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CANNABIS AND AXONAL FIBER CONNECTIVITY

Changes in tissue have been reported in neuronal structures rich in cannabinoid receptors such as the hippocampus and the cerebellum. Several animal studies have pointed to a transient developmental period during which white matter structures might be sensitive to cannabis exposure. This study was designed to examine axonal fiber pathways in the human brain for evidence of microstructural alterations associated with heavy, long-term cannabis use.

Subjects were 59 cannabis users with an average age of 33.4 years, all of whom had used cannabis at least twice per month for a minimum of three years. The subjects were matched with 33, healthy controls with an average age of 31.5 years. All subjects underwent diffusion magnetic resonance imaging (MRI), with data used to reconstruct axonal fiber trajectories, with tractography performed. Differences in anatomical connectivity were compared between users and non-users.

The data revealed no evidence of brain-wide connectivity disturbances in either subject sample. In the user population however, axonal connectivity was impaired in the right fimbria of the hippocampus, the splenium of the corpus callosum and the commissural fibers of the precuneus region of the parietal lobe, all regions high in cannabinoid receptors. Abnormalities in radial and axial diffusivity were positively related to the age at which regular cannabis use commenced.

Conclusion: This study found that long-term cannabis use may be hazardous to white matter in the developing brain, with the effects more pronounced with younger onset of use.

Zalesky, A., et al. Effect of Long-Term Cannabis Use on Axonal Fiber

Connectivity. *Brain*. 2012, July; 135: 2245-2255.

METHYLPHENIDATE FOR FREEZING GATE OF PARKINSON'S DISEASE

Gait disorders are problematic in patients with advanced Parkinson's disease (PD). Freezing of gate (FoG) is a brief, episodic absence or significant reduction of forward progression of the feet, despite the intention to walk. Improvement of FoG in response to dopaminergic treatments or subthalamic stimulation is lost over time. Studies have suggested that methylphenidate may be beneficial in Parkinsonian gait disorders. This study assessed the value of high-dose methylphenidate in patients with advanced PD who experience FoG.

This prospective study included patients diagnosed with PD, all recruited from 13 movement disorder clinics throughout France. Subjects were under 80 years of age, had received deep brain stimulation and had mild to severe gait disorders, including FoG. The participants were randomized to receive placebo or one mg per kilogram per day of methylphenidate, distributed over three doses. The primary outcome measure was the change in the number of steps during the stand-walk-sit test without levodopa. In addition the patient's gait was evaluated for the number of FoG episodes, gait initiation, stopping, rapid 360° and 510° turns and dual tasking.

Sixty-nine patients were enrolled in the study. The mean dose in the treatment group was 71 mg per day of methylphenidate. A positive effect of methylphenidate was found in the primary outcome of number of steps in the off-levodopa condition. In addition, the number of episodes of FoG was less in the methylphenidate group in both the on and off levodopa

conditions ($p=0.015$ and $p=0.049$, respectively). The number of adverse events was greater in the treatment group than in the placebo group, with the modal adverse event being nausea/vomiting/gastritis in 10 of the 35 methylphenidate users.

Conclusion: This study of patients with advanced Parkinson's disease who were receiving subthalamic nucleus stimulation found that methylphenidate can reduce gait hypokinesia and freezing.

Moreau, C., et al. Methylphenidate for Gait Hypokinesia and Freezing in Patients with Parkinson's Disease Undergoing Subthalamic Stimulation: A Multi-Center, Parallel, Randomized, Placebo-Controlled Trial. *Lancet Neurol*. 2012, July; 11(7): 589-596.

CARBONATED LIQUIDS AND SWALLOWING IN DYSPHAGIA

Dysphagia occurs in a wide variety of patients suffering from neurologic insult. The impact of current compensatory strategies is often limited by patient cognition and tolerance. Thus far, dietary modifications, specifically increasing liquid viscosity, have been the most common compensatory strategies for those who aspirate on thin liquids. This study investigated the effects of carbonated thin liquids on oral pharyngeal swallowing among adults with central nervous system dysphagia.

Participants were patients referred for videofluoroscopy. All were at least 18 years of age and had central nervous system disorders confirmed by MRI or CT, confirmed oropharyngeal dysphagia, ability to tolerate videofluoroscopy and a confirmed delayed pharyngeal response. Bolus volumes of five ml, 10 ml and 25 ml were evaluated. The liquids included one with carbonation and the other without.

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Videofluoroscopy results were used to assess the effect of carbonation.

