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KNEE OSTEOARTHRITIS: ONE OR TWO X-RAYS?

The standard method of radiographic assessment of the femoro-tibial joint has been the weight-bearing, extended knee AP x-ray, plus a semi-flexed posterioanterior (schuss) x-ray. As there is insufficient data to determine the utility of using both, this study evaluated the use of both versus the schuss view alone as a diagnostic screening tool.

This study included 350 individuals ranging in age from 45 to 70 years, with various stages of knee osteoarthritis. All subjects underwent weight-bearing, extended AP, a schuss and an axial/skyline view of both knees. Joint space measurements were scored with a five-point system. Radiographic knee osteoarthritis was defined as a K-L score of two or more. X-ray comparisons were made between the different views for K-L stages, osteophyte detection and localization, as well as joint space narrowing (JSN).

When combining the two views, a higher proportion of patients were ranked with K-L scores of two or greater, as compared with either of the views alone. The schuss X-ray alone was significantly better at detecting JSN than the standing AP view alone ($p = 0.003$ and $p= 0.009$ for the right and left knees, respectively). No significant difference was found in detecting JSN and osteophytes when using the schuss view alone as compared with combining the two.

Conclusion: This radiographic study of patients with osteoarthritis of the knee found that the schuss view is sufficient for detecting osteophytes and joint space narrowing.

Roux, C., et al. Femoro-tibial Knee Osteoarthritis: One or Two X-Rays? Results from a Population-Based Study. **Joint Bone Spine.** 2016, January; 83(1): 37-42.

VITAMIN D AND COGNITIVE DECLINE IN OLDER ADULTS

Vitamin D deficiency and insufficiency are highly prevalent in the United States. Previous studies have suggested that low levels of vitamin D are associated with an increased risk of Alzheimer's disease and dementia. This longitudinal, multiethnic cohort study was designed to further clarify the relationship between vitamin D status and the risk of cognitive decline.

Subjects were 382 community dwelling adults, at least 60 years of age, without physical or psychosocial issues. The participants were assessed at baseline and yearly thereafter for serum 25-hydroxyvitamin D (25-OHD), with vitamin D status categorized as deficient, insufficient, adequate or high. Cognitive function was measured by the Neuropsychological Assessment Scales, and compared with vitamin D levels.

Subjects had a mean age of 75.5 years, with 61.8% women, and 54.7% African American or Hispanic, and with 36.7% ApoE4 allele carriers. At baseline, 49.5% were cognitively normal, 32.7% had MCI and 17.5% had dementia. The baseline mean 25-OHD level was lower in individuals with dementia than among cognitively normal individuals and those with MCI ($p=0.006$). In the 318 patients completing all evaluations, rates of decline in cognitive function, and, most significantly, declines in episodic memory and executive function, increased as vitamin D levels decreased.

Conclusion: This ethnically diverse study of patients 60 years of age or older found that low vitamin D status is associated with an accelerated decline in cognitive function.

Miller, J., et al. Vitamin D Status and Rates of Cognitive Decline in a Multiethnic Cohort of Older Individuals. **JAMA Neurol.** 2015, November; 72(11): 1295-1303.

RECOVERY TIME FOR SPORTS RELATED CONCUSSIONS

While symptom resolution after sports related concussion has been reported in some detail among high school athletes, data remain limited concerning the epidemiology of these concussions in college student-athletes. This study was designed to describe the epidemiology of sports related concussions sustained during participation in National Collegiate Athletic Association (NCAA) sports.

Data were obtained from the NCAA injury surveillance program from 2009 to 2014, utilizing a convenience sample of varsity teams from 25 sports, with certified athletic trainers reporting injury data. Types of symptoms, symptom resolution and return play timing were categorized.

During the study period, a total of 1,670 sports related concussions were reported, with 888 occurring during competition and 782 during practice. Football contributed to the greatest number of sports related concussions, followed by men's ice hockey and women's soccer. The most commonly reported symptoms were headache 92.2%, dizziness 60.9% and difficulty with concentration 58.3%.

Symptoms resolved within one week in 60.1%, while 6.2% had symptom resolution in more than four weeks. Over the five academic years of the study, the proportion of sports related concussions with long symptom resolution time increased from 3.7% in 2009 to 8.3% in 2013 ($p=0.03$). The proportion of concussions that required at least one week before return to play increased from 42.7% in 2009 to 70.2% in 2013 ($p<0.01$).

