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ARTHROSCOPIC VERSUS PLACEBO MENISCUS SURGERY

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

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

Intraoperatively, tear morphology was defined as unstable in 34 of the surgery and in 41 of the placebo group. Both groups demonstrated marked improvement in all primary outcomes, with no significant difference in WOMET, Lysholm or pain after exercise scores. Most were satisfied, and reported improvements, with no significant difference between the two groups. Further, no significant difference was found between the groups on follow-up meniscal tests during clinical examination.

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

Sihvonen, R., et al. Arthroscopic Partial Meniscectomy versus Placebo Surgery for a Degenerative Meniscus Tear: A Two-Year Follow-Up of the

Randomised Controlled Trial. **Ann Rheum Dis.** 2018; 77: 188-195.

PERIODONTAL DISEASE, REGULAR DENTAL CARE AND STROKE

Periodontal disease is a prevalent disorder, with gingivitis or periodontitis affecting up to 90% of the world's population. This study was designed to better understand the association between periodontal disease and ischemic stroke.

The Atherosclerosis Risk in Community (ARIC) study recruited 15,792 participants, age 45 to 64 years, all followed clinically every three years, and by phone annually. On the fourth visit, as an ancillary study, a comprehensive dental examination questionnaire and sample collection were completed. From these data, the subjects were placed in one of seven, distinct periodontal profile classes (PPCs). The pattern of dental care and dental visits was classified by patient responses. Data for those without prior stroke were included in the analysis. The subjects were followed for incident stroke

Of the 6,736 participants, 299 ischemic strokes occurred over a median of 15 years of follow-up. Compared to those without periodontal disease, an adjusted analysis found an increased risk of ischemic stroke for those among all categories of periodontal disease, including mild periodontal disease (HR 1.86), high gingival index score (HR 2.06), tooth loss (HR 2.03), posterior disease (HR 2.22), severe tooth loss (HR 2.08) and severe periodontal disease (HR 2.22). The increased risk of stroke was greatest for cardioembolic and thrombotic stroke. Regular dental care was independently associated with lower rates of ischemic stroke (HR 0.77).

Conclusion: This study confirmed an independent association between the risk of ischemic stroke and periodontal

disease, noting that regular dental care may lower this risk.

Sen, S., et al. Periodontal Disease, Regular Dental Care Use, and Incident Ischemic Stroke. **Stroke.** 2018, February; 49 (2): 355-362.

HIP AND KNEE ARTHRITIS IN MARATHON RUNNERS

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

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

The mean age of the marathoners was 47.9 years, with a mean distance of 36.4 miles per week, and a mean training time of 18.8 years. Hip and/or knee pain was reported by 47% of the marathoners, including 22% with knee pain, 11.1% with hip pain and 13.6% with hip and knee pain. The arthritis prevalence of the marathoners was 8.8% in the subgroup of U.S. marathoners, significantly lower than that of the age-matched U.S. population, estimated at 17.9% ($p < 0.001$). A multi-variable analysis revealed no significant, positive relationship between pain or arthritis and running duration, intensity, weekly mileage or number of marathons.

Conclusion: This multi-national study of marathon runners found that

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the prevalence of self-reported arthritis in the United States was less than half of that reported in the U.S. general population.

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

DISCHARGE AFTER TOTAL JOINT ARTHROPLASTY FOR PATIENTS LIVING ALONE

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

This prospective, observational study included 910 consecutive patients undergoing primary, unilateral total hip arthroplasty (THA) or total knee arthroplasty (TKA). The investigational group was defined as patients who were discharged directly to home. A nurse navigator was assigned to each patient for post-operative surveillance. The primary outcome measures were ninety-day post-discharge complications and unplanned clinical events, including readmissions. Functional outcomes were assessed preoperatively at one and six months using the Hip Disability and Osteoarthritis Outcome Score (HOOS), the Knee injury and Osteoarthritis Outcome Score (KOOS), as well as the Short-Form Health Survey (SF-12).

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

Conclusion: This prospective study of 874 patients undergoing total joint arthroplasty found that those discharged directly to home alone did

not differ significantly in medical or functional outcomes from those discharged to home with others.

