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CAPSAICIN INDUCED NERVE DEGENERATION

Capsaicin is an agonist of the transient vanilloid receptor type 1 (TRV1) that functions as an integrator of noxious chemical and physical stimuli. Physiological desensitization of nociceptor neurons follows initial activation, although, with repeat application, neural degeneration has been seen. As previous studies have focused on these effects on small sensory neurons, this study assessed the effect on cutaneous autonomic nerves.

Thirty-two, healthy subjects, ages 20 to 52 years, were recruited for this study. A 50 x 80 mm. area on the right forearm was identified as a discrete testing region. After the first day of testing, an occlusive bandage was placed, containing 2.4 g of 0.1% capsaicin cream or a placebo. The bandage was applied for 48 hours. Twenty subjects received capsaicin, while 20 received placebo. Subjects were evaluated with sudomotor, vasomotor, pilomotor and sensory testing on days one, three, six, nine, 16, 30, 58, 100 and 150. All underwent a total of five skin biopsies, performed during the course of the study, four in the region of the capsaicin/placebo application and one in the contralateral forearm.

In the skin treated with capsaicin, greater reductions were noted in sudomotor, vasomotor, pilomotor and sensory function as compared with placebo ($p < 0.01$). A more rapid decline was noted in sensory nerve function than in autonomic nerve function, with the peak decline in sensory function noted at day six, and in autonomic nerve function at day 16. The density of sensory nerves was also found to decline at a similar rate. Autonomic nerves regenerated to baseline levels by day 50, while sensory fibers regenerated by day 150.

Conclusion: This study found that topical application of capsaicin

can lead to deterioration of both sensory and autonomic nerve fibers.

Gibbons, C., et al. Capsaicin Induces Degeneration of Cutaneous Autonomic Nerve Fibers. *Ann Neurol.* 2010, December; 68: 888-898.

VERY EARLY MOBILIZATION AFTER STROKE

The most rapid recovery after a stroke occurs within the first six months. This study investigated whether early and more intensive, out of bed activity after stroke could reduce the time to unassisted walking and improve independence in activities of daily living.

This prospective, randomized, controlled trial included patients who were at least 18 years of age with a diagnosis of stroke. Baseline assessments included age, gender, stroke type, stroke severity, stroke risk factors and a pre-stroke functional assessment. The patients were randomized to receive either very early, intensive mobilization, within 24 hours of stroke or standard stroke unit care (the control group). The early mobilization group was targeted to be upright and out of bed twice per day, doubling the usual care dose.

Participants were assessed at baseline, after seven and 14 days, and then at three, six and 12 months post-stroke. The primary outcome measure was the time to walking 50 meters without assistance. Patients were also measured with the Barthel index and the Rivermeade Motor Assessment, each administered at three and 12 months.

Seventy-one patients with stroke completed the study. The very early mobilization group walked independently at an average of 3.5 days, compared with seven days for the usual care group ($p = 0.032$). Multivariate regression analysis

revealed that exposure to very early and intensive mobilization is independently associated with a good functional outcome, as measured by the Barthel index at three months ($p = 0.008$) as well as by the Rivermeade Motor Assessment at three and 12 months ($p = 0.05$, and 0.024, respectively).

Conclusion: This prospective study of patients with acute stroke found that very early mobilization after stroke may accelerate functional recovery.

Cumming, T., et al. Very Early Mobilization after Stroke Fast Tracks Return To Walking: Further Results from the Phase II AVERT Randomized Controlled Trial. *Stroke.* 2011, January; 42: 153-158.

VIBRATION FOR UNSTABLE ANKLES

Functional ankle instability is a condition characterized by repetitive episodes of ankle sprain, and is thought to result from both injury of passive structures and neurologic impairments. Whole body vibration training has been found to improve balance scores in certain populations. This study investigated the effects of full body vibration training on dynamic balance among patients with functional ankle instability.

Thirty-eight female dancers from a university dance department were studied. All reported unilateral, chronic ankle instability, with a recurrent feeling of "giving way." All subjects were initially tested for single leg static balance and for dynamic balance, using the Star Excursion Balance Test (SEBT), and for muscle fatigue. All were then randomized to receive either whole body vibration training while participating in single leg exercises or to a control group. The exercise was increased in duration, and vibration increased in frequency, as training progressed.

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The control group continued their normal training regimens.

Significantly greater improvements were noted for the vibration group in static balance, as well as in the anterior, anterior medial, medial, and anterior lateral planes of the SEBT, than in the control group ($p < 0.05$ for all). No significant difference was seen between the groups in recovery from muscle fatigue.

