REHAB IN REVIEW

TM

WWW.REHABINREVIEW.COM

Volume 20 Number 6 Published by Physicians In Physical Medicine and Rehabilitation June 5, 2012

COFFEE AND MORTALITY

Coffee is one of the most widely consumed beverages in the world. As coffee contains caffeine, a stimulant, as well as antioxidants and other biologic compounds, discussions of its health risk and benefits have been mixed. This study was designed to better understand the association between coffee consumption and total or cause specific mortality.

Data were gleaned from the National Institute of Health-AARP diet and Health Study involving more than 400,000 participants. After excluding questionnaires completed by a surrogate correspondent, persons with cancer, heart disease, previous stroke, or tobacco abuse, data from a cohort of 229,119 men and 173,141 women were available for analysis. All completed a baseline questionnaire including demographic and lifestyle characteristics and 124 dietary items. Coffee consumption was assessed according to 10 frequency categories, ranging from zero to six or more cups per day. Patients were followed from baseline until death or December 31, 2008. Specific causes of death were recorded.

After adjusting for potential confounders, particularly tobacco abuse, a modest, inverse association was found between coffee drinking and total mortality for both men and women. After a multivariate adjustment, coffee was found to be inversely associated with most major causes of death in both men and women, with the risk of death progressively declining with greater consumption ($p<0.001$ for trend). The causes of death included heart disease, stroke, respiratory disease, injuries and accidents, diabetes and infections. Compared with those who did not consume coffee, men who drank six or more cups per day had a 10% lower risk of death, while women who drank six or more cups per day had a 15% lower risk of death.

Conclusion: This large, prospective cohort study found a dose dependent, inverse association between coffee drinking and total mortality.

Freedman, N., et al. Association of Coffee Drinking with Total and Cause -Specific Mortality. **N Eng J Med.** 2012, May 17; 366: 1891-1904.

DIETARY SODIUM AND RISK OF STROKE

The American Heart Association recommends sodium consumption of less than 1,500 mg/day for all Americans. This recommendation is largely based upon the relationship between excess sodium intake and hypertension. This study further explored the association between sodium consumption and the risk of stroke and other vascular events.

Data were obtained from the Northern Manhattan Study, a cohort study designed to determine stroke incidence and risk factors. Eligible participants were at least 40 years of age, had no history of stroke and had resided within northern Manhattan for at least three months. Participants were identified by random digit telephone dialing, and were recruited for an in person baseline interview and assessment between 1993 and 2001.

Standardized questions regarding hypertension, diabetes, smoking and cardiac conditions were provided. Measurement of blood pressure and fasting blood specimens for glucose and lipids were obtained. Hypertension was defined as blood pressure of greater than or equal to 140/90 mmHg. The participants completed food frequency questionnaires, assessing dietary patterns over the previous year, with sodium intake calculations based upon these responses.

Responders were placed in groups according to sodium consumption of less than or equal to 1,500 mg/day, 1,501 to 2,300 mg/day, 2301 to 3,999 mg/day and 4,000 to 10,000 mg/day. The primary outcome variable was confirmed incident stroke. Secondary outcomes including incident combined vascular event, incident myocardial infarction and vascular death. Subjects were screened annually by telephone to determine changes in their status.

The study included 2,657 participants with a mean age at baseline of 69 years. Of these, 88% consumed more than the recommended sodium intake of 1,500 mg/day. Over an average of 10 years, 615 vascular events were recorded, including 235 strokes, 209 myocardial infarctions and 371 vascular deaths. A 17% increase in the risk of stroke was found for each 500 mg/day increase in sodium consumption. Those who consumed at least 4000 mg/day had a 2.6-fold increase in stroke, compared to those who consumed less than 1,500 mg/day.

Conclusion: This study found that sodium consumption of at least 4,000 mg/day is associated with an elevated risk of stroke, with a slight, but statistically insignificant, risk among those who consumed 1,500 to 4,000 mg/day.

Gardener, H., et al, Dietary Sodium and Risk of Stroke in the Northern Manhattan Study. **Stroke.** 2012, May ; 43(5): 1200-1205.

ELECTROCARDIOGRAM CHANGES IN INTRACEREBRAL HEMORRHAGE AND MYOCARDIAL INFARCTION

Intracerebral hemorrhage (ICH) accounts for four to 15% of cases of acute stroke, and is the most fatal form of this disease. The incidence of ischemic appearing electrocardiogram (ECG) changes in patients with ICH has been reported to be as high as 35%. This study was

designed to determine whether these ECG changes predict subsequent myocardial infarction (MI).

