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SAUNA BATHING AND ALL CAUSE MORTALITY

While sauna bathing has been associated with improved cardiovascular and circulatory function, the association between regular sauna bathing and the risk of sudden cardiac death (SCD) and fatal cardiovascular diseases is not yet known. This prospective study investigated the association between exposure to sauna bathing and mortality in a male population.

This study involved a population-based sample of men from Eastern Finland, 40 to 60 years of age. All participants underwent an assessment of cardiac risk factors with sauna bathing assessed by self-administered questionnaires, reviewing frequency of sauna bathing, session duration and temperature. Baseline data were obtained from 1984 through 1989, with follow-up data reviewed until 2011. All deaths were reviewed and classified.

Data were reviewed for 2,315 males with a mean age of 53 years and a mean body mass index of 26.9 kg/m^2. The mean frequency, duration, and temperature of sauna bathing were 2.1 times per week, 14.2 minutes per session, and 78.9° C, respectively. At a mean follow-up of 20.7 years, compared to those participating once per week, the hazard ratio for sudden cardiac death was 0.78 for those bathing two to three times per week, and 0.37 for those bathing four to seven times per week (p= 0.005).Significant, inverse associations were found between the duration of sauna bathing and mortality due to CHD (p=0.007), as well as CVD (p=0.03). The greatest benefit was found among those bathing over 19 minutes per session. Frequency of sauna bathing, but not duration, was inversely associated with all-cause mortality, with a 40% reduction seen among those participating four to seven times per week, as compared to those with one session per week.

Conclusion: This Finnish study found an inverse relationship between all-cause mortality and the frequency of sauna bathing among males.

Laukkanen, T., et al. Association between Sauna Bathing and Fatal Cardiovascular and All-Cause Mortality Events. **JAMA Int Med**. 2015, April; 175(4): 542-548.

ELECTRICAL STIMULATION FOR DYSPHAGIA AFTER BRAIN INJURY

Oropharyngeal dysphagia is frequently present during the acute phase of acquired brain injury, stroke and traumatic brain injury (TBI). Neuromuscular electrical stimulation (NMES) is a therapeutic procedure approved by the FDA as a treatment for dysphagia. As previously published studies have yielded conflicting results, this trial sought to further clarify the effectiveness NMES for the treatment of subacute oropharyngeal dysphagia due to acquired brain injury.

This prospective randomized study included 20 patients with stroke and or TBI with videofluoroscopy demonstrated tracheal aspiration. The subjects were randomized to receive either NMES or sham electrical stimulation for four weeks. Each patient received 20 sessions of NMES, five per week, with each session lasting 60 minutes. At the end of treatment and at three month follow-up the participants underwent clinical videofluoroscopy, and esophageal manometric evaluation. Swallowing capacity was evaluated using the Functional Oral Intake Scale (FOIS).

At one month, feeding capacity as measured by FOIS scores increased by 2.9 points in the NMES group and by one point in the sham group (p=0.0005). At three months the mean FOIS value was 5.3 in the NMES and 4.6 in the sham group, an insignificant difference. At one month follow-up, there was no significant difference in the reduction of patients with tracheal aspiration, though a significant improvement was observed in the NMES group regarding the bolus viscosity at which aspiration appeared (p=0.015).

Conclusion: This study of patients with acquired brain injury found that neuromuscular electrical stimulation may shorten recovery time and improve swallow function.

Terr,R et al A Randomized Controlled Study Of Neuromuscular Electrical Stimulation and Oropharyngeal Dysphagia Secondary to Acquired Brain Injury. **Euro J Neurol 2015,April; 22(4):687 – 696.**

HIGH-RESOLUTION ULTRASOUND FOR DETECTING MENISCAL TEARS

Meniscal tears are common in athletes and nonathletes, resulting in pain and disability. While magnetic resonance imaging is the first-line diagnostic modality for the detection of these tears, it is costly, and, for some patients, contraindicated. Noting recent developments in ultrasound(US) technology, this study's authors assessed the accuracy of high-resolution US for diagnosing meniscal abnormalities, including tears. Patients with knee pathology, scheduled for arthroscopic evaluation/treatment, were evaluated preoperatively with a high-resolution US, with a six to 14 MHz linear transducer. Meniscal tears were characterized as horizontal, vertical, radial, flap, bucket handle or complex. The diagnosis by US was compared with findings at the time of arthroscopic repair. In a separate study, cadavers were used to evaluate the area of the meniscus visible to ultrasound.

