

MUSCULOSKELETAL

IN REVIEW

TM

Volume 5, Number 6

Published by Physicians Specializing In
Musculoskeletal Medicine

November 5, 2018

COMORBIDITIES TWO YEARS AFTER ARTHROSCOPIC HIP SURGERY

Surgery of the lower extremities can limit the patient's ability to bear weight for weeks, and can limit physical activity for months. This study was designed to determine the rate of medically diagnosed comorbidities developing within two years of arthroscopic hip surgery.

Data were obtained from claims made within the United States Military Health System (MHS). The MHS data repository (MDR) was used to identify all cohort and health care utilization variables for individuals undergoing arthroscopic hip surgery over a ten- year period. For this study, age was restricted to 18 to 50 years, with data reviewed for two years after surgery.

The final cohort comprised 1,870 participants with a mean age of 32.2 years. Compared to baseline, within two years of hip surgery, a significant increase was noted in the diagnoses of mental health disorders, posttraumatic stress disorder, chronic pain, substance abuse disorder, cardiovascular disease, metabolic syndrome, systemic arthropathy, sleep disorder, insomnia, and breathing related sleep disorder (all $p < 0.001$). The total number of individuals with a chronic pain diagnosis increased by 166%, with PTSD increasing by 149% and sleep disorders by 111%.

Conclusion: This study found that, after arthroscopic hip surgery, the incidence of seven major comorbidities increases significantly.

Rhon, D., et al. Comorbidities in the First Two Years after Arthroscopic Hip Surgery: Substantial Increases in Mental Health Disorders, Chronic Pain, Substance Abuse and Cardiometabolic Conditions. *Br J Sports Med.* 2018, September; 0:1–

8. doi:10.1136/bjsports-2018-099294.

GALCANEZUMAB FOR THE PREVENTION OF EPISODIC MIGRAINE

Calcitonin gene related peptide (CGRP) is widely expressed throughout the nervous system, acting as a sensory neurotransmitter, vasodilator and mediator of neurogenic inflammation.

Galcanezumab is a humanized monoclonal antibody that binds CGRP and prevents biologic activity without blocking the receptor. This study was designed to determine the efficacy of Galcanezumab for the prevention of migraine headaches.

This phase three study included patients who were 18-65 years of age with a diagnosis of migraine for at least one year. The patients were randomized to receive a monthly injection of placebo or Galcanezumab at a dose of 120 mg or 240 mg. Migraine headaches days were recorded for one month before injections and then monthly for 10 months.

Among the 703 patients studied, patients who received both the 120 and the 240 mg doses of Galcanezumab had significantly better reductions in mean headache days ($p < 0.001$) than did those receiving the placebo, with these effects beginning within month one. The proportion of patients that maintained at least a 50% reduction in monthly mean headache days for six consecutive months was 20.5% in the 120 mg group ($p < 0.001$), 19.2% in the 240 mg group ($p < 0.001$) and 8.9% in the placebo group.

Conclusion: This study of patients with chronic episodic migraine found that monthly injections of Galcanezumab can reduce monthly migraine headache days.

Stauffer, V., et al. Evaluation of Galcanezumab for the Prevention of Episodic Migraine. The EVOLVE-1 Randomized Clinical Trial. *JAMA Neurol.* 2018, September; 75 (9): 1080-1088

DEMENTIA AND ONE YEAR MORTALITY AFTER HIP FRACTURE

Fractures of the hip in the elderly are associated with higher rates of morbidity and mortality. This study assessed the rate of mortality during the year following hip fracture surgery in patients with Parkinson's disease (PD) or other dementias.

Using data from the Taiwan National Health Insurance Research Database (NHIRD), the authors identified individuals who were 65 years or older and who had been surgically treated for a non-traumatic, acute fracture of the hip between 1997 and 2012. From this group, patients diagnosed with dementia and/or PD up to two years before the hip fracture surgery were compared to patients with hip fractures but without dementia or PD. The subjects were followed until one year after the date of fracture or until the end of 2013, death or withdrawal from the insurance program.

Of the 6,626 patients in the cohort, 676 had dementia and 371 had PD, with 127 having both. Patients with dementia, or both dementia and PD, had significantly higher mortality than did those with neither condition, hazard ratio (HR) of 1.45 and 1.57, respectively. There was no significant effect of PD alone on the risk of death.

Conclusion: This study of elderly patients undergoing surgical repair of a hip fracture found that dementia is an independent risk factor for death in the year following surgery.

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Chiu, H., et al. Dementia Predicted One-Year Mortality for Patients with First Hip Fracture. **Bone Joint J.** 2018, September; 100B(9): 1220-1226.

