REHAB IN REVIEW

TM

WWW.REHABINREVIEW.COM

Volume 21 Number 3 Published by Physicians In Physical Medicine and Rehabilitation March 5, 2013

SMOKING CESSATION AT VARIOUS AGES

Tobacco abuse remains a major cause of premature death worldwide. While a substantial number of adults have quit smoking in recent decades, data remain unclear regarding the effects of cessation at various ages. This study was designed to determine the benefits of smoking cessation at different ages for male and female smokers.

This study examined a cohort of 216,917 adults involved in the U.S. National Health Interview Survey (NHIS) between 1997 and 2004. These data were linked to the National Death Index. Data for mortality and causes of death were compared among never smokers, current smokers, non-smokers and former smokers.

The hazard ratios for overall mortality at 25 to 79 years of age among current smokers as compared to never smokers were 3.04 for women and 2.8 for men. A person who had never smoked was twice as likely as a current smoker to reach the age of 80 years. Among current smokers, survival was shortened by 11 years for women and 12 years for men, as compared to those who had never smoked.

For smokers who quit at 25 to 34 years of age, survival neared that of those who had never smoked. Smokers who quit at 35 to 44 years of age could expect an additional nine years of life as compared to those who continued. Smokers who stopped at 45 to 54 years of age gained six years of life, and those who stopped at 55 to 64 years of age gained four years of life as compared to those who continued to smoke.

Conclusion: This study of tobacco abuse found that substantial years of life can be gained by smoking cessation through 64 years of age.

Jha, P., et al. Twenty-first Century Hazards of Smoking and Benefits of Cessation in the United States. **N Eng J Med.** 2013, January 24; 368: 341–350.

METHOTREXATE FOR KNEE OA

Current treatment guidelines for osteoarthritis (OA) of the knee include both pharmacologic and non-pharmacologic management. Studies have demonstrated that synovitis is highly prevalent in knee OA and is associated with pain. As methotrexate (MTX) is an effective anti-synovial treatment for inflammatory arthritis, this study was designed to determine whether this medication is effective for pain relief among patients with OA of the knee.

Thirty patients with a mean age of 64.5 years and with painful OA of the knee were included in this study. All had failed conventional nonsteroidal anti-inflammatory drug and opioid therapy. Patients were given MTX at 20 mg per week for 24 weeks while rating pain using a visual analogue scale (VAS). Assessments were recorded at baseline and after 24 weeks of therapy. Ultrasound (US) analysis of synovium was completed at baseline and at final follow-up.

At 24 weeks, 43% of the patients achieved greater than 30% reduction in VAS scores and 23% achieved greater than 50% reduction. Of the 30 patients, 12 described medication related side effects, including nausea, headache or lethargy. Compared with baseline, US analysis demonstrated a median reduction in total synovial thickness of 1.3 mm and a median reduction in total effusion of 0.6 mm.

Conclusion: This small, open label study suggests that MTX may have clinical utility for patients with painful OA of the knee.

Wenham, C., et al. Methotrexate for Pain Relief in Knee Osteoarthritis: An Open Label Study. **Rheumat.** 2013, doi:10.1093/rheumatology/kes38

RAMIPRIL AND WALKING TIMES FOR INTERMITTENT CLAUDICATION

Intermittent claudication occurs in approximately one third of patients with peripheral artery disease (PAD). Treatment for these patients is aimed at increasing functional performance and improving health-related quality-of-life. As previous studies have demonstrated that the angiotensin converting enzyme inhibitor, ramipril, is associated with increased treadmill assisted, pain-free walking, this study examined the associations among ramipril therapy, walking distance and health-related quality of life in patients with PAD.

All subjects had an ankle brachial index (ABI) of less than 0.9 at rest in at least one leg. The patients were randomized to receive either ramipril at 10 mg per day for 24 weeks or a matching placebo. All investigators and patients were held blind to the drug assignment. Outcomes were measured before randomization and at six-month follow-up, and included a treadmill test, an ABI measurement, duplex ultrasound, patient reported functional status and health-related quality of life.

Two hundred patients were recruited and completed the six-month follow-up. Six-month treatment with ramipril resulted in no significant change in any blood safety parameters. Relative to placebo, ramipril was associated with a 75-second increase in mean pain-free walking time ($p<0.001$), a small increase in ABI ($p<0.001$), a significant increase in volume flow, as measured by ultrasound in the common femoral artery proximal to the site of the stenosis ($p<0.001$) and improvements in the physical component summary score of the SF –36 ($p=0.02$).

