31 had a baseline study visit, giving a recruitment rate of 40.5 subjects/week and recruitment success of 28%. Participants' adherence was 97%, and satisfaction scored a median >3 out of 5 on a Likert scale on all questions. The cross-sectional area of the abductor hallucis ( $P = 0.040$ ) and flexor digitorum brevis ( $P = 0.045$ ) increased significantly at 8 weeks in the intervention group. The post hoc sample sizes for almost all the strength and biomechanical parameters were below those of the 112 subjects calculated as the original sample size for clinical outcome (running-related injury).

**CONCLUSION:**

Results show that this RCT is feasible, given an accessible study population that is willing to participate and that perceives the training program as positive and adheres to the program. The training program leads to several positive outcomes on muscle strength that justifies assessing clinical outcomes in this RCT.

**40. ANKLE SPRAINS AND INSTABILITY****Return to play**

Phys Sportsmed. 2018 Oct 16:1-16. doi: 10.1080/00913847.2018.1533392.

**Factors influencing return to play following conservatively treated ankle sprain: a systematic review.**

Al Bimani SA<sup>1,2,3</sup>, Gates LS<sup>1,2</sup>, Warner M<sup>1,2</sup>, Bowen C<sup>1,2</sup>.

**BACKGROUND:**

Ankle sprain is a very common injury, yet uncertainty exists in what is appropriate time to return to play (RTP). Such guidance may inform treatment pathways and effective practice.

**OBJECTIVES:**

To determine if consensus exist about potential influencing factors for time to RTP in conservatively treated ankle sprain.

**METHODS:**

We searched AMED, CINAHL Plus, Cochrane library, EMBASE, MEDLINE (EBSCO), SPOERDiscus, PsycINFO, PEDro, Scopus, unpublished literature and ongoing trials and Google Scholar from inception until April 2017. The quality of the eligible papers was assessed using the Downs and Black tool for randomized controlled trials (RCTs) and Critical Appraisal Skills Program (CASP) for observational studies.

**RESULTS:**

The initial search identified 1885 articles. After screening, 14 articles were included. Of these, 11 were RCTs and 3 were prospective observational studies. Individual treatment methods that resulted in a shorter time to RTP were functional treatment, compression stockings, anteroposterior joint mobilization, hyaluronic acid injection (HA), Jump Stretch Flex Band programme (JSFB) and diclofenac medication. Prognostic factors for determining time to RTP in the included prospective observational studies were measures of Global function, SF 36PF, athlete's ambulation status, weight-bearing activity scores and self-reported athletic ability.

**CONCLUSION:**

To our knowledge, this is the first review to report influencing factors for time to RTP following conservatively treated ankle sprain. Findings from this review identified factors that influence time to RTP. However, caution should be taken in generalizing these results due to the heterogeneity of studies and inability to clearly define and list the criteria for safe RTP. The inclusion of factors such as age, sex, BMI, level of sport, injury related factors in future studies might help to understand the course of injury and therefore assist in constructing safer criteria.

**45 A. MANUAL THERAPY LUMBAR & GENERAL**

McKinsey (MDT) approach has strong evidence

**Reliability of the Mechanical Diagnosis and Therapy System in Patients With Spinal Pain: A Systematic Review**

**Authors:** Alessandra Narciso Garcia, PT<sup>1</sup>, Luciola da Cunha Menezes Costa, PhD<sup>1</sup>, Fabrício Soares de Souza, PT, MSc<sup>1</sup>, Matheus Oliveira de Almeida, PT, PhD<sup>1</sup>, Amanda Costa Araujo, PT<sup>1</sup>, Mark Hancock, PhD<sup>2</sup>, Leonardo Oliveira Pena Costa, PhD<sup>1,3</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2018 **Volume:**48 **Issue:**12 **Pages:**923–933 **DOI:**10.2519/jospt.2018.7876

**Background**

An updated summary of the evidence for the reliability of the Mechanical Diagnosis and Therapy (MDT) system in patients with spinal pain is needed.

**Objective**

To investigate the evidence on the intrarater and interrater reliability of MDT in patients with spinal pain.

**Methods**

Searches in MEDLINE, CINAHL, Embase, PEDro, and Scopus were conducted for this systematic review. We included any study design as long as reliability of the MDT method was tested in patients with spinal pain. We collected data on the reliability of MDT to identify main and subsyndromes, directional preference, the centralization phenomenon, and lateral shift. The methodological quality of studies was assessed using the Quality Appraisal of Diagnostic Reliability and the Guidelines for Reporting Reliability and Agreement Studies checklists.

