

# MUSCULOSKELETAL

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## ACHILLES TENDON RUPTURE TREATED WITH AND WITHOUT SURGERY

After Achilles tendon rupture, the optimal management remains unclear. Studies comparing operative and nonoperative treatment have failed to show a clinically significant difference in outcome. This study was designed to better understand these treatment options.

This cohort study included 200 patients presenting for treatment of an Achilles tendon rupture. The treatment decisions were individualized based upon patient factors including age, activity level, comorbidities and surgeon's preference. Of those presenting, 99 were treated surgically, and 101 nonsurgically. Both groups were kept nonweightbearing in a cast for four weeks, and then placed in a controlled ankle movement walker boot at 20° equinus. Physical therapy was initiated, with the equinus progressively decreased to neutral by weeks six to eight. Weightbearing progressed from partial to full as patient tolerance and range of motion allowed. The orthotic was removed at week eight, with therapy continuing until week 12. The primary outcome variable was patient reported functional outcome, assessed with the Achilles Tendon Total Rupture Score (ATRS).

No significant difference was found between the groups in the rate of rerupture. There was also no significant difference between the groups in ATRS functional scores ( $p=0.55$ ). A logistic regression analysis did not reveal significant effects of age at rupture, gender or mode of treatment on ATRS scores.

**Conclusion:** This non-randomized study of patients with Achilles tendon rupture failed to demonstrate a better outcome for those treated surgically compared to those treated nonsurgically.

Lim, C., et al. Functional Outcome of Acute Achilles Tendon Rupture with and without Operative Treatment Using Identical Functional Bracing Protocol. *Foot Ankle Int.* 2017, Dec; 38(12): 1331-1336.

## AEROBIC EXERCISE AND COGNITIVE CONTROL IN CHRONIC STROKE

Cognitive control/executive dysfunction is particularly associated with reduced functional capacity among patients with a chronic stroke. This study examined the immediate effect of a single session of aerobic exercise on cognitive control and attention among patients with chronic stroke.

Subjects were adults with a history of ischemic or hemorrhagic stroke at least six months prior, and full use of at least one arm and one hand. The participants completed baseline assessment in two experimental sessions. During an exercise session, two minutes of self-paced warm-up was followed by 20 minutes of exercise, corresponding to 45% to 55% of the individual's heart rate reserve. An EEG was recorded throughout the procedure. The subjects were assessed before and after exercise with a modified Eriksen Flanker task.

The data revealed improvements in EEG measures after exercise. P300 amplitude at Fz was greater 40 minutes after exercise as compared with after rest ( $p=0.007$ ). P300 latency was also shorter at 20 minutes after exercise as compared with after rest for both congruent ( $p=0.02$ ) and incongruent ( $p=0.003$ ) conditions at the central electrode on the lesional side. Analyses of performance variables revealed no significant difference between the exercise and control groups.

**Conclusion:** This study suggests that cognitive control may be augmented 20 to 40 minutes after

aerobic exercise among people with chronic stroke.

Swatridge, K., et al. The Acute Effects of Aerobic Exercise on Cognitive Control among People with Chronic Stroke. *J Stroke Cerebrovasc Dis.* 2017, Dec; 26(12): 2742-2748.

## CHINESE HERBAL MEDICINE FOR ALZHEIMER'S DISEASE

Herbal medicine has been used for centuries in China for the treatment of dementia. This study of patients with probable Alzheimer's dementia (AD) investigated the efficacy of combining conventional therapy (a cholinesterase inhibitor or an NMDA receptor antagonist) with Chinese herbal medicine.

Subjects were patients diagnosed with probable dementia due to AD. Clinical records were reviewed for diagnostic tests and treatments used. By chart review, the patients were separated by those treated with conventional therapy plus herbal medicine (CT + H) versus conventional therapy without herbal medicine (CT). Donepezil was used to treat patients with mild to severe AD, and memantine for those with moderate to severe AD. In the CT+H group, the GRAPE formula was prescribed for twice per day intake, consisting of Ren shen (Panax ginseng, 10 g/d), Di huang (Rehmannia glutinosa, 30 g/d), Cang pu (Acorus tatarinowii, 10 g/d), Yuan zhi (Polygala tenuifolia, 10 g/d), Yin yanghuo (Epimedium brevicornu, 10 g/d), Shan zhuyu (Cornus officinalis, 10 g/d), Rou congrou (Cistanche deserticola, 10 g/d), Yu jin (Curcuma aromatica, 10 g/d), Dan shen (Salvia miltiorrhiza, 10 g/d), Dang gui (Angelica sinensis, 10 g/d), Tian ma (Gastrodia elata, 10 g/d), and Huang lian (Coptis chinensis, 10 g/d). Global cognitive function was evaluated with the Mini-Mental State

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Examination (MMSE) at three-month intervals.