Conclusion: This study of patients with intermittent claudication due to peripheral artery disease demonstrates that treatment with ramipril is associated with improved pain-free and maximum walking times.

Ahimastos, A., et al. Effect of Ramipril on Walking Times and Quality-of-Life among Patients with Peripheral Artery Disease and Intermittent Claudication. A Randomized, Controlled Trial. **JAMA.** 2013, February 6; 309(5): 453-460.

YOGA FOR CHRONIC NECK PAIN

Some data suggest that more than 10% of absenteeism from work is associated with neck pain. Several randomized, controlled trials have demonstrated the efficacy of yoga in treating musculoskeletal disorders. This study assessed the effectiveness of yoga for the treatment of nonspecific neck pain.

Patients between 18 and 60 years of age were recruited for participation. All reported nonspecific neck pain for the previous 12 weeks, at least five days per week. Patients with neck pain due to specific causes were excluded. The subjects were randomly allocated to either participate in a yoga group or to use a self-care manual describing stretching and neck exercises.

The yoga group participated in weekly 90-minute yoga classes, designed for patients with chronic neck pain, over a period of 9 weeks. The exercise group received a self-care manual designed to relieve neck pain and stiffness. Both groups were asked to practice for 10 minutes per day. The main outcome measure was a visual analogue scale for pain. Secondary outcome measures included the Neck Disability Index, pain at motion, health-related quality-of-life, using the short form-36 health survey questionnaire, cervical range of motion, and proprioceptive acuity.

At the end of the study, the yoga group reported significantly less pain intensity than did the home exercise group (p=0.03). The yoga group also reported less disability and better quality-of-life, improved range of motion and proprioceptive acuity, as compared to the control group.

Conclusion: This study, comparing yoga to a home-based exercise program for patients with chronic neck pain, found yoga to be more effective in relieving pain and disability and improving health-related quality-of-life.

Cramer, H., et al. Randomized-controlled Trial Comparing Yoga and Home-Based Exercise for Chronic Neck Pain. **Clin J Pain.** 2013, March; 29(3): 216-223.

TECHNOLOGY AND WEIGHT LOSS

The most recent data have demonstrated that 68% of adults in the United States are either overweight or obese. The challenge to obesity management is the need to implement access to intensive treatment within existing systems of care. This study tested the additive benefit of augmenting a weight loss program with a connective technology system.

This 12-month program included 69 individuals with a body mass index (BMI) of 25 to 40 kg/m^2. All were asked to attend biweekly weight loss groups. The treatment group was provided a personal digital assistant (PDA) and asked to upload their data to the study personnel every other day. The treatment group received biweekly coaching session calls for six months to discuss these data. During these calls, a coach provided 10 to 15 minutes of individualized guidance, based upon the uploaded data. Weight loss was measured at baseline and at three, six, nine and 12 months. During the maintenance phase, at 7 to 12 months, all subjects attended monthly support groups led by hospital staff.

Those assigned to the treatment group lost a mean of 3.9 kg more than did participants in the standard group at each post baseline time point. The proportions of participants achieving at least 5% weight loss at six months were 36.7% in the treatment group and zero percent in the standard group. At six months, those proportions were 41.4% in the treatment group and 10.7% in the control group.

Conclusion: This study found that, with the addition of mobile technology, a significantly greater number of patients were able to lose more than five percent of their body weight, with continued weight loss up to one year.

Spring, B., et al. Integrating Technology into Standard Weight-Loss Treatment: A Randomized, Controlled Trial. **JAMA Intern Med**. 2013, January 28; 173(2): 105–111.

HIPPOTHERAPY FOR STRENGTH AND BALANCE IN THE ELDERLY

Previous studies have demonstrated a correlation between strength and functional abilities among the elderly. One exercise therapy, hippotherapy, has shown beneficial results in patients with neurologic conditions, including multiple sclerosis. This study assessed the effects of hippotherapy on functional ability, muscle strength and balance among elderly individuals.

Twenty-eight healthy individuals, ages 60 to 84 years, were randomized to one of two groups. The treatment group received 30 minute sessions of hippotherapy twice weekly for eight weeks. The control group was instructed to continue their current daily activities without beginning any new strength or balance training. At baseline and at two days following the completion of the program, all subjects were tested for balance, lower extremity strength and functional abilities using the Berg Balance Scale (BBS), the 30-Second Chair Stand Test (30CST) and the Timed Get up and Go Test (TUG).

Compared with controls, the hippotherapy group demonstrated significant improvement on the BBS (p=0.003) and the 30CST (p=0.032). No significant differences were seen between the groups on the TUG.

