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PERIODONTITIS AND LACUNAR INFARCT

As several case-control and cohort studies have demonstrated a positive association between periodontitis and ischemic stroke, this study investigated whether chronic periodontitis is also associated with lacunar stroke.

This case-control study included patients between 30 and 80 years of age and a diagnosis of lacunar infarct. Healthy control subjects matched by age and gender were randomly selected from a neurology unit. A periodontal examination was performed to determine the presence of chronic periodontitis. The association between periodontitis and lacunar stroke was determined.

The final study sample included 62 adults with stroke and 60 in the control group. Assessing clinical periodontal variables, significantly higher values were observed for those with lacunar infarcts as compared with controls ($p < 0.0001$). A logistic regression analysis showed that periodontitis and the severity of the periodontitis were strongly associated with lacunar infarct ($p = 0.001$, and $p = 0.04$ respectively).

Conclusion: This study found a positive strong association between periodontitis and lacunar infarct, independent of known confounding factors.

Leira, Y et al. Chronic Periodontitis Is Associated with Lacunar Infarct: Case-Control Study. *Euro J Neurol*. 2016, October; 23(10): 1572-1579.

COMPRESSION GARMENTS AFTER ENDURANCE EXERCISE

As pilot data have suggested that wearing compression garments during exercise may accelerate recovery, this study was designed to determine the effects on performance recovery of wearing a lower body

compression garment for 24 hours following running exercise.

This study included 18 active men with an average age of 22 years. The subjects were randomized to a downhill running group (DHR) or a level surface running group (LR). Each began running at a speed equivalent to 70% of their VO_2 max. Following two stages of submaximal running, the running speed was increased each minute until exhaustion. Respiratory gases were collected and analyzed, with heart rate monitored continuously. For both groups, all subjects completed two different trials, either wearing (CG) or not wearing (CON) a lower body compression garment for 24 hours after exercise. Changes in jump performance, circumference of the thigh and calf, subjective muscle soreness and fatigue and blood work variables were measured before and immediately after exercise, and at one, three and 24 hours after exercise. In addition, running economy was assessed 24 hours after exercise.

At 24 hours after DHR, the counter movement jump height and Rebound Jump Index were significantly higher in the CG trial than in the CON trial ($p = 0.008$ and $p < 0.05$ respectively), but not following the LR trial. Wearing the CG did not affect the time course of changes in blood variables in either group.

Conclusion: This study found that wearing lower extremity compression garments after intense exercise facilitated recovery of jump performance under situations with severe exercise-induced damage.

Mizuna, S., et al. Wearing Compression Garment after Endurance Exercise Promotes Recovery of Exercise Performance. *Int J Sports Med*. 2016, October; 37(11): 870-877.

CPAP FOR PREVENTION OF CARDIOVASCULAR EVENTS

Observational studies have shown that the use of continuous positive airway pressure (CPAP) is associated with lower rates of cardiovascular complications. This study explored the effectiveness of CPAP in reducing the rate of cardiovascular events among patients with obstructive sleep apnea (OSA).

Eligible subjects were between 45 and 75 years of age, all diagnosed with coronary artery disease or cerebrovascular disease, as well as with moderate to severe OSA. The participants were randomized to receive either CPAP plus usual care or usual care alone.

At the time of randomization, and at each follow-up visit, the subjects underwent a physical exam and completed questionnaires assessing symptoms of sleep apnea, with adherence to the CPAP device recorded. The primary endpoint was a composite of death from any cardiovascular cause, myocardial infarction, stroke, hospitalization for heart failure, acute coronary syndrome or transient ischemic attack.

Analysis was completed for 2,717 patients. At a mean of 3.7 years' follow-up, a primary endpoint event was realized in 17% in the CPAP group and 15.4% in the usual care group ($p = 0.34$). Reductions from baseline in sleepiness and other symptoms of OSA were greater in the CPAP group than in the usual care group ($p < 0.0001$).

Conclusion: This study of adults with moderate to severe obstructive sleep apnea and established cardiovascular disease found that treatment with CPAP did not reduce the occurrence of recurrent serious cardiovascular events.

McEvoy, R., et al. CPAP for Prevention of Cardiovascular Events in Obstructive Sleep Apnea. *N Engl J*

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Med. 2016, September 8; 375(10): 919-931.

STATIN MEDICATIONS AND INFECTION AFTER STROKE

Previous studies have demonstrated that central nervous system injury-induced immunosuppression is a contributor to infections in the days after cerebral ischemia. As several studies have indicated a potential protective effect of statins in reducing the risk of infection, this study was designed to clarify this relationship.