Conclusion: This study of NCAA athletes found that return to play taking more than one week increased

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in a linear fashion over the five years of the study, likely reflecting changes in the management of concussions.

Wasserman, E., et al. Epidemiology of Sports Related Concussions in National Collegiate Athletic Association Athletes from 2009-2010 to 2013-2014: Symptom Prevalence, Symptom Resolution Time, and Return-to-Play Time. **Am J Sports Med**. 2016, January; 44(1): 226-233.

ELECTRICAL STIMULATION AND STRETCHING FOR FLEXIBILITY

The practice of some sports is associated with an increased prevalence of the short hamstring syndrome (SHS). Several studies have examined different techniques for increasing hamstring flexibility. This study compared the effectiveness of active stretching (AS) alone with that of AS plus electrical stimulation (TENS) in young soccer players.

This randomized, controlled, single-blind study included boys ages 10 to 16 years registered with the local soccer federation. Those eligible had a straight leg raise (SLR) test result of less than 70° and/or a passive knee extension (PKE) test result of more than 15°. The participants were randomized to one of three groups: AS plus TENS, AS, or a control group. In the AS plus TENS group, the subjects underwent AS combined with low-frequency stimulation with a TENs unit at 15 Hz with pulse trains of 1 second. All participants underwent one session weekly for eight weeks, with evaluations occurring after the final session.

The AS plus TENS group demonstrated significantly better improvement on the SLR than did the AS group ($p<0.001$ for both legs). In addition, the AS plus TENS group had superior improvement in the PKE test than did the AS only group ($p<0.002$-$p<0.001$).

Conclusion: This study of soccer players, 10 to 16 years of age, with short hamstring syndrome found that active stretching plus low-frequency electrical stimulation achieved greater improvement in range of motion than did active stretching alone.

Piqueras-Rodriguez, F., et al. Effectiveness Analysis of Active Stretching versus Active Stretching Plus Low-Frequency Electrical Stimulation in Children Who Play Soccer and Who Have the Short Hamstring Syndrome. **Clin J Sports Med**. 2016, Jan; 26(1): 59-68.

RECOMMENDING ALCOHOL TO REDUCE CARDIAC RISK

Epidemiologic studies have suggested a cardioprotective effect of moderate alcohol consumption for patients with type II diabetes mellitus. This study further explored the relationship between moderate wine consumption and cardiometabolic risk.

This randomized, controlled trial included 224, alcohol abstaining subjects between the ages of 40 and 75 years, with type II diabetes. The patients were randomized to receive either 150 mL of red wine, white wine or mineral water, nightly for two years. The primary outcome measures were lipid profile variables and glycemic profiles. Secondary outcome measures included other components of the metabolic syndrome, genetic interaction and safety variables.

After two years, high density lipoprotein (HDL-C) levels increased for patients in the red wine group as compared with the mineral water group ($p<0.001$) , with no such benefit noted in the white wine group. The fasting glucose levels of subjects in the white wine group decreased as compared to the mineral water group ($p<0.004$), while the red wine group showed no such benefit.

Compared with the mineral water group, the red wine group had favorable changes in apolipoprotein (a) levels and changes in the total cholesterol /HDL-C ratio ($p=0.05$ and $p=0.039$, respectively). In addition, several secondary outcome measures which are correlated with components of the metabolic syndrome showed favorable differences in the wine groups as compared with the mineral water group, although no difference was seen in adiposity or blood pressure.

Conclusion: This long-term, randomized, controlled trial of patients with type II diabetes suggests that initiating moderate wine intake is associated with an improved cardiometabolic risk profile.

Gepner, Y., et al. Effects of Initiating Moderate Alcohol Intake on Cardiometabolic Risk in Adults with Type II Diabetes: A Two-Year,

Randomized, Controlled Trial. **Ann Intern Med**. 2015, October; 163 (8): 569-579.

PERCUTANEOUS CORONARY INTERVENTION VERSUS MEDICAL CARE FOR ISCHEMIC HEART DISEASE

Percutaneous coronary intervention (PCI) has been found to relieve angina and reduce the extent of myocardial ischemia in patients with stable ischemic heart disease. The Clinical Outcomes Utilization Revascularization and Aggressive Drug Evaluation trial (COURAGE) demonstrated no difference in survival benefits between those managed with PCI as compared with those managed with medical therapy alone, at five-year follow-up. This study looked at the extended survival analysis between the groups for up to 15 years after initial enrollment in the COURAGE trial.