Conclusion: This small study of elderly individuals found that hippotherapy may have a positive effect on balance and lower extremity strength in healthy, elderly individuals.

De Araujo, T., et al. Effects of Hippotherapy on Mobility, Strength and Balance in Elderly. **Arch Gerontol Geriat.** 2013, May-June; 56 (3): 478–481

ASPIRIN AND FUNCTIONAL OUTCOME AFTER STROKE IN WOMEN

Reducing stroke morbidity is especially critical among women, who are at an increased risk of poorer functional outcome after stroke, as compared with men. This study examined the effects of low-dose aspirin on functional outcomes after cerebral vascular events.

This randomized, controlled trial included 39,876 female health providers, ages 45 years or older, all without a previous history of cardiovascular, cancer or other major illnesses. The patients were randomized to receive aspirin, vitamin E, both active agents, or both placebos. Aspirin was received at 100 mg every other day. At baseline, the subjects completed a questionnaire concerning lifestyle and demographics, with follow-up questionnaires sent every six months during the first year and annually thereafter for a mean of 9.9 years.

At the end of the study, there were 460 confirmed strokes and 405 confirmed transient ischemic attacks. Those in the aspirin group had a lower risk of TIA (relative risk [RR] =0.77) and a lower risk of total stroke (RR=0.86). This finding appeared to reflect the decreased risk of ischemic stroke (RR=0.80) with no such finding for hemorrhagic stroke (RR=1.30). Among those with a stroke there was no significant difference in functional outcome between the aspirin and the placebo group as measured by the modified Rankin scale.

Conclusion: This study, involving women health care professionals, demonstrates that aspirin, prescribed at 100 mg every other day, may reduce the risk of ischemic vascular events, but does not affect functional outcome in those experiencing a stroke.

Rist, P., et al. Effect of Low-Dose Aspirin on Functional Outcome from Cerebral Vascular Events in Women. **Stroke.** 2013, February; 44(2): 432-436.

RECOVERY FROM APHASIA AFTER STROKE

After stroke, the reported period of recovery from aphasia varies from two weeks to one year, occurring mainly in the first three months after stroke onset. This study investigated the recovery pattern of the core linguistic components in patients with aphasia after stroke.

This study included patients with aphasia due to first-ever stroke, all recruited between June of 2007 and June of 2009. Six assessments were conducted at two to six days (T1), seven to 14 days (T2), six weeks (T3), three months (T4), six months (T5) and one year (T6) after stroke. Each assessment included three measures, including: 1) The ScreenLing, a screening test to detect aphasia and to assess functioning in the main linguistic components, 2) spontaneous speech, evaluated with the Aphasia Severity Rating Scale (ASRS) of the Boston Diagnostic Aphasia Examination, and 3) the Token Test, a measure of the severity of aphasia.

Patients improved in semantics and syntax between T1 and T2 and between T2 and T3 ($p<0.001$ for both comparisons). For phonology, improvement was found between T1 and T2, between T2 and T3 ($p<0.001$ for both comparisons) and between T3 and T4 ($p=0.001$). For ASRS scores, improvement was found between T1 and T2, between T2 and T3 and between T3 and T4 ($p<0.001$ for all comparisons) and between T4 and T5 ($p=0.029$). Results on the Token Test improved significantly between comparisons until three months.

Conclusion: This study of patients with aphasia due to stroke found that semantics and syntax improved significantly for up to six weeks, while phonology and severity of aphasia scores showed a longer period of recovery, with a plateau at six months post-stroke.

Hachioui, H., et al. Recovery of Aphasia after Stroke: A One-Year Follow-Up Study. **J Neurol**. 2013, January; 260: 166-171.

CONTRALATERAL PROPRIOCEPTION AFTER ANTERIOR CRUCIATE LIGAMENT INJURY

Previous studies have demonstrated a loss of stability and proprioception in the knee following an injury to the anterior cruciate ligament (ACL). This study further explored these deficits, both in the ipsilateral and contralateral knee.

Patients between 18 and 35 years of age with unilateral ACL injury were included in this study. A control group of 25 subjects with clinically normal knees and no history of injury or surgery were also included. Proprioception was assessed by joint

position sense (JPS) and kinesthesia tests, including Thresholds for Detection of Passive Movement (TDPM) and a postural sway test using a force plate to detect anterior, posterior and transverse translation while standing on one foot.