The videofluoroscopy results revealed that carbonation significantly decreased penetration and aspiration when using five ml and 10 ml bolus volumes ($p=0.028$ and $p=0.037$, respectively). The carbonation had no effect on pharyngeal transit time, initiation of pharyngeal swallow, or stage transition duration.

Conclusion: This study of patients with neurogenic dysphagia found that carbonation significantly reduces penetration and aspiration when swallowing thin liquids.

Sdravou, K., et al. Effects of Carbonated Liquids on Oral Pharyngeal Swallowing Measures in Patients with Neurogenic Dysphagia. **Dysphagia**. 2012, June; 27: 240-250.

MEASURING THE COBB ANGLE WITH A SMART PHONE

The Cobb angle, first described in 1948, is the gold standard for evaluating spinal deformities in the frontal and sagittal plane. With the growing use of smart phones among physicians, this study sought to determine whether a smart phone application may be a useful tool for measuring this angle.

Conventional radiographs were extracted from the records of 20 patients seen at the author's institution for thoracic or lumbar fractures. These radiographs were presented to six spine physicians, who were asked to measure the Cobb angle using a line drawing and protractor method as described by John Cobb. After this, using an iPhone application (Cobbmeter), the angles were measured with the angle computed electronically. The process was conducted at a different time using the same set of radiographs in a different order to measure inter-observer reliability.

The intraclass correlation coefficient (ICC) between the Cobb meter and protractor for all measurements was 0.963. The standard deviation for the iPhone measurements was 8.961° and that for the protractor measurements was 8.650° . This difference was not statistically significant. The intra-observer ICC was 0.977, indicating excellent reproducibility at different times for all operators. The ICC of the iPhone measurements was 0.983 and

that for the protractor measurements was 0.970.

Conclusion: This study, comparing an iPhone application with the traditional method of measuring the Cobb angle of kyphosis, suggests that this new technology is as reliable as the old method.

Jacquot, F., et al. Measuring the Cobb Angle with the iPhone in Kyphosis: A Reliability Study. **Intern Orthop**. 2012, 36(8): 1655-1660.

ELECTROMYOGRAPHY AFTER CARPAL TUNNEL DECOMPRESSION

Among patients with recalcitrant carpal tunnel syndrome (CTS), surgical decompression of the median nerve at the wrist is considered the optimal treatment. This study was designed to review electromyographic (EMG) study changes up to 10 years after open carpal tunnel decompression.

This retrospective study included 115 patients diagnosed with CTS, each of whom had undergone an open carpal tunnel decompression between 1999 and 2000. All subjects had positive presurgical EMG diagnoses, in addition to a preoperative clinical diagnosis. All surgeries were carried out by the same surgeon. At 10-year follow-up, the patients were evaluated by EMG, including sensory and motor nerve conduction studies. The criteria of the American Society of Electrodiagnostic Medicine were used to classify the results as mild, moderate, severe or very severe. Clinical and functional assessment was conducted using scales of the Levine Self-Administered Questionnaire.

The electrodiagnostic results compared favorably with the preoperative results for sensory conduction velocity of the median nerve, distal motor latency, amplitude of the sensory and compound muscle action potential. However, the mean sensory conduction velocity remained below the cutoff considered normal ($p<0.001$). Therefore, a positive EMG diagnosis of CTS was found in 67% of the patients. An EMG diagnosis of CTS was made in 57.7% of those who were asymptomatic, and in 81.8% of those who were symptomatic at follow-up. On the Levine Questionnaire, most patients reported a favorable outcome, with a

global mean score between the absence of symptoms and a slight degree of discomfort.

Conclusion: This study of patients with a history of carpal tunnel syndrome and surgical decompression found that, at an average of 10 years follow-up, most still have electrodiagnostic findings consistent with carpal tunnel syndrome.

Faour-Martin, O., et al. Long-Term Postoperative Electromyography Evaluation of Patients Who Have Undergone Carpal Tunnel Decompression. *J Bone Joint Surg (Br)*. 2012, July; 94-B(7): 941-945.

HEMATOMA RISK WITH LUMBAR NEEDLE ELECTROMYOGRAPHY

Paraspinal mapping is one electromyographic (EMG) technique which requires needle insertion at multiple sites. There are reports in the literature of asymptomatic, hematomas following paraspinal EMG. This study further investigated the risk of hematoma formation after lumbar paraspinal EMG.

