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BIOMARKERS AND CONCUSSION SEVERITY

Previous studies have demonstrated that elevated levels of cerebral spinal fluid biomarkers of axonal injury can be detected after injuries to the brain, with some demonstrating increased quantities with increasing severity of injury. This study was designed to determine whether sports related concussion is correlated with elevated biomarkers when tested with peripheral blood sampling.

Subjects were 288 players from 12 Swedish hockey teams who underwent clinical examination and concussion screening before season onset. Of these, 47 had biomarkers drawn before the start of the season. During the season, among players who sustained concussion or other head injury, blood samples were drawn at one, 12, 36, 44 and 144 hours post-injury. From these samples, levels of T-tau, S-100B and NSE were determined.

Of the 288 players, 35 sustained a sports related concussion during the study. Of those, 28 agreed to participate. Among these, 15 players had symptoms lasting longer than six days. The T-tau levels were significantly higher in post-concussion samples compared with preseason samples at all times tested ($p=0.002$). Levels of both T-tau ($p<0.001$) and S-100B ($p<0.001$) were higher immediately after concussion, as compared with pre-season samples. However, the levels of S-100B and NSE, but not T-tau, increased after a friendly game without concussion compared with baseline. The concentration of T-tau one hour after concussion, was significantly related to the number of days for concussion symptoms to resolve ($p=0.002$).

Conclusion: This study of

professional ice hockey players found that, after concussion, the concentration of the biomarker T-tau is elevated, and may be useful in determining the severity of the concussion.

Shahim, P., et al. Blood Biomarkers for Brain Injury in Concussed Professional Ice Hockey Players. *JAMA Neurol.* 2014, June; 71 (6):684-692.

BRACING FOR RECURRENT ANKLE SPRAINS

As ankle sprains remain the most common sports and other activity related injury, prevention of recurrence is of significant import. This study was designed to determine the cost-effectiveness of bracing, as compared with neuromuscular training, for the prevention of recurrent ankle sprains.

This prospective, randomized, controlled trial included 340 athletes with recent lateral ankle sprains. The athletes were randomized into three groups. Group 1 underwent a home-based neuromuscular training program, involving three, unsupervised training sessions per week at 30 minutes per session. Those in the bracing group received a semi-rigid ankle brace, to be worn during all sports events for 12 months. Those in the combination group received both training and the brace. For the cost analysis, cost of materials, patient time and health care utilization were recorded at one-year follow-up.

During follow-up, 69 athletes reported a recurrent ankle sprain, including 19% in the combination group, 15% in the brace group and 27% in the neuromuscular training group. By reviewing the total cost of the injuries (including patient time),

the incremental cost-effectiveness ratio was determined. Bracing alone resulted in a significant decrease in costs (hazard ratio=0.81), as well as reduced ankle sprain incidence. Neuromuscular training resulted in a lower cost compared to the combination group but was associated with an increased risk of repeat ankle sprain (hazard ratio=1.52) as compared with the combination group.

Conclusion: This study of athletes with acute ankle sprains found that bracing is the most cost effective intervention for preventing recurrent ankle sprains, as compared with neuromuscular training and combination therapy.

Janssen, K., et al. The Cost Effectiveness of Measures to Prevent Recurrent Ankle Sprains: Results of a Three-Arm, Randomized, Controlled Trial. *Am J Sports Med.* 2014, July; 42(7): 1534-1541.

COMBINED BRAIN AND PERIPHERAL STIMULATION FOR BACK PAIN

The lifetime prevalence of low back pain (LBP) is thought to be as high as 79% in adults and 84% in adolescents. As transcranial direct current stimulation (tDCS) and peripheral electrical stimulation (PES) can each desensitize the nervous system and regulate brain organization, this study investigated the effects of combining tDCS and PES in patients with recurrent episodes of LBP.

Sixteen patients with recurrent, nonspecific LBP were recruited for participation. The participants were randomized to receive anodal tDCS combined with PES (applied to the area of worst pain), anodal tDCS combined with sham PES, sham

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tDCS combined with PES, or sham tDCS combined with sham PES. The subjects were assessed for pain immediately after intervention, using an 11-point numeric rating scale (NRS), motor cortical organization (measured with transcranial magnetic stimulation), sensitization (using pressure pain thresholds), pain free range of motion (measured with the Shober test) and higher sensory functions (measured with two-point discrimination).