Patient records were reviewed for adult patients seen for ischemic stroke between January 2009 and March 2013. Records were reviewed for the onset of infection, and the onset of statin use. The data were reviewed for patients whose statin use preceded evidence of infection, no statin use, or statin medication use with no infection reported. Data were also reviewed for the effect of known predictors of infection

Infection developed in 20% of those with statin exposure and in 41% of those who were not exposed. In the logistic regression analysis, the adjusted odds ratio for the development of infection, controlling for age, sex, in-hospital death, nasogastric intubation, endotracheal intubation, catheterization and dysphagia, found that the use of statins reduced the odds for developing nosocomial infection by 58% as compared to no exposure.

Conclusion: This study of patients with ischemic stroke found that use of statin medicines is associated with a reduced risk of nosocomial infection.

Weeks, D et al. Statin Medication Use and Nosocomial Infection Risk in the Acute Phase of Stroke. **J Stroke Cerebrovasc.** 2016, October; 25(10): 2360 – 2367.

ENDOVASCULAR THROMBECTOMY FOR M2 OCCLUSIONS

Previous studies have demonstrated the benefit of endovascular revascularization (EVT) over medical therapy alone among patients with acute ischemic stroke due to large vessel occlusion (LVO). Previous studies have focused on

proximal occlusions involving the distal internal carotid artery and proximal (first segment [M1]) middle cerebral artery (MCA)). This study was designed to compare EVT with the best medical management in patients with acute ischemic stroke and LVO in the anterior circulation isolated to the M2 segments.

This retrospective study included 522 patients with acute ischemic stroke and LVO isolated to M2 segments, all of whom presented within eight hours from the last known normal clinical status (LKN). Of these, 288 were placed in the endovascular group and 234 in the medical therapy group. Those in the EVT group had three times the odds of good functional outcome as compared to those receiving medical management (p<0.001). The rates of a good outcome at 90 days were 62.8% in the EVT group and 49% in the medical treatment group. While the rate of symptomatic intracranial hemorrhage was higher in the EVT group, the difference did not reach statistical significance.

Conclusion: This study of patients with acute ischemic stroke resulting from occlusions of the M2 segment of the middle cerebral artery found that endovascular thrombectomy was associated with lower rates of disability at three months than among those treated with medical therapy alone.

Sarraj, A., et al. Endovascular Therapy for Acute Ischemic Stroke with Occlusion of the Middle Cerebral Artery M2 Segment. **JAMA Neurol.** doi:10.1001/jamaneurol.2016.2773.

TIME TO TREATMENT WITH ENDOVASCULAR THROMBECTOMY

Previous studies have demonstrated the benefit of endovascular revascularization over medical therapy alone among patients with acute ischemic stroke due to large vessel occlusions. As the recommended cut off time for treatment differs among different national guidelines, this meta-analysis was designed to better understand the association of treatment delivery to functional outcomes, mortality, and symptomatic intracranial hemorrhage among patients with ischemic stroke.

This meta-analysis included randomized phase 3 trials involving stent retrievers or other second-generation devices for the treatment of acute ischemic stroke. The data were reviewed to compare the outcomes of those receiving endovascular therapy plus medical therapy and those assigned to receive medical therapy alone. Additionally, the associations were assessed between time to treatment and substantial endovascular reperfusion, as well as functional outcome. The main efficacy measure was the degree of disability at three months, assessed using the modified Rankin scale.

In five trials enrolling 1287 patients, 634 were assigned to the endovascular group and 653 to the medical therapy group. A lower degree of disability was noted at three months in the endovascular group as compared to the medical therapy group. Among the endovascular group patients in whom substantial reperfusion was achieved, a delay in symptom onset-to-reperfusion times was associated with increased levels of 3-month disability, with the probability of functional independence at 3 months declining from 64.1% with times of 180 minutes to 46.1% with times of 480 minutes.

Conclusion: This meta-analysis of randomized clinical trials of patients with large-vessel ischemic stroke, found that earlier treatment with endovascular thrombectomy plus medical therapy compared with medical therapy alone was associated with lower degrees of disability at 3 months.

Saver, J et al. Time to Treatment with Endovascular Thrombectomy and Outcomes from Ischemic Stroke: A Meta-Analysis. *J Amer Med Assoc.* 2016, Sept 27; 316(12):1279-1288.

