



**April 2012**  
**COX® RESEARCH PEARLS**  
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**BIOMECHANICS**

**FINALLY, ACADEMICS DISPROVE A FOOLISH CONCEPT. JMC**

**PREVIOUS AUTHORS HAD SAID THE NUCLEUS PULPOSUS MOVES ANTERIOR AND POSTERIOR IN THE DISC ON MOTION. THE RESULTS OF THIS STUDY INDICATED THAT THE APPARENT NUCLEUS PULPOSUS MIGRATION WITHIN INTERVERTEBRAL DISC IS ACTUALLY DEFORMATION OF THE NUCLEUS PULPOSUS LENGTH WHICH DEPENDS ON POSTURE AND THE MAGNITUDE OF THE LOAD. IN OTHER WORDS, ADOPTING DIFFERENT POSTURES DEFORMS THE NUCLEUS PULPOSUS AND THEREFORE, CHANGES THE POSITION OF THE NUCLEUS PULPOSUS BUT THERE IS NO APPARENT NUCLEUS PULPOSUS MIGRATION WITHIN THE INTERVERTEBRAL DISC**

Nazari, J; Pope, MH; Graveling, RA: Reality About Migration Of The Nucleus Pulposus Within The Intervertebral Disc With Changing Postures. Clinical Biomechanics 2012;27(3):213-217

Background: Previous studies reported that, in non-degenerate discs, the nucleus pulposus migrates posteriorly during flexion and anteriorly during extension within the intervertebral disc. However, in these studies the differences between anterior and posterior distances have been regarded as an indicator of nucleus pulposus migration. This study investigated the reality of migration of the nucleus pulposus within the intervertebral disc with changing postures.

Method: Magnetic resonance images were obtained of the lumbar spines of 25 asymptomatic volunteers in sitting, standing and supine postures. The anterior and posterior height of the intervertebral disc, the anterior - posterior length of the intervertebral disc and nucleus pulposus, and the positions of the anterior and posterior margins of the nucleus were measured from mid-line sagittal images.

## TREATMENT

### **LOOK AT THIS!!! SAVE THIS FOR TALKING WITH PATIENTS!**

#### **EPIDURAL STEROID INJECTIONS SHOULD BE BANNED. THERE IS NO SUPPORT FOR THEIR USE**

Balagué F, Piguet V, Dudler J: Steroids For LBP - From Rationale To Inconvenient Truth. Swiss Med Wkly 2012;11:142

Low back pain (LBP) and sciatica are highly prevalent and their treatment remains a clinical challenge. Systemic or local administration of corticosteroids is frequently prescribed for this indication, partly because its pathogenesis is believed to be a mix between mechanical and inflammatory phenomenon, and because corticosteroids do have some analgesic properties. Although there is some biological and animal data in favour of the use of corticosteroids in LBP and sciatica, clinical evidence remains scarce. Local epidural injection can have some short term benefit. However, we found no support for any type for systemic administration of corticosteroids, a practice that should definitively be banned.

#### **COX TECHNIC RELIEVES LOW BACK, LEG, AND TESTICULAR PAIN THAT WAS PRESENT FOR 5 YEARS. TOTAL TREATMENTS WAS 19 OVER 8 WEEKS WITH VAS 8/10 AT OURSET AND 0 AT END OF CARE**

Rowell, RM; Rylander, SJ: Low-Back Pain, Leg Pain, and Chronic Idiopathic Testicular Pain Treated with Chiropractic Care. J Altern Complement Med 2012:[Epub ahead of print]

Objectives: The purpose of this article is to report the case of a patient who had low-back pain, leg pain, and idiopathic chronic testicular pain and who sought chiropractic care for his low-back and leg pain and received pain relief including his testicular pain.

Subject: A 36-year-old male patient had low-back pain, right leg pain, and testicular pain that was worsening. All had been present for 5 years. He had been seen by several medical physicians and had lumbar magnetic resonance imaging and x-rays performed. All were read as normal. Examination revealed tenderness of the testicles bilaterally with no masses or other abnormality of the testicles or scrotum. Orthopedic and neurological testing was unremarkable. Tenderness rated 8 out of 10 was noted at the L4 spinous process.

Intervention: The patient was treated with Cox Technic (flexion-distraction) of the lumbar spine, receiving a total of 19 treatments over an 8-week time period. Results: After 4 weeks, the patient's low-back pain was decreased and his leg pain was gone. The testicular pain was improved after the first treatment and gone after 3 weeks of care. The patient was followed up by telephone at 3 and 6 months after discharge to find out if the testicle pain had returned, which it had not.

Conclusions: This case was one of chronic idiopathic testicular pain. The patient was treated with the Cox Technic, and his low-back pain improved with complete remission of his leg and testicular pain. The testicular pain had not returned 6 months following his discharge from care.

