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CONCUSSION DURING ULTIMATE FRISBEE

It has been estimated that over four million individuals play Ultimate Frisbee (Ultimate) in the United States. Despite these numbers, relatively little data exist concerning the risk of concussion among the participants. This study was designed to determine the lifetime prevalence and mechanisms of injury among patients who play competitive Ultimate.

An anonymous, web-based survey was created and was distributed to an estimated 3,500 adult Ultimate players. The questionnaire asked the players to self-report whether they had sustained a concussion while playing Ultimate. Concussion was defined in the questionnaire as "Disruption in brain function, caused by a bump or blow to the head or body. It may or may not be accompanied by temporary loss of consciousness, and symptom presentation may include changes in realms of physiology, cognition, emotion and/or sleep."

A total of 790 players responded to the questionnaires. The mean periods of Ultimate involvement were 8.9 years for men and 7.2 years for women. Of the respondents, 26.6% of the men and 24.8% of the women reported at least one concussion during play. Of those, 45.6% of the men and 43.1% of the women reported a history of multiple concussions. After a concussion, 46% of the men and 37.6% of the women reported having returned to play in the same game or practice.

Conclusion: This survey of competitive Ultimate Frisbee players found that approximately one fourth of the participants experience at least one concussion while playing, with over one third of these reporting that they returned to play within the same game.

Lasar, D., et al. Concussion Prevalence in Competitive Ultimate Frisbee Players. *Ortho J Sports*

Med. 2018. DOI:
10.1177/2325967118759051.

PROGNOSIS OF PLANTAR FASCIITIS

Plantar fasciitis (PF) is one of the most frequent causes of heel pain. This study was designed to determine the long-term prognosis of PF, and to evaluate whether baseline characteristics might help predict the outcome.

Subjects were 174 patients with PF presenting for clinical evaluation. The patients were given instructions for rehabilitation and were then provided a variety of treatments as recommended by their physicians. At follow-up, the patients were interviewed and underwent a clinical evaluation and ultrasound examination of the plantar fascia of both feet. Symptoms were rated on a 10-point, Numerical Rating Scale (NRS).

Of the 269 patients diagnosed with PF, 174 were eligible and agreed to participate. The mean follow-up was 9.7 years from the onset of symptoms. At follow-up, the subjects reported having tried an average of 3.8 different treatments. At that time, 54% were asymptomatic and 46% symptomatic. Of those who were asymptomatic at follow-up, 31.9% had experience at least one relapse before reporting permanent relief. Ultrasound evaluation revealed no significant difference in plantar fascial thickness between the symptomatic and asymptomatic groups. Of those with resolution, the mean time with symptoms prior to resolution was 725 days.

Conclusion: This study found that, of patients presenting for treatment of plantar fasciitis, 45.6% still had symptoms at ten years.

Hansen, L., et al. Long-Term Prognosis of Plantar Fasciitis: A 5 to 15-Year Follow-Up Study of 174 Patients with Ultrasound Examination. *Ortho J Sports Med.*

2018; 6(3): DOI:
10.1177/2325967118757983

MESNA FOR FAILED BACK SURGERY

Among patients with decompressive spinal surgery, including laminectomy, a fibrotic reaction occurs, which may result in persistent pain and poor results. As epidural and radicular fibrosis is one of the determinants of failed back surgery syndrome (FBSS), addressing this fibrosis has been the focus of interventional trials. MESNA (sodium 2-mercaptoethanesulfonate) has been patented for the dissection of pathologic tissue from the healthy tissue in cases of local adhesions. This study was designed to determine the efficacy of MESNA in reducing fibrosis related complications of back surgery.

The authors identified patients diagnosed with FBSS with the presence of epidural fibrosis who were thought not suitable for revision surgery. The subjects underwent one peridural injection of MESNA per week for three weeks. All were assessed before and after using the Oswestry Disability Index (ODI), the Numeric Rating Scale (NRS) and Odoms criteria.

From September of 2011 to November of 2013, six patients were enrolled, with a mean age of 65 years. Improvements in scores on the NRS of pain from baseline to three months after the final injection ranged from 26.5% to 34%. ODI score improvement averaged 20%, and the average reduction in morphine equivalence use per day was 20.5.

Conclusion: This pilot study of patients with chronic, disabling pain found that the use of MESNA to lyse the branches of fibrosis resulted in improvements in pain and disability scores.

Carassiti, M., et al. Failed Back Surgery Syndrome: A New Strategy by the Epidural Injection of MESNA.

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OBESITY TRENDS IN THE UNITED STATES

The prevalence of overweight and obesity has increased since the 1980s, with the prevalence plateauing among youth between 2005 and 2014. This study analyzed the obesity prevalence among youth and adults in the United States between 2007 and 2016.