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

WEIGHT LOSS AFTER SPINE FUSION SURGERY

In the United States, over one third of adults are obese, with 6.3% classified as extremely obese. Data concerning the outcome of obese patients following lumbar spine surgery have suggested that these patients experience improvement in both back and leg pain. This study was designed to determine whether the increased activity after surgery results in weight loss.

Data were extracted from the health records of an integrated health care system (Kaiser Permanente) for patients with surgeries at lumbar discs 1-5. Body mass index (BMI) was recorded from one year before to one year after the surgery. The outcome of interest was a weight loss of five percent at one year post-surgery.

Of the 7,303 patients included in the sample, 61% were non-obese ($BMI < 30 \text{ kg/m}^2$), 35.4% were obese ($BMI 30 \text{ to } 39 \text{ kg/m}^2$) and 3.2% were extremely obese ($> 40 \text{ kg/m}^2$). Weight loss, as a percent of BMI, was 11.1% for a BMI of less than 30 kg/m^2 , 16.6% for a BMI of $30\text{-}39 \text{ kg/m}^2$ and 21.1% for a BMI of $> 40 \text{ kg/m}^2$.

Compared with non-obese patients, obese and extremely obese patients were more likely to lose a clinically significant amount of weight during the first year post-surgery (ORs 1.73 for BMI $> 40 \text{ kg/m}^2$ ($p < 0.0001$) and 1.42 for BMI $30\text{-}39 \text{ kg/m}^2$ ($p = 0.0025$)).

Conclusion: This study of patients undergoing lumbar spine fusion found that obese and extremely obese patients are more likely to lose weight and less likely to gain weight than are non-obese patients after that procedure.

Akins, P., et al. Do Obese and Extremely Obese Patients Lose Weight after Lumbar Spine Fusions? Analysis of a Cohort of 7,303 Patients from the Kaiser National Spine Registry. **Spine.** 2018, Feb 1; 43(3): 22-27.

BRACING AFTER SPINAL FUSION

A recent survey found that 56% of surgeons prescribe some type of brace after spine surgery. This prospective study was designed to better understand the effect of early bracing of patients undergoing posterior spinal instrumented fusion (PSIF).

This prospective trial included all patients with lumbar degenerative conditions admitted for PSIF. The subjects were randomized to a brace (n=25) or no brace (n=18) group. After PSIF surgery, those in the brace group were instructed to wear a rigid, molded, lumbosacral orthosis (LSO) full-time for eight weeks, except during hygiene and wound care. This was followed by daytime wear for another four weeks. The control group underwent the same postoperative rehabilitation, without the use of a brace. Participants were assessed with the Oswestry Disability Index (ODI) questionnaire, the Short Form (SF)-12 General Health Survey and a visual analog scale (VAS) for back pain at baseline, and then at six weeks and three months.

Scores on the ODI improved in both groups, with similar outcomes noted at six weeks, but with greater gains in the control group at three months ($p=0.01$). Improvements in SF-12 scores were similar between the groups at six weeks, but significant only for the control group at three months ($p=0.01$). Significantly better VAS scores were seen in the control group at three months ($p=0.001$). No instrumentation failure was noted in either group.

Conclusion: This prospective, randomized study of patients undergoing posterior spinal instrumented fusion found that those who did not have postoperative bracing performed better than those who did.

Soliman, H., et al. Early Impact of Postoperative Bracing on Pain and Quality of Life after Posterior Instrumented Fusion for Lumbar Degenerative Conditions: A Randomized Trial. *Spine*. 2018, February 1; 43 (3): 155-160.

KINESIOPHOBIA AND PHYSICAL THERAPY RELATED PAIN

Kinesiophobia describes avoidance and fear of movement. This seems to be important to the development of chronic musculoskeletal pain. This study

examined the impact of kinesiophobia at the onset of physical therapy (PT), and the effect of analgesia on kinesiophobia.