Conclusion: This study of patients with chronic ankle sprains found that whole body vibration training may improve single leg balance and excursion performance.

Cloak, R., et al. Vibration Training Improves Balance in Unstable Ankle. *Int J Sports Med.* 2010, December; 31(12): 894-900.

ALENDRONATE VERSUS VITAMIN D IN POST-STROKE FALL PREVENTION

Vitamin D supplementation may reduce falls in the ambulatory elderly through a number of mechanisms, including its effect on bone mineral density. However, no prior studies have examined whether vitamin D supplementation can reduce falls in elderly patients after a stroke. This study compared the efficacy of alendronate to that of alphacalcidol in reducing the risk of falling associated with reduced serum 1,25-[OH]₂D levels in a group of institutionalized, elderly stroke survivors.

Subjects included post-stroke patients with hemiparesis who were least one year post-event. The participants were randomly assigned to receive either alendronate, at 35 mg per week, or alphacalcidol, at one microgram per day. The number of falls and hip fractures was recorded during the one-year treatment period. Pre- and post-bone mineral density, serum iodized calcium levels, parathyroid hormone levels and 1,25-[OH]₂D measurements were collected.

During the pre-treatment period, 79 falls were recorded, including 32 in the alendronate group and 41 in the alphacalcidol group. In both groups, mean serum 1,25-[OH]₂D concentration was approximately 22 pg/mL. Of the 77 falls recorded during the one-year follow-up period, 10 occurred in the alendronate group and 67 in the alphacalcidol group.

After adjusting for covariates, treatment with alendronate was found to be associated with a 65% reduction in falls ($p < 0.0005$). During the 1-year study period, hip fracture due to falling occurred in 1 case in the alphacalcidol group and in 0 cases in the alendronate group.

Conclusion: This study of elderly, post-stroke patients with immobilization hypercalcemia found that alendronate can increase 1,25-[OH]₂D levels and decrease the rate of falls. In contrast, vitamin D supplementation was not associated with any significant reduction in falls.

Sato, Y., et al. An Open Label Trial Comparing Alendronate and Alphacalcidol in Reducing Falls and Hip Fractures in Disabled Stroke Patients. *J Stroke Cerebrovasc Dis.* 2011, January-February; 20(1): 41-46.

SELECTIVE SEROTONIN REUPTAKE INHIBITORS, MOTOR RECOVERY AND INDEPENDENCE AFTER STROKE

After an ischemic stroke, various interventions have been found to modulate brain plasticity and reduce neurologic deficits and disability. This study sought to determine whether fluoxetine, a selective serotonin reuptake inhibitor (SSRI), could reduce motor deficits if given early after an ischemic stroke.

Patients with an acute ischemic stroke resulting in hemiparesis or hemiplegia were prospectively enrolled from nine stroke units in France. The subjects were between the ages of 18 and 85 years, with Fugl-Meyer Motor Scale (FMMS) scores of 55 or less at baseline. Patients were excluded if they had scores of over 20 on the National Institutes of Health Stroke Scale. The participants were randomly assigned to receive either fluoxetine, at 20mg per day, or a placebo. Both groups received physical therapy and were assessed for motor function, independence and depression, all measured at zero, 30 and 90 days. The primary outcome measure was the mean change in FMMS score between inclusion (day zero) and day 90. Analyses were completed, controlling for age, history of stroke and baseline modified Rankin scale score.

A total of 113 patients were included in the final analysis. At 90 days, FMMS scores were significantly better in the fluoxetine group than in the placebo group ($p=0.003$). At three months, the groups did not differ in NIHSS total scores, although motor scores were significantly better in the fluoxetine group than in the placebo group.

Conclusion: This study of ischemic stroke patients presenting with moderate to severe motor deficits found that early treatment with fluoxetine may improve motor recovery at three months.

Chollet, F., et al. Fluoxetine for Motor Recovery after Acute Ischemic Stroke (FLAME): A Randomized, Placebo-Controlled Trial. *Lancet Neur.* 2011, January; 123-130.

TOPIRAMATE DOSE EFFECTS ON COGNITION

Topiramate (TPM) is a broad spectrum, antiepileptic drug with approved indications for epilepsy in children and adults, and for migraine prophylaxis in adults. The cognitive side effects of this medication have previously been described, although the degree to which cognitive impairment is affected by dose or habituates over time is not well known. Thus, this study explored those variables.