Pain severity was significantly reduced following each of the three active interventions, and maintained at day three. No pain reduction resulted from the sham intervention. The combined intervention resulted in improvement on the sensitization tests, normalized motor cortical organization and improved sensory function.

Conclusion: This study suggests that a combination of tDCS and PES can provide clinical benefits greater than those obtained with each intervention applied alone.

Schabrun, S., et al. Targeting Chronic, Recurrent Low Back Pain from the Top-Down and Bottom-Up: A Combined, Transcranial Direct Current Stimulation and Peripheral Electrical Stimulation Intervention. **Brain Stim.** 2014, May-June; 7(3): 451-459.

EPIDURAL STEROID INJECTIONS FOR SPINAL STENOSIS

An estimated 25% of epidural glucocorticoid injections administered in the Medicare population are provided for spinal stenosis. This study compared the effectiveness of epidural injections of glucocorticoids plus anesthetic with injections of anesthetic alone for patients with lumbar spinal stenosis.

The subjects were 50 years of age or older, all with radiographic evidence of central lumbar spinal stenosis. The patients were randomized to receive either a glucocorticoid injection plus 0.25% to 1% lidocaine, or an equivalent volume of 0.25% to 1% of lidocaine alone. The primary outcome measures were the Rolland-Morris Disability Questionnaire (RMDQ) score and the patient's rating of buttock, hip or leg pain, measured at six weeks. Secondary outcomes included the proportion of participants with at least minimally clinically meaningful (>30%) or substantially clinically meaningful (>50%) improvement.

A total of 200 patients were allocated to each group. At three weeks, significant between group differences were seen in RMDQ scores ($p < 0.001$) and intensity of leg pain ($p = 0.02$). However, at six weeks, both groups had improved in the RMDQ scores and leg pain, as compared with baseline, with no significant difference between the groups ($p < 0.07$, and $p = 0.48$, respectively). Among those who received interlaminar injections, those in the combination group reported better physical function on the RMDQ ($p < 0.001$) and greater improvement in left leg pain ($p = 0.005$) at three weeks. No significant difference was found between the groups at six weeks. No significant difference occurred between groups in clinically meaningful improvement.

Conclusion: This study of patients with spinal stenosis found no significant difference in outcomes at six weeks between those treated with epidural injections of lidocaine alone and those injected with lidocaine plus glucocorticoid.

Friedly, J., A Randomized Trial of Epidural Glucocorticoid Injections for Spinal Stenosis. **N Eng J Med.** 2014, July 3; 371(1): 11-21.

EXERCISE AND SEVERE OSTEOARTHRITIS

Previous studies have demonstrated that exercise can improve function and relieve pain for patients with mild to moderate osteoarthritis (OA). This randomized, controlled, single-blind trial evaluated the efficacy of an exercise program for patients with severe knee or hip OA.

Subjects were 165 patients scheduled for primary knee or hip replacement. Those patients were randomized into one of two groups. A control group received an education package only. An intervention group received the same education package, and also participated in an individualized, eight-week, neuromuscular exercise intervention (12 sessions), addressing functional instability and impaired muscle function. The primary outcome measures were Activities of Daily Living (ADL), subscores of the Hip Disability and Osteoarthritis Outcome Score (HOOS), and the Knee Injury and Osteoarthritis Outcome Score (KOOS). The other HOOS/KOOS subscales served as secondary subscales served as secondary outcome variables.

The 165 subjects were an average of 67 years of age. For the primary outcome, the difference in mean change between groups was group ($p = 0.0002$). For the secondary outcomes of pain, symptoms, sport and recreation function and joint related quality-of-life all were significantly better in the treatment group than in the control group ($p = 0.0012$, $p = 0.0358$, $p = 0.0329$ and $p = 0.0034$, respectively). Those with hip OA reported greater improvement in pain and physical function than those with knee OA.

Conclusion: This study of patients scheduled for knee or hip surgery due to osteoarthritis found that a neuromuscular exercise intervention before surgery could produce significant improvements in self-reported physical function and functional outcomes.

Villadsen, A., et al. Immediate Efficacy of Neuromuscular Exercise in Patients with Severe Osteoarthritis of The Hip or Knee: A Secondary Analysis from a Randomized, Controlled Trial. **J Rheum.** 2014, July; 41(7): 1385-1394.