Subjects were selected from an NIH sponsored study concerning spinal stenosis. Participants included those with clinical lumbosacral spinal stenosis and asymptomatic controls, ages 55 to 80 years. Both groups underwent nerve conduction studies, including standardized paraspinal mapping. All subjects were imaged by MRI, with some undergoing scanning before, and others after, the EMG. The scans were reviewed by a neuroradiologist, held blind to the timing of the EMG. The scans were reviewed for the presence, size and location of hematomas in or around the paraspinal muscles. To be considered a hematoma, a lesion was required to be greater than 2 mm in size.

A total of 54 MRIs were reviewed, including 29 in subjects who had undergone EMG with paraspinal mapping in the previous seven days. The MRIs revealed two, definite paraspinal hematomas, both found prior to EMG. Of the 10 possible hematomas, six were found in patients who had undergone recent EMG, while six of the definite or possible hematomas were discovered in patients yet to undergo EMG. No significant difference was seen in the rate of hematomas between those

taking, versus those not taking, nonsteroidal anti-inflammatory drugs, including aspirin.

Conclusion: This study of patients undergoing paraspinal EMG found that this technique does not result in significant hematoma risk, even among those taking aspirin.

London, Z., et al. The Risk of Hematoma following Extensive Electromyography of the Lumbar Paraspinal Muscles. *Musc Nerve*. 2012, July; 46(1): 26-30.

ACCELERATED WEIGHT-BEARING AFTER CHONDROCYTE IMPLANTATION

Matrix induced autologous chondrocyte implantation (MACI) is an established technique for the repair of full thickness chondral defects of the knee. Little information is available concerning the best method for increasing load bearing and exercises after surgery. This study was designed to assess the effects of an accelerated weight-bearing rehabilitation program after MACI surgery.

Seventy patients who had undergone MACI to address localized, full thickness femoral chondral defects of the knee were studied. The subjects were randomized to either a traditional or an accelerated postoperative weight-bearing protocol. Of the 70 patients, 63 underwent clinical follow-up at five years, with 58 of those undergoing radiographic evaluation. After MACI surgery, those in the accelerated group reached full weight-bearing at eight weeks post-surgery, compared to 11 weeks for the traditional group. Assessment measures included the Knee Injury and Osteoarthritis Outcome Score (KOOS), the Short Form Health Survey (SF-36), a visual analogue scale for pain, a six-minute walk test and evaluations of range of motion. Assessments were completed at baseline and at three, six, 12, 24 and 60 months after surgery.

At five years post-surgery, 83% of both rehabilitation groups demonstrated good to excellent tissue infill. The radiographic scores did not differ between the two groups between two and five years after surgery. Of the 63 patients who completed the satisfaction questionnaire at long-term follow-up,

94% were satisfied with their pain relief, 95% were satisfied with their improvement in activities of daily living and 76% were satisfied with their ability to participate in sport. At five years, the accelerated group demonstrated significantly less frequent pain, with no other significant differences seen between the two groups.

Conclusion: This prospective study of patients undergoing matrix induced autologous chondrocyte implantation demonstrates that accelerated weight-bearing, with full weight-bearing at eight weeks, provides results that are comparable, if not superior, to traditional full weight-bearing at 11 weeks.

Ebert, J., et al. A Randomized Trial Comparing Accelerated and Traditional Approaches to Postoperative Weight-Bearing Rehabilitation after Matrix- Induced Autologous Chondrocyte Implantation: Findings at Five Years. *Am J Sports Med*. 2012, July; 40(7): 1527-1537.

CUSTOMIZED BIOMECHANICAL THERAPY FOR OSTEOARTHRITIS OF THE KNEE

Several biomechanical interventions for the treatment of knee osteoarthritis (OA) have been published. These interventions are designed to unload the diseased articular surface, usually by means of wedge insoles, foot orthoses or valgus braces. This study examined the effect of biomechanical therapy on the pain, function and quality of life of patients with medial compartment knee OA.

Data were collected from individuals undergoing AposTherapy between 2009 and 2010. Of those treated, 654 patients were identified with a diagnosis of symptomatic, bilateral, medial compartment knee OA. All received treatment with the Apos device, involving adjustable pods under the hindfoot and forefoot. These devices enabled control of body alignment through all phases of the step cycle. All patients were examined before and after 12 weeks of therapy with this device. Evaluations included the Western Ontario and McMaster Osteoarthritis (WOMAC) Index and the SF-36 health survey.