The JPS test detected a larger error of proprioception in the ACL deficient knees than in the controls ($p<0.001$). A similar finding in the contralateral knees was found in the injured patients compared to the controls ($p<0.0001$). No significant difference was seen between the ipsilateral and contralateral knees in the same patient. The mean TDPM was significantly higher in the ipsilateral knees than in the controls, with no significant difference detected between the ipsilateral and contralateral knees of the injured subjects ($p<0.001$). The sway test yielded velocity movements five and three times greater in the ipsilateral and contralateral knees, respectively, than in the controls.

Conclusion: This study of patients with anterior cruciate ligament injuries found that the contralateral knee displays proprioceptive and kinesthetic deficits.

Arockiaraj, J., et al. Proprioceptive Changes in the Contralateral Knee Joint following Anterior Cruciate Injury. **Bone Joint.** 2013, February; 95-B(2): 188-191.

ULTRASOUND GUIDED INJECTION FOR PLANTAR FASCIITIS

Corticosteroid injections are considered to be a treatment option for patients with plantar fasciitis, although there is little direct evidence to support their use. This study was designed to determine whether ultrasound guidance produces better outcomes in patients treated with these injections.

Participants included 82 patients with a history of plantar fasciitis. All had a history of heel pain, pain on palpation of the medial tubercle or proximal plantar fascia and dorsal plantar fascia thickness of more than four mm as measured by ultrasound. All patients were given a posterior tibial nerve block with two percent lidocaine, and then received an ultrasound guided injection of one mL of four mg/mL dexamethasone sodium phosphate, or one mL saline solution. The subjects were advised to avoid engaging in high-impact activities or stretching for the first eight weeks. The primary outcome measures at four, eight and 12 weeks were pain scores and plantar fascia thickness.

At four weeks, pain improvement was greater in the steroid group than in the treatment group. However, this difference did not persist at eight and 12 weeks. Plantar fascia thickness was reduced more in the steroid group than in control group at each time period. For participants in both groups, improvements in pain scores at 12 weeks were significantly related to reductions in plantar fascia swelling ($p=0.007$).

Conclusion: This study of patients with plantar fasciitis found that a single, ultrasound guided injection of dexamethasone reduced pain in four weeks, and reduced swelling through 12 weeks.

Schulhofer, S., et al. Short-Term Benefits of Ultrasound Guided Corticosteroid Injection in Plantar Fasciitis. **Clin J Sport Med**. 2013, January: 23(1): 83–84.

DEEP BRAIN STIMULATION FOR NEUROPATHIC PAIN

Neuropathic pain has recently been redefined as pain caused by a lesion or disease of the somatosensory system. Deep brain stimulation (DBS) is an invasive neurosurgical intervention used to treat movement disorders, with this technique showing some benefit for refractory neuropathic pain. This prospective cohort study reviewed the outcomes of patients treated for chronic neuropathic pain with DBS.

This study included patients with neuropathic pain, refractory to medication treatment for at least two years. All underwent DBS placement contralateral to the painful side. Outcome measures included quantitative assessment of pain and health related quality of life, assessed for up to four years after surgery. For evaluation of pain, a visual analogue scale (VAS) and the McGill Pain Questionnaire (MPQ) were used. For assessment of quality-of-life, the SF-36 and the EuroQol-5D (EQ-5D) Quality-of-Life Questionnaire were used.

Of the 59 patients with implanted DBS, 39 patients (66.1%) sustained a global improvement of their EQ-5D at follow-up. Data from these 39 patents revealed that, at three months, VAS was improved by 50.3%, SF-36 by 38.7%, MPQ by 38.1% and EQ-5D by 27.2%. Four years after surgery, VAS pain scores remained improved by 36%, SF-36 by 34%, MPQ by 33% and EQ-5D by 20%.

Conclusion: This study of patients with neuropathic pain demonstrates long-term benefits in pain relief and quality-of-life improvement through deep brain stimulation.

Boccard, S., et al. Long-Term Outcomes of Deep Brain Stimulation for Neuropathic Pain. **Neurosurg.** 2013, February; 72(2): 221-231.

LOCAL ANESTHETICS AND MESENCHYMAL STEM CELLS

Previous studies have demonstrated that local anesthetics, when used in intra-articular injections, have cytotoxic effects on chondrocytes. This study was designed to determine whether this toxic effect extends to mesenchymal stem cells.

Commercially available bone marrow derived human mesenchymal stem cells were subjected to six anesthetic conditions. These included two percent lidocaine, one percent lidocaine, 0.5% bupivacaine, 0.25% bupivacaine, 0.5% ropivacaine and 0.2% ropivacaine. The stem cells were incubated in the solutions for one hour, washed and analyzed 24 hours later for cell viability. A control group was incubated with saline for comparison.