KNEE OSTEOARTHRITIS AND METABOLIC SYNDROME

The metabolic syndrome (MetS) has been found to be associated with cardiovascular disease and mortality. There is some evidence of a relationship between MetS and osteoarthritis (OA). This Egyptian study further examined the relationship between MetS and characteristics of OA of the knee.

Subjects were 60 adults with a diagnosis of MetS and 60 obese subjects without MetS. All subjects were assessed for pain with the Western Ontario and McMaster University (WOMAC) index, and underwent laboratory assessment of triglycerides, HDL cholesterol and glucose. All underwent plain radiographs of the knee to diagnose and assess OA.

The frequency of OA and the severity of OA, hypertension and diabetes were significantly higher in the MetS group than in the control group ($p=0.034$, $p<0.001$ and $p<0.001$, respectively). In addition, among those in the MetS group, those with OA of the knee were more likely to have hypertension ($p=0.009$), diabetes ($p=0.002$) and greater weight ($p=0.01$).

Conclusion: This study of

patients with the metabolic syndrome found that osteoarthritis of the knee is prevalent among these patients, and is associated with worse pain, function, and advanced radiographic changes.

Afifi, A., et al. Osteoarthritis of Knee Joint in Metabolic Syndrome. **Clin Rheum.** 2018, October; 37(10): 2855-2861.

SPLINTS VERSUS STEROIDS IN CARPAL TUNNEL SYNDROME

While carpal tunnel syndrome (CTS) is the most common compression neuropathy affecting the upper limb, no consensus exists concerning the best primary care management for mild to moderate cases. This study, the Injection versus Splinting in Carpal Tunnel Syndrome (INSTINCTS) trial, compared the efficacy of splints with steroid injections as a primary intervention.

Subjects were 18 years of age or older, presenting with a new episode of primary, idiopathic, mild to moderate CTS. The participants were randomly assigned to receive either one treatment with 20 mg methylprednisolone acetate, injected into the carpal tunnel or to volar cock-up splints, to be worn at night for six weeks.

Baseline data were collected from self-completed questionnaires immediately before randomization and at six weeks and six months after study initiation. The primary outcome variable was the overall score for symptom severity and limitations in hand function on the Boston Carpal Tunnel Questionnaire (BCTQ) at six weeks.

Participants were 234 patients, with 118 assigned to the splinting group and 116 to the injection group. At six weeks, significantly greater improvement was found in the corticosteroid group as compared to the splinting group in the BCTQ overall score ($p=0.0001$), functional limitations score ($p=0.0031$), hand-wrist pain intensity score ($p=0.049$), and insomnia due to wrist problems ($p=0.018$). At six months, no significant difference was noted between groups.

Conclusion: This prospective study of patients with mild to moderate carpal tunnel syndrome

found that corticosteroid injections into the carpal tunnel produce outcomes at six weeks that were superior to those of nighttime splinting.

Chesterton, L., et al. The Clinical and Cost Effectiveness of Corticosteroid Injection versus Night Splints for Carpal Tunnel Syndrome (Instincts Trial: An Open Label, Parallel Group, Randomised Controlled Trial. **Lancet.** 2018, October; 392 (10156):1423-1433.

TRANSCRANIAL DIRECT CURRENT STIMULATION AND COGNITIVE FUNCTION IN THE ELDERLY

Previous studies of healthy adults have demonstrated that one 20-minute session of transcranial direct current stimulation (tDCS) at the dorsolateral prefrontal cortex can enhance performance on tests of executive function. This study was designed to determine whether tDCS could induce lasting improvements in dual-task performance, cognition and mobility in older adults with mild to moderate impairments in cognitive and motor function.

Participants were 65 years of age or older who exhibited both slow gait and executive dysfunction. The participants were randomized to receive either tDCS or sham intervention delivered with the anode placed over the dorsolateral prefrontal cortex (DLPFC). Cognition, mobility and dual-task performance were assessed at baseline, post-intervention, and at two weeks after completion. The primary outcome measures included the Montreal Cognitive Assessment (MoCA), and the Timed up and Go (TUG), with dual task performance defined by the decrement in performance between single and dual task conditions of walking speed and sway.

At two-week follow-up, the tDCS group had significantly better scores than the sham group in the total MoCA scores ($p=0.03$). A subgroup analysis revealed that the tDCS improved performance within the visuospatial executive function subscore ($p=0.002$), with other subscores unchanged. The tDCS group also showed better mitigation of dual task costs to sway speed ($p=0.0009$) and area ($p<0.0001$).

