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BIOFEEDBACK AND PSYCHOMOTOR PERFORMANCE

The rate of learning and final task performance in a sporting event is affected by the amount of training, training conditions and quality of practice. Biofeedback is an emerging tool that can be used to support the learning process during the training of cognitive and psychomotor skills. This study explored the effect of biofeedback in optimizing psychomotor reactivity among basketball players

Thirty basketball players between the ages of 18 and 28 years were randomized to one of three groups, including an experimental group, a placebo group and a control group. The experimental group underwent heart rate variability biofeedback training for 10 consecutive days for 20 minutes per session. These training sessions included breathing at the individual's resonant frequency using pacing stimuli, a technique previously studied for targeting and modulating the autonomic nervous system. The placebo group was shown motivational basketball video clips for ten minutes daily for 10 days. The control group did not receive any training. Concentration, heart rate variability, respiration rate, response time and shooting performance were measured before intervention, after the 10-day intervention and one month after intervention. The shooting test was the total number of shots made within 90 seconds.

At baseline, the average number of shots made in 90 seconds by those in the experimental group, the placebo group and the control group were 5.3, 5.3 and 5.5 respectively. At the end of 10 days these averages improved in the experimental, the placebo and control group to 10.5, 6.8 and 7.0 respectively ($p < 0.001$). At one month follow up the averages of the three groups were 14.7, 6.1 and 6.7 respectively ($p < 0.001$). The response time, concentration, heart rate variability, and respiration were

all significantly more improved in the intervention group than in the control group.

Conclusion: This study demonstrates that biofeedback training may help athletes acquire control over physiological processes, allowing them to perform better and reduce stress.

Maman, P., et al. Role of Biofeedback in Optimizing Psychomotor Performance in Sports. *Asian J Sp Med.* 2012, March; 3(1): 29-40.

MOBILE PHONE USE AND GLIOMA RISK

The association between microwave radiation exposure from mobile phone use and the development of tumors in the central nervous system remains controversial. Based upon two recent studies, this exposure is now rated as a possible human carcinogen. One Swedish study, pooling data from two other studies, concluded that the use of mobile or portable phones resulted in a significant increase in the risk for developing a glioma. The current study compared the actual and the projected incidence trends for glioma in the United States, based upon the relative risks proposed by this and other studies.

Between 1992 and 2008, incidence data for brain cancer was obtained from a national database to identify 24,813 people diagnosed with a glioma. A latency period of 10 years was applied to reflect the exposure to mobile phones and the number of mobile phone subscriptions during that time period. The actual rates of glioma were then compared to expected rates, based upon the cumulative duration of phone use during that time and the projected glioma risk proposed by earlier studies.

Glioma rates were generally stable during the study period. Further, observed rates were much

lower than the rates predicted by the Swedish study. The data did not rule out a modest effect of phone use suggested by other studies.

Conclusion: This study found that the observed incidence of glioma was much lower than would be expected if cellular and mobile phones had a substantial effect on the development of gliomas.

Little, M., et al. Mobile Phone Use and Glioma Risk: Comparison of Epidemiological Study Results with Incidence Trends in the United States. *British Med J.* 2012; 344: EU 1147 DOI: 10.1136/BMJ. E1147.

GLUTAMINE SUPPLEMENTATION AND EXERCISE-INDUCED MUSCLE DAMAGE

Exercise-induced muscle damage is associated with impaired function and muscle soreness. Symptoms of muscle damage are most evident with eccentric exercises. Therapeutic nutrition interventions have been recommended for reducing symptoms of muscle damage following these exercises, although no studies have investigated glutamine. This study was designed to evaluate the effectiveness of oral glutamine supplementation as a therapeutic nutritional intervention for experimentally induced eccentric muscle damage.

Fifteen, physically active males were randomly assigned in a single blinded manner to control group or a glutamine intervention group. Each subject performed 100 drop jumps from a height of 0.6 m, followed by ingestion of either a placebo or glutamine at 0.3 g per kilogram of body mass. Baseline testing was followed by repeat testing of the same parameters, conducted at one, 24, 48, 72 and 96 hours following exercise.

Subjects in the glutamine group were found to have significantly better peak torque than those in the placebo

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group at 48 hours ($p=0.004$), 72 hours ($p=0.009$) and 96 hours ($p=0.009$). Muscle strength returned to pre-exercise levels by 72 hours in the glutamine group, but remained significantly reduced in the control group ($p=0.008$). Glutamine did not affect the magnitude of peak muscle soreness experienced, but did result in a more rapid reduction in soreness, as demonstrated by significantly lower muscle soreness at 96 hours as compared to the placebo group ($p=0.001$).