HIP FRACTURE SURGERY AND CLOPIDOGREL

Clopidogrel is an adenosine diphosphate receptor/P2Y12 inhibitor used to disrupt platelet function. Historically, it has been assumed that antiplatelet therapy greatly increases the risk of perioperative bleeding, although little evidence supports this conclusion. This study compared patients undergoing hemiarthroplasty while on clopidogrel therapy to the general population of intracapsular hip fracture patients.

All patients with femoral neck fractures between 2005 and 2011, treated at one institution, were identified. Charts were reviewed for preoperative demographics, including age, gender, time to surgery, use of clopidogrel, use of aspirin, use of warfarin or other anti-coagulation agents, comorbidities, American Society of Anesthesia score and preoperative hemoglobin and postoperative hemoglobin. Major complications were defined as hematoma formation, pulmonary embolism, myocardial infarction, cerebrovascular accident, transient ischemic attack, blood transfusion reaction, return to the operating room, infection, acute renal failure, respiratory failure, gastrointestinal bleed or death.

Of the 162 patients meeting the inclusion/exclusion criteria, 15 were receiving clopidogrel at the time of injury. No significant differences were seen between those taking clopidogrel and those who were not at the time of surgery in intraoperative blood loss, wound complications, hemoglobin at follow-up days one to three, 30-day mortality or number of transfusions. Time to surgery was 2.3 days in the clopidogrel group and 1.9 days in the non-clopidogrel group ($p=0.25$).

Conclusion: This retrospective study of patients with femoral neck fractures undergoing hemi-arthroplasty found no significant differences in bleeding or wound related complications between those taking clopidogrel and those not taking clopidogrel at the time of injury.

Manaqibwala, M., et al. Complications of Hip Fracture Surgery on Patients Receiving Clopidogrel Therapy. **Archives Orthopaed Trauma Surgery.** 2014, June; 134(6): 747-753.

KINESIOTAPE FOR ANKLE INSTABILITY

Previous studies have reported that 55-72% of individuals who sustain a lateral ankle sprain have residual symptoms for weeks or years, and/or develop functional ankle instability (FAI). One of the primary factors contributing to FAI is thought to be proprioceptive defects. As the application of tape or braces can improve conscious proprioceptive sense, some have suggested using these techniques as therapeutic interventions. This study assessed the effect of kinesiotape on the proprioceptive capability of patients with ankle sprains.

Fourteen university students were identified with chronic ankle sprains, all of whom felt unstable during sports or recreational activity. A control group comprised 14 subjects with healthy ankles and no history of ankle injury.

After baseline ankle assessment, the subjects were randomized to either a group to receive kinesiotape or a control condition without taping. The ankles were then tested once again for strength by maximum voluntary isometric contraction, and for proprioception by force sense testing. The mean force sense error for the treatment group improved from a baseline of 2.6 to 1.8 at 72 hours after tape application. Immediately after tape application, the injured group had significantly more errors than the control group. After they had worn the tape for 72 hours, no significant differences were noted between the two groups.

Conclusion: This study of patients with functional ankle instability found that, after wearing tape for 72 hours, proprioceptive deficits are improved, approaching those of subjects without injury.

Simon, J., et al. The Effect of Kinesiotape on Force Sense in People with Functional Ankle Instability. **Clin J Sports Med.** 2014, July; 24(4): 289-294.

LIGHT INTENSITY PHYSICAL ACTIVITY AND CANCER SURVIVORS

Compared with individuals without cancer, cancer survivors have a twofold increase risk of having one or

more functional limitation. This study was designed to evaluate the effects for cancer survivors of low – light physical activity, high – light physical activity and moderate – vigorous physical activity.

This randomized controlled trial was designed to evaluate whether a year-long diet and exercise intervention would improve physical function in older long-term cancer survivors. Subjects were at least 65 years of age, were at least five years from diagnosis of breast, prostate or colorectal cancer, were overweight or obese and engaged in less than 150 minutes per week of moderate intensity strength or endurance exercise. Physical activity during intervention was quantified using METs with low-light level physical activity defined as 1.5 to 2 METs, high –light physical activity as 2.1 to 2.9 METs and moderate to vigorous physical activity as greater than 3 METs. The primary outcome was measures of physical function, as assessed at baseline and at one, and two year follow-up.

At follow up increasing tertiles of low physical activity were associated with higher scores on all measures of physical activity ($p<0.005$), with associations stronger for those with increasing high-low than those with low physical activity.

