MUSCULOSKELETAL

IN REVIEW

TM

Volume 2, Number 3 | Published by Physicians Specializing In Musculoskeletal Medicine | May 5, 2015

ATHLETE RECALL VERSUS CLINICALLY DOCUMENTED CONCUSSION

Recurrent concussion is thought to be associated with adverse health effects, including cognitive, neurobehavioral and somatic conditions. A weakness in the knowledge of the long-term effects of concussion in the former athlete is the absence of information regarding the validity of athlete recall. This study estimated the agreement between athlete recall and clinically documented concussion.

Former college athletes who had played at the University of North Carolina at Chapel Hill between 1987 and 2012 were sent online Qualtrics questionnaires concerning concussion history. The participants were asked to report the number of concussions that they had sustained during participation in high school, college and professional sport. For those with concussions during college, the athletes were asked the dates of injuries. The participants were asked about Impacts that they had sustained which they thought should have been, but had not been, diagnosed as concussions by team medical staff. Responses to these questionnaires were linked to clinical records collected by the University athletic department concerning concussions during participation.

The recall data indicated that 43.8% had sustained one or more concussions during college, with 40.8% occurring during collegiate sports. The clinically documented concussion data indicated that 22.3% had sustained one or more concussions during college. The athletes failed to recall 31.6% of the clinically documented concussions, with no clinical documentation associated with 79.6% of the athlete- recalled concussions. Of those who did not disclose their concussions, 90.9% did not think that the event was serious enough to report.

Conclusion: This study of former collegiate athletes found a low agreement between athlete recalled and clinically documented concussion history.

Kerr, Z., et al. Agreement between Athlete – Recalled and Clinically Documented Concussion Histories in Former Collegiate Athletes. **Am J Sport Med.** 2015, March; 43: 606-612.

EPIDURAL STEROIDS VERSUS ORAL GABAPENTIN FOR RADICULAR PAIN

Low back pain (LBP) has been a leading cause of years lost to disability over the past several decades. Treatments for LBP have included epidural steroids, as well as oral medications, including gabapentin. This study compared the efficacy of a single epidural steroid injection versus oral gabapentin for patients with lumbosacral radicular pain.

Subjects were patients at least 17 years of age each diagnosed with radicular leg pain due to a herniated disc or spinal stenosis. The participants received epidural steroid injections plus placebo pills, or sham injections plus gabapentin, titrated to 1800 to 3600 mg per day. The primary outcome measure involved rating of the intensity of leg pain at one and three months after the intervention. The secondary outcome measures included worst leg pain, and average and worst back pain scored using the Oswestry Disability Index.

Of the 145 patients, 73 were included in the injection group and 72 in the gabapentin group. At one month, both groups experienced similar reductions in average leg pain scores from baseline with no significant difference between the groups. At three months, improvements in average leg pain persisted with no significant difference between the groups. For secondary outcome measures small differences were seen between the groups, favoring injections for worst leg pain scores and successful outcomes (p=0.04 and p=0.02, respectively).

Conclusion: This randomized controlled trial of patients with lumbosacral radicular pain due to herniated disc or spinal stenosis found that oral gabapentin and epidural steroid injections have similar effects on pain intensity at one and three months, although steroids may have a slight advantage in reducing worst leg pain at one month.

Cohen, S. Epidural Steroid Injections Compared with Gabapentin for Lumbosacral Radicular Pain: A Multicenter Randomized Double-Blind Comparative Efficacy Study. **Br Med J** 2015, April 16; 350: h1748.

BOTOX DECREASES CALCITONIN GENE RELATED PEPTIDE IN CHRONIC MIGRAINES

A significant portion of patients with chronic migraine (CM) do not respond effectively to preventative medications alone or in combination. OnabotulinumtoxinA was approved for the prevention of CM in 2010. Changes from within the brain are thought to activate the trigeminovascular system, which results in the local release of vasoactive neuropeptides from presynaptic nerve terminals. These include calcitonin gene related peptide (CGRP), vasoactive intestinal peptide (VIP), or pituitary adenylate cyclase activating polypeptide (PACAP). This release induces vasodilation and neurogenic inflammation, giving rise to pulsating migraine pain. This study was

designed to determine whether treatment with OnabotulinumtoxinA induces changes in plasma CGRP concentrations.

Subjects were 83 patients with chronic migraine who had failed, because of either poor efficacy and/or tolerability to treatment with at least two prophylactic medications. The patients were maintained on prior oral preventative medications and received OnabotulinumtoxinA injections at least twice during a 12 week period. Levels of CGRP were determined before and one month after treatment.

The level of CGRP after OnabotulinumtoxinA treatment was significantly decreased as compared to baseline ($p<0.001$). Sixty-four of the patients responded, while 19 did not notice any change. Pretreatment CGRP levels of the responders were significantly higher than of those of the nonresponders ($p<0.001$). One month after treatment, CGRP levels did not change in non-responders, but significantly decreased in responders ($p=0.003$).