This French, multicenter study included consecutive, adult patients, referred to PT for the treatment of musculoskeletal pain. All were assessed for kinesiophobia using the Tampa Scale of Kinesiophobia (TSK). Data collected included medical history, demographic data, pain assessed at baseline and at the fifth PT session using the Numerical Rating Scale (NRS), medication use and patient view of pain. The subjects were asked about pain during PT sessions and of level of satisfaction.

Participants were 700 patients with a mean age of 50.3 years. The level of initial pain was significantly higher for those with kinesiophobia than for those without. Patients with kinesiophobia received a higher number of PT sessions. The proportion of subjects who received a prescription for pain medications was significantly greater ($p<0.001$) for those with as compared to those without kinesiophobia (95.4% versus 85.0%). A significant increase in PT satisfaction was observed in the 25.6% who had been given preventive analgesics before PT sessions.

Conclusion: This study of consecutive patients seen in a musculoskeletal clinic found that kinesiophobia is frequent among patients receiving physical therapy and is associated with higher levels of pain, with improved satisfaction in those given preventative analgesics before therapy.

Perrot, S., et al. Kinesiophobia and Physical Therapy-Related Pain and Musculoskeletal Pain: A National, Multicenter, Cohort Study on Patients and their General Physicians. *Joint Bone Spine*; 2018; 85: 101-107.

CONSTRAINT FORCE DURING AMBULATION AFTER STROKE

After a stroke, the majority of patients regain the ability to walk independently, although often not to the level necessary to resume all daily activities. This study was designed to determine whether the muscle activity of the paretic leg can be enhanced by applying controlled resistance to the non-paretic leg during walking.

Each of 15 subjects with chronic stroke completed two sessions of treadmill walking, at a treadmill speed

of a self-selected, comfortable speed, and then at maximum walking speed, for 30 strides. The subjects then walked with a controlled resistance force applied by a robotic system to the non-paretic leg at the early swing phase (Early) (starting from toe off to mid swing) or the late swing phase (Late). The resistance force magnitudes were set at 10%, 20% and 30% of the maximum voluntary contraction (MVC) of the non-paretic hip flexors. Outcome measures included electromyographic (EMG) activity of the paretic leg and spatial temporal gait parameters.

The Early condition increased the integrated EMG activity of the medial hamstrings by 33.6% ($p=0.001$) and the medial gastrocnemius by 18.5% ($p=0.036$) as compared with baseline. Similarly, the Early condition also increased the integrated EMG of the vastus medialis by 13.9% ($p=0.025$) and that of the tibialis anterior by 12.1% ($p=0.002$) compared with baseline. Among the resistance level trials, 30% MVC induced the greatest level of muscle activity.

Conclusion: This study of patients with chronic hemiparesis secondary to stroke suggests that applying a controlled constraint force to the non-paretic leg may improve gait symmetry.

Hsu, C., et al. Forced Use of the Paretic Leg Induced by a Constraint Force Applied to the Nonparetic Leg in Individuals Post-Stroke during Walking. *Neurorehab Neural Repair*. 2017, 31 (12): 1042-1052.

NEUTROPHIL TO LYMPHOCYTE RATIO AND OUTCOME IN SEVERE TRAUMATIC BRAIN INJURY

A large body of evidence suggests that neuro-inflammation is an important injury mechanism associated with traumatic brain injury (TBI). As the neutrophil to leukocyte (NLR) ratio is a significant indicator of a patient's inflammatory status, including risk of ischemic stroke, this study assessed the utility of NLR for predicting outcomes in patients with TBI.

This retrospective study included patients treated from 2007 -2012 for isolated head trauma, all with posttraumatic Glasgow Outcome Scale (GOS) scores of eight or less. A chart review determined diagnoses of shock, hyperglycemia, and neurologic deterioration, with further review including radiographic studies, pain management and laboratory tests on admission. The NLR was

calculated with this ratio compared with Glasgow Outcome Scale (GOS) scores. Unfavorable outcomes were defined as GOS scores of one to three.

Of the 688 patients, 508 had an unfavorable outcome at one year. Age, body temperature and the NLR on admission were significantly associated with an unfavorable outcome at one year. The NLR was significantly associated with one-year mortality ($p < 0.001$) and unfavorable GOS ($p < 0.001$). The predicted performance sensitivity and specificity of the NLR for unfavorable outcome were 60.2% and 71.1%, respectively.