Changes in mean MMSE scores differed significantly between the two groups, with those in the CT + H performing better in cognition beginning at three months ( $p=0.009$ ), with significance noted through 24 months ( $p=0.000$ ). At 24 months, those treated with CT + H exhibited stabilization of cognitive function, while those with CT alone continued to deteriorate.

**Conclusion:** This retrospective study of 344 patients diagnosed with probable AD found that the addition of traditional herbal Chinese medicine to conventional therapy substantially decelerated cognitive decline.

Shi, J., et al. Adding Chinese Herbal Medicine to Conventional Therapy Brings Cognitive Benefits to Patients with Alzheimer's Disease: A Retrospective Analysis. **BMC Complement Altern Med.** 2017 Dec 13; 17(1): 533.

### **ANTIPLATELET THERAPY IN MILD TRAUMATIC BRAIN INJURY**

While the risk of bleeding is known to increase among those taking antiplatelet therapy, the relative risk is not well understood for those with mild traumatic brain injury (mTBI). This literature review and pooled analysis was designed to better understand the risk of intracranial hemorrhage (ICH) among those presenting to the emergency room (ER) with a mTBI.

After an extensive literature review, ten articles were chosen for inclusion. These included seven retrospective cohort studies, two prospective cohort studies and one retrospective case control trial. Patients with mTBI, with and without traumatic ICH, were compared by antiplatelet use.

The pooled data included 2,966 in the antiplatelet group and 18, 281 in the control group. The pooled analysis found that, compared with controls, the Odds Ratio (OR) for ICH among those taking antiplatelet therapy was 1.87. Of note, the majority of patients in these studies were taking clopidogrel at the time of the trauma.

**Conclusion:** This pooled analysis of studies of patients presenting to the emergency room with mild traumatic brain injury found that the risk of intracranial hemorrhage is higher among those taking antiplatelet medications at the time of the trauma.

McIville, L., et al. Is Antiplatelet Therapy an Independent Risk Factor for Traumatic Intracranial Hemorrhage in Patients with Mild Traumatic Brain Injury? **Ann Em Med.** 2017, Dec; 70(6): 910-911.

### **EVALUATION OF CINNAMON IN HEALTHY ADULTS**

In traditional Indian medicine, cinnamon is advocated for many ailments. Cinnamon comes in two main varieties, Cinnamomum cassia (Cinnamomum aromaticum) and Cinnamomum zeylanicum (CZ). As coumarin levels in cassia are higher than in CZ, the regular use of cassia cinnamon has not been advocated. This study evaluated the pharmacodynamic properties and safety of CZ in healthy adults.

Subjects were healthy adults between the ages of 18 and 60. Each subject was given a daily capsule containing refined CZ at 85 mg the first month, 250 mg the second month and 500 mg the third month. The participants were assessed at baseline, and at each of three monthly follow-ups. Assessments included anthropometrics and lab tests.

Compared with baseline, no significant changes were noted in weight, body mass index, waist circumference or waist to hip ratio. A significant increase in pulse rate was noted between visits two and three

( $p<0.05$ ). Both systolic and diastolic blood pressure readings were significantly reduced during the first month, with this reduction sustained at three months. In addition, significant reductions were noted in total cholesterol ( $p<0.05$ ) and LDL cholesterol ( $p<0.001$ ) at the end of three months. No serious side effects were noted.

**Conclusion:** This study of healthy adults found that daily ingestion of cinnamon may reduce blood pressure, total cholesterol and LDL cholesterol, with no significant side effects noted.

Ranasinghe, P., et al. Evaluation of Pharmacodynamic Properties and Safety of Cinnamomum Zeylanicum (Ceylon Cinnamon) in Healthy Adults: A Phase I Clinical Trial. **BMC Complement Altern Med.** 2017; 17:550.

### **FREMANEZUMAB FOR PREVENTING CHRONIC MIGRAINE**

The global prevalence of migraine has been estimated at 15 to 18%. Chronic migraine, affecting two percent of the population, is defined as the occurrence of migraine headaches at least 15 days per month. Fremanezumab is a humanized, monoclonal antibody which selectively binds to calcitonin gene related peptide, involved in central and peripheral pathophysiologic events of migraine. This study assessed the efficacy of this medication for the treatment of chronic migraine.

Subjects were adults with chronic migraine, who received abdominal subcutaneous injections at baseline, and at weeks four and eight. Those randomized to a fremanezumab-quarterly group received 675 mg of fremanezumab at baseline. Those in a fremanezumab-monthly group received 675 mg of fremanezumab at baseline, and 225 mg at weeks four and eight, while those in the placebo group received placebo injections at all time periods. The primary endpoint was the mean change in the average number of headache days per month.