Conclusion: This study of patients with chronic migraines suggests that a mechanism of action of the treatment is the reversal of peripheral and central sensitization, resulting from the inhibition of the release of calcitonin gene related peptide.

Cernuda-Morollo, E et al**.** OnabotulinumtoxinA decreases Interictal CGRP Plasma Levels in Patients with Chronic Migraine. **Pain,** 2015, May; 156(5): 820 –824.

EARLY OSTEOARTHRITIS AFTER ACL RECONSTRUCTION

Previous studies have suggested that the prevalence of knee osteoarthritis (OA) is as high as 90% one decade after anterior cruciate ligament (ACL) injury. This study assessed the prevalence of knee OA one year after ACL repair.

Subjects were 111 consecutive patients, 18 to 50 years of age, with ACL injury, all of whom had undergone a single bundle hamstring tendon autograph ACL repair. In addition, 20 uninjured, asymptomatic, matched controls were recruited for comparison. All patients underwent MRI at baseline and at one-year follow -up. These MRIs were read by a musculoskeletal radiologist who determined the presence or absence of OA. Preoperative scans were unavailable for analysis.

At one-year follow-up, the MRIs demonstrated that 31% of the participants had knee OA. Of those, 19% had tibiofemoral OA and 17% had patellofemoral OA. None of the controls demonstrated OA. Those who underwent a partial meniscectomy at the time of repair were more likely to have tibiofemoral OA than those who did not. A body mass index of over 25 kg/m^2 was associated with an increased risk of tibiofemoral osteophytes and patellofemoral bone lesions. Older age and male gender were associated with a significantly elevated risk of patellofemoral OA and osteophytes.

Conclusion: This study of patients undergoing anterior cruciate ligament repair found that, at one year, 31% demonstrated evidence of osteoarthritis of the knee.

Culvenor, A., et al. Early Knee Osteoarthritis is Evident One Year following Anterior Cruciate Ligament Reconstruction. A Magnetic Resonance Imaging Evaluation. **Arthritis and Rheum.** 2015, April; 67 (4): 946-955.

CONCUSSION AND BATTING PERFORMANCE

After concussion, cognition is often impaired for weeks to months. Patients often complain of slowed thinking or response speed, mental fogginess, and poor concentration. As concussions account for over two percent of all time loss injuries in major league baseball, this study examined the relationship between concussion and batting performance.

This retrospective cohort study identified major league baseball players who sustained a concussion, examining batting metrics before and after the injury. This change in batting metrics was then compared to players who missed playing time by going on maternity or bereavement leave. Data were included for all events among players who had played in the major league regular season for at least two weeks before the event. The outcome data chosen were batting average (AVG) on- base percentage (OBP) slugging percentage (SLG) calculated as [singles + (2 × doubles) + (3 × triples) + (4 × home runs)]/official at-bats), OBP plus slugging percentage (OPS), walk percentage (walks per plate appearances), strikeout percentage (strikeouts per at-bats), and home run percentage (home runs per at-bats).

Data were retrieved concerning 187 events of concussion, bereavement and paternity leave. Among players with concussion, batting performance declined during the two weeks after return from leave, while those in the other groups were found to have improvement in nearly all metrics. This difference was significant for AVG ($p=0.005$), OBP ($p=0.01$), SLG ($p=0.004$) and OPS ($p=0.003$). However, the differences between groups were not apparent beyond two weeks after return.

Conclusion: This study of major league baseball players with time lost due to concussion found that concussed players perform worse in the two weeks following return from a concussion injury.

Wasserman, E et al. Concussions Are Associated With Decreased Batting Performance Among Major- League Baseball Players. **Am J Sports Med.** 2015, May: 43(5):1127–1133.

AUTONOMIC DYSFUNCTION WITH PERSISTENT POSTCONCUSSION SYMPTOMS

Concussions are common in children and adolescents, with most recovering within seven to 10 days. An association has been found between specific concussion symptoms and protracted recovery, with dizziness suggest to be a potential predictor of this persistence. This study was designed to characterize orthostatic intolerance among young

patients with persistent postconcussive symptoms.

This prospective study included patients, 13 to 18 years of age, referred to a pediatric neurology headache clinic for management of postconcussive symptoms. All subjects complained of ongoing symptoms, including lightheadedness, at three weeks to six months post-injury. All participants were assessed for symptoms on the day of evaluation, and underwent a head-upright tilt table (HUT) study. At that evaluation, 70.6% had abnormal results, with isolated syncope in 29.4%, and postural tachycardia syndrome (POTS) in 41.2%. The HUT test scores were compared to the postconcussive symptom scores.

Fifty percent of the patients with POTS also demonstrated syncope or intermittent syncope between five and 10 minutes of testing. Patients with POTS had higher lightheadedness ratings than did the normal and syncope group ($p<0.001$). Patients with POTS also had higher post-concussion scores than did normal patients ($p<0.001$). At follow-up, nine of 12 patients no longer met the POTS diagnostic criteria.