Conclusion: This study of patients with eccentric exercise induced muscle soreness found that glutamine supplementation after exercise can reduce strength loss and muscle soreness.

Street, B., et al. Glutamine Supplementation in Recovery from Eccentric Exercise Attenuates Strength Loss and Muscle Soreness. *J Exerc Sci Fit.* 2011, December; 9 (2): 116-122.

ANTERIOR CRUCIATE LIGAMENT INJURY AFTER PRIMARY RECONSTRUCTION

Approximately 90% of patients who suffer an anterior cruciate ligament (ACL) injury in the United States undergo reconstruction. Prior studies have indicated that patients who undergo such surgeries are at an increased risk of subsequent ACL injury, although data have been based upon proportion, rather than incident rate. This study was designed to better estimate the incidence rates of a second ACL injury in either the ipsilateral or contralateral knee, taking into account athletic exposure.

This prospective case control study included 63 athletes between 10 and 25 years of age who suffered a noncontact ACL injury with subsequent ACL reconstruction. All patients completed rehabilitation and were released to return to their previous level of activity. The patients were compared with a reference group of 39, young, healthy subjects. All subjects were asked to report any athletic activity, defined as participation in a game or a practice, as well as any new knee injuries. Injuries to the ACL were confirmed by arthroscopy or MRI. Incident rates were calculated as new injuries per 1,000 athletic exposures. All athletes

were followed for 12 months after return to sport.

During those 12 months, 25.4% of the subjects from the surgery group and 2.6% from the reference group sustained an ACL injury. Of the recurrent injuries, 75% occurred to the contralateral ACL. The rate of ACL injury was 15 times higher among those in the surgery group (1.82/1000 athletic exposures) than in the reference group (0.12/1000 athletic exposures).

Conclusion: This study found an increased incidence rate of ACL injury during the first 12 months after ACL repair and return to sport, especially among female athletes.

Paterno, M., et al. Incidence of Contralateral and Ipsilateral Anterior Cruciate Ligament (ACL) Injury after Primary ACL Reconstruction and Return to Sport. *Clin J Sp Med.* 2012; 22(2): 116-121.

NEGATIVE PRESSURE ON CLOSED SURGICAL INCISIONS

Some have suggested that negative pressure wound treatment (NPWT) over a closed surgical wound may stimulate blood flow, increasing oxygen saturation and angiogenesis. This study evaluated the effect of NPWT in reducing postoperative seromas.

Nineteen consecutive patients who had undergone total hip arthroplasty were randomized into two groups. Group A received standard wound dressing, while group B received NPWT. The surgical procedure and postoperative therapy and mobilization were identical for both groups. Both groups underwent diagnostic ultrasound examination of the wound, with volume measurement before and after surgery and then again at days five and 10. On the same days, blood was drawn to assess hemoglobin, leukocytes, platelets, international normalized ratio and C-reactive protein.

On day five, ultrasound showed fluid volumes of 22.0 ml for group A and 0.58 ml for group B ($p=0.102$). On day 10, the mean fluid volume for group A was 5.08 ml and for group B was 1.97ml ($p=0.021$). A seroma was present in 90% of patients in group A and 44% of those in group B. After five days, five patients in group A and one patient in group B had secretions from the wound. No significant

differences were seen in the lab values measured.

Conclusion: This prospective study of patients undergoing total hip arthroplasty found that the use of postoperative negative pressure wound dressings may reduce the occurrence of postoperative seroma.

Milena, P., et al. Negative Pressure Wound Therapy to Prevent Seromas and Treat Surgical Incisions after Total Hip Arthroplasty. *Int Orthopaedics*. 2012, April; 36(4): 719-722.

PULSED ULTRASOUND PROMOTES TENDON BONE INTERFACE HEALING

Despite improved surgical techniques, regeneration of tendon-bone interfaces has not been well achieved. As low intensity pulsed ultrasound (LIPUS) has been shown to benefit bone healing, this study examined the effects of LIPUS in promoting tendon-bone healing.

Eight sheep underwent surgery to sever and reattach the infraspinatus tendon. The animals were randomly allocated to either a LIPUS treated group or to a control group. The treatment group received LIPUS for 20 minutes, five days per week, beginning the day after surgery. After 28 days, the animals were sacrificed, with the repair sites undergoing evaluation by bone mineral density, histology and immunostaining analysis.

