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ANTIBIOTICS FOR CHRONIC BACK PAIN

Modic type I changes/edema in the vertebrae have been found in 35 to 40% of patients with low back pain (LBP). Infection has been proposed as a potential mechanism for Modic type I changes. As *Propionibacterium acnes* (*P. Acnes*) has been identified in cultures of material retrieved during surgery for lumbar herniated discs, this study was designed to determine the effect of antibiotic therapy for patients with Modic type I changes.

Subjects were between the ages of 18 and 65 years, all with MRI confirmed disc herniation and LBP of at least six months' duration. Individuals were recruited if a repeat MRI demonstrated Modic type I changes adjacent to the previously herniated disc. The patients were randomized to receive either one or two tablets of a placebo or amoxicillin-clavulanate (500 mg/125 mg) three times per day for 100 days. At baseline and at a one-year follow-up appointment, all completed questionnaires and underwent physical examination and MRI. The primary outcome measures were the disease specific disability Roland Morris questionnaire (RMDQ) and lumbar pain (LBP Rating Scale).

Of the 162 patients who entered the study, 144 completed the one-year follow-up. The antibiotic group improved on all primary outcome measures, with improvement continued from 100 days follow-up until one-year follow-up ($p < 0.0001$ for all comparisons). The participants reported that pain relief and improvement in disability began gradually, with most reporting an effect within six to eight weeks after the start of medication.

A trend was noted towards a positive dose response relationship, with double antibiotics more efficacious, although this effect did not reach statistical significance.

Adverse events were more common in the antibiotic group, and included 65% of the treatment group and 23% of the placebo group. The most common adverse event was gastrointestinal complaints.

Conclusion: This double-blind, randomized controlled trial involving patients with chronic low back pain and Modic type I changes demonstrated significant improvement in pain and disability with antibiotic treatment.

Albert, H., et al. Antibiotic Treatment in Patients with Chronic Low Back Pain and Vertebral Bone Edema (Modic Type 1 Changes): A Double-Blind, Randomized, Clinical, Controlled Trial of Efficacy. *Euro Spine J.* 2013, April, 22(4): 697-707.

PROPIONIBACTERIUM ACNES AND OSTEOARTHRITIS

Propionibacterium acnes (*P. acnes*) is a gram positive anaerobic bacillus found in the deep layers of the skin, respiratory tract, digestive tract and eye mucosal. This study was designed to explore the association between this pathogen and degenerative arthritis.

Patients scheduled to undergo primary shoulder replacement between September of 2008 and February of 2010 and were studied. At the time of surgery, under sterile conditions, samples of the glenohumeral joint fluid were aspirated for culture. In addition, three tissue biopsy specimens were taken, with two undergoing culture and the third evaluated histologically. The cultures were examined for aerobic and anaerobic organisms.

During the study, 55 patients were included, with a mean age of 72.4 years. Of those patients, cultures were positive for colonization in 23, including 11 with osteoarthritis and 12 with cuff tear arthropathy. In 21 of the 23 cases, *P. Acnes* was the only

organism isolated. Histologic analysis demonstrated features of chronically inflamed synovial tissue in 11 of the 13 patients assessed. The workup for inflammatory arthropathy, including rheumatoid arthritis, was negative in all patients. None of the patients with positive cultures had clinical features of infection.

Conclusion: This study of patients undergoing shoulder surgery demonstrates a high incidence of *Propionibacterium acnes* within the joint, suggesting a role for this bacterium in the pathogenesis of osteoarthritis.

Levy, O., et al. *Propionibacterium Acnes: An Underestimated Etiology in the Pathogenesis of Osteoarthritis? J Shoulder Elbow Surg.* 2013; 22: 505-511.

ASSOCIATION BETWEEN ATHEROSCLEROSIS AND OSTEOARTHRITIS

Previous studies have found a higher risk of cardiovascular death among patients with knee or hip osteoarthritis (OA). While some studies have indicated that atherosclerosis is associated with OA, the data remain inconclusive. This study further investigated the role that atherosclerosis plays in the prevalence, incidence and progression of OA.

Data were obtained from the Rotterdam study, instigated in 1989 to investigate the occurrence and determinants of diseases in the middle age and older population. All inhabitants at least 55 years of age of the Ommoord district of Rotterdam were invited to participate in the study. Baseline measures obtained between 1990 and 1993 included a home interview and physical examination.

Follow-up data were collected at visits from 1997 to 2000 and 2002 to 2005. Those with radiographs of the

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knees, hips and hands at baseline were assessed at follow-up for progression of OA. In addition, atherosclerosis was estimated using ultrasonography of both carotid arteries. A multivariate logistic regression model was used to estimate the relationship between atherosclerosis and the presence and progression of OA.

