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MEMORY RETENTION ENHANCED BY PHYSICAL EXERCISE

Previous studies suggest that persistent long-term memory depends upon successful stabilization and integration of new memories after the initial coding. This consolidation has been found to require neuromodulation factors, including dopamine, noradrenaline and brain derived neurotrophic factor. As exercises have been found to stimulate the release of several of these factors, this study investigated whether exercise might influence the consolidation of new memories and retrieval.

Participants were randomly assigned to one of three groups after first encoding a set of 90 picture-location associations over a period of approximately 40 minutes. The groups performed exercises immediately or four hours after the encoding session, while a third refrained from exercise. At 48 hours, participants returned for a cued recall test, undergoing magnetic resonance imaging.

Retention in the delayed exercise group was found to be higher than that in the immediate exercise and the no exercise groups, with no difference noted between the latter two. Memory retention was not correlated with the participants' reported routine weekly exercise schedule. The MRI findings suggested an increased hippocampal pattern similarity for correct responses during delayed retrieval.

Conclusion: This study found that properly timed physical exercise can improve memory retention.

VanDongen, E., et al. Physical Exercise Performed Four Hours after Learning Improves Memory Retention and Increases Hippocampal Pattern Similarity during Retrieval. **Current Biology**. 2016, doi:10.1016/ j.cub.2016.04.071.

DECISION RULES AFTER ACL RECONSTRUCTION

It is estimated that 250,000 anterior cruciate ligament (ACL) injuries occur annually in the United States. While the intention to return to sport is a common reason for undergoing surgery, there is no clear evidence to guide whether return to sport should be delayed, and what level function should be achieved before this return.

Subjects were between 13 and 60 years of age who had participated in a level I or level II sport at least twice weekly before ACL injury. All participants underwent a preoperative rehabilitation program, with all undergoing bone-patella tendon-bone or hamstring autograft. The participants were advised against full participation in level I sports if, during rehabilitation, they had not regained at least 90% quadriceps and hamstring strength and hopping performance in the injured leg, compared with the uninjured leg. Knee function, sports participation and any reinjury were recorded monthly.

The first two years after reconstruction, 30% of those returning to level I sports sustained a reinjury, compared with eight percent who participated in lower-level sports. The reinjury rate was reduced by 51% for each month that the return to sport was delayed until nine months after surgery. After this time, no further reduction was noted. Of those who failed the return to sport criteria, 38% suffered injuries, as compared to 5.6% among those who achieved the criteria. Symmetry of quadriceps was found to be correlated with a reduced risk of reinjury.

Conclusion: This prospective study of patients undergoing ACL reconstruction found that return to sport, delayed until at least nine months, and symmetric quadriceps strength prior to return were correlated with a significantly reduced risk of reinjury.

Grindem, H., et al. Simple Decision Rules Can Reduce Reinjury Risk by 84% after ACL Reconstruction: The Delaware-Oslo ACL Cohort Study. **Br J Sports Med.** 2016, July; 50(13): 804-808.

BLOOD PRESSURE AND INTRACEREBRAL HEMORRHAGE GROWTH

While elevated systolic blood pressure (SBP) is common after acute spontaneous intracerebral hemorrhage (ICH), intensive blood pressure lowering was not supported by the Intensive Blood Pressure Reduction and Acute Cerebral Hemorrhage Trial (INTERACT). This study was designed to assess the effects of blood pressure reduction on hematoma growth among participants in the INTERACT 2 trial.

This international multicenter open, blinded endpoint randomized controlled trial included 2,839 patients with spontaneous ICH and elevated systolic blood pressure (SBP). The patients were randomly assigned to intensive SBP lowering with a target of less than 140 mmHg within one hour, or guideline recommended target of less than 180 mmHg. Baseline and 24 hour CT scans were performed, with SBP reduction compared to 24 hour hematoma growth.

Among the original participants, 960 were including in this study. A greater degree of SBP reduction was associated with less hematoma growth ($p<0.001$). In the intensive treatment group, the least mean hematoma growth was achieved in patients who achieved the target SBP in less than one hour as compared to those who achieved this target within one-six hours and those whose target was achieved in greater than six hours.

Conclusion: This study of patients with spontaneous intracerebral hemorrhage found that intensive blood pressure lowering

with a greater systolic blood pressure reduction achieved quickly after hospital admission is associated with a reduced expansion of hematoma volume during the first 24 hours.