Data were obtained from the National Health and Nutrition Examination Survey (NHANES) a cross-sectional survey of civilian, noninstitutionalized individuals in the United States. For the survey, obesity was defined as a body mass index of 30 m/kg² and severe obesity as 40 m/kg² or more. Data were compared between the surveys obtained in 2007-2008 and those obtained in 2015-2016.

Data from 16,875 youth and 27,449 adults were analyzed. The prevalence of obesity in youth was 16.8% in 2007-2008, and 18.5% in 2015-2016. The age standardized prevalence of obesity among adults was 33.7% in 2007-2008 and 39.6% in 2015-2016. This increase was significant among women and in adults 40 years of age or older. Severe obesity in adults increased from 5.7% in 2007-2008 to 7.7% in 2015-2016 (p=0.001).

Conclusion: This study, using data from the NHANES, found that, over the most recent decade, increases in obesity and severe obesity have continued among both youth and adults.

Hales, C., et al. Trends in Obesity and Severe Obesity Prevalence in U.S. Youth and Adults by Sex and Age, 2007-2008 to 2015-2016. **JAMA**. Published online March 23, 2018. doi:10.1001/jama.2018.3060.

BMI ASSOCIATED WITH EARLY SURVIVAL

While obesity is associated with worse health-related outcomes overall, data suggest that it is also associated with a survival advantage after some acute illnesses. This study reviewed the short- and long-term effects of obesity on recovery after acute illness.

This study included participants in the U.S. Health and Retirement Study, a probability sample linked to Medicare claims. The database was

reviewed for an association between an excess body mass index (BMI) and mortality following acute illness. The date of death was determined from the National Death Index. The reference group was those with normal BMI (18.5 to < 25 kg/m²), with comparisons made to the overweight (≥25.0 to < 30.0 kg/m²), obese (≥30.0 to < 35.0 kg/m²), and severely obese (≥35.0 kg/m²). The authors reviewed charts of patients who were hospitalized for congestive heart failure (CHF), pneumonia or acute myocardial infarction (AMI).

Data were obtained for the hospitalizations of 4,287 with CHF, 4,182 with pneumonia and 2,001 with AMI. The median age of the group was 77-79 years. Multivariable regression revealed that, compared to normal BMIs, overweight or obese BMIs were independently associated with lower 90-day, one-year and five-year mortality rates (p<0.05 for each). Among those who survived to one year, the mortality was similar between weight categories.

Conclusion: This national sample of older adults found that those who were overweight or obese when hospitalized for congestive heart failure, pneumonia or myocardial infarction had a reduced mortality of up to five years as compared with normal weight individuals.

Prescott, H., et al. Overweight or Obese BMI is Associated with Earlier but Not Later Survival after Acute Illnesses. **BMC Geriatr.** 2018; 18: 42.

VAGUS NERVE MAGNETIC MODULATION FOR POST-STROKE DYSPHAGIA

Stroke involving the brainstem causes a wide spectrum of neurologic deficits, including oral pharyngeal dysphagia (OD). As studies of vagus nerve stimulation in animals with stroke have shown improvement in motor function, this study investigated the effect of repetitive transcranial magnetic stimulation (rTMS) in restoring swallowing function after stroke in humans.

This sham control, double-blinded, parallel study included 30 patients with ischemic or hemorrhagic stroke, all with chronic bulbar manifestations. In an intervention group, the TMS coil was placed at the left mastoid to stimulate the vagus nerve, with 10 daily sessions over two weeks. A sham group underwent the same protocol without stimulation. Concurrently, a speech and language

pathologist, held blind to the study group, conducted two training sessions per week for all subjects. The participants were assessed for swallowing before and after treatment using neurophysiological, radiological and functional criteria. The primary functional outcome measure was the Australian Therapy Outcome Measures-Swallowing Scale (AusTOMS).

At the end of two weeks, the intervention group demonstrated greater improvement in all swallowing outcomes as compared with the control group. These variables included higher cricopharyngeal motor evoked potential (CP-MEPS) amplitude ($p=0.004$), shorter CP-MEP latency ($p=0.004$), a better Penetration-Aspiration Scale score ($p<0.001$) and a higher AusTOMS score ($p<0.001$).

Conclusion: This study found that stimulation of the vagus nerve by repetitive transcranial magnetic stimulation can improve swallow function after a stroke.

Lin, W., et al. Vagus Nerve Magnetic Modulation Facilitates Dysphagia Recovery in Patients with Stroke Involving the Brainstem-A Proof of Concept Study. **Brain Stim.** 2018, March-April; 11(2): 264-270.

TRANSCRANIAL DIRECT CURRENT STIMULATION FOR POST STROKE DYSPHAGIA

Oral pharyngeal dysphagia (OD) has been reported in 20% to 81% of patients after stroke. As transcranial direct current stimulation (tDCS) has been found to enhance brain plasticity, this study examined the effects of this intervention on patients with OD after stroke.