After 12 weeks of treatment, the WOMAC pain and function subscales were significantly lower than at baseline. Pain decreased by 30% ($p<0.001$) and function improved by 29% ($p<0.001$). Scores on all eight categories of the SF-36 health survey significantly improved after 12 weeks of treatment ($p<0.001$).

Conclusion: This uncontrolled study of patients with medial compartment knee osteoarthritis suggests that customized biomechanical therapy may be beneficial in reducing pain and increasing function.

Drexler, M., et al. Effects of a Customized Biomechanical Therapy on Patients with Medial Compartment Knee Osteoarthritis. *Ann Phys and Rehabil Med.* 2012, May; 55(4): 213-228.

TAPING VERSUS CASTING FOR PATELLAR DISLOCATION

Patellar dislocations often occur during sporting activities. These injuries are mostly seen in adolescents and young adults. Some studies have shown that nonoperative treatment may be as effective as surgical intervention for cases not associated with osteochondral fractures. This prospective study compared taping with cast immobilization for treatment of this injury.

Eighteen patients with primary patellar dislocation were studied. All were treated with a pressure bandage and a dorsal leg splint during the first week post-injury. They were then randomized to either a taping or a cylinder cast immobilization group for five weeks. The primary outcome measures were subjective knee function, with the Lysholm Knee Scoring Scale used to measure subjective function at weeks one, six and 12, as well as one and five years after dislocation. Physical examination was completed at follow-up, including assessments of function and quadriceps strength.

The taping group obtained significantly better Lysholm scores than did the control group at six and 12 weeks, as well as at five-year follow-up. The range of motion was better in the taping group at 12 weeks and at one-year follow-up. At six weeks follow up the hypotrophy of the quadriceps compared to the

contralateral leg was significantly less in the taping group ($p<0.001$). There were no cases of dislocation.

Conclusion: This study of patients with primary patellar dislocation found that taping may be better than casting as a nonoperative treatment for this injury.

Rood, A., et al. Tape versus Cast for Nonoperative Treatment of Primary Patellar Dislocation: A Randomized, Controlled Trial. *Arch Ortho Trauma Surg.* 2012, August; 132: 1199-1203.

SHORT TERM REHABILITATION AND ANKLE STABILITY

Ankle sprains are frequent among those participating in sports involving jumping and cutting actions. Among those with ankle sprain, 10-30% develop chronic ankle instability (CAI). This study was designed to determine whether short-term rehabilitation programs which address range of motion, muscle performance and neuromuscular control training can improve ankle instability.

This study included 236 subjects who reported a history of unilateral ankle sprain. From these, 18 were identified with chronic ankle weakness, pain or instability. All patients were assessed at baseline with the Foot and Ankle Disability Index (FADI), and the FADI-sport to measure self-reported function. In addition, subjects underwent range of motion tests, functional performance tests and neuromuscular control tests. Rehabilitation included four weeks of 90 to 100 minutes of daily exercise. The rehabilitation portion of this treatment consisted of theraband ankle exercises, isometric exercises, one leg jumping and balance exercises. The primary outcome measure was the change in FADI and FADI-sport scores. Secondary outcomes included range of motion, neuromuscular function and isokinetic torque.

The rehabilitation group improved more on the FADI and FADI-sport scores than did the control group. In addition, eversion, plantar flexion, dorsiflexion of the involved side and balance test scores were significantly higher in the treatment group than in the control group.

Conclusion: This study demonstrates that a short-term rehabilitation program can improve

the functional capacity of patients with chronic ankle instability.

Lee, K., et al. Short-Term Rehabilitation and Ankle Instability. *Int J Sports Med.* 2012, June; 33 (6):485-496.

TRAJECTORY OF POSTOPERATIVE DELIRIUM

Delirium affects up to 75% of patients after cardiac surgery, and is associated with adverse outcomes. While delirium has been associated with cognitive decline in the general patient population, it is unclear whether delirium affects the return of cognitive function after surgery. This prospective study examined the trajectory of cognition during the first year after cardiac surgery.