## **PAPER SHOWS NON SURGICAL CARE FOR SURGICAL DISC HERNIATION PATIENTS IS EQUAL TO SURGERY!**

**-181 CONSECUTIVE PATIENTS WITH RADICULAR PAIN BELOW THE KNEE WERE EXAMINED AT THE BASELINE, AT 8 WEEKS, AND AT 1 YEAR AFTER THE TREATMENT. ALL WERE SURGICAL CANDIDATES FOR LUMBAR DISC SURGERY.**

**-PARTICIPANTS WERE RANDOMIZED INTO 2 GROUPS: (1) SYMPTOM-GUIDED EXERCISES + INFORMATION + ADVICE TO STAY ACTIVE AND (2) SHAM EXERCISES + INFORMATION + ADVICE TO STAY ACTIVE.**

**-4.8 TREATMENTS WERE GIVEN EACH PATIENT.**

**-THE RESULTS FOR THE SYMPTOM-GUIDED EXERCISE GROUP IMPROVING SIGNIFICANTLY MORE WITH RESPECT TO GLOBAL IMPROVEMENT, SICK LEAVE, VOCATIONAL STATUS, ROOT COMPRESSION SIGNS, AND PATIENTS' SATISFACTION WITH INFORMATION OVER SHAM EXERCISE TREATED PATIENTS.**

**-THERE WAS NO DIFFERENCE CONCERNING BACK-SPECIFIC, AND GENERIC, FUNCTION. WITH RESPECT TO CURRENT LEG PAIN, A BORDERLINE SIGNIFICANT DIFFERENCE ( $P < 0.06$ ) WAS OBSERVED AT THE END OF THE TREATMENT BUT NOT AT 1-YEAR FOLLOW-UP.**

**-OVERALL 89% OF BOTH TREATED GROUPS IMPROVED AT THE END OF 4.8 VISITS BUT AT THE END OF 1 YEAR THERE WAS LITTLE DIFFERENCE**

**-AT 8 WEEKS, 74% OF SYMPTOM DIRECTED EXERCISE PATIENTS WERE BACK TO WORK AND 60% OF SHAM EXERCISE PATIENTS RETURNED TO WORK. THIS SHOWS NON SURGICAL CARE TO BE AS GOOD OR BETTER THAN SURGICAL OUTCOME**

**-PATIENTS COULD USE NSAIDS OR MILD ANALGESICS SUCH AS PARACETAMOL**

**-PHYSICAL THERAPISTS AND CHIROPRACTORS DID THE TREATMENT. MCKENZIE AND STABILIZATION EXERCISES WERE USED.**

Albert, Hanne B; Manniche, Claus: The Efficacy of Systematic Active Conservative Treatment for Patients With Severe Sciatica: A Single-Blind, Randomized, Clinical, Controlled Trial. *Spine* 2012;37(7):531–542

Study Design: Prospective single-blind, randomized, clinical, controlled trial.

Objective: To evaluate the efficacy of active conservative treatment and to compare 2 active conservative treatment programs for patients with severe sciatica.

Summary of Background Data: Reviews have demonstrated little or no efficacy for passive conservative treatment modalities in patients suffering from sciatica. The results for surgery are conflicting. Cohort studies have shown excellent results for active treatment modalities in patients with sciatica.

Methods: One hundred eighty-one consecutive patients with radicular pain below the knee were examined at the baseline, at 8 weeks, and at 1 year after the treatment. Participants were randomized into 2 groups: (1) symptom-guided exercises + information + advice to stay active and (2) sham exercises + information + advice to stay active. Symptom-guided exercises consisted of a variety of back-related exercises given in accordance with a written algorithm in which symptoms or response to exercises determined the exercises given (<http://www.sygehuslillebaelt.dk/wm345075>, click exercises). Sham exercises were optional, designed to increase general blood circulation, and had no targeted effect on the back. The information was comprehensive and included anatomy, pathogenesis, and how discs heal without surgery. The advice included encouragement to stay as active as possible but to reduce activity if leg pain increased. The use of medication was optional, but only paracetamol and nonsteroidal anti-inflammatory drugs were recommended.

Results: A mean of 4.8 treatment sessions were provided. All patients experienced statistically significant and clinically important improvements in global assessment, functional status, pain, vocational status, and clinical findings. The symptom-guided exercise group improved significantly more than the sham exercise group in most outcomes.

Conclusion: Active conservative treatment was effective for patients who had symptoms and clinical findings that would normally qualify them for surgery. Although participating patients had greater faith in the sham exercises before treatment, the symptom-guided exercises were superior for most outcomes.

**REVISION LUMBAR FUSION CAN BE ASSOCIATED WITH CONSIDERABLE 2-YEAR HEALTH CARE COSTS. THESE COSTS CAN ALSO VARY WIDELY AMONG PATIENTS, AS EVIDENCED BY THE 2.6-FOLD OVERALL COST RANGE IN THIS SERIES**

Parker, SL; Shau, DN; Mendenhall, SK; McGirt, MJ: Factors Influencing 2-Year Health Care Costs In Patients Undergoing Revision Lumbar Fusion Procedures Clinical Article. Journal Of Neurosurgery-Spine 2012;16(4):323-328

**Object:** Revision lumbar fusion procedures are technically challenging and can be associated with tremendous health care resource utilization and cost. There is a paucity of data regarding specific factors that significantly contribute to increased cost of care. In light of this, the authors set out to identify independent risk factors predictive of increasing 2-year direct health care costs after revision lumbar fusion.