The Topiramate Obesity Trial was conducted at 17 cities in the United States over one year. A total of 385 subjects entered the double-blind phase of the obesity trial and were randomly assigned to receive placebo ($n = 76$), 64 mg/day TPM ($n = 76$), 96 mg/day TPM ($n = 78$), 192 mg/day TPM ($n = 76$) or 384 mg/day TPM ($n = 79$). Among the participants, a computerized neuropsychological assessment was performed on 188 cognitively normal adults. This assessment was completed at baseline and at weeks six, 12 and 24. Comparisons were made between dosing groups.

A dose effect was observed, demonstrating no significant cognitive decline at TPM doses of 64 or 96 mg, while declines in cognition were noted for doses of 192 mg ($p<0.01$) and 384 mg ($p<0.0001$). The neuropsychological ability most sensitive to changes in TPM was visual memory, with significant

declines beginning at the 96 mg dose.

Conclusion: This study of the neuropsychological effects of topiramate found that cognitive impairment is dose dependent, with significant effects beginning at doses of 192 mg per day.

Loring, D., et al. Topiramate Dose Effects on Cognition. *Neur.* 2011, January 11; 76(2): 131-137.

ANTIEPILEPTIC DRUGS AND NONTRAUMATIC FRACTURES

Antiepileptic drugs (AEDs) are associated with greater bone density reduction in postmenopausal women. This study explored the relationship between AED use and non-traumatic fractures in those older than 50 years of age.

This retrospective, matched cohort study used data from the Population Health Research Data Repository, housed at the Manitoba Centre for Health Policy, capturing nearly all residents of the province of Manitoba, Canada. Subjects were individuals 50 years of age or older who had reported non-traumatic fractures to a primary care physician. Each of those subjects was matched with up to three controls, for gender, degree of comorbidity and ethnic status. Exposure to AEDs was determined. These medications included carbamazepine, clonazepam, ethosuximide, gabapentin, phenobarbital, phenytoin and valproic acid. Epileptic drug exposure was classified as non-use, past use, or current use.

A total of 15,792 patients met the case definition for non-traumatic fracture. These cases were matched for age, gender, ethnicity and number of AEDs taken. The adjusted odds ratio for fracture associated with AED treatment ranged from 1.2 to 1.47. The most common fracture site was the wrist, followed by the hip and the vertebra. The only drug that was not associated with increased fracture was valproic acid.

Conclusion: This study of persons 50 years of age or older found that most AEDs studied were associated with an increased risk of non-traumatic fracture.

Jette, N., et al. Association of Antiepileptic Drugs with Non-

Traumatic Fractures. *Arch Neur.* 2011, January; 68(1): 107-112.

GLIOMA RELATED SEIZURES, TREATED WITH ANTI-EPILEPTICS

First-generation anti-epileptic drugs such as phenytoin have been used to treat seizures in patients with glioma, although second generation drugs such as levetiracetam have recently been trialed. This study compared the responses of two cohorts of patients, each group treated with one of these two medications.

This retrospective study identified 500 patients enrolled in clinical trials between 2001 and 2008 in the Mayo Clinic database. Study participants had experienced at least one clinical seizure and were initiated with monotherapy using either phenytoin or levetiracetam. Seizure outcomes and side effects were compared between the two cohorts. The primary outcome measures were seizure treatment efficacy, as measured by time to second seizure and overall seizure frequency.

Seventy-six patients were identified, with 25 treated with phenytoin and 51 treated with levetiracetam. After adjusting for age, gender, type of seizure and type of glioma, no significant difference was found between the two groups in the average number of monthly seizures or the time to second seizure. Side effects were noted in 20% of the phenytoin group and in 5.9% of the levetiracetam group.

Conclusion: This study of patients with a glioma associated first seizure found no significant difference between those taking phenytoin and those taking levetiracetam in time to second seizure or total number of seizures, although more side effects were noted in the phenytoin group.

Merrell R., et al. Seizures in Patients with Glioma Treated with Phenytoin and Levetiracetam. *J Neurosurg.* 2010, Dec; 113: 1176-1181.

NEUROLOGIC IMPROVEMENT AFTER SPINAL CORD INJURY

Predicting neurologic improvement after spinal cord injury (SCI) is a complex process. This study reviewed a large sample of patients with spinal cord injury,

differentiating neurologic improvement by anatomical region.