Bone mineral density, as assessed by micro-computed tomography, was 0.40 g/cm³ in the treatment group and 0.24 g/cm³ in the control group (p=0.008). Histologic evaluation of the control group revealed discontinuity between tendon and bone, whereas the treatment animals were found to have linearly arranged collagen fibers, intertwined with newly formed trabecular bone. In addition, vascularity was increased in the treatment group as compared to the control group. Markers of osteogenesis, including RUNX2 and angiogenesis, including vascular endothelial growth factor (VEGF) were found to have an increased expression in the experimental group (p=0.02 and p=0.038, respectively).

Conclusion: This animal study of rotator cuff repair found that low intensity pulsed ultrasound can

promote the healing of the tendon-bone interface.

Lovric, V., et al. The Effects of Low Intensity Pulsed Ultrasound on Tendon- Bone Healing in a Trans Osseous Equivalent Sheep Rotator Cuff Model. *Knee Surg Sp Traumatol Arthrosc*. DOI 10.1007/s00167-012-1972-z.

ULNAR NEUROPATHY AMONG TRIATHLETES

Since its founding, triathlon has grown significantly, with an estimated 2.3 million individuals completing a triathlon in 2010. For the cycling portion of the race, aerobars are often used, whereby the athletes' upper body weight rests on the elbows or forearms. Depending upon the fit of the bike, this may place pressure for extended periods on the ulnar nerve at the cubital tunnel. This study assessed the incidence of ulnar nerve symptoms and compression at the elbow in Ironman triathletes, and its relationship to the use of aerobars.

Study I involved 712 participants who completed a pre-race questionnaire of demographics, training history and ulnar symptoms. Study II included 101 subjects who completed a pre-race questionnaire, among whom 54 also underwent a pre-and post-race examination. Study III involved 11 subjects who completed the questionnaire and an examination including nerve conduction study, before and immediately after a three-hour ride using aerobars, and at eight months after the training season ended.

Of the athletes completing study I, 20.8% reported ulnar symptoms using aerobars. In study II, 35% reported symptoms. In study III, five of the 11 reported a history of numbness, tingling or pain along an ulnar distribution. Post-ride and post-season nerve compression studies demonstrated prolonged latency and decreased amplitude of the ulnar nerve at the elbow. Nerve conduction velocity at the elbow was significantly decreased only at the post-season evaluation. No athlete met the electrodiagnostic criteria for ulnar neuropathy.

Conclusion: This study suggests that cycling with aerobars positioned at the elbow may cause ulnar nerve symptoms and nerve conduction velocity changes.

Bales, J., Evaluation of Ulnar Neuropathy at the Elbow in Ironman Triathletes: Physical Examination and Electrodiagnostic Evidence. *Clin J Sport Med*. 2012, March; 22(2): 126-131.

EFFICACY OF TENECTEPLASE FOR ACUTE ISCHEMIC STROKE

Intravenous alteplase is the only approved treatment for acute ischemic stroke. However, for many patients, this medication results in incomplete and often delayed reperfusion. Tenecteplase is a genetically engineered mutant tissue plasminogen activator with some pharmacokinetic advantages over alteplase. This study further assessed the efficacy of tenecteplase for the treatment of ischemic stroke.

Seventy-five patients with acute ischemic stroke, all of whom were eligible for thrombolytic therapy, were randomized to receive either alteplase at 0.9 mg per kilogram of body weight, or tenecteplase at 0.1 mg or 0.25mg per kilogram of body weight. The primary endpoints were the proportion of the perfusion lesions that were reperfused at 24 hours, as assessed by perfusion weighted magnetic resonance imaging (MRI), as well as the extent of clinical improvement at 24 hours, as assessed by the National Institute of Health Stroke Scale (NIHSS).

The mean NIHSS score at baseline for all three treatments was 14.4. The two tenecteplase treatment groups demonstrated greater reperfusion (p=0.004) and clinical improvement (p<0.001) at 24 hours than did the alteplase group. There were no significant differences between the groups in serious adverse events. The higher dose tenecteplase group did have better outcomes than the low dose and the alteplase groups, including the absence of serious disability at 90 days (72% versus 40%; p=0.02).

Conclusion: This study of patients with acute ischemic stroke found tenecteplase to be superior to alteplase for the treatment of acute ischemic stroke.

Parsons, M., et al. A Randomized Trial of Tenecteplase versus Alteplase for Acute Ischemic Stroke. *N Engl J Med*. 2012, March 22; 366 (12): 1099-1107.

COGNITIVE AND PHYSICAL ACTIVITY FOR POST-STROKE FATIGUE

Post-stroke fatigue is reported to occur in 38% to 73% of stroke patients. Despite its persistent nature, no evidence-based treatments are routinely available to alleviate this symptom. This study investigated whether cognitive therapy, in conjunction with graded activity training (COGRAT), or cognitive therapy (CO) alone, can alleviate post-stroke fatigue.