**Methods:** One hundred fifty patients undergoing revision instrument-assisted fusion for adjacent-segment disease (50 cases), pseudarthrosis (47 cases), or same-level stenosis (53 cases) were included in this study. Patient demographics, comorbidities, preoperative health states as assessed by patient-reported outcome questionnaires and perioperative complications were collected and analyzed. Two-year back-related medical resource utilization and direct health care costs were assessed. The independent association of all variables to increasing cost was assessed using multivariate linear regression analysis.

**Results:** There was a wide range (\$24,935+/- \$63,769) in overall 2-year direct costs for patients undergoing revision lumbar fusion (mean \$32,915+/- \$8344 [+/-SD]). Preoperative variables independently associated with 2-year direct health care costs included diagnosis of congestive heart failure, more severe leg pain (visual analog scale), greater back-related disability (Oswestry Disability Index), and worse mental health (12-Item Short Form Health Survey Mental Component Summary score). There was a 1.1- to 1.2-fold increase in cost for patients in the greatest quartiles compared with those in the lowest quartiles for these variables. Surgical site infection, return to the operating room, and spine-related hospital readmission during the 90-day global health period were postoperative variables independently associated with 2-year cost. Patients in the greatest versus lowest quartiles had a 1.7- to 1.9-fold increase in cost for these variables.

**Conclusions:** Revision lumbar fusion can be associated with considerable 2-year health care costs. These costs can also vary widely among patients, as evidenced by the 2.6-fold overall cost range in this series. Although comorbidities and preoperative severity of disease states contribute to cost of care, the primary drivers of increased cost include perioperative complications such as surgical site infection, return to the operating room, and readmission during the global health period. Measures focused on health service

improvement will be most successful in reducing the cost of care for patients undergoing revision lumbar fusion.

**AT 14 MONTHS, THE MRI OUTCOME WAS GENERALLY GOOD FOR DISC HERNIATIONS AND NERVE ROOT COMPROMISE. NERVE ROOT COMPROMISE HAD THE BEST MRI PROGNOSIS IF THE DISC WAS EXTRUDED AT BASELINE**

Jensen, TS; Albert, HB; Soerensen, JS; Manniche, C; Leboeuf-Yde, C: Natural Course Of Disc Morphology In Patients With Sciatica: An MRI Study Using A Standardized Qualitative Classification System. Spine (Phila Pa 1976) 2006;31(14):1605-12

**STUDY DESIGN:** A prospective observational study of patients with sciatica.

**OBJECTIVES:** To describe the 14-month development of disc-related MRI findings in patients with sciatica receiving active conservative treatment.

**SUMMARY OF BACKGROUND DATA:** Previous studies of disc changes over time have reported reduction of herniations in 35% to 100% of cases. This wide range may be explained by differences in patient populations and classifications used to describe disc herniations.

**METHODS:** Data were obtained from patients with radicular pain (n = 181) who were randomly allocated into one of two active conservative treatment regimens lasting 8 weeks. All patients were scanned at baseline and at 14 months of follow-up. Variables of interest in the present study were disc contour and nerve root compromise at the presumed symptomatic disc level. Disc contour was assessed using the recommendations from the Combined Task Forces of NASS, ASSR, and ASNR.

**RESULTS:** In all, 154 patients were included in this study (70 women and 84 men; range, 18-65 years; mean and median age, 45 years). It was possible to identify the symptomatic disc level in 90% of patients. Extrusions or sequestrations were more common in individuals younger than 45 years and in men. Men were also more likely to have nerve root compromise. Only 3% of bulges and 38% of focal protrusions improved, whereas 75% to 100% of broad-based protrusions, extrusions, and sequestrations improved (P < 0.0001). Nerve root compromise improved in 21% to 80% depending on the disc contour. Neither type of treatment nor age had any effect on the development of MRI findings over time. However, nerve root compromise was more likely to improve in men.

**CONCLUSIONS:** This classification system could be used to identify the majority of symptomatic disc levels. At 14 months, the MRI outcome was generally good for disc herniations and nerve root compromise. Nerve root compromise had the best MRI

prognosis if the disc was extruded at baseline. There were significant differences between men and women in relation to baseline findings as well as in relation to development of MRI findings over time.