Of the patients completing the study, the average age at baseline was 68.2 years, with 58% women. After adjustment for confounding variables, intima media thickness was found to be associated with the prevalence of knee OA, as well as with the progression of metacarpophalangeal (MCP) OA in women. In addition, carotid plaque was associated with distal interphalangeal (DIP) OA and with MCP OA in women.

Conclusion: This study revealed a significant association between atherosclerosis and osteoarthritis of the DIP, MCP and knee joints in women. This was not the case for men.

Hoeven, T., et al. Association of Atherosclerosis with Presence and Progression of Osteoarthritis: The Rotterdam Study. *Ann Rheum Dis.* 2013, May; 72(5): 646-651.

EARLY REHABILITATION AFTER BREAST CANCER SURGERY

Breast cancer (BC) is the most frequent tumor in women, comprising 27% of female tumors in Western societies. Studies have demonstrated that even minimally invasive BC surgery can result in neuromotor or articular impairments. This study investigated upper limb function and the impact of early rehabilitation and postsurgical consequences.

Between May of 2006 and March of 2007, 103 patients who underwent lumpectomy or mastectomy were enrolled in the study. In September of 2006, the Department of Rehabilitation Services updated interventions with respect to early treatment of patients undergoing BC surgery. A comparison was made between those treated before and those treated after this change.

Patients in group A did not begin therapy during hospitalization, while those in group B began during hospitalization, with treatments including exercises and interventions

designed to reduce apprehension and pain. In-hospital therapy occurred daily for 30 to 40 minutes. In group B, the patients were assessed at 15 to 30 days after surgery for functional impairment of the shoulder and for upper limb edema. Subjects were compared between groups for shoulder-arm mobility, upper limb function and presence of edema.

At 15 to 30 days follow-up, upper limb range of motion was restricted in 72% of group B patients and in 76% of group A patients. At 180 days, 44% of group A and 12% of group B reported restrictions in shoulder arm mobility ($p=0.001$). In addition, at 180 days, Constant and Murley scores were superior in group B patients, as compared to group A patients ($p=0.001$), and lymphedema was noted in 20% of group A and 5.2% of group B ($p=0.036$).

Conclusion: This study demonstrates that early rehabilitation after breast cancer surgery can improve mobility, function and edema of the upper extremity.

Scaffidi, M., et al. Early Rehabilitation Reduces the Onset of Complications in the Upper Limb following Breast Cancer Surgery. *Eur J Phys Rehab Med.* 2012; 48: 601-611.

DULOXETINE FOR CHEMOTHERAPY INDUCED PERIPHERAL NEUROPATHY

Approximately 20 to 40% of patients with cancer who receive neurotoxic chemotherapy develop painful peripheral neuropathy. This study explored the effect of duloxetine for the treatment of chemotherapy induced, peripheral neuropathic pain.

This randomized, phase 3, double-blind, placebo-controlled trial included patients recruited from eight research networks, resulting in a geographically diverse sample throughout the United States. All subjects were 25 years or older, and all reported an average rating of four on a 10-point scale of neuropathic pain for three or more months' duration after completing chemotherapy.

The participants were randomized to receive either, 60 mg of duloxetine daily and placebo at crossover, or to receive placebo first, with duloxetine at crossover. Outcome measures were patient reported pain severity

and functional interference, as assessed weekly using the Brief Pain Inventory Short Form (BPI-SF).

At the end of treatment, those in the duloxetine first group reported a larger decrease in average pain than did those in the placebo first group ($p=0.003$). Of the patients treated with duloxetine first, 59% reported any decrease in pain, versus 38% of those treated with placebo first. Of the duloxetine treated patients, 30% reported no change in pain and 10% reported an increase in pain.

Conclusion: This study of patients with painful, chemotherapy induced peripheral neuropathy found that treatment with duloxetine can significantly reduce this pain.

Smith, E., et al. Effect of Duloxetine on Pain, Function and Quality of Life among Patients with Chemotherapy-Induced, Painful Peripheral Neuropathy. *JAMA*. 2013, April 3; 309(13): 1359-1367.

PATENT FORAMEN OVALE SURGERY AND RISK OF STROKE

While it is believed that a patent foramen ovale (PFO) increases the risk of stroke, evidence conflicts regarding whether the closure of the PFO reduces the risk of recurrent stroke. This prospective study was designed to assess the benefits of PFO closure among patients with a history of cryptogenic ischemic stroke.