Conclusion: This study of patients admitted with a severe traumatic brain injury found that an increase in the neutrophil to lymphocyte ratio at admission was significantly related to unfavorable functional and mortality outcomes at one year.

Chen, W., et al. Neutrophil to Lymphocyte Ratio as a Novel Predictor of Outcome in Patients with Severe Traumatic Brain Injury. *J Head Trauma Rehab.* 2018, January/February; 33(1): E59-E53.

DUAL TASK TRAINING IN OLDER ADULTS

Several studies have demonstrated age-related changes in motor skills under dual task (DT) conditions. This study investigated the effect of physical exercise and dual task training on mobility performance in older adults.

Subjects were independent living adults, 70-80 years of age, and able to ambulate without a walking aide. The participants were randomly assigned to one of three groups, including a DT training group, a single-task (ST) training group, or a control group. Training included twice-weekly, 60-minute sessions, with the ST group practicing balance and walking, and the DT group performing additional motor tasks during these activities. Examples of DT tasks included screwing or unscrewing a bolt during balance activities or buttoning and unbuttoning a sweater during walking exercises. Data collected included socio-demographics and mobility test results, including the Six Meter Timed Walk (6MTW), the Timed Up and Go (TUG) and the Four Square Step Test (FSST).

After intervention, the DT group obtained significantly better scores on the TUG ($p < 0.05$) and FSST ($p < 0.01$)

measures, whereas the CG and ST scores did not differ significantly among the groups.

Conclusion: This study of elderly individuals found that dual task training during balance and gait training activity can improve gait and balance performance.

Brustio, P., et al. Dual-Task Training in Older Adults: The Effect of Additional Motor Tasks on Mobility Performance. *Arch Geront Geriatr.* 2018, March-April; 75: 119-124.

FASTING BLOOD GLUCOSE AND RISK OF INTRACEREBRAL HEMORRHAGE

Intracerebral hemorrhage (ICH) accounts for 10-15% of all strokes, with higher mortality and worse functional outcomes than for other forms of stroke. While diabetes mellitus is a risk factor for ischemic stroke, evidence of its effect on ICH remains limited. This prospective study examined the impact of fasting blood glucose (FBG) levels on the risk of ICH.

This prospective study (The Kailuan study) included 96,110 participants enrolled in 2006. All were followed biennially for risk factors, with a primary outcome of first occurrence of ICH, either nonfatal or fatal. Data concerning hospitalizations for nontraumatic ICHs were obtained from 11 area hospitals, by questionnaire for those with ICH who were not hospitalized. Fasting blood glucose concentrations were measured in 2006, 2008, 2010 and 2012. The cumulative, average, fasting blood glucose (FBG) concentration was compared to the risk of ICH.

During a median of nine years follow-up, of the 96,110 participants, 755 incident ICH cases were identified. The data revealed a U-shaped relationship between FBG concentration and the risk of ICH. The lowest risk was determined to be at an FBG of 5.3 mmol/L. Compared with normal FBG (4-5.59 mmol/L), the relative risk of ICH was higher for $FBG < 4.0$ mmol/L (HR 2.04) and $FBG > 7.00$ mmol/L (HR 1.59).

Conclusion: This large, community-based, Chinese cohort study found that low and high fasting blood glucose concentrations are significantly associated with an increased risk of ICH.

Jin, C., et al. Prospective Study of Fasting Blood Glucose and Intracerebral Hemorrhage Risk.

Stroke. 2018, January; 49 (1): 27-33.

TRANSCRANIAL DIRECT CURRENT STIMULATION FOR UPPER EXTREMITY AFTER STROKE

Several noninvasive brain stimulation techniques been studied for enhancing neuro-plasticity after stroke. One of these is transcranial direct current stimulation (tDCS), an inexpensive, portable device with studies covering several medical conditions. As literature does not provide clear guidelines to its use, this systematic review was designed to better understand the relative effectiveness different tDCS applications.