Eligible patients had sustained a stroke at least four months before recruitment and presented with complaints of severe fatigue, without severe cognitive deficits or other severe medical comorbidities. Eighty-three patients were randomly assigned to receive either CO or COGRAT for 12 weeks. The CO group received weekly two-hour sessions of cognitive behavioral therapy and teaching of compensation strategies for pacing and relaxation. The COGRAT group received twice weekly, two hour sessions of graded activity training in addition to the CO treatment. The primary outcome measures included the Checklist Individual Strength Subscale Fatigue (CIS-f) and the Fatigue Self Observation List (SOL-f). Secondary outcomes included the Hospital Anxiety and Depression Scale, the Stroke Adopted Sickness Impact Profile 30, and a six-minute walk test. Outcome measures were collected at baseline, after the 12 week treatment and at six-month follow-up.

Of those completing the treatment, 68 were available for follow-up. Both groups significantly improved in CIS-f and SOL-f scores ($p < 0.001$ and $p = 0.007$, respectively), with those in the CONGRAT group demonstrating greater improvement in their CIS-f scores and physical endurance ($p < 0.001$). More patients in the CONGRAT group showed clinically relevant improvement on the CIS-f than did those receiving CO only.

Conclusion: This study demonstrates that a 12-week cognitive therapy program, combined with graded physical activity, can reduce persistent fatigue among patients with stroke.

Zedlitz, A., et al. Cognitive and Graded Activity Training Can Alleviate Persistent Fatigue after

Stroke: A Randomized, Controlled Trial. *Stroke*. 2012, April; 43(4): 1046-1051.

PAIN AND DISABILITY RETIREMENT

Retirement due to disability often involves health, diseases, functional decline and adverse working conditions. In Finland, the primary medical causes of disability retirement are musculoskeletal diseases and mental disorders. Pain is a major disabling element in many musculoskeletal diseases and is likely to contribute to disability retirement. As few studies have examined the association between pain and disability retirement, this study examined this potential relationship. Data for this study were gathered from the Helsinki Health Study Questionnaire Survey and the Finnish Nation Pension Registry. Questionnaires were mailed to all employees of the city of Helsinki, Finland, reaching 40, 45, 50, 55 and 60 years of age in the years 2000, 2001 or 2002. The questionnaires queried subjects about pain and health measures, sociodemographic and socioeconomic factors and work conditions. Pain was classified as acute if lasting up to three months and chronic if lasting longer. Data were obtained from 6,258 individuals, with a mean follow-up of 8.1 years.

Participants were followed until retirement due to age, reaching the age of 63, death or until the end of 2010. A total of 632 employees retired due to disability during the follow-up period. Of the respondents, 10% of women and eight percent of men, retired due to disability. The prevalence of disability retirement was higher among those with low social support or high job strain. A Cox regression analysis showed that, if acute pain, but no long-standing illness, was reported at baseline, the hazard ratio (HR) for disability retirement was 1.61, compared to those having neither pain nor long-standing illness. If chronic pain was present, the HR of disability retirement was 2.99. If the individual reported both acute pain and long-standing illness at baseline, the HR of disability retirement was as high as 3.64. The corresponding HR for chronic pain was 6.59 and long-standing illness, compared to no pain or long-standing illness. The associations were particularly strong

for disability retirement due to musculoskeletal diseases.

Conclusion: This study found that chronic pain contributes to disability retirement, both with and without concurrent, long-standing illness.

Saastamoinen, P., et al. Pain and Disability Retirement: A Prospective Cohort Study. *Pain*. 2012, March; 153(3): 526-531.

SEVERITY OF AUTONOMIC DYSFUNCTION AFTER ISCHEMIC STROKE

Obtaining medical measures to predict functional outcome after stroke is important both for prognosis and for the establishment of appropriate therapeutic options. While some measures, such as age, and initial stroke severity are agreed upon as strong predictors, the impact of autonomic changes on functional outcome have not been well studied. This study investigated the association between autonomic dysfunction and functional outcome after ischemic stroke.

Thirty-four consecutive, acute ischemic stroke patients were enrolled in the study. The subjects were at least 45 years of age and had sustained an MRI/CT verified ischemic stroke. Participants also underwent assessment with the NIH Stroke Scale, evaluation of activities of daily living by the Barthel Index and measurement of global disability with the modified Rankin Scale (mRS). The BI and mRS were repeated at two months. Autonomic function was evaluated within seven days of stroke with the Ewing's Battery, with patients categorized as having normal/minor autonomic dysfunction or relatively severe autonomic dysfunction.