Carcel, C., et al. Degree and Timing of Intensive Blood Pressure Lowering on Hematoma Growth in Intracerebral Hemorrhage. Intensive Blood Pressure Reduction in Acute Cerebral Hemorrhage Trial -2 Results. **Stroke.** 2016, June; 47 (6):1651–1653.

HIGH FAT MEDITERRANEAN DIET AND BODY WEIGHT

The PREvencion con DIeta MEDiterranea (PREDIMED) trial provided first-level evidence of cardiovascular protection by the Mediterranean diet. This study analyzed data from this trial in order to assess the long-term changes in body weight and waist circumference associated with the Mediterranean diet.

This five-year, parallel group, randomized, clinical trial included participants at high cardiovascular risk, comparing unrestricted calorie Mediterranean diets enriched with extra virgin olive oil, or with mixed nuts, with a control diet (advice to avoid all dietary fat). The subjects were community dwelling men, ages 55 to 80 years, and women, ages 60 to 80 years, with multiple cardiovascular risk factors. The study analyzed the effects of these interventions on body weight and waist circumference recorded over five years.

Subjects were 7,447 men and women with an average age of 67 years, followed for a median of 4.8 years. Over 90% were overweight or obese at the beginning of the study. Participants in the extra-virgin olive oil group had a significant decrease in body weight. The average, between-group changes were significant at three years (p=0.026) and five years (p=0.044). Those in the nut group had significant decreases in body weight, although this did not differ from that of the control group. A multivariable adjusted analysis showed significantly lower waist circumference at three and five years for those in the olive oil group and at five years for those in the nut group.

Conclusion: This study describing a long-term intervention with an unrestricted calorie, high vegetable fat Mediterranean diet demonstrates that this diet is associated with decreases in body weight and less gain in central adiposity as compared to a diet advising individuals to restrict their intake of dietary fat.

Estruch, R., et al. Effect of a High-Fat Mediterranean Diet on Body Weight and Waist Circumference: A Prespecified, Secondary Outcomes Analysis of the PREDIMED Randomized, Controlled Trial. **Lancet Diabetes Endocrin.** 2016 http://dx.doi.org.proxy.library.emory.edu/10.1016/S2213-8587(16)30085-7

AEROBIC EXERCISE FOR INSTITUTIONALIZED PATIENTS WITH DEMENTIA

Previous research has demonstrated a correlation between aerobic exercise and cognitive health. However, research on the effects of long-term physical exercise programs on the cognitive status of patients institutionalized with dementia are scarce. This study presents longitudinal data involving institutionalized patients with dementia to help clarify the effects of an exercise program on cognitive decline and impairment.

Subjects were residents of an elderly home care facility, who were able to engage in aerobic exercise. Medical information was obtained from medical records. Cognitive impairment was determined before and after intervention by the Mini Mental State Examination. Other tests were used to evaluate functional mobility, psychiatric disturbances, activities of daily living, depression, and memory. The patients were randomized to an exercise group (EG) or to a control group (CG). The EG engaged in cycling using a recumbent bicycle for 15 minutes each day, for a total of 15 months. A physiotherapist monitored each session.

Those in the EG exercised a mean of 108.45 minutes per week. With the exception of depression, all variables improved in the EG and worsened in the CG. A decline in cognitive function was observed in those in the CG (p=0.015), while a slight improvement was observed in those included in the EG. Significant improvement was observed in the neuropsychiatric symptoms (p = 0.020), memory function

(p = 0.028) and functional mobility (p = 0.043) among those in the EG.

Conclusion: This prospective study of patients institutionalized with dementia found that aerobic exercise, 15 minutes per day, could result in improvement in cognition, functional mobility, neuropsychiatric symptoms and memory.

Cancela, J et al. Effects of a Long-Term Aerobic Exercise Intervention on Institutionalized Patients with Dementia. **J Sci Med Sport**. 2016, April; 19(4):293–298.

BLOOD PRESSURE AND RISK OF VASCULAR DEMENTIA

While blood pressure is a known causal risk factor for stroke, studies have been inconclusive about the relationship between blood pressure and vascular dementia. This study was design to further assess this relationship.

The study included 4.9 million individuals, 30-90 years of age whose blood pressure had been measured at their general practice. Baseline covariates included body mass index, smoking status, lipid status and baseline blood pressure. Individuals were excluded who had pre-existing cardiovascular disease, with further analysis completed for a cohort of patients with incident transient ischemic attack and stroke.