Conclusion: This prospective study found that among chronic cancer survivors, increasing light physical activity by 2.1 minutes or greater per day can result in significant health benefits.

Blair, C et al. Light Intensity Activity Attenuates Functional Decline In Older Cancer Survivors. **Med Science Sports and Exercise.** 2014, July; 46(7): 1375 – 1383

PHONOPHORESIS FOR CHRONIC NECK PAIN

Approximately 70% of adults experience neck pain during the lifetime. Exercise is often a central component of treatment of chronic pain, with phonophoresis often used as an adjunct therapy. This study compared the effects of phonophoresis with those of exercise therapy for patients with chronic neck pain.

This randomized, single-blind study included 64 female patients with complaints of neck pain of at least

three months' duration. The subjects were randomly assigned to one of three groups. Group 1 received phonophoresis with capsaicin and exercise. Group 2 received placebo phonophoresis with capsaicin and exercise. Group 3 received exercise only. All underwent treatment three days a week for six weeks, with the phonophoresis groups receiving 10-minute treatments with capsaicin, while the exercise groups received 60-minute treatments. The participants were assessed before and after treatment using measurements of pain, disability, sleep quality and depression.

All groups demonstrated significant improvement in pain, disability, sleep quality and depression scores as compared to their initial status. The visual analogue scale scores for rest pain, as well as that for activity pain, were lowest in group 1 and highest in group 3 ($p < 0.001$ for all comparisons). In addition, Neck Pain Disability Scale scores were significantly better in group 1 than in group 2, and significantly better in group 2 than in group 3 ($p < 0.001$ for all comparisons).

Conclusion: This randomized, blinded study of patients with chronic neck pain found that capsaicin, applied via phonophoresis, can improve outcomes of patients, especially when combined with exercise therapy.

Durmus, D., et al. A Randomized, Placebo-Controlled, Clinical Trial of Phonophoresis for the Treatment of Chronic Neck Pain. **Rheum International**. 2014, May; 34(5): 605-611.

RADIOFREQUENCY ABLATION FOR TRIGEMINAL NEURALGIA

Previous studies have demonstrated that CT guided percutaneous radiofrequency thermocoagulation (PRT) can decrease pain caused by trigeminal neuralgia. This study evaluated the long-term outcomes of patients receiving repeated PRT for recurrent trigeminal neuralgia.

From January 2002 to December 2012, 996 patients underwent initial PRT procedures for trigeminal neuralgia. After the initial PRT,

recurrent pain occurred in 146 patients. Of these patients 33 underwent a combined 43 repeated PRT procedures over the course of 10 years. The patients' pain was measured using a Barrow Neurological Institute rating scale prior to procedure, immediately after procedure and at two years and five years. The primary outcome measures were pain and need for further intervention.

The data revealed that 91% of the patients had immediate relief following repeat PRT, with 75% of them remaining in excellent or good pain control at one year. In addition 60% had excellent or good pain control at two years and 68% at five years. Of those who again had recurrent pain, 10 patients underwent a third PRT treatment with only three achieving good results or better.

Conclusion: This study of patients with recurrent trigeminal neuralgia found that repeated PRT may provide long-term pain relief.

Tang, Y et al. Repeated CT Guided Percutaneous Radiofrequency Thermocoagulation For Recurrent Trigeminal Neuralgia. **European Neurology**. 2014, July; 72:54 – 59

PHYSICAL ACTIVITY AND INCIDENT DISABILITY AMONG ADULTS AT RISK FOR KNEE ARTHRITIS

Disability accounts for more than one in four dollars spent on health care. This study examined whether moderate physical activity is related to a decreased risk of developing disability among community dwelling adults with knee osteoarthritis (OA).

This prospective, multi-site cohort study included community dwelling adults participating in the Osteoarthritis Initiative (OAI). Subjects were 45 to 79 years of age, and were eligible for study inclusion if they had OA, with symptoms in at least one knee, or at least one established risk factor for knee OA. Physical activity was determined using an accelerometer. Disability was assessed, based upon limitations in instrumental and basic activities of daily living at baseline and at two years. The secondary

outcome was progression of disability.