Subjects were 70 patients, with 33 undergoing ACL reconstruction, 38 meniscectomy, six meniscal repair, five microfracture, one synovectomy

and one tumor resection. Compared to the arthroscopic findings, the sensitivity of the ultrasound was 88%, specificity 85%, positive predictive value 85% and negative predictive value 88%. Gender, age and body mass index did not appear to affect the results of ultrasound. The sensitivity and negative predictive values for the detection of lateral meniscal tears were low. In the cadaveric study, 89% of the meniscus was visible, with all areas except the anterior horn visible.

Conclusion: This study of patients scheduled for surgical repair of knee pathology found that high-resolution ultrasound has a relatively high accuracy for the detection of meniscal tears, with the exception of those in the anterior lateral horn.

Akatsu, Y., et al. Accuracy of High-Resolution Ultrasound in the Detection of Meniscal Tears and Determination of the Visible Area of Meniscus. **J Bone Joint Surg.** 2015, May 20; 97(10) :799-806.

PAROXETINE, MITOCHONDRIAL PROTEINS, AND NEURAL PROTECTION

Even with the advent and implementation of combination anti-retrovirals therapy, the occurrence of HIV-associated neurocognitive disorders (HANDs) persists. These complications result from immune activation, oxidative stress and neurotoxicity resulting from persistent HIV replication or the release of viral products directly toxic to neurons. This study was designed to determine the neuroprotective mechanisms of paroxetine.

The authors initially screened more than 2000 compounds for protective efficacy against oxidative stress mediated neuronal injury. This screen identified selective serotonin reuptake inhibitors as having such a capacity. Rat hippocampal neurons were exposed to the mitochondria toxin, 3-NP, which resulted in death of approximately 20% of the cells. Rat neurons were then treated with paroxetine, or fluoxetine, at various doses, one hour prior to mitochondria toxin exposure. This treatment was follow by *in vivo* studies of similar exposures.

Paroxetine at doses of five and 10 microM provided almost complete protection against neuronal death, while fluoxetine reduced cell death by 500%. In the *in vivo* study, rats were randomized to receive paroxetine or saline one week after exposure to a mitochondrial neurotoxin, with a striking reduction in cell death in the paroxetine group. Paroxetine also increased the proliferation of neural progenitor cells, and induced anti-inflammatory effects, including a reduction in calcium dependent swelling of mitochondria.

Conclusion: This animal study provides evidence that paroxetine and fluoxetine can reduce neuronal cell death after exposure to a mitochondrial neurotoxin, reduce swelling of the mitochondria, and induce the proliferation of neural progenitor cells.

Steiner, J et al. Interaction of Paroxetine with Mitochondrial Proteins Mediates Neuroprotection. **Neurotherap.** 2015, Jan; 12(1): 200-216.

PREDICTOR OF PHYSICAL HEALTH ONE TO FIVE YEARS AFTER TRAUMATIC BRAIN INJURY

Traumatic brain injury (TBI) often causes long-term physical, cognitive, behavioral and emotional impairments. Due to the paucity of research examining the longitudinal trajectories of health-related quality of life after TBI, this study was designed to determine whether the trajectory of recovery of physical health over five years can be predicted by demographic and injury related variables.

This longitudinal, cohort study included subjects with moderate to severe TBI, recruited between 2005 and 2007 at a Norwegian referral center. All subjects were assessed at follow-ups of one, two and five years post-injury, using the four subscales of the 36-item short-form health survey. Predictor variables collected included gender, age, relationship status, guardianship of dependent children, education level, employment status, occupation, acute Glasgow scale score, cause of injury, length of posttraumatic amnesia and results of CT of the head.

Of the original subjects, 97 had at least one follow-up visit. Of the four subscales evaluated, only physical functioning yielded significant improvement over all time points ($p=0.006$). Participants with higher level education ($p=0.014$), employed at the time of injury ($p=0.029$) and with shorter posttraumatic amnesia ($p<0.001$) had higher scores on physical functioning over time. The other three subscales remained stable over time. Participants who were employed at the time of injury had a much higher general health over time than those who were not ($p<0.001$).

Conclusion: This study of patients with moderate to severe traumatic brain injury found that physical function scores improved significantly at one, two and five years post-injury.

Andelic, N., et al. Trajectories of Physical Health the First Five Years after Traumatic Brain Injury. **J Neurol.** 2015, March; 262(3): 523-530.