### **SYNOVIAL CYST SURGICAL REMOVAL**

Landi, A; Marotta, N; Tarantino, R; Ruggeri, AG; Cappelletti, M; Ramieri, A; Domenicucci, M; Delfini, R: Microsurgical Excision Without Fusion As A Safe Option For Resection Of Synovial Cyst Of The Lumbar Spine: Long-Term Follow-Up In Mono-Institutional Experience. *Neurosurgical Review* 2012;35(2):245-253

Spinal synovial cysts are cystic dilatations of the synovial membrane that may arise at all levels of the spine. We describe our experience, paying attention to diagnosis, surgical treatment, and long-term follow-up. Between 1995 and 2007, 18 patients were surgically treated. Of these, three patients were excluded from the study because they presented spinal instability at pre-operative assessment. All patients were evaluated pre-operatively with CT, MRI, and dynamic X-rays, and underwent surgery for removal of the cyst by hemilaminectomy and partial arthrectomy. All patients were evaluated with early MRI and had a minimum 2-year follow-up by dynamic X-rays. None of the patients required instrumented fusion due to the absence of radiological signs of instability on the pre-operative dynamic tests. In all patients, there was an immediate resolution of the symptoms, with evidence of complete removal of the cysts on post-operative MRI. At 2-year follow-up, all patients underwent dynamic X-rays and responded to a questionnaire for evaluation of outcome. None of them showed signs of relapse. The gold standard for treatment is surgery, even though other conservative treatment regimens have been proposed. Correct surgical strategy relies on pre-operative assessment of biomechanical stability for deciding whether patients need instrumented fusion during cyst removal. Patients with no instability signs are suitable for hemilaminectomy with partial arthrectomy, preserving 2/3 of the medial portion of the articular facet, because this represents a valid option of treatment with a low risk of complications and a low rate of relapse.

### **TOTAL DIRECT COSTS OF CHRONIC LOW BACK PAIN WITH NEUROPATHIC PAIN ARE 160% HIGHER THAN WITHOUT NEUROPATHIC PAIN**

Mehra, M; Hill, K; Nicholl, D; Schadrack, J: The Burden Of Chronic Low Back Pain With And Without A Neuropathic Component: A Healthcare Resource Use And Cost Analysis *Journal Of Medical Economics* 2012;15(2):245-252

**Background:** This research addresses the need for population-based studies on the burden of chronic low back pain (CLBP) by examining healthcare service use and costs for patients with and without neuropathic components in the US population.

**Methods:** Data were analyzed from PharMetrics IMS LifeLink (TM) US Claims Database (2006-2008). Patients ( $\geq 18$  years) with 36 months continuous enrollment, ICD-9 code for low back pain, and claims in 3 out of 4 consecutive months in the 12-month prospective period were included and classified with CLBP. Patients were further classified with a neuropathic component (wNP) and without a neuropathic component (woNP) based on ICD-9 codes. Healthcare resources, physical therapy, prescription medication use, and associated costs were assessed for the period January 1-December 31, 2008.

**Results:** A number of patients (39,425) were identified with CLBP (90.4% wNP). Patients wNP included more women, were older and more likely to have clinically diagnosed depression, and made significantly greater use of any prescription medication at index event, opioids (particularly schedule II), and healthcare resources. Total direct costs of CLBP-related resource use were similar to US\$96 million over a 12-month follow-up. CLBP wNP accounted for 96% of total costs and mean annual cost of care/patient was similar to 160% higher than CLBP patients woNP (US\$ 2577 vs US\$ 1007,  $p < 0.0001$ ).

**Limitations:** This study was descriptive and was not designed to demonstrate causality between diagnosis, treatment, and outcomes. Resource use and costs for reasons other than LBP were not included. Patients with neuropathic pain are more likely to seek treatment; therefore CLBP patients with a non-neuropathic component may be under-represented.

**Conclusions:** The disproportionately high share of interventional resource use in CLBP wNP suggests greater need for new treatment options that more comprehensively manage the range of pain symptoms and signaling mechanisms involved, to help improve patient outcomes and reduce the burden on healthcare systems.

**STUDY TO DETERMINE IF ACUPUNCTURE, ALONE OR AS AN ADJUNCT TO PHARMACOTHERAPY PROVIDES EFFECTIVE, SAFE AND ACCEPTABLE PAIN RELIEF FOR PATIENTS PRESENTING TO EMERGENCY DEPARTMENTS WITH ACUTE BACK PAIN, MIGRAINE OR ANKLE SPRAIN.**

Cohen, M; Parker, S; Taylor, D; Smit, DV; Ben-Meir, M; Cameron, P; Xue, C: Acupuncture As Analgesia For Low Back Pain, Ankle Sprain And Migraine In Emergency Departments: Study Protocol For A Randomized Controlled Trial. *Trials* 2011;12:NIL\_1-NIL\_7



**Background:** Pain is the most common reason that patients present to an emergency department (ED) and is often inadequately managed. Evidence suggests that acupuncture is effective for pain relief, yet it is rarely practiced in the ED. The current study aims to assess the efficacy of acupuncture for providing effective analgesia to patients presenting with acute low back pain, migraine and ankle sprain at the EDs of four hospitals in Melbourne, Australia.