Subjects were patients hospitalized for acute ischemic stroke who demonstrated dysphagia at admission screening. Of those screened for participation, 60 were identified and randomized to receive either 20 minutes of active tDCS or a sham tDCS over the center of the motor cortical swallowing network on four consecutive days. The subjects were evaluated before and after this intervention with the Fiberoptic Endoscopic Dysphagia Severity Scale (FEDSS) and by clinical assessment.

Scores on the FEDSS significantly improved from baseline to post-intervention in both groups. More patients in the active group improved by one or more points on the FEDSS than in the sham group (83.3% vs

36.7%; $p<0.0005$). In addition, the active treatment group showed greater improvement in all secondary swallow outcomes, including the Dysphagia Severity Rating Scale ($p=0.001$) and the FEDSS ($p=0.04$). Pneumonia was identified in 53.3% of the sham group and 37.9% of the active treatment group, although this difference failed to reach statistical significance.

Conclusion: This study of patients with stroke related dysphagia found that transcranial direct current stimulation can accelerate the recovery of swallowing.

Suntrup-Krueger, S., et al. Randomized Trial of Transcranial Direct Current Stimulation for Post-Stroke Dysphagia. **Ann Neurol.** 2018, February; 83(2): 328-340.

FLUOROQUINOLONES, AORTIC ANEURYSM, AND DISSECTION

Recently, fluoroquinolones have been found to be associated with tendinopathy and tendon rupture. The mechanism of this phenomenon is thought to involve degradation of collagen and other structural components. As the integrity of the aorta depends upon an intact extracellular matrix, this study was designed to better understand the association between aortic morbidity and fluoroquinolones use.

Data were obtained from the Swedish National Prescribed Drug Register, the National Patient Register of Outpatient and Emergency visits, Statistics Sweden which captures demographic characteristics, and the Swedish Cause of Death Register. From these databases, the use of antibiotics, including fluoroquinolones and amoxicillin, was captured and compared to the first diagnosis of aortic aneurysm or dissection.

Eligible cases were 560,768 episodes of fluoroquinolone use and 440,504 episodes of amoxicillin use. The incidence of aortic aneurysm or dissection among those using fluoroquinolones was 1.2 per 1,000-person years, compared to 0.7 per person years among those using amoxicillin (HR 1.66). Of the 64 cases of aortic aneurysm, among those treated with fluoroquinolones, 41% occurred in the first 10 days after initiating treatment.

Conclusion: This nationwide Swedish study found that the use of fluoroquinolones was associated with a 66% increase in the rate of aortic

aneurysm or dissection, as compared to the use of amoxicillin.

Pasternak, B., et al. Fluoroquinolone Use and Risk of Aortic Aneurysm and Dissection: Nationwide Cohort Study. **BMJ.** 2018; 360: K678.

MIGRAINE AND RISK OF CARDIOVASCULAR DISEASE

As migraine has been associated with ischemic stroke and ischemic heart disease, this study was designed to better understand the cardiovascular morbidity associated with migraine.

This Danish cohort study used prospective data collected by the National Health Insurance Program, involving the entire Danish population. The Danish National Patient Registry was reviewed for patients with a first-time primary or secondary migraine between 1995 and 2013. These patients were matched with 10 migraine-free individuals in the general population. Outcomes included myocardial infarction, ischemic and hemorrhagic stroke, peripheral artery disease, venous thromboembolism, atrial fibrillation or flutter and heart failure.

The migraine cohort included 51,032 with a median age at diagnosis of 35 years. After adjusting for covariables, migraine was associated with myocardial infarction (HR=1.49), ischemic stroke (HR=2.26), hemorrhagic stroke (HR=1.94), venous thromboembolism (HR=1.59) and atrial fibrillation/flutter (HR=1.25). A subgroup analysis revealed that those with aura had a higher risk than those without aura for all outcomes except venous thromboembolism and heart failure.

Conclusion: This study found that migraine is associated with an increased risk of cardiovascular disease, stronger among patients with aura than among those without, and stronger in women as compared with men.

Adelborg, K., et al. Migraine and Risk of Cardiovascular Diseases: Danish Population-Based, Matched Cohort Study. **BMJ.** 2018; 360: K96.

LONG-TERM OUTCOMES OF MICROFRACTURE OF THE SHOULDER

The incidence of glenohumeral chondral defects reported incidentally at arthroscopy has been within the range of five to 17%. As

microfracture has been used in knee surgery, this study was designed to determine the effect of this procedure on patients with articular cartilage defects at the glenohumeral joint.