TETANUS TOXIN PRESERVES SKELETAL MUSCLE

Skeletal muscle disuse results in a decrease in the volume of myofibers, with a resultant decrease in muscle force production. As the action of tetanus toxin results in increased muscle activity, this animal study was designed to determine the ability of tetanus toxin to prevent changes associated with disuse atrophy.

Female Sprague rats were divided into three groups, with all undergoing immobilization. Within the experimental groups, one group underwent tetanus toxin injection and one group underwent saline injection. A third group, receiving no injections, served as controls. Two weeks after the injections, the contractile force, muscle and myofiber morphology, as well as the tibialis anterior weight were analyzed and compared to those of the control group.

After immobilization, the wet weight of the saline group muscles decreased

significantly, to 68% of the wet weight of the control muscles. The wet weight of the toxin-treated muscles maintained 98% of the wet weight of the control muscles. The maximal tetanic tension (Po) of the toxin injected muscles did not differ from that of the control muscles. The saline group muscles developed on average only 58%/44% of the maximal twitch response (Pt)/ maximal tetanic tension (Po) produced by control muscles. Saline group muscles developed on average only 61%/45% of the Pt/ Po generated by the toxin injected muscles.

Conclusion: This animal study found that tetanus toxin can prevent common signs of muscle disuse atrophy.

Matthews, C., et al. Tetanus Toxin Preserves Skeletal Muscle Contractile Force and Size During Limb Immobilization. **Muscle Nerve.** 2014, November; 50(5): 759-766.

TOBACCO ABUSE AND CERVICAL SPINE SURGERY

Previous studies have demonstrated that tobacco abuse is associated with poor bone quality, lower fusion rates, delayed fusion and an increased likelihood of pseudo- arthrosis following spine instrumentation and fusion. This study was designed to better understand the effects of smoking on perioperative outcomes after cervical corpectomy.

This retrospective review included medical records between 2006 and 2011, documenting adult patients who underwent anterior cervical corpectomy as a treatment for radiculopathy or myelopathy. The patient's smoking status was categorized as current smoker, quitter (cessation at least one year prior to surgery) or non-smoker. Charts were reviewed for baseline demographic and clinical variables, as well as for comorbidities. The primary outcome measures of interest were estimated blood loss, 30-day postoperative complications and length of hospital stay.

Of the 160 adult patients included in the study, 49.4% were non- smokers, 25.6% were quitters and 25% were current smokers. Relative to non-smokers, current smokers had a higher odds ratio (OR) of experiencing complications (OR=2.87; p=0.012), while quitters did not experience such a significant increase in complications (OR=1.71; p=0.174). Current smoking was independently associated with a higher OR of pseudoarthrosis compared with non-smoking (p=0.012). Current smokers experienced mean length of stays of 9.5 days, quitters 6.8 days, and nonsmokers 4.8 days. In addition, there was a trend toward greater blood loss among smokers than non-smokers, though that finding did not reach statistical significance.

Conclusion: This study of patients undergoing cervical corpectomy found that current smokers have higher perioperative complications, longer lengths of hospital stay and higher rates of pseudoarthrosis than do non-smokers.

Lau, D., et al. The Effects of Smoking on Perioperative Outcomes in Pseudoarthrosis following Anterior Cervical Corpectomy. **J Neurosurg Spine.** 2014, October; 21: 547-558.

NATALIZUMAB IMPROVES AMBULATION IN MULTIPLE SCLEROSIS

Issues with mobility present a significant challenge for patients with multiple sclerosis (MS), and can lead to reduced quality-of-life. Natalizumab, an alpha 4-integrin antagonist, has been found to affect disease activity and reduce relapse rates among those with relapsing remitting multiple sclerosis (RRMS). This study examined the effect of natalizumab on ambulation in patients with RRMS.

This study included data from two, large, prospective studies of natalizumab for patients with RRMS. The TIMER was an international, multicenter, open label, prospective study of 215 subjects who received natalizumab, 300 mg IV, every four weeks for 48 weeks. The patients were assessed with a timed, 25-foot walk (T25FW) test and a timed, 100- m walk (T100MW) test at baseline, 24 and 48 weeks. AFFIRM was a randomized, placebo-controlled, double-blind, phase 3 study, including 942 patients with RRMS. Eligible subjects received natalizumab, 300mg or placebo, every four weeks for up to 116 weeks. Those patients were assessed using a T25FW every 12 weeks for 30 months.