STRENGTH TRAINING AND MORTALITY

While increased activity has been found to be associated with improved quality of life and a decreased risk of mortality, the data concerning the effects of strength training on mortality are not as clear. This study was designed to better understand the association between strength training and the risk of mortality in older adults.

This cohort study included data from the 1997-2001 National Health Interview Survey and death certificate data from the National Center for Health Statistics National Death Index. The survey employed a multistage stratified sampling to collect health, disease and disability data concerning the United States population. Limiting data to those 65 years of age and older, strength training practices among participants were compared with all-cause mortality. Covariates for the analysis included demographics, past medical history and other health behaviors.

Of the 30,162 adults aged 65 years of age and older, 9.6% reported being engaged in strength training at least twice per week, consistent with guidelines from the American College of Sports Medicine and the American Heart Association. Of the cohort, 31.6% died during the 15-year follow-up. Those who reported performing strength training at least twice a week had a 45% lower all-cause mortality, a 19% lower odds of death from cancer, and a 41% lower odds of cardiac death. After adjusting for demographic covariates those who reported guideline-concordant strength training had a 37% lower all-cause mortality than those who did not ($p < 0.001$).

Conclusion: This study of older patients engaged in biweekly strength training found a significant association between this training and a decrease in overall mortality.

Kraschnewski, J et al. Is Strength Training Associated with Mortality Benefits? A 15 Year Cohort Study of US Older Adults. *Prev Med.* 2016, June; 87:121-127.

CABBAGE LEAF WRAPS FOR OSTEOARTHRITIS OF THE KNEE

Osteoarthritis (OA) of the knee is a common, chronic disease affecting the elderly. A cabbage leaf wrap (CLW), using white or savoy cabbage applied to the painful joint, is a conservative treatment that has been used for centuries. This study investigated the effects of CLWs for the treatment of OA of the knee.

This randomized, controlled, three-armed parallel group trial included patients with OA of the knees with radiographic evidence of Kellgren-Lawrence stage II to III. The subjects were assigned one of three groups,

including four weeks of daily CLWs at two hours per day, 10 mg topical diclofenac once daily or usual care (UC). The primary outcome measure was pain intensity, assessed with a visual analogue scale (VAS) after four weeks. Secondary outcomes included the Western Ontario and McMaster Universities Arthritis index (WOMAC), quality of life, self-efficacy, physical function, pressure pain sensitivity, satisfaction and safety after four and 12 weeks.

The subjects included 42 women and 39 men with an average age of 65.9 years. After four weeks, pain scores were significantly more improved in the CLW group than in the UC group, with a difference of 12.1 points ($p = 0.033$). No significant difference was found between the CLW group and the topical diclofenac group.

Conclusion: This study of patients with osteoarthritis of the knee found that cabbage leaf wraps can significantly reduce pain and improve function and quality of life as compared to usual care, with results similar to those of topical diclofenac.

Lauche, R., et al. Efficacy of Cabbage Leaf Wraps in the Treatment of Symptomatic Osteoarthritis of the Knee. Randomized, Controlled Trial. *Clin J Pain.* 2016, November; 32 (11): 961-971.

BOTOX FOR MEDICATION OVERUSE HEADACHES

Patients with chronic migraine headaches (CMHs) have greater healthcare resource utilization than do those with episodic migraines. It is estimated that approximately 50 to 80% of patients with CMH, referred to a headache clinic, show analgesic overuse that may lead to the development of medication overuse headaches (MOHs). This study of patients with CMH and MOH explored the efficacy of treatment with OnabotulinumtoxinA at two different dosing regimens.

Subjects were 143 patients with CMH with MOH, referred to a headache clinic between January of 2012 and January of 2013. The participants were treated with OnabotulinumtoxinA 195 U repeated every three months during the two-year study. Headache days, migraine days, acute pain medication intake, as well as the Headache Impact Test

(HIT-6) scores were used as efficacy measures. The outcomes of this study were compared with those of a sample of patients treated with OnabotulinumtoxinA 155 U, and followed for two years.

In the OnabotulinumtoxinA 195 U group, headache days per month, as well as the migraine days per month, decreased from the first to the eighth session of therapy ($p < 0.001$ for both comparisons). In addition, medication intake days decreased significantly, as did the mean HIT-6 scores ($p < 0.001$). Compared to the group treated with 155 U, the mean headache days and migraine headache days were significantly fewer in the 195 U dosed group ($p < 0.001$).

