

# REHAB IN REVIEW

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## EXERCISE TO PREVENT ANTERIOR KNEE PAIN

Overuse anterior knee pain is a diagnosis that encompasses several conditions, including patellofemoral pain syndrome. Some have estimated that this disorder affects one in four active individuals. This study investigated the effect of a preventative exercise intervention program on the incidence of anterior knee pain in army recruits.

This randomized, controlled trial included 1,502 British army recruits, randomly assigned to an intervention or a control group. In the intervention group, participants engaged in eight exercises delivered in subsets of four during the warm-up and warm-down sessions of each formal physical training lesson. The treatment group exercises comprised closed kinetic chain quadriceps and gluteal strengthening exercises, each performed in sets of 10 to 14 repetitions. The control group continued with the routine training exercises. The primary outcome measure was the occurrence of anterior knee pain during the 14-week training period.

At the end of the training period, there were 46 cases of anterior knee pain, among which 36 were in the control group and 10 in the intervention group. The risk of anterior knee pain was reduced by 75% in the intervention group, with significant differences also noted in the secondary outcome measures.

**Conclusion:** This study of young military personnel undergoing an intensive, 14-week physical training program demonstrates that targeted exercise may reduce the risk of anterior knee pain.

Oppack, R., et al. Effect of Exercise for the Prevention of Overuse Anterior Knee Pain: A Randomized, Controlled Trial. *Am J Sp Med.* 2011, May; 39(5): 940-949.

## ANTERIOR KNEE PAIN AND BOTULINUM TOXIN

Some have suggested that abnormal lateral tracking of the patella, associated with an imbalance in activation of the components of the quadriceps muscle, may contribute to anterior knee pain. This study investigated the efficacy of an intramuscular injection of botulinum toxin for improving this imbalance and anterior knee pain.

This randomized, controlled crossover trial included volunteers 15 to 55 years of age with a history of anterior knee pain of more than six months' duration. All subjects reported having significantly reduced their involvement in pain-provoking physical activity in order to control their symptoms. All had failed conservative care and had undergone no surgical intervention. Those randomized to the treatment group received eight intramuscular injections totaling 500 U of Dysport delivered in the most distal portion of the vastus lateralis muscle. The group of control subjects receive the same number of injections with normal saline. All participants were instructed in a standard anterior knee pain exercise protocol, performed twice daily at home. The primary outcome measure was the change in self-reported knee pain and disability from baseline to 12 weeks post-injection, with additional assessments made until a mean of 20 months.

Improvement between baseline and 12 weeks was significantly greater for the treatment group than for the placebo group on measures of knee related disability, pain on kneeling, squatting and level walking ( $p < 0.03$ ,  $p < 0.004$ ,  $p < 0.02$  and  $p < 0.04$ , respectively). Long-term data for pain and knee-related disability were available for 17 of the 24 subjects enrolled in the study (with a mean follow-up period of 20 months). Sustained improvement was reported in 11 of 14 Dysport-injected subjects.

At 24 weeks, 16 of 19 Dysport - treated subjects reported that they were highly satisfied (8/19) or satisfied (8/19) with their treatment.

**Conclusion:** This study of patients with chronic refractory anterior knee pain found that an injection of botulinum toxin type A at the vastus lateralis can significantly improve pain.

Singer, B., et al. Treatment of Refractory Knee Anterior Knee Pain Using Botulinum Toxin Type A (Dysport) Injection to the Distal Vastus Lateralis Muscle: A Randomized, Placebo Controlled, Crossover Trial. *Br J Sports Med* 2011, June; 45 (8): 640-645.

## ATHLETIC SCREENING FOR THE RISK OF SUDDEN DEATH

Sudden cardiac death in young athletes is typically caused by ventricular arrhythmias, prompting some institutions to adopt mandatory cardiac screenings prior to participation. In Israel, screening includes mandatory medical questionnaires, physical exams, resting EKGs and exercise testing. This study evaluated the impact of these extensive mandatory screenings on the incidence of sudden death and cardiac arrests in athletes.

Data were collected by screening the top newspapers in Israel for reports of sudden death in athletes over a 12-year window prior to mandatory testing (1985 to 1997) and 12 years after the onset of testing (1997 to 2009). Sudden death due to trauma was excluded. Sudden death was defined as witnessed and instantaneous death with futile resuscitation. The annual incidences were compared between the two time periods.