This retrospective study used data originally collected as part of a prospective cohort study dealing with primary ICH outcome. Patients admitted to Massachusetts General Hospital with a diagnosis of ICH were entered into a database and followed prospectively. A chart review was performed to capture ECG, cardiac enzyme levels, echocardiogram findings and results of stress tests. Myocardial injury was defined as an elevation of troponin I or T.

Of 206 patients, 86% had troponin levels checked in the emergency department on the day of admission and 93% by day two. Ischemic (ECG) changes were noted on arrival in 41% of the patients with ICH, while troponin elevations were noted in 24 patients (12%). The risk of myocardial injury was 18% among those with T wave inversions, 19% among those with ST depressions, 23% among those with ST elevations and 24% among those with Q waves. A multivariate logistic regression analysis revealed that the only independent predictors of myocardial injury were ischemic appearing ECG changes and a history of diabetes.

Conclusion: This study found that ischemic appearing electrocardiogram changes occurred in 41% of patients arriving with an intracranial hemorrhage, and that these changes independently predicted a subsequent myocardial infarction.

Hasegawa, K., et al. Ischemic Appearing Electrocardiographic Changes Predict Myocardial Injury in Patients with Intracerebral Hemorrhage. **Am J Emerg Med**. 2012, May; 30: 545-552.

ANTERIOR CRUCIATE LIGAMENT INJURY PREVENTION

Injuries to the anterior cruciate ligament (ACL) have serious consequences for athletes, predisposing those patients to subsequent osteoarthritis (OA). Approximately 80% of all ACL injuries are noncontact in nature. This review and meta-analysis was designed to determine the effectiveness of ACL prevention strategies.

The authors conducted a systematic review of the literature, reviewing prospective, controlled studies that directly compared ACL prevention programs with no treatment. Studies reviewed were those involving proprioceptive neuromuscular retraining techniques, with or without a balance board, round board or wobble board.

A total of nine studies were deemed eligible for analysis. These investigations were published between 1996 and 2008. Five of the studies focused on soccer players, two on handball players and two on a combination of sports. The risk difference varied significantly among the individual studies, with a pooled risk ratio of 0.38. The resultant reduction in the risk of ACL rupture with prevention strategies was significant (p=0.003). For female athletes, the pooled risk ratio was 0.48, while that for male athletes was 0.15. The resultant reduction in the number of ACL tears was significant for both male and female athletes (p=0.021 and p=0.001, respectively).

Conclusion: This meta-analysis of anterior cruciate ligament injury prevention programs demonstrates that these programs may reduce the risk of injury by 62%, with males benefiting more than females.

Sadoghi, P., et al. Effectiveness of Anterior Cruciate Ligament Injury Prevention Training Programs. **J Bone Surg (AM).** 2012, May 2; 94(9): 769-776.

WII FIT AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Rehabilitation after anterior cruciate ligament (ACL) reconstruction has been found to be critical for the functional outcome of these procedures. Currently, no standardized rehabilitation program has been established for patients undergoing ACL reconstruction. This study compares the outcomes of those treated with Nintendo Wii Fit and those treat with conventional rehabilitation.

This study involved 30 male subjects who underwent ACL reconstruction surgery, all of whom were randomized to either a Wii Fit group or a conventional rehabilitation group in the 12 weeks following surgery. Those in the Wii Fit group engaged in one hour rehabilitation sessions, three times per week. The

selected games included bowling, skiing, boxing, football and balance board. Those in the conventional group participated in a graded therapy program over 12 weeks. The subjects were allowed weight-bearing activities as tolerated. Measurements included strength, coordination, proprioception and response time, as well as the modified Star Excursion Balance Test (SEBT).

No significant difference was found between the two groups on measurements of isokinetic knee strength, dynamic balance or functional squat tests, including coordination, proprioception and response time at eight and 12 weeks follow up.

Conclusion: This study of patients undergoing ACL reconstruction found that rehabilitation with the Nintendo Wii Fit was as successful as conventional rehabilitation in restoring muscle strength, balance and functional performance.

Baltaci, G., et al. Comparison between Nintendo Wii Fit and Conventional Rehabilitation on Functional Performance Outcomes after Hamstring Anterior Cruciate Ligament Reconstruction: Prospective, Randomized, Controlled, Double-Blind Clinical Trial. **Knee Surg Sports Traumatol Arthrosc**. 2012, April DOI 10.1007/S00167-012-2034-2.

ULTRASOUND GUIDED TRANSFORAMINAL INJECTIONS

Ultrasound (US) has recently gained acceptance as a diagnostic tool to help guide injections. This study was designed to assess the efficacy of a modified in plane technique, using the vertebral body as a landmark for aiming.

