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PLATELET RICH PLASMA PROTECTS AGAINST CHONDROCYTE DEATH

Recent literature has raised concerns over the potential detrimental effects on chondrocytes of corticosteroids and/or local anesthetics. As some have suggested that platelet rich plasma (PRP) may reduce the cytotoxic effects of some agents, this study assessed the effects on chondrocytes of combining PRP with steroid or local anesthetics.

This *in vivo* study obtained blood from eight, healthy volunteers. From these samples, chondrocyte cultures were produced and treated with PRP alone or in combination with lidocaine, bupivacaine, methylprednisolone and Depo-Medrol. After treatment, chondrocytes in each group were assessed for proliferation and viability.

Compared with the normal saline control, both steroids and both anesthetic agents significantly reduced the number of viable chondrocytes at all time points measured. When combined with PRP, cell viability was significantly improved in the lidocaine, bupivacaine, methylprednisolone and Depo-Medrol groups relative to each of these agents alone ($p < 0.05$ for all comparisons).

Conclusion: This *in vivo* study of chondrocyte activity found that the addition of PRP to corticosteroids and local anesthetics resulted in a significant improvement in chondrocyte viability and proliferation as compared to the effects of each of these agents alone.

Durant, T., et al. Protective Nature of Platelet Rich Plasma against Chondrocyte Death when Combined with Corticosteroids or Local Anesthetics. *Amer J Sports Med.* 2016. 10.1177/0363546516664161

BONE MARROW ASPIRATE FOR KNEE OSTEOARTHRITIS

Osteoarthritis (OA) of the knee is a painful, degenerative condition that affects millions of patients. The American Academy of Orthopedic Surgeons recently published a position paper which recommended against most conservative therapies. This study reviewed the effects of bone marrow aspirate concentrate (BMAC), without additives, as a treatment for OA of the knee.

Subjects included 25 patients seen for bilateral knee OA between 2013 and 2015. All had been unresponsive to conventional treatments. Each patient received a randomly determined intra-articular injection of BMAC, (harvested from the patient's superior iliac crest) into one knee, and a similar volume of normal saline placebo into the contralateral knee. At baseline and follow-up, the patients were assessed using the Osteoarthritis Research Society International (OARSI) measures, the Intermittent and Constant Osteoarthritis Pain (ICOAP) questionnaire and visual analog scale (VAS) pain scores.

Significant improvement was noted in both groups in ICOAP scores and VAS pain scores, with no significant difference found between the treatment groups. In addition, while there was significant improvement in the activity levels of both groups compared to baseline, there was no significant difference in the degree of improvement between the two treatment groups at any of the follow-up periods.

Conclusion: This study of patients with chronic osteoarthritis of the knee found that injections with saline produced similar results in pain reduction and functional abilities as did injections with bone marrow aspirate concentrate.

Shapiro, S., et al. A Prospective, Single-Blind, Placebo-Controlled Trial

of Bone Marrow Aspirate Concentrate for Knee Osteoarthritis. *Amer J Sports Med.* DOI: 10.1177/0363546516662455.

SHORT-TERM, LOW INTENSITY, BLOOD FLOW RESTRICTED INTERVAL TRAINING

While research has demonstrated that both strength training and aerobic fitness training contribute significantly to health, there is interest in identifying efficient training methods which can simultaneously improve both cardiovascular and neuromuscular performance. Given the research concerning blood flow restricted (BFR) training, this study was designed to determine the aerobic and strengthening effects of intermittent, BFR exercise.

Thirty-seven adults, with an average age of 23.8 years, were randomly assigned to one of four training groups: high intensity (HIT) interval training, low intensity interval training with BFR, low intensity interval training without BFR or HIT interval training with BFR (every session performed 50% as BFR and 50% as HIT). At baseline and after four weeks of training (three sessions per week), subjects were assessed for maximal oxygen uptake, maximal power output, onset blood lactate accumulation (OBLA) and muscle strength. The training power was 30% of P_{Max} for low and BFR training groups, and began with 110% in the HIT group. The BFR group wore pressure cuff belts inflated to 140 mmHg, progressing by 20 mmHg after three complete sessions up to 200 mmHg in the last session.

After 12 sessions, low intensity interval BFR training resulted in significant improvements in all selected variables, including $VO2_{Max}$, P_{Max} , OBLA and muscle strength. Those in the HIT and BFR+HIT training groups only produced improvements in aerobic variables,

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although HIT provided a higher effect size compared with BFR and BFR + HIT training. The low-intensity interval training on its own without occlusion (LOW) was not sufficient to improve VO_{2max} , P_{max} or muscular strength, but did improve OBLA.