Twenty-four deaths were included in the study. Eleven occurred between 1985 and 1997, and 13

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between 1997 and 2009. The average yearly incidence of deaths per person years participation was 2.54 per 100,000 years in the early years, and 2.66 per 100,000 years in the latter years ( $p=0.88$ ).

**Conclusion:** This study found that the implementation of mandatory, pre-participation electrocardiograms in Israel did not result in fewer sudden cardiac deaths per 100,000 years of athletic participation.

Steinvil, A., et al. Mandatory Electrocardiographic Screening of Athletes to Reduce Their Risk of Sudden Death: Proven Fact or Wishful Thinking? **J Amer Coll Cardiol.** 2011, March 15; 57(11): 1291-1296.

### **ANODAL TRANSCRANIAL CURRENT STIMULATION FOR WORKING MEMORY**

Working memory impairment is a major feature of a number of neurologic and psychiatric disorders. A number of studies have found small but significant improvements in working memory with the use of cognitive remediation techniques. In addition, transcranial direct current stimulation (tDCS) has been explored as a means by which to increase cortical excitability in areas highly involved in the working memory process. This study investigated whether anodal direct current stimulation, applied to the dorsolateral prefrontal cortex (DLPFC) during a working memory task, would enhance working memory.

Ten, healthy subjects, including four men and six women, ages 20 to 51 years, were recruited for this study. All participated in three counterbalanced experimental conditions, active tDCS, applied during an n-back task, sham tDCS, applied during an n-back task and active tDCS, applied at rest. The n-back task involved asking participants to remember the identity of a series of random letters presented consecutively and to respond whenever a letter, which had been presented n letters previously, was again presented. A digit span working memory task was administered before and after treatment to measure changes in performance.

Paired t- tests revealed that, in the condition with active tDCS with the n-

back task, accuracy in the digit span forward task improved significantly after stimulation ( $p<0.05$ ). No significant differences were seen between performances in the group with sham stimulation with n-back task or in the active stimulation without n-back task group. This finding was not evident with the digit span backward task.

**Conclusion:** This study suggests that the addition of cognitive remediation techniques enhances the effects of transcranial current stimulation in the improvement of working memory.

Andrews, S., et al. Improving Working Memory: The Effect of Combining Cognitive Activity and Anodal Transcranial Direct Current Stimulation to the Left Dorsolateral Prefrontal Cortex. **Brain Stim.** 2011, April; 4(2): 84-89.

### **ANTI-EPILEPTIC EXPOSURE AND BIRTH DEFECTS**

The prevalence of anti-epileptic drug use among pregnant women has been estimated to be between 0.2% and 0.5%. Although the primary indication for antiepileptic drug use is seizures, many are being used for the treatment of mood disorders, migraine headaches and neuropathic pain syndromes. While the use of older generation anti-epileptic drugs has been associated with an increased risk of birth defects, data concerning the newly licensed antiepileptic drugs is sparser. This study reviewed the association between the use of five newer antiepileptic drugs during the first trimester of pregnancy and the risk of major birth defects.

This cohort study included data concerning all live births in Denmark between 1996 and 2008. Information was gathered from the Medical Birth Registry and the Registry of Medicinal Product Statistics. Data gathered included antiepileptic drug use, birth defect diagnoses and potential confounders. The primary outcome measure was the prevalence ratios of major birth defects that were diagnosed within the first year of life. Odds ratios were calculated after adjusting for older generation antiepileptic drug use and epilepsy.

Major birth defects were diagnosed in 3.2% of those exposed

to antiepileptic drugs during the first trimester and in 2.4% of those not exposed during the first trimester (adjusted prevalence odds ratio of 0.99). The adjusted prevalence odds ratios were 1.18 for lamotrigine, 0.86 for oxycarbazine and 1.44 for topiramate. Exposure to gabapentin or levetiracetam was uncommon.

**Conclusion:** This study of live births in Denmark found that exposure to newer generation antiepileptic drugs, including lamotrigine, oxycarbazine, topiramate, gabapentin and levetiracetam, was not associated with a significant increased risk of major birth defects.

Molgaard-Nielsen, D., et al. Newer Generation Antiepileptic Drugs and the Risk of Major Birth Defects. **JAMA.** 2011, May 18; 305(19): 1996-2002.

#### AGE TRAJECTORIES OF STROKE CASE FATALITY

Epidemiologic data from large populations indicate that stroke mortality levels off after the age of 80 to 85 years. This leveling off in the oldest old is considered to be the result of continuous selection of individuals with the best survival capacity. This study explored whether age trajectories follow the same phenomenon among patients who suffer a stroke.