The mean number of headache days per month was reduced by 4.3 days in the quarterly group, by 4.6 days in the monthly group and by 2.5 days in the placebo group ( $p<0.001$  for both, compared to placebo). Significantly more patients treated in

the fremanezumab groups reported a reduction of at least 50% in the average number of headache days per month as compared with placebo. There was no elevation in adverse or serious adverse events in the treatment groups as compared with the control group.

**Conclusion:** This study of patients with chronic migraine found that the monoclonal antibody, fremanezumab, when administered subcutaneously, monthly or quarterly, is effective for the preventive treatment of migraine.

Silberstein, S., et al. Fremanezumab for the Preventive Treatment of Chronic Migraine. *N Eng J Med.* 2017, Nov 30; 377(22): 2113-2122.

### **GALCANEZUMAB FOR EPISODIC MIGRAINE PREVENTION**

Currently, five medications are approved by the United States Food and Drug Administration for the prevention of migraines, all of which have less than ideal treatment and side effect profiles. As calcitonin gene related peptide (CGRP) has been found to be a promising target for the treatment of migraine, this study assessed the efficacy of a humanized monoclonal antibody (galcanezumab), which selectively binds to CGRP.

This prospective, multicenter study included adult patients with a history of migraine, with or without aura. The participants were randomized to receive a placebo or subcutaneous galcanezumab, at doses of five mg, 50 mg, 120 mg, or

300 mg, administered monthly for three months. The primary outcome variable was the number of migraine days per month (MHD).

Compared with the placebo group, all groups receiving galcanezumab had a significant reduction in MHDs at month one. The overall change from baseline to month three in the number of MHDs was significant for both the 120 mg and 300 mg dose groups, as compared with placebo. The frequencies of adverse events were 51.1% in the placebo group and 53.1% in the treatment group.

**Conclusion:** This study of patients with migraine headaches found that, compared with placebo, monthly subcutaneous injections of galcanezumab are efficacious and well-tolerated for the prevention of episodic migraines.

Skljarevski, V., et al. Effect of Different Doses of Galcanezumab versus Placebo for Episodic Migraine Prevention. A Randomized, Clinical Trial. *JAMA Neurol.* doi:10.1001/jamaneurol.2017.3859.

### **PAIN CATASTROPHIZING AND POSTOPERATIVE PAIN AFTER TOTAL JOINT ARTHROPLASTY**

Between 1997 and 2010, the rate of total knee arthroplasties (TKA) has doubled, while the rate of total hip arthroplasties (THA) has increased from 11 to 15 per 10,000 population. While these procedures have been effective in reducing pain, a small portion of patients continue to experience chronic, postoperative pain, and to report poor functional outcomes. This study examined the relationship between pain catastrophizing and postoperative pain intensity among patients undergoing joint replacement surgery. This prospective study included all patients undergoing primary TKA or THA in August of 2013 and March of 2014. All were administered the Pain Catastrophizing Scale (PCS) at their final presurgical visit. From these scores, the patients were divided into catastrophizing and non-catastrophizing cohorts. The primary outcome measure was patient reported postoperative pain at three months post-surgery, as measured on a visual analog scale (VAS).

Of the 123 patients in the analysis, 87 scored <30 (non-catastrophizers) and 36 scored ≥30 (catastrophizers) on the PCS. At three months, the average VAS pain score was significantly higher in the catastrophizer group than in the non-catastrophizer group (p=0.000), although this level did not meet the pre-established clinically important difference of two points on the VAS. In addition, there were no significant differences between the two groups in the morphine equivalent doses consumed during hospitalization.

**Conclusion:** This prospective study of patients undergoing total knee or total hip arthroplasty found a statistically, but not clinically, significant difference in pain scores three months after surgery between pain catastrophizers and non-catastrophizers.

Wright, D., et al. Pain Catastrophizing as a Predictor for Postoperative Pain and Opiate Consumption in Total Joint

Arthroplasty Patients. *Arch Ortho Trauma Surg.* 2017, Dec; 137 (12): 1623-1629.

### **SURGERY FOR CLINICALLY POSITIVE AND ELECTRODIAGNOSTICALLY NEGATIVE CARPAL TUNNEL SYNDROME**

Treatment for carpal tunnel syndrome (CTS) may include splinting, corticosteroid injections and/or surgery. Electrodiagnostic (EDX) tests to confirm this diagnosis can be negative in up to 15% of patients. This study was designed to determine whether surgical decompression can effectively treat those with clinically positive, but EDX negative CTS.

Subjects were adult patients referred with symptoms of CTS, with normal EDX results. The patients were randomly assigned to surgical decompression or nonsurgical treatment, with the latter including nocturnal wrist splinting or local corticoid injections. Outcomes were measured with a six-point scale for perceived improvement, as well as the Boston Carpal Tunnel Questionnaire, completed at baseline and at six-month follow-up.