At a mean of seven years follow-up, 11,114 cases of vascular dementia were identified. The association between systolic blood pressure and the risk of vascular dementia was linear within the age groups of 30-50 years, and 51-70 years. The association between BP and risk of vascular dementia declined with increasing age from a 62% higher risk per 20 mmHg in the age group 30-50 years, to a nonsignificant association in the age group of 71-90 years.

Conclusion: This study found that blood pressure is continuously related to the risk of vascular dementia among those 70 years of age or younger.

Emdin, C., et al. Blood Pressure and Risk of Vascular Dementia. Evidence from a Primary Care Registry and a Cohort Study of Transient Ischemic Attack and Stroke. **Stroke.** 2016, June; 47 (6):1429–1435.

TRANSCRANIAL DIRECT CURRENT STIMULATION FOLLOWING LUMBAR SURGERY

While systemic opioid medications have been effective for pain relief, postoperative complications include mental clouding, confusion, and addiction. This study was designed to evaluate the effect of transcranial direct current stimulation (tDCS) on pain reduction among patients receiving spinal surgery.

Subjects were 27 patients undergoing lumbar spine procedures requiring overnight hospitalization. The patients were randomly assigned to receive four 20 minutes sessions of tDCS or a sham procedure during hospitalization. Postoperative orders included a standardized protocol for self-administered PCA hydromorphone with patient pain ratings collected by a Brief Pain Inventory administered at admission and at discharge from the hospital. The groups were compared for use of PCA and pain ratings.

At the time of discharge, participants in the tDCS group used an average of 12.6 mg of hydromorphone while those in the sham group used an average of 16.5 mg, a 23% reduction in PC usage. Despite this difference in medication use, the groups did not differ in subjective reports of pain.

Conclusion: This study of patients undergoing lumbar spine surgery suggests that treatment with transcranial direct current stimulation may result in a reduced need for opioid pain medications during hospitalization.

Glaser, J et al. Motor/Prefrontal Transcranial Direct Current Stimulation (tDCS) Following Lumbar Surgery Reduces Postoperative Analgesia Use. **Spine.** 2016, May; 41 (10):835 – 839.

TRANSCRANIAL DIRECT CURRENT STIMULATION FOR THE REVERSAL OF HYPERALGESIA

Neuropathic pain arises from peripheral and central nerve damage and constitutes a significant clinical and often debilitating condition. As previous studies have shown that transcranial direct current stimulation (tDCS) can affect pain transmission in other pain models, this study investigated the effects of tDCS on the nociceptive and cytokine response in a neuropathic pain (NP) model.

The subjects included 84 adult male rats randomized to: a control group (C), a sham NP group (SN), a sham NP plus sham tDCS treatment (SNS), a sham NP plus tDCS treatment (SNT), an NP group(NP), an NP plus sham tDCS treatment group(NPS), or a NP plus tDCS treatment group (NPT). The NP was established by chronic constriction injury (CCI) of the sciatic nerve. After the injury the rats received 20 minutes of bicephalic tDCS daily for eight days. Nociceptive testing was completed at baseline, seven and 14 days and immediately after the last session of tDCS. The animals were then sacrificed by decapitation, with cortex, spinal cord and brain stem IL – 1β, IL – 10, and TNF – alpha levels measured.

The bicephalic tDCS treatment (NPT) totally reversed the nociceptive behavior, with statistical difference from NP and NPS immediately and until at least seven days after the end of treatment. In addition the CCI model induced an increase in the levels of IL-1 β and IL-10 in the cerebral cortex and spinal cord that lasted through the assessment time-points. Those increases were totally reversed by bicephalic tDCS as measured only in the spinal cord.

Conclusion: This study demonstrates that by bicephalic direct -current stimulation is effective in promoting anti-nociceptive behavior in a neuropathic pain model, which can be associated with pro and anti-inflammatory cytokine levels observed in the long-term.

Cioato, S et al. Long-Lasting Effect of Transcranial Direct Current Stimulation in the Reversal of Hyperalgesia and Cytokine Alterations Induced by the Neuropathic Pain Model. **Brain Stimulation.** 2016, Mar-April; 9 (2):209-217.

EXERCISE BEFORE PREGNANCY AND PELVIC GIRDLE PAIN

Approximately two to three percent of all women report chronic pelvic girdle pain one year after delivery. This study examined the association between pre-pregnancy leisure time exercise and pelvic girdle pain among pregnant women.