Data were collected in the Danish National Indicator Project, including information from all stroke admissions in Denmark. All hospitals committed to report a predefined set of data on all patients admitted with acute stroke, including age, gender, admission stroke severity, stroke subtype and a predefined cardiovascular profile. Survival of patients in the Danish National Indicator Project database was followed through the Danish Central Person Registry. Data regarding mortality were used to construct age trajectories of three days, one week, one month and one year case fatality rates in both men and women.

The mean stroke severity, expressed by the Scandinavian Stroke Scale, increased markedly with age. In women and men, three-day case-fatality rates began to level off for patients in their mid-70s. In women, one-week case-fatality rates leveled off in the early 80s, whereas,

in men, one-week case-fatality rates continued to rise with age. However, the trajectories of one-month and one-year case-fatality rates in men and women, with the stroke severity adjusted to a Scandinavian Stroke Scale score of 25, revealed that case-fatality rates increased with age for both genders.

**Conclusion:** This large, population-based study found that, in the acute state of stroke, case fatality rates level off in the oldest patients, suggesting that the capability to survive the very acute state of stroke appears to improve with age from the early 80s.

Olsen, T., et al. Age Trajectories of Stroke Case Fatality: Leveling off at the Highest Ages. **Epidem.** 2011, May; 22(3): 432-436.

#### BEHAVIOR THERAPY FOR URINARY INCONTINENCE IN PARKINSON DISEASE

Urinary symptoms such as incontinence and urgency are common in patients with Parkinson disease (PD). Pelvic floor muscle therapy is recommended as a first-line intervention for this disorder in older adults. This study assessed the feasibility and efficacy of exercise-based behavioral therapy to treat urinary incontinence in older adults with PD.

Twenty patients with PD were studied. All were 50 years of age or older and experienced four episodes or more per week of urinary incontinence. The subjects made five visits over eight weeks to receive pelvic floor EMG biofeedback training and education on fluid management and constipation. The primary outcome measure was the frequency of urinary incontinence at baseline and at week eight. Secondary outcome measures included urgency, nocturia, symptom severity, symptom bother and quality of life.

Seventeen participants completed the study. Seventy-one percent of those who completed the study achieved a 50% reduction in the frequency of urinary incontinence ( $p < 0.0001$ ), while 41% achieved total continence ( $p < 0.0001$ ). Questionnaire data showed improved quality of life ( $p < 0.002$ ), overactive bladder symptoms ( $p < 0.008$ ) and symptom bother ( $p < 0.02$ ).

**Conclusion:** This study of patients with PD and urinary incontinence found that pelvic floor therapy significantly alleviated urinary urgency and incontinence and improved quality of life.

Vaughan, C., et al. Behavior Therapy to Treat Urinary Incontinence in Parkinson Disease. **Neur.** 2011, May 10; 76 (19): 1631-1634.

#### BRIEF BEHAVIORAL TREATMENT FOR CHRONIC INSOMNIA

Insomnia is defined by difficulty falling asleep, difficulty staying asleep, non-restorative sleep and waking symptoms such as fatigue, impaired concentration and mood disturbance. The prevalence of insomnia had been estimated at approximately five to 20% in the general adult population, and at 20% to 30% in primary care medical settings. This study tested the efficacy of a brief behavioral treatment for insomnia.

A convenience sample of 82 older adults with chronic insomnia was recruited from a single primary care practice or from community advertisements. Eligible participants were randomly assigned to receive brief behavioral treatment for insomnia, or to an information control group. The active treatment emphasized behavioral elements of insomnia and included sleep education and discussions of homeostatic and circadian mechanisms of sleep regulation.

Four main interventions included reduced time in bed, getting up at the same time every day, regardless of sleep duration, not going to bed unless sleepy and not staying in bed unless asleep. These instructions were delivered in two intervention sessions and two telephone calls. The information condition involved provision of printed educational material. The primary outcome measure was sleep, based upon sleep questionnaires and diaries. Secondary outcomes included self-reported symptoms and health measures, sleep diaries, actigraphy and polysomnography.