Using five cadavers, US guided lumbar transforaminal injections were performed on multiple levels from L1 to S1. Ten injections were completed per cadaver, for a total of 50 injections. The cadavers were in a prone position, with US viewing a 20 gauge, five- inch spinal needle, aimed at the most medial visible shadow of the vertebral body. When the needle touched the bone surface, 1 mL of iohexol was injected, after which placement of the needle and the flow of the contrast was visualized using fluoroscopy.

Injections failed in two specimens at the level of L5/S1 levels due to the inability to visualize the vertebral body. Foraminal placement was confirmed in 100% of the injections. The contrast spread pattern was extraforaminal in four cases, all of these occurring in a 104-year-old female cadaver.

Conclusion: This cadaveric study found that ultrasound guided, lumbar transforaminal injections can be accurate, with a risk of intra-vascular needle placement comparable to that of computed tomography guided injections.

Gofeld, M., et al. Ultrasound Guided Lumbar Transforaminal Injections: Feasibility and Validation Study. **Spine.** 2012, April 20; 379(9): 808-812.

ULTRASOUND GUIDED INJECTIONS FOR DE QUERVAIN'S

De Quervain's tenosynovitis involves the first dorsal compartment of the wrist, affecting the extensor pollicis brevis and the abductor pollicis longus tendon sheath. Nonsurgical management routinely involves corticosteroid injections into the first dorsal compartment tendon sheath. Treatment failure of injections has been attributed to inaccurate injection technique and anatomical variation of the first dorsal compartment. This study assessed the effect of ultrasound (US) guidance to assist with these injections.

This prospective study included a consecutive series of 40 patients with a clinical diagnosis of de Quervain's tenosynovitis. All received injections of 0.5 ml of 1% of lidocaine and 0.5ml of triamcinolone (20mg) under US guidance. Scores on the Disabilities of the Arm, Shoulder and Hand (DASH) scale and a visual analogue scale (VAS) were obtained at six weeks and six months after the injections. A total of 42 wrists were treated, with 36 available for six week, and 34 for six month evaluation.

Separate subcompartments were noted in 52% of the wrists. At six-week follow-up, 97% of the wrists and 36 patients had partial symptom relief, with 92% reporting near complete resolution of symptoms after one injection. At the last follow-up, the mean VAS for pain was 2.2 and the mean DASH score was 18.39. Three patients subsequently underwent surgery, all three of whom had two separate compartments, as observed by ultrasound and confirmed at surgery.

Conclusion: This study supports the utility of ultrasound guidance in the treatment of de Quervain's tenosynovitis. All symptomatic wrists that eventually required surgery had multiple subcompartments.

McDermott, J., et al. Ultrasound Guided Injections for De Quervain's Tenosynovitis. **Clin Orthop Relat Res.** 2012, May. DOI 10. 1007/ S11999-012-2369-5

PLATELET RICH PLASMA FOR CHRONIC PLANTAR FASCIITIS

The planter fascia is a thickened aponeurosis that forms the longitudinal foot arch. Plantar fasciitis is a common cause of acute pain in adults, with this pain most often caused by collagen degeneration at the origin of the planter fascia. While usually self-limiting, the time to resolution is often six to 18 months. Conventional treatments can provide substantial relief for about 80% of these patients. This study was designed to assess the effect of platelet rich plasma (PRP) in treating chronic plantar fasciitis.

This study included 25 patients with chronic plantar fasciitis, all 18 years of age, with the failure of conservative treatment for at least six months. At baseline, visual analogue scale scores for pain and sonographic measurements of the planter fascia were obtained. Patient activity limitation was recorded by questionnaire. The PRP was injected at 5 mL at the most tender area using single needle insertion. The subjects began physical therapy for stretching two days after the injections, for a total of two weeks. All participants were then advanced to strengthening exercises for two additional weeks. Normal recreation was allowed at four weeks. The patients were assessed for pain, satisfaction and functional limitation at up to one year.

The mean follow-up period was 10.3 months. The average visual analogue pain score before injection was 9.1, with 72% of the patients reporting severe limitations of activity. After injection, the average pain score was 1.6 ($p<0.001$), with 60% reported

no functional limitations and 32% reporting minimal limitations. Eighty percent of the patients were completely satisfied and none experienced any complications.

Conclusion: This uncontrolled study of patients with chronic plantar fasciitis suggests that platelet rich plasma may be effective in reducing pain and increasing function.