This retrospective review included consecutive patients with chondral defects of the humeral head and/or glenoid who received microfracture surgery after failed conservative treatment. Participants were contacted by phone for postoperative assessments, including a visual analogue scale (VAS) for pain, the Single Assessment Numeric Evaluation (SANE), subsequent surgery, willingness to undergo the surgery again, the Simple Shoulder Test (SST), the American Shoulder and Elbow Surgeons (ASES) form and the Short Form-12 (SF-12). The average follow-up time was 10.2 years.

Of the 13 patients available for follow-up, three had progressed to failure, with 10 available for follow-up questionnaires. The adjusted VAS scores were significantly improved at long-term follow-up as compared with baseline ($p=0.004$), as were scores on the ASES ($p=0.009$) and SST ($p=0.009$). Survivorship was 93.8% at one year, 87.5% at three years and 76.6% at nine years.

Conclusion: This study of patients with shoulder joint chondral defects, treated with microfracture, found a reoperation rate of 28.6% and a long-term clinical failure rate of 24.2%.

Wang, K., et al. Long-Term Clinical Outcomes after Microfracture of the Glenohumeral Joint. Average 10-Year Follow-Up. *Am J Sports Med.* 2018, March; 46 (4): 786-794.

OUTCOME AFTER MICROFRACTURE VERSUS MOSAICPLASTY

Focal chondral lesions at the knee have been shown to impaired quality of life and clinical function. As these lesions have little potential for spontaneous healing, surgical treatment options have often included microfracture and autotransplantation of osteochondral cylinders (mosaicplasty). This study compared the clinical outcomes of these two procedures.

Subjects were 40 patients, 18 to 50 years of age, presenting for repair of chondral lesions at the knee. The participants were randomized to receive either microfracture or mosaicplasty. For both procedures, continuous passive motion was

started within hours after surgery, and continued for the duration of the hospitalization. The patients used crutches with toe-touch weight bearing for six weeks, progressing thereafter to full weight bearing. At baseline, and yearly up to 15 years postoperatively, the subjects completed a standardized form with questions concerning symptoms and function.

At 15 years, the mean Lysholm score improved 21 points from baseline in the mosaicplasty group and was significantly better than the microfracture group at one, five, 10 and 15 years. The mosaicplasty group contained a significantly higher number of patients who reported good/excellent outcomes ($p=0.01$), and a lower percent who reported a poor outcome ($p=0.08$), as compared with the microfracture group.

Conclusion: This study of patients with chondral defects of the knee found that mosaicplasty results in better short- and long-term outcomes, as compared to microfracture.

Solhheim, E, et al. Randomized Study of Long-Term (15 to 17 Years) Outcome after Microfracture versus Mosaicplasty in Knee Articular Cartilage Defect. *Am J Sports Med.* 2018, March; 46 (4): 826-831.

TEN-YEAR OUTCOMES AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

A number of reports have documented the short-and intermediate-term success after anterior cruciate ligament (ACL) reconstruction. Less discussion has focused on patient specific risk factors and patient reported outcome measures after ACL repair. This study explored individual characteristics which convey an increased risk for poor outcome after these surgeries.

This multisite study included all patients who underwent unilateral, primary or revision ACL reconstruction between 2002 and 2004. All subjects completed a 13-page questionnaire encompassing demographics, injury descriptors, sports participation, comorbidities, medical history including surgeries and patient reported outcomes, using the International Knee Documentation Committee (IKDC), the Knee injury and Osteoarthritis Outcome Score (KOOS) and an activity scale. At two, six and 10 years, patients were mailed the same questionnaire.

Of the 1,592 patients initially enrolled, 83% were available for 10-year follow-up. Both the IKDC and KOOS scores significantly improved for the entire cohort, as measured at two years. This improvement was maintained at six and 10 years. Risk factors for inferior outcome at 10 years were lower baseline scores, higher body mass index, being a smoker at baseline, having medial meniscal repairs during the index surgery and a history of meniscal procedures before the index surgery. While the IKDC and KOOS scores at 10 years were similar to those at two and six years, the activity scores steadily declined over time.

Conclusion: This study of 1,592 patients undergoing ACL reconstruction found that the patients were able to perform sports-related functions and maintain high knee-related quality of life for up to 10 years after surgery, although activity levels declined over time.

The MOON knee group. Ten-Year Outcomes and Risk Factors after Anterior Cruciate Ligament Reconstruction: A MOON Longitudinal, Prospective, Cohort Study. *Am J Sport Med.* 2018, April; 46 (4): 815-825.

HIP FOCUSED THERAPY FOR ACL INJURY PREVENTION

Studies have shown a steady increase in anterior cruciate ligament (ACL) injuries among physically active youth. Few studies have demonstrated an effective training strategy to reduce the incidence of these injuries among athletic populations. This study reviewed the effect of a hip-focused injury prevention training protocol on the risk of knee injuries in basketball players.