Eligible patients were 60 years of age or older, planning to undergo cardiac surgery at one of three hospitals. The participants underwent preoperative assessments including the Mini Mental State Examination (MMSE), and the Katz Index of Independence in Activities of Daily Living. Beginning on postoperative day two and continuing until discharge, the patients underwent daily assessment for delirium using the Confusion Assessment Method (CAM). After discharge, the subjects were interviewed at one, six and 12 months to assess cognitive function. Of the 225 patients enrolled, postoperative delirium developed in 46%. Delirium lasted for one to two days in 65%, and for three or more days in 35% of the patients. A decline in cognitive function of 4.6 points on the MMSE was noted from baseline to postoperative day two ($p<0.001$). This decline was followed by significant increases of one point each day on days three to five ($p<0.001$). After day 183, cognitive performance stabilized. Those who developed delirium had a greater decline in cognitive function immediately after surgery than did those without delirium (7.7 points versus 2.1 points). The mean MMSE scores at six and 12 months after surgery did not differ between those with and those without delirium ($p=0.06$). A greater percentage of patients with delirium had not returned to their baseline levels at six months ($p=0.01$), although that difference was not significant, at 12 months (31% versus 20%, $p=0.055$).

Conclusion: This prospective study of patients undergoing cardiac surgery demonstrated that postoperative delirium is a risk factor for cognitive decline after surgery, followed by slow recovery of cognition in the year after surgery.

Saczynski, J., et al. Cognitive Trajectories after Postoperative Delirium. *N Eng J Med.* 2012, July 5; 367(1): 30-39.

PERSISTENT POSTSURGICAL PAIN IN THE GENERAL POPULATION

Numerous studies have indicated a high prevalence of persistent pain after common surgical procedures. This study was designed to assess the prevalence of persistent pain after surgery and to identify factors associated with this persistence

Between 2007 and 2008, 12,982 surgical patients were recruited from four different groups, all with postal addresses in the municipality of Tromsø, Norway. In a questionnaire, the participants were asked whether they had undergone surgery during the three years preceding the survey. Those with surgeries were asked to complete follow-up questionnaires regarding the surgery and pain intensity in the area of the surgery.

During the previous three years, 3,111 individuals (24%) had undergone one or more surgical procedures. Chronic pain was reported more frequently among those in the surgery group than among the non-surgery group. Persistent postsurgical pain was reported by 40.4% of the participants; 22.2% had mild pain, 11.7% moderate pain and 6.6% severe pain. The prevalence ranged from 63.4% of those with hip surgery to 20.3 % of those with abdominal pelvic surgery. A strong association was seen between sensory disturbances and the presence and intensity of postsurgical pain.

Conclusion: This cross-sectional survey found that, at three months or more after surgery, 40% of the patients reported pain. Sensory disturbances in the area of surgery were strongly associated with persistent pain.

Johansen, A., et al. Persistent Postsurgical Pain in the General Population: Prevalence and

Predictors in the Tromsø Study. *Pain.* 2012, July; 153(7): 1390-1396.

POTASSIUM CHANNEL KIR4.1 AND MULTIPLE SCLEROSIS

Multiple sclerosis (MS) is the most common, chronic inflammatory disease of the central nervous system. While the cause of this disease is unknown, evidence suggests an interaction between genetic and environmental factors. In a subgroup of patients, B cells and antibodies seem to contribute to the disease. This study was designed to further explore the target of the autoantibody response in MS.

Patients with MS or with a clinically isolated syndrome were compared to two control groups; one comprising age matched healthy donors and the second comprising persons with other neurologic diseases. Antibodies were screened from persons with MS in order to identify antibodies capable of binding to brain tissue. Using a proteomic approach, the target of the IgG antibodies was identified as KIR4.1. The levels of antibodies to KIR4.1 were then compared among the three groups.

Serum antibodies targeting the potassium channel KIR4.1 were found to be higher in patients with MS than in controls, including those with other neurologic diseases ($p < 0.001$ and $p < 0.001$, respectively). These antibodies were present in 46.9% of patients with MS, 0.9% in those with other neurologic diseases and in 0% of the healthy donors.

Conclusion: This study found that a potassium channel, KIR4.1, seems to be a target of the immune response in patients with multiple sclerosis.

Srivastava, R., et al. Potassium Channel KIR4.1 as an Immune Target in Multiple Sclerosis. *N Eng J Med.* 2012, July 12; 367 (2): 115-123.

DARK CHOCOLATE CONSUMPTION FOR CARDIOVASCULAR PROTECTION

Dietary modifications have been shown to alter the risk of cardiovascular disease, with foods high in polyphenolic antioxidants believed to have a positive effect. As dark chocolate is among these foods,

this study sought to estimate the long-term effects and costs of dark chocolate for consumption in individuals with the metabolic syndrome at high risk of cardiovascular disease.

