MEMORY FUNCTION BEFORE AND AFTER STROKE

A number of studies have reported that dementia and cognitive impairment are higher among stroke survivors than among age matched, stroke free adults. Recent evidence suggests that acute stroke follows a long period of accumulating cerebrovascular injury, possibly associated with subtle ischemic injury, silent stroke and stroke symptoms. This study used 10 years of data to describe the long-term pre- and post-stroke trajectories of memory function among stroke survivors.

Data were obtained from the Health and Retirement Study, a nationally representative cohort study initiated in 1992. Analysis for this paper included non-institutionalized Americans, 50 years of age or older in 1998. From among the participants, 18,987 who were stroke free at baseline were identified. The patients were interviewed twice yearly for up to 10 years. Memory was assessed with immediate and delayed recall tests, as well as by proxy informants using a five-item Likert scale and a 16-item version of the Informant Questionnaire for Cognitive Decline. At each interview, the patients were assessed for incident stroke.

Of the 17,340 patients included in the final analysis, 1,189 (6.9%) survived a stroke, while 385 (2.2%) experienced a stroke and did not survive. Among the stroke survivors, memory function significantly declined with each additional year of age, both before and after stroke, with a large decrement at the time of stroke onset. The average, annual pre-stroke memory decline was greater among those who did not survive the stroke as compared to those who did survive (p<0.001). As the time of stroke onset approached, the decline of memory function accelerated. Compared with annual memory decline in stroke free participants, memory decline occurred most rapidly among those who experienced a fatal stroke, followed by those who survived a stroke (p<0.001).

Conclusion: This study of elderly individuals found a faster memory decline in the years before stroke among stroke patients, compared with those who remain stroke free, with this decline accelerated among those who would suffer a fatal stroke.


COGNITIVE FUNCTION IN SEVERE ASYMPTOMATIC CAROTID STENOSIS

Asymptomatic stenosis of the internal carotid artery is defined as significant atherosclerosis without stroke or transient ischemic attack. While previous studies have noted an association between this stenosis and cognitive impairment, little is yet known concerning how these cognitive alterations are related to disruptions in brain connectivity. This study evaluated structural and functional connectivity, as they relate to cognitive impairment among patients with severe asymptomatic carotid stenosis.

This study included 17 patients with severe, unilateral stenosis of the internal carotid artery, defined as greater than 70% stenosis on the ipsilateral side and less than 50% stenosis on the contralateral side. Twenty-six individuals with less than 50% stenosis of large cerebral arteries were recruited as controls. Outcome measures included the dizziness handicap inventory, the Mini Mental State Examination, the Taiwan Geriatric Depression Scale, working memory, verbal memory, attention, executive function and a complex visual spatial perception test. Diffusion tensor imaging and resting state functional connectivity magnetic resonance imaging (fcMRI) data were obtained for all subjects.

Compared with controls, the cases had significantly greater severe dizziness scores (p<0.001) and poorer cognitive performance on the working memory and verbal memory tests (p=0.03 and p=0.01, respectively). The case group had significantly reduced whole-brain mean fractional anisotropy and functional connectivity, particularly in the interhemispheric fronto-parietal network (between bilateral dorsal lateral prefrontal cortices and bilateral anterior inferior parietal lobules) and the intrahemispheric fronto-parietal network (dorsal lateral prefrontal cortices–anterior inferior parietal lobules ipsilateral to the stenosis) and the default mode network (PCC–hippocampus and PCC–medial prefrontal cortex). The whole brain FA was correlated with the Symbol Digit test scores of attentional function (p=0.005) and immediate recall scores of verbal memory function (p=0.03) in patients, but not in controls.

Conclusion: This study of patients with asymptomatic carotid stenosis found patterns of brain network disruption which correlated with symptoms of dizziness and impaired cognitive performance.