Subjects were 980 patients with a history of stroke and PFO. The participants were randomized to either undergo closure of the PFO with the Amplatzer PFO Occluder, or to receive medical therapy, including one or more antiplatelet medications or warfarin, chosen at the discretion of the treating physician. Patients were followed for 24 months. Outcome measures included recurrent ischemic stroke, transient ischemic attack or death within 30 days of implantation.

In the intention to treat analysis, nine patients in the closure group and 16 in the medical therapy group suffered nonfatal ischemic strokes ($p=0.08$). In the as treated analysis, five events occurred in the closure group and 16 in the medical therapy group ($p=0.007$). The incidence of transient ischemic attack did not differ significantly between the two groups, with no reports of any deaths.

Conclusion: This study of patients with ischemic cryptogenic stroke found that closure may result in fewer recurrent ischemic strokes or transient ischemic attacks than medical treatment.

Carroll, J., et al. Closure of Patent Foramen Ovale versus Medical Therapy after Cryptogenic Stroke. *NEJM*. 2013, March 21; 368: 1092-1100.

FISH OIL AND HYPERTENSION

Many health recommendations include a diet that comprises two or three portions of oily fish per week. This recommendation derives from the fact that consumption of fish oils is believed to protect against cardiovascular disease. This study further explored this benefit by reviewing the literature concerning the effect of fish oil supplements on hypertension.

This systematic data review included articles published in EMBASE, CENTRAL and the Cochrane Collaboration Hypertension Group. Studies considered for the analysis included randomized, controlled trials involving fish oil supplements, with subjects including adults with raised or normal blood pressure of at least eight weeks' duration. The meta-analysis included 25 eligible studies including 17 with hypertensive participants and nine with normotensive participants with 1,524 total participants. Within the studies, fish oil was given as the capsule supplement, with doses varying from 0.8 to 13.33 g per day.

The meta-analysis showed a statistically significant reduction in SBP in hypertensive patients given fish-oil supplements for a minimum of 8 weeks (2.56 mmHg). A statistically significant reduction in DBP was also found (1.47 mmHg). However, among the normotensive patients, no significant reductions in blood pressure were noted.

Conclusion: This study of randomized controlled trials of fish oil supplements found a significant reduction in blood pressure among hypertensive, but not normotensive, patients.

Campbell, F., et al. A Systematic Review of Fish – Oral Supplements for the Prevention and Treatment of Hypertension. *Euro J Preventive*

Cardiol. 2013, February; 20(1): 107-120.

RISK OF STROKE AMONG HYPERTENSIVE OVERWEIGHT MEN USING ALCOHOL

Hypertension and obesity are risk factors for stroke. It has been reported that heavy alcohol consumption may also lead to an increased risk of stroke. This study was designed to determine the role of alcohol consumption on stroke risk among those with elevated blood pressure and body mass index.

Subjects were 2,599, middle-age men, randomly selected from a community in Finland. Baseline examinations were performed between 1984 and 1999, with an average follow-up time of 14.9 years. The association between alcohol consumption and stroke was analyzed for those with a BMI of less than 26.4kg/m² and for those with a BMI of 26.4kg/m² or greater.

Of the 2,599 participants, 244 reported strokes. Elevated BMI was associated with an increased risk of any stroke. The risk of stroke was not significantly increased among those with BMI less than 26.4kg/m² who consumed alcohol, but was increased in the heavier patients with alcohol consumption. Similarly, the risk of stroke increased among those with HTN who consumed alcohol, but did not increase among normotensives with alcohol consumption. Those with hypertension and elevated BMI who were binge drinkers (over 6 drinks) had an elevated risk of stroke (1.66 and 1.50 fold respectively) compared to those who drank less.

Conclusion: This study found that alcohol consumption increases the risk of stroke among those who are overweight and hypertensive.

Rantakomi, S., et al. Alcohol Consumption and the Risk of Stroke among Hypertensive and Overweight Men. *J Neuro*. 2013, February; 260: 534-539.

DIABETES AND BRAIN INJURY OUTCOME

Diabetes mellitus (DM) has been identified as a significant risk factor for both morbidity and mortality among the critically ill. This study examined the impact of DM on the

outcomes of patients sustaining isolated traumatic brain injury (TBI).

Data for this study was gathered from the national trauma databank, collecting data from more than 900 national trauma centers. These data were reviewed over a five-year period comparing the outcomes of those with versus without DM.