Conclusion: This study of adolescents with persistent postconcussive symptoms found that the majority had evidence of autonomic dysfunction, revealed by head-upright tilt table testing.

Heyer, G., et al. Orthostatic Intolerance and Autonomic Dysfunction in Youth with Persistent Postconcussion Symptoms: A Head Upright Tilt Table Study. **Clin J Sp Med.** 2015. DOI: 10.1097/ JSM.0000000000000183

EFFECT OF EXERCISE ON ABDOMINAL OBESITY AND GLUCOSE TOLERANCE

Exercise is thought to be important for individuals who wish to reduce obesity and related glucose tolerance. This randomized, clinical trial investigated the separate effects of habitual exercise, differing in amount and intensity, on abdominal obesity and glucose tolerance.

This randomized, controlled trial included 300 sedentary, obese adults. The subjects were randomized to a control group receiving no exercise (C), a low amount/low intensity group (LALI), a high amount/low intensity (HALI) group and a high amount high-intensity group (HAHI). Target heart rates were adjusted to maintain VO_2 peak at 50% for the low intensity and 75% for the high-intensity groups, respectively. At these exercise intensities, the target amounts of exercise for women and men, respectively, were 180 and 300 kcal for the low amount group, and 360 and 600 kcal for the high amount groups. The primary outcome measures were waist circumference and two-hour glucose tolerance, measured at baseline, 16 weeks and 24 weeks. Secondary measures included measures of cardiovascular fitness.

Reductions in the waist circumference at 24 weeks were greater in all exercise groups ($p<0.001$ for all) than the control group, but did not differ between the exercise groups. Reductions in the two-hour glucose levels at 24 weeks were greater in the HAHI group than in the control ($p=0.027$) and LALI ($p=0.03$) groups. No significant changes were noted for the LALI or HALI groups. Compared with the control group, body weight and cardiorespiratory fitness levels were significantly improved in all exercise groups, although cardiorespiratory fitness improved with increased volume and intensity of exercise.

Conclusion: This study of patients with abdominal obesity found that obesity decreases with exercise, regardless of intensity, although only high-intensity exercise can reduce two-hour glucose levels.

Ross, R., et al. Effects of Exercise Amount and Intensity on Abdominal Obesity and Glucose Tolerance in Obese Adults. **Ann Intern Med**. 2015, March 3; 162(5): 325-334.

EXERCISE PRESCRIPTION AFTER OSTEOPOROTIC VERTEBRAL FRACTURE

Osteoporotic vertebral fracture is common among people with osteoporosis, and is linked with a reduced quality of life. Although exercise is recommended as a component of the management of osteoporosis, it is unclear whether exercise intervention has benefits among those with osteoporotic vertebral fractures. This literature review evaluated the benefits and harms of exercise among adults with a history of osteoporotic vertebral fracture.

A literature review was completed of men and women over the age of 40, with a history of nontraumatic or minimal trauma osteoporotic fracture of the vertebrae, treated with exercise. The primary outcome variable was the incidence of future fractures and adverse events. The literature review identified seven studies, including 480 participants. Four adverse events to this were reported, including three fractures (fracture of the costal cartilage, rib fracture and metatarsal fracture), that were directly attributable to exercise. For secondary outcomes, the data demonstrated that exercise improves pain, performance on the timed get up and go test, walking speed, back extensor strength, trunk muscle endurance and quality-of-life.

Conclusion: This literature review revealed an absence of large, randomized trials of the effects of exercise on patients with osteoporotic vertebral fractures. The data do, however, suggest that exercise can improve pain, performance and quality of life.

Kasch, R., et al. Exercise Prescription for People with Osteoporotic Vertebral Fracture. **Br J Sport Med.** 2015, April; 49(7): 489-490.

NERVE BLOCK AND NEUROTOMY FOR SPASTIC EQUINOVARUS FOOT

Spastic equinovarus foot is a common deformity among patients with hemiplegia. Treatment for this condition includes physical therapy, stretching, orthoses, functional electrical stimulation, chemical neurolysis with phenol, alcohol, botulinum toxin, tendon transfers and selective tibial neurotomy. This study compared the effect of a diagnostic motor nerve block with anesthetics, with that of a selective tibial neurotomy.

Patients were consecutively recruited by an interdisciplinary spasticity group at a university hospital. All participants underwent a diagnostic nerve block with a one mL dose of lidocaine 2% at the different motor branches of the tibial nerve until the triceps spasticity had disappeared. The patients then underwent a neurotomy of the same branches of the tibial nerve. Before and after diagnostic nerve block, and two months and two years after selective tibial neurotomy, spasticity, muscle strength, passive range of ankle motion, gait parameters and gait kinematics were assessed.