**Results**

Twelve studies were included (8 studies on back pain, pooled n = 2160 patients; 3 studies on neck pain, pooled n = 45 patients; and 3 studies recruited mixed spinal conditions, pooled n = 389 patients). Studies investigating patients with back pain reported kappa estimates ranging from 0.26 to 1.00 (main and subsyndromes), 0.27 to 0.90 (directional preference), and 0.11 to 0.70 (centralization phenomenon). Kappa estimates for studies investigating neck pain ranged from 0.47 to 0.84 (main and subsyndromes) and 0.46 (directional preference). In mixed populations, kappa estimates ranged from 0.56 to 0.96 (main and subsyndromes).

**Conclusion**

The MDT system appears to have acceptable interrater reliability for classifying patients with back pain into main and subsyndromes when applied by therapists who have completed the credentialing examination, but unacceptable reliability in other therapists. We found conflicting evidence regarding the reliability of the MDT system in patients with neck pain or mixed pain locations. *J Orthop Sports Phys Ther* 2018;48(12):923–933. Epub 22 Jun 2018. doi:10.2519/jospt.2018.7876

**45 B. MANUAL THERAPY CERVICAL****TMD helped with upper cervical mobilization**

J Oral Rehabil. 2018 Oct 11. doi: 10.1111/joor.12733.

**Effectiveness of mobilisation of the upper cervical region and craniocervical flexor training on orofacial pain, mandibular function and headache in women with TMD. A randomised, controlled trial.**

Calixtre LB<sup>1</sup>, Oliveira AB<sup>1</sup>, de Sena Rosa LR<sup>1</sup>, Armijo-Olivo S<sup>2,3</sup>, Visscher CM<sup>4</sup>, Albuquerque-Sendín F<sup>5</sup>.

**BACKGROUND:**

Studies exploring interventions targeting the cervical spine to improve symptoms in patients with temporomandibular disorders (TMD) are limited.

**OBJECTIVES:**

To determine whether mobilisation of the upper cervical region and craniocervical flexor training decreased orofacial pain, increased mandibular function and pressure pain thresholds (PPTs) of the masticatory muscles and decreased headache impact in women with TMD when compared to no intervention.

**METHODS:**

In a single-blind randomised controlled trial, 61 women with TMD were randomised into an intervention group (IG) and a control group (CG). The IG received upper cervical mobilisations and neck motor control and stabilisation exercises for 5 weeks. The CG received no treatment. Outcomes were collected by a blind rater at baseline and 5-week follow-up. Orofacial pain intensity was collected once a week. A mixed ANOVA and Cohen's d were used to determine differences within/between groups and effect sizes.

**RESULTS:**

Pain intensity showed significant time-by-group interaction ( $P < 0.05$ ), with significant between-group differences at four and five weeks ( $P < 0.05$ ), with large effect sizes ( $d > 0.8$ ). The decrease in orofacial pain over time was clinically relevant only in the IG. Change in headache impact was significantly different between groups, and the IG showed a clinically relevant decrease after the treatment. No effects were found for PPT or mandibular function.

**CONCLUSION:**

Women with TMD reported a significant decrease in orofacial pain and headache impact after 5 weeks of treatment aimed at the upper cervical spine compared to a CG.

**Cervical mobilizations effective**

Musculoskelet Sci Pract. 2018 Oct 13;38:83-90. doi: 10.1016/j.msksp.2018.10.003.

**Immediate effects of cervical mobilisations on global perceived effect, movement associated pain and neck kinematics in patients with non-specific neck pain. A double blind placebo randomised controlled trial.**

Lascurain-Aguirrebeña I<sup>1</sup>, Newham DJ<sup>2</sup>, Casado-Zumeta X<sup>3</sup>, Lertxundi A<sup>4</sup>, Critchley DJ<sup>5</sup>.

**BACKGROUND:**

Neck pain is prevalent, costly and disabling. Cervical mobilisations are frequently used to treat it but their effectiveness has been questioned by several systematic reviews. Evidence suggests that better outcomes are achieved with mobilisations when they are applied to specific patient subgroups. A criteria for patients suitable for neck mobilisations has been proposed, but the effectiveness on this patient subgroup has not been tested.