Of the 2,009 patients enrolled in the COURAGE trial, data for 1,200 patients was available for extended survival analysis. The median follow-up period of the study was 11.9 years. Of the initial patients, 561 deaths occurred, with 24% of those in the medical group and 25% in the PCI group (p=0.76). A regression analysis indicated that the hazard ratio from death from any cause in the PCI group did not differ significantly from that of the medical therapy group (p=0.76).

Conclusion: This extended analysis of the COURAGE trial of patients with stable ischemic heart disease did not find a survival benefit for patients undergoing percutaneous intervention as compared to those undergoing medical therapy alone.

Sedlis, S., et al. Effect of PCI on Long -Term Survival in Patients with Stable Ischemic Heart Disease. **N Eng J Med**. 2015, November 12; 373(20): 1937-1946.

EXERCISE PREVENTS LOW BACK PAIN

The global point prevalence of low back pain (LBP) is 12%, and is thought likely to increase. While there have been several reviews of strategies to prevent LBP, most have major limitations. This systematic review was completed to evaluate the evidence for the effectiveness of interventions for the prevention of episodes of LBP.

Several databases were reviewed through November 22, 2014, searching for randomized, controlled trials assessing the effectiveness of prevention strategies for nonspecific LBP. Studies were reviewed for the quality of the trials and overall quality of the evidence, with the primary outcome being episodes of LBP and the secondary outcome being sick leave associated with LBP.

Of the studies reviewed, 23 published reports, including 30,850 participants, were included. The studies reviewed six prevention strategies, including exercise, education, back belts, shoe insoles and other techniques.

The pooled results provided moderate quality evidence that exercise and education can reduce the risk of LBP at short-term follow-up, and low-quality evidence of a protective effect at long-term follow-up. There was also low-quality evidence of a protective effect against sick leave due to LBP at short-term follow-up. There was no evidence of protective effects of back belts or shoe insoles against episodes of LBP.

Conclusion: This literature review suggests that exercise, combined with education, may be effective in preventing low back pain.

Steffens, D., et al. Prevention of Low Back Pain: A Systematic Review and Meta-Analysis. **JAMA Intern Med**. 2016, February; 176(2): 199-208.

MUSCLE POWER VERSUS PAIN AND QUALITY-OF-LIFE IN OSTEOARTHRITIS

Knee osteoarthritis (OA) is a highly prevalent condition that often leads to disability and decreases in quality of life. Studies which have evaluated the relationship between muscle strength at the knee and the progression of OA have produced inconsistent results. This study investigated the relationships between leg muscle strength, muscle power and perceived disease severity in patients with established knee OA.

This single center, cross-sectional study investigated 190 patients with radiographically diagnosed knee OA. The subjects were assessed with the WOMAC pain subscale and the SF – 36 health questionnaire with muscle strength assessed using a one repetition maximum in the leg press. Muscle power and peak contraction velocity measurements were made after a five-minute rest.

A multivariate analysis revealed that leg strength, power and contraction velocity in patients with OA were decreased compared to those of the reference population. Power was found to be inversely associated with OA ($p< 0.02$). While muscle power was a significant, independent predictor of pain ($p<0.02$) and PCS scores ($p<0.05$), muscle strength was not an independent determinant of pain or quality-of-life.

Conclusion: This study found that, among patients with osteoarthritis of the knee, leg power is independently predictive of pain and function.

Reid, K., et al. Muscle Power Is an Independent Determinant of Pain and Quality-Of-Life in Knee Osteoarthritis. **Arthritis Rheum.** 2015, December; 67(12): 3166-3173.

OUTCOME AFTER PLANTAR FASCIA RELEASE

Plantar fasciitis is a common condition, with a lifetime incidence of up to 10%. When conservative measures fail to provide sufficient relief, open plantar fascia release may be considered. This study evaluated the long-term effect of open plantar fascia release.

This retrospective study included 37 patients identified with recalcitrant plantar fasciitis, undergoing plantar fascia release surgery. Data gathered included preoperative function, work status, sleep disturbance and ability to exercise. The subjects were contacted at an average of 80 months post-surgery, and invited to complete two, patient-reported outcome questionnaires, the Manchester Oxford Foot Questionnaire (MOXFQ) and the Visual Analog Scale-Foot and Ankle (VAS-FA).

After surgery, the mean MOXFQ total score was 33.6. The mean VAS-FA score was 57.8. The authors also found worse outcomes among those with preoperative steroid injections, and better outcomes in older patients. A negative correlation was noted between the duration of follow-up and outcome, with patients continuing to improve for many years after surgery.