Of the 1,680 adults studied, 149 cases of new disability were identified. Significantly lower frequencies of incident disability were related to greater light activity time among men ($p = 0.042$) and women ($p < 0.001$), adults with knee OA ($p < 0.001$) and those without knee OA ($p = 0.001$). A multivariate analysis revealed that greater activity was significantly related to lower risk of developing disability. In addition a strong association was found between increasing quartile categories of moderate to vigorous activity time and reduced incident disability ($p = 0.005$). The hazard ratios for disability progression decreased across increasing quartile categories of light activity, as well as moderate to vigorous activity ($p = 0.018$ and $p = 0.07$, respectively).

Conclusion: This study of community dwelling adults with or at high risk of osteoarthritis of the knee found an inverse relationship between physical activity and the risk of developing disability.

Dunlop, D., et al. Relation of Physical Activity Time to Incident Disability in Community Dwelling Adults with or at Risk of Knee Arthritis: Prospective Cohort Study. **BMJ**. 2014, May; 348: g2472.

GREATER OCCIPITAL NERVE BLOCKS FOR CHRONIC CLUSTER HEADACHE

Cluster headache is a rare, but highly disabling, primary headache disorder. Treatment of episodic cluster headaches with a blockade of the greater occipital nerve (GONB) has been found to be effective. However, data is lacking concerning the efficacy of this treatment for chronic cluster headaches.

Consecutive patients presenting with a chronic cluster headache and treated with a GONB were identified. All subjects had previously reported an unsatisfactory benefit from preventative treatments. All patients underwent injections with methylprednisolone and lidocaine. At least four weeks before and after each injection, the participants

recorded the frequency, duration and severity of their attacks.

Eighty-three patients with chronic cluster headache underwent GONB. After the first injection, 57% reported a positive response, with 42% becoming pain-free. The median time to a positive effect was one day. The median duration of a favorable response was 21 days. Of those who became pain-free, 31% were pain free at day 15, 15% at day 30 and 2% at day 90. Thirty-seven patients responding to the first injection received a second injection. Of those, 84% had a further positive response, with 46% becoming pain-free. The median duration of the effect of the second injection was 21 days.

Conclusion: This prospective study of patients with chronic cluster headache found that greater occipital nerve blocks may be useful in the management of this disorder.

Lambu, J., et al. Greater Occipital Nerve Loss and Chronic Cluster Headache: A Prospective, Open Label Study. *Euro J Neurol*. 2014, February; 21(2): 338-343.

PHYSIOTHERAPY VERSUS ADVICE FOR CHRONIC WHIPLASH

Whiplash associated disorders (WADs) are associated with substantial social and economic costs. This study investigated the effectiveness of a comprehensive exercise program, compared to advice alone, for patients with chronic WAD.

All subjects had a grade 1 or 2 WAD of three to 12 months' duration. The participants received patient education and were then randomized to receive either advice or a comprehensive exercise program. In the comprehensive exercise group, 21, tailored, supervised exercise sessions occurred over 12 weeks. The program began with four weeks of cervical spine exercises, including flexion and extension training, scapular training, posture reeducation and sensory/motor exercises.

Manual therapy techniques were allowed in the first week only. Between weeks four and six, the

focus shifted to whole body exercise. Outcome measures were obtained at baseline, 14 weeks, six months and 12 months after randomization. The primary outcome variable was the average pain intensity during the preceding week, with secondary outcomes including average pain intensity over the prior 24 hours, self-rated recovery, and disability as measured with the Neck Disability Index and the Whiplash Disability Questionnaire.

The primary analysis revealed that the comprehensive exercise program did not provide benefit over advice alone. In addition, results of most of the secondary analyses were not significant. The exceptions were the results for self-rated recovery at all time points and functional ability at 14 weeks, both statistically significant but not reaching the level of predetermined clinically important gains.

Conclusion: This study of patients with chronic whiplash associated disorder found that simple advice is equal in effectiveness to a more intense comprehensive physical exercise program for symptom treatment.

Michaleff, Z., et al. Comprehensive Physiotherapy Exercise Program or Device for Chronic Whiplash (PROMISE): A Pragmatic, Randomized, Controlled Trial. *Lancet*. 2014, July 12; 384(9938): 133-141.

REHABILITATION AFTER ANKLE RECONSTRUCTION FOR CHRONIC, LATERAL INSTABILITY

Chronic ankle instability occurs in approximately 20% of patients with ankle inversion sprain. In these cases, surgical reconstruction is an option, with post-surgical immobilization and non-weight bearing. This study compared post-reconstructive surgery clinical outcomes between those with a traditional, delayed rehabilitation and patients subjected to early accelerated rehabilitation.