**OBJECTIVE:**

To assess the effectiveness of cervical mobilisations applied to a subgroup of patients with neck pain who fulfil specific criteria.

**DESIGN:**

Randomised controlled trial.

**METHOD:**

40 patients with neck pain attending a Physiotherapy clinic were recruited and randomised to a single session of either cervical mobilisations or motionless manual contact placebo. The immediate effects on global perceived effect, range of movement (ROM), movement velocity and movement associated pain were assessed.

**RESULTS:**

mobilisation participants reported significantly better global perceived effect ( $p < 0.001$ ) and improvements in movement associated pain ( $p = 0.041$ ). Mobilisations produced a significant increase in ROM in side flexion ( $p = 0.006$ ) and rotation ( $p = 0.044$ ) when compared with placebo, but only in patients with pre-intervention ROM restriction. 29-47% of all movement associated pains were resolved following mobilisations and 11-27% following placebo. Patients in both groups showed a significant ( $p < 0.05$ ) increase in movement velocity, but only in those who had a velocity restriction pre-intervention.

**CONCLUSIONS:**

Cervical mobilisations are effective in improving movement-associated pain, increasing ROM and velocity, and patient perceived improvement when applied to patients with neck pain that fulfil a criteria. Their use should be advocated.

**46 A. UPPER LIMB NEUROMOBILIZATION****Carpel tunnel helped with Neural dynamics care**

Clin Rehabil. 2018 Oct 11:269215518805213. doi: 10.1177/0269215518805213.

**Is manual therapy based on neurodynamic techniques effective in the treatment of carpal tunnel syndrome? A randomized controlled trial.**

Wolny T<sup>1</sup>, Linek P<sup>1</sup>.

**OBJECTIVE:**

The aim of this study was to evaluate the efficacy of manual therapy based on neurodynamic techniques in conservative treatment of carpal tunnel syndrome.

**DESIGN:**

Randomized controlled trial.

**SETTING:**

Several medical outpatient clinics in the south of Poland.

**PARTICIPANTS:**

The study included 103 patients with mild and moderate carpal tunnel syndrome (mean age = 53.95, SD = 9.5) years, who were randomly assigned to a neurodynamic techniques group (experimental group, n = 58) or a group without treatment (control group, n = 45).

**INTERVENTION:**

Neurodynamic techniques were used in the experimental group. Treatment was conducted twice weekly (20 sessions). Control group did not receive treatment.

**MAIN MEASURES:**

Nerve conduction study, pain, symptom severity and functional status of Boston Carpal Tunnel Questionnaire, and strength of cylindrical and pincer grips were assessed at baseline and immediately after treatment (nerve conduction study one month after treatment).

**RESULTS:**

Baseline assessment revealed no group differences in any assessed parameters ( $P > 0.05$ ). There were significant differences between groups after treatment, including nerve conduction (e.g. sensory conduction velocity: experimental group: 38.3 m/s, SD = 11.1 vs control group: 25.9 m/s, SD = 7.72,  $P < 0.01$ ). Significant changes also occurred in pain (experimental group: 1.38, SD = 1.01 vs control group: 5.46, SD = 1.05,  $P < 0.01$ ), symptom severity (experimental group: 1.08, SD = 0.46 vs control group: 2.87, SD = 0.68,  $P < 0.01$ ), and functional status (experimental group: 1.96, SD = 0.64 vs control group: 2.87, SD = 1.12,  $P < 0.01$ ). There were no group differences in strength ( $P > 0.05$ ).

**CONCLUSION:**

The use of neurodynamic techniques in conservative treatment for mild to moderate forms of carpal tunnel syndrome has significant therapeutic benefits.

**48 A. STM****STM to adductors in adductor strain**

Physiother Theory Pract. 2018 Oct 11:1-10. doi: 10.1080/09593985.2018.1531096. [

**Manual therapy and early return to sport in football players with adductor-related groin pain: A prospective case series.**

Tak I PhD, MScPT<sup>1,2</sup>, Langhout R MMT PT<sup>2,3</sup>, Bertrand B MScPT<sup>4</sup>, Barendrecht M MPTS<sup>5</sup>, Stubbe J PhD<sup>6</sup>, Kerkhoffs G PhD, MD<sup>2,7</sup>, Weir A PhD, MBBS<sup>3,8</sup>.