Conclusion: This study of patients with recalcitrant plantar

fasciitis found that those patients improved after surgery, although that improvement was rather poor.

Macinnes, A., et al. Long-Term Outcome of Open Plantar Fascia Release. **Foot Ankle Intern**. 2016, January; 37:17 – 23.

OUTCOME AFTER KNEE REPLACEMENT IN RHEUMATOID ARTHRITIS

Historically, over 50% of patients with rheumatoid arthritis (RA) have undergone orthopedic surgery over the course of the illness. This study evaluated pain, function, and quality-of-life after primary total knee replacement (TKR) in a cohort of patients with RA, as compared with those with osteoarthritis (OA).

All primary TKR patients in a prospective joint replacement registry between 2007 and 2010 were eligible for enrollment. From that database, 268 patients with RA were identified. Data gathered included RA specific information concerning medication use, use of RA related medications, assessments of pain function and quality of life data, using the WOMAC and SF-12 questionnaires. Results were compared with those of patients undergoing surgery due to OA.

Data were gathered for 4,020 patients with OA and 136 patients with RA. Pain, as measured by the WOMAC, was significantly worse at baseline for patients with RA undergoing TKR ($p<0.0001$), as compared to those with OA. However, at two years, almost all patients with RA and OA had achieved clinically meaningful improvement in pain, with no significant difference in WOMAC pain scores at two years (13.3 versus 12.7, $p=0.65$).

Preoperative SF-12 PCF scores were significantly worse for patients with RA at baseline and remained so at two years. Satisfaction with surgery was high for both patients with RA and those OA, with most reporting that they were very satisfied with the pain relief (81% versus 71%, $p=0.89$).

Conclusion: This study found that patients with rheumatoid arthritis achieve excellent pain and functional outcomes after primary knee replacement, with improvement consistent with that achieved by patients with osteoarthritis.

Goodman, S., et al. Patients with Rheumatoid Arthritis Have Similar, Excellent Outcomes after Total Knee Replacement Compared with Patients with Osteoarthritis. **J Rheumatol.** 2016, January; 42(1): 46-52.

LUMBAR TOTAL DISC REPLACEMENT

Traditionally, management of lumbar degenerative disease is limited to either nonsurgical treatment or fusion of the affected level. Research has focused on the development of total disc replacement (TDR) as a motion preserving alternative to fusion. This study evaluated the safety and efficacy of a novel lumbar TDR, compared with currently FDA-approved TDRs.

This prospective, randomized, controlled, noninferiority trial included patients with degenerative disc disease at L4 through S1, which remained painful despite six months of nonsurgical management. The subjects were randomized to receive either the activeL artificial disc modular prosthesis or one of two FDA approved devices (prodisc-L or Charity). The primary outcome measure was a composite success outcome at two-year follow-up, including ≥15 point improvement in Oswestry Disability Index (ODI), maintenance or improvement in neurological status, maintenance or improvement in range of motion, freedom from revision, reoperation, removal, or supplemental fixation, and freedom from serious device-related adverse events

A total of 324 patients were randomized at 14 sites between January of 2007 and December of 2009. At two-year follow-up, the activeL was not inferior to controls ($p<0.001$). In addition, patients treated with the activeL demonstrated higher rates of radiographic success ($p<0.01$) and also trended toward better ODI scores ($p=0.09$). Patient satisfaction with the treatment was over 90% in each of the groups at two years, with over 90% saying that they would definitely/probably have the surgery again.

Conclusion: This study of patients with low back pain, comparing a new disc replacement device with two currently approved by the FDA, demonstrates that the new, activeL, is a safe and effective treatment, with non-inferior performance as compared to other total disc replacements.

Garcia, R., et al. Lumbar Total Disc Replacement for Discogenic Low Back Pain: Two-Year Outcomes of the ActiveL Multicenter Randomized Controlled IDE Clinical Trial. **Spine.** 2015, December; 40(24): 1873-1881.

AUTOANTIBODIES AND DEVELOPMENT OF RHEUMATOID ARTHRITIS IN RELATIVES OF PATIENTS

Although the incidence of rheumatoid arthritis (RA) peaks in the fifth decade of life, in some countries the disease begins before the age of 35 years in almost 50% of cases. Early initiation of an optimal treatment strategy is thought to limit the overall impact of RA, including the prevention of joint damage. This study was designed to determine whether it is possible to predict which healthy relatives of patients with RA will later develop the disease.