Conclusion: This study demonstrated the advantage of short-term, low intensity, interval blood flow restricted training as a method to concurrently improve aerobic parameters and muscle strength.

Oliveira, M., et al. Short-Term, Low Intensity, Blood Flow Restricted Interval Training Improves Both Aerobic Fitness and Muscle Strength. *Scand J Med Sci Sports*. 2016, September; 26(9): 1017-1025.

CONTRALATERAL FUNCTIONAL ELECTRICAL STIMULATION IN CHRONIC HEMIPARESIS

Data suggest that cyclic neuromuscular electrical stimulation (cNMES) of the paretic wrist and finger extensors can improve upper extremity function in patients with subacute and chronic stroke. Contralateral controlled functional electrical stimulation (CCFES) is a new modality that enables the patient to actively open the paretic hand. The patient controls the stimulus in real-time by opening and closing the unaffected hand. This study compared the efficacy of CCFES to that of cNMES.

This parallel group study included patients at least six months out from a hemorrhagic or ischemic stroke, each of whom had unilateral finger extensor paresis. For each participant in the CCFES group, surface electrodes were positioned over the forearm finger and thumb extensors to produce hand opening. Using electrodes, pulses of electric current with a frequency of 35 Hz and amplitude of 40 mA were applied. The stimulus was programmed to increase the pulse duration for each electrode in proportion to the amount of opening of an instrumented glove worn on the contralateral nonparetic hand. The cNMES group was treated with the stimulator automatically and repetitively applying stimulus. A total of 20 sessions of therapist-guided, and 10 sessions of self-administered therapy were administered at 60 minutes per session over 12 weeks. The primary outcome measure was

the Box and Block Test, a measure of manual dexterity.

During the study, 72 patients completed the treatment. By six months, both groups had realized significant improvement in BBT scores, with the gain significantly greater in the CCFES group than in the cNMES group ($p=0.045$). Both groups improved on the upper extremity Fugl-Meyer, with no significant difference between groups. Those with the greatest gains were less than two years post-stroke.

Conclusion: This study of patients with chronic, moderate to severe hand impairment after stroke found that 12 weeks of CCFES therapy improves manual dexterity more than does an equivalent dose of cNMES.

Knutson, J., et al. Contralaterally Controlled Functional Electrical Stimulation Improves Hand Dexterity in Chronic Hemiparesis. A Randomized Trial. *Stroke*. 2016; 47:00-00. DOI: 10.1161/STROKEAHA.116.013791.

HEADACHES AS RISK FACTORS FOR STROKE IN THE ELDERLY

Migraine is a well-established risk factor for stroke, specifically when accompanied by an aura. There is less evidence for the association between non-migrainous headaches and stroke. This study was designed to further explore the long-term relationship between headaches and the risk of stroke.

This study included 1,119 community dwelling persons 65 years of age or older who were randomly invited to a half-day clinical examination. At baseline, data were obtained, including sociodemographics, lifestyle characteristics, health, personal and family medical history and medications. Health conditions were noted, and a standardized neuropsychiatric interview was completed. During the initial examination, subjects were questioned about past and current headache episodes. Headaches were diagnosed as either non-migrainous (NMH) or migraine (MH). At baseline and follow-up, episodes of stroke were recorded.

Lifetime MHs were diagnosed in 17.4%, and current MHs in 5.4%, of the subjects. In addition, lifetime

NMHs were diagnosed in 11.4%, and current NMHs in 8.9 %. Of the NMHs, 36.5% were classified as tension headaches. There were 73 incident strokes during follow-up, with 82.2% ischemic. Of baseline migrainers 1.9% had a stroke during follow-up, compared to 6.2% of those with an NMH, 3.6% of those with no lifetime history of headache, and 4.3% of those with past migraine or NMH. The 12-year risk of stroke was twice as high among patients with baseline NMHs as compared with unaffected subjects ($p=0.049$). No significant association was found between baseline MHs and subsequent stroke.

Conclusion: This study of elderly individuals found that the risk of stroke is significantly higher among patients who have non-migrainous headaches, with no such association found among those with migraines.

Norton, J., et al. Are Migraine and Non-Migrainous Headaches Risk Factors For Stroke in the Elderly? Findings from a 12-Year Cohort Follow-Up. *Euro J Neurol*. 2016, September; 23(9): 1463-1470.