In-hospital mortality was 22.6% among those with DM and 16.8% among those without DM ($p=0.002$). Discharge to home occurred in 38.9% of those with DM and 46.1% of those without DM ($p=0.008$). Among patients with a Glasgow Coma Scale score of eight or less, mortality was significantly higher among those with DM than among those without DM ($p<0.001$).

Conclusion: This study of patients with traumatic brain injury found a 1.5-fold increase in mortality among those with diabetes mellitus as compared to those without.

Lustenberger, T., et al. Effect of Diabetes Mellitus on Outcome in Patients with Traumatic Brain Injury: A National Trauma Databank Analysis. **Brain Inj.** 2013, March; 27 (3): 281-285.

NONSTEROIDAL ANTI-INFLAMMATORY DRUGS AND TISSUE HEALING

Nonselective and selective anti-inflammatory drugs decrease the inflammatory phase of healing. However the use of these drugs in orthopedic surgery remains controversial, as some studies have suggested a negative effect on bone healing. This review article summarizes the data concerning nonsteroidal anti-inflammatory drugs (NSAIDs) and their effect on healing of tissue.

A Medline search was performed, reviewing studies of selective and nonselective NSAIDs and their effect on healing. From these data, nine articles were found concerning soft tissue healing and 35 concerning bone healing. For soft tissue healing no human studies were found. Only three medications (indomethacin, piroxicam, and celecoxib) were studied in sufficient detail for analysis.

Of those studies found, conflicting and inconclusive data were found to suggest an effect on soft tissue healing through the use of NSAIDs for up to two weeks. For soft tissue

the bone healing, three animal studies were found, all demonstrating impairment of healing. For bone healing, indomethacin seemed to have a clear detrimental effect.

Conclusion: This literature review concerning the effect of nonsteroidal anti-inflammatory drugs on tissue healing found insufficient evidence to conclude that NSAIDs at standard doses produce a detrimental effect on soft tissue but may be detrimental to bone healing.

Chen, M., et al. Effect of Nonsteroidal Anti-Inflammatory Drugs on Tissue Healing. **Knee Surg Sports, Traumatol Arthroscopy.** 2013, March; 21: 540-549.

DEEP HEATING THERAPY FOR KNEE OSTEOARTHRITIS

The prevalence of knee osteoarthritis (OA) is known to rise steadily with advancing age, with symptomatic knee OA occurring in 10 to 13% of men and women over the age of 60 years. Heat therapy has long been used in the management of knee OA, and can be administered through a variety of techniques. This study compared the effects of deep heating therapy (DHT) with superficial heating therapy (SHT) for patients with OA of the knee.

Patients included individuals with radiographically demonstrated OA of the knee, (Kellgren-Lawrence grades II-III), who reported pain of at least three weeks' duration. The subjects were randomized to receive either DHT, using three, 30-minute sessions per week of local microwave diathermy for four weeks, or SHT, using hot packs for 30 minutes, three times per week for four weeks. The primary outcome measure was the Western Ontario and McMaster University (WOMAC) OA index. Secondary outcomes included the British Medical Research Council (BRMC) rating of muscle strength and a visual analogue scale for pain.

Fifty-four patients were randomized for intervention. At 24 weeks, greater improvement was seen in WOMAC scores in the DHT group than in the SHT group ($p<0.0001$). At 12 months' follow-up, improvements in the WOMAC summary scores, as well as in pain, stiffness and function subscores, were maintained in the DHT group ($p<0.05$). With regard to the

secondary outcomes, both BMRC and VAS scores favored the DHT group over the SHT group.

Conclusion: This study of patients with osteoarthritis of the knee found that microwave diathermy is significantly better than topical heat for improvement of pain and function.

Rabini, A., et al. Deep Heating Therapy via Microwave Diathermy Relieves Pain and Improves Physical Function in Patients with Knee Osteoarthritis: A Double-Blind, Randomized, Clinical Trial. **Eur J Phys Rehab Med.** 2012, December; 48: 549-559.

RADIOFREQUENCY DENERVATION IN SPORTSMAN'S HERNIA

Chronic groin pain is a common complaint among athletes. The diagnosis of sportsman's hernia is often assigned when alternative diagnoses have been excluded. The syndrome is likely to have a multifactorial etiology which may include a compression of the ilioinguinal nerve. This study was designed to determine the efficacy of radiofrequency denervation (RDF) as a treatment for sportsman's hernia.