Of the 144 consecutive patients who

benefited from a diagnostic nerve block, 49 met the inclusion and exclusion criteria, and underwent surgery. Thirty of the 49 patients completed the study. At two-year follow-up the decrease in spasticity and improvement in gait kinematics were similar after the diagnostic nerve block and two years after neurotomy.
Conclusion: This study of patients with spastic equinovarus foot secondary to hemiplegia found that a diagnostic nerve block with anesthetics is an effective tool in predicting the result of a tibial neurotomy.

Deltombe, T., et al. Comparison between Tibial Nerve Block with Anesthetics and Neurotomy in Hemiplegic Adults with Spastic Equinovarus Foot. **Ann Phys Rehab Med**. 2015, April; 58(2): 54-59.

EXERCISE THERAPY AND INFLAMMATORY MARKERS FOR KNEE OSTEOARTHRITIS

The knee is the joint most commonly affected by osteoarthritis (OA). Although initially considered a non-inflammatory disease, recent studies have demonstrated the role of cytokines and prostaglandins in cartilage destruction. This study assessed the effects of an exercise therapy protocol on physical performance, pain and inflammatory markers.

Subjects included ambulatory patients with radiographically demonstrated OA of the knee. Excluded were those with a history of ligament or meniscus injury at the knee, or other medical issues that might reduce their ability to participate. All participants underwent 12 weeks of training involving three, weekly, 80-minute sessions, including strength and flexibility exercises. Three sets were performed for each muscle group. Before and after the exercise Intervention, blood was collected for measures of inflammatory markers, including IL-6, TNF-alpha and soluble TNF-alpha receptors. Pain perception was measured using the visual analogue scale (VAS), as well as the WOMAC.

The average VAS score was decreased from 6.6 at baseline to 2.5 after training ($p<0.001$). The stiffness subscale, the physical functional subscale, as well as the global scale of the WOMAC were all significantly improved after training ($p<0.004$, $p<0.001$ and $p<0.001$, respectively). After the exercise protocol, a reduction was seen in serum IL-6, with the other markers failing to show a statistically significant change.
Conclusion: This study of patients with osteoarthritis of the knee found that strengthening exercise could reduce some markers of inflammation, while decreasing pain and increasing function.

Aguiar, G., et al. Effects of Exercise Therapy Protocol on Inflammatory Markers, Perception of Pain and Physical Performance in Individuals with Knee Osteoarthritis. **Rheumat Intern.** 2015, March; 35 (3): 525-531

ULTRASOUND IN CARPAL TUNNEL SYNDROME WITH NORMAL NERVE CONDUCTION STUDIES

Carpal tunnel syndrome (CTS) is typically confirmed by nerve conduction studies (NCS). However, recently, it has been demonstrated that high-resolution sonography can detect an absolute or relative enlargement of the median nerve proximal to the edge of the flexor retinaculum in cases of CTS. This study further assessed the utility of ultrasound for patients with clinically definite CTS who have normal NCS results.
This prospective, blinded, cross-sectional study included 35 patients with clinically definite CTS and normal NCS results, as well as 20 healthy, matched controls. All subjects underwent neurologic testing, including provocative testing for CTS, sensorimotor examination and routine median and ulnar NCS. Using a high resolution sonography, the median nerve cross-sectional area (CSA) was measured at the level of the pisiform bone. In addition, the flexor retinaculum thickness (FRT) was measured.
The mean CSA was significantly higher in the patients with clinical CTS than in the control patients ($p=0.001$), with 17 of 35 patients and one of 20 controls demonstrating a CSA above 9.5 mm^2 ($p=0.001$). In addition, FRT was significantly greater in the CTS patients than in the control patients ($p= 0.001$).
Conclusion: This study of patients with clinically definite carpal tunnel syndrome who had normal nerve conduction studies found that half of the cases could be confirmed by high-resolution ultrasound.

Al-Hashel, Y., et al, Sonography in Carpal Tunnel Syndrome with Normal Nerve Conduction Studies. **Muscle Nerve.** 2015, April; 51(4): 592-597.

INTRA-ARTICULAR INJECTIONS IN THUMB OSTEOARTHRITIS

Osteoarthritis (OA) of the carpometacarpal joint of the thumb is thought to affect at least 30% of women over the age of 65. While intra-articular corticosteroid use is often studied in patients with hip and knee OA, studies of intra-articular therapy for thumb OA are scarce. This systematic literature review was designed to better assess the effects of intra-articular injections for OA of the thumb.
A systematic literature review was performed of studies of OA of the thumb, which included treatment with intra-articular injections of corticosteroids and/or hyaluronic acid. Outcome measures included pain and/or functional capacity and/or pinch force.
The meta-analysis included 428 patients, with 168 treated with hyaluronic acid, 166 with corticosteroid and 94 with placebo injections. Among studies of hyaluronic acid versus placebo, hyaluronic acid was superior for functional improvement, but not for pain. Among those comparing hyaluronic acid and steroid injections, no difference was noted between the groups at short-term follow-up, although hyaluronic acid seemed superior on pulp pinch force status, while steroids were superior for pain relief at week 24.
Conclusion: This literature review of patients with osteoarthritis of the thumb found corticosteroids to be useful for decreasing pain, while hyaluronic acid may be useful to increase function at 24 weeks after injection. The authors note that the great heterogeneity of the results limits a clear understanding of the efficacy of each.