At six-month follow-up, more patients in the surgery group (70%) than in the non-surgery group (35.3%) reported important improvement (p=0.02). In addition, complete symptom relief was reported by 39.4% of the surgery group and zero percent of the non-surgery group (p=0.003).

**Conclusion:** This study provides evidence that most patients with clinically defined carpal tunnel syndrome and normal electrodiagnostic study results can benefit from carpal tunnel release surgery.

De Kleermaeker, F., et al. Treatment Outcome in Patients with Clinically Defined Carpal Tunnel Syndrome but Normal Electrodiagnostic Test Results: A Randomized, Controlled Trial. *J Neuro.* 2017, Dec; 264(12): 2394-2400.

### **TISSUE FLOSSING, JUMP AND SPRINT PERFORMANCE**

Previous studies have demonstrated that tissue flossing can be useful in improvement of ankle range of motion and single leg jump performance. This study investigated

the effect of tissue flossing at different time points following the application of the bands.

Subjects were 69, healthy, recreational athletes. The participants were randomized to either a FLOSS group or a control group (CON). Following a standardized warmup, both groups were asked to perform several athletic maneuvers, including a weight-bearing lunge test (WBLT), a counter movement jump and a 15-meter sprint test. Those in the FLOSS group had a band attached to each ankle before beginning warmup exercises, while the CON group had none.

A significant intervention-time interaction was found for the WBLT in favor of FLOSS as compared to CON ( $p < 0.05$ ). These results were associated with trivial to small effect sizes at all time points. As compared to CON, better, but non-significant, improvement in CMJ force and sprint times were seen in the FLOSS group ( $p > 0.05$ ) at up to 45 minutes after the bands were removed.

**Conclusion:** This study revealed that applying FLOSS bands to the ankle (talocrural) joint for two minutes may improve ROM, jump and sprint performance for up to 45 minutes after removing the bands.

Driller, M., et al. Tissue Flossing on Ankle Range of Motion, Jump and Sprint Performance: A Follow-Up Study. *Phys Ther Sport*. 2017, Nov; 28: 29-33.

#### VITAMIN D SUPPLEMENTATION FOR CHRONIC, WIDESPREAD PAIN

Chronic widespread pain (CWP), including fibromyalgia (FM), is prevalent in the general population, with estimates ranging from 10-18%. As vitamin D has been proposed to be an associated factor in CWP, this meta-analysis was designed to better understand this relationship.

Medical databases were reviewed for randomized, controlled trials involving patients with CWP, FM and vitamin D supplementation. From those studies were extracted diagnoses, serum vitamin D levels, vitamin D dosing and the results of clinical outcome measures. The primary outcome variables of the meta-analysis were differences in

VAS pain scores, Fibromyalgia Impact Questionnaire (FIQ) scores or Discomfort Behavior Scale (DBS) scores between the intervention and the placebo groups.

From the literature review, six randomized, controlled trials were identified and were included in this analysis. The pooled results revealed that patients with CWP who received vitamin D treatment had significantly lower pain scores than those who received a placebo. No significant relationship was found between changes in blood levels of vitamin D and pain scores.

**Conclusion:** This study of patients with chronic, widespread pain found that vitamin D supplementation can decrease pain scores, independent of changes in blood levels of vitamin D.

Yong, W., et al. Effect of Vitamin D Supplementation in Chronic Widespread Pain: A Systematic Review and Meta-analysis. *Clin Rheum*. 2017, Dec; 36 (12): 2825-2833.

#### MULTIPLE VERSUS SINGLE HYALURONIC ACID INJECTIONS

For patients with osteoarthritis (OA) of the knee, common, nonoperative therapies include nonsteroidal anti-inflammatory drugs, physical therapy, analgesics and intra-articular injections.

Recommendations of the major medical societies, including the American Academy of Orthopedic Surgeons, the American College of Rheumatology and the American Medical Society for Sports Medicine, differ in their recommendations for the use of intra-articular hyaluronic acid. This meta-analysis was designed to better understand the effect of single versus multiple injections of hyaluronic acid for the treatment of OA of the knee.

A comprehensive literature search was conducted for articles assessing the efficacy of hyaluronic acid injections for patients with OA of the knee, with outcomes including pain, function and adverse events. Relevant articles were reviewed and included in the meta-analysis.

Studies included were 26, double-blind, randomized, controlled trials and four, single-blind, randomized, controlled trials involving a total of 5,848 patients. Low molecular

weight hyaluronic acid was the most frequently used treatment (47%), followed by high molecular weight hyaluronic acid (43%) and moderate weight hyaluronic acid (10%). Compared with intra-articular saline, two to four injections of HA produced the largest reduction in pain at three ( $p < 0.00001$ ) and six ( $p = 0.008$ ) months. Treatments involving five or more injections were correlated with significant improvement in pain at six months.