Patients with groin pain of greater than six months' duration were considered for this trial. None were found to have an identifiable structural cause of the pain, and all had failed conservative treatment. The participants were randomized to undergo either RDF of the inguinal ligament ($n=18$) or injection with bupivacaine ($n=18$) or triamcinolone ($n=18$). The RDF patients were assessed with a visual analogue scale (VAS) of pain, with functional assessments using the London Abductor and Abdominal Groin (LAAG) scale, both administered at baseline, one week, three months and six months post-treatment.

All scores were significantly improved as compared with baseline at each time interval in both groups I and II. The mean VAS score had significantly improved in group I, from 6.89 at baseline to 1.61 six months post-treatment and in group III, from seven at baseline to 2.2 at six months post-treatment. The improvements were nonsignificant in group II.

Conclusion: This study found that using RFD for the treatment of a sportsman's hernia is safe and

efficacious, at least in the short term, and it is superior to anesthetic and steroid injection.

Comin, J et al. Radiofrequency Denervation of the Inguinal Ligament for the Treatment of Sportsman's Hernia: A Pilot Study. **Br J Sports Med.** 2013, April; 47(6): 380-386,

PLATELET RICH PLASMA FOR CHRONIC TENDINOPATHY

Platelet rich plasma (PRP) has been increasingly used to treat musculoskeletal injuries over the past several years, although the utility of this intervention for the treatment of chronic tendinopathy is unclear. This multicenter, retrospective, cross-sectional study reviewed the effect of ultrasound guided PRP in recalcitrant, chronic tendinopathy.

All subjects were between the ages of 18 and 75 years of age, with a diagnosis of tendinopathy for a minimum of six months. All reported a poor response to conventional treatments, including oral medications, physical modalities and eccentric exercises. All participants received injections into the lateral epicondyle, Achilles and patellar tendons, with follow-up at a minimum of six months. The primary outcome measurement was the perceived improvement in symptoms at least six months after the PRP injection, using a five point Likert scale. Secondary outcome measurements included perceived change in visual analog scale (VAS) before and after the procedure, functional pain after the procedure using the Nirschl Pain Phase Scale for overuse injuries, and overall satisfaction with the PRP procedure

One hundred eighty patients, with a median symptom duration of 18 months, were contacted. Of those, 82% reported at least 50% resolution in symptoms, including 100% of those injected at the Achilles tendon, 93% of those injected at the lateral epicondyle and 59% of those injected at the patella tendon. Seventy percent reported at least 75% improvement. Eighty five percent of the patients were satisfied with the procedure, 13% were dissatisfied, and 2% were indifferent.

Conclusion: This retrospective study of patients with recalcitrant tendinopathy found that an injection

of platelet rich plasma can significantly reduce pain.

Mautner, K., et al. Outcomes after Ultrasound Guided Platelet Rich Plasma Injections for Chronic Tendinopathy: A Multicentered, Retrospective Review. **PM&R.** 2013, March: 5(3); 169–175.

MONTH OF BIRTH AND MULTIPLE SCLEROSIS

One of the environmental factors implicated in the development of multiple sclerosis (MS) is vitamin D deficiency. Month of birth has been described as a risk factor for MS, due to the variations in maternal sunlight exposure among pregnancies. This meta-analysis further investigated the effect of month of birth on the risk of MS.

A literature search was completed of articles published after the year 2000, including both patients with MS and healthy control subjects. The relative risk of MS for each month of birth was described compared to a healthy control population. From the initial literature search, 10 papers were considered for inclusion, with 151,978 MS births identified for the analysis. The relationship between observed and expected birth ratio of patients with MS for each month was calculated.

Of patients born at a latitude of greater than 52°, it was found that an increased risk for MS occurred among those born in April ($p=0.002$) and in May ($p=0.0006$), while a reduced risk was seen among those born in October ($p=0.004$) and in November ($p=0.0002$).

Conclusion: This retrospective review and meta-analysis found that month of birth affects the risk of developing multiple sclerosis, and may be related to level of maternal ultraviolet light exposure.

Dobson, R., et al. The Month of Birth Effect in Multiple Sclerosis: Systematic Review, Meta-Analysis and Effect of Latitude. **J Neurol Neurosurg Psych.** 2013, April; 84(4): 427-432.

OPEN KINETIC CHAIN EXERCISE AFTER KNEE RECONSTRUCTION

Ruptured anterior cruciate ligament (ACL) requiring surgical

reconstruction is a common orthopedic injury. One of the major challenges after that surgery is strengthening of the muscles of the knee without compromising the healing of the graft. Despite numerous studies reviewing the effects of adding open kinetic chain (OCK) exercises to the postoperative protocol, there remains limited information concerning the appropriate time to introduce these exercises. This study was designed to determine whether an early introduction of open chain exercises enhances clinical performance as compared to later onset of exercise.