Sixty-six percent of the participants had relatively severe/severe autonomic dysfunction. Measurements at two months demonstrated improvement in both groups as compared with admission scores (BI; $p < 0.05$) and (mRS; $p < 0.05$). Greater improvement was noted in scores on the Barthel Index among those with minor autonomic dysfunction at admission, as compared to those with more severe dysfunction ($p = 0.001$).

Conclusion: This study of patients with acute ischemic stroke found that severe autonomic

dysfunction is related to less favorable functional outcome.

Xiong, L., et al. Preliminary Findings of the Effects Of Autonomic Dysfunction on Functional Outcome after Acute Ischemic Stroke. **Clin Neurol Neurosurg.** 2012; 114(4): 316-320.

COMPLICATIONS OF FLUOROSCOPICALLY DIRECTED FACET BLOCKS

Chronic spinal pain in the United States is often treated with various modalities, including epidural and facet joint nerve blocks. While severe complications of facet nerve blocks have been reported, the overall complication rate is thought to be low. This study was designed to better understand the complication rate and side effects of facet joint nerve blocks.

This prospective study included all patients at the authors' clinic presenting for fluoroscopically guided facet joint nerve blocks between May of 2008 and December of 2009. Data gathered included a pre-enrollment evaluation, description of the intervention and complications. Each patient was contacted within 48 hours after the procedure to assess for side effects and complications. Measured outcomes included intravascular entry of the needle, profuse bleeding, local bleeding, local hematoma, oozing, bruising, dural puncture, headache, nerve root or spinal cord irritation with injury, infectious complications, numbness, postoperative soreness and increased pain.

No major complications were identified as resulting from the 7,482 facet joint procedures. Among the minor complications, intravascular penetrations were found in 4.3%, with the highest rate occurring with adhesiolysis and lumbar transforaminal procedures. Local bleeding was seen in 63%, although profuse bleeding was seen in only 0.5%. Transient nerve irritation was noted in 0.85%, with the highest rate, 4.6%, in lumbar transforaminal procedures.

Conclusion: This study of 7,500 episodes of 43,000 facet joint nerve blocks found that major complications are extremely rare, while minor side effects are common.

Manchikanti, L., et al. Complications of Fluoroscopically Directed Facet

Joint Nerve Blocks: A Prospective Evaluation of 7,500 Episodes with 43,000 Nerve Blocks. **Pain Physician.** 2012, March/April; 15(2): EU 143-EU 150.

EARLY PASSIVE MOTION AFTER ROTATOR CUFF REPAIR

The success of rotator cuff repair depends upon the surgical technique and post-operative care. The nonhealing rate of rotator cuff repair remains as high as 20-90%. Early range of motion is recommended to prevent stiffness and muscle atrophy. This study assessed whether early passive motion after arthroscopic rotator cuff repair affects functional outcome.

Between August of 2007 and July of 2009, 117 consecutive patients were followed. All were diagnosed with small to medium rotator cuff tears. All were scheduled for arthroscopic rotator cuff repair. The patients were divided into two groups, with group I to begin passive range of motion the day after surgery and group II allowed no passive range of motion until brace removal at four to five weeks post-surgery.

Shoulder range of motion and a visual analogue scale for pain were checked at four to five weeks, and then again at three, six and 12 months. Functional outcomes were assessed with the Constant Score, the Simple Shoulder Test (SST) and the American Shoulder and Elbow Surgeons' (ASES) score. Anatomical outcome was assessed at three to six months after repair and by CT/MRI at least one year after surgery.

At six and 12 months, no significant differences were seen between groups on any ROM measures. The pain scores were also similar between groups at both six and 12 months' follow-ups. Finally, there were no significant differences on any of the functional outcome scores between groups at six or 12 months. Imaging at one year revealed that the tendon was healed in 88% of group I and 82% of group II (p=0.429).

Conclusion: This study of patients with rotator cuff tear and arthroscopic repair found that early passive range of motion does not add to the functional outcomes of these patients.

Kim, Y., et al. Is Early Passive Motion Exercise Necessary after

Arthroscopic Rotator Cuff Repair? **Am J Sp Med.** 2012, April; 40(4): 815-821.

RED MEAT CONSUMPTION AND MORTALITY

While many studies have shown that consumption of red meat is associated with an increased risk of diabetes, cardiovascular disease and certain cancers, few rigorous studies have investigated the relationship between red meat consumption and mortality. This study explored the association between red meat intake and cause specific, as well as total, mortality.