This project reviewed the progress of 1,746, consecutive patients with SCI treated at a level I trauma center. A total of 150 patients with T4-S5 injury were selected for analysis, 95 of those having one-year follow-up data. Neurologic improvement was compared by level and severity of injury.

Of the patients with lumbar injuries, 92.9% improved at least one ASIA level, as compared with 22.4% of those with thoracic or thoracolumbar injuries. Of the patients with ASIA A injuries, 7.7% showed neurologic improvement, as compared to 95.2% of those with ASIA D injuries. When considered jointly, ASIA A and thoracic/thoracolumbar patients had only a 4.1% rate of improvement, as compared to 96% of those with lumbar or ASIA B-D injuries ($p < 0.001$ for all relationships).

Conclusion: This study of patients with spinal cord injury found that those with thoracic and thoracolumbar injuries have a much worse chance of neurologic improvement than those with lumbar injuries.

Harrop, J., et al. Neurologic Improvement after Thoracic, Thoracolumbar and Lumbar Spinal Cord (Conus Medullaris) Injuries. *Spine*. 2011, January; 36(1): 21-25.

CRITICAL GASTROINTESTINAL BLEEDING IN INPATIENT REHABILITATION

Prophylaxis against gastrointestinal (GI) bleeding is commonly used in hospital settings. This study sought to determine the incidence of critical GI bleeding in an inpatient rehabilitation center.

This retrospective study included all patients admitted to an inpatient rehabilitation center from November 7, 1997, to July 1, 2008. Critical GI bleeding was defined as that which directly led to hemodynamic instability, requiring transfer from the rehabilitation setting and/or emergent management. These cases were compared with control patients who were admitted on the same or an adjacent day, and who did not experience a critical GI bleed.

A total of 11,645 adult patients were admitted during the study

period. During that time, 30 developed a critical GI bleed (0.3%). The average age of the bleed patients was 66.34 years and that of the control patients 62.97 years. After adjusting for prophylactic use of heparins, risk factors found to be significantly associated with a critical GI bleed included diabetes, colonic disease and use of glucocorticoids. After adjusting for full dose anticoagulant treatment with warfarin, heparins or clopidogrel, significant risk factors for a critical GI bleed included diabetes, glucocorticoid use, alcohol use, renal insufficiency and colonic disease. Four of the 35 cases were not receiving any gastrointestinal prophylaxis medication prior to or during the inpatient rehabilitation stay. However, gastrointestinal prophylaxis was not found to be protective against a critical GI bleed.

Conclusion: This retrospective study of patients on an inpatient rehabilitation unit found the incidence of critical GI bleeding to be 0.3%.

Faulk, C., et al. Critical Gastrointestinal Bleeding at an Inpatient Rehabilitation Center: Incidence, Risk Factors and the Role of Gastrointestinal Prophylaxis. *PM&R*. 2010, December; 2: 1104-1112.

SHOCKWAVE THERAPY FOR HAMSTRING TENDINOPATHY

Proximal hamstring tendinopathy (PHT) produces ill-defined pain, especially while performing sports activities. As the pathologic changes have been found to be similar to those observed in other tendinopathies, this study assessed the effectiveness of treatment of PHT with shockwave therapy (SWT).

Between 2004 and 2006, 40 patients with MRI verified, chronic PHT were enrolled in the study. The subjects were randomized to receive either SWT or traditional, conservative treatment, consisting of nonsteroidal anti-inflammatory drugs, physical therapy and a strengthening program focused on the hamstring muscles. The SWT was delivered weekly for four weeks at 2,500 shocks per session, with a total energy flux density of 450 mJ/mm² per session.

The patients were assessed before treatment, at one week, and at

three, six and 12 months for self-rated pain and for pain and activity limitations, as measured by the Nirschl Phase Rating Scale (NPRS). The primary treatment outcomes included a decrease of three points on the self-rated pain score and a two-phase decrease in the NPRS score, as measured at three months.

At three-month follow-up, a significant reduction in self-reported pain was noted, along with a significant treatment-time interaction ($p < 0.001$ for both). This improvement was not found in those in the conservative treatment group. In addition, significant improvement was noted on the NPRS at three months ($p < 0.001$), with worsening seen in the conservative treatment group. By three months post-treatment, 85% of the patients in the shockwave group and 10% in the conservative treatment group had achieved a reduction of at least 50% of their pain ($p < 0.001$).

Conclusion: This study of patients with chronic proximal hamstring tendinopathy found that shockwave therapy may be an effective treatment for the pain associated with this overuse syndrome.