This prospective study assessed the incidence of ACL injury by following 309 female collegiate basketball players. After an observation period of four years, intervention was initiated for a period of eight years. The intervention included education three times per week and a hip-focused training protocol. The training program was designed to enhance hip joint function through jump-landing maneuvers, hip strength training and balance exercises. The sessions were 20 minutes in duration, performed three times per week.

During the observation period, ACL injuries occurred at a rate of 0.25 per 1,000 athletic exposures

(AEs). During the intervention period, those injuries were reduced to a rate of 0.10 per 1,000 athletic exposures. Thirteen, noncontact ACL injuries (0.21/1000 AEs) were recorded during the observation period, while eight noncontact ACL injuries (0.08/1000 AEs) were documented during the intervention period.

Conclusion: This study found that a hip-focused injury prevention program resulted in a 62% reduction in the incidence of ACL injuries among female, collegiate basketball players.

Omi, Y., et al. Effect of Hip-Focused Injury Prevention Training for Anterior Cruciate Ligament Injury Reduction in Female Basketball Players. A 12-Year, Prospective Intervention Study. *Am J Sports Med.* 2018, March; 46 (4): 852-861.

POSTSURGICAL OPIOID PRESCRIPTION REFILLS AND MISUSE

Opioid overdose now ranks as the leading cause of death related to unintentional injury. As surgical patients are nearly four times more likely to receive post-discharge opioid prescriptions than are their nonsurgical counterparts, this study was designed to quantify the association between post-surgical opioid prescribing patterns and dependence, overdose and abuse.

This retrospective study used the data from a commercial healthcare database. The sample included members who underwent surgery and had medical insurance, including pharmacy coverage, before and after surgery. Patients were considered opioid naïve if they had a history of seven days or less of opioid use in the 60 days prior to surgery. Postsurgical opioid use was documented. The primary outcome measure was an ICD-9 diagnosis code of opioid dependence, abuse and/or overdose.

From the database, 1,015,116 met the inclusion criteria and were followed for a mean of 2.67 years. Postoperatively, 56% filled a prescription for a postsurgical opioid. Compared to those with no refills, rates of misuse more than doubled among those with one refill, with each additional refill increasing the rate of misuse by 44% ($p<0.001$). Each additional week of opioid use resulted in a 19.9% increase in the rate of misuse ($p<0.001$). Compared with the duration of use, the dosage

prescribed was a weaker predictor of misuse.

Conclusion: This retrospective study of opioid use after surgery found that the risk of opioid misuse significantly increases for every prescription refill.

Brat, G. et al. Postsurgical Prescriptions for Opioid Naïve Patients and Association with Overdose and Misuse: Retrospective Cohort Study. *BMJ.* 2018; 360: J5790.

GABAPENTINOID USE IN THE UNITED STATES

Gabapentin and pregabalin are widely used in the United States, often for off-label indications. This study was designed to understand the change in gabapentinoid use from 2002 through 2015.

Data for the study were obtained from the 2002-2015 Medical Expenditure Panel Survey, consisting of two, overlapping, noninstitutionalized, adult cohorts who self-reported medical conditions and health indicators. Medications recorded included gabapentinoids, benzodiazepines and opioids. Medical conditions were identified by self-report. Trends over time were calculated.

Subjects were 346,177 adults. The percentage of individuals who used gabapentinoids increased from 1.2% in 2002 to 3.9% in 2015 ($p<0.001$). Of the gabapentinoids, gabapentin was used 82.6% of the time. A subgroup analysis revealed increases among individuals older than 64 years and among those with diabetes.

Conclusion: This study found that the use of gabapentinoids in the United States more than tripled between 2002 and 2015.

Johansen, M., Gabapentinoid Use in the United States 2002 through 2015. *JAMA Intern Med.* February, 2018; 178(2): 292-294.

CRACKING SOUNDS DURING MANIPULATION

In 400 B.C., Hippocrates described combinations of spinal traction and manipulation. Spinal manipulation remains widely used today, with many patients with low back pain seeking this treatment. During this manipulation, a cracking sound is heard, which is now ascribed to cavitation, which is the

formation of bubbles in a fluid when exposed to a drop in pressure. However, the origin of this sound remains enigmatic to the general population. This study evaluated beliefs regarding this sound.

Subjects were 60 individuals with, and 40 without, a history of spinal manipulation. All were interviewed during a face-to-face meeting. Data collected included demographics and medical history, including experience with spinal manipulation and beliefs regarding the cracking sounds heard during these procedures.

Of the respondents, 50% of those treated with spinal manipulation, and 48.3% of those who had not received that treatment, believed the sound was the result of the repositioning of the vertebrae. The second most common belief was that the sound was caused by friction between vertebrae. Only nine percent indicated that the sound was produced by a gas bubble within the joint. Overall 40% believed that the cracking sound was proof of a successful spinal manipulation.