WHEELCHAIR WHEEL SIZE AND PERFORMANCE

Wheel size affects the rolling resistance of the wheelchair user, with greater resistance experienced with smaller wheels at a given
A SIMPLE TEST FOR PREDICTION OF MEDIAL TibIAL STRESS SYNDROME

The medial tibial stress syndrome (MTSS) is a common and debilitating condition associated with both running and walking activities. The typical symptoms include pain along the posterior medial border of the tibia, occurring during exercise. This study was designed to assess two clinical tests for their ability to predict the onset of MTSS. Three hundred eighty-four Australian Defense Force Academy officer cadets ages 17 to 19 years were screened with preparticipation musculoskeletal exams. Included within this exam were the two MTSS techniques. The shin palpation test (SPT) was performed by palpating the distal two thirds of the posterior medial border of the tibia and associated musculature bilaterally. In addition the shin oedema test (SOT) was performed, involving sustained palpation of the distal two thirds of the medial surface of the tibia, with signs of pitting oedema recorded. The results of these tests were compared with those for later onset of MTSS.

Conclusion: This study describes two simple clinical tests that predict those at greater risk for developing medial tibial stress syndrome.


ABDOMINAL SYMPTOMS DURING PHYSICAL EXERCISE

Up to 70% of endurance athletes experience gastrointestinal (GI) symptoms during exercise. During exercise, splanchnic blood flow is redistributed to the working muscles and skin, at the expense of GI perfusion. This study illustrates a clinical practice for diagnosing these patients.

Patients were referred for evaluation of exercise induced GI complaints between 1999 and 2010. All underwent a standardized protocol, including prolonged exercise tonometry. Gastric and jejunal ischemia were defined as a serum lactate level of less than 8 mmol, increased luminal PC02 and a gastric gradient of >0.8 kPa, or a jejunal gradient of >1.4 kPa. In addition, imaging of the splanchnic arteries was performed. During the study period, 1,005 patients were referred for suspected GI ischemia. Twelve were specifically referred for evaluation of exercise induced GI symptoms, with an average age of 29 years. The most
frequently reported upper GI symptoms were nausea (55%), gastro-oesophageal reflux (30%) and vomiting (18%). The most frequently reported lower GI symptoms included abdominal cramp (75%) followed by the urge to defecate (25%). Of these athletes, GI ischemia was found in six athletes during submaximal exercise, with all athletes demonstrating both gastric and jejunal ischemia during maximal exercise.

Conclusion: This study of athletes with exercise-induced abdominal symptoms found that GI ischemia is common during maximal intensity exercise.


HIP MUSCLE STRENGTHENING AND Patelofemoral Pain Syndrome

Patellofemoral pain syndrome is a common overuse disorder, which is traditionally addressed by knee strengthening exercises and stretching. Some have suggested that strengthening of the hip musculature may also be important when addressing this condition. This study assessed whether a hip strengthening program, in addition to a conventional knee exercise program, can improve the outcomes of these patients.

Fifty- four sedentary women with unilateral patellofemoral pain syndrome were randomly assigned to either a knee exercise group (KE) or a knee and hip exercise group (KHE). The knee extension exercises were completed at 70% of the estimated one repetition maximum, involving knee flexion and extension exercises, as well as calf raises. The KHE group also performed hip abduction, abduction, lateral rotation and hip extension exercises. The patients were involved in 12 treatment sessions, three times per week for four weeks. Outcome measures included an 11-point numeric pain rating scale, along with the Lower Extremity Functional Scale and the Anterior Knee Pain Scale, completed at three, six and 12 months.

The KE subjects demonstrated decreased pain while ascending stairs at six months and while descending stairs at three and six months, and improved single hop test performance at three, six and 12 months after treatment. However, the KHE subjects demonstrated significantly less pain and showed improved function as compared to the KE group on all outcome measures at three, six and 12 months (p<0.05 for all comparisons).

Conclusion: This study of sedentary females with patellofemoral pain syndrome found that supplementing knee strengthening exercises with hip abductor, lateral rotator and extensor strengthening exercises is more effective for improving function and reducing pain than is knee strengthening alone.


SLEEP DISTURBANCE IS AN EARLY MARKER FOR DEMENTIA IN PARKINSON'S DISEASE

In addition to the motor symptoms of patients with Parkinson's disease (PD), many experience non-motor symptoms, which may precede motor symptoms and adversely affect quality of life. This study examined the relationship between cognitive dysfunction and non-motor symptoms in newly diagnosed PD.