Compared with controls, the lidocaine treated stem cells had a significantly reduced cell viability in both the one percent and two percent conditions ($p<0.0001$ for both). The two percent lidocaine group also demonstrated significantly reduced ATP content as compared to the bupivacaine and ropivacaine groups. There was no significant reduction in viability in either the bupivacaine or the ropivacaine conditions.

Conclusion: This *in vitro* study of mesenchymal stem cells found that commonly used concentrations of lidocaine significantly decrease mesenchymal stem cell viability. The authors note that, given the known chondrotoxicity of bupivacaine, ropivacaine may be the safest of the

drugs studied for intra-articular analgesia.

Rahnana, R., et al. Cytotoxicity of Local Anesthetics on Human Mesenchymal Stem Cells. **J Bone Joint Surg**. 2013, Jan 16; 95(2): 132-137.

LATERAL EPICONDYLALGIA, INJECTIONS AND PHYSICAL THERAPY

For patients with lateral epicondylalgia, evidence is lacking concerning the long-term efficacy of steroid injections. This study evaluated the effect of corticosteroid injections, with or without physiotherapy, as a treatment for unilateral lateral epicondylalgia.

The study included 165 patients 18 years of age or older diagnosed with unilateral lateral epicondylalgia of at least six weeks' duration. The subjects were randomized to receive injections, either of placebo or triamcinolone plus lidocaine, and/or physiotherapy, involving eight, 30 minute sessions over eight weeks.

The primary outcomes were one-year global rating of change scores of complete recovery or much improvement at four or eight weeks and one year recurrence. Secondary outcomes were global ratings of change of complete recovery or much improvement at four and 26 weeks. In addition, pain levels and health-related quality of life were measured at four, 26 and 52 weeks.

At four weeks, complete recovery or much improvement was greater following corticosteroid compared with the placebo injection ($p<0.001$). When physiotherapy was combined with corticosteroid injection (vs. placebo injection combined with physiotherapy) there was a benefit for pain and disability ($p<0.001$).However, at one year, those treated with corticosteroid injections demonstrated lower complete recovery or much improvement rates ($p=0.01$)and higher recurrence rates ($p<0.001$) compared with placebo.

Conclusion: This placebo-controlled, single blinded study of patients with lateral epicondylalgia demonstrated better outcomes at four weeks, but worse outcomes at 12 months, among patients undergoing corticosteroid injections, with physiotherapy of benefit only in the first two months.

Coombes, B., et al. Effect of Corticosteroid Injection, Physiotherapy, or Both on Clinical Outcomes in Patients with Unilateral Lateral Epicondylalgia. **JAMA.** 2013, February 6; 309(5): 461-469.

PLATELET RICH PLASMA FOR KNEE OSTEOARTHRITIS

Knee osteoarthritis (OA) is a common cause of musculoskeletal disability. Given the limited effectiveness of conventional management techniques, alternative options are being discussed, including biological and regenerative treatments. Among the new options, autologous platelet rich plasma (PRP) is thought to contain a pool of growth factors, and therefore may provide symptomatic relief to patients with OA. This study assessed the role of PRP in the early stages of knee OA.

This double-blind, randomized, placebo-controlled trial included 78 patients (156 knees) with bilateral, early OA. Twenty-seven participants in group A (54 knees) received a single injection of PRP, 25 participants in group B (50 knees) received two injections of PRP at an interval of three weeks, and 26 participants in group C (52 knees) received a single injection of normal saline. Outcomes measures included the Western Ontario and McMaster University Arthritis Index (WOMAC), administered at baseline and at 1.5, three and six months.

Significant improvement in pain was noted according to WOMAC scale scores in groups A and B at 1.5 and three months, with both superior to group C ($p<0.001$). Pain reduction was significant in groups A and B ($p=0.001$), but not in group C ($p=0.598$).Complications including dizziness and headache occurred in 22% of group A, 44% of group B and zero percent of group C.

Conclusion: This blinded, randomized trial provides evidence that platelet rich plasma may improve pain in patients with knee osteoarthritis, with the effect lasting for up to six months.

Patel, S., et al. Treatment with Platelet Rich Plasma is More Effective than Placebo for Knee Osteoarthritis: A Prospective, Double-Blind, Randomized Trial. **Am J Sport Med**. 2013, February; 41(2):356-364.