Conclusion: This pilot, sham

controlled trial found that 10 sessions of direct current stimulation, with the anode over the left dorsolateral prefrontal cortex, may be helpful in reducing impairments in gait and executive function.

Manor, B., et al. Transcranial Direct Current Stimulation May Improve Cognitive-Motor Function in Functionally Limited Older Adults. **Neurorehabil Neural Repair.** 2018, September; 32(9): 788-798.

SURGICAL VERSUS NONSURGICAL TREATMENT OF MENISCAL TEARS

Previous studies of meniscal tears which compared surgical to nonsurgical care have failed to demonstrate the superiority of surgery. This study was designed to determine whether physical therapy (PT) is noninferior to arthroscopic partial meniscectomy for improving self-reported knee function after a meniscal tear.

This multicenter trial was performed in nine hospitals in the Netherlands. Participants were 45-70 years of age with knee pain and a nonobstructive meniscal tear confirmed by MRI. Subjects were randomized to receive either surgical removal of the torn portion of the meniscus followed by therapy or to a PT exercise protocol consisting of 16 sessions of 30 minutes each over eight weeks. The primary outcome was patient reported knee function on the subjective knee form of the international knee documentation committee (IKDC) from baseline to 24 months.

Of the 321 patients enrolled, 159 were randomized to surgery and 162 to PT. At 24 months, knee function scores in the surgical group improved 26.2 points compared with improvement of 20.4 points in the PT group, suggesting a noninferiority of PT. Knee pain during weight-bearing improved more in the surgical group ($p=0.01$), with no difference between groups in general health and activity levels.

Conclusion: This multicenter randomized controlled trial of patients 45 years of age or older with painful meniscal tears found that physical therapy was noninferior to partial meniscectomy for improving knee function in the two years after the injury.

van de Graaf, V., et al. Effect of Early Surgery Versus Physical Therapy on Knee Function among Patients with Nonobstructive Meniscal Tears: The ESCAPE Randomized Clinical Trial. **JAMA.** 2018, October 2; 320 (13): 1328-1337.

SMOKING AND HEALING OF ROTATOR CUFF TEARS

The incidence of rotator cuff tears has increased dramatically over the past several years. The healing failure rate after rotator cuff repair has been estimated to be between 20% and 94%. This study was designed to determine whether tobacco abuse a well-known metabolic risk factor, is also a risk factor for poor healing of a rotator cuff tear. This retrospective cohort study included patients undergoing arthroscopic repair of full thickness rotator cuff tears. Subjects identified were current smokers with a greater than 20-pack-year smoking history. The control group included 34 nonsmokers matched for age, fatty infiltration and tear size. All patients had follow-up at a minimum of six months with magnetic resonance imaging or ultrasound, and a functional assessment at a minimum of one year.

At final follow-up, 29.4% of the smoking group and 5.9% of the nonsmokers had failed to heal ($p=0.023$). In the final regression analysis, failure to heal was correlated with rotator cuff tear size ($p=0.02$) and tobacco abuse ($p=0.012$). The final functional assessment found no difference between the smoking group and the nonsmoking group.

Conclusion: This study found that current heavy smoking resulted in a significant increase in healing failure as compared with nonsmokers.

Park, J., et al. Effect of Smoking on Healing Failure after Rotator Cuff Repair. **Am J Sports Med.** 2018, October; 46 (12): 2960-2968.

SURGICAL TREATMENT OF SUBACROMIAL PAIN SYNDROME

Subacromial pain syndrome (SPS) is a common shoulder disorder, viewed as a condition wherein tightness and friction in the subacromial space can lead to bursitis, tendinopathy and eventual cuff tears. Some have suggested that those with rotator cuff tears have more advanced pathology

and, thus, are less likely to respond to intervention. This study investigated the long-term results of an isolated subacromial decompression surgery, as compared to those of rotator cuff repair combined with subacromial decompression.

Subjects were patients with symptomatic, chronic SPS, or small to medium size rotator cuff tears. All underwent a subacromial decompression, with those with rotator cuff tear also undergoing repair. The primary outcome measure was performance on the Disabilities of Arm, Hand and Shoulder (DASH), with a visual analog scale (VAS) of pain and function included as a secondary outcome.

Data were obtained for 180 patients undergoing combined surgery and 180 undergoing subacromial decompression only.

Significant improvement was noted in both treatment groups in DASH scores ($p<0.001$) and VAS scores for function ($p<0.001$) and pain ($p<0.001$). Interestingly, post-operative function was significantly more improved in patients >55 years of age ($p=0.038$) than in younger patients.