**Method:** The study is a multi-site, randomized, assessor-blinded, controlled trial of acupuncture analgesia in patients who present to an ED with low back pain, migraine or ankle sprain. Patients will be block randomized to receive either acupuncture alone, acupuncture as an adjunct to pharmacotherapy or pharmacotherapy alone. Acupuncture will be applied according to Standards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA). Pain after one hour, measured using a visual analogue scale (VAS), is the primary outcome. Secondary outcomes measures include the following instruments; the Oswestry low back pain disability questionnaire, 24-hour Migraine Quality of Life questionnaire and Patient's Global Assessment of Ankle Injury Scale. These measures will be recorded at baseline, 1 hour after intervention, each hour until discharge and 48 +/- 12 hours of ED discharge. Data will also be collected on the safety and acceptability of acupuncture and health resource utilization.

**Discussion:** The results of this study will determine if acupuncture, alone or as an adjunct to pharmacotherapy provides effective, safe and acceptable pain relief for patients presenting to EDs with acute back pain, migraine or ankle sprain. The results will also identify the impact that acupuncture treatment may have upon health resource utilisation in the ED setting.

### **DEPRESSIVE SYMPTOMS WITH LOW BACK PAIN PLAY A SIGNIFICANT ROLE IN DETERMINING THE ASSOCIATIONS BETWEEN RELATIONSHIP QUALITY, PERCEIVED PARTNER REACTIONS, AND PAIN AND DISABILITY**

Campbell, P; Jordan, KP; Dunn, KM: The Role of Relationship Quality and Perceived Partner Responses with Pain and Disability in Those with Back Pain. *Pain Medicine* 2012;13(2):204-214

**Objective:** The objectives of this study were to investigate the associations of key constructs of relationship quality (cohesion, consensus, and satisfaction) and perceived partner responses to pain behavior (e.g., solicitous and negative responses) with the outcomes of pain and disability in those with long-term low back pain, and to explore the role of the patient's depressive symptom mood state on those associations.

**Methods:** Self-report questionnaires on pain intensity, disability, relationship quality, perceived partner reactions to pain, and depressive symptoms were collected from

participants (N = 174) taking part in a longitudinal study on low back pain within a primary care sample.

Results: Participants reporting more consensus (e. g., agreement about sexual intimacy, level of affection) in their relationships had significantly higher pain intensity ( $P = 0.03$ ), and solicitous partner responses ( $P = 0.04$ ) were significantly positively associated with disability levels. However, the findings for pain intensity were only present in those with higher levels of depression, while the association of solicitous responses with disability was only significant in those with lower levels of depression, indicating a suppression effect of depression on pain and disability.

Conclusions: Depressive symptoms play a significant role in determining the associations between relationship quality, perceived partner reactions, and pain and disability. The relationship construct of consensus and perceived solicitous responses were associated with pain and disability. These findings illustrate the importance of social context and patient mood state on the outcomes for those with low back pain.

### **EPIDURAL STEROID INJECTION FOR LOW BACK GIVE SHORT TERM BUT NOT LONG TERM RELIEF OF PAIN AND TRANSFORAMINAL INJECTIONS DO NOT APPEAR TO BE MORE EFFICACIOUS THAN INTERLAMINAR INJECTIONS**

Wilkinson, IM; Cohen, SP: Epidural Steroid Injections. *Current Pain And Headache Reports* 2012;16(1):50-59

Epidural steroid injection (ESI) is the most commonly performed intervention in pain clinics across the United States. This article provides an evidence-based review of ESI, including data on efficacy, patient selection, comparison of types, and complications. The data strongly suggest that ESI can provide short-term relief for radicular symptoms but are less compelling for long-term effects or relief of back pain. Although it has been asserted that transforaminal ESIs are more efficacious than interlaminar injections, the evidence supporting this is limited.

### **PHYSICAL THERAPISTS DID NOT FIND LUMBOPELVIC REGION MANIPULATION EFFECT QUADRICEPS FORCE OUTPUT OR ACTIVATION IN PEOPLE WITH PATELLOFEMORAL PAIN SYNDROME**

Grindstaff, TL; Hertel, J; Beazell, JR; Magrum, EM; Kerrigan, DC; Fan, X; Ingersoll, CD: Lumbopelvic Joint Manipulation And Quadriceps Activation Of People With Patellofemoral Pain Syndrome. *J Athl Train* 2012;47(1):24-31

**CONTEXT:** Quadriceps weakness and inhibition are impairments associated with patellofemoral pain syndrome (PFPS). Lumbopelvic joint manipulation has been shown to improve quadriceps force output and inhibition, but the duration of the effect is unknown.

**OBJECTIVE:** To determine whether quadriceps strength and activation are increased and maintained for 1 hour after high-grade or low-grade joint mobilization or manipulation applied at the lumbopelvic region in people with PFPS.