Conclusion: This study of patients with chronic migraines and medication overuse headaches suggests that injections of 195 units of OnabotulinumtoxinA may be superior to injections of the standard 155 units.

Negro, A., et al. A Two-Years, Open Label, Prospective Study of OnabotulinumtoxinA 195 U in Medication Overuse Headache: A Real-World Experience. *J Headache Pain*. 2016; 17:1 DOI 10.1186/s10194-016-0591-3.

BLOOD PRESSURE LOWERING AFTER ACUTE CEREBRAL HEMORRHAGE

In the Second Intensive Blood Pressure Reduction in Acute Cerebral Hemorrhage Trial (INTERACT 2), patients with spontaneous intracerebral hemorrhage (ICH) who had systolic blood pressure (SBP) of 150-200 mmHg were targeted to a SBP less than 140 mmHg within one hour. These patients had a non-significantly lower rate of death than those with a targeted SBP of less than 180 mmHg. This trial, the Antihypertensive Treatment of Acute Cerebral Hemorrhage 2 (ATACH-2), was designed to determine the efficacy of rapidly lowering SBP in an earlier time window.

Patients with intracerebral hemorrhage and a Glasgow Coma Scale score of five or above were recruited within 4.5 hours of symptom onset. The subjects were randomized either to a group with a targeted SBP of 110-139 mmHg or to a group with a targeted SBP of 140-179 mmHg.

The primary outcome measure was death or disability (based upon a modified Rankin scale score) at three months after randomization.

The primary outcome of death or disability was observed in 38.7% of those in the intensive treatment group and 37.7% of those in the standard treatment group ($p = 0.84$). The rate of serious adverse events within 72 hours did not differ between the two groups. The rate of renal adverse events with seven days was significantly higher in the intensive treatment group ($p = 0.002$).

Conclusion: This study of patients with intracerebral hemorrhage found that targeting systolic blood pressure at 110-139 mmHg during the acute phase of recovery did not result in improved outcomes as compared to a systolic blood pressure targeted at 140-179 mmHg.

Qureshi, A., et al. Intensive Blood Pressure Lowering in Patients with Acute Cerebral Hemorrhage. *N Eng J Med*. 2016, September 15; 375(11): 1033-1043.

ORTHOSTATIC HYPOTENSION AND DEMENTIA

While cardiovascular health has been well-established as a key determinant in the prevention of dementia, mechanisms by which vascular damage leads to cognitive decline remain unclear. As two important mechanisms for the maintenance of cerebral blood perfusion are local vasoreactivity and autonomic nervous system function, this study was designed to determine the association between orthostatic hypotension (OH) and the risk of dementia.

This study, embedded within The Rotterdam Study, began with an initial sample of 7,983 participants. The participants underwent baseline assessment, including measurements of OH, between October of 1989 and July of 1993. Orthostatic hypotension was defined as a greater than 20 mmHg decrease in systolic blood pressure or a greater than 10 mmHg decrease in diastolic blood pressure after a postural change. The subjects were screened for dementia at baseline and at follow-up examinations.

Of the 6,204 patients, 18.6% were diagnosed with OH. Only 13.9%

reported feeling unwell during the blood pressure drop. During a median follow-up of 15.3 years, 1,176 developed dementia. Orthostatic hypotension at baseline was associated with an increased risk of dementia at follow-up, with an adjusted hazard ratio of 1.15 ($p = 0.05$). The risk was highest among those who lacked a compensatory increase in heart rate during the episode of OH.

Conclusion: This large, population-based study found that orthostatic hypertension was present in nearly one in five participants, and was associated with a 15% increase in the long-term risk of dementia.

Wolters, F., et al. Orthostatic Hypotension and the Long-Term Risk of Dementia: A Population-Based Study. *PLOS Med*. 2016, October 11; 13(10): e1002143. doi:10.1371/journal.pmed.1002143.

NEUROPATHIC PAIN AND OBESITY

Some have considered obesity to be a risk factor for musculoskeletal system disorders, although this relationship remains controversial. This study was designed to better clarify the relationship between obesity and neuropathic pain.

Subjects were adults diagnosed with neuropathic pain, with a neuroanatomically plausible distribution. Subjects were asked to quantify the average intensity of their pain in the prior week on an 11-point numerical rating scale (NRS). Neuropathic pain symptoms were assessed with the Neuropathic Pain Symptom Inventory (NPSI). The subjects were assessed for body mass index (BMI), with a cutoff of 25 kg/m² for overweight.