This study included 2,013 individuals selected from the Australian Diabetes Obesity and Lifestyle Study (AusDiab). All subjects met the criteria for the metabolic syndrome. Only participants free of cardiovascular disease or diabetes or both at baseline were included in the analysis. An algorithm was used to calculate the baseline risk of nonfatal cardiovascular disease, comprising myocardial infarction and stroke, as well as cardiovascular death. With each annual cycle, cardiovascular risk was recalculated according to increases in age and anticipated changes in systolic blood pressure and lipid levels. Treatment effects associated with dark chocolate consumption were derived from published meta-analyses, with these data used to determine the absolute number of cardiovascular events with and without chocolate consumption. The changes in risk were calculated by the application of expected effects of dark chocolate on systolic blood pressure and lipid levels.

The calculations, based upon 100% compliance of 100 g per day of dark chocolate consumption, demonstrated that this consumption could potentially prevent 70 nonfatal and 15 fatal cardiovascular events per 10,000 population treated over 10 years. When compliance levels were reduced to 90%, the number of potentially preventable nonfatal and fatal events was reduced to 60 and 10 per 10,000 treated over 10 years, respectively. The cost per person was estimated to be \$42 per year.

Conclusion: This study, using data from the Australian Diabetes Obesity and Lifestyle Study, suggests that the blood pressure lowering and lipid effects of plain dark chocolate could be an effective and cost effective strategy for the prevention of cardiovascular disease in people with metabolic syndrome.

Zomer, E., et al. The Effectiveness and Cost-Effectiveness of Dark Chocolate Consumption as Prevention Therapy in People at High Risk of Cardiovascular Disease: Best Case Scenario Analysis Using a

TRANSCRANIAL MAGNETIC STIMULATION AND MOTOR FUNCTION AFTER STROKE

Repetitive transcranial magnetic stimulation (rTMS) is a noninvasive method which modulates cortical excitability with several studies suggesting that this intervention may affect motor function after stroke. This meta-analysis reviewed the effects of rTMS on upper limb recovery and cortical excitability in patients with stroke.

Computerized searches were performed of PubMed, MEDLINE, Cochran and CINAHL to identify relevant studies published between January of 1990 and October of 2011. Data extracted from each study included study design, number of subjects, age, treatment protocol, outcome measures and mean differences. Subgroup analyses were conducted to determine potential influences on motor recovery.

Eighteen articles met the inclusion criteria and were used in the analysis. A significant mean effect size of 0.55 was found for upper limb motor outcome ($p < 0.01$). Subgroup analysis revealed that the mean effect size of low-frequency rTMS to the unaffected side was larger than that of high frequency rTMS to the affected side. The lesion site subgroup analysis demonstrated a relatively larger effect size for patients with subcortical strokes than for those with nonspecific site lesions.

Conclusion: This meta-analysis demonstrates that repetitive transcranial magnetic stimulation has a positive effect on upper extremity motor recovery, with low-frequency rTMS over the unaffected hemisphere more effective than high frequency rTMS over the affected hemisphere.

Hsu, W., et al. Effects of Repetitive Transcranial Magnetic Stimulation on Motor Function in Patients with Stroke: A Meta-Analysis. **Stroke.** 2012, July; 43: 1849-1857.

WHOLE BRAIN FUNCTIONAL NETWORKS IN ACUTE, MILD TRAUMATIC BRAIN INJURY

Many patients with mild traumatic brain injury (MTBI) develop early neuropsychological impairment. A

subgroup of these patients experience persistent postconcussive syndrome. The majority of patients with MBTI have clinical neuroimaging findings that are normal. Some have suggested that the cognitive changes after MTBI arise from damage to integrated neural networks rather than focal lesion sites. This study investigated whether functional connectivity is altered in patients with MTBI with homogeneous fronto-occipital injuries.

Thirty-five patients with acute MTBI were recruited from a level I trauma center. Only patients with fronto-occipital impact injuries were included. All patients underwent a resting state functional MRI scan with susceptibility weighted imaging as well as neuropsychological testing and postconcussive symptom assessment. Independent component analysis was performed, with these results compared to those of control subjects.

A between-groups analysis demonstrated a decrease in functional connectivity within the motor striatal network in the MTBI group. At the same time, neuropsychological evaluation demonstrated deficits in psychomotor speed, as well as in speed of information processing. The sensory motor cortex did not show significantly decreased connectivity.