**DESIGN:** Randomized controlled clinical trial.

**SETTING:** University laboratory. **Patients or Other Participants:** Forty-eight people with PFPS (age =  $24.6 \pm 8.9$  years, height =  $174.3 \pm 11.2$  cm, mass =  $78.4 \pm 16.8$ kg) participated. **Intervention(s):** Participants were randomized to 1 of 3 groups: lumbopelvic joint manipulation (grade V), side-lying lumbar midrange flexion and extension passive range of motion (grade II) for 1 minute, or prone extension on the elbows for 3 minutes. **Main Outcome Measure(s):** Quadriceps force and activation were measured using the burst superimposition technique during a seated isometric knee extension task. A 2-way repeated-measures analysis of variance was performed to compare changes in quadriceps force and activation among groups over time (before intervention and at 0, 20, 40, and 60 minutes after intervention).

**RESULTS:** We found no differences in quadriceps force output ( $F(5.33,101.18) = 0.65$ ,  $P = .67$ ) or central activation ratio ( $F(4.84,92.03) = 0.38$ ,  $P = .86$ ) values among groups after intervention. When groups were pooled, we found differences across time for quadriceps force ( $F(2.66,101.18) = 5.03$ ,  $P = .004$ ) and activation ( $F(2.42,92.03) = 3.85$ ,  $P = .02$ ). Quadriceps force was not different at 0 minutes after intervention ( $t(40) = 1.68$ ,  $P = .10$ ), but it decreased at 20 ( $t(40) = 2.16$ ,  $P = .04$ ), 40 ( $t(40) = 2.87$ ,  $P = .01$ ) and 60 ( $t(40) = 3.04$ ,  $P = .004$ ) minutes after intervention. All groups demonstrated decreased quadriceps activation at 0 minutes after intervention ( $t(40) = 4.17$ ,  $P < .001$ ), but subsequent measures were not different from preintervention levels ( $t(40)$  range, 1.53-1.83,  $P > .09$ ).

**CONCLUSIONS:** Interventions directed at the lumbopelvic region did not have immediate effects on quadriceps force output or activation. Muscle fatigue might have contributed to decreased force output and activation over 1 hour of testing.

**ROLE OF SPINAL MANIPULATION IS STUDIED VIA INITIAL EPISODE(S) OF BACK OR NECK PAIN MAY LEAD TO ONGOING CHANGES IN INPUT FROM THE SPINE WHICH OVER TIME LEAD TO ALTERED SENSORIMOTOR INTEGRATION OF INPUT FROM THE SPINE AND LIMBS**

Haavik, H; Murphy, B: The Role Of Spinal Manipulation In Addressing Disordered Sensorimotor Integration And Altered Motor Control. J Electromyogr Kinesiol 2012:[Epub ahead of print]

This review provides an overview of some of the growing body of research on the effects of spinal manipulation on sensory processing, motor output, functional performance and sensorimotor integration. It describes a body of work using somatosensory evoked potentials (SEPs), transcranial magnetic nerve stimulation, and electromyographic techniques to demonstrate neurophysiological changes following spinal manipulation. This work contributes to the understanding of how an initial episode(s) of back or neck pain may lead to ongoing changes in input from the spine which over time lead to altered sensorimotor integration of input from the spine and limbs.

**A MULTIMODAL/MULTIDISCIPLINARY APPROACH INCORPORATING PHARMACOLOGIC AND NONPHARMACOLOGIC THERAPY INTO A PROGRAM THAT INCLUDES MORE THAN 1 DISCIPLINE IS IMPORTANT TO IMPROVE OUTCOMES IN PATIENTS WITH CHRONIC PAIN**

Clauw, D; McCarberg, BH: Managing Chronic Pain With Nonopioid Analgesics: A Multidisciplinary Consult. Am J Med 2012;125(5):S1

As detailed in this online CME activity ([www.cmeaccess.com/AJM/ChronicPain04](http://www.cmeaccess.com/AJM/ChronicPain04)), determining pain mechanism is an important aspect guiding treatment selection for chronic musculoskeletal pain states. Although broad classifications provide a framework, any combination of mechanisms may be present in a chronic pain patient, and there is growing evidence that pain states generally considered nociceptive may also involve elements of augmented central nervous system pain processing. Nonopioid analgesics, including serotonin norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants, and alpha-2-delta ligand anticonvulsants, are the treatments of choice for fibromyalgia and other central neuropathic pain states. Additionally, studies have now shown that certain SNRIs can be effective in treating "classic" nociceptive pain states, such as osteoarthritis, and also are effective for low back pain. In addition to considering biological mechanisms, chronic pain management also involves recognizing and evaluating the contribution of psychological and sociocultural factors that can influence pain chronicity and patient prognosis. A multimodal/multidisciplinary

approach incorporating pharmacologic and nonpharmacologic therapy into a program that includes more than 1 discipline is important to improve outcomes in patients with chronic pain.