COGNITIVE AND PHYSICAL REST AFTER CONCUSSION

The Fourth International Consensus Statement on Concussion in Sport suggested that cognitive and physical rest are important for treatment during acute concussion. While clinical expertise supports this rest period, the external clinical evidence is limited and largely derived from animal research. This study evaluated the effectiveness of cognitive and physical rest on the traditional concussion recovery metrics among college-age student-athletes with concussion.

Participants were drawn from a prospective study on concussion management. As part of a revised concussion management protocol, all student-athletes diagnosed with concussion were withheld from all activities for the remainder of the day and were provided one additional day of cognitive and physical rest. Outcomes of these individuals were compared with those of 25, consecutive students treated in the two academic years prior to this policy change, who had not had their activities restricted.

All subjects were assessed with a graded symptom checklist, Immediate

Post-Concussion Assessment Cognitive Testing (ImPACT), the Balance Error Scoring System (BESS) and the Standard Assessment of Concussion (SAC) test. Both groups were withheld from team-related physical activity until they self-reported being asymptomatic and achieved baseline values on the clinical battery of tests.

The rest group was symptomatic for 5.2 days and the no rest group for 3.9 days ($p=0.047$). There was no significant difference between the two groups in time to return to baseline as assessed with the BESS, the SAC, and computerized neuropsychological testing, or the time to clinical recovery.

Conclusion: This study of college students with concussions found that those given a day of rest after concussion had significantly longer time to recovery from symptoms, than did those without such a period of rest, with no difference in time to clinical recovery.

Buckley, T., et al. Acute Cognitive and Physical Rest May Not Improve Concussion Recovery Time. *J Head Trauma Rehabil*. 2016, July/August; 31(4): 233-241.

ABALOPARATIDE FOR VERTEBRAL FRACTURES IN POSTMENOPAUSAL WOMEN

Osteoporosis is associated with substantial economic and public health costs. Osteoanabolic therapy is often recommended for women at risk for future fracture, although the evidence of rapid fracture protection with this treatment is lacking. Abaloparatide is a peptide that selectively binds to the RG conformation of the parathyroid hormone type I receptor. This study was designed to determine the efficacy of this medication for the prevention of new vertebral fractures in postmenopausal women.

This international, randomized, placebo and active controlled trial included postmenopausal women, 49 to 86 years of age with osteoporosis. The participants were randomized to receive daily subcutaneous injections of abaloparatide 80 µg, a matching placebo, or teriparatide 20 µg. Radiographs of the lumbar and thoracic spine were obtained at baseline and at the end of treatment. The primary outcome measure was

the percentage of participants with one or more incidents of new morphometric vertebral fracture.

Subjects were 2,463 women with 33.5%, randomized to receive abaloparatide, 33.3% to receive placebo and 33.2% to receive open label teriparatide. New morphometric vertebral fractures occurred in 0.58% of those in the abaloparatide group and 4.22% in the placebo group ($p<0.001$). In the teriparatide group, fractures occur in 0.84% ($p<0.001$). At 18 months, compared to placebo, the abaloparatide group demonstrated significant changes from baseline bone mineral density (BMD) at the total hip, femoral neck and lumbar spine ($p<0.001$ for all comparisons). The BMD increases from baseline to six months in the abaloparatide group were greater than for those in the teriparatide group for total hip and femoral neck ($p<0.001$ for all comparisons). The incidence of hypercalcemia was lower in the abaloparatide group than in the teriparatide group ($p=0.006$).

Conclusion: This study of postmenopausal women with osteoporosis found that the use of abaloparatide reduced the incidence of fractures over 18 months.

Miller, P., et al. Effect of Abaloparatide versus Placebo on New Vertebral Fractures in Postmenopausal Women with Osteoporosis. A Randomized, Clinical Trial. *J Amer Med Assoc*. 2016, August 16; 316(7): 722-733.

CHANGE IN BONE MINERAL DENSITY AS AN INDICATOR OF ANTI-FRACTURE EFFECT OF INTERVENTION

Osteoporosis related fractures result in a significant individual and societal burden. This diagnosis is usually based on finding low bone mineral density (BMD) using dual energy x-ray absorptiometry (DXA). This study assessed the effectiveness of repeated BMD testing in routine clinical practice as a predictor of treatment related fracture risk.

Since 1997, routine DXA baseline screening has been completed for women in Manitoba, Canada, at the age of 65 years, as well as younger women with additional risk factors. This program's recommended interval for follow-up is three years for most

patients and at least five years for those reported as low risk. From this database, women 40 years or older were identified, each of whom had undergone at least one follow-up examination. Using a linkage with a province-wide retail pharmacy network, women were identified who had not been receiving osteoporosis treatment during the year before baseline testing, who had then initiated. The DXA scans were reviewed to determine whether subsequent scans revealed stable, decreased or increased BMD. Incident fractures were recorded and compared to the DXA data.