STRENGTH TRAINING IN MUSCULAR DYSTROPHY

Previous studies of patients with limb girdle type II (LGMD2) and Becker muscular dystrophy (BMD) have demonstrated improved endurance and strength with aerobic training. This study was designed to assess the effects of strength training in the same patients.

Patients included eight patients with LGMD2I, LGMD2A and BMD. For the first four months, all participated in resistance training, focusing on the quadriceps and biceps. The training began at 40% of their one rep max, and increased by five percent weekly. For the second six months, training was performed at 60% of the one rep max, and focused on additional muscle groups, including wrist flexion/extension and plantar flexion.

The training occurred three times per week. During the first four months of training the dominant side was trained while the contralateral side served as a control. Both sides were trained for the final two months. All subjects were tested before and after four and six months of training for maximum strength and endurance. In addition, each subject completed the Sickness Impact Profile (SIP) and underwent plasma creatinine kinase measurements.

During the first four months, the patients completed 93% of the sessions, with significant increases in elbow flexion and knee extension strength and endurance. In study two, four of six subjects completed all training sessions, with significant improvements in strength and endurance. No significant changes were seen in plasma CK or SIP results.

Conclusion: This study of patients with muscular dystrophy found that both low and high intensity strength training procedures are reasonably well tolerated and can improve strength and endurance.

Sveen, M., et al. Resistance Training in Patients With Limb Girdle and Becker Muscular Dystrophies. **Muscle Nerve.** 2013, February; 47: 163–169.

ENOXAPARIN AND MODERATE RENAL IMPAIRMENT

While enoxaparin has a predictable pharmacokinetic profile and dose response curve, there is potential for accumulation of an anticoagulant effect in patients with declining renal function. Despite this fact, there is no recommendation for dose adjustment for patients with moderate renal impairment. This study compared the outcomes of bleeding and recurrent thrombotic events in patients with moderate renal dysfunction.

This study included patients seen at the Minneapolis Veterans Affairs Healthcare System. The system uses an enoxaparin protocol which requires baseline laboratory data and body weight documentation prior to treatment. Data were reviewed concerning patients who received enoxaparin between June 1 and November 30, 2009. Patients with normal renal function, defined as a creatinine clearance of over 80 mL per minute, were compared to those with moderate renal impairment, defined as a creatinine clearance of 30-50 mL per minute. The primary outcome variable was major bleeding, defined as any bleeding resulting in hospital admission or death, lengthened hospital stay or an emergency department visit.

The final analysis included 105 patients with normal renal function and 59 with moderate renal impairment. The primary outcome of major bleeding occurred in 5.7% of those with normal renal function and in 22% with moderate renal impairment (p=0.002). There were no deaths and no recurrent thromboemboli.

Conclusion: This study indicates a significant increase of major bleeding among patients with moderate renal impairment who receive therapeutic doses of enoxaparin.

De Carolis, D., et al. Enoxaparin Outcomes in Patients with Moderate Renal Impairment. **Arch Intern Med**. 2012, Dec 10/24; 172(22): 1713-1718.

NUTRITION AND HIP FRACTURE REHABILITATION

Patients with hip fractures are more likely to be malnourished at the time of the fracture, with suboptimal intake common among those hospitalized for fracture repair. This study was designed to study the beneficial effects of nutritional supplementation among patients recovering from hip fracture surgery.

This randomized, controlled trial included all postoperative hip fracture patients transferred to a rehabilitation hospital. All subjects were 60 years of age or older, had low-impact osteoporotic fractures repaired within four weeks and had a body mass index of less than 25 kg/m^2. The patients were randomized to one of two groups, both receiving similar diets.

The treatment group received an additional supplement of twice daily protein and a caloric supplement, with 18 to 24 g of protein and 500 kcal per day. The primary outcome measures included change in serum albumin, body mass index, Functional Independence Measure scores and the Elderly Mobility Scale. Secondary outcomes included complications, length of stay, mortality and hospital readmission.

The treatment group had a length of stay 3.8 days lower than that of the control group (p=0.04). The total numbers of complications were 30 in the treatment group and 16 the control group (p=0.068). Episodes of infections numbered 14 in the treatment group and 29 in the control group. While FIM scores increased similarly in both groups, the FIM efficacy showed a nonsignificant, but larger, change in the treatment group (0.524 versus 0.485 per day).

Conclusion: This randomized, controlled study of elderly patients with hip fractures found that oral nutritional supplementation can prevent weight loss, reduce infections and reduce length of hospital stay.

Myint, M., et al. Clinical Benefits of Oral Nutrition Supplementation for Elderly Hip Fracture Patients: A Single Blind, Randomized, Controlled Trial. **Age Aging.** 2013, January; 42: 39-45.