**MOST INFORMATIVE STUDY FROM \* University of California, San Francisco, CA; † Kaiser Permanente Division of Research, Oakland, CA; ‡ University of Northern Carolina, Chapel Hill, NC – STATING NEED FOR BROAD INITIATIVES TO DEVELOP NEW MEANS FOR THE PRIMARY AND SECONDARY INTERVENTION OF RECURRENT AND CHRONIC LOW BACK PAIN. CHIROPRACTIC HAS A HUGE ROLE TO PLAY IN THIS SITUATION. jmc**

**605 PATIENTS HAD AN AVERAGE PAIN INTENSITY OF 5.6 AND DISABILITY OF 15.8 (ROLAND-MORRIS SCALE = 0–24). 18% HAD DECLARED SICK LEAVE BETWEEN PAIN ONSET AND BASELINE INTERVIEW. THIRTEEN PERCENT OF 521 PATIENTS (86% FOLLOW-UP) EXPERIENCED CHRONIC PAIN AT 6 MONTHS AND 19% OF 443 PATIENTS AT 2 YEARS. AT 6 MONTHS, 54% HAD EXPERIENCED AT LEAST 1 LBP RECURRENCE, AND 47% IN THE SUBSEQUENT 18 MONTHS. THE PROGNOSIS OF STRICTLY DEFINED ACUTE LBP, WITH OR WITHOUT SCIATICA, IS LESS FAVORABLE THAN COMMONLY STATED IN PRACTICE GUIDELINES BASED ON FAILURE TO RETURN TO WORK. BROAD INITIATIVES TO DEVELOP NEW MEANS FOR THE PRIMARY AND SECONDARY PREVENTION OF RECURRENT AND CHRONIC LBP ARE URGENTLY NEEDED**

Mehling, Wolf; Gopisetty, Viranjini; Bartmess, Elizabeth; Acree, Mike; Pressman, Alice; Goldberg, Harley; Hecht, Frederick; Carey, Tim; Avins, Andrew L: The Prognosis of Acute Low Back Pain in Primary Care in the United States: A 2-Year Prospective Cohort Study *Spine* 2012;37(8):678–684

Study Design: Prospective cohort study.

Objective: To assess the prognosis of patients presenting with acute low back pain (LBP) in a primary care setting in the United States.

Summary of Background Data: Practice guidelines for acute LBP based on return-to-work outcomes underestimate the development of chronic pain in the primary care setting. Because of differences in inclusion criteria, chronic pain definitions, and national health systems, prognostic cohort studies have reported a wide range of results limiting interpretation and generalization. Current data from carefully designed prognostic studies of acute LBP are lacking for the US primary care system.

**Methods:** Members of a large health service organization were enrolled after seeking medical care for acute LBP, with or without sciatica, of up to 30 days duration, with no episode in the past 12 months and no history of spine surgery. We conducted phone interviews at baseline, 6 months, and 2 years. Based on receiver operating characteristic analyses, a combination of global perceived recovery with pain intensity was used as primary outcome for chronic pain. Recurrence and multiple secondary outcomes were assessed to allow for comparison with other studies.

**Results:** Six hundred five patients had an average pain intensity of 5.6 (numeric rating scale = 0–10) and disability of 15.8 (Roland-Morris scale = 0–24). Eight percent had declared sick leave between pain onset and baseline interview. Thirteen percent of 521 patients (86% follow-up) experienced chronic pain at 6 months and 19% of 443 patients at 2 years. At 6 months, 54% had experienced at least 1 LBP recurrence, and 47% in the subsequent 18 months.

**Conclusion:** The prognosis of strictly defined acute LBP, with or without sciatica, is less favorable than commonly stated in practice guidelines based on failure to return to work. Broad initiatives to develop new means for the primary and secondary prevention of recurrent and chronic LBP are urgently needed.

## **BRIEF CITATION FROM THIS PAPER ENHANCE THE SERIOUSNESS OF LOW BACK PAIN IN THE U.S.**

Based on return to work, 6% to 10% of patients with acute low back pain are expected to develop chronic pain. These patients consume up to 75% of LBP-related health care expenses in the United States, estimated at \$26.3 billion in 1998<sup>5</sup> and even higher since.

At 8 weeks of acute LBP, failure to return to work is 11% at 3 and 6 months and 9-13% at one year

Proportions of patients developing chronic LBP were higher in primary care studies, using outcomes of pain and function rather than return to work: 26% (range, 2%–48%) of low back pain patients become chronic.

A systematic review of studies in patients with LBP of less than 3 weeks' duration recruited from any kind of medical setting including specialty care, showed pain is expected to rapidly decrease by 58% (mean; range, 12%–84%) of initial levels within 1 month. Thereafter, pain continues to decrease more slowly, until 3 months, after which pain levels remain nearly constant. The cumulative risk of at least 1 recurrence within 12 months was 73%.

¼ to 1/3 of “acute” LBP patients had symptoms 6 to 12 months later.