Regab, E., et al. Platelet Rich Plasma for Treatment of Chronic Plantar Fasciitis. **Orthop Trauma Surg.** 2012, May 4; DOI.10.1007/S00402-012-1505-8

PLATELET RICH PLASMA FOR PATELLA TENDINOPATHY

Tendinopathy of the patella tendon is thought to be caused by a failed healing response due to poor tendon vascularity. As histopathological and biochemical evidence indicates that tendinopathy is degenerative rather than inflammatory, a shift to a more biological approach to arresting the degeneration of tissue has been endorsed. This study evaluated the outcomes of patients with patella tendinopathy treated with platelet rich plasma.

This prospective cohort study included 36 patients with chronic patella tendinopathy. Of these patients, 14 had been treated with steroids, sclerosing agents and/or surgery. The participants were injected with 1 mm of platelet rich plasma with bupivicaine. All subjects were sent home, with instructions to rest for 24 hours. After 24 hours, the patients were provided a standardized stretching protocol to follow for two weeks. A formal eccentric strengthening program was then initiated. At four weeks, patients were allowed to proceed with normal sporting and recreational activity. The subjects were assessed with the Victorian Institute of Sports Assessment-patella (VISA-P) questionnaires, as well as with visual analogue scales for pain (VAS).

Before treatment, 5.6% of the patients reported no pain with sports, increasing to 22% after treatment. The mean scores on the VISA-P improved from 40.1 to 57.7 ($p<0.0001$). The VAS for sport decreased from 8.5 to 4.61 ($p<0.0001$). Those who had not been treated previously with steroids, surgery or sclerosing agents showed the largest improvement.

Conclusion: This study of patients with chronic patella tendinopathy suggests that platelet rich plasma may be an effective treatment option, with better outcomes among those who have not previously been treated with other injections or surgery.

Gosens, T., et al. Pain and Activity Levels before and after Platelet Rich Plasma Injection Treatment of Patellar Tendinopathy: A Prospective Cohort Study and the Influence of Previous Treatments. **Intern Ortho**. 2012, DOI 10.1007/S00264-012-1540-7

ANTICITRULLINATED ANTIBODY AND RHEUMATOID ARTHRITIS

Anticitrullinated protein antibodies (ACPA) are the most specific marker for rheumatoid arthritis (RA). These antibodies have been found useful in prognostic discussions of patients with RA. This study was designed to determine whether the titer of ACPA can be used as a predictor of radiographic progression and/or disease activity in patients with RA.

Patients with RA underwent measurement of second-generation ACPA (ACPA-2) at their first hospital visit. Those who visited within two years after disease onset, and were found to fulfill the diagnostic criteria for RA were eligible for inclusion in this study. Participants were divided based upon their ACPA-2 titer, as negative, low positive or high positive. All subjects were treated with disease modifying antirheumatic drugs, excluding patients who were treated with biologics. Radiographic progression of disease activity was followed for two years, with radiographs scored with the van der Heijde- modified Sharp score (SHS). In a subgroup analysis, 126 rheumatoid factor (RF) negative patients were identified to assess the independent effect of ACPA-2 in predicting radiographic progression.

The RF and radiographic erosion scores were higher in the ACPA-2 low and high positive groups than in the ACPA-2 negative group. No significant difference was seen between the low titer group and the high titer group in the rate of disease progression. After treatment with DMARDs, laboratory and clinical data improved in the ACPA-2 negative group, but remained worse in the positive group. In the RF negative group, the annual change in SHS in the ACPA-2 low and high titer groups was significantly higher than that in the negative group

Conclusion: This study of patients with rheumatoid arthritis found that the presence of anticitrullinated protein antibody, but not its titer, is predictive of the progression of disease activity.

Shiozawa, K., et al. Anticitrullinated Protein Antibody, but not its Titer, Is a Predictor of Radiographic Progression and Disease Activity in Rheumatoid Arthritis. **J Rheum.** 2012, April 1; 39(4): 694-700.

IMPACT SPORTS AND HIP ARTHROPLASTY DURABILITY

The population of patients undergoing total hip arthroplasty (THA) has changed over the last 30 years, with many patients now receiving these joints at a younger age. As such, return to sport is an expectation for a growing number of patients. Many surgeons do not recommend high-impact sports after THA, as they may cause fracture or excessive wear. This study evaluated the effect of return to high-impact sports on the function, dislocation rate, linear wear and survivorship of THAs.

Using prospectively collected data, cases were retrospectively identified, including 70 engaged in high impact sports and 140 in low activity levels. Patients were chosen from a group of 843 THAs performed between 1995 and 2000. The subjects were evaluated at a minimum of 10 years' follow-up, with measurements including Harris hip scores (HHS) and hip osteoarthritis outcome scores (HOOS). Follow-up radiographs were assessed for wear and aseptic loosening or need for revision. At a minimum of 10 years' follow-up, patients were asked to complete a questionnaire describing their characteristics and level of activity.