This prospective cohort study included 819 initially healthy relatives of 252 patients with RA. At baseline, all healthy relatives underwent a joint assessment and had labs drawn for IgM-RF and second generation anti-CCP-2 IgG. The healthy relatives were followed for five years, completing questionnaires via phone every four months. The primary endpoint was the development of RA, as defined by the American Congress of Rheumatology.

At baseline, among healthy relatives, 11 were positive for both antibodies, 12 were positive for anti-CCP-2 only and 16 were positive for IgM-RF only. Over five years RA developed in 17 of the relatives. A Cox analysis revealed that IgM-RF and anti- CCP-2 increased the risk of developing RA, and the absence of both markers was protective against RA ($p=0.03$). The median time to RA onset was 2.4 years in the anti-CCP-2 positive/IgM-RF-negative, and 4.5 years in the anti-CCP-2 positive/IgM-RF positive groups, respectively. The positive predictive value (PPV) was 63.6% when both anti–CCP-2 and IgM-RF were positive and 58.3% when only anti–CCP-2 was positive and 0% when IgM-RF was positive .

Conclusion: This study of healthy relatives of patients with rheumatoid arthritis found a positive predictive value of 64% for predicting the development of rheumatoid arthritis

when both anti-CCP-2 and IgM-RF were positive, and 58% when only anti-CCP-2 was positive.

Ramos-Remus, C., et al. Autoantibodies in Prediction of the Development of Rheumatoid Arthritis among Healthy Relatives of Patients with the Disease. **Arthritis Rheum**. 2015, Nov; 67 (11): 2837-2844.

BOTULINUM TOXIN A FOR CEREBRAL PALSY SCOLIOSIS

The most common neurologic disease in children is cerebral palsy (CP). For years, botulinum toxin A (BTX) injections have been used, off label, for the treatment of spastic CP, to improve motor dysfunction and reduce spasticity. This study was designed to determine the effectiveness of BTX treatment for patients with scoliosis related to CP.

This prospective study included patients with a history of CP, all between the ages of two and 18 years, who were undergoing brace treatment. The subjects were randomized to either an active BTX group or a normal saline placebo group. Both groups received intramuscular injections, at the concave side of the scoliosis in the iliopsoas, quadratus lumborum, and erector spinae, with the treatment group receiving a maximum dose of 100 units BTX for each muscle.

Radiological measurements were obtained before treatment and six weeks after treatment. The primary outcome measures were the change in the Cobb angle and the rotation by Nash and Moe classification. The clinical effect was measured by the Pediatric Quality of Life Score and open questions to the parents concerning the child's well-being.

Subjects were 10 patients with CP, maintained in a brace throughout the study. The primary measures improved in two subjects and worsened in four after BTX, while improving in two and worsening in two after normal saline (p=0.3).

Conclusion: This study of children with cerebral palsy did not find that BTX injections were helpful in the treatment of scoliosis.

Wong, C., et al. The Effect of Botulinum Toxin A Injections in the Spine Muscles for Cerebral Palsy Scoliosis, Examined in a Prospective, Randomized, Triple-Blind Study. **Spine.** 2015, December; 40(23): 1205-1211.

EFFECT OF HYPOTHERMIA AFTER TRAUMATIC BRAIN INJURY

Among patients hospitalized with traumatic brain injury (TBI) with intracranial hypertension, standard care includes reducing intracranial pressure using mannitol, hypertonic saline, inotropes and therapeutic hypothermia. This study evaluated the effect on functional outcome of therapeutic hypothermia initiated after TBI.

This randomized study included patients with TBI with intracranial pressure of above 20 mmHg, assigned to receive standard care or standard care plus hypothermia. The primary outcome measure was the Extended Glasgow Outcome Scale (GOS-E), as measured at six months.

Subjects were 387 patients seen between 2009 and 2014. Of those, 195 were randomized to hypothermia plus standard care, and 192 to a standard care group without hypothermia. Six months after injury, the distribution of GOS-E shifted in an unfavorable direction in the hypothermia group (p=0.04). Favorable outcomes, defined as a GOS-E scores five to eight, were seen in 25.7% of the hypothermia group and 36.5% of the standard care group (p=0.03). The risk of death favored the standard care group (p=0.047).

Conclusion: This study of patients with traumatic brain injury and an intracranial pressure of over 20 mmHg found that, while therapeutic hypothermia reduced intracranial pressure, it did not improve functional recovery more than standard care alone.

Injuries, P., et al. Hypothermia for Intracranial Hypertension after Traumatic Brain Injury. **N Engl J Med.** 2015, December 17; 373(25): 2403-2412.