**OBJECTIVES:**

To study the clinical course including return to sport success rates of football players with adductor-related groin pain (ARGP) after manual therapy of the adductor muscles.

**DESIGN:**

Prospective case series.

**METHODS:**

Thirty-four football players with ARGP with median pre-injury Tegner scores of 9 (IQR 25-75: 9-9) were treated with manual therapy of the adductor muscles. Main outcome measures were numeric pain rating scale (NPRS), Hip and Groin Outcome Score (HAGOS) and global perceived effect (GPE) for treatment and patient satisfaction at 2, 6 and 12 weeks. Return to sport was documented.

**RESULTS:**

Pain during (NPRS 7 (6-8) and after (NPRS 8 (6-8) sports decreased to NPRS 1 (0.2-3) and 1 (0.8-3), respectively ( $p < 0.001$ ). Within 2 weeks 82% of the players returned to pre-injury playing levels with improved ( $p < 0.001$ ) HAGOS subscale scores. Eighty-five percent reported clinically relevant improvement, 82% reported to be satisfied. At 12 weeks, 88% had returned to pre-injury playing levels. HAGOS showed symptoms were still present.

**CONCLUSION:**

Early return to sport seems possible and safe after manual therapy of the adductor muscles in football players with ARGP in the short term. While the majority of injured football players return to sport within two weeks, caution is advised regarding effectiveness as hip and groin symptoms were still present and no control groups were available.

**50 B. PNF****PNF for elbow**

Clin Rehabil. 2018 Oct 10:269215518802886. doi: 10.1177/0269215518802886

**A structured exercise programme combined with proprioceptive neuromuscular facilitation stretching or static stretching in posttraumatic stiffness of the elbow: a randomized controlled trial.**

Birinci T<sup>1</sup>, Razak Ozdincler A<sup>2</sup>, Altun S<sup>3</sup>, Kural C<sup>3</sup>.

**OBJECTIVES:**

To compare the different stretching techniques, proprioceptive neuromuscular facilitation (PNF) stretching and static stretching, in patients with elbow stiffness after a treated elbow fracture.

**DESIGN:**

Randomized-controlled, single-blind study.

**SETTING:**

Department of physiotherapy and rehabilitation.

**SUBJECTS:**

Forty patients with posttraumatic elbow stiffness (24 women; mean age, 41.34 ± 7.57 years).

**INTERVENTION:**

PNF stretching group (n = 20), hold-relax PNF stretching combined with a structured exercise programme (two days per week for six weeks); static stretching group (n = 20), static stretching combined with a structured exercise programme (two days per week for six weeks).

**MAIN MEASURES:**

The primary outcome is the Disabilities of the Arm, Shoulder and Hand (DASH). The secondary outcomes are active range of motion (AROM), visual analogue scale (VAS), Tampa Scale for Kinesiophobia, Short Form-12 and Global Rating of Change. Participants were assessed at baseline, after a six-week intervention period and one-month later (follow-up).

**RESULTS:**

After treatment, improvement in the mean DASH score was slightly better in the PNF stretching group (8.66 ± 6.15) compared with the static stretching group (19.25 ± 10.30) (p = 0.03). The overall group-by-time interaction for the 2 × 3 mixed-model analysis of covariance (ANCOVA) was also significant for elbow flexion AROM (mean change for PNF stretching group; static stretching group; 41.10, 34.42, p = 0.04), VAS-rest (-1.31, -1.08, p = 0.03) and VAS-activity (-3.78, -3.47, p = 0.01) in favour of PNF stretching group. The other outcomes did not differ significantly between the two groups.

**CONCLUSION:**

The study demonstrated that the structured exercise programme combined with PNF stretching might be effective in patients with posttraumatic elbow stiffness with regard to improving function, elbow flexion AROM, pain at rest and during activity.

**52. EXERCISE****Pilates helps chronic pain**

Musculoskeletal Care. 2018 Nov 6. doi: 10.1002/msc.1365.

**A qualitative study of the experiences and perceptions of adults with chronic musculoskeletal conditions following a 12-week Pilates exercise programme.**

Gaskell L<sup>1</sup>, Williams AE<sup>2</sup>.