Data were analyzed from two prospective cohort studies, including 37,698 men participating in the Health Professionals Follow-Up Study and 83,644 women participating in the Nurses Health Study. All were free of cardiovascular disease and cancer at baseline and were followed until 2008. Food intake was assessed by validated food frequency questionnaires, with these measures updated every four years. The subjects were queried about both processed and unprocessed meat consumption, as well as medical problems and lifestyle. Data were analyzed for comparisons between red meat consumption and cause specific, as well as total, mortality during follow-up.

After combining both cohorts of patients, 23,926 deaths were documented during 2.9 6 million person-years of follow-up. Men and women with higher intake of red meat were less likely to be physically active, and more likely to be current smokers, to drink alcohol and have a higher body mass index. Unprocessed and processed red meat intake was associated with an increased risk of total, cardiovascular disease, and cancer related mortality in both men and women.

The risk of total mortality in the pooled analysis was elevated by 13% for one serving per day of unprocessed red meat, and 20% for processed red meat. Substitution analysis revealed that, replacing one serving of total red meat with one serving of fish, poultry, nuts, legumes, low-fat dairy products or whole grains daily was associated with a lower risk of total mortality. The authors estimated that, of total deaths, 9.3% in men and 7.6% in women could be prevented if all participants consumed

fewer than 0.5 servings per day of total red meat.

Conclusion: This large, prospective study found that higher intake of red meat is associated with a significantly elevated risk of total, cardiovascular and cancer mortality, with a relatively greater risk for processed meat.

Pan, A., et al. Red Meat Consumption and Mortality. *Arch intern Med.* 2012, April 9; 172(7): 555-563.

NONINVASIVE VENTILATION IN AMYOTROPHIC LATERAL SCLEROSIS

Motor neuron disease, in particular amyotrophic lateral sclerosis (ALS), is marked by progressive impairment of motor functions, resulting from the degeneration of upper and lower motor neurons. Often patients with motor neuron disease develop respiratory weakness, which can result in respiratory failure, leading to substantial morbidity and mortality. While noninvasive ventilation (NIV) has been shown to improve symptoms and quality of life, few patients have received this treatment. This population-based study looked at data regarding the use of NIV among patients with motor neuron disease.

Data were reviewed for patients referred for NIV, comparing those treated from 1995 to 1999 to those treated from 2000 to 2004. The frequency of use of NIV significantly increased in the later time frame among patients attending tertiary ALS centers ($p=0.0001$). The median tracheostomy free survival period from symptom onset was 2.4 years, as compared to 2.8 years among those who underwent NIV ($p=0.74$). The overall, median survival time after initiation of NIV was 289 days. The three-year survival rate was 13.2%, while the five-year survival rate was 5.7%. No significant difference in survival from symptom onset was found between patients who did and those who did not undergo NIV.

Conclusion: This British study found increased use of noninvasive ventilation among patients with ALS between the years 1995 and 2004.

Chio, C., et al. Noninvasive Ventilation in Amyotrophic Lateral Sclerosis: A Ten-Year, Population-

Based Study. *J Neurol Neurosurg Psychiatry.* 2012, April; 83(4): 377-381.

ULTRASOUND TO EVALUATE BONE STRESS INJURIES

Overuse injuries are common among elite track and field athletes, with bone stress injuries accounting for a significant percentage of these. Recently therapeutic ultrasound (TUS) has been found to be a potential tool for the diagnosis of these injuries, as application of TUS to the injured site may produce pain. This study assessed the sensitivity and specificity of TUS for diagnosing these injuries.

This study was completed with 113 elite track and field athletes diagnosed with bone stress injury. All presented with exercise-induced pain, limiting their performance. At physical examination tenderness was limited to a localized area. All underwent evaluations with both MRI and TUS. The contralateral leg served as a control. The subjects were classified as having, or not having, pain with the application of TUS. The MRI findings were graded to five stages and were compared with the findings of the TUS.

The MRI findings demonstrated that 77 (68.2%) of the patients had a grade three injury, with the tibia bone the most commonly affected site. At TUS there was no injury detected (no pain) in 22 of the 113 patients. Using MRI as the reference for detecting stress injury, the TUS showed 81.8 % sensitivity and 66.6% specificity.

Conclusion: This study of elite track and field athletes found that therapeutic ultrasound is a reliable technique as a first line modality for diagnosing bone stress injuries.

Papalada, A., et al. Ultrasound as a Primary Evaluation Tool of Bone Stress Injuries in Elite Track and Field Athletes. *Am J Sp Med.* 2012, April; 40(4): 915-919.