In TIMER, there was an increase in the T100MW speed at weeks 24 and 48, as compared with baseline ($p \leq 0.0001$ for both). In addition, the T25FW speed increased at week 24 (p=0.0074), although not at week 48 (p=0.16). In AFFIRM, at two years, 78% more of those in the treatment arm showed a 20% or greater improvement in the T25FW, as compared to placebo.

Conclusion: This study of patients with relapsing remitting multiple sclerosis found that natalizumab can improve ambulation.

Voloshyna, N., et al. Natalizumab Improves Ambulation in Relapsing-Remitting Multiple Sclerosis: Results from the Prospective TIMER Study and a Retrospective Analysis of AFFIRM. **European J Neurol.** 2015, March; 22(3): 570-577.

VISUAL EVOKED POTENTIALS TO ASSESS VISUAL ATTENTION IN MILD TRAUMATIC BRAIN INJURY

Due to its global nature, mild traumatic brain injury (mTBI) often results in a constellation of deficits, including sensory, motor, perceptual, linguistic, cognitive and behavioral. This study investigated the use of visual evoked potentials (VEPs) as a means to quantify visual attention among patients with mTBI.

Subjects were 16 individuals with mTBI, of whom 11 had self-reported visual/general attention deficits, and five who did not. All patients were assessed with a VEP test, with five trials for each of three test conditions, including conventional VEP, Eyes Closed (EC), and Eyes Closed Number Counting (ECNC). Patients were also assessed with the Visual Search and Attention Test (VSAT). The adult ADHD Self-Report Scale (ASRS) was used as a screening tool for general attention deficit. The different VEP tests were quantified using the VEP alpha attenuation ratio (AR).

The AR at each Alpha frequency differentiated between those with and without attention deficit. The AR for individual as well as for combined frequencies was abnormal among those with mTBI and an attention deficit. The AR was normal for those without an attention deficit. Similar results were obtained when the AR was combined across the alpha frequency band.

Conclusion: This study of patients with mild traumatic brain injury suggests that visual evoked potentials may be useful to differentiate objectively between those with and without an attentional deficit.

Yadav, N., et al. Objective Assessment of Visual Attention in Mild Traumatic Brain Injury (mTBI) Using Visual-Evoked Potentials (VEPs). **Brain Inj.** 2015, March; 29

(3): 352-365.

NEUROENDOCRINE DYSFUNCTION IN ACUTE BRAIN INJURY

Hypopituitarism due to traumatic brain injury (TBI) can occur in up to 50% of patients. While the typical consequences of TBI include disorders of consciousness, attention, impulsive behavior, depression and sleep, some of these symptoms might be a consequence of anterior pituitary insufficiency. This study was designed to determine the prevalence of anterior pituitary hormone deficiencies in the acute phase of moderate to severe TBI.

One hundred, consecutive patients with moderate to severe TBI were studied. The participants underwent clinical assessment, with severity of injury assessed by initial Glasgow Coma Scale (GCS) results. The patients were further assessed with the Glasgow Outcome Scale (GOS). Subjects with scores of four or five were placed in a good outcome group, and those with scores of one, two or three were placed in a bad outcome group.

Of the hundred subjects, 52% had moderate, and 40% had severe, TBIs. The percentage of patients with low fT3 was 26%, fT4 12%, TSH 4%, growth hormone 28%, cortisol 2% and prolactin 6%. Thirty percent had an increased cortisol level. On day seven, the percentage of patients with a low hormone profile of fT3 was 14.89%, fT4 46.8%, TSH 44.68%, growth hormone 48.93%, cortisol 2.12% and prolactin 4.25% while 21. 27% had increased cortisol levels. The patients with severe TBI, with pressure effects and a poor GOS scores, had more abnormal hormone profiles than did patients with moderate TBI, without pressure effects and a good GOS.

Conclusion: This prospective study found that neuroendocrine dysfunction is common in the acute phase of moderate to severe traumatic brain injury, and that there is a correlation with severity of injury, Glasgow Outcome Scale and radiological findings.

Prasanna, K., et al. Neuroendocrine Dysfunction in the Acute Phase of Moderate to Severe Traumatic Brain Injury: A Prospective Study. **Brain Inj.** 2015, March; 29(3): 336-342.

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ELEVATED CALCIUM AFTER ACUTE ISCHEMIC STROKE

Previous studies have demonstrated that calcium can influence the cascade of events leading to neuronal injury. This study further assessed the association between serum calcium levels and outcome after stroke.