*INTRODUCTION:*

The aim of the present study was to explore the experiences and perceptions of adult patients with chronic musculoskeletal conditions following a Pilates exercise programme. A qualitative approach was taken to both data collection and analysis, with alignment to the philosophy of interpretive phenomenology. Participants included 15 women and seven men with a range of chronic musculoskeletal conditions, including nonspecific low back pain, peripheral joint osteoarthritis and a range of postsurgical conditions. The age range was from 36 years to 83 years, and the mean age was 57 years (standard deviation 14.1 years).

*METHODS:*

Data were collected via digital recordings of four focus groups in three North-West of England physiotherapy clinics. The data were transcribed verbatim and then analysed using a thematic framework. Data were verified by a researcher and randomly selected participants, and agreement was achieved between all parties.

*RESULTS:*

The results were organized into five main themes: physical improvements; Pilates promotes an active lifestyle: improved performance at work and hobbies; psychosocial benefits and improved confidence; increased autonomy in managing their own condition; and motivation to continue with exercise.

*CONCLUSION:*

The study was the first to investigate individual perceptions of the impact of Pilates on the daily lives of people with chronic conditions. The Pilates-based exercise programme enabled the participants to function better and manage their condition more effectively and independently. Further to previous work, the study revealed psychological and social benefits which increase motivation to adhere to the programme and promote a healthier lifestyle.

**Inflammatory biomarkers**

Arthritis Care Res (Hoboken). 2018 Oct 15. doi: 10.1002/acr.23786.

**Impact of exercise therapy on molecular biomarkers related to cartilage and inflammation in people at risk of, or with established, knee osteoarthritis: a systematic review and meta-analysis of randomized controlled trials.**

Bricca A<sup>1</sup>, Struglics A<sup>2</sup>, Larsson S<sup>2</sup>, Steultjens M<sup>3</sup>, Juhl CB<sup>1,4</sup>, Roos EM<sup>1</sup>.

**OBJECTIVE:**

To investigate the impact of exercise therapy on molecular biomarkers related to cartilage and inflammation in people at risk of, or with established, knee osteoarthritis by conducting a systematic review of randomized controlled trials (RCTs).

**METHODS:**

Literature search up to September 2017 in five major databases with no restriction on publication year or language. Data were extracted from the first available follow-up time point and we performed a narrative synthesis for the effect of exercise therapy on molecular biomarkers related to cartilage and inflammation. A subset of studies reporting sufficient data was combined in a meta-analysis, using an adjusted random effects model.

**RESULTS:**

Twelve RCTs, involving 57 study comparisons at 4 to 24 weeks following an exercise therapy intervention were included. Exercise therapy decreased molecular biomarkers in 17 (30%) study comparisons, had no effect in 36 (63%), and increased molecular biomarkers in four (7%) study comparisons. Meta-analyses of nine biomarkers showed that exercise therapy was associated with non-significant reductions of C-reactive protein, C-terminal crosslinking telopeptide of type II collagen, tumor necrosis factor alpha (TNF- $\alpha$ ), soluble TNF- $\alpha$  receptor-1 and -2, C2C neoepitope of type II collagen and cartilage oligomeric matrix protein compared to non-exercising control groups and had no effect on interleukin-6 and soluble interleukin 6 receptor.

**CONCLUSIONS:**

Exercise therapy is not harmful, as it does not increase the concentration of molecular biomarkers related to cartilage turnover and inflammation, implicated in osteoarthritis progression. The overall quality of evidence was downgraded to low because of the limited number of RCTs available. This article is protected by copyright. All rights reserved.

**54. POSTURE****Postural ex helps TKR**

Knee Surg Sports Traumatol Arthrosc. 2018 Oct 25. doi: 10.1007/s00167-018-5246-2.

**Preoperative high-intensity strength training improves postural control after TKA: randomized-controlled trial.**

Casaña J<sup>1</sup>, Calatayud J<sup>2,3</sup>, Ezzatvar Y<sup>1</sup>, Vinstrup J<sup>4,5</sup>, Benítez J<sup>1</sup>, Andersen LL<sup>4,5</sup>.

**PURPOSE:**

This study investigates the effectiveness of preoperative high-intensity strength training (with a special emphasis on lower limb muscle strength and secondarily on balance training) on postural control after TKA.

**METHODS:**

Forty-four subjects (7 men, 37 women, and mean age  $66.7 \pm 3.9$  years) scheduled for unilateral TKA for osteoarthritis (OA) participated in this randomized-controlled trial. Each patient performed two postural control tests: Romberg test with eyes open and closed. These tests were assessed at 8 weeks before surgery (T1), after 8 weeks of training (T2), 1 month after TKA (T3), and finally 3 months after TKA (T4). The intervention group completed an 8-week training program 3 days per week prior to surgery, while the control group received no intervention.