Him, S., et al. Intra-Articular Injections in Thumb Osteoarthritis: A Systematic Review and

Meta-Analysis of Randomized, Controlled Trials. **Joint, Bone, Spine.** DOI:10.1016/ j.jbspin.2015.02.002

OPIOIDS FOR DIABETIC PERIPHERAL NEUROPATHY

It is estimated that 20% of all diabetic patients experience chronic neuropathic pain. Only duloxetine and pregabalin are currently approved by the FDA for treating diabetic peripheral neuropathy (DPN). Tramadol or opioids are generally recommended as third line agents for moderate to severe pain. This study was designed to better understand the opioid prescription patterns for patients with DPN.

A 10% random sample of IMS -Lifelink Health Plan claims data were obtained from 1998 to 2008. Adult patients were identified with a diagnosis of DPN, with data further assessed for demographics, comorbidities and medication prescriptions. Medications considered as prescribed for DPN included opioids, antidepressants, anticonvulsants, nonsteroidal anti-inflammatory drugs, topical agents and skeletal muscle relaxers.

A total of 363,241 patients diagnosed with diabetes were identified, with 666 meeting all the inclusion criteria. Of patients with DPN, pharmacologic treatment for the DPN was observed for 43.2%. Of those who received DPN related pharmacologic treatment, 53.47% were prescribed opioids. The most common first-line agents for DPN were opioids 33%, antidepressants 26.39%, anticonvulsants 22.5%, nonsteroidal anti-inflammatory drugs 19.09% and skeletal muscle relaxants 5.21%. The FDA approved agents duloxetine and pregabalin, were used in 1.04% and 5.56% of the cases, respectively. Twenty-two percent of DPN patients exclusively used opioids for DPN.

Conclusion: This study found that, of patients with diabetic peripheral neuropathy, 57% did not receive prescription pharmacologic treatment. Among those with prescriptions, opioids were the most frequently prescribed, first-line agents.

Patil, P., et al. Opioid Use in the Management of Diabetic Peripheral Neuropathy (DPN) in a Large Commercially Insured Population. **Clin J Pain.** 2015, May; 31(5): 414-424.

TOTAL CONTACT INSOLES FOR PLANTAR FASCIITIS

Plantar fasciitis is characterized by pain and stiffness in the heel and medial arch of the foot. While insoles are often prescribed as a treatment, little is known about the relative effects of prefabricated and custom made insoles. This study assessed the efficacy of custom made insoles on pain, function, distribution of load, gait, quality of life and satisfaction.

This double-blind, placebo-controlled trial included 74 patients with plantar fasciitis. The patients were randomized to receive either custom-made insoles (treatment group), or flat insoles (control group). Insole use was titrated up to daily wear for six months. Subjects were assessed at baseline and at 45, 90 and 180 days using a visual analogue scale for pain, 6 minute walk test, the foot function index, the foot health status questionnaire, the medical outcomes study short form – 36 and a Likert scale for patient satisfaction.

Significant improvement in pain while walking was documented in the treatment group, as compared to the control group (p=0.008). Both groups demonstrated improvement, with no difference between groups for pain at rest, foot pain, foot function, general foot health, general health and physical activity subscales of the foot health status questionnaire, or for subscales of the SF-36. Further, no difference between the two groups was noted in patient satisfaction.

Conclusion: This randomized, controlled trial of patients with plantar fasciitis found that total contact insoles reduced pain while walking, as compared to flat insoles, but did not result in a greater improvement in patient satisfaction.

Oliveira, H. Effectiveness of Total Contact Insoles in Patients with Plantar Fasciitis. J Rheum. 2015, May; 42(5): 870-878.

TIME TO RETURN TO TRAINING AFTER STRESS FRACTURES

The incidence of stress fractures in military recruits can be as high as 12%. In addition, those who sustain a stress fracture during basic training are at higher risk of subsequent stress fractures. As little is known about the length of time required for rehabilitation and return to pre-injury level of physical activity after these injuries, this study used longitudinal prospective data to help clarify this issue.

Subjects were 4,200 Marines undergoing commando training between April of 2004 and April of 2008. Among these, 220 stress fractures were diagnosed. When diagnosed, the patients were removed from training and placed in physiotherapy and rehabilitation. When fully recovered, they were placed in a recovery group to regain fitness and military skills. Data were reviewed for stress fracture type and course of recovery.