Subjects included 49 patients between the ages of 16 and 60 years, all of whom had undergone ACL reconstruction between March of 2008 and July of 2011. The patients were randomized to either an early OCK group, adding the exercises at week four, or a late OCK group adding the exercises at week 12. Both groups were measured for knee strength, stability and function at weeks 12, 19 and 25 and at month 17.

No significant difference was found between the groups at any time point when measuring for quadricep and hamstring strength, anterior knee laxity or functional assessment of pain.

Conclusion: This study of patients undergoing ACL reconstruction found no significant difference in function and muscle strength between those who started open chain kinetic exercises early versus those who started late.

Fukada, T. Open Kinetic Chain Exercises in a Restricted Range of Motion after Anterior Cruciate Ligament Reconstruction: A Randomized, Controlled, Clinical Trial. **Am J Sport Med.** 2013, April; 41(4): 788 -794.

VIRTUAL TELEREHABILITATION AFTER TOTAL KNEE ARTHROPLASTY

After total knee arthroplasty (TKA), rehabilitation helps to optimize functional results. With improvements in technology, telerehabilitation has been introduced as a means to assess, monitor, supervise and interact with patients. This study assessed the efficacy of interactive

virtual telerehabilitation (IVTR) for patients recovering from TKA.

This trial included 142 patients undergoing TKA. The subjects were randomized to receive either traditional outpatient therapy (a control group), involving one hour sessions for 10 days, or to a IVTR group that used wireless sensors, including accelerometer and interactive software, with a 3D avatar that demonstrated the exercises. A web portal permitted the therapist to receive performance data and allowed for daily adjustment of the prescribed therapies. Outcome measures included active knee flexion and extension, quadriceps and hamstring strength, the Timed Get-up-and-Go Test, pain, as measured by visual analog scale (VAS) scores and function, as measured by the Western Ontario and McMaster Universities Arthritis Index (WOMAC).

At three months follow up, improvements in active knee flexion and extension were similar in both groups. In addition, both hamstring and quadriceps strength were equal between groups at three months. Timed Get-up-and-Go Test results were equal between groups at three months, but, given a lower baseline, improved more in the control group ($p=0.008$). No significant differences were found between the groups in changes in WOMAC or VAS scores.

Conclusion: This study of patients with total knee arthroplasty found that a two-week, interactive, virtual telerehabilitation program may be as effective as face-to-face therapy in achieving postsurgical recovery.

Piqueras, M., et al. Effectiveness of an Interactive, Virtual Telerehabilitation System in Patients after Total Knee Arthroplasty: A Randomized, Controlled Trial. *J Rehab Med*. 2013; 45: 392-396.

IMAGING AND ENDOVASCULAR TREATMENT FOR ISCHEMIC STROKE

Multiple studies have demonstrated the efficacy of intravenous tissue plasminogen activator (tPA), administered up to 4.5 hours after the onset of ischemic stroke symptoms. Endovascular approaches, including thrombectomy devices, have been found to achieve greater rates of recanalization than tPA, although clinical data concerning

their outcomes is limited. This study assessed the relationship between penumbral patterns in brain imaging and functional outcome among patients undergoing embolectomy.

Subjects were 118 patients, each diagnosed with a large vessel, anterior circulation stroke, who were randomized within eight hours of symptom onset. Sixty-four patients underwent embolectomy and 54 received standard care. Prior to randomization, a CT or MRI of the brain was obtained, and, based upon those images, the patients were stratified as having either a favorable penumbral pattern (substantial salvageable tissue and a small infarct core) or a non-penumbral pattern. Functional outcome at 90 days post-treatment was measured with the modified Rankin scale.

Among all patients, the modified Rankin scores did not differ between those with embolectomy and those with standard care ($p=0.99$). Embolectomy was not superior to standard care in either the favorable or nonfavorable penumbral groups ($p=0.23$).

Conclusion: This study of patients with acute ischemic stroke did not find that penumbral imaging identifies patients who will respond to endovascular therapy.

Chelsea, S., et al. A Trial of Imaging Selection and Endovascular Treatment for Ischemic Stroke. *NEJM*. 2013, March 7; 368(10): 914-923.

SURGERY VERSUS PHYSICAL THERAPY FOR MENISCAL TEAR AND OSTEOARTHRITIS

Symptomatic osteoarthritis (OA) of the knee affects more than nine million Americans. Meniscal tears are estimated to occur in 35% of persons older than 50 years of age. Two thirds of these tears are asymptomatic. Meniscal damage is prevalent among persons OA, and is often treated with partial meniscectomy. This study assessed the efficacy of arthroscopic partial meniscectomy, as compared with that of standardized physical therapy, for patients with symptomatic meniscal tears and mild to moderate OA.