This study included 66 patients who were dopaminergic drug naïve, newly diagnosed with PD, under 70 years of age and had no significant cerebral lesions as demonstrated on MRI or CT. All completed a baseline Non-Motor Symptoms Questionnaire (N M S Q u e s t) and a neuropsychological battery. Those who failed two or more cognitive tests were diagnosed with mild cognitive impairment. Follow-up was conducted at one year.

At least one non-motor symptom was identified in all but three patients, including anxiety in 56%, sadness in 46%, acting out during dreams in 38%, loss of interest in 35% and forgetfulness/memory in 33%. Approximately 38% of the patients fulfilled the criteria for mild cognitive impairment. Acting out during dreams was associated with immediate (p<0.0001) and delayed (p<0.0001) recall. Insomnia was related to impairments in cognitive testing, including performance on the Constructional Apraxia Test (p=0.008), the copy task of the Rey Copy Rey-Osterrieth Complex Figure Test (p=0.004), the Stroop Color-Word Test interference task (p=0.005) and the Benton Judgment of Line Orientation Test (p<0.05).

Conclusion: This study of patients seen early in the course of Parkinson's disease found a correlation between sleep disturbance and cognitive dysfunction.


BLOOD AMMONIA AND NEUROLOGIC OUTCOME IN CARDIAC ARREST

Out of hospital cardiac arrest occurs in approximately one of 2,500 adults in the developed world each year. Treatment with hypothermia is thought to reduce brain injury in comatose survivors with cardiopulmonary arrests. As recent studies have suggested that serum ammonia and lactate levels may be predictors of neurologic outcome after cardiac arrest, this study investigated the association between neurologic outcome and laboratory measures among patients hospitalized for out of hospital cardiac arrest.

This study was conducted at a university emergency department, and included patients 18 years of age or older who were successfully resuscitated after non-traumatic out of hospital cardiac arrest, and were then treated with therapeutic hypothermia. Hospital records were reviewed for demographic and medical data. Unconscious patients with Glasgow Coma Scale scores of less than nine after resuscitation were treated with therapeutic hypothermia. Hospital records were reviewed for demographic and medical data. Unconscious patients with Glasgow Coma Scale scores of less than nine after resuscitation were treated with therapeutic hypothermia and admitted to the intensive care unit. The target temperature was 32° to 34°C for 24 hours. Laboratory measures were obtained at arrival and included CBC, WBC, hemoglobin level, platelet count, arterial blood gas, ionized calcium, lactate and serum biochemistry data, including ammonia. After one month, the
patients were categorized by neurologic outcome using the Cerebral Performance Category (CPC).

Of the 140 patients admitted, 137 completed the hypothermia protocol. A univariate analysis found that among the blood measurements, those correlated with neurologic outcome included hemoglobin level, pH, PaCO2, PaO2, BE, albumin, potassium, chloride, total bilirubin, phosphorus and ammonia. The poor outcome group had a lower hemoglobin level as compared to the good outcome group (p<0.000). A multivariate logistic regression analysis found that noncardiac causes of the arrest, blood ammonia levels and the time interval from collapse to resuscitation were significantly related to worse neurologic outcome.

Conclusion: This study of patients with cardiac arrest treated with therapeutic hypothermia found that blood ammonia at hospital admission is predictive of neurologic outcome at one month.


INCIDENCE OF SUDDEN CORONARY ARREST DURING MARATHONS

The most common cause of death for runners during a marathon is sudden cardiac arrest (SCA). Most victims of exercise-related SCA have no premonitory symptoms. This study was designed to estimate and characterize the risk of SCA in marathon runners.

A Web-based survey was sent to all of the medical directors of the United States marathons who had supervised events from 1976 to 2009. This survey addressed 33 items surrounding the runners that experienced SCAs. Details of the SCA and resuscitation efforts were requested. If the athlete did not survive, medical information, including autopsy, was requested.