Conclusion: This study of patients with acute, mild traumatic brain injury demonstrates that whole brain functional connectivity is altered among these patients, suggesting that functional networks may underlie the cognitive deficits reported by patients.

Shumskaya, E., et al. Abnormal Whole Brain Functional Networks in Homogeneous, Acute, Mild Traumatic Brain Injury. **Neurol.** 2012, July 10; 79(2):175-182.

RUPTURE RISK OF GROWING CEREBRAL ANEURYSMS

Data concerning the rupture rate of aneurysms in patients with no history of subarachnoid hemorrhage is quite limited. This study investigated the characteristics of growing, unruptured cerebral aneurysms, in order to calculate the recommended follow-up interval.

This retrospective study identified patients with unruptured cerebral aneurysms who underwent evaluation

at least twice between January 1, 2008, and December 31, 2009. A total of 1,002 patients with 1,325 aneurysms were selected for evaluation. Subjects with symptomatic aneurysms were included in the study only if subarachnoid hemorrhage was excluded by lumbar puncture. Aneurysm growth was defined as an increase in diameter by 1.5 times with obvious morphologic change.

Aneurysm growth was observed in 18 patients during the study period (1.8%/person-years). No significant difference was seen between patients with and without aneurysm growth in aneurysm location or multiplicity. Aneurysm rupture was observed one to 23 months after aneurysm growth in four of these 18 patients.

Conclusion: This retrospective study of patients with unruptured cerebral aneurysms found that the risk for growth within the first year was 1.8%/person-years, with the risk of rupture among those growing of 18.5%/person-years.

Inoue, T., et al. Annual Rupture Risk of Growing Unruptured Cerebral Aneurysms Detected by Magnetic Resonance Angiography. **J Neurosurg.** 2012, July: 20-25.

COURSE OF UNRUPTURED CEREBRAL ANEURYSMS IN A JAPANESE COHORT

Previous studies have shown that aneurysms smaller than 7 mm rarely rupture, and that aneurysms in the posterior circulation have a greater tendency to rupture than those in the anterior circulation. As incidentally discovered cerebral aneurysms are common, further knowledge of the natural course of these aneurysms is important for patient discussion. This study was designed to better define the natural history of unruptured cerebral aneurysms.

The study included 6,413 Japanese patients with newly identified aneurysms discovered between 2001 and 2004. Most of the patients were asymptomatic, with 91% of the aneurysms discovered incidentally. Aneurysms of 7 mm or more were found in 18% of patients younger than 50 years of age, 21.4% of those 50 to 59 years of age, 24.7% of those 60 to 69 years of age, 32.6% of those 70 to 79 years of age and 39.7% of those 80 years of age or older. The subjects were followed

until April 14, 2010. Data were compared between those whose aneurysms did and those that did not rupture.

During the follow-up period, 2,722 patients with 3,050 aneurysms underwent surgical repair before rupture. During the follow-up period, 111 aneurysms ruptured. Of those, 39 resulted in death. The annual risk of rupture was 0.95%. The size of the lesion, the location and the presence of a daughter sac were independent factors affecting the risk of rupture. The risk of rupture was significantly increased for all aneurysms 7 mm or larger. The presence of another aneurysm causing a subarachnoid hemorrhage, tobacco abuse, family history of subarachnoid hemorrhage or the presence of multiple aneurysms did not influence the risk of rupture of an aneurysm.

Conclusion: This study of Japanese patients found that unruptured cerebral aneurysms that are larger than 7 mm, are located in the anterior communicating or internal carotid-posterior communicating artery, and that have a daughter sac are at increased risk of rupture. The annual risk of rupture of all incidentally discovered aneurysms was 0.95%

The UCAS Japan Investigators. The Natural Course of Unruptured Cerebral Aneurysms in a Japanese Cohort. *N Eng J Med.* 2012, June 28; 366: 2474-2482.

DEPRESSION AFTER SPINAL CORD INJURY

Depressive symptoms after spinal cord injury (SCI) are thought to be prevalent, with estimates ranging from 7-31%. This study examined the incidence and time course of depressive symptoms among patient with SCI, and their association with other clinical features of the injury.

This prospective study included 130 patients hospitalized for traumatic SCI. The subjects were assessed for depression, neurologic impairment, pain, patient rated affective disorders, activities of daily life and the use of antidepressant medications. SCI was categorized using the American Spinal Injury Association Impairment Scales. The patients were assessed at one, three, six and 12 months after traumatic SCI. Depressive symptoms were quantified using the Beck Depression

Inventory (BDI), with the severity of depression tracked over time.