This prospective, population based cohort study, The Norwegian

Mother and Child Cohort Study, was conducted by the Norwegian Institute of Public Health, recruiting participants between 1999 and 2008. Questionnaires queried the frequency and types of exercise performed before pregnancy, as well as information about maternal health, demographics, lifestyle behaviors and medical history. Participants reported how often they performed one of 14 exercises, rating the frequency of each. From these, seven groups were determined including; non-exerciser, brisk walking, non-weight bearing exercise, low impact exercise, high impact exercise, and horseback riding. The primary outcome measure was pelvic girdle pain in pregnancy week 30.

Of the 39,184 singleton pregnancies included in the study, 10.4% reported pelvic girdle pain in pregnancy. Compared to women who developed pelvic girdle pain, those who did not more often reported an exercise frequency of 3-5 times per week ($p<0.001$). In addition, participation in high impact exercises and high-impact aerobics were more commonly reported among those without pelvic girdle pain ($p<0.001$). In adjusted models, those who exercised 3-5 times weekly before pregnancy had a 14% reduced risk of pelvic girdle pain during pregnancy as compared to those who did not exercise. Participation in high-impact exercise was also associated with a similar risk reduction.

Conclusion: This study showed that women who exercise regularly before their first pregnancy, particularly those participating in high-impact exercise, had a reduced risk of pelvic girdle pain during pregnancy.

Owe, K et al. Exercise Level Before Pregnancy and Engaging in High-Impact Sports Reduce the Risk of Pelvic Girdle Pain: The Population–Based Cohort Study of 39,184 Women. **Br J Sports Med**. 2016, July; 50 (13):817-822.

SLEEP DURATION AND PRESEASON CONCUSSION TESTING

Baseline, preseason assessment of cognition, symptoms and balance are often used as part of a comprehensive sport concussion management program. As recent studies have demonstrated a relationship between poor sleep and baseline cognitive testing, this study was design to further examine the relationship between sleep and baseline testing in adolescent student athletes.

This cross-sectional descriptive cohort study included 2928 student athletes between 13 and 18 years of age. All completed baseline preseason ImPACT testing as well as a demographic and history questionnaire. Athletes were asked to estimate the number of hours that they slept the night before testing. Hours slept were categorized as 5 or less, 5.5-6.5, 7-8.5 and 9 or more. The results on the Post-Concussion Symptoms Scale of the ImPACT test as well as cognitive testing were compared by sleep category.

Those who slept less reported more symptoms on the post-concussion symptoms scale, with girls reporting more symptoms than boys. There were no differences between those in different sleep category groups and ImPACT testing cognitive composite scores.

Conclusion: This study of healthy uninjured adolescent athletes found that poor sleep the night before preseason baseline testing did not result in deficits in cognitive performance, but did result in higher post-concussion-like symptoms.

Silverberg, N et al. Relationship between Short Sleep Duration and Preseason Concussion Testing. **Clin J Sport Med**. 2016, May; 26(3):226-231.

CLIMBING FOR LOW BACK PAIN

Among the working age population, low back pain (LBP) is the most common cause of physical disability. Substantial evidence exists supporting the use of exercise as a therapeutic tool to improve symptoms of LBP. As climbing offers closed chain muscle training, this study reviewed the effects of this exercise technique among patients with LBP.

This prospective, randomized, controlled trial included 30 individuals with chronic LBP, between 18 and 45 years of age, with a body mass index of 25 kg/m^2 or lower. None had climbing experience. All patients underwent baseline x-ray and MRI evaluation. Ten sessions of one-hour climbing activity occurred at least once a week over eight weeks. The control group subjects were instructed to not change their lifestyle, and were allowed to take paracetamol 500 mg, four times a day as needed. All patients were assessed at baseline, after eight weeks of treatment (T8) and six weeks after treatment ended (T14).

The climbing group had better improvement in VAS scores over time, in a resting position ($p<0.0001$) and in the finger to floor condition ($p=0.011$), with no significant difference between groups for VAS in motion. A significant improvement in the Oswestry Disability index was found over time, favoring the climbing group ($p=0.022$). No significant difference was found in the analysis for gender, age, height, weight or duration of pain. Climbing was found to be safe without severe side effects.

Conclusion: This study of patients with chronic low back pain found that rock climbing may be a useful intervention for improving pain and disability.

Schinan, M., et al. Climbing Has a Positive Impact on Low Back Pain: A Prospective, Randomized, Controlled Trial. **Clin J Sports Med.** 2016, May; 26(3): 199-205.