This randomized, controlled trial included patients over the age of 45 with mild to moderate OA and a meniscal tear. Of those recruited, 161 patients underwent physical therapy

and 169 underwent arthroscopic partial meniscectomy with subsequent postoperative therapy. The patients were followed up at three, six and 12 months with the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) physical function score, as the primary outcome measure. Secondary outcomes included the Knee Injury and Osteoarthritis Outcome Scale and the physical activity scale of the Medical Outcomes Study 36-Item Short Form Health Survey.

At six months, in the intention to treat analysis, the average WOMAC scores were 20.9 points in the surgical group and 18.5 points in the nonsurgical group, a nonsignificant difference. No significant between group differences occurred in the frequencies of overall or specific adverse events. At six months, 30% in the nonsurgical group opted to cross over and undergo surgery.

Conclusion: This multicenter, randomized, controlled trial involving patients with symptomatic osteoarthritis and meniscal tears found no significant difference in the magnitude of improvement in pain and functional status among those treated conservatively versus those treated with surgery.

Katz, J., et al. Surgery versus Physical Therapy for a Meniscal Tear and Osteoarthritis. *NEJM*. 2013 DOI: 10.1056/NEJMoa1301408.

ULTRASOUND THALAMOTOMY FOR ESSENTIAL TREMOR

Essential tremors, a common movement disorder in adults, are characterized by bilateral, postural or kinetic tremor involving hands and forearms. Several surgical procedures used to treat essential tremor involve lesioning or chronically stimulating sites along the pathologically oscillating motor loop. Focused ultrasound has been used to treat a number of pathologies, including use in the brain for treatment of brain tumors and pain. This paper describes a novel procedure for treating disabling essential tremor.

Four patients with essential tremor, refractory to medical treatment, were included in the study. The participants were treated with magnetic resonance guided, focused ultrasound to ablate tremor mediating

areas of the thalamus. Serial sonifications were applied until there was a complete or near complete cessation of tremor in the target arm. All subjects underwent physical examination and structural MRI screenings at one, 30 and 90 days after the procedure. Measured outcomes included tremor severity and rates of adverse events.

The immediate benefits on tremor at the completion of the procedure were maintained at one month and three months, with reductions in tremor in the target arm of 89.4% at one month and 81.3% at three months. Successful completion of gross and fine motor tasks was improved at three months, with impairment diminished by means of 45.5% at one month and 39.6% at three months.

Conclusion: This proof of concept study found that magnetic resonance guided, focused ultrasound may be a safe and effective approach for the management of medication resistant essential tremor.

Lipsam, N., et al. MR Guided Focused Ultrasound Thalamotomy for Essential Tremor: A Proof of Concept Study. *Lancet Neur.* 2013, May; 12: 462–468.

COGNITIVE-AFFECTIVE STATUS AFTER THALAMIC STROKE

Damage to thalamic nuclei can result in a variety of cognitive deficits, including impaired attention, executive function and memory. This study sought to better understand the effect of focal thalamic damage on a patient's subjective cognitive-emotional status and quality of life.

This study included 68 patients with chronic, post-ischemic thalamic lesions. A cohort of 34 patients with transient ischemic attack served as controls.

Cognitive-affective impairments were evaluated using subjective self-report questionnaires assessing memory with the Memory Assessments Clinics Self-Rating Scale (MCS), attention with the Fragebogen Erlebter Defizite der Aufmerksamkeit (FEDA) questionnaire, executive function with the Dysexecutive Questionnaire (DEX) and emotional status with the Hospital Anxiety and Depression Scale (HADS, German version).

No significant differences were seen between the stroke patients and

the TIA patients across all subjective cognitive-affective domains. Significant differences were found in subjective affective impairments and health-related quality-of-life measures between those with posterior thalamic lesions versus patients with infarctions in other thalamic regions or those with TIA. The maximum lesion overlap of patients with abnormal affective and quality of life measures was found in the pulvinar, particularly in the right hemisphere, both for the HADS Anxiety subscale and the SF-12 MCS.

Conclusion: This study demonstrates that ischemic lesions of the posterior thalamus may cause greater subjective affective deficits and greater impairments in health-related quality-of-life than do other types of thalamic stroke or transient ischemic lesions.

Liebermann, D., et al. Subjective Cognitive-Affective Status following Thalamic Stroke. *J Neurol.* 2013, February; 260(2): 386-396.