The authors performed a review of studies including adults experiencing a stroke and treated with a tDCS device for improving ADLs or function of the arm after stroke. Of the 5,709 records reviewed, 176 full text articles were thought to be eligible. The final review included 12, randomized, controlled trials, with a total of 284 participants, all focusing on ADL capacity.

The meta-analysis revealed a significant, moderate effect, in favor of cathode tDCS, in improving ADLs. For motor function of the upper extremity, no evidence of improvement was found for the tDCS or physical rehabilitation interventions.

Conclusion: This meta-analysis of randomized, controlled trials found that cathode tDCS is a promising treatment to improve ADL capacity following a stroke.

Elsnes, B., et al. Transcranial Direct Current Stimulation (tDCS) for Improving Capacity and Activities and Arm Function after Stroke: A Network Meta-analysis of Randomized, Controlled Trials. *J Neuroeng Rehab.* 2017; 14: 95.

SHOCKWAVE AND CORTICOSTEROID INJECTION FOR CARPAL TUNNEL SYNDROME

Recent studies have suggested that radial extracorporeal shock wave therapy (rESWT) can reduce pain and improve function in patients with carpal tunnel syndrome (CTS). This study compared the effects of a single dose of rESWT versus local corticosteroid injection (LCsl).

Adult patients presenting with CTS were randomly assigned to a group to receive a single dose of rESWT or a single LCsl. Those in the rESWT group received seven minutes of continuous shockwaves at 4 Bar, 15 Hz frequency, 5,000 shocks, BTL-6000 SWT, radial shockwave mode. The injection group received 1 ml of triamcinolone (acetanide), 10 mg, mixed with 1 ml of one percent lidocaine. The primary outcome measure was the Boston Self-Assessment Questionnaire (BQ).

Compared with baseline a significant improvement in pain and function scores, was noted at weeks 12 and 24 compared to baseline in the rESWT group, with no significant change noted in the LCsl group. In addition, significant reductions in symptom severity and BQ scores were found at weeks four, 12 and 24 in the rESWT group, with significant reductions noted in the injection group at weeks one and four. Electrodiagnostic studies revealed a significant decrease in peak sensory distal latency in both groups at week 12 as compared to baseline.

Conclusion: This study of patients with carpal tunnel syndrome found that a single session of radial extracorporeal shock wave therapy may provide greater symptom and functional improvement than steroid injections.

Atthakomol, P., et al. Comparison of Single-Dose Radial Extracorporeal Shockwave and Local Corticosteroid Injection for Treatment of Carpal Tunnel Syndrome, Including Mid-Term Efficacy: A Prospective Randomized Controlled Trial. **BMC Musculoskel Dis.** 2018; 19: 32.

UPPER EXTREMITY STRENGTHENING FOR CHRONIC LOW BACK PAIN

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

Twenty sedentary males with chronic LBP were randomized to receive conventional LBP exercises, with or without exercises for the upper back, neck and shoulders. At baseline, all were assessed for lumbar strength, shoulder abduction and horizontal abduction strength,

isokinetic neck strength and isometric neck strength. The conventional exercise (CE) group underwent isometric back exercises, as well as back and abdominal concentrated strengthening exercises, three days per week for six weeks. For the supplemental exercise (SE) group, the back exercises were supplemented with neck and shoulder isotonic exercises. The participants were assessed for disability with the modified Oswestry Disability Questionnaire (MODQ), and for pain with a Visual Analog Scale (VAS).

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

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

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

OSTEOARTHRITIS, KNEE PAIN AND OMEGA-3

Studies have suggested that, in addition to joint specific inflammation, systemic inflammation is also involved in the pathogenesis of osteoarthritis (OA). As higher levels of Omega-3 polyunsaturated fatty acids, and lower levels of Omega-6, are associated with lower inflammation and pain in inflammatory conditions such as rheumatoid arthritis, this study investigated the association between these levels and symptoms among patients with OA of the knee.