Conclusion: This study found that most people have erroneous beliefs about the cracking sound heard during spinal manipulation.

Demoulin, C., et al. Beliefs in the Population about Cracking Sounds Produced During Spinal Manipulation. *Joint Bone Spine.* 2018, Mar; 85(2): 239-242.

CONCUSSION HISTORY AND VISUAL-MOTOR FORCE COMPLEXITY

In United States, an estimated 1.6 to 3.8 million sports-related concussions occur each year. Previous studies have shown that a significant number of individuals with a history of concussion exhibit subtle, but persistent, increases in postural sway irregularity. This study was designed to determine whether individuals a history of concussion have impaired performance in tasks requiring integration of proprioceptive and visual systems.

Subjects were 50 adults with self-reported concussion history who were asymptomatic. All individuals performed an isometric, visual-motor tracking task. During this task, index finger force was measured, using a straight red line as the target, with the subjects asked to maintain a constant force. From these data calculations were made of the subjects' isometric visual-motor tracking force multi-scale complexity.

Males were found to have greater complexity than females ($p < 0.001$). Complexity decreased significantly for each concussion ($p = 0.031$). The average power decreased by approximately 11% per diagnosed concussion for those with no history of loss of consciousness ($p = 0.355$), but by 41.5% for those with a history of a loss of consciousness ($p = 0.014$).

Conclusion: This study found that, among asymptomatic individuals with a history of concussion, visual-motor tracking force complexity is degraded, suggesting cumulative reductions in the ways in which previously concussed individuals process and integrate visual information.

Raikes, A., et al. Concussion History Is Negatively Associated with Visual-Motor Force Complexity: Evidence for Persistent Effects on Visual-Motor Integration. *Brain Inj.* 2018. DOI: 10.1080/02699052.2018.1444204.

EARLY CRANIOPLASTY AND NEUROLOGICAL IMPROVEMENT

After decompressive craniectomy, a cranioplasty is commonly performed to address cosmesis, and for protection of the brain. Surgeons have traditionally waited for months before cranioplasty to allow recovery from the initial trauma. This systematic review evaluated the effect of cranioplasty on neurological function, with a further effort to determine whether the timing of this surgery affects recovery.

A systematic review of the literature was performed for studies published between January of 1990 and April of 2016. Those studies reported on the relationship between the timing of cranioplasty and neurological outcomes of adults. Early cranioplasty was defined as those performed less than 90 days post-craniectomy, while late cranioplasty was defined as those performed over 90 days post-craniectomy. Changes in neurological evaluation results from pre- to post-surgery were compared between groups.

Studies included in the analysis were 551 cranioplasty procedures, with 248 occurring early and 303 occurring late. Combining all procedures, significant improvements were found on the Barthel index ($p = 0.005$) and Karnofsky Performance Scale (KPS; $p < 0.001$) post-surgery. Compared to late surgery, early cranioplasty was associated with greater improvements in KPS scores ($p < 0.001$). For all other measures greater improvement was noted after

early cranioplasty, compared to late although none of those comparisons reached statistical significance.

Conclusion: This study of patients with decompressive craniectomies found that cranioplasty is associated with improved neurologic scores, with greater improvement among those undergoing this procedure within 90 days of the initial surgery.

Malcolm, J. Early Cranioplasty is associated with Greater Neurological Improvement: A Systematic Review and Meta-Analysis. *Neurosurg.* 2018, March 1; 82(3): 278-288.

NEUROPSYCHOLOGICAL PERFORMANCE AFTER CONCUSSIONS AND/OR POST-TRAUMATIC STRESS DISORDER

Between 2000 and 2016 approximately 361,000 military personnel experienced a traumatic brain injury (TBI), with the 82% of those classified as mild. As those events have been associated with altered cognitive performance and posttraumatic stress symptoms, this study evaluated the effects of multiple concussions on subjective and objective cognitive performance.

Subjects were 126 active-duty military personnel referred to a TBI clinic with suspected deployment related mild traumatic brain injury (mTBI). All were three to 24 months post-injury, without abnormalities on CT or MRI. Each had at least one cognitive complaint of at least moderate severity.

The mTBI group was compared to 60 soldiers with orthopedic injuries, and 23 soldiers with Post-Traumatic Stress Disorder (PTSD) without TBI. After testing, the subjects were classified into one of five mutually exclusive groups: (1) no concussion- orthopedic injury: reference control, (2) no concussion- PTSD positive, (3) one concussion, (4) two concussions or (5) three or more concussions.

An analysis of variance found significant group differences ($p < 0.001$) with a post hoc analysis finding that those with one concussion and three or more concussions performed significantly worse on neuropsychological testing than did the orthopedic group, with no differences found among the three concussion groups. The orthopedic group had the lowest level of symptom complaints, while the PTSD group had the highest level.