Conclusion: This long-term, follow-up study of patients who underwent decompressive surgery for subacromial pain syndrome found no evidence of inferior outcome as compared to those who underwent combined decompressive surgery and rotator cuff repair surgery.

Inderhaug, E., et al. Long-Term Results after Surgical Treatment of Subacromial Pain Syndrome with or without Rotator Cuff Tear. **J Orthopaed.** 2018, September 15(3): 757-760.

EFFECT OF VALPROIC ACID IN GLIOBLASTOMA

Glioblastoma (GBM) is a malignant disease with a median survival of 14 to 18 months. Up to 40% of those patients present with seizures, and are often managed with an antiepileptic drug (AED). This meta-analysis was designed to better understand the effect of valproic acid (VPA) on the clinical course of patients with GBM.

Data were reviewed for articles involving primary GBM patients, treated by elements of current conventional therapy, with patients who receive VPA compared to those who did not.

Of the 1,498 studies reviewed, 35 underwent full-text analysis. From these, seven retrospective, cohort studies were included for quantitative analysis. Pooling all studies yielded an overall survival hazard ratio of 0.71 for those who received VPA compared with those who did not. The pooled, mean difference in survival between the two groups was calculated to be 2.35 months ($p < 0.01$).

Conclusion: This meta-analysis of studies involving patients with glioblastoma found that treatment with valproic acid was associated with a significantly increased time of survival.

Lu, V., et al. The Survival Effect of Valproic Acid in Glioblastoma and its Current Trend: A Systematic Review and Meta-Analysis. *Clin Neurol Neurosurg.* 2018, November; 174:149-155.

HEADING IN SOCCER

There is concern surrounding the potential long-term consequences of subcutaneous, concussive repetitive head impacts sustained in sports, including "headers" in soccer. As serum plasma tau and serum neurofilament light (NF-L) protein have been found to be promising candidates for biomarkers for central nervous system damage, this study examined how these levels are affected by soccer heading.

Subjects were 11 male, highly competitive soccer players with a mean age of 23.7 years and with at least five years of experience. The subjects were tested under three conditions, including heading, sham and control. For the heading condition, participants were positioned 25 m from a JUGS machine which launched regulation soccer balls at 77.4 km/h, (the velocity that had been previously estimated from corner kicks in collegiate and professional soccer matches). During the heading condition, players performed 40 headers within 20 minutes, with 30 seconds separating each trial. In the sham condition, contact with the ball was made with the hands, chest or thigh. No balls were launched during the control condition. Serum samples were collected, with plasma tau and NF-L calculated

before and one hour after each testing condition, and again at three week follow-up. Symptoms were assessed using the Standardized Concussion Assessment Tool— 3rd edition (SCAT3).

While serum levels remained unchanged following the sham condition, at one hour following the heading condition, NF-L levels rose an average of 26%. Of the seven players who returned at 22 days, these levels were elevated at 311% above baseline ($p = 0.04$). Tau levels remained unchanged in all conditions. Both the total number of concussion symptoms and symptom severity scores were increased compared with pre-heading values ($p = 0.01$ and $p = 0.03$, respectively).

Conclusion: This study demonstrated that serum neurofilament light protein was increased at one hour and at 22 days following an episode of 40 headers at speeds mimicking professional play.

Wallace, C., et al. Heading in Soccer Increases Serum Neurofilament Light Protein and SCAT3 Symptom Metrics. *BMJ Open Sport Exer Med.* 2018; 4(1): E000433.

LOW INTENSITY EXERCISE REDUCES CONTRALATERAL MUSCLE INJURY

Previous studies have shown that low intensity eccentric contractions can reduce the magnitude of muscle damage induced by maximal eccentric contractions. This study assessed whether those contractions can provide a protective effect to the contralateral limb.

Sedentary young men with no musculoskeletal injuries of the upper extremities were randomized into one of six groups, including one control group. The experimental groups underwent one bout of low intensity eccentric contractions of the elbow flexors (EF) at 10% of maximal eccentric contractions (MaxEC). The exercise was performed with one arm on either one, two, seven, 14 or 21 days prior to a bout of MaxEC, applied to the contralateral arm. The maximal eccentric contraction bouts consisted of five sets of six MaxECs. The control group only

performed MaxEC of the non-dominant arm. Blood samples were taken to assess muscle damage, with muscle soreness assessed using a visual analog pain score.

Immediately after exercise, the maximal voluntary concentric contraction torque (MVC-CON) decreased by 40% for all groups. Compared to the control group, recovery was faster for the one, two- and seven-day groups. Recovery was also faster for the one-day and two-day groups, as compared to the two- and three-week groups, respectively. The magnitude of creatinine kinase activity after MaxEC was smaller for all experimental groups than the control group with the one-day and two-day muscle soreness found to be lower than in the two-week and the three-week groups.