Between January of 2007 and March of 2010, 33 athletes with inversion ankle sprain, followed by chronic ankle instability and pain, underwent reconstruction of the anterior talofibular ligament. Those

randomized to receive traditional rehabilitation were immobilized in a short leg cast for four weeks, followed by a soft ankle orthosis for four weeks. Two weeks after surgery, weight bearing was allowed with the cast on, and at four weeks after surgery, full weight bearing was allowed while wearing a soft ankle orthosis.

In the study group, a soft ankle orthosis was applied immediately after surgery for eight weeks, with weight-bearing allowed without restriction. In both groups, all patients removed the soft ankle orthosis eight weeks after surgery. Endurance training, sports specific drills, and balance training began six to seven weeks after surgery in the traditional group, and at two to three weeks after surgery in the study group. Clinical and radiographic outcomes were measured before and two years after the surgery. Both groups demonstrated significant improvement in clinical outcome at two years post-surgery. No significant difference was seen between the groups at two years post-surgery. All patients were able to return to their previous athletic activities, with mean times to return of 18.5 weeks in group 1 and 13.4 weeks in group 2 ($p < 0.001$).

Conclusion: This study of patients with chronic ankle instability due to inversion injury found that accelerated rehabilitation with early weight-bearing resulted in significantly faster return to sports participation.

Miyamoto, W., et al. Accelerated versus Traditional Rehabilitation after Anterior Talofibular Ligament Reconstruction for Chronic Lateral Instability of the Ankle in Athletes. *Am J Sport Med*. 2014, June; 42 (6): 1441-1447.

RISK-PRONE PITCHING IN YOUTH BASEBALL

Despite improvements in the incidence of serious arm injuries in young baseball pitchers, roughly half of pitchers nine to 14 years of age report either shoulder or elbow pain while pitching. This study was designed to understand the consequences of certain pitching behaviors and the odds of pitching

related injuries resulting from these behaviors.

Subjects included children, ages nine to 18, all of whom pitched in at least one organized baseball game during the 12 months of the study. Parents who agreed to their child's participation were given a survey for the child to complete, with the assistance of the parent. The questionnaire included 55 items regarding pitching activities, as well as preventive/protective activities, pitching related shoulder and elbow problems and treatments received. Injuries were identified as pitching related trauma which caused the athlete to forgo at least one practice or game.

Pitching related arm tiredness and arm pain were measured by two separate questions. Subjects were 754, young, male pitchers with an average age of 14.1 years. Of those, 31.3% reported having sustained a pitching related elbow or shoulder injury in the 12 months prior to the survey. Despite the recommendations of the American Sports Medicine Institute, 13.2% reported having pitched more than eight months during the prior 12 months, with 52.7% having pitched year-around. In addition, 45% pitched in a league without pitch counts or limits, and 43.5% pitched at least once on consecutive days, with 19% pitching more than one game on the same day. Those who engaged in these activities were more likely to experience pitching related shoulder and/or elbow injuries.

Conclusion: This study of youth baseball pitchers found that those who violate recommendations of the American Sports Medicine Institute are at increased risk for pitching related injuries to the shoulder or elbow.

Yang, J., et al. Risk Prone Pitching Activities and Injuries in Youth Baseball. *Am J Sports Med.* 2014, June; 42(6): 1456-1463.

SHOCK-WAVE THERAPY FOR CHRONIC SHOULDER TENDINITIS

Extracorporeal shock-wave therapy (ESWT) has been

suggested as an alternative treatment for refractory shoulder pain due to calcific or non-calcific tendinitis. Although ESWT is widely used, the appropriate dosage and efficacy remain uncertain. This systematic review summarized the evidence concerning this treatment for chronic calcific shoulder tendinitis.

Databases were reviewed for randomized, controlled trials comparing extracorporeal shockwave therapy with placebo for the treatment of calcific or noncalcific tendinitis of the shoulder. The therapy was classified as high, medium or low energy. From a literature search, 28 randomized, controlled trials were identified, with 20 comparing ESWT with placebo and eight comparing ESWT with other treatment modalities. Outcome measures included pain, functional assessment results and resolution of calcifications.

Studies involving high energy ESWT demonstrated the treatment to be effective for calcific tendinitis of the shoulder, with reductions in pain, improvement in function and resorption of calcification. Studies concerning low energy ESWT found this treatment to be less effective than high-energy ESWT, but still effective in improving shoulder function. Noncalcific tendinitis was not improved by ESWT, regardless of energy level.