The mean HHS improved from 54 to 88.29 in the high-impact group, and from 55 to 69.38 in the low activity group ($p<0.001$). At follow-up, no significant difference was found between the two groups in dislocation rate. At long-term follow-up, the

mean polyethylene wear rate was 1.62 mm/year and the linear wear was 0.14 mm/year in the high-impact group and 0.74 and 0.06 mm/year respectively in the low-impact group (p<0.001).Survivorship was worse in the high-impact group, with 14 patients in the high-impact group and nine in the low-impact group realizing mechanical failure or implant migration. The 15-year follow-up to survivorship in the high-impact group was 80%, while that in the low-impact group was 93.5%.

Conclusion: This study of patients with total hip arthroplasties found that participation in high impact sports such as football, skiing, tennis or martial arts results in an increased wear rate and an adverse effect on implant survivorship.

Ollivier, M., et al. Does Impact Sport Activity Influence Total Hip Arthroplasty Durability? **Clin Orthop Relat Res.** 2012, DOI: 10.1007/ s11999-012-2362z

C-2 FRACTURES IN THE ELDERLY

Individuals over 65 years of age are at increased risk of axis (C2) fractures, which account for the majority of spine fractures in the elderly. The relative risks of surgical fixation versus nonsurgical treatments are not clear. This study compared the outcomes of patients treated surgically with those treated non-surgically.

Data were obtained from the Stanford Translational Research Integrated Database Environment (STRIDE). The database was searched for patients 65 years of age or older with closed C-2 fractures without spinal cord injury. The analysis included data from 28 patients treated surgically and 28 treated conservatively. The data included comorbidities, fracture characteristics and treatment details. The primary outcomes were the 30-day mortality and complication rates. The secondary outcome measures were hospital length of stay and long-term survival.

Of the subjects, 86% of surgical patients had type II fractures and 7.1% had type III fractures. Of those, 92% underwent posterior cervical fusion and eight percent underwent anterior cervical fusion. Among the nonsurgical patients, 89.3% were treated with a hard cervical collar and 7.1% with a halo device, while 3.6% received neither. The median hospital length of stay was longer in surgical than nonsurgical patients (11.8 days versus 4.4 days, respectively). Both short- and long-term survival were higher in the surgical group, although this finding did not reach statistical significance. Complication rates were similar between the two groups.

Conclusion: This study of elderly patients with C-2 fractures found no significant difference in mortality and complication rates between those treated surgically and those treated nonsurgically.

Chen, Y., et al. Morbidity and Mortality of C-2 Fractures in the Elderly: Surgery and Conservative Treatment. **Neurosurg.** 2012, May; 70(5): 1055-1059.

VORAPAXAR AND ATHEROTHROMBOTIC EVENTS

Thrombin is critical in thrombosis, generating fibrin and acting as a potent agonist of platelets, through interaction with protease activated receptors (PARs). Vorapaxar is a competitive and selective antagonist of PAR-1, the major thrombin receptor on human platelets. This study evaluated the efficacy of vorapaxar in reducing atherothrombotic events in patients with established atherosclerosis.

This multinational, double-blind, placebo-controlled trial included patients with a history of atherosclerosis, defined as a spontaneous myocardial infarction or ischemic stroke within two to 52 weeks, or patients with a history of peripheral artery disease. The participants were randomized to receive either vorapaxar, at 2.5 mg daily, or a matched placebo. The primary efficacy endpoint was a composite of cardiovascular death, myocardial infarction, stroke or recurrent ischemia leading to urgent coronary revascularization. The secondary endpoint was a composite of cardiovascular death, myocardial infarction and/or stroke.

A total of 26,449 patients were enrolled in the trial. The longest duration of follow-up was 49 months, with a median of 30 months. At three years, the primary endpoint occurred in 9.3% of the study group and 10.5% of the placebo group (p<0.001). The rate of cardiovascular death or myocardial infarction was 8.2% among those in the placebo group and 7.3% in the treatment group (p=0.002). The major secondary endpoint occurred in 11.2% of the study group and 12.4% of the placebo group (p=0.001). The major safety endpoint of moderate or severe bleeding occurred in 4.2% of the study group and 2.5% of the placebo group (p<0.001). Intracranial hemorrhage occurred in 1% in the study group and 0.5% of the placebo group (p<0.01). A composite endpoint comprising the primary efficacy and safety endpoints occurred in 11.7% of the treatment group and in 12.1% of the placebo group (p=0.40).

Conclusion: This study found that the addition of vorapaxar to standard therapy can reduce the risk of cardiovascular death, myocardial infarction or stroke among patients with stable atherosclerosis. However, the risk of intracranial hemorrhage was increased with this medication, especially among those with a history of stroke.