ANTIHYPERTENSIVE THERAPY IN ACUTE INTRACEREBRAL HEMORRHAGE

While elevated blood pressure is a risk factor for stroke, it is unclear whether pre-stroke antihypertensive medications should be continued during the acute phase after an intracerebral hemorrhage (ICH). The Continue or Stop Post Stroke Antihypertensives Collaborative Study (COSSACS) found no significant difference in functional outcome, death or serious adverse events between groups whose medications had been continued or stopped, although the study had low statistical power. This study, a subset of the Efficacy of Nitric Oxide in Stroke (ENOS) trial, was designed to provide further clarity to this clinical issue.

This prospective, international, multicenter, randomized, blinded study included adult patients recruited within 48 hours of an intracranial hemorrhage. The patients were randomized to continue receiving their pre-stroke medications, or to discontinue. After seven days, antihypertensive therapy that had

been stopped was restarted according to clinical need. The primary outcome measure was the modified Rankin Scale score (mRS) assessed at day 90.

Of the 246 patients with ICH included in the study, 119 were randomized to continue and 127 were randomized to stop antihypertensive drugs. At 90 days, there was no significant difference between the groups in mRS scores. In addition, there was no significant difference in any of the secondary medical outcomes, death or other serious adverse events.

Conclusion: This prospective study of patients admitted with intracranial hemorrhage found no significant beneficial effects of continuing pre-stroke antihypertensive drugs during the first week after the onset of the event.

Krishnan, K., et al. Continuing versus Stopping Pre-Stroke Antihypertensives Therapy in Acute Intracerebral Hemorrhage: A Subgroup Analysis of the Efficacy of Nitric Oxide in Stroke Trial. **J Stroke Cerebrovasc Dis.** 2016, May; 25(5): 1017-1026.

BONE MARROW DERIVED STEM CELLS IN CHRONIC STROKE

A recent metanalysis of preclinical studies found that mesenchymal stem cells, used to treat ischemic stroke, were associated with improvements in neurologic function. This paper reports on the interim data from a 12 month open label study designed to evaluate the safety and clinical outcomes of the stereotactic placement of bone marrow derived mesenchymal stem cells (SB623) at the margins of stroke in patients with chronic motor deficits.

Subjects included 18 patients with stable chronic stroke, divided into three cohorts of six patients. These subjects received single doses of 2.5 x 10^6, 5.0x10^6 or 10 x 10^6 SB623 cells, delivered by MRI stereotactic technique, with deposits at five to six mm intervals along each track in the peri-infarct area. Acute and long-term outcomes were determined using the European Stroke Scale (ESS), the NIHSS, the modified Rankin scale (mRS), and Fugl- Meyer (F-M) scores. All patients were monitored for treatment emergent adverse events (TEAE).

Significant improvement from baseline was reported for the ESS, the NIHSS, the F-M total and the F-M motor scores (all $p<0.001$), with significant improvement noted beginning at one month. All participants experienced at least one TEAE 12 months after implantation, with the most common being headache related to the surgical procedure, nausea, vomiting, depression, muscle spasticity, fatigue, blood glucose increase, and C-reactive protein increase. All serious TEAEs resolved without sequelae.

Conclusion: This interim report of patients with chronic stroke found that stereotactic implantation of SB623 stem cells was safe and was associated with significant improvement in clinical outcomes.

Steinberg, G., et al. Clinical Outcomes of Transplant of Modified Bone Marrow–Derived Mesenchymal Stem Cells and Stroke: A Phase ½ a Study. **Stroke.** 2016, July: 47 (7);1817-1824.

ANKYLOSING SPONDYLITIS TREATED WITH ETANERCEPT AND SULFASALAZINE

Ankylosing spondylitis (AS) is a painful inflammatory rheumatic disease affecting the axial skeleton. Despite its global prevalence, controlled trials evaluating the efficacy and safety of biologic agents to treat this condition have occurred mostly in North America and Western Europe. This study was designed to assess the efficacy of etanercept compared with sulfasalazine for the treatment of patients with AS from Asia, Eastern/Central Europe and Latin America.

The ASCEND study was a randomized double-blind multicenter study comparing the safety and efficacy of etanercept with sulfasalazine in adult patients with active AS who had failed nonsteroidal anti-inflammatory drug treatment. The primary endpoint was the proportion of subjects who achieved a 20% improvement from baseline according to ASAS (ASAS20) criteria. Adverse events were recorded and physical examinations as well as laboratory tests were conducted to assess safety. A total of 297 patients met the study criteria of whom 190 received etanercept and 97 received sulfasalazine.