The active treatment group enjoyed significantly better outcomes than did the information group ( $p < 0.001$ ). The percentages of participants who no longer met the criteria for insomnia disorder were

55% in the intervention group and 13% in the information group ( $p < 0.001$ ). The treatment group had later bed times, improved sleep quality, lower sleep onset latencies, less wakefulness after sleep onset and better sleep efficiency, with improvements maintained at six months

**Conclusion:** This study found that brief behavioral treatment may be effective for chronic insomnia in older adults.

Buysse, D., et al. Efficacy of Brief Behavioral Treatment for Chronic Insomnia in Older Adults. **Arch Int Med.** 2011, May 23; 171(10): 887-895.

### DEXAMETHASONE FOR SEPTIC ARTHRITIS

Septic arthritis is a severe, rapidly progressive erosive disease. Even after the bacteria have been eliminated with antimicrobial treatment, the inflammatory process may be prolonged, leading to delayed recovery and residual joint damage. This study evaluated the effect of adding dexamethasone to antibiotic therapy during the course of treatment of septic arthritis in children.

This randomized, double-blind, placebo-controlled trial included 49 children with septic arthritis. In addition to antibiotic therapy, the patients were randomly assigned to receive intravenous dexamethasone at 0.15 mg per kilogram every six hours for four days, or a similarly delivered placebo. The groups were compared for clinical and laboratory parameters, lengths of hospital stay and late sequelae. The subjects' mean age was 33 months, ranging from six to 161 months.

No significant difference was noted at baseline between the two groups. Compared with placebo, those treated with dexamethasone had significantly shorter durations of fever and local inflammatory signs, lower levels of acute phase reactants, shorter durations of parenteral antibiotic treatment and shorter hospital lengths of stay. No side effects of treatment were noted in either group.

**Conclusion:** This study of children with septic arthritis found that a four-day course of dexamethasone,

given with antibiotics, is safe and can lead to more rapid recovery.

Haarel, L., et al. Dexamethasone Therapy for Septic Arthritis in Children: Results of a Randomized, Double-Blind, Placebo Controlled Study. **J Ped Ortho.** 2011, March; 31 (2): 211-215.

### LEUKOCYTOSIS AFTER TOTAL HIP OR KNEE ARTHROPLASTY

Postoperative infection is a significant complication after total hip arthroplasty (THA) and total knee arthroplasty (TKA). Although clinical signs and symptoms may accompany such an infection, such clues may also be part of a normal response to surgery. In the early postoperative period, patients frequently have elevated white blood cell counts. This study sought to establish the natural history and incidence of leukocytosis after total joint surgery.

Using their institutional joint arthroplasty database, the authors identified 15,492 patients who underwent primary unilateral and bilateral total hip and knee arthroplasties over an eight-year period. As the standard of care at their institution included a complete blood count for all patients on each postoperative day, the authors used these data to determine the natural history of white blood cell values and the incidence of leukocytosis after surgery.

The average postoperative white blood cell count increased by approximately  $3 \times 10^6$  cells/ $\mu$ L over the first two postoperative days. At postoperative day four, the levels returned to slightly higher than average preoperative levels. The incidence of leukocytosis among all arthroplasties within the first 4 postoperative days was 38%. The trend of leukocytosis mirrored the general trend of postoperative WBC values, with an incidence of 20% on POD 1, 31.5% on POD 2, 19% on POD 3, and 9% on POD 4. Those who developed postoperative leukocytosis were slightly older, more often women, had a higher modified Charleston comorbidity index, were more likely to have had a TKA than a THA, as well as a higher preoperative white blood cell count.

**Conclusion:** This study found that, after total hip and total knee arthroplasty, leukocytosis is common

over the first two postoperative days, returning to near baseline by day four.

Deirmengian, G., et al. Leukocytosis Is Common after Total Hip and Knee Arthroplasty. **Clin Ortho Rel Research.** 2011, DOI 10 1007/s11999=011-1887-x

### OBESITY AND OUTCOME AFTER TOTAL HIP REPLACEMENT

Previous studies have demonstrated that obesity is associated with increased rates of bilateral total hip and total knee replacement. Despite this fact, controversy persists regarding the impact of obesity on the outcome of total hip replacement. This study assessed the outcomes of patients with obesity after total hip replacement.

This prospective study included all patients undergoing primary total hip replacement at the authors' institution between 1990 and 2008. Pre-and post-outcome data, as well as data regarding body mass index were collected and entered into a database. Patients included in the study had a minimum of two years' follow-up, with data collected including Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) Scores, Harris hip scores (HHS), the short form-12 (SF-12) mental and physical outcome scores and gender, age and body mass index. Subjects were categorized into four groups by body mass index, including normal weight and underweight ( $BMI < 25$ ), overweight ( $BMI 25-29.0$ ), obese ( $BMI 30-39$ ), and morbidly obese ( $BMI > 40$ ) individuals.