The final sample were 6,629 women, with an average age of 64.3 years at baseline. Of these, 57.2% met the BMD criteria for osteoporosis at one or more sites. Biphosphonates were prescribed in 84.9% of the women. The mean interval between the first and second BMD tests was 4.5 years. For the total hip, a detectable increase was seen in 30.4% of the women and a detectable decrease in 18.8%.

As compared with stable total hip BMD, a decrease in total hip BMD was associated with a greater risk of fracture ($p < 0.001$), while an increase was associated with lower risk of fracture ($p = 0.004$). A one standard deviation increase in total hip BMD was associated with 19% relative reduction in the fracture hazard rate.

Conclusion: This Canadian study found that treatment related increases in total hip BMD are associated with a reduction of fracture risk, while decreases in BMD are associated with an increased risk of fracture.

Leslie, W., et al. Change in Bone Mineral Density Is an Indicator of Treatment-Related Anti-Fracture Effect in Routine Clinical Practice. *Ann Int Med*. 2016 doi:10.7326/M15-2937.

ROMOSUZUMAB FOR OSTEOPOROSIS

Even after fracture, fewer than 25% of patients receive pharmacologic treatment for osteoporosis. After the discovery that sclerostin deficiency causes rare genetic conditions that are characterized by high bone mass and resistance to fracture, sclerostin has

become a therapeutic target for the treatment of this disease. This study assessed the effect of romosozumab, a monoclonal antibody that binds and inhibits sclerostin with the dual effect of increasing bone formation and decreasing bone resorption.

Subjects were ambulatory, postmenopausal women, 55 to 90 years of age, with T scores at the total hip or femoral neck of -2.5 to -3.5. All patients received daily calcium at 500 to 1000 mg and daily vitamin D₃ or D₂ at 600 to 800 IU. The participants were then randomly assigned to receive subcutaneous injections of 210 mg of romosozumab or placebo once per month for 12 months. The subjects then received open label denosumab, 60mg milligrams, every six months for an additional 12 months. The primary endpoints were new vertebral fracture at 12 months and 24 months.

Of the patients who underwent randomization, 6,006 completed the 24 month study. At 12 months, the romosozumab group had a risk of new vertebral fracture that was 73% lower than that of the placebo group ($p < 0.0001$). The treatment group also had a 36% lower risk of clinical fractures at 12 months, as compared with placebo ($p = 0.008$). At 24 months, the cumulative incidence of new vertebral fracture was lower in the group that had originally received romosozumab, as compared to those who had originally received placebo ($p < 0.001$).

Conclusion: This study of women with postmenopausal osteoporosis found that treatment with romosozumab, a sclerostin inhibitor, resulted in a significantly lower risk of vertebral fracture and clinical fracture at 12 months.

Cosman, F., et al. Romosozumab Treatment in Postmenopausal Women with Osteoporosis. *N Engl J Med*. 2016, September. DOI: 10.1056/NEJMoa1607948

ACETABULAR LABRAL TEAR IN BALLET DANCERS

Ballet dancers are believed to be at an increased risk of acetabular labral tears as a result of the repetitive torsional loading of the hip joints in extremes of range of motion. This study, using improved magnetic resonance imaging techniques, was designed to determine whether

professional ballet dancers have an increased prevalence of labral tears, as compared to a matched sporting population.

This case-control study engaged ballet dancers and a sporting control group with an average age of 30 years. Dancers included 66 current and 32 retired professional ballet dancers. The 49 controls were matched with dancers by gender and age. The controls who had sport participation including tennis, netball or basketball more than three times a week from at least 10 years of age. All subjects were assessed by questionnaire for years of activity and medical/injury history. Questionnaires were used to determine energy expenditure per week and perception of hip pain or dysfunction. Range of motion of the hip and MRI evaluation of the hip were completed for all subjects.

The MRIs demonstrated that 61% of the participants had a labral tear in at least one hip. There was no significant difference in the frequency of labral tears between ballet dancers and controls ($p = 0.41$). No significant relationship was found between pain and the presence of a labral tear. Among patients with pain, internal rotation of the hip while in 90° of flexion was associated with a labral tear in the left hip but not in the right hip.

Conclusion: This study of professional ballet dancers found that these athletes have a high incidence of labral tears, which is similar to that of other age and gender matched sporting participants.

Mayes, S., et al. Similar Prevalence of Acetabular Label Tear in Professional Ballet Dancers and Sporting Participants. *Clin J Sp Med*. 2016, July; 26(4): 307-313.