**Conclusion:** This meta-analysis of randomized, controlled trials involving hyaluronic acid for the treatment of osteoarthritis of the knee found that a series of two to four injections resulted in better outcomes than did single injections, or placebo.

Concoff, A., et al. Efficacy of Multiple versus Single Hyaluronic Acid Injections: A Systematic Review and Meta-analysis. *BMC Musculoskel Dis*. 2017; 18: 542.

#### ARTHROSCOPIC VERSUS PLACEBO MENISCUS SURGERY

Arthroscopic partial meniscectomy is a common orthopedic procedure, with its incidence increasing steadily. Despite studies suggesting a lack of clinical efficacy, most guidelines advocate meniscal surgery after failed conservative treatments. This prospective study, the Finnish Degenerative Meniscal Lesion Study (Fidelity), was designed to better understand the effect of meniscal surgery.

This multicenter, randomized, placebo-controlled trial included adults, 35 to 65 years of age, each with chronic knee symptoms. All were scheduled for knee arthroscopic surgery, and were randomized to receive a partial meniscectomy (PM) or a placebo surgery. All patients were assessed with the Western Ontario Meniscal Evaluation Tool (WOMET), the Lysholm knee score and for pain after exercise from baseline to 24 months after surgery.

Intraoperatively, tear morphology was defined as unstable in 34 of the surgery and in 41 of the placebo group. Both groups demonstrated marked improvement in all primary outcomes, with no significant difference in WOMET, Lysholm or pain after exercise scores. Most were satisfied, and reported improvements, with no significant

difference between the two groups. Further, no significant difference was found between the groups on follow-up meniscal tests during clinical examination.

**Conclusion:** This prospective, blinded study of patients with degenerative meniscal pathology found no significant difference in outcome between those receiving surgical intervention and those receiving placebo intervention, as measured for up to two year follow-up.

Sihvonen, R., et al. Arthroscopic Partial Meniscectomy versus Placebo Surgery for a Degenerative Meniscus Tear: A Two-Year Follow-Up of the Randomised Controlled Trial. *Ann Rheum Dis.* 2018; 77: 188-195.

### **CONCUSSION AND FUNCTIONAL BRAIN PROCESSES**

While routine MRI cannot adequately identify micro-structural injury after concussion, improvements have been made with the use of functional MRI (fMRI) or event-related potentials (ERP) and magnetoencephalography (MEG). This study used MEG to assess patients during visual working memory tasks.

Eighteen patients with a recent, first ever concussion were compared to 19 controls. Both groups were tested using the Sport Concussion Assessment Tool-Two (SCAT2), as well as an assessment battery including the Wechsler Abbreviated Scale of Intelligence (WASI) for IQ, the Alcohol Use Disorders Identification Test (AUDIT), the Conners, Attention-Deficit Hyper-activity Disorder (ADHD) Test, the Generalized Anxiety Disorder-7 test (GAD-7) and the Patient Health Questionnaire (PHQ-9) to assess depression. For both groups, MEG data were collected during a visual One-Back task with complex scenes as a test of visual working memory. MEG responses were compared between the groups.

Scores on tests of ADHD, anxiety and depression were worse in the concussion group than in the controls ( $p=0.035$ ,  $p=0.035$ , and  $p=0.004$ , respectively). The mean accuracy on the One-Back test was similar between the two groups.

Despite this, MEG demonstrated abnormal hypo- and hyperactivation patterns in brain areas involving frontoparietal, ventral occipitotemporal, temporal, and subcortical areas in concussed patients as compared with controls. Hyperactivation in the right hippocampus and orbital frontal areas during encoding and/or recognition was found, suggesting inefficient, compensatory activity.

**Conclusion:** This study of patients with recent concussion found that, during tests of visual working memory, abnormal activity was present in the frontoparietal, ventral occipitotemporal, medial temporal and orbitofrontal areas.

Shah-Basak, P., et al. Concussion Alters the Functional Brain Processes of Visual Attention and Working Memory. *J Neurotrauma.* 2018, January 15; 35: 267-277.

### **REPEATED ISCHEMIC LEG PRE-CONDITIONING AND CYCLING PERFORMANCE**

Ischemic preconditioning (IPC) involves repetitive, pressure induced, brief ischemia followed by reperfusion. While many studies have analyzed the effects of this technique on strengthening, little is known about its effect on athletic performance. This study investigated the effect of IPC on cycling performance.

Subjects were recreationally active sport science students who underwent baseline aerobic and anaerobic capacity testing prior to the IPC protocol. At baseline, and after the final IPC, all participants were tested with a simulated Kerin cycling event. The subjects were then randomized into an IPC or a sham IPC group to perform seven daily sessions. Participants received four, five-minute episodes of IPC (220 mm Hg) or sham treatment (20 mm Hg), separated by five minutes of rest for each leg. Urine samples were collected five minutes before each IPC session. Four Wingate tests were used to simulate the Kerin competition. VO<sub>2</sub>max testing was conducted 48 hours and seven days following the last IPC session.