Of the 1.7 million runners included in the medical directors’ response, the incidence of SCA was one in 57,000 runners, with a death rate of one in 171,000 runners. Of these, 93% occurred in men, with a median age of 49 years. The incidence was highest in the last four miles of the race. Of the fatalities, coronary artery disease accounted for 70% of the deaths. Automated external defibrillator use was associated with increased survival of runners (p=0.0026).

Conclusion: This study suggests that the incidence of sudden cardiac arrest during marathons is one in 57,000. Those cases in which an automated external defibrillator was available and used resulted in significantly fewer deaths.


RISK OF DEPRESSION WITH SELF-REPORTED CONCUSSIONS IN PROFESSIONAL FOOTBALL

Annually, an estimated 1.7 million people sustain a traumatic brain injury (TBI) in the United States. For adolescents and young adults, sports contribute to a substantial portion of these injuries, particularly to mild TBI or concussion. Some have suggested that there may be a dose response between concussions and an increased risk for depression and dementia later in life. This study was designed to prospectively determine the nine-year risk of a diagnosis of depression in former professional football players.

In 2001, the General Health Survey was sent to all living members of the NFL Retired Players Association. In 2010, a follow-up was sent to those who had completed the initial survey. Included were questions about the number of concussions that they had sustained. In addition, the athletes were questioned about diagnosed medical conditions such as depression, arthritis, coronary heart disease, stroke, cancer and diabetes.

A total of 1,044 respondents completed both questionnaires. Between 2001 and 2010, 10.2% reported having been diagnosed as clinically depressed. Of the 64.2% who reported still suffering from depression in 2010, 34% were still being treated with antidepressant medications. Of the 1,044 respondents, 35% reported no concussions during their careers, 25.8% reported one to two concussions, 19.5% reported three to four concussions, 12.9% reported five to nine concussions and 6.8% reported 10 or more concussions.

The nine-year risk of a depression diagnosis ranged from three percent in the no concussion group to 26.8% in the 10 or more concussions group (p<0.001).

Conclusion: This study of former professional football players found a linear relationship between self-reported concussions and the subsequent diagnosis of clinical depression.


COLLAGEN MENISCUS IMPLANT FOR LATERAL MENISCAL DEFECTS

The menisci are critical to knee joint health. The collagen meniscus implant (CMI) is a meniscal scaffold made of collagen type I fibers purified from bovine Achilles tendons. Preliminary reports suggest reasonable safety and early return to midterm good clinical results using the scaffold. This study further evaluated the safety and efficacy of such a scaffold for repairing partial lateral meniscal defects.

Between April of 2006 and April of 2009, 25 consecutive patients with partial lateral meniscal injuries were enrolled in this study. All had non-repairable, acute lateral meniscal tears requiring partial meniscectomy or partial traumatic or degenerative loss of lateral meniscal tissue. All received an arthroscopically placed lateral CMI. A knee brace, locked in full extension, was placed for six weeks and removed four times per day for continuous passive motion.

After two weeks, progressive weight-bearing was started, while isometric muscle strengthening began on the second postoperative day. At six months, the patients were allowed to return to full unrestricted activity. The participants were evaluated at six-month and two-year follow-ups with the Lysholm, a visual analogue scale (VAS) for pain, the Tegner index, the International Knee
while postoperative measures, obtained at a median of two years, included the AOFAS hindfoot scale and a physical examination. A postoperative MRI evaluated the surgical site for evidence of recovery.

At follow up seven patients were free of pain, 11 had mild pain, two had occasional pain, one had moderate daily pain and three had severe, almost always present pain. At MRI follow-up, the mean reduction in lesion volume was 30%. In two cases, the lesion disappeared. In 11 cases, the lesion was completely filled with repair material, in 11 cases, it was partially refilled, and in four it was only slightly refilled with repair tissue. Age and body weight did not influence the reduction in volume or defect filling.

Conclusion: This study of patients with osteochondral lesions of the talus found that, at two year follow-up, the majority of patients reported no or only mild pain.