Forty-four patients participated in the study. The total NPSI score was significantly higher in the overweight group than in the normal weight group ($p < 0.01$), as were the paroxysmal scores ($p = 0.049$), pain intensity ratings ($p = 0.04$) and the McGill Pain Questionnaire scores ($p = 0.049$).

Conclusion: This study of patients with neuropathic pain found that those whose body mass index was above 25 kg/m² had higher pain scores than did those with a normal body mass index.

Hozumi, J. et al. Relationship between Neuropathic Pain and Obesity. **Pain Research Management.** 2016. doi.org/10.1155/2016/2487924.

DULOXETINE IN PAINFUL DIABETIC NEUROPATHY

With a worsening of the global epidemic of diabetes, it is expected that painful diabetic neuropathy (PDN) will also increase. Three categories of drugs are commonly used to treat PDN. These include antiepileptics, tricyclic antidepressants and non-specific analgesics. The guidelines recommend pregabalin as a front-line treatment. This meta-analysis reviewed the effectiveness of duloxetine for the management of diabetic peripheral neuropathic pain.

A literature search was completed for articles assessing the effects of duloxetine for patients with PDN, published between 2005 and 2015. Of the studies identified, nine met the inclusion criteria. A review of the studies found that the dosing use and pain assessment methods differed, precluding statistical pooling of the data. Therefore, a best evidence synthesis was created, based upon eight, high-quality studies.

The data from the high-quality studies, including 4,084 participants, suggested that duloxetine is beneficial for reducing pain, as compared with placebo. The data further suggested that duloxetine may be advantageous over pregabalin, with poor evidence of superiority over amitriptyline.

Conclusion: This study of patients with painful diabetic neuropathy found that duloxetine has beneficial effects over placebo and pregabalin, although the effects compared to amitriptyline need further review.

Hossain, S., et al. Duloxetine in Painful Diabetic Neuropathy. A Systematic Review. **Clin J Pain.** 2016, November; 32(11): 1005-1010.

PERCUTANEOUS RADIOFREQUENCY TREATMENT FOR SACROILIAC JOINT PAIN

For patients with sacroiliac (SI) joint pain, among the treatments described in literature is

radiofrequency denervation. This study explored the utility of a device targeting the lateral branches S1 to S4 for the treatment of SI joint pain.

This randomized, sham control, double-blind, multicenter, clinical trial included patients with SI joint pain of at least three months' duration. All patients underwent a test SI joint injection with lidocaine, two percent. Those with a reduction in pain of two or more on a numeric rating scale were randomized into the study. Those in the treatment group underwent percutaneous radiofrequency lesions at the lateral branches of S1 to S4 nerve roots and the posterior rami dorsalis of L-5. Those in the sham group underwent the same procedure without radiofrequency lesions. The groups were compared for changes in scores on the Numeric Rating Scale of pain.

At three months, no significant difference in pain level was found between the treatment and sham treatment groups. Further, no significant difference was found between the groups in the level of satisfaction over time.

Conclusion: This study of patients with sacroiliac joint pain did not find that percutaneous radiofrequency heat lesions are more effective than placebo for improving symptoms.

Van Tilburg, C., et al. Randomized, Sham-Controlled, Double-Blind, Multicenter, Clinical Trial to Ascertain the Effect of Percutaneous Radiofrequency Treatment for Sacroiliac Joint Pain. Three-Month Results. **Clin J Pain.** 2016, November; 32(11): 921-926.

IMAGE BASED SCORES FOR PREDICTING STROKE AFTER TRANSIENT ISCHEMIC ATTACK

Transient ischemic attack (TIA) is associated with a significant increase in the risk of early subsequent stroke. As this risk is not uniform, the ABCD2 prediction score was derived to improve risk stratification among these patients. Recently, the ABCD2 score was extended to include imaging findings, including brain MRI (ABCD2-I) and ABCD3-I which included both brain MRI and carotid imaging as well as TIA data. This study was designed to better understand the utility of these

imaging-based stroke risk scores after a TIA.

A literature search was completed for studies including adult patients who had sustained a TIA. Medical information gathered included brain MRI, occurrences of atrial fibrillation, carotid stenosis and/or recurrent strokes within two, seven, 28 and 90 days after the index TIA. A multivariable logistic regression was performed to assess the predictive utility of abnormal diffusion-weighted MRI, carotid stenosis, and a previous TIA within one week of the index TIA (dual TIA) after adjusting for the ABCD2 score.