The morbidly obese obtained poorer preoperative scores on the WOMAC than did patients in the other weight categories. However, the mean postoperative scores did not differ significantly between the groups. In addition, the preoperative HHS scores were poorer for the morbidly obese patients, but improved with surgery such that they were worse than only the overweight group. The results were similar among groups for scores on the SF-12. The overall rate of revision was not significantly different in any group, but was numerically highest in the morbidly obese group.

**Conclusion:** This study of consecutive patients undergoing total hip replacement found that morbidly obese patients improve with surgery to a similar degree as do patients in other weight categories.

McCalden, R., et al. Does Morbid Obesity Affect the Outcome of Total Hip Replacement? **J Bone Joint Surg (Br)**. 2011, March; 93-B(3): 321-326.

### CREATINE SUPPLEMENTATION IMPROVES GLYCEMIC CONTROL IN TYPE II DIABETES

Creatine is one of the most popular nutritional supplements worldwide. Previous studies have demonstrated that creatine supplementation may improve glucose metabolism especially when combined with exercise. This study was designed to assess the impact of creatine supplementation combined with exercise training on glycemic control in patients with type II diabetes.

Fifteen physically inactive, creatine naïve patients with a known diagnosis of type II diabetes were studied. The patients were randomized to receive either five g daily of creatine or a similar appearing placebo. Both groups participated in the same 12 week supervised aerobic and resistance training exercise program. Patients were assessed regarding food intake, hemoglobin A1c, strength, body composition, maximal oxygen consumption, lipid profiles, muscle phosphorylcreatine content and by muscle biopsy results.

After the intervention, only the creatine group showed a significant reduction in hemoglobin A1c from baseline ( $p=0.004$ ). The creatine group also demonstrated more improved postprandial plasma glucose levels within the first hour than did the placebo group ( $p=0.001$  to  $p=0.03$ ). Western blot analysis revealed an increased expression of skeletal muscle membrane glucose transporter (GLUT-4) in both groups, with a significantly greater increase in the supplementation group ( $p=0.05$ ).

**Conclusion:** This study of patients with type II diabetes found that creatine supplementation can have a therapeutic effect, improving glycemic control when combined with exercise. The authors suggest that

this effect is likely due to an improvement in glucose transporter expression in skeletal muscle.

Ualano, B., et al. Creatine in Type II Diabetes: A Randomized, Double-Blind, Placebo-Controlled Trial. **Med Sci Sports and Exer**. 2011, May; 43(5): 770-778.

### PLATELET RICH PLASMA VERSUS CORTICOSTEROID INJECTIONS FOR LATERAL EPICONDYLITIS

Lateral epicondylitis affects one to three percent of the population. Standard treatment options for this malady include rest, nonsteroidal anti-inflammatory drugs, bracing, therapy, and corticosteroid injections. Platelet rich plasma (PRP) injections have been recently proposed as a reasonable treatment option. This study reported on the two-year outcomes of patients treated for lateral epicondylitis with injections of either corticosteroids or PRP.

This double-blind, randomized, controlled trial included 100 patients with lateral epicondylitis, presenting for treatment between 2006 and 2008. Criteria for participation included lateral epicondylitis for at least six months and pain rated as at least a 50 on a 100-point visual analogue scale (VAS). All subjects completed the Disabilities of the Arm, Shoulder and Hand (DASH) outcome measure and a visual analogue scale (VAS) for pain. Of the 100 patients, 51 were randomized to the PRP group and 49 to the corticosteroid group. Each participant was assessed at baseline, four, eight, 12, 26, 52 and 104 weeks. The primary endpoint was a 25% reduction in VAS pain or DASH scores.

At two-year follow-up, sixty of the 100 patients were treated successfully, with more successes noted in the PRP group than in the corticosteroid group ( $p<0.0001$ ). At two years the DASH scores of the corticosteroid group had returned to baseline, while the gains persisted in the PRP group. Of the patients who failed initial treatment, those who crossed over to the PRP group significantly improved in both the VAS and DASH scores ( $p<0.01$ ).

**Conclusion:** This study of patients with lateral epicondylitis found that a single injection of platelet rich plasma improved pain and function better than did a

corticosteroid injection, with improvement maintained over two years.