Subjects were patients with acute ischemic stroke, admitted to a university hospital between 2002 and 2008, within seven days of symptom onset. Data were gathered concerning patients' stroke subtype, National Institutes of Health Stroke Scale (NIHSS) score at the time of admission, thrombolytic treatment and modified Rankin scale (mRS) score at discharge. Baseline demographics and clinical characteristics were obtained, with the latter including serum levels of glucose, hemoglobin A-1 C, lipids and albumin corrected calcium levels. These levels were compared to mortality.

Patients enrolled in this study included 1,915 patients with stroke, with a mean age of 65.7 years. The mean follow-up period was 917 days, with a mortality rate of 1.6% at one month post-admission, and an overall mortality rate of 17.3%. The second ($p<0.01$) and third ($p<0.04$) tertile of serum calcium level, and the third tertile ($p<0.04$) of albumin corrected calcium level, were all found to be independent risk factors for poor outcome (mRS) at discharge. The third tertile of serum calcium level was found to be an independent risk factor for long-term mortality ($p=0.02$). The albumin corrected calcium was associated with long-term mortality. In addition, male gender, age, serum glucose level, serum triglyceride level, serum albumin level, stroke subtype and NIHSS scores on admission were significantly associated with long-term mortality.

Conclusion: This study found that high levels of albumin corrected calcium are associated with a worse discharge outcome and increased incidence of mortality after acute ischemic stroke.

Chung, J., et al. Elevated Calcium after Acute Ischemic Stroke: Association with Poor Short-Term Outcome and Long-Term Mortality. **J Stroke.** 2015, January; 17(1): 54-59.

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CREATINE AND CO-ENZYME Q 10 FOR MILD COGNITIVE IMPAIRMENT IN PARKINSON'S DISEASE

Creatine and coenzyme Q 10 are important, active components of energy metabolism in mitochondria with known protective effects against neurodegenerative diseases. This study was designed to determine the effects of combining creatine and coenzyme Q 10 on the cognitive function of patients with Parkinson's disease (PD) related cognitive impairment.

This study included 75 patients diagnosed with PD, each with confirmed, gradually declining cognitive function. All were assessed with the Unified Parkinson's Disease Rating Scale (UPDRS) at baseline and again at 12 and 18 months. The subjects were initially assessed with the Montréal Cognitive Assessment (MoCA) and for plasma phospholipid levels. The participants were randomized to a treatment group receiving creatine monohydrate at 5 g BID and oral Coenzyme Q 10 at 100 mg three times per day, or a control group receiving placebo capsules.

After 12 and 18 months, MoCA scale scores of the treatment group were significantly higher than those of the control group ($p<0.05$, and $p<0.01$, respectively). In addition, at 12 and 18 months follow-up, the treatment group's phospholipid levels were significantly lower than those of the controls ($p<0.01$ and $p<0.01$, respectively). After 12 and 18 months, no significant differences were found between the two groups in UPDRS scores.

Conclusion: This study of patients with Parkinson's disease and mild cognitive impairment found a positive effect in delaying the decline in cognitive function of these patients with the daily use of Coenzyme Q10 and creatine.

Wanag, L., et al. The Effect of Creatine and Coenzyme Q 10 Combination Therapy on Mild Cognitive Impairment in Parkinson's Disease. **Euro Neurol**. 2015, April; 75(3-4): 205-211.

ROTATOR CUFF RECONSTRUCTION IN WHEELCHAIR BOUND PATIENTS

Of patients with paraplegia, 32 to 67% have complaints of pain and limitation of movement, with rotator cuff tears common in this population. This study assessed the effect of rotator cuff repair in patients with paraplegia.

This retrospective study included patients with paraplegia who underwent rotator cuff repair between October of 1995 and October of 2011. All patients had full thickness rotator cuff tears with surgical repair and postoperative rehabilitation. After surgery, a shoulder abduction brace was applied for eight weeks. The functional evaluation included pre- and postoperative pain scores, range of motion, muscle power, American Shoulder and Elbow Surgeons (ASES) scores, and Constant scores. Tendon integrity was evaluated by MRI at an average of 31.2 months post-surgery.

At follow-up, ASES scores had improved from 53 to 85 points ($p<0.001$). Constant scores had improved from 48 to 75 points ($p<0.001$). The ASES scores were above 80 points in 87.5% of the patients, indicating satisfactory results. Structural integrity of the repair was maintained in 88% of the patients, while recurrent tears were observed in 12%.

Conclusion: This study of patients with paraplegia who were wheelchair ambulators with rotator cuff tears found that rotator cuff repair surgery can provide satisfactory functional outcomes.