The analysis was completed for a pooled subject group of 2,176 from 16 cohort studies. Among these patients, stroke occurred in one percent at two days and two percent at seven days. The ABCD3-I score was better than the ABCD2 and the ABCD2-I scores for the discrimination of the risk of two-day stroke ($p=0.006$ and $p<0.001$ respectively), with similar results for risk of stroke at seven and 90 days. Based upon findings of a multivariable logistic regression analysis, after adjusting for the ABCD2 score, a positive diffusion weighted MRI was maintained as an independent predictor of increased seven-day stroke risk.

Conclusion: This pooled analysis of cohort studies found that, after a TIA, the ABCD3-I score reliably identified patients at highest risk of a stroke after transient ischemic attack, with improved prediction compared with ABCD2-I.

Kelly, P., et al. Validation and Comparison of Imaging-Based Scores for Prediction of Early Stroke Risk after Transient Ischemic Attack: A Pooled Analysis of Individual Patient Data from Cohort Studies. **Lancet Neurol.** 2016, November; 15 (12): 1238-1247.

CYCLOOXYGENASE-2 GENE - 765G/C AND -1195G/A AND STROKE

Stroke is one of the most common causes of death and a leading cause of disability worldwide. Atherosclerosis and thrombosis formation are the two mechanisms of ischemic stroke (IS). Evidence has emerged demonstrating that inflammation plays a major role in the

pathogenesis of IS. As cyclooxygenase (COX) is a modifier gene and key enzyme in the conversion of free arachidonic acid into prostaglandins, this meta-analysis was designed to better explain the association between COX-2 polymorphisms and IS.

A literature search was conducted for studies evaluating the association between COX-2 polymorphisms, COX-2 -765G/C, or COX-2 -1195G/A, and IS. The authors chose manuscripts including 4,086 cases of ischemic stroke compared with 4,747 controls.

A significantly increased risk of IS was founded in Brazilians and in the African-American population who had the COX-2 -765G/C polymorphism, with no such association found in the White or Chinese populations. The overall analysis revealed no evidence of a significant association between the -1195G/A polymorphism and IS, although an association was found for COX-2 -1195G/A polymorphism in the subtypes of small vessel disease (SVD) of IS.

Conclusion: This meta-analysis reviewed two common gene polymorphisms of COX-2, finding that the COX-2 -765G/C polymorphism increases susceptibility to ischemic stroke in Brazilians and African-Americans, but not in the White and Chinese populations.

Wu, G., et al. Influence of the Cyclooxygenase-2 Gene -765G/C and -1195G/A Polymorphisms on Development of Ischemic Stroke. *J Stroke Cerebrovasc.* 2016, September; 25(9): 2126-2135.

DIRECT CURRENT STIMULATION AND WORKING MEMORY

Cognitive deficits, including working memory impairment, are core features in a number of neuropsychiatric disorders. A number of studies have reported on the benefits of transcranial direct current stimulation (tDCS) on memory function. This review and meta-analysis was designed to better understand the effect of tDCS on working memory in healthy and neuropsychiatric cohorts.

A literature search was completed, reviewing articles from 1998 through 2014. Subjects were adults who were either healthy or diagnosed with a neuropsychiatric illness. All studies selected included a sham stimulation control.

The analysis used 16 studies, with a total of 350 participants, comprising 170 healthy adults and 182 with neuropsychiatric diagnoses. Among the studies involving healthy cohorts, tDCS produced a significant improvement in working memory accuracy ($p=0.05$) as well as reaction time ($p=0.04$) after stimulation, but not during stimulation. Among studies focusing on individuals with neuropsychiatric conditions, tDCS produced improvements for accuracy during stimulation ($p=0.003$) but not following stimulation.

Conclusion: This meta-analysis of studies reviewing the effects of transcranial direct current stimulation found that this intervention has the capacity to enhance working memory in both healthy and neuropsychiatric populations.

Hill, A., et al. Effects of Anodal Transcranial Direct Current Stimulation on Working Memory: A Systematic Review and Meta-Analysis of Findings from Healthy and Neuropsychiatric Populations. *Brain Stim.* 2016, March-April; 9 (2):197-208.

CANNABIS FOR SPINAL CORD INJURY RELATED PAIN

Despite recent medications being approved for pain relief in patients with spinal cord central pain, there remains a need for improved pain relief for these patients. This study assessed the efficacy of vaporized cannabis for patients with pathology of the spinal cord related to traumatic injury or disease.