Subjects were 45 to 85 years of age with symptomatic OA of the knee. All completed self-reported measures of clinical pain and functional limitations, including the Western Ontario and McMaster Universities Index of Osteoarthritis (WOMAC), the Graded Chronic Pain Scale and the Short Physical Performance Battery (SPPB). In addition, all were assessed with several psychosocial measures. Blood samples were collected with

Omega-6: Omega-3 ratios determined. Those with high ratios were compared to those with low ratios.

Subjects in the high ratio group obtained worse scores on the WOMAC ($p=0.011$), and slightly lower physical function scores on the SPPB chair stand ($p=0.001$) and total scores ($p=0.008$) than did those in the low ratio group. The high ratio group reported greater pain intensity following 10 mechanical taps, had higher perceived stress and reported greater negative affect.

Conclusion: This study of adults with symptomatic osteoarthritis of the knee found that those with lower Omega-6:Omega-3 ratios have lower levels of knee pain, better physical function, and less psychosocial distress than do those with high Omega-6:Omega-3 ratios.

Sibille, K., et al. Omega-6: Omega-3 PUFA Ratio, Pain, Functioning and Distress in Adults with Knee Pain. **Clin J Pain.** 2018, Feb; 34(2): 182-189.

REPEATED ISCHEMIC LEG PRE-CONDITIONING AND CYCLING PERFORMANCE

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

Subjects were recreationally active sport science students who underwent baseline aerobic and anaerobic capacity testing prior to the IPC protocol. At baseline, and after the final IPC, all participants were tested with a simulated Kerin cycling event. The subjects were then randomized into an IPC or a sham IPC group to perform seven daily sessions. Participants received four, five-minute episodes of IPC (220 mm Hg) or sham treatment (20 mm Hg), separated by five minutes of rest for each leg. Urine samples were collected five minutes before each IPC session. Four Wingate tests were used to simulate the Kerin competition. VO₂max testing was conducted 48 hours and seven days following the last IPC session.

Compared to baseline, performance increased in the IPC group in peak power by 11% ($p<0.001$), in average power by 4.3%

($p=0.02$) and improved in the Fatigue Index by 12.1% ($p=0.01$). No significant changes were observed for the sham group on any of these parameters. Maximal aerobic capacity increased in the treatment group by 9.5% at 48 hours post-treatment, with a further increase of 12.8% after an additional seven days ($p<0.01$). Urine studies indicated an increase in total bipterin, suggesting increased vasodilation and sympathetic activation, and lower levels of indirect markers of oxidative stress, during cycling.

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

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

MEDICATION, PHYSICAL THERAPY AND ACUPUNCTURE FOR SPINAL STENOSIS

Lumbar spinal stenosis (LSS) is associated with neurological symptoms and a reduced quality of life, particularly among the elderly. This study compared acetaminophen, exercise and acupuncture as conservative treatments for patients with LSS.

Subjects were adults with L5 radiculopathy associated with LSS, treated between December of 2011 and January of 2014. The participants were randomized to receive; 1) 900 mg of acetaminophen, three times per day, 2) physical therapy, including six sets of 10 repetitions of back flexion exercises or 3) acupuncture. Interventions were provided twice in the first week and once each week from weeks two through four. The acupuncture sites included BL-23 (Shenshu), BL-25 (Dachangshu), BL-53 (Hoko), BL-54 (Zhibian), BL-40 (Weizhong) and GB-34 (Yanglingquan). The primary outcome measure was the Zurich Medication Questionnaire (ZMQ), completed before, and four weeks after treatment.

A total of 119 patients were randomized into the three groups. Symptom severity scores improved in the acetaminophen group ($p=0.048$), the exercise group ($p=0.003$) and the acupuncture group ($p=0.04$), with no significant differences between the

three groups. The mean improvements in physical function scores were significantly greater only after acupuncture, and were significantly greater in the acupuncture than in the exercise group. As compared to the acetaminophen group, satisfaction was better in the acupuncture group ($p=0.0004$), and trended toward being better than in the exercise group ($p=0.06$).

Conclusion: This Japanese study of patients with lumbar spinal stenosis found that pain and function can be better improved with acupuncture than with exercise or acetaminophen.