Gosens, T., et al. Ongoing Positive Effect of Platelet Rich Plasma versus Corticosteroid Injection in Lateral Epicondylitis. **Am J of Sp Med**. 2011, June; 39(6): 1200-1208.

### SPONTANEOUS HEALING IN COMPLETE ANTERIOR CRUCIATE LIGAMENT RUPTURES

Anterior cruciate ligament (ACL) rupture is most often treated with surgical reconstruction in symptomatic patients. Multiple studies have shown the poor potential for primary healing in cases of complete rupture of the ACL, with most nonoperative treatments including bracing and rehabilitation. This study reviewed cases of spontaneous ACL healing among patients with acute, complete rupture.

This retrospective review included 14 patients with acute complete ACL rupture that evolved with spontaneous healing. The lesion was established by physical examination and magnetic resonance imaging (MRI) between 2005 and 2007. The average age at the time of injury was 31 years. All patients had sustained the injury during a sporting activity. The minimum follow-up period was 25 months post-trauma. Surgery was recommended for all patients, but was delayed for various reasons. Most of the injured let the injury run its course with no bracing or rehabilitation. All of the subjects were evaluated at least once per year using the International Knee Documentation Committee's (IKDC) Subjective Knee Evaluation form. MRI was performed at a minimum of 25 months post-injury.

At the final follow-up, all patients had stable knee examination results, having regained endpoint and a negative pivot shift test. In all patients, MRI at the time of follow-up revealed a continuous ACL with a homogeneous signal and disappearance of the secondary signs. All patients returned to the same or nearly the same physical activity as pre-lesion. According to the IKDC evaluation, 10 patients had normal knees and four were nearly normal.

**Conclusion:** This retrospective review reports on 14 patients with

acute anterior cruciate ligament injury, with magnetic resonance imaging confirmed spontaneous healing, without using an extension brace or engaging in formal rehabilitation.

Costa-Paz, M., et al. Spontaneous Healing In Complete ACL Ruptures: A Clinical and MRI Study. **Clin Ortho Rel Res.** 2011. DOI 10. 1007/s11000 -011-1933-8.

### OSTEOBLAST ACTIVITY WITH DIRECT THROMBIN INHIBITORS

Anticoagulant therapy is capable of drastically reducing the incidence of thromboembolic events after orthopedic and trauma events. However, previous studies have shown that unfractionated heparins and low molecular weight heparins induce osteopenia during long-term therapy. This study compared the effect of a direct thrombin inhibitor on osteoblasts with those of those unfractionated or low molecular weight heparin.

Osteoblast cultures were derived from bone from six individuals, harvested during knee replacement surgery. The bone cell cultures were prepared, to which were added melagatran, dalteparin, unfractionated heparin or phosphate buffered saline (PBS), all at varying concentrations. Measurements included cell proliferation, cell vitality, measurements of protein, measurement of alkaline phosphatase activity, and collagen type I synthesis.

In the highest investigated concentration (50 nmol/ml) melagatran only reduced the cell count to 84% of the control group after 15 days of incubation, while the reduction of cell count was far more pronounced under the influence of dalteparin (39%) and UFH (10%). Mitochondrial, alkaline phosphatase activity and collagen showed similar patterns, with unfractionated heparin showing the most pronounced effect.

**Conclusion:** This *in vitro* model shows that direct thrombin inhibitors have less inhibitory effects on human osteoblasts than do low molecular weight or unfractionated heparins.

Winkler, T., et al. Effect of a Direct Thrombin Inhibitor Compared with Dalteparin and Unfractionated

Heparin on Human Osteoblasts. **The Open Ortho J.** 2011; 5; 52-58. DOI 10.2174/1874325001105010052.

### STRENGTH AND ENDURANCE TRAINING FOR RHEUMATOID ARTHRITIS

Patients with rheumatoid arthritis (RA) have muscle loss and decreased strength and endurance estimated at 30% to 70%. This study evaluated the effects of a combined strength and endurance training program on patients with RA.

This trial included 40 patients with RA who were randomized to one of two groups. Each patients' duration of symptoms was greater than two years at study onset. All had received stable drug therapy during the preceding three months. Subjects randomized to the intervention group completed a six-month, supervised, strength and endurance program, titrating weight training to approximately 70% of their one repetition maximum.