Jung, H., et al. Reconstruction of Rotator Cuff Tears in Wheelchair Bound Paraplegic Patients. **J Should Elbow Surg.** 2015, April; 24(4): 601-605.

AUTOLOGOUS BLOOD INJECTIONS FOR PLANTAR FASCIITIS

Plantar fasciitis is a common condition, typically affecting people in the fourth and fifth decades of life. A wide variety of conservative therapies have been used to treat this condition, including rest, stretching, splinting, taping and orthotics. Although corticosteroid injections have been used with some success, plantar fascia rupture has been reported in up to 10% of cases. This study explored the efficacy of autologous blood injections for the management of chronic plantar fasciitis.

This prospective study included 62 patients with plantar fasciitis, with an average duration of symptoms of 50 months. All subjects received three to four mL of autologous whole blood, injected into the plantar fascia with the use of ultrasound guidance. The patients were then given a standardized home exercise program. All were followed up at two to three weeks and six weeks post-procedure, and then at three and six months.

Outcome measures included visual analogue scale (VAS) pain scores, satisfaction scores and a patient rated outcome measure, the Revised Foot Function Index questionnaire.

At a median duration of 631 days, 55% of the patients were pain free, 68% were virtually pain free (with a VAS score of zero or one), with 4.9% reporting insufficient recovery, proceeding to surgery. The mean VAS pain score at baseline was 8.1, falling to 1.3 at follow-up. At follow-up, 62% of the patients reported being very satisfied with the procedure, with 74% reporting that they would definitely recommend the procedure.

Conclusion: This case series of patients with chronic plantar fasciitis suggests that autologous blood injections may be effective in reducing pain.

Wheeler, P., et al. The Role of Autologous Blood Injections in the Treatment for Patients with Chronic Plantar Fasciitis - A Case Series and Longer-Term Follow-Up. Intern Musculoskel Med. 2015, July; 37 (2):47-53.

OBESITY AND TOTAL KNEE REPLACEMENT

Obesity has been found to be associated with higher rates of revision and infection among patients undergoing total hip and total knee arthroplasty. This study assessed the effect of obesity on patients undergoing total ankle replacement (TAR).

This retrospective cohort trial included patients undergoing TAR between May of 2002 and November of 2011. The cohort included 30 obese patients and 48 nonobese patients, followed for means of 3.76 years and 3.92 years, respectively. Outcome measures were the Ankle Osteoarthritis Scale (AOS) and the Short Form-36 (SF-36), administered preoperatively and again at least two years postoperatively.

At follow-up, both cohorts demonstrated significant improvements in AOS pain scores, with no significant difference in change between the groups. In addition, scores on the SF-36 improved in both groups, with no significant difference noted between groups. Similarly, the rates of complications and revisions between groups did not differ significantly. The mean operation-free survival times were 4.5 years for the obese group and 4.6 years for the non-obese group (p = 0.47).

Conclusion: This study of patients undergoing total ankle replacement found that the surgery improves disability and pain, with no difference in outcome between those with and those without obesity at the time of surgery.

Bouchard, M., et al. Impact of Obesity on the Outcome of Total Ankle Replacement. **J Bone Joint Surg**. 2015, June; 97(11): 904-910.

SIDELINE BALANCE ERROR SCORING SYSTEM PERFORMANCE

Appropriate concussion management is predicated on timely symptom recognition. One symptom of concussion is impaired postural control, which is commonly tested with the balance error scoring system (BESS). This study examined the difference between BESS testing on the sideline and testing in quiet settings, in an effort to determine whether environmental factors influence those results.

Subjects were National Collegiate Athletic Association Division I female student-athletes (SA) involved in soccer, volleyball or softball at a single institution. Controls were recreational level athletic female college students. A BESS test was performed three times for each participant, once in a quiet setting and twice in either basketball or football settings. The SA group performed their baseline test during pre-participation physicals in a quiet, controlled environment, with the controls assessed in the same environment. The controls were then matched to members of the athlete group, and then tested in either a basketball or a football environment, with testing of the athletes during games, and that of the controls in the same venue when no game was occurring.

Subjects ultimately included 38 athletes and 38 controls completing the testing. No significant difference was present between the athletes and controls in baseline BESS scores. At the football and basketball settings, the athletes increased BESS errors from baseline, while the controls decreased errors (p=0.001 and p=0.005, respectively).