VITAMIN D LEVELS AND INFLAMMATORY SPINAL CORD DISEASE

Prior research has suggested that low vitamin D levels are associated with an increased risk of developing multiple sclerosis (MS), and are also associated with an increase in the relapse rate in patients with known

MS. Unknown, however, is the influence of vitamin D levels on monophasic or recurrent, non-MS spinal cord diseases, including transverse myelitis and neuromyelitis optica. This study investigated the association between low serum vitamin D levels and recurrent, non-MS spinal cord disease.

This retrospective study included patients who had had total 25-hydroxyvitamin D levels drawn at the Johns Hopkins Transverse Myelitis Center and Neuromyelitis Optica clinic within the previous six years. Subjects included 44 patients with monophasic inflammatory spinal cord disease, and 33 with recurrent disease. Patients with monophasic disease had been disease-free for at least one year, without immunomodulatory or immunosuppressive treatment. Vitamin D levels were compared between the two groups.

The mean hydroxyvitamin D levels were 33 ng/ml in the monophasic group and 18 ng/ml in the recurrent group ($p=0.002$). After adjusting for demographic variables, including age, race, gender and season, the total 25 hydroxy D levels in patients with recurrent disease averaged 10 ng/ml lower than those of patients with monophasic disease. Levels of disability or mobility did not differ by vitamin D level.

Conclusion: This retrospective study of patients with inflammatory spinal cord disease found an association between lower vitamin D levels and recurrent disease.

Mealy, M., et al. Low Serum Vitamin D Levels and Recurrent Inflammatory Spinal Cord Disease. *Arch Neurol.* 2012, March; 69(3): 352-356.

ACUTE PARTIAL TRANSVERSE MYELITIS

Multiple sclerosis (MS) is a common inflammatory disease of the central nervous system, characterized by symptom variability and an unpredictable course. The first attack of MS, also called clinically isolated syndrome (CIS), usually consists of optic neuritis, brainstem involvement and/or partial myelitis. This study assessed the long-term risk for conversion from acute partial transverse myelitis (APTMs) to MS.

A total of 85 patients with no prior neurological history, who presented with APTM, were studied in three

French university hospitals. Demographic data and clinical features were noted on admission. Also at admission, the patients underwent magnetic resonance imaging (MRI) of the spine and brain, with the revised criteria of McDonald used for diagnosing MS. The participants also underwent visual evoked potentials and lumbar puncture for cerebrospinal fluid analysis. All were followed with a clinical evaluation for three, six and nine months, and then yearly, after the occurrence of APTM.

The mean age at symptom onset was 36.7 years, and the mean follow-up period was 104.8 months. At the end of follow-up, 62% of the patients were classified as having MS, with the remaining largely diagnosed with APTM of undetermined etiology. Patients with MS more frequently had cerebral spinal fluid oligoclonal bands (92% versus 38%), abnormal brain MRI findings (54% versus 0%) and abnormal visual evoked potential results (43% versus four percent) at the time of presentation than did those with APTM of undetermined etiology. Logistic regression analysis identified two variables as risk factors. These included brain abnormalities (OR of 7.74) and oligoclonal bands (OR of 15.76).

Conclusion: This study of patients presenting with acute, partial, transverse myelitis found that independent factors predictive of conversion to multiple sclerosis included cerebral spinal fluid oligoclonal bands and at least one magnetic resonance imaging detected brain lesion.

Bourre, B., et al. Long-Term Follow-up of Acute Partial Transverse Myelitis. *Arch Neurol.* 2012, March; 69(3): 357-362.

ALCOHOL CONSUMPTION AND STROKE RISK IN WOMEN

A number of studies have demonstrated that the risk of stroke is reduced by light to moderate alcohol intake. A recent meta-analysis revealed a greater risk reduction for stroke with low to moderate alcohol consumption among women than men. However, relevant, prospective cohort data are limited. This study further explored the association between alcohol intake and risk of total, ischemic and hemorrhagic stroke among women.

Data were analyzed from the Nurses' Health Study, including 83,578 women ages 30 to 55 surveyed between 1980 and 2006. Participants were free of cardiovascular disease and cancer at baseline. Alcohol consumption was assessed at baseline and every four years thereafter. Stroke and other possible confounding data were assessed at baseline and twice annually. Alcohol consumption was quantified as zero, zero to 4.9g/day, five to 14.9 g/day, 15 to 29.9 g/day or 30 to 45 g/day. The primary endpoints were total, ischemic and hemorrhagic stroke.

Overall, heavier consumption of alcohol was associated with a higher prevalence of current smoking, a history of hypertension, increased physical activity and lower body mass index as compared to those who abstain. Over 26 years of follow-up, women with low (zero to 4.9g/day) and moderate (five to 14.9 g/day) consumption had a lower risk of total stroke than did abstainers. Women who consumed 30 to 45 g/day had no greater risk of total stroke, but a greater risk of stroke was observed for alcohol intake of greater than 36 g/day. There was no association between alcohol consumption and risk of hemorrhagic stroke when compared to abstinence.