Cacchio, A., et al. Shockwave Therapy for the Treatment of Chronic, Proximal Hamstring Tendinopathy in Professional Athletes. *Am J Sports Med*. 2011, January; 39(1): 146-163.

ULTRASOUND GUIDED INJECTIONS FOR HIP OSTEOARTHRITIS

Osteoarthritis (OA) of the hip is a common and increasing cause of disability worldwide. For those with significant symptomatic OA, joint injection is one potential option, although not widely used. With increased use of ultrasound (US) to perform injections, this procedure can be performed with increasing certainty of placement. This study assessed the efficacy of US guided injection with either steroid or hyaluron.

This prospective, randomized trial included 77 patients with the OA of the hip. Those subjects were randomized to one of four groups: standard care (no injection), saline injection, steroid injection or hyaluronan injection. All of the injections were completed with US

guidance, with the practitioner held blind to the recruitment group. Improvements in pain, function and global assessment were measured at one, four, eight and sixteen weeks post-injection.

Significant improvements were noted over eight weeks in the steroid group in numerical rating scale pain (NRS) scores for worst pain, and in Western Ontario and McMaster Osteoarthritis Index (WOMAC) pain and function scores ($p = 0.002, 0.003$ and 0.009 , respectively). No significant improvement in outcome occurred with saline or hyaluron. Univariate analysis of potential clinical, radiographic and ultrasound predictors of response revealed that synovitis was the single best predictor of steroid response at weeks four and eight.

Conclusion: This study of patients with osteoarthritis of the hip found that a single, ultrasound guided injection of corticosteroid at the hip can be beneficial in the management of that disorder.

Atchia, I., et al. Efficacy of A Single, Ultrasound Guided Injection for the Treatment of Hip Osteoarthritis. *Ann Rheum Dis.* 2011, January; 70: 110-116.

PROGRESSIVE WEIGHT-BEARING EXERCISES AND BREAST CANCER RELATED LYMPHEDEMA

Breast cancer related lymphedema (BCRL) is prevalent among cancer survivors. Patients are often advised to limit heavy weight bearing activity in the arms, for fear of BCRL. This advice often results in deconditioning of the arms. This study investigated whether weight bearing exercise changes the incidence of BCRL.

For this randomized, controlled equivalence study, 154 breast cancer survivors were recruited. All had unilateral breast cancer, with two or more lymph nodes removed, and without clinical signs of BCRL. These patients were randomized to receive weightlifting intervention or to a control group. The intervention group participated in supervised, progressive weight bearing arm exercises for one year, while the control group was asked to avoid changing their exercise patterns. Lymphedema was defined as a five

percent or more increase in arm swelling.

After 12 months, 11% of the intervention participants and 17% of the control group developed BCRL. For patients with five or more lymph node biopsies, similar results were seen. The intervention group also had significant gains in strength and non-significant improvements on anthropometry measurements.

Conclusion: This study of patients with unilateral breast cancer found that weight bearing arm exercise does not increase the incidence of lymphedema.

Schmitz, K., et al. Weightlifting for Women at Risk for Breast Cancer Related Lymphedema: A Randomized Trial. *JAMA.* 2010, December 22/29; 304(24): 2699-2705.

OPERATIVE VERSUS NONOPERATIVE TREATMENT OF ACUTE ACHILLES TENDON RUPTURE

The appropriate treatment of acute Achilles tendon rupture remains controversial. This study compared the outcomes of patients with acute Achilles tendon ruptures treated with operative repair and accelerated functional rehabilitation to those of patients treated by accelerated rehabilitation alone.

A total of 144 patients between the ages of 18 and 70 years, all with an acute Achilles tendon rupture, were recruited. Those randomized to the operative group underwent surgical repair, followed by an aggressive rehabilitation program. The nonsurgical group underwent accelerated rehabilitation, including early weight bearing and early range of motion. The primary outcome measure was the re-rupture rate. Secondary outcomes included isokinetic strength, the Leppilahti score, ankle range of motion, and calf circumference.

Re-rupture occurred in two patients in the operative group at one and three months after injury and in three patients in the non-operative group at one, two, and three months after injury. At one year post injury no significant difference was found between the groups on measures of isokinetic strength, range of motion, calf circumference or patient ratings

of Achilles tendon injury related function.

Conclusion: This study of patients with acute Achilles tendon rupture supports the use of accelerated functional rehabilitation for the treatment of these injuries.

Willits, K., et al Operative versus Non-Operative Treatment of Acute Achilles Tendon Ruptures. *J Bone Joint Surg (Am).* 2010, December 1; 92: 2767-2775.