PEDIATRIC INTRA-ARTICULAR INJECTIONS AFTER ELBOW SURGERY

Pediatric supracondylar fractures are the most common elbow fractures in the pediatric population. Closed reduction and percutaneous pinning is the standard treatment. This study evaluated the efficacy of intra-articular elbow injections on postoperative pain after such procedures.

This randomized, single-blind study included patients between four and 12 years of age. All had experienced Garland type II or type III fractures. The participants were randomized into three groups; group C (control) received no injections (n=43), group R received 0.2% ropivacaine injections (n=39), and group B received 0.25% bupivacaine injections (n=42). All injections were performed immediately after surgery, with the subjects then placed in a bivalved long arm cast. Analgesics that were administered after surgery were recorded. Pain was assessed with the Faces Pain Scale -Revised, and the Parent Total Quality Pain Management Survey. Measurements were taken preoperatively, intraoperatively, postoperatively and after discharge.

A significantly lower opioid consumption was noted in group B as compared with group C (p=0.036) with nonsignificant differences between group R and group C (p=0.06). Significantly less over-the-counter analgesic use was seen in group B, as compared with group C, on postoperative days one and three. The parentally reported pain scale results were significantly lower in group B than in group C for pain while in the PACU and for worst pain at rest and worst pain with movement (p=0.005, p=0.014 and p=0.011, respectively).

Conclusion: This pediatric study of patients with humeral fractures, all undergoing surgical repair, found that postoperative, intra-articular bupivacaine injections may result in significant postoperative pain.


SPENDING IN THE UNITED STATES IN AMBULATORY SPINE CARE CENTERS

In recent years, the prevalence and expenditures of spinal conditions in the United States have increased significantly. Total expenditures for the care for low back pain (LBP) is estimated to be $90 billion. This study used the Medical Expenditure Panel Survey (MEPS) to examine US expenditures on common ambulatory health services for the management of back and neck conditions.

This study analyzed data from respondents to the MEPS survey from 1999 to 2008. The survey was conducted annually by the Agency for Healthcare Research and Quality (AHRQ) to gather information on adults who sought care for a primary diagnosis of a spine condition. Type of service was recorded, and total expenditures were aggregated and converted to 2008 dollars.

From 1999 to 2008, six percent of US adults visited a health care provider for a spine condition. Ambulatory visits fluctuated between
over the 10-year period, peak in the year 2002. When subdivided, expenditures on primary care physician services were stable, while expenditures on specialty care services increased. During the study period, expenditures for chiropractic care were stable, and those for physical therapy expenditures contracted.

**Conclusion:** This study demonstrates that, over 10 years ending in 2008, the annual expenditures on medical care for patients with back and neck conditions increased by 95%, with most of this increase occurring through the use of specialty medical services.


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**SPA THERAPY FOR LOW BACK PAIN**

Balneology, or spa therapy, is a treatment modality which uses thermal-mineral water for therapeutic purposes. A number of studies have suggested beneficial effects of spa therapy, primarily in musculoskeletal disorders. This study was designed to determine the effect of high mineral content in thermal water, as compared with that of tap water, for use in spa therapy.

Sixty patients with chronic low back pain (LBP), ages 40 to 79 years, were randomized into two groups. A treatment group received 15, daily, 30-minute balneotherapy sessions for three weeks, while a control group received the same treatment with tap water. The treatment water was of extremely high mineral content, dominated by sodium, hydrogen carbonate, chloride lithium and bromide. The participants were assessed using a visual analogue scale (VAS), the amount of non-steroidal anti-inflammatory disease (NSAID) medications used, the mobility of the lumbar spine, the Oswestry Disability Questionnaire and quality-of-life questionnaires. All were assessed at treatment end and at three and 10 weeks after therapy.

At the end of treatment, the VAS for LBP at rest and on exertion, mobility of the lumbar spine and responses to the Oswestry questionnaire improved significantly more in the treatment group as compared with baseline. These improvements persisted at three and 10 weeks after therapy. By contrast, no significant changes occurred in the control group. In the treatment group, quality-of-life was significantly improved at the end of treatment and for three weeks follow-up, with reversed trends observed for control subjects. Consumption of NSAIDs decreased significantly at the end of therapy in the treatment group, with no change seen in the control group.