**RESULTS:**

The Center of Pressure area (COP) was lower (i.e., better score) for the intervention group at T2, T3, and T4. The anteroposterior range of COP with eyes open was lower in the intervention group at T2, T3, and T4 and with eyes closed at T2. The medial-lateral standard deviation of COP with eyes open was lower in the intervention group at T2 and T4 and with eyes closed at T2 and T3. The anteroposterior standard deviation of COP with eyes open did not change, while that with eyes closed the intervention group showed lower score at T2.

**CONCLUSION:**

Preoperative high-intensity strength training is effective for improving postural control before and early after TKA. Recommendations should include preoperative strength training, and not only balance training, to speed-up recovery of postural control after TKA.

**56. ATHLETICS****Pain perceptions**

Eur J Pain. 2018 Oct 31. doi: 10.1002/ejp.1335.

**The type of sport matters: Pain perception of endurance athletes versus strength athletes.**

Assa T<sup>1</sup>, Geva N<sup>2</sup>, Zarkh Y<sup>2</sup>, Defrin R<sup>2,3</sup>.

**BACKGROUND:**

Studies assessing athletes' pain sensitivity yield inconsistent data, which demonstrate either increased pain threshold and tolerance in athletes than controls or similar thresholds. This inconsistency may result from the variability in the type of sport practiced by the athletes and its effect on pain perception. For example, endurance athletes perform continuous intense exercise for prolonged durations, whereas strength athletes perform short bouts of extreme efforts. Consequently, endurance athletes may tolerate and modulate pain better than strength athletes. This hypothesis was tested by comparing pain perception of endurance athletes with that of strength athletes.

**METHODS:**

Subjects were 19 endurance athletes (triathletes), 17 strength athletes (weightlifters and throwers) and 17 non-athlete controls. Quantitative measurements included heat-pain threshold, heat-pain tolerance, cold pressor pain ratings, temporal summation of pain (TSP) and conditioned pain modulation (CPM). Fear of pain and pain catastrophizing were also assessed.

**RESULTS:**

The two athlete groups had lower pain ratings than non-athletes. However, strength athletes had higher heat-pain threshold than endurance athletes, whereas endurance athletes had higher heat-pain tolerance and stronger CPM than strength athletes and lower fear of pain levels. Longer training time correlated with TSP in endurance athletes but with CPM and heat-pain tolerance in strength athletes.

**CONCLUSIONS:**

Although athletes in general seem less responsive to noxious stimuli than non-athletes, the type of sport differentially affects pain perception; whereas endurance-based sport is associated with improved pain inhibition, strength-based sport is associated with reduced pain sensitivity. These characteristics may be considered when sport is recommended for pain management.

**SIGNIFICANCE:**

This study shows that different sport types are associated with different characteristics of pain perception and modulation, as well as of thoughts towards pain.

**58. RUNNING****ACL alterations****Bilateral Alterations in Running Mechanics and Quadriceps Function Following Unilateral Anterior Cruciate Ligament Reconstruction**

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**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, 2018 **Volume:**48 **Issue:**12 **Pages:**960–967 **DOI:**10.2519/jospt.2018.8170

**Background**

Following anterior cruciate ligament reconstruction (ACLR), individuals have quadriceps muscle impairments that influence gait mechanics and may contribute to an elevated risk of knee osteoarthritis.

**Objectives**

To compare running mechanics and quadriceps function between individuals who have undergone ACLR and those in a control group, and to evaluate the association between quadriceps function and running mechanics.

**Methods**

In this controlled, cross-sectional laboratory study, 38 individuals who previously underwent primary unilateral ACLR (mean  $\pm$  SD time since reconstruction, 48.0  $\pm$  25.0 months) were matched to 38 control participants based on age, sex, and body mass index, and underwent assessments of quadriceps muscle performance and running biomechanics. Quadriceps muscle performance was assessed via isokinetic and isometric knee extension peak torque and rate of torque development (RTD) over 2 time frames: 0 to 100 milliseconds (RTD100) and 0 to 200 milliseconds (RTD200). Running evaluation included assessment of the knee flexion angle (KFA), knee extension moment (KEM), rate of knee extension moment (RKEM), vertical instantaneous loading rate, and vertical impact peak.