Significantly more patients in the etanercept group achieved ASAS20 as compared to those receiving sulfasalazine at every time point measured ($p\leq0.008$). In addition, a significantly greater proportion of patients in the etanercept group achieved ASAS40 compared with the sulfasalazine group ($p\leq0.001$). At week 16, the proportion of patients achieving partial remission, a 50% response in the Bath Ankylosing Spondylitis Disease Activity Index, and all health-related quality of life parameters, were significantly greater in the etanercept group as compared to those in the sulfasalazine group ($p=0.002$).

Conclusion: This study of patients from Eastern/Central Europe, Latin America and Asia with ankylosing spondylitis found that treatment with etanercept is significantly more effective than sulfasalazine.

Damjanov, N et al. Assessment of Clinical Efficacy and Safety in a Randomized Double-Blind Study of Etanercept and Sulfasalazine in Patients With Ankylosing Spondylitis From Eastern/Central Europe, Latin America, And Asia. **Rheumatol Int.** 2016, May; 36 (5):643 – 651.

RADIOGRAPHIC ABNORMALITIES IN THE ELBOWS OF YOUTH BASEBALL PLAYERS

It is estimated that 20% of baseball players between the ages of eight and 12 years of age will experience arm pain during a single youth baseball season. This study examined elbow abnormalities in asymptomatic little league baseball players to review the association between these findings and the players' throwing history and physical examination.

This prospective study included 26 Little League baseball players recruited from the highest league level within the district. All patients underwent a detailed history, physical examination of both upper extremities and an MRI of the elbow. Those who reported a history of pain or injury to the arm from baseball were compared to those with a negative history.

The subjects were a mean age of 11.4 years with a mean playing time of 6.2 years. Of these 27% responded "yes" to having sustained an arm injury from throwing, or to

having had experienced arm pain from throwing. Asymmetric MRI abnormalities were observed in the dominant elbows of 35% of the cohort with one third of these having two abnormalities. Those with positive MRI findings demonstrated a greater reduction in shoulder internal rotation compared to the nondominant arm. Factors associated with positive MRI findings were year-round play and working with a private coach.

Conclusion: This study of asymptomatic youth baseball players found that MRI abnormalities involving the medial aspect of the elbow were common in year-round baseball players, especially among those with glenohumeral internal rotation deficits and among those using private coaches.

Pennock, A., et al. Preseason Assessment of Radiographic Abnormalities in the Elbows of Little League Baseball Players. **J Bone Joint Surg**. 2016, May; 98(9):761 – 767.

KETOROLAC AFTER SURGERY AND FRACTURE HEALING

A number of studies have suggested that nonsteroidal anti-inflammatory drugs (NSAIDs) may have detrimental effects on fracture healing. This study evaluated the effect of ketorolac, used during the first 24 hours after surgery, on the healing of fractures.

This retrospective, comparative study included patients with femoral or tibial shaft fractures, who were treated surgically. The patients were divided into two groups: those who received ketorolac within 24 hours after surgery and those who did not. The ketorolac was administered at 15 to 30 mg every six hours. The primary endpoints included repeat surgery for repair of a nonunion and time to union.

The subjects were 80 patients with 85 fractures in the ketorolac group (Group 1) and 233 patients with 243 fractures in the control group (Group 2). The average time to union of the femur was 147 days for Group 1 and 159 days for Group 2 (p=0.81). Healing time for the tibia was 175 days for each group. All patients with a nonunion in the study group were current smokers.

Conclusion: This study found that ketorolac used within 24 hours of lower extremity fracture surgery had no ill effect on fracture healing.

Donahue, D., et al. Ketorolac Administration in the Recovery Room for Acute Pain Management Does Not Affect Healing Rates of Femoral and Tibial Fractures. **J Orthopaedic Trauma.**DOI:10.1097/ BOT.0000000000000620

STROKE SYMPTOMS WITH ABSENCE OF RECOGNIZED STROKE IN OLDER PATIENTS WITH DIABETES.

Diabetes is a significant health concern, increasing the risk of cardiovascular disease, cognitive impairment, dementia, depression and the risk of ischemic stroke. Some have suggested that a large percentage of older adults without previously diagnosed stroke or TIA report having experienced at least one stroke symptom. This study examined stroke symptoms in older adults with diabetes but without a history of stroke or TIA to assess the association between the symptoms and cognitive impairment or depression.