Conclusion: This study found no neurocognitive differences between soldiers with varying numbers of concussions, as well as PTSD.

However, those with PTSD had the highest number of complaints.

Cooper, D., et al. Neuropsychological Performance and Subjective Symptom Reporting in Military Service Members with a History of Multiple Concussions: Comparison with a Single Concussion, Posttraumatic Stress Disorder and Orthopedic Trauma. *J Head Trauma Rehab.* 2018, March/April; 33 (2): 81 -90.

EARLY SURGERY AFTER HIP FRACTURE

Globally, the incidence of hip fracture is expected to climb from 1.6 million to 4.5 million by the year 2050. Hip fractures are the second leading cause of hospitalization for the elderly and are often the sentinel event for the individual's overall decline. This study reviewed the effect of the timing of surgical intervention on one-year mortality after hip fracture.

Subjects were 720 patients, all over 65 years of age, consecutively admitted for treatment of a hip fracture. The time from hospital admission to surgery was identified as a continuous variable. This variable was compared to one-year mortality.

Of the 720 patients, 68% were female, with an average total sample age of 82 years. Within one year, 22% had died. The median time from hospital admission to the beginning of surgery was 30 hours. The odds ratio for increased death was 1.05 for each 10-hour increase in time to surgery ($p = 0.001$). An adjusted analysis, revealed that those who underwent surgery over 60 hours after admission were more likely to die within one year, compared with those receiving surgery within 18 hours (odds ratio 2.81), as well as compared with those receiving surgery with 18 to 24 hours (odds ratio 2.9).

Conclusion: This study of elderly patients hospitalized for hip fracture repair found a linear relationship between a delay in surgery and one-year mortality.

Maheshwari, K., et al. Early Surgery Confers One-Year Mortality Benefit In Hip Fracture Patients. *J Orthop Trauma.* 2018, March; 32(3):10 5-110.

CITRUS FLAVONOIDS AND EXERCISE PERFORMANCE

Exhaustive exercise increases reactive oxygen species (ROS), leading to muscle fiber damage, eventually creating muscle fatigue.

Polyphenols including flavonoids, derived primarily from fruits, have been shown to reduce muscle soreness and improve muscle strength and endurance. Some flavonoids have also been found to stimulate nitric oxide production, causing vasodilation and improving blood flow. This study was designed to determine whether citrus flavonoid (CF) can improve performance in trained athletes.

Subjects were 39 males, ages 18 to 25, all engaged in moderate to high physical activity for a minimum of 30 minutes, three or more times per week. Each participant was tested on a cycle ergometer for maximal power, oxygen consumption and maximal oxygen consumption. The subjects were then randomized to receive a daily dose of 500 mg of CF or a placebo.

After four weeks, both the absolute and relative power outputs were significantly increased in the CF group, with no such gain in the placebo group. The VO_2 consumption/power ratio significantly improved ($p=0.001$) by 5.1% in the CF group, compared to 0.6% in the placebo group ($p=0.54$).

Conclusion: This study found that citrus flavonoid extract for four weeks significantly increased absolute power as compared with placebo.

Overdrvest, E., et al. Citrus Flavonoid Supplementation Improves Exercise Performance in Trained Athletes. *J Sports Sci Med.* 2018; 17 (1): 24-30.

SMALL FIBER NEUROPATHY

Small fiber neuropathy (SFN) is characterized by the dysfunction of small-caliber sensory and/or autonomic nerve fibers. As small fibers can be affected in several pathological conditions, it is thought that SFN may represent an early stage of other neuropathies. This study was designed to better understand the clinical course of idiopathic SFN.

This retrospective study included 16 patients diagnosed with SNF, all of whom were initially seen between 2008 and 2014. At follow-up, ranging from 2.5 to 14 years, all participants underwent skin biopsy of the distal proximal lower extremity to identify intraepidermal nerve fibers (IENFDs). In addition, the subjects were asked to complete the Quality-of-Life Scale from the American Chronic Pain Association.

Of the 16 patients, eight initially presented with burning sensations, eight with pain and eight with reduced

vibration sense. Skin biopsies of all patients revealed a decrease in IENFD. Follow-up exams involving 12 patients found that, in nine patients, clinical and electrophysiologic studies had not progressed. Three patients progressed or converted to axonal demyelinating sensorimotor neuropathy or demonstrated increased tibial-evoked potentials.

Conclusion: This study of patients diagnosed with small fiber neuropathy found that, at follow-up, 75% were stable and had not progressed to involvement of large fibers.

Flossdorf, P., et al. Long-Term Course of Idiopathic Small Fiber Neuropathy. *Euro Neurol.* 2018, March; 79(3-4): 161-165.