CHONDROCYTE IMPLANTATION VERSUS MICROFRACTURE FOR OSTEOARTHRITIS

Cartilage injuries over time are thought to increase the risk of osteoarthritis (OA). Microfracture is the most widely used marrow stimulation procedure, rated by many as a first-line treatment for smaller contained cartilage lesions. This study reports on the long-term results of a randomized, controlled trial comparing autologous chondrocyte implantation (ACI) with microfracture

among patients with chronic cartilage defects.

Subjects were patients with relatively large chronic focal cartilage defects in the knee. The participants were randomized to undergo either ACL or microfracture. Data were collected using the International Cartilage Repair Society (ICRS), Lysholm, Short Form-36 (SF-36), and Tegner forms at the time of inclusion and at follow-up evaluations. Surgeries were considered to have failed if the patient needed a repeat surgery due to symptoms resulting from a lack of healing. At the time of final follow-up, standard radiographs were obtained.

At 15-year follow-up, the failure rate in the ACL group was 42.5%, and in the microfracture group was 32.5% ($p=0.356$). Of the survivors who did not have a failure, both treatment groups had significant improvement in scores on the Lysholm, VAS for pain, and SF-36 physical component scores at the short, medium and long-term evaluations ($p < 0.05$). No significant difference was found between the groups. At long-term follow-up, 50% of the patients had radiographic signs of early OA.

Conclusion: This study of patients with chronic cartilage defects treated with either microfracture or chondrocyte implantation found that, at 15-year follow-up, 37% had treatment failure, with no significant difference noted between groups in function or pain outcomes.

Knutsen, G., et al. A Randomized, Multicenter Trial Comparing Autologous Chondrocyte Implantation with Microfracture. Long-Term Follow-Up of 14 to 15 Years. **J Bone Joint Surg.** 2016, August 17; 98-A(16): 1332-1339.

MENISCUS TRANSPLANTATION SURVIVAL

Meniscus transplantation has been performed for more than 20 years, with the goal of decreasing pain and improving function. This study was designed to determine the long-term functional outcomes and survivorship rates in a consecutive series of patients receiving meniscal transplants.

Subjects were 69 consecutive patients, 50 years of age or younger, seen between 1995 and 2005, receiving a total of 72 meniscus

transplants. Of these surgeries, 44% were isolated meniscus transplantations, and 56% involved a concurrent or staged operative procedure. Outcomes determined at follow-up examinations included physical exam findings, ratings using the International Knee Documentation Committee (IKDC) and the Cincinnati Knee Rating System. Postoperative imaging included radiographs and MRI.

For all transplants, the combined probability of survival was 85% at two years, 77% at five years, 45% at 10 years and 19% at 15 years. Repeat surgeries related to the failure of transplants were performed in 37 cases, ranging in time from 0.2 to 3.5 years postoperatively. Of the 58 transplants available for long-term functional outcome, at 11.2 years, 26 failed and required later surgery. For all 58 survivors, significant improvements were found in pain, swelling, patient perception of overall knee condition, walking and stair climbing.

Conclusion: This study of 69 patients undergoing meniscus transplant found the survival rates at 10 and 15 years to be 45% to 19%, respectively.

Noyes, F., et al. Long-Term Survivorship and Function of Meniscus Transplantation. **Amer J Sports Med.** 2016, September; 44 (9): 2330-2338.

ANTI-IL-17 THERAPY FOR RHEUMATOID ARTHRITIS

Rheumatoid arthritis (RA) is a chronic, autoimmune disease which causes synovitis and cartilage damage. The recent identification of a subset of CD4 + T helper cells has expanded the target of therapy for this disease. As IL-17 is a pro-inflammatory cytokine thought to be involved in both the induction and expansion of the cytokine cascade in (RA), this systemic review and meta-analysis was designed to better understand the effectiveness of anti-IL-17 agents for the treatment of RA.

This literature search included multiple databases reviewed through September of 2015 for studies involving adult patients with RA, randomly selected for treatment with anti-IL-17 therapy compared with placebo. The efficacy outcomes were

measured with ACR20/50/70 response to anti-IL-17 therapy.

Of the 244 citations discovered, seven were chosen for full text review, with these studies involving 1,226 patients. Combining these results, anti-IL-17 agents were found to be more effective than placebo in achieving ACR 20 response ($p = 0.006$), as well as ACR 50 response ($p=0.005$). Compared with placebo, treatment with anti-IL agents did not increase the risk of adverse events.