Conclusion: This study found that, for student-athletes, Balance Error Scoring System performance worsened when determined during a live football or basketball game, suggesting caution when evaluating an athlete in those settings.

Rahn, C., et al. Sideline Performance of the Balance Error Scoring System During a Live Sporting Event. Clin J Sports Med. 2015, May; 25(3): 248-253.

INFLAMMATORY MARKERS AND DEPRESSION AFTER BRAIN INJURY

Many patients experience depression after traumatic brain injury (TBI). Previous studies have demonstrated that non-responders to antidepressant medications often have increased inflammatory profiles. This study investigated whether inflammatory profiles, obtained during the acute phase of injury, can predict posttraumatic depression (PTD) symptomatology after TBI.

This prospective study included patients admitted to a level I trauma center with moderate to severe TBI. Serum and cerebral spinal fluid (CSF) samples were collected to measure 12 inflammatory markers, with comparisons made to those of 15, healthy controls. Outcome variables included depression, assessed with the Patient Health Questionnaire- Nine (PHQ-9), administered at six and 12 months post-injury.

Subjects were 41 participants with CSF data and 50 with serum data, all with at least one PHQ-9 score. The patients' average, acute CSF inflammatory biomarker levels in the first week after TBI were significantly elevated compared to those of healthy controls for IL-1 [beta], IL-4, IL-6, IL-7, IL-8, IL-10, TNF-[alpha], sVCAM-1, sICAM-1 and sFAS($P \leq 0.05$). No significant relationships were found between acute serum inflammatory biomarker levels and PTD at six or 12 months. The inflammatory cell surface marker, sVCAM-1, sICAM-1, and sFAS in the CSF, and the cytokine IL-8, were each positively associated with PTD at six months ($p<0.02$), while the cytokine IL-7 was inversely associated with PTD at 12 months ($p<0.05$).

Conclusion: This study of patients with TBI found that higher levels of the cytokine-induced proteins sICAM-1, sVCAM-1, and sFAS predicted a higher likelihood of post-traumatic depression (PTD)

at six months post-injury.

Juengst, S., et al. Acute Inflammatory Biomarker Profiles Predict Depression Risk following Moderate to Severe Traumatic Brain Injury. J Head Trauma Rehab. 2015, May/ June; 30(3): 207-218.

PHYSICAL EXERCISE AND NEUROINFLAMMATION, NEUROPLASTICITY, NEURODEGENERATION AND BEHAVIOR

The effects of exercise on the central nervous system in health and in neurodegenerative and cerebrovascular disorders have been a recent focus of research. This study reviewed the effects of different types of exercise on experimental models of neurodegenerative disorders, particularly Parkinson's disease and Alzheimer's disease.

This literature review used articles in PubMed from 1980 through August of 2014. The search focused on physical exercise, training, neuroinflammation, neuro-degeneration, intensity, high-intensity interval training, cytokines, behavior, cognition, in rodents and in humans. Exercise was found to lead to increased levels of neurotrophic factors, as well as changes in levels of different cytokines and altered microglial functions in different parts of the brain that could be beneficial for patients with neurodegenerative diseases.

Exercise was also shown to affect cell surface receptors, such as the TLR and adrenergic receptors, as well as intracellular signaling molecules involved in inflammatory pathways.Exercise intensity studies have demonstrated that high intensity training can increase anti-inflammatory cytokines and decrease pro-inflammatory cytokines. Moderate intensity exercise lowers levels of pro -inflammatory cytokines more than does mild intensity training in diabetes patients. No studies have investigated the effect of training intensity on neuroinflammation and neurodegeneration.

Conclusion: This literature review demonstrates that exercise is related to increased levels of neurotrophic factors, elevated expression of anti-inflammatory cytokines and reduced levels of pro-inflammatory cytokines and activated microglia.

Svensson, M., et al. Effects of Physical Exercise on Neuroinflammation, Neuroplasticity, Neurodegeneration, and Behavior: What We Can Learn from Animal Models in Clinical Settings. **Neurorehab Neural Repair.** 2015, July; 29(6): 577-589.

FAMILIAR AUDITORY SENSORY TRAINING FOR ACUTE TRAUMATIC BRAIN INJURY

For patients in states of disordered consciousness (DOC) after traumatic brain injury (TBI), rehabilitation commonly includes sensory stimulation. This study was designed to determine whether familiar auditory sensory training (FAST) is beneficial for patients with severe TBI.

Persons with disorders of consciousness were randomized to either a FAST group or a "placebo silence" group. The FAST protocol listened to customized stories told by people well known to the patient. Those stories represented specific events experienced by both the patient and the storyteller. The placebo protocol was silence.