**Conclusion:** This randomized, single-blinded study of patients with low back pain found that high mineral balneotherapy may be effective for relieving symptoms and improving quality of life.


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**PRAMIPEXOLE FOR RESTLESS LEG SYNDROME**

Restless leg syndrome (RLS) is characterized by an urge to move the legs, and is often associated with uncomfortable sensations. RLS is also often associated with insomnia, affecting both sleep onset and maintenance. The mainstay of treatment for daily RLS involves dopamine agonists, although their long-term use in clinical practice is often constrained by the development of side effects and augmentation in many patients. This study evaluated the effect of pramipexole, a non-ergot agonist, for patients with RLS.

This cross-sectional study included 50 patients diagnosed with RLS, all of whom began treatment with pramipexole between 1998 and 1999. Data were obtained from a retrospective chart review, a written survey and telephone interviews. Those data obtained included pramipexole dosage, adequacy of symptom control, and adverse effects. For RLS, augmentation was defined as earlier onset of symptoms, increased severity, duration, or new anatomic distribution of symptoms.

Fifty patients were studied, with a mean onset of RLS at 42 years of age. All had daily RLS, with impaired quality of life. Treatment duration varied from 0.6 to 12 years, with a median of 9.68 years. The median, initial effective dose was 0.3 mg/d, with a median dose at the end of the study of 0.63 mg/d. Forty-eight patients required increased dosage over time. Those adjustments were judged to be due to augmentation in 42% of the patients. At the date of final contact, pramipexole was found to be completely effective in controlling RLS symptoms in 40%, partially effective in 58% and ineffective in 2%.

**Conclusion:** This study of patients with restless leg syndrome found that pramipexole may decrease in efficacy over time, requiring dose increases. Even with increases, only 40% of the patients in this study enjoyed complete relief at long-term follow-up.


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**PAROXETINE FOR SLEEP PROBLEMS AND CANCER PATIENTS**

Many cancer patients experience difficulties with sleep, sadness and fatigue. Sleep problems are reported by 30-50% of newly diagnosed cancer patients, with pain and sleep issues the most frequently distressing symptoms seen during chemotherapy in breast cancer patients. While sleep disturbances and depression are linked, it is unclear whether depression precedes or follows the sleep disturbance. This study examined the effect of antidepressants on sleep problems in patients with cancer.

Patients diagnosed with cancer who were beginning chemotherapy were recruited from 18 oncology practice groups participating in the National Cancer Institutes Community Clinical Oncology Program. All were...
involved in a randomized, controlled trial examining the impact of paroxetine on fatigue in patients receiving chemotherapy. Eligible patients were randomized to receive either 20 mg of paroxetine or a placebo. Sleep problems were assessed using the Hamilton Depression Inventory, administered three times during the course of chemotherapy. Patients who reported difficulty falling asleep, staying asleep or early-morning awakening on at least one to two nights per week were coded as having sleep problems. Those who had difficulty at least three days a week for two weeks were coded as having severe sleep problems. In addition, depression was assessed using the Center for Epidemiological Studies Depression scale (CES-D).

Of the participants, 73.2% reported difficulty falling asleep, 56% reported waking in the middle of the night and 65% reported waking earlier than intended in the morning. At the end of the study, the treatment group had significantly fewer sleep problems than did the placebo group (p=0.01). In the paroxetine group, the percentage with severe sleep problems improved from 57.7% at baseline to 44% at final follow-up. While the placebo and treatment groups were similar at baseline, at final follow-up, 20.7% of the treatment group and 12% of the placebo group were characterized as good sleepers. Paroxetine worked equally well for those who were depressed and those who were not.

Conclusion: This study provided support for the use of an antidepressant, paroxetine, in patients undergoing chemotherapy for a cancer diagnosis.


RED MEAT AND STROKE RISK

A high consumption of red meat, especially processed meat, has been associated with an increased risk of morbidity and mortality due to cardiovascular disease and cancer. This systematic review and meta-analysis was designed to better understand the relationship between red meat consumption and the risk of ischemic and hemorrhagic stroke.