Conclusion: This study found that performing 10% eccentric contractions in one arm conveys protection against exercise related muscle damage and soreness in the contralateral arm up to three weeks later.

Chen, T., et al. Low Intensity Elbow Flexion Eccentric Contractions-Attenuate Maximal Eccentric Exercise Induced Muscle Damage of the Contralateral Arm. *J Sci Med Sport.* 2018, October; 21(10): 1068-1072.

PHYSICAL ACTIVITY VERSUS WEIGHT REDUCTION FOR IMPROVED FOOT FUNCTION

Foot disorders that impact foot function have been thought to affect 24% of those over 45 years of age and 42% of those over the age of 60. This study was designed to determine the effect of weight reduction and increased physical activity on foot structure and function in obese individuals.

Subjects were recruited with a body mass index of greater than 25 kg/m, each of whom performed less than 150 minutes of moderate to vigorous activity weekly and had no current or previous foot or ankle disorders. Those 51 participants were divided into a weight reduction group (WR) and increased physical activity group (PA).

Foot anthropometric data were measured with participants both sitting and standing, using a three-

dimensional foot scanner. Those in the weight reduction group had energy intake restrictions of 1,680 kcal per day for males and 1,200 kcal per day for females. The activity group participated in a 90-minute session, three times per week for 12 weeks, titrated up to 60 to 70 percent of maximal heart rate for the final four weeks.

The mean weight changes were 2.8% in the weight reduction group and 0.9% in the exercise group. Significantly greater improvements in truncated foot length and on a decrease in the arch stiffness index were found in the physical activity group. A greater change was seen for the PA group than for the WR group in the increase in the dorsum height ($p=0.024$) and arch height index ($p=0.015$), and decrease in the truncated foot length ($p=0.02$).

Conclusion: This study demonstrated that both weight reduction and increased physical activity can influence foot structure and function, although a greater change was found in the increased physical activity group than in the weight reduction group.

Zhao, X., et al. Increasing Physical Activity Might Be More Effective to Improve Foot Structure and Function than Weight Reduction in Obese Adults. *J Foot Ankle Surg.* 2018, Sept-Oct; 57(5): 876-879.

THIRTY DAY ADVERSE EVENTS AFTER VERTEBROPLASTY

Vertebral compression fractures (VCFs) are a leading cause of morbidity among the elderly. This study was designed to better understand the incidence and risk factors for 30-day adverse outcomes among patients who undergo vertebroplasty or kyphoplasty.

Data were obtained from the American College of Surgeons' National Surgical Quality Improvement Program Database, collected from more than 400 North American medical centers. Postsurgical data were reviewed for 30-day outcome variables, with postoperative complications including wound complications, respiratory complications and cardiac complications.

Of the 2,433 patients included in the study, 242 underwent vertebroplasty and 2,191 underwent kyphoplasty. The overall, thirty-day readmission, reoperation and mortality rates were 10.6%, 3.6% and 2.0%, respectively. A greater risk of 30-day readmission was found among those who were 76 to 89 years of age ($p=0.013$), or 90 years of age or older ($p=0.001$). Comorbidities which increased the risk of readmission were COPD, (OR=1.77), disseminated cancer, (OR=2.98), chronic steroid use, (OR=2.21) and undergoing vertebroplasty as compared with kyphoplasty, (OR=1.65).

Conclusion: This retrospective study of patients with vertebral compression fractures revealed that the 30-day readmission rate after kyphoplasty and/or vertebroplasty was 10.6%.

Choo, S., et al. 30-day Adverse Outcomes, Re-admissions and Mortality following Vertebroplasty/Kyphoplasty. *Clin Neurol Neurosurg.* 2018; 174, November: 129-133.

IBUPROFEN GEL WITH PHONOPHORESIS FOR KNEE OSTEOARTHRITIS

Phonophoresis combines ultrasound with topical pharmacologic agents. Several studies have demonstrated the effectiveness of nonsteroidal anti-inflammatory drugs (NSAIDs) applied by phonophoresis in patients with osteoporosis (OA) of the knee. As studies have not produced consistent results, this study compares the clinical effectiveness of gel and cream forms of ibuprofen used in phonophoresis for OA of the knee.