Conclusion: This literature review and meta-analysis of randomized, controlled trials found that, for patients with rheumatoid arthritis, anti-IL-17 treatment is effective, without an increase in the risk of serious, adverse events.

Kunwar, S., et al. Anti-IL-17 Therapy in Treatment of Rheumatoid Arthritis: a Systematic Literature Review and Meta-Analysis of Randomized, Controlled Trials. **Rheumatol Int.** 2016, August; 36(8):1065-1075.

VITAMIN D AND FRACTURE COMPLICATIONS

Research has shown that vitamin D regulates several areas of human physiology, including the cardiac, immune, digestive and musculoskeletal systems. Orthopedic surgeons frequently prescribe calcium and vitamin D supplementation for patients with fractures to promote fracture healing. This study was designed to better understand the relationship between serum 25(OH) D levels and the likelihood of postoperative complications after fracture related surgery.

This retrospective review was performed for all adult orthopedic trauma patients seen at a level I trauma center for a fracture between 2009 and 2010. The patients had available serum 25(OH) D levels drawn within two weeks of injury and repeat levels drawn at a minimum of eight weeks later. All patients received 100 IU of vitamin D₃ and 1,500 mg of calcium daily. Those with a serum 25(OH) D deficiency or insufficiency also received a regimen of 50,000 IU ergocalciferol weekly until 25(OH)D levels were normalized (>32 ng/mL). Standard clinical follow-up was performed at two, six and 12 week visits, and every two to three months until fracture healing.

Among the 201 patients included in this study, 15 had fracture healing complications, including infection (6%), nonunion (3%), osteomyelitis (1.5%), wound dehiscence (1.5%), malunion (0.5%) and joint contracture (0.5%). There was no significant difference in the likelihood of fracture healing complications based upon the initial or repeat levels of 25(OH) D ($p>0.5$ and $p>0.6$, respectively).

Conclusion: This retrospective study of patients with traumatic fractures found that vitamin D supplementation does not appear to have a large impact on fracture healing.

Bodendorfer, B., et al. Do 25-Hydroxyvitamin D Levels Correlate with Fracture Complications? *J Ortho Trauma*. 2016, September; 30(9): e312 – e317.

SUBACROMIAL STEROID INJECTION AFTER ROTATOR CUFF REPAIR

Patients frequently experience severe postoperative pain after rotator cuff repair, despite improvements in surgical technique. Few studies have investigated the methods for controlling the pain which persists during the period of rehabilitation. This study was designed to determine the effectiveness and safety of subacromial steroid injections for pain control after rotator cuff repair.

This retrospective review included 458 patients who underwent arthroscopic rotator cuff repair with a minimum two-year follow-up. After surgery, the patients received oral nonsteroidal anti-inflammatory drugs once a day for two weeks, and engaged in a standard rehabilitation program. Shoulder function was evaluated using the American Shoulder and Elbow Surgeons (ASES) score and the Constant score.

In addition, a postoperative visual analogue scale for pain (pVAS) was administered, and patient satisfaction was assessed. Those patients with painful postoperative shoulders received a subacromial corticosteroid injection of 40 mg triamcinolone and 4mL of 2% lidocaine. An independent examiner measured and recorded the pain scores and shoulder function at the first and third months after the injection, and every three months thereafter. Outcomes were compared

between those with and those without injections.

The pVAS scores of patients administered injections averaged 7.7 (0 to 10) at the time of the injection, 2.3 at the end of the first month ($p<0.01$) and 1.2 after three months. The final outcome functional scores did not differ between those receiving and those not receiving injections. The re-tear rate was 6.8% among those with an injection and 18.4% among those without an injection.

Conclusion: This study of patients undergoing rotator cuff repair found that a single corticosteroid injection is a safe and effective method for reducing pain during the recovery period.

Shin, S., et al. Efficacy of a Subacromial Corticosteroid Injection for Persistent Pain after Arthroscopic Rotator Cuff Repair. *Am J Sports Medicine*. 2016, September; 44(9): 2231-2237.

INTRA-ARTICULAR STEROID INJECTION BEFORE HIP REPLACEMENT SURGERY

Among patients with osteoarthritis (OA), those who fail oral medications may benefit from an intra-articular injection. Data suggest that surgeons often refrain from these injections prior to hip replacement surgery for fear of increasing the risk of infection. This study employed a literature review and meta-analysis to further explore this question.

A literature review was completed of articles published between 1992 and 2013. Studies were chosen involving patients with OA of the hip who underwent total hip arthroplasty, comparing those who did with those who did not receive a steroid injection prior to the surgery.