Subjects were patients 18 to 70 years of age with a spinal cord injury (SCI) and with pain intensity of at least four on a 10-point visual analogue scale (VAS). After baseline data collection, the participants were scheduled for three, eight-hour sessions, separated by seven days, to receive, in random order, a placebo, 2.9% Delta nine THC or 6.7% Delta nine THC. The subjects inhaled four puffs after baseline data collection, and then four to eight puffs at 240 minutes. The primary outcome measure was pain intensity on an 11-point numerical rating scale (NRS). Secondary measures of pain relief were the Pain Global Impression of Change and the Neuropathic Pain Scale.

At follow-up, both doses of cannabis significantly improved NRS scores as compared with placebo,

although the higher dose resulted in better pain relief at two hours. After the second dose, the pain relief from the two active doses did not differ from one another. Many of the psychoactive side effects were concentration dependent, with greater effects seen with the higher than with the lower dose.

Conclusion: This preliminary, phase 1 study suggests that cannabis may be an effective treatment for neuropathic pain in patients with spinal cord injury.

Wisley, B., et al. An Exploratory Human Laboratory Experiment Evaluating Vaporized Cannabis in the Treatment of Neuropathic Pain from Spinal Cord Injury and Disease. *J Pain.* 2016, September; 17(9): 982-1000.

TRANSVERSE MEDIAN NERVE MOVEMENT IN THE CARPAL TUNNEL

Some have reported that, during carpal tunnel release, the median nerve is adherent to the flexor retinaculum. This study investigated the effects of finger motions on the movement of the median nerve in patients with carpal tunnel syndrome (CTS).

Subjects were 23 healthy controls and 22 patients with CTS. Control subjects were healthy volunteers with no history of numbness, pain or finger weakness. For patients with CTS, the more affected side was studied, while both sides were studied in the controls. The diagnosis of CTS was verified by electrodiagnostic studies, with CTS rated as mild, moderate or severe. All subjects underwent ultrasound examination, during which they were asked to flex and extend the first, and then the second and third fingers, while keeping the others extended. Ultrasound images were captured before and after each motion, with movement of the nerve calculated. Movement was compared between the control and CTS subjects.

The median nerve motions while moving the first and second fingers and grip motion differed significantly between those with and those without CTS in the radioulnar axis. The third finger motions and grip motions differed significantly with respect to median nerve movement between groups in the dorsopalmar axis. The movement of the nerve correlated negatively with CTS severity.

Conclusion: This study found a significant decrease in movement of the median nerve among patients with carpal tunnel syndrome, with this decrease in movement correlated with the severity of carpal tunnel syndrome.

Kang, H., et al. Effect of Finger Motion on Transverse Median Nerve Movement in the Carpal Tunnel. **Muscle Nerve.** 2016, October; 54 (4): 738-742.

INVASIVE OCCIPITAL NERVE STIMULATION FOR CLUSTER HEADACHE

Cluster headache is among the most disabling of the primary headaches. Among the small percentage who are considered to be drug-resistant, occipital nerve stimulation has been proposed to be a good alternative to more invasive and risky hypothalamic deep brain stimulation. This study assessed the long-term clinical utility of invasive occipital nerve stimulation (iONS).

Subjects were 15 patients with drug-resistant, chronic cluster headaches who underwent iONS implantation. Of those, five had their stimulators removed, with the remaining 10 undergoing a mean follow-up of 71 months.

At midterm, 80% of the patients reported improvement in the frequency of cluster headaches, and 60% were pain-free. At long-term follow-up, 40% evolved to an episodic form of cluster headache, while six reported that their attack frequency decreased by 70% as compared to baseline.

Conclusion: This study of patients with refractory, chronic cluster headaches found that, among those who were initially tolerant of the procedure, Invasive Occipital Nerve Stimulation resulted in significant pain relief benefits at nine-year follow-up.

Magis, D., et al. Invasive Occipital Nerve Stimulation for Refractory Chronic Cluster Headache: What Evolution at Long-Term? Strengths and Weaknesses of the Method. **J Headache Pain.** 2016; 17:8. DOI 10.1186/s10194-016-0598-9

GAIT CHANGES AFTER ANKLE ARTHRODESIS

The surgical options for patients with severe tibiotalar arthritis involve

either a total ankle arthroplasty or a tibiotalar arthrodesis. The difference in outcomes between these two procedures, and the resulting gait changes, remain unclear. This study assessed the postoperative gait function of patients undergoing ankle arthrodesis.