Adult patients with clinical OA of the knee were randomized to receive either gel phonophoresis or cream phonophoresis. Both groups received five sessions per week for two weeks to the index knee. Gel and cream forms of five percent ibuprofen were used with ultrasound set at 1 MHz with an intensity of 1 W per centimeter squared for five minutes. All patients were assessed at baseline and follow-up for demographic variables, body mass index, radiographic

grading of the index knee, with outcome measures including pain as graded on a visual analog scale (VAS) and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).

Both groups had significant reductions in VAS pain measures from baseline to follow-up ($p<0.001$). Significant improvement in WOMAC scores was found for the gel ($p<0.001$) as well as the cream ($p<0.05$) groups. The gel group showed more improvement than the cream group in the VAS pain ($p=0.003$) WOMAC-pain ($p=0.001$), WOMAC-stiffness ($p=0.012$), WOMAC-physical function ($p<0.001$) and WOMAC total scores ($p<0.001$).

Conclusion: This study of patients with osteoarthritis of the knee found that ibuprofen phonophoresis is effective, and is best delivered using gel rather than a cream.

Benlidayi, I., et al. Comparative Short-Term Effectiveness of Ibuprofen Gel and Cream Phonophoresis in Patients with Knee Osteoarthritis. *Rheumatol Int.* 2018, October; 38(10):1927-1932.

REHABILITATION FOLLOWING LOWER LIMB MUSCLE INJURY

After a muscle injury, the risk of reinjury after return to play is elevated, particularly at the site of the original injury. This study was designed to determine the relationship between rehabilitation training loads and return to play time, as well as subsequent injury rate.

This investigation included participants in an Australian football club who had sustained a noncontact lower limb injury. Data were obtained for subsequent injuries within the same season. Rehabilitation was started on the day of injury and concluded on the day of the athlete's return to play. Rehabilitation periods included, stage I (characterized by absence of running loads), stage II (characterized by the beginning of running and non-football contacts) and stage III (resumption of group football training). Data collected

included chronic training load, calculated by the average weekly load over four weeks, total load and average weekly load at each stage of rehabilitation.

Of the 85 athletes with muscle injuries, 70 underwent rehabilitation until return to play. Of these, 11.8% sustained a recurrent injury, with 31.4% having an injury at a new site. The risk of recurrent injury was reduced among those with greater time spent in stage I, and greater total rehabilitation accumulated load. Those who were allowed to return to play within four days of injury had a significantly higher risk of subsequent injuries, as compared to those with a longer delay.

Conclusion: This study of Australian football players found that, after a muscle injury to the lower extremity, higher rehabilitation training loads can delay return to play, but can protect against subsequent injury.

Stares, J., et al. How Much Is Enough in Rehabilitation? High Running Workloads following Lower Limb Muscle Injury Delay Return to Play but Protect against Subsequent Injury. *J Sci Med Sport*. 2018, October; 21 (10): 1019-1024.

HIGH INTENSITY INTERVAL TRAINING FOR OVERWEIGHT ADULTS

Current public health guidelines recommend at least 30 minutes of moderate exercise per day. However, time is often cited as a barrier to compliance. An alternative approach is high intensity interval training (HIIT), defined as brief, intermittent bursts of vigorous activity, interspersed by periods of rest. This study investigated the compliance of overweight individuals in a one-year program of unsupervised HIIT, and the outcome of this participation.

Subjects were 18 years of age and older with a body mass index (BMI) of at least 27 kg/m who had no history of cardiovascular disease or serious medical issues. Data collected included weight, body composition, blood pressure, aerobic fitness indices and serum lipids. Participants chose whether to follow current exercise recommendations or HIIT. The HIIT participants used a cycle ergometer

to produce three intervals of up to 30 seconds of near maximum effort to obtain perceived effort of 8/10 or greater. The traditional exercise group underwent 30 minutes per day of moderate intensity exercises. Changes in baseline data were compared after 12 months.

Of the initial group, 104 participants (41.6%) elected to try HIIT. At 12 months there were no differences between exercise groups in weight loss, or visceral fat, though the HIIT group reported greater enjoyment of physical activity ($p=0.01$). Compliance with three or more sessions of HIIT per week fell from 40% at week one to 10.8% at 12 months.

Conclusion: This study comparing traditional with high intensity interval training exercises found that the high intensity exercise was more accepted than standard exercise, though adherence at one year was low.

Roy, M., et al. High Intensity Interval Training in the Real World: Outcomes From a 12-month Intervention in Overweight Adults.

Med Sci Sports Exerc. 2018, September; 50(9):1818-1826.

LOW-DOSE TRAZODONE AND NURSING HOME FALLS

Recent studies have shown a decline in benzodiazepine prescribing in nursing homes, thought to be due to the risk of cognitive impairment, falls, and related adverse events. Concurrent with this decline has been an increase in the off-label use of trazodone as a sedative in this population. This study evaluated the comparative risk of fall-related injuries among nursing home residents who are prescribed benzodiazepines or trazodone.