Compared to baseline, performance increased in the IPC group in peak power by 11% ( $p<0.001$ ), in average power by 4.3% ( $p=0.02$ ) and improved in the Fatigue Index by 12.1% ( $p=0.01$ ).

No significant changes were observed for the sham group on any of these parameters. Maximal aerobic capacity increased in the treatment group by 9.5% at 48 hours post-treatment, with a further increase of 12.8% after an additional seven days ( $p<0.01$ ). Urine studies indicated an increase in total biopterin, suggesting increased vasodilation and sympathetic activation, and lower levels of indirect markers of oxidative stress, during cycling.

**Conclusion:** This randomized, controlled study of repeated, ischemic preconditioning found that seven days of this treatment significantly increased aerobic and anaerobic capacity.

Lindsay, A., et al. The Effect of one Week of Repeated Ischemic Leg Preconditioning on Simulated Keirin Cycling Performance: A Randomized Trial. *BMJ Open Sport Exer Med.* 2017; 3(1): e000229.

### **DISCHARGE AFTER TOTAL JOINT ARTHROPLASTY FOR PATIENTS LIVING ALONE**

Numerous studies have demonstrated that patients undergoing total joint arthroplasty (TJA) who are discharged to home have an equivalent recovery to those who are discharged to an inpatient rehabilitation facility (IRF). Despite these findings, concern has been expressed about those who are discharged to live alone. This study was designed to better understand the outcomes of these patients.

This prospective, observational study included 910 consecutive patients undergoing primary, unilateral total hip arthroplasty (THA) or total knee arthroplasty (TKA). The investigational group was defined as patients who were discharged directly to home. A nurse navigator was assigned to each patient for post-operative surveillance. The primary outcome measures were ninety-day post-discharge complications and unplanned clinical events, including readmissions. Functional outcomes were assessed preoperatively at one and six months using the Hip Disability and Osteoarthritis Outcome Score (HOOS), the Knee injury and Osteoarthritis Outcome

Score (KOOS), as well as the Short-Form Health Survey (SF-12).

Data analysis was completed for 769 patients, including 443 undergoing THA and 326 undergoing TKA. Of those, 137 reported living alone, of whom 37.2% reported limited or no support at home. No significant difference was seen in the rates of unplanned clinical events, with at least one event occurring in 10.9% of those living alone and 9.5% of those with home support ( $p=0.64$ ). Readmission occurred in 2.2% of those living alone and 3.2% of those living with others. At two weeks, 83.6% of those living alone reported being happy to have been discharged directly home.

**Conclusion:** This prospective study of 874 patients undergoing total joint arthroplasty found that those discharged directly to home alone did not differ significantly in medical or functional outcomes from those discharged to home with others.

Fleischman, A., et al. Patients Living Alone Can Be Safely Discharged Directly Home after Total Joint Arthroplasty: A Prospective Cohort. *J Bone Joint Surg.* 2018, January 17;100(2):99-106.

### HIP AND KNEE ARTHRITIS IN MARATHON RUNNERS

While distance running has been associated with numerous health benefits, data regarding the impact of this behavior on hip and knee joint health remain inconclusive. This large, cross-sectional study was designed to better understand hip and knee health in active marathon runners.

An electronic survey was distributed to marathon clubs, with eligibility for inclusion restricted to active, adult marathoners. On a survey, 953 marathon runners provided information concerning running history, and current running status. Joint health questions inquired about hip or knee pain in the past year, doctor-diagnosed hip or knee arthritis, age of diagnosis, family history, and surgical history. The subjects were also asked whether they had been diagnosed with hip or knee arthritis by a doctor.

The mean age of the marathoners was 47.9 years, with a mean distance of 36.4 miles per week,

and a mean training time of 18.8 years. Hip and/ or knee pain was reported by 47% of the marathoners, including 22% with knee pain, 11.1% with hip pain and 13.6% with hip and knee pain. The arthritis prevalence of the marathoners was 8.8% in the subgroup of U.S. marathoners, significantly lower than that of the age-matched U.S. population, estimated at 17.9% ( $p<0.001$ ). A multi-variable analysis revealed no significant, positive relationship between pain or arthritis and running duration, intensity, weekly mileage or number of marathons.

**Conclusion:** This multi-national study of marathon runners found that the prevalence of self-reported arthritis in the United States was less than half of that reported in the U.S. general population.

Ponzio, D., et al. Low Prevalence of Hip and Knee Arthritis in Active Marathon Runners. *J Bone Joint Surg.* 2018, January 17; 100(2): 131 -137.