NARCOTIC USE AND FALLS IN THE ELDERLY

Falls are a common occurrence in the elderly population, with estimates that 50% of those 80 and older fall at least once per year. This study examined the relationship between analgesic versus narcotic prescriptions for the management of pain in osteoarthritis (OA) and the incidence of falls and fractures in the elderly.

This case-control study used electronic medical records of a Pennsylvania health care system, reviewing over nine years of data. From among these records, 13,354 patients, ranging in age from 65 to 89 years, were identified with a diagnosis of OA. The incidence of falls and fractures was examined, comparing prescriptions of narcotics, COX-2 inhibitors and nonsteroidal anti-inflammatory drugs (NSAIDs). Of additional interest was the shift in consumption patterns after the removal of certain COX-2 inhibitors in 2004.

In 2001, only 1.6% of participants were prescribed narcotic analgesics. This rate peaked in 2009, with 30.2% receiving such medications. The percentage of participants who received COX-2 selective agents peaked at 10% in 2007, followed by a decline to four percent in subsequent

years. The likelihood of a fall/fracture was higher among those prescribed narcotic analgesics than among those prescribed COX-2 inhibitors (Odds Ratio 3.3) or NSAIDs (Odds Ratio 4.1).

Conclusion: This study of elderly individuals found that the risk of falls with fractures is elevated among patients prescribed narcotic analgesics, as compared to those prescribed COX-2 inhibitors or NSAIDs.

Rolita, L., et al. Greater Number of Narcotic Analgesic Prescriptions for Osteoarthritis Is Associated with Falls and Fractures in Elderly Adults. *JAGS.* 2013, April; 61(3): 335-340.

NEUROLOGIC SIGNAL OF PHYSICAL PAIN

Pain is primarily assessed by self-report, which is often limited in many vulnerable populations. This study was designed to combine functional magnetic resonance imaging (fMRI) with machine learning, in an effort to develop a brain-based neurologic signature for experimental pain.

Subjects were 114 healthy participants, engaged in one of four studies. In all four studies, thermal stimuli were applied in randomized sequences of various intensities to the left forearm during fMRI. In study I, subjects underwent 12 trials of four temperature intensities, calibrated for each person, to result in visual analogue intensities of one, three, five, and seven on a nine-point scale. In this study, a machine-learning analysis was used to identify a pattern of fMRI activity across brain regions, a neurologic signature, that was associated with heat-induced pain.

In study II, participants underwent 75 trials across six temperatures, rating pain on 100-point visual analogue scale. In study III, participants underwent 32 trials, consisting of eight trials of each four stimulus types. Those subjects had been chosen as they had been recently estranged from a partner. Those participants were exposed to an image of the recently estranged partner to elicit social pain. In study IV, subjects received intravenous infusions of remifentanyl, a μ -opioid agonist, during fMRI scanning. The subjects were exposed to 18 trials involving pain and 18 involving warmth.

(Continued from page 2)

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

*Mamie Air, M.D.
Felicia Skelton, M.D.
Ryan Solinsky, M.D.
University of Washington, Seattle, WA

*Bonnie Weigert, M.D.
Lang O. Jacobson, M.D.
Benjamin Rawson, D.O.
University of Wisconsin, Madison, WI

*William Robbins, M.D.
Teresa Kerge, M.D.
VCU, Richmond, VA

*Mahathy Goli, M.D.
Laura Giganti, M.D.
Mahesh Mohan, M.D.
Aarti Soorya, M.D.
Washington University, St. Louis, MO

Executive Editor Emeritus

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In study I, the neurologic signature included significant, positive weights in regions including the bilateral dorsal posterior insula, the secondary somatosensory cortex, the anterior insula, the ventrolateral and medial thalamus, the hypothalamus and the dorsal anterior cingulate cortex. The signature response increased with increasing stimuli intensity during thermal stimulation. Both the sensitivity and specificity in discriminating pain versus no pain were 94% or more.

In study II, the signature discriminating between painful heat and non-painful warmth was found to have 93% sensitivity and specificity. In study III, the signature discriminated between physical pain and social pain with 85% sensitivity (95% CI, 76 to 94) and 73% specificity. Finally, in study IV, the strength of the signature response was substantially reduced when remifentanyl was administered.

Conclusion: This study found that functional MRI is useful in identifying patterns of pain elicited by noxious heat in healthy individuals.

Wagner, T., et al. An FMRI-Based Neurologic Signature of Physical Pain. *NEJM*. 2013, April 11; 368: 1388-1397.

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