INTERNET AND TELEPHONE TREATMENT FOR SMOKING CESSATION

The key components of smoking cessation treatment include problem solving, skills training, pharmacotherapy and social support. Web-based cessation interventions have yielded mixed results, with abstinence rates ranging from 7% at 3 months through 21% at 12 months. This study sought to determine the relative effect of internet and internet plus telephone treatment for smoking cessation.

This trial was completed between March 8, 2005, and November 30, 2008. Included were adults who were currently smoking five or more cigarettes per day. Patients were randomized to treatment groups, including use of an evidence-based cessation treatment website (QuitNet), use of this website plus proactive telephone counseling and a basic, information-only comparison condition composed of the content provided on QuitNet. The subjects were followed for cessation, as measured at three, six, 12 and 18 months after randomization.

At 18 months, the multiple point prevalence abstinence rates across all follow-up intervals were 3.5% in the basic Internet group(BI), 4.5% in the enhanced Internet (EI) group and 7.7% in the enhanced Internet plus telephone(EI+P) group. In the intention to treat analyses, post hoc comparisons showed EI+P to be significantly outperforming the other conditions at three and six months (all $p < 0.01$) and EI at 12 months ($p = 0.003$). In a responder-only analyses, EI+P outperformed the other conditions at three, six and 12 months (all $p < 0.02$). The difference between EI and BI was not statistically significant at any time point under either set of analysis.

Conclusion: This study demonstrates that a combination of internet plus telephone interaction for smoking cessation can provide superior short-term results as compared with internet only interventions, although these differences attenuate over time.

Graham, A., et al. A Randomized Trial of Internet and Telephone Treatment for Smoking Cessation. *Arch Intern Med.* 2011, January 10; 171(1): 46-53.

IMPACT OF NICOTINE AND HYPERTENSION ON RUPTURED INTRACRANIAL ANEURYSM

Aneurysmal subarachnoid hemorrhage remains a disease with high morbidity and mortality, producing death rates between 25% and 50%. Previous studies of risk factors for aneurysm rupture have identified size, location, age, female gender, hypertension and cigarette smoking as important. This study further explored the effects of hypertension and nicotine on the size of ruptured aneurysms.

This retrospective review included records from 373 patients with subarachnoid aneurysms, treated for rupture. After controlling for gender and age, the patients were stratified into four groups including, normotensive non-smokers, smoking only, hypertension only, and hypertensive smokers. Aneurysm size, configuration and location were assessed by reviewing the initial three-dimensional rotational digital subtraction angiographies.

The mean aneurysm size in patients with a combined history of hypertension and cigarette smoking was 5.47 mm, significantly smaller ($p < 0.001$) than that of patients with hypertension only (6.27 mm). Those with a history of cigarette smoking had only slightly smaller ruptured aneurysms (7.61 mm) as compared to patients with no risk factors (8.08 mm). This difference was not significant ($p = 0.56$).

Conclusion: This retrospective analysis of patients with intracranial aneurysm found that those with a history of hypertension and cigarette smoking have an increased risk of rupture, with these ruptures occurring in smaller aneurysms than occur with non-smokers who are normotensive.

Etminan, N., et al. The Impact of Hypertension and Nicotine on the Size of Ruptured Intracranial Aneurysm. *J Neuro, Neurosurg, Psych.* 2011, January; 82(1): 4-7.

THORACIC MEDIAL BRANCH BLOCKS

The prevalence of thoracic pain in the United States is estimated at 15%. This study examined the effectiveness of medial branch blocks with local anesthetic, with and without steroids, for the treatment of chronic thoracic facet joint pain.

One hundred patients with a confirmed diagnosis of facet joint pain, seen at an interventional pain practice, were selected for this study. All diagnoses were confirmed by a diagnostic local anesthetic block. The patients were found to have at least six months of function limiting pain that had failed conservative treatment. Of these, 50 were randomized to receive medial branch blocks with bupivacaine, while the other 50 were randomized to receive blocks using a combination of bupivacaine and betamethasone. Outcome measures included the Numeric Rating Scores (NRS), the Oswestry Disability Index (ODI), work status and pain medication intake.

Over a one-year period, significant pain relief of 50% or more was noted in 90% of the participants in both groups. In the non-steroid group, one year, total, average pain relief was 47.2 weeks, while that for the steroid group was 46.3 weeks. No significant difference was found between the two groups in the number who realized at least 50% improvement on the ODI ($p = 0.780$).