LENGTH OF HOSPITAL STAY FOLLOWING HIP FRACTURE

Hip fracture among elderly adults is associated with high mortality, despite advances in healthcare. This study was designed to identify whether a shorter hospital length of stay corresponds with a decrease in mortality within 30 days of discharge from acute care hospitalization.

Subjects were 180,208 patients over the age of 50 years, who were admitted to one of 233 New York State hospitals with a hip fracture between 2000 and 2011. Of these, 169,258 were treated surgically and 18,950 nonsurgically. Those who died during hospitalization were excluded.

During the 30 days post-discharge, 5.1% of the patients died. During the study, the average length of stay decreased from 12.9 days in 2000 to 5.6 days in 2011. A shorter hospital stay was associated with a decreased 30-day mortality. A multivariate regression analysis revealed that discharge to a hospice facility and age over 90 years were the largest risk factors for 30-day mortality. The mortality rate for surgically treated patients was 4.5%, while that for nonsurgically treated patients was 10.7%. Patients with a stay longer than 14 days had similar mortality rates to those of patients treated nonsurgically.

Conclusion: This study of patients with a hip fracture found that hospital length of stay has decreased significantly since the year 2000, and that shorter hospital length of stay and surgical treatment are associated with decreased mortality within 30 days after discharge from acute care. The authors suggest that longer length of hospitalization likely represents a surrogate for medical comorbidities or complications.

Nikkel, L., et al. Length of Hospital Stay after Hip Fracture and Risk of Early Mortality after Discharge in New York State: Retrospective Cohort Study. **Br Med J.** 2015; 351: H6246.

RETURN TO WORK AFTER HIP AND KNEE REPLACEMENT

The number of total hip arthroplasty (THA) and total knee arthroplasty (TKA) surgeries is between 70 and 112 per 100,000 in northern Europe and the United States. Studies have shown that 15 - 45% of these patients are of working age, with plans to return to work after surgery. This study quantified the work status and return to work in both THA and TKA.

Data from patients 18 to 65 years of age who underwent TKA or THA were gathered from the Department of Orthopedics at Alrijne hospital in the Netherlands. This prospective,

cohort study gave all patients a preoperative and a one-year post-operative questionnaire, gathering data on demographics, work status and quality of life, as well as functional outcome information. Preoperative and postoperative data were analyzed from 71 patients with THA (average age 57.7) and 64 with TKA (average age 57.4). The primary outcome measures were work status and time to return one year after surgery.

The mean times to return to work were 12.5 weeks for patients with THA, and 12.9 weeks for patients with TKA. At one year, 64 of 71 patients with THA, and 56 of 64 those with TKA had returned to work. At one year, 14% of the patients with THA and 19% of those with TKA reported working fewer hours per week than before surgery.

Conclusion: This study of adult patients undergoing knee or hip joint replacement found that a large majority returned to work at an average of 12 weeks after surgery.

Tilbury, C., et al. Return to Work after Total Hip and Knee Arthroplasty: Results from a Clinical Study. **Rheum Intern**. 2015, Dec; 35(12): 2059-2067.

AEROBIC EXERCISE TRAINING AND ARTERIAL CHANGES IN AFRICAN-AMERICANS

African-Americans develop hypertension and other heart diseases at an earlier age than do Caucasians. Previous studies have demonstrated that Caucasian adults can realize reduced blood pressure and arterial stiffness with endurance routines. This study compared the effects of aerobic exercise on blood pressure parameters and arterial stiffness between African-Americans (AA) and Caucasian Americans (CA).

Subjects were 49 AA and 42 CA, healthy volunteers between the ages of 18 and 35 years, all of whom were without a history of cardiovascular and respiratory disease and did not abuse tobacco. All subjects were enrolled in an eight-week endurance exercise program, including 24 exercise training sessions. The participants were assessed with measures of arterial structure, function and blood pressure variables before and after the exercise intervention. The response to exercise was compared between AA and CA subjects.

At baseline, no significant difference was seen between the groups in systolic blood pressure, diastolic blood pressure, mean arterial pressure or pulse pressure in the carotid or the aorta. After training, both groups realized a decrease in brachial systolic blood pressure ($p<0.05$) and carotid pulse pressure. Both groups also demonstrated a decrease in intima media thickness with exercise, although greater decreases were noted in the AA group. Carotid artery diameter increased in the CA group, but not in the AA group.