This prospective study evaluated patients with isolated end-stage ankle arthritis who were treated with tibiotalar arthrodesis. Analysis was completed two weeks before surgery, and then again after surgery. Gait parameters were collected for both the affected and the unaffected limbs. Parameters followed were cadence, step length, walking velocity, and total support time. Kinematic data included range of motion, maximal plantarflexion and dorsiflexion of the ankle.

After surgery, significant increases were noted in step length ($p<0.003$) and gait velocity ($p<0.001$). The mean total range of motion in the sagittal plane did not change significantly after surgery. An increase in maximum dorsiflexion, as well as a decrease in maximal plantarflexion, were noted in the affected limb. Significant increases in the mean ranges of motion for the affected hip joint and knee joint were also noted. Kinematic data revealed significant improvement in the ankle moment and hip power after surgery.

Conclusion: This study of patients with severe osteoarthritis undergoing ankle arthrodesis found significant improvements in numerous temporal-spatial, kinematic and kinetic measures.

Brodsky, J., et al. Abnormalities of Gait Caused by Ankle Arthritis Are Improved by Ankle Arthrodesis. **Bone Joint J.** 2016; 98-B: 1369-1375.

GLOBAL ALL CAUSE AND CAUSE SPECIFIC MORTALITY

The Annual Global Burden of Disease Study of 2015, funded by the Bill and Melinda Gates Foundation, was designed to employ new analytic tools and data sources to generate comparable estimates of death and mortality rates throughout the world. This latest version increased the number of regions and countries for which this data was calculated.

Between 1980 and 2015, the global life expectancy at birth increased by 10.1 years, rising to 71.8 years in 2015. Slower gains were achieved for those 50 years of

age, with 50-year-old females adding 4.5 years of life expectancy since 1980, and males adding 3.5 years. The leading causes of death in 2015 were ischemic heart disease, cerebral vascular disease, lower respiratory infections, neonatal preterm birth complications, diarrheal diseases, neonatal encephalopathy, AIDS, road injuries, malaria and COPD.

Deaths from causes known as group 1 (communicable, maternal, neonatal and nutritional) accounted for 20.2% of deaths in 2015. Within this category, total HIV/AIDS deaths fell by 33.4% and malaria deaths decreased by 37.4%. In 2015, the leading cause of noncommunicable deaths were cardiovascular disease (17.9 million), cancers (8.8 million) and chronic respiratory diseases (3.8 million).

Conclusion: Over the last 35 years, global life expectancy increased by over 10 years. In 2015 the leading causes of death were ischemic heart disease, cerebrovascular disease, and lower respiratory infections.

GDD 2015 Mortality and Causes of Death Collaborators. Global, Regional and National Life Expectancy, All-Cause Mortality, and Cause Specific Mortality for 249 Causes of Death, 1980-2015: A Systematic Analysis for the Global Burden of Disease Study 2015. **Lancet.** 2016, September; 388: 1459-1554.

NEUROCHEMISTRY OF REPETITIVE MILD TRAUMATIC BRAIN INJURY

The relationship between mild traumatic brain injury (TBI) and the development of postconcussive symptoms is poorly understood. This study tested the hypothesis that postconcussive syndrome is associated with axonal injury and astrogliosis, increased amyloid burden, tau pathology and synaptic loss.

This multicenter, cross-sectional study included 16, male, professional hockey players with prolonged postconcussive symptoms, and 15, neurologically healthy, control individuals. All participants underwent neuropsychological assessment with the Rivermeade Postconcussion Symptoms Questionnaire, with that measure repeated at the end of the study. Cerebral spinal fluid was collected, with specimens analyzed to

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measure neurofilament light (NF-L) concentrations, total tau and glial fibrillary acidic protein.

Cerebral spinal fluid concentrations of NF-L were greater in the postconcussive group than in the control group. The concentrations were significantly higher in the subgroup of patients with PCS of more than one year's duration, as compared with PCS of shorter duration. These concentrations were also significantly related to scores on the Rivermeade Postconcussion Symptoms Questionnaire ($p=0.02$). No significant differences were found between groups in concentrations of total tau and glial fibrillary acidic protein. Players with postconcussive symptoms had lower levels of amyloid β than controls.

Conclusion: This study found that, among patients with post-concussive syndrome, neurofilament light proteins and reduced amyloid beta are present, suggesting axonal white matter injury and amyloid deposition.

Shahim, P., et al. Neurochemical Aftermath of Repetitive Mild Traumatic Brain Injury. **JAMA Neurol.** 0.1001/jamaneurol, 2016: 2038.

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