Morrow, D., et al. Vorapaxar in the Secondary Prevention of Atherothrombotic Events. **N Eng J Med**. 2012, April 12; 366: 1404-1413.

CENTRAL AND PERIPHERAL STIMULATION FOR MOTOR RECOVERY AFTER STROKE

One of the more promising therapies for treatment of stroke in the chronic phase, is noninvasive brain stimulation. These techniques include transcranial direct current stimulation (tDCS), and repetitive transcranial magnetic stimulation (rTMS). Recent studies of tDCS have shown that stronger and longer lasting effects can be obtained with repeated consecutive sessions. The influence of the number of sessions on motor outcome after stroke has not however been investigated. This study was designed to determine whether a second five-day intervention would provide additive gains to those realized after an initial five-day session.

Ten patients with chronic stroke underwent bihemispheric tDCS in combination with physical and occupational therapy for two, five-day interventions. All patients had a documented ischemic stroke at least five months prior to enrollment. Patients underwent 30 minutes of

stimulation, and simultaneous physical and occupational therapy for 60 minutes for five consecutive days. This was followed by a second five-day intervention separated from the first day by a mean of 9.9 days. All patients and therapists were blinded as to whether the patients received real or sham stimulation. The tDCS consisted of 1.5 milliamps with the anode placed over the ipsilateral motor cortex. Outcome measures included the upper extremity Fugal Meyer assessment and the Wolf Motor Function Test completed at baseline, before each intervention and after each of the two intervention periods.

The average improvements during the first five-day intervention were 23.6% on the Wolf Motor Function Test and 16.6% on the Fugal Meyer Test. The average improvements after the second intervention were 16.9% on the Wolf Motor Function Test and 5.5% on the Fugal Meyer Test. Multiple regression analysis demonstrated that the length of the interval between the two interventions had no effect on any outcome measure.

Conclusion: This study demonstrates that consecutive, multiple sessions of transcranial direct current stimulation, added to a rehabilitation program of standard peripheral sensorimotor stimulation, can yield enhanced improvements, with smaller additional gains with a second course of intervention.

Lindenberg, R., et al. Combined Central and Peripheral Stimulation to Facilitate Motor Recovery after Stroke: The Effect of Number of Sessions on Outcome. **Neurorehabil Neural Repair.** 2012, June; 26(5): 479-483

LASMIDITAN FOR ACUTE MIGRAINE

Migraine is one of the most common neurological disorders. Despite the advances in treatment heralded by 5-$HT_{1B/1D}$ receptor agonists (triptans), many patients experience an incomplete response to treatment. Some have suggested that 5-HT_{1F} receptor agonists may be a potential treatment alternative to triptans. Lasmiditan is a highly selective 5-HT_{1F} agonist, with 470 times greater affinity for 5-HT_{lF} receptors than vasoconstrictor 5-HT_{1B} receptors. This study assessed the efficacy and safety of oral lasmiditan for the treatment of acute migraines.

This double-blind, placebo-controlled, parallel group study included patients presenting with acute migraine, with and without aura. All had at least a one-year history of migraine, onset before the age of 50 years, with one to eight migraine attacks per month. The subjects were randomly assigned to receive 50 mg, 100mg, 200 mg or 400 mg of lasmiditan or a placebo, all delivered in identical packages. A total of 534 patients were randomly assigned to one of the groups, with 305 receiving the treatment drug. At baseline, medical and migraine history was taken, with physical examination including electrocardiogram and laboratory tests. The patients were instructed to treat their next migraine attack within four hours of onset. The primary outcome measure was headache relief at two hours.

A significant, linear association was seen between headache response rate and dose of lasmiditan ($p<0.0001$). Every treatment dose significantly improved headache response at two hours to a greater extent than did placebo. After one hour, all but the 50 mg group were superior to the placebo. A dose-related reduction in the use of rescue drugs was also noted. Nausea, photophobia and phonophobia decreased in all treatment groups within two hours of drug intake.

Conclusion: This study of patients with acute migraine found that a 5-HT_{1F} receptor agonist, lasmiditan, can effectively reduce migraine headache frequency and intensity, with a 400 mg dose superior to other doses tested.

Farkkila, M., et al. Efficacy and Tolerability of Lasmiditan , an Oral 5-HT1F Receptor Agonist, for the Acute Treatment of Migraine: A Phase 2, Randomized, Placebo-Controlled, Parallel-Group, Dose-Ranging Study. **Lancet Neurol.** 2012, May: 11(5): 405-413.