### UPPER EXTREMITY STRENGTHENING FOR CHRONIC LOW BACK PAIN

For patients with chronic low back pain (LBP), the best combination of exercise type, frequency and duration remains uncertain. As no common exercise programs for chronic LBP incorporate the upper part of the spinal muscle chain, this study assessed the impact of a program for back pain that includes these exercises.

Twenty sedentary males with chronic LBP were randomized to receive conventional LBP exercises, with or without exercises for the upper back, neck and shoulders. At baseline, all were assessed for lumbar strength, shoulder abduction and horizontal abduction strength, isokinetic neck strength and isometric neck strength. The conventional exercise (CE) group underwent isometric back exercises, as well as back and abdominal concentrated strengthening exercises, three days per week for six weeks. For the supplemental exercise (SE) group, the back exercises were supplemented with neck and shoulder isotonic exercises. The participants were assessed for disability with the

modified Oswestry Disability Questionnaire (MODQ), and for pain with a Visual Analog Scale (VAS).

Both groups improved significantly in fingertip to floor distance and VAS scores. In addition, compared to the CE group, greater improvements were noted at follow up in the SE group in VAS ( $p<0.001$ ) and MODQ scores ( $p<0.001$ ).

**Conclusion:** This study of patients with chronic low back pain found that a low back exercise program used in combination with neck, shoulder and upper back exercises can reduce pain and disability more than conventional low back exercise alone.

Atalay, E., et al. Effect of Upper-Extremity Strengthening Exercises on the Lumbar Strength, Disability and Pain of Patients with Chronic Low Back Pain: A Randomized, Controlled Study. *J Sport Sci Med.* 2017, December 1; 16(4): 595-603.

### PERCUTANEOUS RADIOFREQUENCY TREATMENT FOR SACROILIAC JOINT PAIN

For patients with sacroiliac (SI) joint pain, among the treatments described in literature is radiofrequency denervation. This study explored the utility of a device targeting the lateral branches S1 to S4 for the treatment of SI joint pain.

This randomized, sham control, double-blind, multicenter, clinical trial included patients with SI joint pain of at least three months' duration. All patients underwent a test SI joint injection with lidocaine, two percent. Those with a reduction in pain of two or more on a numeric rating scale were randomized into the study. Those in the treatment group underwent percutaneous radiofrequency lesions at the lateral branches of S1 to S4 nerve roots and the posterior rami dorsalis of L-5. Those in the sham group underwent the same procedure without radiofrequency lesions. The groups were compared for changes in scores on the Numeric Rating Scale of pain.

At three months, no significant difference in pain level was found between the treatment and sham treatment groups. Further, no significant difference was found between the groups in the level of satisfaction over time.

**Conclusion:** This study of patients with sacroiliac joint pain did not find that percutaneous radiofrequency heat lesions are more effective than placebo for improving symptoms.

van Tilburg, C., et al. Randomized, Sham-Controlled, Double-Blind, Multicenter, Clinical Trial to Ascertain the Effect of Percutaneous Radiofrequency Treatment for Sacroiliac Joint Pain. Three-Month Results. *Clin J Pain*. 2016, November; 32(11): 921-926.

### NEUROLOGICAL TEST RESULTS BEFORE AND AFTER BOXING

Professional boxing has been considered dangerous, due to repetitive exposure to head trauma, which can lead to concussion and/or cumulative trauma injuries. Olympic style boxing has a less violent history, with no strong evidence supporting a relationship between it and chronic brain injury. This study was designed to determine the short-term effects of Olympic style boxing on neurocognitive abilities.

Subjects were female boxers participating in the 2016 Women's World Boxing Championships. All subjects underwent pre-participation evaluations, repeated after they were eliminated from competition. Tests included the modified Balance Error Scoring System (mBESS), the King-Devick Test and the 3m Timed Up and Go (TUG) test. A subset of the subjects also completed the CogState computerized neurocognitive test.

Of the 285 female boxers from 64 countries who competed in the games, 61 (21%), ranging in age from 19 to 36 years agreed to participate. King-Devick visual function test scores ( $p=0.02$ ) were better at post-tournament testing than at pre-tournament baseline testing. Processing speed, as measured by the Maze Chase task of the CogState test, was also improved after the tournament, as compared to baseline ( $p<0.001$ ). On tests of balance and dual-task function, participants committed fewer errors on post-tournament testing, as compared to baseline, on the mBESS test ( $p<0.001$ ) and the TUG subtraction test accuracy scores ( $p=0.02$ ).

**Conclusion:** This study of female Olympic boxers found that,

as a group, the participants actually improved after the tournament, as compared with baseline, on measures of postural stability, visual function and processing speed.

Howell, D., et al. Neurological Tests Improve after Olympic Style Boxing: A Pre-Tournament and Post-Tournament Study in the 2016 Women's World Boxing Championships. *Br J Sports Med*. 2017, September; 51(18): 1279-1284.