Conclusion: This study of patients with chronic thoracic pain found that most realized good relief with a medial branch block, with no significant difference found between those receiving blocks using bupivacaine and those receiving blocks with a combination of bupivacaine and steroids.

Manchikanti, L., et al. Comparative Effectiveness of a One-Year Follow-Up of Thoracic Medial Branch Blocks in Management of Chronic Thoracic Pain: A Randomized, Double-Blind, Active Controlled Trial. *Pain Phys.* 2010, December; 13(6): 535-548.

PLATELET RICH PLASMA AND ANTERIOR CRUCIATE LIGAMENT REPAIR

Platelet rich plasma (PRP) contains high levels of growth factors known to induce biological changes in the cell proliferation and matrix metabolism of various connective tissues. This study examined the effect of autologous PRP on the function of the cells of the anterior cruciate ligament (ACL).

Harvesting from four patients who underwent ACL reconstruction surgery, researchers obtained fresh blood and ACL remnants. Both platelet poor plasma and platelet rich plasma were prepared from the blood samples. Each sample was tested for various concentrations of growth factors. Cells from the ACL were isolated and cultured. Platelet-rich plasma and platelet-poor plasma releasates were applied to the ACL cells from the same patient autologously. Cell viability and collagen synthesis were analyzed, with semi-quantitative gene expression assays prepared for type I and type III collagen.

The concentrations of the major growth factors were much higher in the platelet rich plasma than in the platelet poor plasma. Significantly greater ACL viability was seen on days two and 10 in the 10% PRP group than in the five percent PRP group. Those cells cultured in the platelet rich group accumulated significantly more collagen than did the platelet poor group ($p < 0.005$).

Conclusion: This study found that platelet rich plasma can enhance the viability and function of anterior cruciate ligament cells.

Fallouh, L., et al. The Effects of Autologous Platelet Rich Plasma on Cell Viability and Collagen Synthesis in Injured Human Anterior Cruciate Ligament. *J Bone Joint Surg (Am).* 2010, Dec 15; 92-A (18): 2909-2916.

PROXIMAL STRENGTHENING FOR PATELLOFEMORAL PAIN SYNDROME

Patellofemoral pain syndrome is an overuse injury characterized by aching pain in the area of the patella, exacerbated by physical activity. One theory about its etiology is that poor proximal neuromuscular control and/or weakness of the hip muscles may lead to poor control of frontal and

transverse plane motions of the hip during single leg stance. This study examined the effect of hip and core strengthening on the symptoms and functioning of those with patellofemoral pain syndrome.

Potential participants included women referred with a chief complaint of knee pain. Those with patellofemoral pain syndrome were referred for inclusion in the study. The participants attended eight to 15 clinic sessions lasting 30 to 60 minutes, and were asked to perform the clinic exercises at home at least three times per week. The subjects were assessed at baseline and follow-up with a motion analysis laboratory assessment, and for strength, joint range of motion and pain, using the Kujala Anterior Knee Pain Scale (AKPS) Questionnaire and a Visual Analogue Scale (VAS) score for pain.

Significant improvement was found in both VAS pain rating scores ($p < 0.005$) and AKPS scores ($p = 0.001$). The peak internal knee abduction moment was significantly reduced after the rehabilitation program with no other significant changes noted in joint moments or range of motion.

Conclusion: This study of patients with a patellofemoral pain syndrome found that an eight week exercise program focused on strengthening and/or muscular control of the hip and core musculature can reduce pain and knee abduction moments.

Earl, J., et al. A Proximal Strengthening Program Improves Pain, Function and Biomechanics in Women with Patellofemoral Pain Syndrome. *Am J Sport Med.* 2011, January; 39 (1): 154-163.

SPINAL CORD STIMULATORS FOR ANGINA

Patients with moderate to severe angina, who are not candidates for percutaneous coronary intervention or bypass surgery despite medical management, are often a challenge to treat. Spinal cord stimulation has been used for a quarter of a century to treat these patients, with improvement noted in both angina symptoms and quality of life. This study assessed whether subliminal (non-paresthetic) spinal cord stimulation is comparable to classic paresthetic spinal cord stimulation for the treatment of this symptom.

Twenty-five patients with refractory angina were selected for this study. All were treated with an implanted spinal cord stimulation device and were randomized to one of three groups: paresthetic spinal cord stimulation, subliminal spinal cord stimulation or sham spinal cord stimulation.