Measurements included echocardiography, blood pressure, sedimentation rate, C-reactive protein, modified disease activity score, pain and general health, assessed with visual analogue scales, functional ability, assessed with the Health Assessment Questionnaire Disability Index, exercise stress test results, strength testing results, body fat mass and lean body mass. The control group was restricted to performing stretching exercises twice a week to maintain joint mobility.

The intervention group enjoyed significant decreases in pain ( $p=0.05$ ), body weight ( $p=0.01$ ), percent body fat ( $p=0.02$ ) and disease activity ( $p=0.06$ ) and a significant increase in their assessments of general health ( $p=0.04$ ). Cardiorespiratory endurance significantly improved ( $p<0.0001$ ), and strength, as measured by leg press and bench pull, also improved ( $p=0.00-0.03$ ).

**Conclusion:** This study of patients with rheumatoid arthritis found that long-term strength and conditioning may be an effective strategy for reducing disease activity and improving functional ability.

Stressar, B., et al. The Effects of Strength and Endurance Training in Patients with Rheumatoid Arthritis.

**Clin Rheum.** 2011, May; 30(5): 623-632.

### VITAMIN D LEVELS AND GAIT IMPAIRMENT

An increase in stride to stride variability (STV) is associated with falls, as well as with lower limb peripheral neuropathy, Parkinson disease and dementia. In addition, low levels of vitamin D are common in the elderly population, and have been associated with falls and decreased balance. This study assessed the association between STV in gait and serum 25 hydroxyvitamin D levels.

Four hundred eleven patients who presented for a free physical exam in France were enrolled. The subjects were all assessed by history of falls, medication list, the Geriatric Depression Scale, the Clock Drawing Test, the memory portion of the Mini Mental State Examination, hand strength, standing postural sway, proprioception, visual acuity, the Timed Up and Go test and vitamin D levels. Gait parameters, including STV, were measured using a foot switch placed within the subjects' shoes.

The subjects were divided into three groups, based upon vitamin D levels; 16% had severe deficiency ( $<10\text{ng/ml}$ ), 73% had moderate deficiency ( $10-30\text{ng/ml}$ ) and 13.1% had normal levels ( $>30\text{ng/ml}$ ). High STV was associated with severe vitamin D deficiency ( $p=0.028$ ), high center of mass motion ( $p=0.031$ ), diminished lower limb proprioception ( $p=0.017$ ) and female gender ( $p=0.041$ ). STV was not significantly related to any of the other covariates.

**Conclusion:** This study of patients 65 years of age or older found that stride to stride gait variability is associated with low vitamin D levels.

Beauchet, O., et al. Biology of Gait Control: Vitamin D Involvement. **Neur.** 2011, May 10; 76(19): 1617-1622.

### YOGA FOR LOW BACK PAIN

Low back pain (LBP) is one of the most common musculoskeletal complaints of those seeking medical attention. Yoga is among the treatments proposed for the treatment of LBP. This paper reviewed the

literature concerning yoga as a treatment for LBP.

A literature search was performed to identify all controlled clinical trials of yoga targeting LBP. The mean change in pain on any pain related questionnaire compared with baseline was defined as the primary outcome measure. All trials were reviewed for safety information.

The search generated a total of 201 references, of which 145 were considered potentially relevant. Of those, seven studies involving 404 patients were eligible for inclusion. The patient samples were relatively homogeneous in clinical condition, namely chronic LBP. Primary and secondary outcome measures included pain measurements and medication use, disability and depression.

Five of the trials included in this review found yoga to be effective for chronic LBP, with two trials showing no effect. The authors note that the heterogeneous application of yoga made it difficult to draw firm conclusions from these studies.

**Conclusion:** This literature review of yoga as a treatment for low back pain found that most studies conclude that yoga is an effective treatment strategy.

Posadzki, P., et al. Yoga for Low Back Pain: A Systematic Review of Randomized Clinical Trials. *Clin Rheum.* 2011, May; 1764-1768.

#### **THERAPEUTIC CLIMBING FOR CHRONIC LOW BACK PAIN**

Multiple studies concerning low back pain (LBP) have shown that exercise therapy can reduce pain related disability and severity. Some have suggested that the benefit of exercise therapy in chronic LBP cannot be attributed to muscular strengthening alone. This study investigated therapeutic climbing as an alternative treatment for patients with chronic low back pain.

Fourteen patients were randomized to a standard exercise therapy group or a therapeutic climbing group. Each training session was 45 minutes in duration, conducted four times per week over a four-week period. The primary outcome measures included subjective perceived physical and mental health, as assessed using the 36 Item Short Form Health Survey

(SF-36), and the Hannover Functional Ability Questionnaire (FFbH-R).