Conclusion: This literature review of studies focusing on patients with chronic calcific tendinitis of the shoulder found high-energy extracorporeal shock-wave therapy to be effective in improving pain and function.

Bannuru, R., et al. High-Energy Extracorporeal Shock-Wave Therapy for Treating Chronic Calcific Tendinitis of the Shoulder. *Ann Intern Med.* 2014, April; 160 (8): 542-549.

STRUCTURED PHYSICAL ACTIVITY TO PREVENT MAJOR DISABILITY IN OLDER ADULTS

Life expectancy of older Americans continues to increase, with persons 65 years of age or older representing the fastest

growing segment of the population. Of significance is the preservation of the capacity to live independently as the population ages. This study was designed to determine whether physical activity can prevent or delay the onset of mobility disability.

The subjects included men and women, 70 to 89 years of age, who were sedentary and at increased risk for mobility disability. The participants were randomized to a physical activity group or to a health education program group. The physical activity intervention involved walking 115 minutes per week, along with strength, flexibility and balance training. The health education program focused on successful aging. Participants were assessed every six months at clinic visits. The primary outcome variable was major mobility disability, defined as the inability to complete a 400-meter walk test within 15 minutes without sitting and without the help of another person.

During the study, 818 subjects were randomized to the physical activity group and 817 to the education group. Major mobility disability was experienced by 30.1% of the physical activity group and 35.5% of the health education group (p=0.03). Persistent mobility disability was experienced by 14.7% of the physical activity group and 19.8% of the education group (p=0.006). Major mobility disability or death was experienced by 32.3% in the physical activity group and 37.8% in the education group (p=0.02). Finally, serious adverse events were reported by 49.4% of the physical activity group and 45.7% of the health education group.

Conclusion: This study of older adults at risk of disability found that a structured, moderate intensity physical activity program can reduce major mobility disability among these individuals.

Pahor, M., et al. Effect of Structured Physical Activity on Prevention of Major Mobility Disability in Older Adults. The Life Study Randomized, Clinical Trial. *JAMA.* 2014, June 18; 311(23): 2387-2396.

STATINS AND PHYSICAL ACTIVITY IN OLDER MEN

Previous studies have suggested that statin use is linked to less physical activity in older adults, although long-term studies are lacking. This large, observational study of older men evaluated the relationship between physical activity and statin use for up to seven years after baseline.

This multi-centered study included community dwelling men, 65 years of age or older, all with a baseline examination completed between March of 2000 and April of 2002. At each clinic visit, the men were asked to report their medication use, and to complete a self-administered questionnaire to determine age, race, education, marital status, smoking status, self-perceived health, dizziness and selected self-reported/physician diagnosed conditions. At each visit, a Physical Activity Scale for The Elderly (PASE) questionnaire was completed. At visit three, the subjects were asked to wear an accelerometer over a seven-day period. Categories of statin use were compared to levels of activity.

Of those studied, 989 were statin users and 3,148 were nonusers at baseline. On average a decrease in physical activity was observed in all groups during follow-up. The PASE scores of the prevalent statin users declined by roughly the same number of points annually as those of nonusers. In new users, the scores declined at a faster rate than in nonusers. Of the 3,071 men who had adequate accelerometer data, statin users expended less energy and engaged in less moderate physical activity, less vigorous activity and more sedentary behavior than did nonusers.

Conclusion: This prospective study of community dwelling elderly men found statin use to be associated with modestly lower physical activity, even after accounting for medical history and other confounding factors.

Lee, D., et al. Statins and Physical Activity in Older Men: The Osteoporotic Fractures in Men Study. *JAMA Intern Med.* 2014; 2014 Jun

9. doi: 10.1001/jamainternmed.2014.2266.

SLEEP QUALITY AND LOW BACK PAIN

Sleep problems have been reported in 50 to 60% of patients with chronic or acute low back pain (LBP). This study was designed to determine whether poor sleep quality is associated with subsequent increases in pain intensity in patients with acute LBP.

Data were obtained from a randomized, placebo-controlled trial evaluating the use of paracetamol for the treatment of acute LBP. The patients were randomly assigned to receive either paracetamol or a placebo until recovery from back pain. The sleep quality item (item 6) of the Pittsburgh Sleep Quality Index was used to evaluate sleep quality over the prior seven days. Participants were asked to rate average pain over the last 24 hours on a zero to 10-point numerical rating scale (NRS). The relationship between pain intensity and sleep quality was evaluated using repeated measurements of pain intensity and sleep quality over 12 weeks.