RE-INJURY, DEMENTIA AND DEATH AFTER TRAUMATIC BRAIN INJURY

The Institute of Medicine recently concluded that TBI, with loss of consciousness, is associated with an increased risk of Alzheimer's disease (AD). This study was designed to further address the risk of AD and other dementias and death in a large, community-based sample of patients with a history of traumatic brain injury (TBI) and loss of consciousness (LOC).

Data were obtained from the Adult Changes in Thought (ACT), a prospective longitudinal cohort study of incident dementia and AD. A total of 4,249 dementia free older adults were enrolled between 1994 and 2011. Individuals underwent a battery of laboratory tests including APOE allele testing, dementia screening with the Cognitive Abilities Screening Instrument (CASI), and neuroimaging. All patients were reassessed every two years. The main outcome measures included incident late life TBI or re-injury, incident all cause dementia, AD, and or death.

The mean age at enrollment was 74.9 years. There were 3,465 people with complete data (other than APOE) and at least one follow-up visit. A strong association was found for lifetime re-injury regardless of age at initial injury. The incidence rates for people with and without a history of TBI with LOC were 8.3 and 3.0 per thousand person-years. There was no association between a history of TBI with LOC and an increased risk of developing AD, all dementias or death.

Conclusion: This prospective study of a community-based population of persons over the age of 65 found that those with a history of traumatic brain injury with loss of consciousness are at an increased risk for re-injury, but not at increased risk for developing Alzheimer's disease or all forms of dementias.

Dams-O'Connor, K al. Risk for Late Life Re-injury, Dementia and Death among Individuals with Traumatic Brain Injury: A Population-Based Study. **J Neurol Neurosurg Psych.** 2013, February; 84(2):177-182.

TRIAMCINOLONE IMPROVES VISCOSUPPLEMENTATION

Intra-articular injections have been used for many years to treat patients with osteoarthritis (OA). Viscosupplementation (VS) is a relatively new intervention, with widespread use among patients with knee OA. This injectant is reported to

relieve pain, but is also considered to be a disease modifying drug. Some studies have shown that the effect of this medication may occur within two to five weeks after the procedure. Therefore, this study was designed to determine whether the addition of steroids could improve early relief and long-term benefits.

This study included 104 patients diagnosed with knee OA, all of whom were randomized to one of two groups. Group A received a single intra-articular injection of 6 mL of hylan GF-20. Group B received the same injection with the addition of 1 mL (20mg) of triamcinolone. The primary outcome measures included knee pain and function assessed with a visual analogue scale, the Western Ontario and McMaster (WOMAC) scale, and the Lequesne questionnaire, all administered at weeks one, four, 12 and 24. A secondary outcome measure involved adverse effects, as noted at one week.

At one week, group B significantly improved on all primary outcome measures as compared with baseline, with lower levels on the WOMAC ($p = 0.038$) and VAS ($p = 0.014$) as compared to group A. No significant difference occurred with regard to adverse effects. At six months, no significant differences were seen between the groups in any of the primary outcome measures.

Conclusion: This study of patients with knee OA found that the addition of triamcinolone to viscosupplementation improves the first week of pain and function without changing the long-term benefits of viscosupplementation alone.

De Campos, G., et al. Adding Triamcinolone Improves Viscupplementation: A Randomized Clinical Trial. **Clin Ortho Rel Research.** 2013, February; 471: 613-620.

HAND EXERCISES IN RHEUMATOID ARTHRITIS

Patients with rheumatoid arthritis (RA) have reduced muscle strength in their hands, and are thought to benefit from strengthening exercises. While previous studies have suggested that exercises may not be damaging to the hands of these patients, those studies lacked direct measurements of disease activity. This study investigated the influence of handgrip training on RA disease activity.

Subjects included 42 women with clinically stable RA, but with evidence of increase blood flow in the synovial tissues, as measured by ultrasound Doppler (USD). The patients were randomized to a group to receive eight weeks of hand exercises (n= 24) or to a control group (n=18). The training group was asked to squeeze a rubber ball to 60% of maximum grip strength for 10 seconds five times, twice per day for eight weeks. Grip strength and wrist pain were recorded for all patients, with all undergoing USD examination at eight weeks.

Grip strength increased by 8.8% in the training group ($p=0.055$), with significantly decreased pain with motion ($p=0.04$). There was no significant difference between groups in synovial blood flow as measured by USD at baseline or at eight week follow-up.