Conclusion: This study found that eight weeks of aerobic exercise significantly improved systolic blood pressure in both Caucasian Americans and African Americans, while intima media thickness improved more among African-Americans.

Ranadive, S., et al. Aerobic Exercise Training and Arterial Changes in African-Americans versus Caucasians. **Med Sci Sports Exer**. 2016, Jan; 48(1): 90-97.

AMSSM ON VISCOSUPPLEMENTATION FOR KNEE OSTEOARTHRITIS

Osteoarthritis (OA) is one of the leading causes of disability in the United States, with knee OA ranked within the top 10, non-communicable diseases for global disability-adjusted life years. This meta-analysis and position statement was completed by the American Medical Society for Sports Medicine (AMSSM), culminating in recommendations for the use of viscosupplementation patients with knee OA.

A systematic literature search was completed for relevant articles between 1960 and August of 2014. Eligible studies were randomized, controlled trials of patients with OA of the knee, comparing treatments including intra-articular steroids (IAS) or intra-articular hyaluronic acid (IHA) with intra-articular placebo (IAP). Outcome measures included WOMAC pain, stiffness and function subscale scores. The treatment effect was determined by examining the number of subjects within a treatment arm who met the Outcome Measures in Rheumatoid Arthritis Clinical Trials-Osteoarthritis Research Society International (OMERACT-OARSI) criteria.

On meta-analysis, those receiving IHA were 15% and 11% more likely to respond to treatment by the OMERACT-OARSI criteria than those receiving IAS or IAP, respectively ($p<0.05$ for both comparisons). Patients treated with IHA trended toward improving in WOMAC stiffness scores as compared with control and IAS, although statistical significance was not achieved.

Conclusion: This meta-analysis of studies involving patients with osteoarthritis of the knee resulted in a recommendation by the AMSSM for the use of IHA for appropriate patients with knee osteoarthritis. The recommendation was strongest for those over 60 years of age.

Trojian, T., et al. AMSSM Scientific Statement Concerning Viscosupplementation Injections for Knee Osteoarthritis: Importance for Individual Patient Outcomes. **Clin J Sport Med.** 2016, January; 26(1): 1-11.

CEREBRAL SMALL VESSEL DISEASE AND 24-HOUR ACTIVITY RHYTHMS

Many elderly persons suffer from disturbances in circadian rhythm and sleep. These phenomena also occur among patients with dementia and stroke. This population-based study investigated the associations between cerebral small vessel disease and 24-hour activity rhythms and sleep parameters in a stroke-free population.

Subjects were participants in the Rotterdam study. From this database, 1,179 persons with no history of stroke were invited for brain MRI scanning. The subjects were asked to wear an actigraph for seven, consecutive days and nights, with 24-hour activity rhythms analyzed. The participants were assessed with the Pittsburgh Sleep Quality Index, in order to measure sleep quality and to screen for possible sleep apnea. Covariates included age, gender, body mass index, depressive symptoms, activities of daily living, possible sleep apnea, fasting blood

glucose, total cholesterol, systolic blood pressure, use of antihypertensives, lipid lowering medications and sleep medications.

White matter lesions and cerebral microbleeds were associated with 24-hour activity rhythm fragmentation. No associations were found between lacunar infarcts and 24-hour activity rhythm parameters. The white matter lesions and cerebral microbleeds were not related to total sleep time, wake after sleep onset or sleep quality.

Conclusion: This population-based study found that white matter lesion volume and the presence of cerebral microbleeds are related to more unstable and fragmented 24 activity rhythms, independent of total sleep time and sleep quality.

Zuurbier, L., et al. Cerebral Small Vessel Disease Is Related to Disturbed 24-Hour Activity Rhythms: A Population-Based Study. **Euro J Neurol.** 2015, November, 22 (11): 1482-1487.

FUNCTIONAL ELECTRICAL STIMULATION CYCLING FOR INCOMPLETE SPINAL CORD INJURY

After spinal cord injury (SCI), motor recovery occurs mostly within the first six months, continuing at a slower pace during the second year. Functional electrical stimulation (FES) cycling has been suggested as a means to promote recovery after complete SCI. This study investigated the effects of FES cycling on functional improvement after incomplete SCI.

This prospective study included 10 patients with incomplete SCI who were at least two years post-injury, and able to walk independently or with a cane/walker for at least 10 meters. The subjects participated in three, weekly, one-hour sessions for 15 weeks. All were measured at baseline, and again at three and six months, with the American Spinal Cord Injury Association impairment scale and the Functional Independence Measures, as well as for spasticity, gait parameters and oxygen consumption during ambulation.