Oka, H., et al. A Comparative Study of Three, Conservative Treatments in Patients with Lumbar Spinal Stenosis: Lumbar Spinal Stenosis with Acupuncture and Physical Therapy Study (LAP Study). *BMC Complimentary Alt Med.* 2018; 18: 19.

CONCUSSION AND FUNCTIONAL BRAIN PROCESSES

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

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

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

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

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

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

CONCUSSION NONDISCLOSURE IN THE NATIONAL FOOTBALL LEAGUE

Studies of retired national football league (NFL) players have found associations between recurrent concussions and adverse health outcomes. Despite the institution of a concussion protocol in the 2009 season, assessment of concussion remains dependent to some extent upon the willingness of the athletes to disclose symptoms. This study of retired NFL players was designed to determine the extent of nondisclosure of concussion events.

This retrospective survey used data from the retired NFL players General Health Survey (GHS), with responses from players ranging from those playing before World War II to those playing in the early 2000s. A baseline instrument was sent to all living members of the NFL Retired Players Association in 2001, with a follow-up GHS sent in 2010. The survey contained queries concerning sports related concussions during the players' career and whether any of these was unreported to the medical staff.

Of the respondents, 50.3%, reported that they had sustained at least one concussion that they did not disclose to the medical staff. The prevalence of at least one nondisclosure was higher among those with more professional career concussions, ranging from 35.5% in those with one or two concussions, to 75% among those with 10 or more concussions.

Conclusion: This study of retired National Football League players found that over half did not disclose to the medical team at least one concussion during their playing careers.

Kerr, Z et al. Concussion Nondisclosure during Professional Career among a Cohort of Former National Football League Athletes. **Am J Sports Med.** 2018, January; 46 (1): 22-29.

GALANTAMINE ADMINISTERED AFTER TRAUMATIC BRAIN INJURY

Studies have shown that traumatic brain injury (TBI) is associated with reduced cholinergic neurotransmission, decreased evoked release of acetylcholine and altered cholinergic receptor levels. As Galantamine has been shown to increase synaptic ACh levels and boost acetylcholine receptor (AChR) signaling, this study evaluated the effect of this medication on TBI-related blood-brain barrier permeability.

Male Sprague-Dawley rats underwent controlled cortical impact to produce moderate brain injury, with a control group undergoing a sham procedure. Galantamine was administered at one mg/kg, 30 minutes and seven hours post-injury, and then twice daily for three days after the injury. All animals were assessed for recognition memory using a novel object recognition (NOR) task, and for blood-brain barrier permeability. After euthanasia, the animals were assessed with immunohistochemistry and fluorescence quantification.

Compared with vehicle treated animals, at 24 hours post-injury, the galantamine treated group had significantly reduced BBB permeability ($p=0.011$). In addition, those treated with galantamine had a reduced loss of GABAergic and newborn neurons in the ipsilateral hippocampus, as well as improved performance on the Morris Water Maze, Novel Object Recognition, and Context-Specific memory tasks.

Conclusion: This animal study of mild traumatic brain injury found that galantamine, administered after traumatic brain injury, can reduce the disruption of the blood-brain barrier and reduce cell loss in, and preserve function in the hippocampus.

Zhao, J., et al. Post-Injury Administration of Galantamine

Reduces Traumatic Brain Injury Pathology and Improves Outcomes. **J Neurotrauma.** 2018, January 15; 35: 362-374.

BARK OF FICUS RACEMOSA L FOR WOUND HEALING

Many drugs currently used for wound management are expensive, with some patients intolerant or resistant to its effects. In the Ayurveda system of medicine, Ficus racemosa L has been used for a number of purposes, including the wound healing. This animal study was designed to better understand the efficacy of extracts of Ficus racemosa L in healing wounds.

A number of extracts of Ficus racemosa L were initially evaluated for their cell migration enhancing ability and antimicrobial activity using a scratch wound assay. These included hexanes, dichloromethane (CH_2Cl_2) ethyl acetate (EtOAc) and methanol (MeOH). Of the extracts, the initial evaluation detected two, Dichloromethane and hexanes (lupeol, β -sitosterol and lupeol acetate), that seemed appropriate to evaluate for their effect on wound healing. These were trialed for antimicrobial activity in a wound healing assay, using two different cell lines, and were compared to a control healing assay.