The most common stress fracture sites were metatarsal 65%, tibia 24%, femur 10%, and fibula 3%. The mean rehabilitation time for a single metatarsal was 12.2 weeks, multiple metatarsals 15.4 weeks, tibia 21.1 weeks, fibula 13.3 weeks and femur 21.1 weeks.

Conclusion: This four-year study of military recruits in commando training identified a stress fracture prevalence of five percent, with recovery times ranging from 12.2 weeks to 21.1 weeks, depending upon the site of the fracture.

Would, A., et al. Incidence and Time to Return to Training for Stress Fractures during Military Basic Training**. J Sports Med.** 2014. 10.1155/2014/282980

PHYSICAL ACTIVITY IN YOUTH DANCE CLASSES

Activity recommendations for children include 60 minutes of moderate to vigorous physical activity on most days. Data suggest that only 42% of children and eight percent of adolescents meet this guideline. As dance is particularly popular among girls, this study assessed the physical activity involved in seven types of studio dance classes.

Dance studios in San Diego, California, were identified, with 17 randomly selected for inclusion. The dance studios offered classes in ballet, jazz, hip-hop, Latin flamenco, Latin salsa, ballet folklorico and partnered dance. Students, five to 18 years of age, and instructors, were given accelerometers for the

length of class and asked to complete a brief survey. Only beginner and intermediate level classes were eligible for inclusion. Data were reviewed for total activity, as well as time spent in sedentary, light, moderate, vigorous and moderate plus vigorous activity (MPVA).

A total of 264 girls participated in the study, including 110 adolescents. For children, minutes of MVPA per hour session were 26.9 for hip-hop, 22.3 for partnered dancing, 22.1 for jazz dancing, 19.2 for tap dancing, 18.1 for Latin-salsa, 13.9 for ballet, and 6.4 for Latin-flamenco. For adolescents, the time spent in MVPA per hour class was 15.6 minutes for hip-hop, 13.9 minutes for jazz, 12.74 for tap, 11.2 for Latin-salsa, 16.6 for ballet, 9.34 for partnered dance, and -4.04 for Latin-flamenco.

Conclusion: This study of dance classes for children and adolescents demonstrates that hip-hop provides the greatest amount of moderate to vigorous physical activity, both for children and adolescents, while Latin flamenco provides the least.

Cain, K., et al. Physical Activity in Youth Dance Classes. **Pediatrics.** doi: 10.1542/peds.2014-2415 .

PRE-EXISTING SLEEP PATTERNS AND RECOVERY FROM CONCUSSION

Although the association between poor sleep hygiene and declining neurocognitive function has previously been demonstrated, it is unclear whether pre-injury sleep patterns affect recovery from sport-related injury. This study assessed neurocognitive impairment and symptoms among athletes presenting with concussion, comparing those with and those without self-reported premorbid sleep difficulties.

This prospective study included athletes, 14 to 23 years of age with a baseline neurocognitive assessment and a diagnosis of sports related concussion (SRC). Outcome measures included Immediate Post- Concussion Assessment and Cognitive Test (ImPACT) and Postconcussion Symptom Scale (PCSS) results, as well as sleep difficulties, characterized as difficulty falling asleep or sleeping less than usual. Postconcussive data were compared between the athletes with pre-existing sleep difficulties and those without.

Significantly worse performance was found in the poor sleep group for measures of verbal memory, visual memory and reaction time as compared with controls. While the differences between groups were no longer apparent after seven days for verbal memory and reaction time, visual memory was worse in the poor sleep group for up to 14 days. Patients in the poor sleep group reported higher total symptoms and sleep-related symptoms than did the control group.

Conclusion: This study of collegiate athletes with concussion found that pre-injury sleep difficulties were correlated with decreased post - concussion neurocognitive performance and increased symptoms.

Sufrinko. A., et al. Effect of Pre-Injury Sleep Difficulties on Neurocognitive Impairment and Symptoms after Sport Related Concussion. **Am J Sports Med.** 2015, April; 43(4): 830-838.

PREVENTING DELAYED ONSET MUSCLE SORENESS WITH SAFFRON

Delayed onset muscle soreness after eccentric exercise leads to muscle swelling, elevated creatinine kinase, lactate dehydrogenase and reduced strength. Saffron, a spice whose compounds have been found to have anti-inflammatory and anti-nociceptive activities, was evaluated for its effects on muscle soreness and strength following eccentric exercise.

Thirty-nine subjects were randomized to one of three groups to receive three identical capsules per day beginning one week before, and continuing three days after, an exercise protocol. These included saffron powder at 300 mg per day, indomethacin at 25 mg three times per day or a placebo capsule three times per day. All subjects underwent a muscle soreness protocol using a leg press machine with the weight loaded to 80% of their maximum isotonic force in four sessions with 20 repetitions. The groups were compared for muscle soreness at 24, 48 and 72 hours post-exercise.