The analysis included six studies, including a total of 10,890 stroke cases and 328,495 participants. These all involved a prospective design and documentation of participants’ exposure to fresh red meat, processed meat and/or total red meat consumption, with outcomes of interest including stroke and stroke subtypes. The data were analyzed to explore the risk of stroke and stroke subtypes for each category of meat consumption.

The relative risk of total stroke for each one 50 g serving per day increment of total red meat consumption ranged from 1.1 to 1.14. For processed red meat, the relative risk ranged from 1.09 to 1.18. Analyzing by stroke subtypes, the risk of ischemic stroke was found to increase for each serving per day of fresh red meat by a relative risk of 1.13, processed red meat by 1.15 and total red meat consumption by 1.12. No significant association was seen between hemorrhagic stroke and consumption of red meat.

Conclusion: This meta-analysis found that consumption of both fresh red meat and processed red meat may increase the risk of total and ischemic stroke, but not of hemorrhagic stroke.


MEMANTINE AND THROMBOLYSIS AFTER STROKE

The thrombolytic agent recombinant tissue type plasminogen activator (tPA) is the only approved acute treatment for ischemic stroke. In addition to its ability to promote fibrinolysis, tPA is also a positive neuromodulator of N-Methyl-D-Aspartate (NMDAR) receptors, leading to increased sensitivity of neurons to excitotoxicity. As NMDAR mediated excitotoxicity is thought to be a major cause of neuronal death after stroke, NMDAR antagonists may provide neuroprotection when using tPA. This study was designed to explore this concept.

The in-vitro portion of this study involved cultured cortical neurons prepared from Swiss mouse embryos. Excitotoxicity was induced at 12 to 13 days in vitro by exposure to NMDA. NMDA was applied alone or together with rtPA and/or memantine at one, five or 10 µmol per liter. Oxygen and glucose deprivation was performed in a hypoxic chamber. In addition, male Swiss mice underwent thrombotic stroke induction, and then were treated with rtPA with or without memantine. The animals next underwent evaluation by MRI, as well as a series of behavioral tests.

The in vitro study demonstrated a dose-dependent prevention of NMDA mediated neuronal death, with near complete prevention at 10 µmol per liter (p<0.05). In the in vivo model, T2-weighted MR images 15 days post ischemia showed that animals with late rtPA-induced thrombolysis had a smaller cortical volume than those treated with memantine. The survival of the animals treated with rtPA after ICH was increased among those treated with memantine (p<0.05).

Conclusion: This study provides in vitro and in vivo evidence supporting the use of memantine as an adjunct therapy to improve the safety of tPA thrombolysis.


COMPRESSIVE LOADS AND BONE LOSS AFTER SPINAL CORD INJURY

Severe osteoporosis can develop rapidly after a spinal cord injury (SCI) and can result in fractures during routine daily activity. Some studies have demonstrated that passive standing may not significantly affect bone mineral density (BMD), while higher loads may have bone sparing effects. This study compared the effects of three doses of bone compressive load on BMD loss among patients with SCI.

This study included 28 individuals with motor complete SCI who were randomized to receive either unilateral quadriceps stimulation in a supported stance to produce loads of 150% body weight (High Dose), passive standing with approximately 40% body weight (Low-Dose) or no...
standing (Untrained). Those in the standing groups were instructed to train themselves five times per week. In addition, 14 participants without SCI provided normative data. The BMD was assessed between one and six times over three years using peripheral quantitative computer tomography (pQCT).

The high-dose group was found to have higher bone mineral density than both the low dose and the untrained groups, with no significant difference found between the latter two groups. A high-resolution CT revealed 86% higher bone mineral density and 67% higher trabecular width in the high-dose limb compared to the low-dose limb.

Conclusion: This study of patients with complete spinal cord injury found that compressive loads of 150% body weight in an upright stance can significantly reduce the rate of bone mineral density decline over three years of training.


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**REHAB IN REVIEW**

Cancer Rehabilitation Director Jonah Fox, MD at Emory’s Winship Cancer Center