Conclusion: This study of patients with rheumatoid arthritis demonstrated that hand exercises can increase strength and decrease pain without increasing perfusion to the synovial tissue.

Ellegaard, K., et al. The Effect of Isometric Exercise of the Hand on Synovial Blood Flow in Patients with Rheumatoid Arthritis Measured by Color Doppler Ultrasound. **Rheum Intern.** 2013, January; 33(1): 65-70.

EXERCISE AND AUTONOMIC FUNCTION IN SPINAL CORD INJURY

Recent studies of wheelchair rugby players with cervical spinal cord injury (SCI) have demonstrated that, in some of the athletes, heart rates can exceed 120 bpm. This finding appears to be at odds with known physiologic effects of sympathetic decentralization. This study was designed to determine the physiologic basis of this phenomenon, and to investigate associations between autonomic function and indices of exercise performance.

Seven, male elite wheelchair rugby athletes with C-5 or C-6 ASIA A or B SCI injury were studied. The subjects completed three experimental trials. Trial one consisted of motor, sensory, cardiovascular and autonomic testing, while trial two involved a maximal four -minute push performance test. Trial three consisted of a maximal incremental arm crank ergometer test. Associations between outcome measures were assessed using Spearman's rank correlation coefficient.

All participants demonstrated at least a partially intact sympathetic skin response, ranging from minimal preservation to full preservation. The sympathetic skin response strongly correlated with peak heart rate ($p<0.001$) during the four-minute wheelchair push, four-minute push distance ($p=0.001$) and peak VO2 ($p<0.001$) during the arm crank exercise.

Conclusion: This study of elite wheelchair athletes with cervical spinal cord injury suggests a partial preservation of descending autonomic control, which correlates with functional indices of sports performance.

West, C., et al. Autonomic Function and Exercise Performance in Elite Athletes with Cervical Spinal Cord Injury. **Med Sci Sports Med**. 2013, February; 45(2): 261-267.

NEUROPATHIC CONTROL AND TETRAPLEGIA

Brain-machine interfaces can transform neural activity into control signals for an external device. This human case study was designed to determine whether an individual with tetraplegic spinal cord injury can achieve control of an anthropomorphic prosthetic limb using such an interface.

This case study involved a 52-year-old woman with spinocerebellar degeneration with motor complete loss of the upper extremity. Two intracortical microelectrodes arrays were placed in the participant's left motor cortex using structural and functional MRI to guide placement. A prosthetic arm was mounted on a stand next to the participant, with cables providing connections between the patient, a computer and a prosthetic limb. Training was completed over 13 weeks, with the goal of controlling the prosthetic limb with 7° of freedom. In the initial phase, the prosthetic limb moved automatically, with the participant instructed to watch the limb as it moved to the targets. During the

(Continued from page 2)

*Rachel Hallmark, M.D., Ph.D.
Rebecca Louie, D.O.
UVA, Charlottesville, VA

*Mamie Air, M.D.
University of Washington, Seattle, WA

*Bonnie Weigert, M.D.
Sara Liegel, M.D.
Lauren Schatzeder, D.O.
University of Wisconsin, Madison, WI

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

*Mahathy Goli, M.D.
Shawna Arsenault, M.D.
Karl Boellert, M.D.
Ikram Malik, M.D.
Washington University, St. Louis, MO

Executive Editor Emeritus
Donald F. Langenbeck, Jr., M.D.

Subscription Manager
Michael P. Burke, M.S.

***Regional Managing Editors have attested that they have no financial conflict of interest when choosing articles that appear in Rehab in Review.**

second phase of calibration, the participant was asked to control the device. The ability to control the limb was assessed by clinical measures of upper limb performance.

After the second day of training, the subject was able to move the prosthetic limb in the three-dimensional workspace. After 13 weeks, the subject demonstrated the ability to perform seven dimensional movements, with a mean success rate of reaching tasks of 91- 96%. The patient then demonstrated the ability to use the prosthetic limb to complete skillful and coordinated reach and grasp movements, resulting in clinically significant gains in upper limb function.

Conclusion: This case study of a patient with long-term paralysis found that an individual could, within 13 weeks, develop the ability to maneuver a prosthetic upper extremity well enough to be able to perform activities of daily living.

Collinger, J., et al. High-Performance Neural Prosthetic Control by an Individual with Tetraplegia. **Lancet.** 2013, February, 16-22; 381(866)557–564.

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

REHAB IN REVIEW

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

EMORY UNIVERSITY SCHOOL OF MEDICINE | Department of Rehabilitation Medicine

Expanding the frontier of rehabilitation sciences in research, teaching, and patient care