MUSIC FOR DISORDERS OF CONSCIOUSNESS

Disorders of consciousness (DOC) is a term which includes the unresponsive wakefulness syndrome and the minimally conscious state. As musical activities have been associated with a range of psychological and physical benefits, this systematic review was designed to better understand the effects of music therapy on patients with DOC.

The medical literature was reviewed for publications up until 2017. Studies chosen involved quantitative empirical research focusing on adult patients with neurogenic DOC receiving music-based interventions. The results were reviewed for a total of 329 participants, with a median of 9.5 patients per study. The subjects were exposed to either recorded or live music. Independent measures included behavioral, physiological and brain imaging data.

Music interventions were found to be associated with enhanced arousal, and or activation, changes in cardiac activity, oxygen saturation, temperature and respiration frequency. Studies found that improved behaviors included turning of the body toward the sound source, reduced psychomotor agitation, change in glance direction or facial expression, increased visual fixation, increased blink rate, deeper breathing, movement of the extremities and production of sounds. Brain measurement studies found an increase in functional brain connectivity, and an increase in metabolic brain activity.

Conclusion: This systematic review of patients with disorders of consciousness found that music interventions are associated with

favorable behavioral and physiologic responses.

Grimm, T et al. Music Interventions in Disorders of Consciousness (DOC)-Systematic Review. *Brain Inj.* doi.org/10.1080/02699052.2018.1451657.

NUMBER OF RESIDUAL TEETH AND INCIDENCE OF DEMENTIA

With the exception of dementia caused by genetic abnormalities, dementia is thought to develop as a result of multiple, rather than single, factors. A number of studies have suggested that oral health is related to cardiovascular and cerebrovascular health. This literature search and meta-analysis was designed to understand the association between tooth loss and dementia.

A literature search was completed for studies comparing oral health with dementia. From this review, 11 cohort studies were identified, involving a total of 28,642 patients, ages 52 to 75 at enrollment, with observation periods ranging from 2.4 to 32 years.

The data revealed that the residual number of missing teeth was consistently associated with the occurrence of dementia at five or more years ($p=0.01$). Compared to the group with a low residual number of teeth, the high residual number group had a decrease in the risk of dementia by approximately 50% ($p<0.001$).

Conclusion: This systematic review and meta-analysis found a correlation between tooth loss and the development of dementia.

Oh, B., et al. Association between Residual Teeth Number in Later Life and Incidence of Dementia: A Systematic Review and Meta-Analysis. *BMC Geriatr.* 2018; 18: 48.

CHRONIC OXYCODONE AND AXONAL DEGENERATION

Recently, some have suggested a toxic effect of long-term opioid use on the central nervous system. This animal study was designed to further investigate this association.

Female Sprague Dawley rats were randomized to receive either a placebo, or oxycodone at 15 mg/kg per day for 30 days, (estimated to be the equivalent of a high-dose range for humans). After 30 days, the brains were harvested for analysis.

Immunofluorescent analysis indicated morphological changes of

(Continued from page 2)

*Jennifer Haewon Lee, M.D.
Ann Hulme, M.D.
Akta A. Rajani, M.D.
Supriya Shah, M.D.
Tulsi Singh, M.D.
Univ. of Pennsylvania, Philadelphia, PA

*William Hodgson, M.D.
John Lattin, M.D.
University of Virginia, Virginia St. Univ, VA

*Anna Coles, M.D.
Alicia Fuhrman, M.D.
University of Washington, Seattle, WA

*Bonnie Weigert, M.D.
Michael Lin, M.D.
University of WI, Madison, WI

*Sean Smith, M.D.
Michael Maher, M.D.
Washington U in St. Louis, St. Louis, MO

Executive Editor Emeritus
Donald F. Langenbeck, Jr., M.D.

Subscription Manager
Michael P. Burke, M.S.

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both myelin basic protein (MBP) and neurofilaments (NF) in the oxycodone compared to those in the control group. Compared with controls the treatment group demonstrated an excess of demyelinated axons in the corpus callosum, structural changes in white matter in the cerebellum accompanied by loss of MBP and NF. The greatest effect was detected in the striatum and nucleus accumbens, characterized by a reduction in axonal bundles, loss of MBP and NF, but an increase in the amyloid precursor protein beta (β -APP). In addition, pro-apoptotic signaling, as indicated by activated caspase 3 and Bax, was increased in the corpus callosum, cerebellum and striatum of the oxycodone treated animals.

Conclusion: This animal study suggests that chronic opioid administration results in neuronal degeneration leading to an induction of apoptotic signaling in neurons and demyelination in the central nervous system.

Fan, R et al. Chronic Oxycodone Induces Axonal Degeneration and Rat Brain. **BMC Neurosci.** 2018;19:15.

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