In the control group, there was a significant decline in the maximum isotonic force at 24 hours (15.3%), 48 hours (23.8%), and 72 hours (24.3%) after the eccentric protocol. Creatinine kinase concentrations were increased in the placebo group, peaking at 48 hours (125.8%), while the saffron group increased by 3.7% at 24 hours and then returned to normal. In addition, LDH levels were less in the saffron group than in the placebo group ($p<0.001$). The saffron group had less pain than the placebo group at 24, 48 and 72 hours ($p<0.001$), with no pain in the saffron group at 48 and 72 hours. In the indomethacin group, pain was alleviated after 72 hours.

Conclusion: This study indicates that a 10-day supplementation with saffron has a preventative effect on delayed onset muscle soreness and loss of strength following eccentric exercise.

Meamarbashi, A., et al. Preventative Effects of 10-Day Supplementation with Saffron and Indomethacin on the Delayed Onset Muscle Soreness. **Clin J Sports Med.** 2015, March; 25 (2): 105-112.

SHORT-TERM USE OF NONSTEROIDAL ANTI-INFLAMMATORY DRUGS AND STROKE RISK AMONG HYPERTENSIVE PATIENTS

Previous studies have suggested an association between selective and nonselective nonsteroidal anti-inflammatory drugs (NSAIDs) and the risk of cardiovascular and cerebrovascular events. Limited data exist, concerning patients taking these medications who are at an increased risk of vascular disease. This study examined the short-term effect of selective and nonselective NSAIDs on the risk of ischemic or hemorrhagic stroke among patients with hypertension.

Data for this study were obtained from the National Health Insurance Research Database in Taiwan. Patients were identified with an incident stroke in 2010, each of whom was diagnosed with hypertension. Each was matched with a control. Data were also reviewed to identify prescriptions of NSAIDs, including selective COX-2 inhibitors and nonselective NSAIDs, within 30 days of stroke (study period), and at 91 to

120 days before the stroke (control

period). Data were analyzed to determine the effect of recent prescriptions for NSAIDs and the subsequent risk of stroke. Of the 1,653 patients with hypertension who were hospitalized for stroke in 2010, 84% were admitted for ischemic, and 16% for hemorrhagic, stroke. The use of NSAIDs during the 30 days before stroke was associated with a 1.51 fold increased risk of stroke and a 1.57 fold increased risk of ischemic stroke. Nonselective NSAIDs significantly increased the risk of stroke, with an adjusted odds ratio (AOR) of 1.54, ischemic stroke AOR of 1.55 and hemorrhagic stroke AOR of 1.56.

Conclusion: This study of hypertensive patients found that the recent use of nonsteroidal anti -nflammatory drugs increases the risk of ischemic stroke.

Chuang, S., et al. Association of Short-Term Use of Nonsteroidal Anti - Inflammatory Drugs with Stroke in Patients with Hypertension. **Stroke**. 2015, April; 46(4): 996-1003.

SPHENOPALATINE GANGLION BLOCK FOR ACUTE HEADACHE

As recent evidence has implicated the sphenopalatine ganglion as an important neural relay for migraine, a block of this ganglion is thought to be a potential treatment option. This study evaluated the efficacy of a sphenopalatine ganglion block for the treatment of acute frontal headaches in patients presenting to an emergency department.

Subjects were patients ages 18 to 65 years of age, presenting to an emergency department with a frontal - based headache and a normal neurologic examination. The subjects were randomized to receive 0.3 ML of either saline (control), or 0.5% bupivicaine, applied by catheter to the sphenopalatine ganglion. The subjects were assessed for headache pain at baseline, and at five and 15 minutes after intervention. The predefined, primary endpoint was a 50% absolute pain reduction at 15 minutes. Secondary outcomes included a reduction of pain by more than 19 mm on a 100 mm visual analogue scale.

A total of 93 patients were enrolled in this study, with 45 randomized to the bupivicaine group and 48 to the normal saline group. A total of 48.8% of the treatment group enjoyed a 50% reduction in pain as compared to 41.3% of the saline group, resulting in a nonsignificant difference. At 15 minutes, the median VAS headache score for the treatment group was 34 and that for the saline group was 51.5. At 24 hours, among those available for follow-up, 72.2% of the bupivicaine treated, and 47.5% of the saline treated patients were headache and nausea free.

Conclusion: This emergency department study of patients presenting with acute frontal headache found that a sphenopalatine ganglion block did not reduce the proportion of patients with a 50% or greater reduction in headache severity, although the treatment did result in better 24-hour outcomes.

Schaffer, J., et al. Noninvasive Sphenopalatine Ganglion Block for Acute Headache in the Emergency Department: A Randomized, Placebo-Controlled Trial. **Ann Emerg Med**. 2015, May; 65(5): 503-510.

SYNOVIAL STEM CELLS FOR KNEE CARTILAGE DEFECTS

Articular cartilage injuries are a common clinical problem, which left untreated, may lead to osteoarthritis (OA). Previous studies of mesenchymal stem cells (MSCs) have shown that synovial MCSc have superior chondrogenic ability compared with MSCs from other tissues. This study assessed the efficacy of synovial MSCs for the treatment of singular cartilage defects.