**Results**

On average, there was a smaller KFA ( $P = .016$ ) in the involved limb compared to the uninvolved limb in the ACLR group. Compared to limbs in the control group, involved limbs in the ACLR group had lower RTD100 ( $P = .015$ ), lower peak torque at 60°/s ( $P = .007$ ), lower peak torque at 180°/s ( $P = .016$ ), smaller KFA ( $P < .001$ ), lower KEM ( $P = .001$ ), lower RKEM ( $P = .004$ ), and higher vertical instantaneous loading rate ( $P = .016$ ). Compared to limbs in the control group, uninvolved limbs in the ACLR group had lower RTD100 ( $P = .003$ ), lower peak torque at 60°/s ( $P = .017$ ), and smaller KFA ( $P = .01$ ). For the involved limbs in the ACLR group, there was a low correlation between isokinetic peak torque at 180°/s and RKEM ( $r = 0.38$ ,  $P = .01$ ), and a negligible correlation between RTD100 and RKEM ( $r = 0.26$ ,  $P < .05$ ). No differences were found in isometric strength for any comparison.

**Conclusion**

Individuals who have undergone ACLR have bilateral alterations in running mechanics that are weakly associated with diminished quadriceps muscle performance. *J Orthop Sports Phys Ther* 2018;48(12):960–967. *Pub* 22 Jul 2018. *doi:*10.2519/jospt.2018.8170

## 62 A. NUTRITION/VITAMINS

### Artificial sweeteners

#### 2018 Top Stories in Primary Care: Nonnutritive Sweeteners

In 2017, one of the most viewed studies on PracticeUpdate was a paper by Pase et al, published in *Stroke*, showing an association between stroke and the number of artificially sweetened beverages consumed per day. This finding was seen only with artificially sweetened beverages and not with sugar-sweetened beverages, suggesting that the risk was from the artificial sweeteners.

My story of the year for 2018 builds on the public health concern of consuming nonnutritive sweeteners (NNS) as relating to weight gain and insulin resistance.<sup>1</sup>

Observational studies have shown that high consumption of beverages containing NNS is associated with weight gain, with greater visceral adiposity and a 22% higher incidence of diabetes, even though there was a reduction in total energy intake. The mechanism is likely multifactorial, with a main concern being the body sensing high levels of sweetness.<sup>2</sup>

#### Possible mechanisms: Sweetness

- Sweet tasting compounds activate sweet taste receptors (T1R2/T1R3) that were originally thought to only be present in the mouth but are now known to be located throughout the body, including in the intestines and pancreas. Consuming something sweet can trigger these receptors to promote insulin secretion and possibly insulin resistance.
- Delivering sweetness without calories may result in disturbance to appetite regulation and metabolic signaling.
- Exposure of infants and children to NNS early in life may promote a higher preference for sweetness later in life, resulting in more calorie consumption and risk of obesity.
- NNS (aspartame, saccharin, sucralose) have also been found to have a negative effect on the intestinal microbiome, possibly affecting glucose tolerance and metabolism.

There are packets of these blue, pink, and yellow NNS on the majority of restaurant tables. And now they are being used as main sweeteners in processed foods, including baked goods. Although the evidence is inconclusive, there is enough to be concerned about the potential public health effects of these products to encourage us to simply eat multicolored whole foods and drink water until we have enough evidence proving safety.

### 63. PHARMACOLOGY

#### Tabacco and Opioids

##### **An association between tobacco smoking, daily opioid use, pain response and the risk for aberrant opioid use behaviors**

*Journal of Clinical Oncology* — Yennu SJ, et al. | November 30, 2018

Researchers reviewed 1,501 consecutive cancer patients referred to a supportive care clinic from March 1, 2016 to June 6, 2018, to determine the link between current tobacco smoking, daily opioid use, pain response, and risk for aberrant opioid use behaviors (AOB).

Eligibility criteria included having a diagnosis of cancer, and being on opioids for pain for at least a week. The Edmonton Symptom Assessment Scale (ESAS), SOAPP-14 (validated questionnaire for assessment of risk for aberrant opioid use behaviors), and CAGE-AID, were used to assess the study participants. Findings revealed an increased risk of AOB among male patients and those with history of current or previous smoking history, anxiety, and prior alcoholism/illicit drug use.