The subliminal group was treated with a stimulation intensity of between 75% and 80% below the sensory threshold. The primary endpoint of the study was the effect of treatment on the number of angina episodes. Secondary measures included consumption of nitroglycerin, angina class, angina status, quality of life and hospital visits/admissions. After one month, the sham group was randomized to one of the two treatment groups.

At one month, changes in angina episodes, nitroglycerin use, angina class and quality of life were significantly more improved in the paresthetic group than in the sham group, with no significant differences noted between the paresthetic and subliminal groups. At three months, the patients in the paresthetic group had significantly fewer angina attacks than did the subliminal group.

Conclusion: This study of patients with refractory angina found that paresthetic, but not subliminal, spinal cord stimulation is superior to sham spinal cord stimulation in improving clinical status.

Gaetano, A., et al. Spinal Cord Stimulation for the Treatment of Refractory Angina Pectoris: A Multi-Center, Randomized, Single Blind Study. *Pain.* 2011, January; 152: 42-52.

HABITUAL ACTIVITY AND OBESITY RISK

The highest risk of obesity development occurs in the transition from young adulthood to middle age. Public health guidelines recommend regular physical activity to minimize age-related weight gain, implying that weight gain may be prevented by maintaining high activity levels over time. This study evaluated data concerning habitual activity levels and the effects on weight gain over 20 years.

This study employed a cohort established in 1985 to 1986, including 5,115 individuals ages 18 to 30 years at baseline. The data were obtained

using the CARDIA Physical Activity History Questionnaire, collected at baseline and during follow-up examinations at years two, five, seven, 10, 15 and 20. This questionnaire queried about sports activities, exercise and occupational activity.

Those in the highest tertile of physical activity had similar gains in body mass index over 20 years. Those men and women maintaining the highest levels of activity gained 2.6 and 6.1 fewer kg, respectively, than did those in the lowest tertile of exercise.

Conclusion: This 20 year study found that, by maintaining high activity levels through young adulthood, weight gains are minimized during the transition from young adulthood to middle age, particularly among women.

Hankinson, A., et al. Maintaining a High Physical Activity Level over 20 Years and Weight Gain. *JAMA.* 2010, Dec 15; 304(23): 2603-2610.

ORAL APIXABAN AFTER HIP REPLACEMENT

The incidence of symptomatic venous thromboembolism is estimated to be as high as four percent in the first three months after hip replacement surgery, even with current prophylactic therapies. Apixaban is a highly specific factor Xa inhibitor that is given orally, twice daily, without the need for laboratory monitoring. This study assessed the effect of this medication on thromboprophylaxis after hip surgery.

This multi-center trial included 3,195 patients undergoing elective total hip replacement or revision of a previously inserted hip prosthesis. One group of patients was randomized to receive apixaban at an oral dose of 2.5 mg twice per day plus a placebo injection once daily. The enoxaparin group received enoxaparin injections at 40 mg once per day plus placebo tablets twice per day. Both groups underwent treatment for 12 days after surgery, and then were assessed by venography between days 10 and 14. Follow-up evaluations were performed at 30 days and 60 days after the last dose of the study medicine. The primary efficacy outcome measures included thromboembolic events or death from

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any cause. The safety outcomes were bleeding events.

The primary efficacy outcome of asymptomatic and symptomatic deep vein thrombosis, pulmonary embolism or death from any cause occurred in 104 of the 1,157 patients in the apixaban group (9.0%) and in 100 of the 1,130 patients in the enoxaparin group (8.8%) ($p < 0.001$). During the 60-day follow-up period, symptomatic venous thromboembolism occurred in 0.3% of the apixaban and 0.5% of the enoxaparin group. Finally, major bleeding occurred in 0.7% of those in the apixaban group and in 1.4% of those in the enoxaparin group.

Conclusion: This study of patients undergoing hip replacement surgery found that a specific factor Xa inhibitor, apixaban, may result in lower rates of thromboembolic events, without increasing the rate of bleeding, as compared with the low molecular weight heparin enoxaparin

Lassen, M., et al. Apixaban versus Enoxaparin for Thromboprophylaxis after Hip Replacement. **New Eng J Med.** 2010, December 23; 363: 2487-2498.

Rehab in Review is a monthly publication produced by physicians in the field of Physical Medicine and Rehabilitation (PM&R). The summaries appearing in this publication are intended as an aid in reviewing the broad base of literature relevant to this field. These summaries are not intended for use as the sole basis for clinical treatment, or as a substitute for the reading of the original research.

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