Compared to those in the control condition, those receiving added hexanes and dichloromethane extracts demonstrated faster healing ($p<0.05$). The hexanes, lupeol and β -sitosterol, were identified as those which enhanced cell migration. The ethyl acetate and methanol extracts of the plant exhibited anti-microbial activity against Staphylococcus, Bacillus and Saccharomyces species, as well as Candida albicans.

Conclusion: This *in vitro* wound healing model found that constituents within Ficus racemosa L bark enhance wound healing as a result of enhanced cell migration and antimicrobial properties.

Bopage, N., et al. Dual Function of Active Constituents from Bark of Ficus Racemosa L in Wound Healing. **BMC Compliment Altern Med.** (2018) 18:29.

PLATELET RICH PLASMA FOR GLUTEAL TENDINOPATHY

Tendinopathy of the gluteus medius and/or minimus tendons is a major cause of lateral hip pain or

greater trochanteric pain syndrome. This study compared the efficacy of injections with glucocorticoids, with and without platelet rich plasma (PRP), for the treatment of gluteal tendinopathy (GT).

Eligible subjects were 18 to 80 years of age, all with a history of GT of greater than four months' duration. The participants were randomized to a glucocorticoid or a PRP group, with both undergoing blood withdrawal of 55 mL. In the PRP group, six to seven mL of autologous PRP were injected into the affected area of the tendon using ultrasound guidance. In the corticosteroid group, a similar volume of corticosteroid was injected, using the same procedure. The primary outcome measures were pain and function, assessed with the modified Harris Hip score (mHHS), administered at two, six and 12 weeks. As the minimal clinically important difference (MCI) for the mHHS is been shown to be eight points, this cutoff was used to help estimate clinical efficacy.

At 12 weeks, the mean mHHS scores improved to 74.05 in the PRP group and 67.13 in the corticosteroid group ($p=0.048$). The proportions of subjects who achieved the predefined MCI change from baseline at 12 weeks were 56.7% in the corticosteroid group and 82% in the PRP group ($p=0.016$). There were no significant treatment related, adverse events in either group.

Conclusion: This study of patients with chronic gluteal tendinopathy found better clinical improvement with a single injection of PRP than with a single injection of corticosteroid.

Fitzpatrick, J., et al. The Effectiveness of Platelet Rich Plasma Injections in Gluteal Tendinopathy. A Randomized, Double-Blind, Controlled Trial Comparing a Single Platelet-Rich Plasma Injection with a Single Corticosteroid Injection. **Am J Sports Med.** 2018, January. DOI:10.1177/0363546517745525

CORTICOSTEROIDS FOR DUCHENNE MUSCULAR DYSTROPHY

Studies have shown that corticosteroids slow the decline in muscle strength and function among patients with Duchenne muscular dystrophy (DMD). This study assessed the change in motor function of patients with DMD over the first 24 months after corticosteroid implementation.

(Continued from page 2)

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Data for this retrospective, multicenter, cohort study included males with DMD, ambulating at baseline, ages six years or older, with at least two motor function measure (MFM) assessments six to 24 months apart. Those in the corticosteroid-treated group had had two years of corticosteroid use beginning shortly after the first MFM assessment.

Those in the corticosteroid treatment group were most often treated by prednisone, with the most frequent initial dose of 0.5 mg/kg per day. During the first six months, motor scores worsened in the untreated group and improved in the treated group ($p < 0.001$). At 12 and 24 months, while both groups deteriorated, those in the treated group had a reduced rate of deterioration ($p < 0.001$ for both comparisons).

Conclusion: This retrospective study of patients with Duchenne muscular dystrophy found that treatment with steroids results in better motor performance when compared to those no corticosteroid treatment.

Schreiber, A., et al. Corticosteroids in Duchenne Muscular Dystrophy: Impact on the Motor Function Measure Sensitivity to Change and Implications for Clinical Trials. **Dev Med Child Neurol.** 2018, February; 60(2): 185-191.

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