This retrospective study of nursing home residents >65 years of age included 7,791 new users of low-dose trazodone and 7,791 new users of benzodiazepines. The primary outcome was cumulative incidence of a fall-related injuries which resulted in visits to the emergency department (ED) or resulted in acute care hospitalization.

A multivariate analysis found no significant difference in the cumulative incidence of fall-related injuries between the new trazodone

users and the new benzodiazepine users ($p=0.43$). Lorazepam was the most commonly prescribed benzodiazepine.

Conclusions: This retrospective study of nursing home patients found that the risk of falls did not differ between those newly prescribed trazodone and those newly prescribed a benzodiazepine.

Bronskill, S., et al. Low-Dose Trazodone, Benzodiazepines, and Fall-Related Injuries in Nursing Homes: A Matched-Cohort Study. *J Am Geriatr Soc*. 2018, October; 66(10):1963-1971.

STATIN USE AND KNEE OSTEOARTHRITIS

Several studies have demonstrated the cumulative impact of metabolic disorders on the onset or progression of knee osteoarthritis (OA). Among these were small studies demonstrating that serum cholesterol and triglyceride levels are associated with bone marrow lesions. This study investigated the association between treatment with statins and the progression of OA of the knee.

This randomized double-blind placebo-controlled trial included adult patients from 18 countries presenting with OA of the knee. Subjects were

50 years of age and older with symptomatic and radiographic evident knee OA. Data recorded at baseline included statin use, as well as body mass index and radiographic assessment. Patients were followed for three years for radiographic progression.

Of the 336 patients assessed, 71 were statin users. The statin users had a higher rate of radiographic progression of OA ($p=0.007$). In the adjusted analysis the radiographic progression remained significantly associated with the use of statins ($p=0.01$).

Conclusion: This prospective study suggests that among patients with osteoarthritis of the knee, those who take statins are more likely to have radiographic progression.

Eymard, F., et al. Statin Use and Knee Osteoarthritis Progression: Results from a Post Hoc Analysis of the SEKOIA Trail. *Joint Bone Spine*. 2018; 85:609-614.

SHORT-TERM MUSCULAR EFFECTS OF KINESIOTAPE

A number of studies have suggested that Kinesiotape may be effective for the treatment of shoulder pathologies. This study explored the effects of Kinesiotape after rotator cuff surgery.

Subjects were adults with a rotator cuff tear, with surgical repair less than six weeks prior to enrollment. The patients were randomized to receive either Kinesiotape (KT), sham tape (ST) or no tape (NT). Those randomized to the KT condition underwent taping according to the method of Kenzo Kase. Those in the sham tape (ST) condition were taped horizontally at the distal insertion of the deltoid.

At six and 12 weeks, the subjects answered questions of the Quick Disabilities of the Arm Shoulder and Hand (DASH) to assess physical function symptoms. For each testing condition, the muscular activity of the trapezius, deltoid and infraspinatus were measured using EMG, conducted by an evaluator held blind to the condition (with taping hidden by a long sleeve shirt worn by the patient)

There was no significant difference between the groups in scores on the DASH and VAS pain scores at six and 12 weeks. At six weeks, during active forward flexion, muscular activity was greater in the KT than the ST condition for the posterior deltoid ($p=0.013$) and the infraspinatus ($p=0.004$). At 12 weeks the muscular activity was greater in the KT than in the ST group in the middle as well as the posterior deltoid ($p=0.001$ for both comparisons). A decrease in the upper trapezius recruitment was found in the KT group with increased flexion ROM at six weeks in both the KT and ST groups.

Conclusion: This study of patients with recent rotator cuff surgical repair found that Kinesiotape decreases activity of the upper trapezius, as compared to sham taping, with no difference between the groups in pain at six or 12 weeks.

Reynard, F., et al. Immediate and Short-Term Effects of Kinesiotaping on Muscular Activity, Mobility, Strength and Pain after Rotator Cuff Surgery: A Crossover, Clinical Trial.

BMC Musculoskel Dis. 2018; 19:305.

DAYS BETWEEN MATCHES AND MUSCLE INJURY RATES IN SOCCER

Studies have found that muscle fatigue may last more than 72 hours after a professional soccer match. However, nearly one third of matches for top level professional soccer teams are played within a 72-hour interval. This study compared the injury rates to the days of rest between match play.