WEIGHT LOSS AND PERFORMANCE IN ULTRAMARATHONS

Officials at ultramarathons have typically relied on weight to identify dehydration and to guide the athlete's intake. This study was designed to describe key physiologic parameters before, during and after a 160 km ultramarathon, in an effort to determine their capacity to predict the competitor's performance.

This prospective study included 91 participants in the 2010 Tahoe Rim 100-mile endurance run. Weight, systolic blood pressure, diastolic blood pressure and heart rate were measured before the race, at mid-race and immediately after the race. Weight loss was recorded both continuously and categorically, as less than three percent, three to five percent or more than five percent of prerace weight. Participants were grouped as finishers or non-finishers and by overall time to completion.

No significant difference was seen between the weight loss categories and the rates of athletes finishing the race. The highest rate of finishing was observed in runners who lost more than five percent of starting body weight by mid-race. A trend was found toward greater weight loss predicting both a successful completion of the race and faster times to completion. Subjects with narrow pulse pressure (<25mmHg difference between systolic and diastolic BP) at 80 km were more likely to not finish the race ($p=0.002$).

Conclusion: This study found that greater weight loss during an ultramarathon is not related to impaired performance, with faster runners demonstrating a greater magnitude of weight loss at both 80 km and 160 km.

Landman, Z., et al. Physiological Alterations and Predictors of Performance in a 160-km Ultramarathon. **Clin J Sport Med.** 2012, March; 22(2): 146-151.

MUSCLE FUNCTION AFTER FROZEN SHOULDER MANIPULATION

Adhesive capsulitis is characterized by limited range of motion, with a gradual increase in pain. For those cases that do not respond to conservative treatment, surgical release is an option. This study assessed the recovery of shoulder muscle function and active range of motion among patients undergoing manipulation under anesthesia (MUA).

Thirteen patients with frozen shoulder, ranging in age from 38 to 74 years of age, participated in this study. All subjects had at least a 50% loss of passive range of motion in one or more directions, shoulder pain at rest, and the inability to sleep on the affected side. The average time from onset of the disease to manipulation was 8.6 months. All patients performed immediate passive exercise after the procedure.

Outpatient physiotherapy continued, and included supervised and therapeutic home exercises focusing on stretching. In addition, isometric strengthening exercises with elastic bands and power stimulator were used, as postoperative pain and active shoulder motion allowed. All subjects underwent 10 physiotherapy sessions. Strength and range of motion were measured before and six months after the manipulation procedure.

Before MUA, the affected shoulders demonstrated less strength than did the unaffected shoulders. Shoulder strength increased in all directions measured in the first month after MUA ($p<0.05$). At one and six month follow-ups, the shoulder isometric strength in the affected side did not differ from that of the unaffected side. However, shoulder muscle endurance was reduced at baseline, and remained significantly reduced at both the one and six month follow-ups.

Conclusion: This study of patients with adhesive capsulitis of the shoulder found that, after manipulation under general anesthesia, isometric strength returned to baseline at one month, while endurance remained reduced at up to six months.

Sokk, J., et al. Recovery of Shoulder Muscle Function Characteristics and Active Range of Motion in Patients with Frozen Shoulder after Manipulation under Anesthesia. **Eur Orthop Traumatol**. 2012, DOI 10.1007/s12570-012-00105-y

LEVETIRACETAM VERSUS LORAZEPAM FOR STATUS EPILEPTICUS

Although lorazepam (LOR) and phenytoin are commonly accepted, first-line treatments for status epilepticus, both have significant side effects. Parenteral levetiracetam (LEV) has been recently approved by the FDA as an adjunctive therapy for epilepsy. Several small studies have suggested that this drug is useful in treating status epilepticus. This study was designed to compare LEV and LOR for the treatment of status epilepticus.

Seventy- nine individuals with convulsive status epilepticus were included in this pilot study. The subjects were randomized to receive either LEV at 20 mg/ml IV or LOR at 0.1 mg/kg. A crossover to the other drug occurred if seizures did not stop within 10 minutes. The primary outcome variable was seizure termination within 30 minutes.

Seizures were terminated with the use of LEV in 76.3% and with LOR in 75.6% of the cases ($p=1.0$). Of those who were crossed over to the alternate drug, seizures were terminated in 88.9% with LEV and 70% with LOR ($p=1.0$). Of those treated, 36.7% died in the hospital, with no difference in death rate noted between the two groups.

Conclusion: This study of patients with status epilepticus found that levetiracetam is as effective as lorazepam in aborting the seizure.

Misra, U., et al. Levetiracetam versus Lorazepam in Status Epilepticus: A Randomized, Open Label, Pilot Study. **J Neurol**. 2012, April; 259(4): 645-648.