Subjects were 10 patients, ages

20 to 43 years, with symptomatic, single cartilage defects of the femoral condyle. All patients underwent ACL reconstruction and two received meniscal sutures. Synovium was harvested from the suprapatellar pouch for MSC culturing. At surgery, the injured cartilage was degraded arthroscopically, with synovial MSCs placed over the defect for 10 minutes. Follow up evaluations included MRI examination with a second look arthroscopy completed for patients with discomfort. A needle biopsy was performed at the center of the repaired cartilage. Clinical outcomes were assessed using the Lysholm score and Tegner activity level scales.

MRI scores for cartilage defects increased after treatment for all 10 patients ($p=0.005$). Lateral femoral condyle defects were incompletely healed in one patient whose lateral meniscus had been completely removed. Lysholm knee scores improved after treatment for all patients ($p=0.005$), while the Tegner activity scores did not.

Conclusion: This small case series found that transplantation of synovial mesenchymal stem cells may be effective for the treatment of cartilage defects of the knee.

Sekiya, I et al. Arthroscopic Transplantation of Synovial Stem Cells Improves Clinical Outcomes in Knees with Cartilage Defects. **Clin Ortho and Rel Res.** 2015, April 30:10:.1007/s119999-015-4324-8.

RISK OF COMPLEX REGIONAL PAIN SYNDROME AFTER DISTAL RADIAL FRACTURE

The most common type of fracture in the upper extremity is the distal radial fracture. Such fractures carry a high risk of creating complex regional pain syndrome, type I (CRPS-1). This study was designed to further understand the risk of CRPS-1 among patients with these fractures.

Subjects were 477 patients with a distal radial fracture, treated surgically between July of 2010 and April of 2013. The patients were assessed for symptoms of CRPS-1 at six, 12 and 24 weeks after surgery. At follow-up, 42 patients with were diagnosed with CRPS-1. These cases were reviewed for distinguishing characteristics, including age, gender, body mass index, type of fracture, energy of type of surgery, and duration of immobilization.

A bivariate relationship analysis indicated that six percent of male, and 11% of female, patients had developed CRPS-1 ($p=0.02$). Those with CRPS-1 were older and more likely to have sustained a high-energy injury and to have a comminuted fracture ($p<0.02$, $p<0.02$ and $p<0.01$, respectively). Multivariate logistic analysis revealed that female gender, a severe type of fracture, and a high-energy injury contributed significantly to the development of CRPS-1.

Conclusion: This study of patients with surgically treated distal radial

fractures found that gender, high-energy injury and a severe fracture type are risk factors for developing CRPS-1.

Roh, Y., et al. Factors Associated with Complex Regional Pain Syndrome Type I in Patients with Surgically Treated Distal Radius Fracture. Arch Orthop Trauma Surg. 2014, December; 134(12):1775-1781.

TOTAL KNEE ARTHROPLASTY OUTCOMES IN DIABETICS

Some studies have estimated that more than half of patients with diabetes mellitus have arthritis, and may eventually need a hip or a knee replacement. As several studies have demonstrated that hyperglycemia can adversely affect wound healing, the risk of poor outcomes among diabetics undergoing joint replacement is a concern. This meta- analysis was undertaken to clarify the prevalence of diabetes mellitus among patients undergoing primary total knee replacement, and to determine whether this disease impacts outcome.

A systematic search was conducted for publications between 1996 and 2014. That search yielded 14, high-quality, controlled observational studies covering 835,071 total knee arthroplasties.

The data revealed that patients with diabetes mellitus were at increased risk of deep infection [odds ratio (OR)=1.61], periprosthetic fracture (OR=1.89), aseptic loosening (OR=9.36) and worse Knee Society Function subscores (mean difference=-5.86) relative to those without diabetes.

Conclusion: This meta-analysis of studies concerning the effect of diabetes on the outcome of knee replacement found that diabetes increases the risk of infection, fracture, hardware loosening and poor outcome.

Yang, Z., et al. The Influence of Diabetes Mellitus on the Post-Operative Outcome of Elective Primary Total Knee Replacement. Bone Joint J. 2014; 96-B: 1637-1643.

***Musculoskeletal in Review* (*MSK*) is produced by physicians specializing in musculoskeletal and neurological medicine, with the cooperation and assistance of Emory University School of Medicine. Summaries appearing in this publication are intended as an aid in reviewing the literature relevant to the practice of clinical musculoskeletal medicine. The summaries appearing in this publication are intended as an aid in reviewing the broad base of literature relevant to this field.**

These summaries are not intended for use as the sole basis for clinical treatment, or as a substitute for the reading of the original research.

***MSK* is affiliated with the World Health Organization and multiple national medical societies worldwide.**

Private subscriptions are available by email at mskinreview@aol.com or by phone at (417) 779-9101.

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