Participants included community dwelling diabetic adults, 65 years of age or older. Participants completed telephone interviews which included diabetes specific health and psychosocial factors as well as performance-based cognitive testing. Stroke symptoms were assessed using the Questionnaire For Verifying Stroke Free Status (QVSS) with cognitive function assessed using the Modified Version of the Telephone Interview From Cognitive Status (TICS-M). Depressive symptoms were assessed using the Geriatric Depression Scale – Short Form (GDS). A logistic regression was used to examine the relationship between stroke symptoms and cognitive impairment.

Among the 206 participants, 27% endorsed one or more stroke symptoms with 12.6% reporting two or more symptoms. Overall, 96.5% of those endorsing one or more stroke symptoms also had at least one comorbid cardiovascular condition. Having greater than one stroke symptom was associated with a greater odds of cognitive impairment (odds ratio 3.04) and more depressive symptoms (p<0.001).

Conclusion: This study of older patients with diabetes found a high prevalence of self-reported stroke symptoms in the absence of diagnosis cerebrovascular disease, with these symptoms associated with cognitive impairment and depression.

Passler, J et al. Stroke Symptoms with Absence of Recognized Stroke are Associated with Cognitive Impairment and Depressive Symptoms in Older Adults with Diabetes. **J Geriatr Psych and Neur.** 2016, May; 29(3): 142 – 148.

INTENSIVE THERAPY IN CHRONIC STROKE

Recently, there has been increase interest in clinical research concerning the benefits of rehabilitation treatments for stroke survivors beyond the subacute period. This study provides a secondary analysis of the U.S. Department of Veterans Affairs' Robotic-Assisted Upper-Limb Neurorehabilitation in Stroke Patients (VA-ROBOTICS).

The primary objective of the VA-ROBOTICS study was to test the therapeutic benefit of robot-assisted therapy versus an active comparison group, with both groups providing intensive rehabilitation therapy. Subjects were at least six months post-stroke, divided into usual care, robot-assisted therapy or intensive comparison therapy. This secondary analysis combined the two intensive rehabilitation arms of this study to compare with usual care. The primary outcome measure was the Fugl-Meyer (FM) assessment, administered at 12 and 36 weeks. Secondary outcomes included the Wolf Motor Function Test (WMFT) and the Stroke Impact Scale (SIS) scores.

Subjects were 127 patients with moderate to severe upper limb impairment, six months or more post-stroke. The mean improvement was significantly better in the combined intensive therapy group compared to the usual care group in FM scores (p=0.005), and SIS scores (p=0.002), and were marginal for the WMFT scores (p=0.052).

Conclusion: This study suggests that intensive therapy in patients with subacute stroke may be beneficial in improving motor skills, although this difference attenuates over time.

Wu, X., et al. Effectiveness of Intensive Therapy in Chronic Stroke.

Neurorehab Neural Repair. 2016, July; 30(6): 583-590.

AGE EFFECT ON YOUTH SPORTS INJURIES

The relative age effect (RAE) is a phenomenon suggesting that children born in, or right after, a critical age cutoff month may have an advantage both in school and sports because of the physical and emotional maturity relative to peers. This study explored the importance of RAE as a predictor of sports injuries.

The study population consisted of children, 5-17 years of age, presenting to a Children's Hospital between 2000 and 2009. From the 121,047 patient visits a probability sample was randomly drawn. For each patient, the relative age for each sport was identified, defined as a child's birth month relative to the month his/her activity used as an arbitrary age cutoff. Data were reviewed for the association between injuries and the relative age at the time of injury.

The final study group included 1997 children. Among the pre-pubescent children, the relatively younger displayed a higher rate of injury relative to their older peers. In the pubescent group, more injured patients were born in the month of or after the cutoff.

Conclusion: This study of athletic injuries among children found that among pre-pubescent athletes, the relatively younger children displayed a higher risk of injury compared to their relatively older peers. The analysis of the pubescent age group found that the reverse may be true.

Straciolini, A., et al. The Relative Age Effect on Youth Sports Injuries. **Med Sci Sport Exer**. 2016, June; 48(6); 1068-1074.

STEROID INJECTION SITE FOR IDIOPATHIC FROZEN SHOULDER

Previous studies of frozen shoulders have demonstrated a radiographic enhancement and increased thickness of the joint capsule, as well as hypermetabolic lesions in the rotator interval, anterior joint capsule and axillary recess. This study compared the short-term effects of corticosteroid injections into different sites including the glenohumeral joint space, the subacromial space or both.