DYNAMIC VERSUS STATIC SPLINTING

Both static and dynamic elbow splints are used when sustained stretching of a joint is needed to regain range of motion. Though widely used, data comparing the two splints is sparse. This study was designed to compare the efficacy of static progressive and dynamic elbow splinting.

This study included adults who had recent elbow surgery, and had failed to regain elbow range of motion. All were noted to have a lack of improvement in elbow range for at least four weeks. Patients were randomized to receive either dynamic or static progressive splinting. Before splinting, elbow and forearm motion was measured, and patients completed the Disabilities of the Arm Shoulder and Hand (DASH) questionnaire. The static splint was worn three times per day for 30 minutes while the dynamic splint was worn for 6 to 8 continuous hours per day. Splinting was discontinued after the measurements indicated no gain in range of motion over 30 days. At three, six months, and twelve months, elbow motion was measured with a handheld goniometer. At six and 12 months, patients again completed the DASH questionnaire.

A total of 66 patients enrolled in the trial, with 31 assigned to the dynamic splinting cohort and 35 to the static progressive splinting cohort. There were no differences in the gain in elbow range of motion between the two cohorts at any follow-up evaluation. At enrollment, and at 12 month follow-up, there were no differences in the average DASH scores between the cohorts. There was a significant association between the average elbow flexion and extension arc and the average DASH score.

Conclusion: This study demonstrates that both dynamic and static splinting can improve elbow range of motion up to 12 months, with no difference in gains between the two splints.

Anneluuk, L et al. A Prospective Randomized Controlled Trial of Dynamic Versus Static Progressive Elbow Splinting for Posttraumatic Elbow Stiffness. **J Bone Joint Surg.** 2012, April 18; 94(8): 694-700

EVOLUTION OF SUPRASPINATOUS TEARS

With increasing age, the likelihood of a rotator cuff tear increases. Some have suggested that early surgical repair may prevent progression of these tears from partial thickness to full thickness. This study was designed to clarify the clinical and structural outcomes of patients with symptomatic, isolated, full thickness supraspinatus tears.

All patients with symptomatic, isolated, full thickness supraspinatus tears who declined surgery were retrospectively selected from a database covering three years. All participants had isolated, repairable full thickness tears of the supraspinatus, confirmed with magnetic resonance arthrography, with at least two years of follow-up. Patients over 65 years of age at diagnosis were excluded. All subjects

(Continued from page 2)

*Rachel Hallmark, M.D., Ph.D.
UVA, Charlottesville, VA

*Elaine Tsao, M.D.
University of Washington, Seattle, WA

*Bonnie Weigert, M.D.
University of Wisconsin, Madison, WI

*Donald Tower, D.O.
Teresa Kerge, M.D.
Jeffrey Zeckser, M.D.
VCU, Richmond, VA

*Angela Tripp, M.S., M.D.
Shawna Arsenault, M.D.
Karl E. Boellert, Jr, M.D., MPH
Laura Giganti, M.D.
Washington University, St. Louis, MO

underwent imaging at baseline and at a median of 42 months after diagnosis. Additionally, each subject underwent clinical assessment, including a medical history and physical examination.

The median time from the onset of symptoms to the first imaging was four months. At follow-up, the average tear size did not change significantly. The average tear size at the time of diagnosis was 393 mm², while that at the time of follow-up was 372 mm². No significant difference was seen between the initial size of the tears that decreased in size, remain unchanged or increased in size. At follow-up, seven patients were very satisfied, 10 were satisfied, five were less satisfied and two were not satisfied with the outcome of their shoulder.

Conclusion: This study of patients with symptomatic, full thickness supraspinatus tears found that , on average these tears do not expand.

Fucentese, S., et al. Evolution of Nonoperatively Treated Symptomatic Isolated Full Thickness Supraspinatus Tears. **J Bone Joint Surg.** 2012, May 2; 94: 801-808.

***Rehab in Review (RIR)* is produced monthly by physicians in the field of Physical Medicine and Rehabilitation (PM&R), with the cooperation and assistance of Emory University School of Medicine, Department of Rehabilitation 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.**

The Emory University School of Medicine designates this journal based activity for a maximum of 3 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity. The Emory University School of Medicine is accredited by the ACCME to provide continuing medical education for physicians.

***RIR* is affiliated with the Association of Academic Physiatrists, the World Health Organization, and the Chinese and Indian Societies of PM&R and endorsed by the International Society of Physical and Rehabilitation Medicine.**

Private subscriptions are available by email at rehabinreview@aol.com or by fax or phone at (800) 850-7388.

ISSN # 1081-1303
www.rehabinreview.com

EMORY UNIVERSITY SCHOOL OF MEDICINE