A total of eight pertinent studies were identified, with a mean time elapsed between the most recent steroid injection and surgery ranging from 3.7 months to 18 months. Of these, one was a prospective, observational, cohort design, while the remaining were retrospective cohort studies. The definition of infection was not described in five studies. The rate of infection varied from 0% to 30%. In one study, infection occurred in 30% of those in the injection group and 7.5% in the non-injection group. Overall, the data were found to be insufficient to conclude whether intra-articular

corticosteroid injections increased the risk of postsurgical infections.

Conclusion: This systematic literature review failed to demonstrate that preoperative intra-articular injections, prior to total hip arthroplasty, increase the risk of postoperative infection.

Pereira, L., et al. Intra-Articular Steroid Injection for Osteoarthritis Prior to Total Hip Arthroplasty. *Bone Joint J*. 2016, August; 98-B (8): 1027 -1035.

DETERMINANTS OF PAIN AND FUNCTION IN OSTEOARTHRITIS

Among patients with osteoarthritis (OA), studies have shown that pain does not always accompany radiologic findings. This study assessed whether disease specific, demographic and psychological factors at baseline may be used to predict pain and function at one-year follow-up.

Subjects were 111 patients with radiologically diagnosed OA of the knee and associated pain symptoms. All participated in a randomized, controlled trial with a group-based cognitive-behavioral intervention to treat pain. Each subject was assessed at baseline and at 12-month follow-up with questions concerning knee pain and physical function, as well as demographic, socioeconomic and psychological variables. Outcome measures included The Western Ontario and McMaster University Osteoarthritis Index (WOMAC), the SF-36 item Health Survey and RAND-36 subscales. Psychological variables were assessed with questions focusing on psychological resources, fear and catastrophizing. Depressive symptoms were assessed with the Beck Depression Inventory (BDI), and anxiety symptoms with the Beck Anxiety Inventory (BAI).

A multivariate, linear, mixed model analysis revealed that a normal mood at baseline, measured with the BAI, predicted significantly better results at one-year follow-up for pain (WOMAC $p=0.02$) and function (WOMAC $p=0.002$, RAND-36 $p=0.002$). High scores on the Pain Catastrophizing Scale predicted significantly higher WOMAC pain levels at one year. Low kinesiophobia scores predicted significantly lower impairment in WOMAC measured function.

Conclusion: This study of patients with osteoarthritis of the knee found that anxiety symptoms, pain catastrophizing and kinesiophobia are predictive of pain and function at one year.

Helminen, E., et al. Determinants of Pain and Function in Osteoarthritis: A One-Year, Prospective Study. **Clin Rehabil.** 2016, September; 30(9): 890-900.

HOME EXERCISES FOR KNEE OSTEOARTHRITIS

Knee osteoarthritis (OA) is a major cause of musculoskeletal disability. The aims of treatment include decreased pain and improved function. A number of studies have suggested that home exercise programs are effective in improving strength, reducing pain and improving function among patients with OA. This systematic review and meta-analysis was designed to clarify the effectiveness of home exercise programs for this disease.

A literature review was conducted for trials comparing home exercise programs with inpatient or outpatient physical therapy for patients with knee OA. Outcome measures of interest were pain and function. After review, 16 studies were selected for inclusion. Interventions used as home exercise programs included a combination of open and closed kinetic chain exercises. Three studies used muscle stretching and range of motion exercises, while four studies used balance exercises. One study used proprioception, cold compression, electrical stimulation and tai chi.

A meta-analysis demonstrated that most treatments resulted in significant improvement in pain compared with no intervention. In addition, most studies demonstrated significant improvement in function with intervention, as compared with no treatment ($p < 0.001$).

Conclusion: This literature review and meta-analysis concluded that home exercise programs can reduce pain and improve function among patients with knee osteoarthritis.

Anwer, S., et al. Effect of Home Exercise Program in Patients with Knee Osteoarthritis: A Systematic Review and Meta-Analysis. **J Geriatr**

Phys Ther. 2016, January/March; 39 (1): 38-48.

GLOBAL FREQUENCY OF ATRIAL FIBRILLATION ASSOCIATED STROKE

Atrial fibrillation (AF) is an important cause of ischemic stroke, whose importance is magnified through the efficacy of oral anticoagulation. Previous studies have estimated that 16% of ischemic strokes are associated with AF, although increased surveillance and inclusion of older cohorts suggest that this number might be higher. This study was designed to clarify the prevalence of AF associated stroke worldwide.