### HEEL-RISE DEFICIT AFTER ACHILLES TENDON RUPTURE

After an Achilles tendon rupture, a major complication is that of the tendon healing in an elongated position. This study explored ankle biomechanics, calf muscle recovery tendon length, and outcome, six years after an Achilles injury.

Data for this study were derived from a cohort of 201 patients enrolled in randomized, controlled trials, where surgery was compared with conservative treatment of Achilles tendon injury. All subjects were assessed with the Limb Symmetry Index (LSI) of their heel-rise height, calculated as the injured side divided by healthy side  $\times 100$ . Patient-reported outcome measures included the Achilles Tendon Total Rupture Score (ATRS), the Physical Activity Scale (PAS), and the Foot and Ankle Outcome Score (FAOS). The Achilles tendon length was measured using ultrasound. Subjective and objective outcome measures were compared between those with an LSI of less than 15% and those with an LSI of more than 30%.

At follow-up, no significant differences were found in patient-reported outcome measures between the less than 15% group and the more than 30% group. However, significant differences were found at six years, favoring the less than 15% group, in eccentric plantar flexor power, concentric plantar flexion power and peak Achilles tendon force.

**Conclusion:** This study found that, after an Achilles tendon rupture, those with a greater than 30% side-to-side difference in heel rise height at one year had greater chronic deficits in the injured limb

and ankle kinetics, as compared to those with a less than 15% side-to-side difference.

Brorsson, A., et al. Heel-Rise Height Deficit One Year after Achilles Tendon Rupture Relates to Changes in Ankle Biomechanics Six Years after Injury. *Am J Sport Med*. 2017, Nov; 45(13): 3060-3068.

### ELECTRONIC DEVICE USE AND THE MEDIAN NERVE AT THE CARPAL TUNNEL

Frequent use of electronic devices may result in repetitive strain injury. This study of electronic device users compared subjective and objective data focusing on the median nerve at the carpal tunnel.

Subjects were university students between 18 and 25 years of age. Questionnaires determined the frequency and duration of electronic device use and self-reported musculoskeletal pain in the neck, shoulder, back, elbow and wrist/hand in the past 12 months. From these data, the students were classified as intensive electronic device users (over five hours per day), or non-intensive users (under five hours per day). The carpal tunnel was evaluated with the Phalen's and Durkin's tests, and the median nerve at the carpal tunnel evaluated by ultrasound.

The mean daily use by intensive users was 9.1 hours, and that by nonintensive users was 2.8 hours. Intensive users had positive Durkin's test results more frequently ( $p<0.01$ ), and had a larger wrist circumference in the right hand ( $p<0.05$ ), than did nonintensive users. Median nerve cross-sectional areas were significantly larger in the intensive users at most of the levels of the wrist, and demonstrated greater bowing of the transverse carpal ligament. Total time of use of devices on a typical day was strongly related to pain intensity ( $p=0.002$ ), duration of symptoms of the wrist/hand ( $p=0.005$ ) and ultrasound findings.

**Conclusion:** This study of college students found that overuse of electronic devices may adversely affect the median nerve within the carpal tunnel.

Woo, E., et al. Effects of Electronic Device Overuse by University

Students in Relation to Clinical Status and Anatomical Variations of the Median Nerve and Transverse Carpal Ligament. **Muscle Nerve.** 2017, Nov 5; 56(5): 873-880.

### **BONE UNION AFTER BALLOON KYPHOPLASTY**

Among patients with osteoporotic vertebral body fractures, balloon kyphoplasty (BKP) has been shown to have effective clinical outcomes. This retrospective study reviewed the frequency of bone union after this procedure, and the correlation between bone union and symptom relief.

This retrospective study reviewed the charts of patients receiving BKP at one institution over four years. All subjects underwent balloon kyphoplasty, with an evaluation of bone union by lateral x-ray and CT scan. The presence of back pain before BKP and at the final follow-up examination was evaluated using a VAS. The difference in the mean

VAS scores between the bone union group (UG) and the non-union group (NUG) was analyzed using a t-test.

Of the patients seen during the study, 36 were followed for more than two years. Of these, 75% exhibited bone union at the final examination. Pain scores improved in all cases. There was no significant difference in pain scores at two years between those with union and those without union.

**Conclusion:** This retrospective study of patients undergoing balloon kyphoplasty for vertebral fractures found that, at two years, 25% had not achieved bone union.

Tarukado, K., et al. Does an Osteoporotic Vertebral Fracture Treated by Balloon Kyphoplasty Successfully Achieve Bone Union During the Follow-Up? A Retrospective Study with a Minimum Two-Year Follow-Up. **J Orthop.** 2017, Aug 9; 14(4): 480-483.

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