Subjects were 60 male and four female subjects with a mean age of 37.5 years, and a mean time since injury of 27.4 months. Significant improvements in motor scores and in FIM scores were noted at three and six months, as compared with baseline ($p<0.01$). Spasticity at the rectus femoris and hamstrings decreased at three and six months as compared with baseline ($p<0.01$). The average FIM scores improved from 116 to 120 at six months ($p<0.01$). Several gait parameters improved, without reaching statistical significance. Oxygen consumption during ambulation was reduced during treadmill walking and reached significance at six months as compared with baseline ($p<0.01$).

Conclusion: This study of patients with incomplete spinal cord injury found that functional electrical stimulation cycling can improve motor scores.

Yarar, F., et al. Effect of Functional Electrical Stimulation Cycling On Late Functional Improvement in Patients with Chronic, Incomplete Spinal Cord Injury. **Spinal Cord**. 2015, December; 53(12): 866-869.

MATERNAL PHYSICAL ACTIVITY AND UMBILICAL STEM CELLS

Fetal stem cells have been associated with postnatal health outcomes in cases such as cardiovascular disease and breast cancer. This study explored the effect of exercise before and during pregnancy on fetal stem cell populations.

Subjects were recruited from the Tufts Medical Center. All had a singleton full-term pregnancy with no blood-borne diseases or pregnancy complications. Exercise information was documented during the 12 weeks prior to pregnancy, as well as during the first and second trimesters. Exercise was categorized as vigorous, moderate or light. Fetal stem cell samples were obtained from the umbilical cord at delivery, with flow cytometry used to assess cell subpopulations. Stem cells were identified as hemopoietic stem cells, endothelial precursor cells, or breast putative progenitor cells.

A total of 373 pregnant women were recruited for the study. The amount of pre-pregnancy vigorous exercise was significantly related to levels of endothelial (CD34+CD133+, CD34+CD133+VEGFR2+, CD34+VEGFR2+, and CD133+VEGFR2+) progenitor cell populations ($p=0.02$, $p=0.01$, $p=0.001$, and $p=0.003$, respectively). No significant associations were observed between the amount of pre-pregnancy vigorous exercise and levels of hemopoietic stem cell populations.

Light exercise during the first trimester was not associated with any cell population, although light exercise during the second trimester was associated with endothelial CD34+VEGFR2+ progenitor levels ($p=0.03$). Levels of EpCAM+CD49f+ and CD49f+CD24+ breast stem cell subpopulations were significantly lower among pregnant women who engaged in vigorous/moderate exercise during pregnancy than among those who did not exercise ($p=0.05$ and $p=0.02$, respectively).

Conclusion: This study found that the amount of vigorous exercise before pregnancy is strongly associated with levels of endothelial progenitor cells, suggesting a potential for improving cardiovascular fitness in offspring. Vigorous/ moderate exercise during pregnancy had a negative association with putative breast stem cells.

Onoyama, S., et al. Prenatal Maternal Physical Activity and Stem Cells in Umbilical Cord Blood. **Med Sci Sports Exerc.** 2016, January; 48(1): 82-89.

SOCIOECONOMICS AND STROKE

Previous studies have demonstrated a strong, inverse relationship between socioeconomic status and the risk of stroke. This study assessed the role of adverse socioeconomic conditions in childhood, adolescence and adulthood as potential risk factors for stroke.

Subjects were 470 patients living in the city of Ludwigshafen, Germany, with a first ever ischemic stroke. The participants were compared with randomly selected age and gender matched controls. Socioeconomic data were obtained, including parental occupation, childhood financial conditions, adolescent education, profession, marital status and periods of unemployment. Risk scores were calculated for each period of the patient's life.

(Continued from page 2)

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After adjustment for age and gender, low socioeconomic conditions were found to be associated with a higher risk of stroke in all life periods. A multivariate analysis revealed that childhood socioeconomic conditions significantly related to stroke included a higher number of siblings, lack of one's own toilet and lower family income. In adolescence, factors associated with stroke included lack of vocational training. In adulthood, marital status, periods of unemployment and unskilled last profession were associated with stroke.

Conclusion: This study of patients with first ever stroke found that socioeconomic conditions in all periods of life impact the risk of stroke later in life.

Becher, H., et al. Socioeconomic Conditions in Childhood, Adolescence and Adulthood and the Risk of Ischemic Stroke. **Stroke**. 2016, January; 47: 173-179.

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