Using data from the Embolic Stroke of Undetermined Source Global Registry, data from consecutive patients with recent ischemic stroke were reviewed. Using data from 19 stroke centers in 19 countries, patients with acute ischemic stroke were reviewed at each site. AF-associated stroke was defined as an ischemic stroke associated with any history of AF, or AF detected during the evaluation of the index stroke.

Of the 2,144 patients with recent ischemic stroke, the frequency of AF-associated stroke was 28%, ranging from 11% in the Philippines to 45% in Ireland. Those with AF-associated stroke were on average 75 years of age, as compared to those with non-AF strokes, whose average age was 64 years ($p < 0.001$). Of the ischemic strokes associated with AF, only 56% had a recorded history of AF before the index stroke.

Conclusion: This cross-sectional global sample of patients with recent ischemic stroke found that 28% were atrial fibrillation related.

Perera, K., et al. Global Survey of the Frequency of Atrial Fibrillation-Associated Stroke. Embolic Stroke of Undetermined Source Global Registry. **Stroke.** 2016, September; 47(9): 2197-2202.

FITNESS TO DRIVE AFTER STROKE

A recent systematic review found that 46% of patients with stroke who underwent an official road test were found to be unfit to drive. This study investigated the agreement between

medical and practical fitness-to-drive recommendations after stroke.

This Belgian study included consecutive individuals with a diagnosis of stroke who performed an official on-road test between September of 2012 and December of 2013. A medical and driving history questionnaire was completed by the patient and referring physician before the road test. Physicians were asked to provide a medical fitness-to-drive recommendation. On-road assessors were held blind to the physicians' recommendations. The agreement between medical and practical fitness to drive recommendations was calculated.

Of the 735 patients assessed, agreement between the physicians and on-road assessors occurred in 73% of the cases. A favorable recommendation was given by physicians in 86% of the cases and by on-road assessors in 78% ($p < 0.001$). In cases where they disagreed, compared with the on-road assessors, fitness was overestimated by the physicians in 70% of the cases and underestimated in 30%.

Conclusion: This study of patients with stroke, assessed for fitness to drive, found that agreement between physicians and on-road assessors occurred in only 73% of the cases, with physicians often overestimating fitness to drive.

Ranchet, M., et al. Fitness to Drive Agreements after Stroke: Medical versus Practical Recommendations. **Euro J Neurol.** 2016, September; 23 (9): 1408-1414.

PHENYTOIN FOR ACUTE OPTIC NEURITIS

Multiple sclerosis (MS) is an anti-inflammatory, demyelinating disorder of the central nervous system. Acute optic neuritis is a common feature of MS, which can damage vision through neurodegeneration of the optic nerve. As phenytoin has been found to be neuroprotective in preclinical models, this study was designed to determine whether this medication can be neuroprotective for patients with acute optic neuritis.

This randomized, double-blind, placebo-controlled trial included patients 18-60 years of age with MS and acute demyelinating optic neuritis. Participants were randomized to receive either

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*Justin L. Weppner, D.O.
Austin L. Albright M.D.
Idris Amin, M.D.
UVA, Charlottesville, VA

*Alicia Fuhrman, M.D.
Anna Coles, M.D.
University of Washington, Seattle, WA

*Bonnie Weigert, M.D.
Tyler Klein, D.O...
Karyn Laursen, M.D.
Michael Suer, M.D.
University of Wisconsin, Madison, WI

*Rucha Kharod, M.D.
Dr. Jeremy Hartman
Dr. Elizabeth O'Keefe
Dr. Amanda Miller
Washington University, St. Louis, MO

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

Subscription Manager
Michael P. Burke, M.S.

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phenytoin to achieve serum concentrations appropriate for epilepsy, or placebo. The patients were assessed by the treating physician at one and three months from baseline. The primary outcome measure was the change in retinal nerve fiber layer thickness (RNFL) in the affected eye at six months compared to the unaffected eye.

Of the 81 patients available for follow-up, the mean RNFL thickness remained stable in the unaffected eye. In the modified intention-to-treat population, the adjusted mean difference in six-month RNFL in the affected eye (phenytoin group minus placebo group) was 7.15 μm ($p=0.021$). This represents a 30% reduction in the extent of RNFL loss with phenytoin as compared with placebo.

Conclusion: This study of patients with multiple sclerosis and acute demyelinating optic neuritis, found that phenytoin can be neuroprotective, reducing the loss of RNFL thickness.

Raftopoulos, R., et al. Phenytoin for Neuroprotection in Patients with Acute Optic Neuritis: A Randomized, Placebo-Controlled, Phase 2 Trial. **Lancet Neurol.** 2016, March; 15(3): 259-269.

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