At one month, 38% of the patients had mild, six percent moderate and two percent severe depressive symptoms. After three and six months, 72% had no depression, 24% showed mild depression, four percent moderate depression and one percent severe depression. Forty-five percent of the patients were treated with antidepressants at any time during the study period. The level of injury did not influence scores on the BDI. Compared with historic data from patients hospitalized with stroke, multiple sclerosis, amyotrophic lateral sclerosis or whiplash injury, the level of depression in the SCI group was generally lower.

Conclusion: This study of patients with traumatic SCI found that the prevalence of severe depression is low, with most patients experiencing no clinical depression after injury.

Hassanpour, K., et al. Low Depressive Symptoms in Acute Spinal Cord Injury Compared to Other Neurological Disorders. *J Neuro.* 2012, June; 259: 1142-1150.

RISK FACTORS FOR HETEROTOPIC OSSIFICATION AFTER SPINAL CORD INJURY

The incidence of heterotopic ossification (HO) among patients with traumatic spinal cord injury (SCI) has been estimated to range from one to 50%. In most cases, HO runs a relatively benign course without severe complications, while, in other cases, loss of joint mobility and function can occur. This study explored the risk factors associated with the development of HO in patients with traumatic SCI.

This case controlled study included patients admitted to a level I trauma center with a diagnosis of a traumatic SCI. The medical records of those who developed HO were compared with those of patients who did not. To diagnose HO, ultrasound examinations were performed every two weeks, with those whose studies were suspicious for HO sent for computed tomography or magnetic resonance imaging verification. The primary outcome measures were level and completeness of SCI and the time between the injury and surgery.

Of the patients with SCI, 21.9% were diagnosed with HO. The most common location for the HO was the hip/pelvic area (91.6%), followed by the shoulder region (4.9%) and the knee joint (2.1%). Those with complete lesions had a six-fold increased risk of developing HO, as compared to those with incomplete lesions. A two-fold increase in HO development was found among those with thoracic trauma. Those with spasticity, pneumonia, a tracheostomy or urinary tract infections had the highest rates of HO development. Smokers had a three-fold increased risk of developing HO. Injuries associated with the SCI including brain injury, upper limb injuries, lower limb injuries, abdominal trauma, pressure ulcers and deep venous thrombosis were not associated with an increased risk of HO.

Conclusion: This large study of patients with spinal cord injury found that those with complete injuries have the highest risk of HO, with other risk factors including spasticity, pneumonia, tracheostomy, nicotine abuse and urinary tract infections.

Citak, M., et al. Risk Factors for Heterotopic Ossification in Patients with Spinal Cord Injury: A Case Control Study of 264 Patients. *Spine.* 2012, DOI: 10.1097/BRS.0b013e3182568ffc9.

IN HOME TECHNOLOGIES FOR FALL REDUCTION

Falls are of serious concern to the elderly and are a major cause of hospitalization and loss of independence. Interventions to reduce the risk of falling at home have met with varying degrees of success. This study reviewed the efficacy of two, in-home technologies designed to address situations that are correlated with the risk of falling.

A total of 194 patients were included in the study, all of whom were 65 years of age or older and were listed by their local government as being at high risk for falling. The subjects were randomized to an intervention group or a control group. The intervention group received an automated path lighting system that activated when they set foot on the floor from their bed, and an electronic bracelet that activated to provide remote assistance, triggering a phone call to the resident's home. The

(Continued from page 2)

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primary outcome measure was the number of falls over a one-year period.

Over the 12 months of the study, 40.5% of the participants suffered a fall. Of those in the treatment group, 30.9% experienced a fall compared with 50% in the control group. A multivariate analysis found a significant effect on the risk of falling for the in-home technology with an odds ratio of 0.33 ($p=0.0091$), age by decade, with an odds ratio 2.37 ($p=0.019$) and having at least three comorbidities, odds ratio 2.78 ($p=0.0456$)

Conclusion: This study of elderly individuals found that a home automation system combining automatic lighting with tele-assistance can significantly reduce the risk of falls at home.

Tchalla, A., et al. Efficacy of Simple Home-Based Technologies, Combined with a Monitoring Assistive Center, in Decreasing Falls in a Frail Elderly Population (Results of the Esoppe Study). **Arch Geront Geriatrics**. <http://dx.doi.org/10.1016/j.jbbr.2011.03.031>.

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