Subjects included 133 adult patients with idiopathic frozen shoulder. The subjects were randomized to receive ultrasound-guided injections using a solution of 40 mg of triamcinolone and 4 mL of 1% lidocaine, delivered at the glenohumeral joint (IA group), the subacromial space (SA group), or both sites (IA + SA group). The primary outcome measures included the ASES shoulder score, a visual analog scale (VAS) for shoulder pain with motion, subjective shoulder value (SSV) and passive range of motion. Assessments were performed before treatment and at three, six and 12 weeks after the injection.

All outcome measures in all groups were significantly improved at three, six and 12 weeks after the injection as compared with baseline ($p<0.001$). The improvement of the IA and IA + SA groups were significantly greater than that of the SA group for ASES scores, VAS pain scores, SSV scores, and internal rotation.

Conclusion: This study of patients with idiopathic frozen shoulder found that intra-articular injections alone or combined with subacromial injections resulted in better outcomes than did subacromial injections alone.

Cho, C et al. Proper Site of Corticosteroid Injection for the Treatment of Idiopathic Frozen Shoulder: Results from a Randomized Trial. **Joint Bone Spine**. 2016, May; 83(3):324-329.

CONCORDANCE OF ACTIGRAPHY WITH POLYSOMNOGRAPHY IN TBI

Sleep disturbance represents one of the more common presenting symptoms among patients admitted for rehabilitation with a diagnosis of traumatic brain injury (TBI). As recent studies have established that disturbance in sleep is an independent risk factor for poor recovery after TBI, evaluation of sleep seems important to monitor. While the gold standard method for sleep assessment is polysomnography (PSG), the complexity of including such evaluations in TBI settings precludes its common use. This study was design to assess the concordance of actigraphy (ACG) and PSG in patients with acute TBI.

This study included admissions to an inpatient rehabilitation center between 2009 and 2015. Beginning in 2013, all brain injury admissions were referred for PSG in the sleep laboratory with concurrent ACG. Actigraphy devices were placed on the nondominant wrist of the patient, with data scored using an automated algorithm. Patient clinical data were recorded including a Glasgow Coma Scale, Rancho Los Amigos scale, and modified Ashworth scale. The data obtained by the PSG and the ACG were compared for total sleep time and sleep efficiency.

The 50 study patients averaged 37.5 years of age with 64% having a severe TBI. Moderate to strong correlations were found between the ACG and PSG for total sleep time ($r=0.78$, $p<0.01$), as well as sleep efficiency ($r=0.66$, $p<0.01$).

Conclusion: This study of patients hospitalized with traumatic brain injury found that actigraphy is a valid proxy for monitoring sleep, with strong correlations found between actigraphy and polysomnography.

Kamper, J et al. Concordance of Actigraphy with Polysomnography and Traumatic Brain Injury Neurorehabilitation Admissions. **J Head Trauma Rehab.** 2016, March/ April; 31(2): 117–125.

A RESTRICTED ENVIRONMENTAL STIMULATION TECHNIQUE FOR GENERAL ANXIETY DISORDER

General anxiety disorder (GAD) is relatively common, with a lifetime prevalence of 5.7% and a 12 month prevalence of 3.1%. As a complementary and alternative medicine (CAM) technique, flotation–REST (restricted environmental stimulation technique) has been shown to reduce stress, anxiety, and depression, and to alleviate symptoms associated with GAD. This study evaluated flotation–REST as a treatment for patients with self-diagnosed GAD.

This randomized, parallel group, unblinded study included adult patients with GAD, randomized in a one-to-one ratio to a wait list control group or to a treatment group. Those in the treatment group underwent 12 sessions of 45 minutes in duration in isolation tanks of water saturated with Epsom salts, 0.3 mm deep at 35°C.

(Continued from page 2)

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The tanks were insulated to keep out sound and light, with earplugs provided to further minimize sensory input. The primary outcome was GAD–symptomatology with secondary outcomes including depression, sleeping difficulties, emotional regulation difficulties and mindfulness.

For the treatment group there was a significant reduction in GAD symptomatology as compared to baseline ($p<0.001$), which was not evident in the control group. In addition, significant reductions were noted in the treatment group for measures of emotional regulation, sleep difficulties and depression.

Conclusion: This study of patients with generalized anxiety disorder found that the flotation-restricted environmental stimulation technique may be an effective adjunctive treatment.

Jonsson, K., et al. Promising Effects of Treatment with Flotation–REST (Restricted Environmental Stimulation Technique) as an Intervention for Generalized Anxiety Disorder (GAD): A Randomized Controlled Pilot Trial. **BMC Complem Altern Med**. 2016; 16:108.

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