For all patients significant improvements were noted in seven of the eight SF-36 subscales from baseline to study completion. The therapeutic climbing group demonstrated significant improvement on five of the eight SF 36 subscales, while the standard group improved on four of the eight subscales. The therapeutic climbing group showed greater improvements in physical functioning ( $p=0.01$ ) and general health perceptions ( $p=0.018$ ) than did the standard exercise group.

**Conclusion:** This study of chronic low back pain found that therapeutic climbing may be a suitable alternative to standard exercise therapy.

Engbert, K., et al. The Effects of Therapeutic Climbing in Patients with Chronic Low Back Pain. *Spine.* 2011, May 15; 36(11): 842-849.

#### **TUMOR NECROSIS FACTOR THERAPY AND RISK OF INFECTION OR MALIGNANCY**

The efficacy of tumor necrosis factor (TNF) inhibition has been shown in numerous trials for patients with rheumatoid arthritis (RA). These studies have established TNF as an important therapy for reducing symptoms and radiographic progression of RA as well as for improving quality of life. The most important side effects of TNF inhibition are the risks of serious infection and the potential for malignancy, though studies addressing these risks have produced conflicting results. This meta-analysis reviewed the risk of serious infection or malignancy among those treated with TNF inhibitors.

Data from selected studies were extracted and analyzed using a predefined, peer reviewed assessment, written by the Cochrane collaboration. Using the National Center for Biotechnology Information (NCBI) Database, data were extracted from the inception of the analysis until August 2009. All included studies were randomized, controlled trials involving any of the currently licensed TNF biologic agents. All participants were allocated to receive a biologic monotherapy or placebo, or a biologic therapy plus DMARD or placebo for at least six

months. The primary outcome variables examined were malignancy or serious infections requiring hospitalization.

Of the 548 published reports, six trials were included in this meta-analysis. From these, serious infection was found in 3.3% of patients who received at least one dose of TNF inhibitor, compared with 2.4% of those in the treatment group ( $p=0.27$ ). Malignancy occurred in 0.87% of the 2,183 patients with RA who received at least one dose of a TNF inhibitor, and in 0.81% of the 1,236 control patients ( $p=0.77$ ). The risk of malignancy was not increased in patients treated with a TNF inhibitor compared with control patients treated with MTX.

**Conclusion:** This meta-analysis of patients with rheumatoid arthritis did not find any significant differences in the risk of infection or malignancy between those treated with antitumor necrosis factor therapy and those treated with MTX or placebo.

Thompson, A., et al. Tumor Necrosis Factor Therapy and the Risk of Serious Infection and Malignancy in Patients with Early Rheumatoid Arthritis: A Meta-Analysis of Randomized Controlled Trials. *Arthr Rheum.* 2011, June; 63(6): 1479-1485.

#### **PULSED ELECTRICAL STIMULATION FOR OSTEOARTHRITIS**

Electrical therapy is often used to manage symptoms of osteoarthritis (OA). Previous studies have demonstrated that pulsed electrical stimulation (PES) may be a potential disease modifier through its capacity to up-regulate chondrocyte activity. This study investigated whether PES can improve pain and function among patients with OA of the knee.

This double-blind, randomized, placebo-controlled trial included 70 subjects with confirmed OA of the knee. Treatments were delivered with the anode over the anterior distal thigh and the cathode anterior to the knee joint itself. The intensity was adjusted to be sub-sensory. In a sham group, the stimulation was cut off after three minutes. The subjects used the device for seven hours per day for 26 weeks. The participants were assessed for changes in pain scores. Other measures included

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pain and function, as assessed with the Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Index, quality of life and global perceived effect subscales of the Medical Outcomes Study Short-Form 36 (SF-36) health survey.

The intention to treat analysis demonstrated significant improvement in the pain scores over 26 weeks. However, the mean differences in changes in pain scores, as well as in WOMAC and function scores, did not differ significantly between the two groups. In addition, no difference was seen between the two groups in quality of life or global perceived effect of treatment.

**Conclusion:** In this study of subjects with OA of the knee, PES was found to be no more effective than placebo in achieving improvements in pain, function, quality of life, or physical activity.

Fary, R., et al. The Effectiveness of Pulsed Electrical Stimulation in the Management of Osteoarthritis of the Knee. *Arthr Rheum.* 2011, May; 63 (5): 1333-1342.

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