Data of 1,046 individuals with acute low back pain were included in the analysis. At baseline, 633 participants reported their sleep quality to be very bad or fairly bad. The analysis found a significant association between sleep quality and subsequent pain intensity ($p < 0.001$). The strength of the association between sleep quality and subsequent LBP remained after adjusting for important LBP prognostic factors.

Conclusion: This study demonstrates a strong relationship between sleep quality and subsequent pain intensity in patients with acute low back pain.

Alsaadi, S., et al. Poor Sleep Quality Is Strongly Associated with Subsequent Pain Intensity in Patients with Acute Low Back Pain. *Arthritis and Rheum.* 2014, May; 66(5): 1388-1394.

TREATING FULL THICKNESS CHONDRAL DEFECTS WITH HYALOGRAFT C

Autologous chondrocyte implantation has recently been

introduced as a repair option for patients with full thickness chondral defects of the knee. Modifications of this procedure include matrix assisted autologous chondrocyte transplantation (MACT). This study assessed the long-term effect of MACT, using Hyalograft C autograft, for the treatment of the knee.

This prospective study included consecutive patients treated with Hyalograft C over a six-year period. The case series included 22 female and 31 male patients with a mean age of 32 years and a mean defect size of 4.4 cm². Surgery comprised a two-step procedure. Four weeks after cells were harvested from healthy tissue, the cell seeded matrix was implanted through a mini-arthrotomy. Crutch assisted, non-weight-bearing ambulation was ordered for six weeks, with touchdown weight-bearing progressing to full weight-bearing from seven to 12 weeks. Outcome measures included the subjective International Knee Documentation Committee (IKDC) knee form, an objective IKDC knee score, a Lysholm score and a modified Cincinnati Knee Rating System score.

The mean follow-up period was nine years, with a minimum follow-up of seven years. Treatment failure occurred in 12 of 53 patients at a mean of three years' post-surgery. Significant improvement was observed in all scores at all time points compared with pre-surgery levels ($p < 0.05$). Analysis demonstrated a significantly lower chance of graft survival in complex and salvage cases ($p < 0.001$).

Conclusion: This study of consecutive patients with full thickness chondral defects found that treatment with Hyalograft C autograft can produce good, clinical, long-term outcomes.

Brix, M., et al. Treatment of Full Thickness Chondral Defects with Hylograft C in the Knee: Long-Term Results. *Am J Sport Med.* 2014, June; 42: 1426-1432.

VARENICLINE PLUS NICOTINE REPLACEMENT THERAPY FOR SMOKING CESSATION

Tobacco is the foremost preventable cause of morbidity and

mortality due to respiratory and cardiovascular diseases. Previous studies have evaluated the combination of varenicline and nicotine replacement therapy (NRT) as a means for increasing abstinence rates. This study compared varenicline plus NRT with NRT alone as a means to increase abstinence rates.

This randomized, double-blind trial included 446 healthy smokers, randomly assigned to receive either a nicotine 15 mg patch or a placebo patch plus varenicline, titrated to 1 mg twice daily through week 12. The primary endpoint was the four-week continuous abstinence rate, at weeks nine through 12. Secondary endpoints included the point prevalence abstinence at six months, the continuous abstinence rate from weeks nine to 24 and the incidence of adverse events.

Of the patients included, 222 were randomized to receive the combination therapy and 224 to receive varenicline alone. The intention to treat analysis indicated that continuous abstinence at 12

weeks occurred in 44.6% of the combination group and 31.3% of the varenicline group ($p=0.004$). Continuous abstinence at 12 weeks was realized by 55.4% of the combination group and 40.9% of the varenicline group. The mean weight gains after six months were 3 kg in the combination group and 2.2 kg in the varenicline group.

Conclusion: This study of patients with tobacco abuse found that combining varenicline with nicotine replacement therapy is more effective than varenicline alone in achieving tobacco abstinence at 12 weeks and six months.

Koegelenberg, C., et al. Efficacy of Varenicline Combined with Nicotine Replacement Therapy versus Varenicline Alone for Smoking Cessation: A Randomized Clinical Trial. **JAMA**. 2014, July 9; 312(2):155-161.

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