Conclusion: This study demonstrates that light to moderate alcohol consumption is associated with a lower risk of total stroke in women.

Jimenez, M., et al. Alcohol Consumption and Risk of Stroke in Women. *Stroke.* 2012, April; 43(4): 939-945.

MUSIC INTERVENTION FOR CHRONIC PAIN

For the last several decades, music therapy has been found to be useful as an adjunct to the treatment of pain. Music therapy has been shown to be a mood inducer, affecting the cognitive, affective and behavioral functions of the brain. This study investigated the effect of music intervention on chronic pain.

Eighty-seven patients, hospitalized with lumbar pain, fibromyalgia, inflammatory disease or neurological disease, were divided into two groups, a control group of 44 patients and an intervention group of 43 patients. For the treatment group,

during the first 10 days, at least two daily 20 minute sessions of music therapy were completed, followed by music therapy at home until day 60. The control group received only standard treatment. At baseline and at days 10, 60 and 90, efficacy of pain reduction was measured with a visual analogue scale, while anxiety and depression were measured with the Hospital Anxiety and Depression Scale (HAD). Medication consumption was also recorded.

At day 60, those in the music intervention group enjoyed a significantly greater reduction in pain than did the controls ($p < 0.001$). In addition, those in the intervention group had significantly reduced depression scores ($p < 0.001$), as well as reduced consumption of anxiolytic medications at day 60 ($p = 0.028$). For both of these, a nonsignificant trend persisted at 90 days. The consumption of antidepressants and analgesics, although trending lower in the treatment group, were not significantly different at days 60 or 90.

Conclusion: This study suggests that music therapy can help reduce chronic pain and anxiety when added to traditional treatments.

Guetin, S., et al. The Effects of Music Intervention in the Management of Chronic Pain: A Single Blind, Randomized, Controlled Trial. *Clin J Pain.* 2012, May; 28(4): 329-337.

HYPERLACTATEMIA AND FUNCTIONAL OUTCOME AFTER STROKE

An elevation in lactate is considered to be a marker of the metabolic stress response, and is associated with increased mortality in critically ill patients. In previous studies, lactate has been shown to accumulate in ischemic brain lesions among patients with acute stroke. This study was designed to determine whether elevated lactate is associated with poor outcome and/or death among patients with ischemic stroke.

This retrospective, observational study was completed at a tertiary hospital between April of 2010 and March of 2011. All patients admitted to the emergency department with a diagnosis of ischemic stroke were eligible for inclusion. A total of 292 patients were enrolled. Lactate and glucose levels were obtained at presentation to the emergency

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Ravid Avraham, M.D.
Matthew Edel, D.O.
UT SW Medical Center, Dallas TX

*Rachel Hallmark, M.D., Ph.D.
UVA, Charlottesville, VA

*Elaine Tsao, M.D.
University of Washington, Seattle, WA

*Bonnie Weigert, M.D.
Michelle Faull, D.O.
University of Wisconsin, Madison, WI

*Donald Tower, D.O.
Mohammed Agha, M.D.
William Carter, M.D.
Dave Powell, MD
VCU, Richmond, VA

*Angela Tripp, M.S., M.D.
Sachin Kumar Bansal, M.D.
Shawn Furst, D.O.
Jon Kronberg, M.D.
Mahesh Mohan, M.D.
Washington University, St. Louis, MO

Executive Editor Emeritus

Donald F. Langenbeck, Jr., M.D.

Subscription Manager

Michael P. Burke, M.S.

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department, while a National Institutes of Health Stroke Scale (NIHSS) score was recorded at admission. Poor outcome was defined as a Modified Rankin Scale score of two or more, measured at three months.

At presentation, elevated lactate levels were found in 24% of the patients. No significant difference was seen between those with normal, and those with elevated lactate levels upon reviewing demographics, risk factors, NIHSS scores or those undergoing thrombolysis. Assessment of clinical outcomes at three months demonstrated that 75.7% of those in the elevated lactate group had poor outcomes, as compared with 58.6% of those in the normal lactate group ($p=0.01$).

Conclusion: This retrospective study of acute ischemic stroke demonstrates that elevated lactate at the emergency department presentation is an independent risk factor for poor outcome at three months.

Sion, J., et al. Initial Hyperlactatemia in the ED is Associated with Poor Outcome in Patients with Ischemic Stroke. *Am J Emerg Med.* 2012, March 1; 30(3): 449-455.

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