This study used a *post hoc* analysis of data gathered during 14 consecutive seasons in a prospective cohort study of 57 professional European soccer teams from across 16 countries. All first team players were invited to participate, with a total of 2,672 players included. Individual exposure during matches was recorded, with injuries and participation records reviewed. The intervals between matches and the total number of hours of match exposure were compared to the rate of injury.

During 166,433 match hours, 4,083 injuries were reported, resulting in an injury rate of 24.5/1,000 match hours, and a muscle injury rate of 9.4/1,000 match hours. Compared with three or less days between matches, the muscle injury rate was 20% lower with six to ten day intervals. There was no difference in injury rates between three or less days and four days between matches, suggesting that a recent rule change by the World Football Academy would have no effect on the rate of injury.

Conclusion: This analysis of elite professional soccer players found that muscle injury rates were lower when players were given at least six days between match play, as compared to three or less days.

Bengtsson, H., et al. Muscle Injury Rate in Professional Football is higher in Matches Played within Five Days since the Previous Match: A 14- Year, Prospective Study with More Than 130,000 Match Observations. *Br J Sports Med.* 2018; 52(17): 1116-1122.

EXERCISE FOLLOWING RESOLUTION OF POST CONCUSSIVE SYMPTOMS

For children and adolescents, guidelines for return to play following concussion recommend a gradual increase in activity, with monitoring for post-concussive symptoms. The authors examined the effect of exercise on PCS and cognition in children and adolescents following the resolution of symptoms post-concussion.

This study included 41 males and 39 females, ranging in age from eight to 18 years, each of whom had been diagnosed with a concussion at an emergency room visit, (CON group). Healthy controls, (HC group), were also recruited, comprising non-injured adolescents, matched for age and cognitive function.

At day two following symptom resolution, the subjects completed an exercise protocol (the McMaster All- Out Progressive Continuous Cycling Test) and post-exercise tests of post-concussive symptoms, using the Cog Sport Symptom Scale (CogSport SS) and a computer-based assessment of cognitive efficacy (the CogSport).

Results of the CogSport SS demonstrated that the HC group reported an average increase of three symptoms from pre-to post-exercise, while the CON group reported an average decrease by nearly 1.5 symptoms. For the CogSport SS composite, the CON group demonstrated faster reaction times than did the HC group, with this effect more pronounced on the more demanding tasks.

Conclusion: This study of children and adolescents, ranging in age from eight to 18 years, found that exercise did not result in a cognitive decline or greater symptom emergence, as compared with healthy controls.

Anderson, V., et al. Impact of Moderate Exercise on Post-Concussive Symptoms and Cognitive Function after Concussion in Children and Adolescents, Compared to Healthy Controls. *Int J Sports Med.* 2018; 39(9): 696-703.

TRIAMCINOLONE IN IDIOPATHIC CARPAL TUNNEL SYNDROME

Subsynovial connective tissue fibrosis and vascular proliferation have been reported as significant factors in the development of carpal tunnel syndrome (CTS). This fibrosis impedes the normal motion of the median nerve and may result in nerve compression between the flexor tendons and flexor retinaculum. This study examined the effect of steroid treatment on fibrosis development.

Subsynovial connective tissue samples were obtained from patients with CTS, as well as from fresh cadavers with no history of CTS. Collagen gels were prepared from these cells, with these gels treated with either 10 M of triamcinolone acetonide (TA) or vehicle. Using a gel contraction model as a measure of fibroblast activation, the gels were photographed every four hours for three days, in order to calculate the contraction rate. The tissue was then harvested for analysis.

In all cases, cells treated with TA had significantly higher contraction rates ($p < 0.001$), tensile strength ($p < 0.001$) and stiffness ($p < 0.001$)

than did the untreated gels. When the control group was compared with the TA-supplementation group, nine genes in the human fibrosis array were up-regulated and 11 were down regulated. In the TA supplemented CTS cells, the addition of TA was found to modulate tumor growth factor beta signaling, with fibrotic genes and 6 ECM regulators down regulated. This finding suggests that TA may work in part by decreasing fibrotic gene expression.

Conclusion: This study demonstrates that steroids can affect cell regulation and gel structural integrity and regulate fibrotic gene expression, thus affecting carpal tunnel syndrome by modulating cellular function.

Yang, T., et al. Triamcinolone Acetonide Affects TGF-Beta Signaling Regulation of Fibrosis in Idiopathic Carpal Tunnel Syndrome. *BMC Musculoskel Dis.* 2018; 19:342.

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MUSCULOSKELETAL IN REVIEW

**Produced by the Department of
Rehabilitation Medicine, Emory
University School of Medicine**

Expanding the frontier of medicine in research, teaching, and patient care