All patients received the auditory protocols for 10 minutes, four times per day, with at least two hours between sessions, for six weeks. Outcome measures included the Disorders of Consciousness Scale (DOCS) and the Coma - Near Coma (CNC) Scale. In addition, functional magnetic resonance imaging (fMRI) was used to examine the effect of the FAST protocol on neuroactivation.

The FAST group had significantly greater average change in CNC measures than did the control group ($p=0.049$), though the average change in DOCS scores did not differ significantly between the groups ($p=0.465$). The fMRI analysis revealed that the FAST patients had more fMRI activation than did the placebo group in language regions and whole brain ($p<0.05$), resembling the activation of healthy controls.

Conclusion: This study of patients with disorders of consciousness after traumatic brain injury found that improved arousal and awareness may occur with the use of familiar auditory sensory training.

Pape, T., et al. Placebo-Controlled Trial of Familiar Auditory Sensory Training for Acute, Severe Traumatic Brain Injury: A Preliminary Study. Neurorehab Neural Repair. 2015, July; 29(6): 537-547.

SMOKING AND SHORT-TERM COMPLICATIONS FOLLOWING HIP AND KNEE ARTHROPLASTY

Total joint arthroplasty is the most frequently performed orthopedic procedure in the United States. Smoking is a modifiable factor found to increase short-term complications following these surgeries. This study compared thirty-day complication rates among patients undergoing primary total hip arthroplasty (THA) or total knee arthroplasty (TKA) stratified by smoking history.

The American College of Surgeons' National Surgical Quality Improvement Program (ACS NSQIP) was queried to identify all patients with undergoing primary THA or TKA between 2006 and 2012. The database included prospectively gathered preoperative and 30-day postoperative morbidity and mortality data. Smokers were categorized as current smokers (smoking within one year of surgery) and lifetime smokers, past-year smokers or non-smokers. Former smokers were those who reported not smoking during the prior year, but who had a history of a least one lifetime period of smoking.

Of the 78,191 patients included in this study, the multivariate analysis revealed that current smokers were more likely to experience wound complications than were former smokers and nonsmokers ($p=0.001$).In addition former smokers were more likely to experience perioperative morbidity or mortality compared with current smokers or nonsmokers ($p < 0.001$).Both current and former smokers had significantly increased total complication risks compared with non-smokers ($p=0.002$ and $p=0.001$, respectively) when stratified by lifetime pack years.

Conclusion: This study of patients undergoing hip or knee arthroplasty found that current smokers have an increased risk of wound complications, with ever smokers also having an increased risk of total complications.

Duchman, K., et al. The Effect of Smokingon Short-Term Complications following Total Hip

and Knee Arthroplasty. J Bone Joint Surg. 2015, July 1; 97(13): 1049-1058.

DIABETES AND PAIN AFTER JOINT REPLACEMENT

Persistent pain has been reported in approximately five to 21% of hip replacements and eight to 27% of knee replacements. These patients often describe their pain in a way that suggests persistent inflammation. As low grade inflammation is associated with the pathogenesis of diabetes, this study assessed the association of persistent pain with glucose metabolism, the metabolic syndrome and obesity.

Between December of 2009 and May of 2011, 200 patients with primary osteoarthritis (OA) who were scheduled for primary hip or knee replacement were recruited. Preoperative laboratory tests, as well as measurements to diagnose the metabolic syndrome and diabetes, were obtained. Pain in the operated joint was surveyed one to two years post-surgery using a postal questionnaire. These results were compared with baseline measurements. The primary outcome measure was the occurrence of persistent pain in the operated joint.

The likelihood of persistent pain, but not of joint pain, was higher among patients who were diabetic than among those who were not (adjusted odds ratio 8.5). A higher ratio of patients with a body mass index (BMI) of over 35kg/m^2 had a painful joint than did those with a BMI of less than 30kg/m^2 (adjusted odds ratio 5.0). The metabolic syndrome was not associated with persistent pain.

Conclusion: This study found that previously diagnosed diabetes is a risk factor for persistent pain and that severe obesity is a risk factor for painful joints one to two years after primary hip or knee replacement.

Rajamaki, T., et al. Diabetes Is Associated with Persistent Pain after Hip and Knee Replacement. **Acta Orthopedic**. 2015, June; 86 (4): 1-8.

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Expanding the frontier of medicine in research, teaching, and patient care