**OZONE THERAPY APPEARS TO YIELD POSITIVE RESULTS AND LOW MORBIDITY RATES WHEN APPLIED PERCUTANEOUSLY FOR THE TREATMENT OF CHRONIC LOW BACK PAIN.**

Magalhaes, FND; Dotta, L; Sasse, A; Teixeira, MJ; Fonoff, ET: Ozone Therapy as a Treatment for Low Back Pain Secondary to Herniated Disc: A Systematic Review and Meta-analysis of Randomized Controlled Trials. *Pain Physician* 2012;15(2):E115-E129

**Background:** Low back pain (LBP) is one of the most common and important health problems affecting the population worldwide and remains mostly unsolved. Ozone therapy has emerged as an additional treatment method. Questions persist concerning its clinical efficacy.

**Objective:** The purpose of our study was to evaluate the therapeutic results of percutaneous injection of ozone for low back pain secondary to disc herniation.

**Study Design:** A systematic review and meta-analysis of randomized controlled trials.

**Methods:** A comprehensive literature search was conducted using all electronic databases from 1966 through September 2011. The quality of individual articles was assessed based on the modified Cochrane review criteria for randomized trials and criteria from the Agency for Healthcare Research and Quality.

**Outcome Parameters:** The outcome measure was short-term pain relief of at least 6 months or long-term pain relief of more than 6 months.

**Results:** Eight observational studies were included in the systematic review and 4 randomized trials in the meta-analysis. The indicated level of evidence for long-term pain relief was II-3 for ozone therapy applied intradiscally and II-1 for ozone therapy applied paravertebrally. The grading of recommendation was 1C for intradiscal ozone therapy and 1B for paravertebral ozone therapy.

**Limitations:** The main limitations of this review are the lack of precise diagnosis and the frequent use of mixed therapeutic agents. The meta-analysis included mainly active-control trials. No placebo-controlled trial was found.

**Conclusions:** Ozone therapy appears to yield positive results and low morbidity rates when applied percutaneously for the treatment of chronic low back pain.

## **CT-GUIDED SELECTIVE NERVE ROOT INFILTRATIONS WITH THE SUPPLEMENT OF TRAMADOL WERE FOUND TO BE HIGHLY EFFECTIVE IN THE TREATMENT OF PERSISTANT RADICULOPATHIES**

Wewalka, M; Abdelrahimsai, A; Wiesinger, GF; Maria, E: CT-Guided Transforaminal Epidural Injections with Local Anesthetic, Steroid, and Tramadol for the Treatment of Persistent Lumbar Radicular Pain. *Pain Physician* 2012;15(2):153-159

**Background:** A substantial number of patients with persistent lumbar radicular pain are treated with a multimodal spectrum of conservative therapies without lasting effect. The duration of pain is certainly a risk factor for chronification. There is evidence that guided periradicular infiltrations are a valid option in the treatment of radiculopathies. Usually a combination of local anesthetic and/or corticosteroid is injected. Tramadol is being used for perioperative analgesia and has been shown to provide effective, long-lasting pain relief after epidural administration.

**Objective:** The aim of this pilot study was to evaluate the efficacy of serial CT-guided transforaminal nerve root infiltrations with a supplement of tramadol for patients with persistent, radicular pain.

**Study Design:** Interventional cohort study.

**Setting:** Outpatient department for interdisciplinary pain medicine.

**Methods:** 37 patients who had radicular leg pain for over 9 weeks received up to 3 CT-guided transforaminal nerve root infiltrations at intervals of 2 weeks as long as their level of pain was over 3 on a numerical rating scale from 0 to 10. 50 mg of Tramadol were added to a combination of local anesthetic (Ropivacain, 2 mg) and corticosteroid (Triamcinolon, 40 mg). Evaluations were carried out 24 hours after the Infiltration as well as 2 weeks, 3 and 6 months after the treatment series. The intensity of their radicular pain was measured by a numerical rating scale (NRS). Pain reduction of at least 50% was defined as successful outcome.

**Results:** In total, 65 infiltrations were carried out with pain relief in more than 90% of the patients within 24 hours and an average pain reduction of 64%. Six months post-injection 23 of 34 patients available for follow-up (67.6%) had a successful pain reduction of 84% on average. No adverse effects ascribable to the use of tramadol were noted.

**Limitations:** Due to the lack of a control group we cannot make any statement if tramadol improves short-term pain reduction.



Conclusion: Fast and lasting pain relief is the key to optimize rehabilitation for patients with radicular pain. There is a physiological rationale that the opioid receptors at the spinal level could be used to optimize the analgetic effect of guided periradicular injections. In our case series, serial CT-guided selective nerve root infiltrations with the supplement of tramadol were found to be highly effective in the treatment of persistent radiculopathies. Randomized controlled trials will be necessary to clarify the possible benefit of the supplement of an opioid.

**THE AQUATIC EXERCISES THAT MAXIMIZE TRUNK MUSCLE ACTIVITY IN THE HEALTHY MALES STUDIED ARE ABDOMINAL BRACING AND SWISS BALL EXERCISES. SOME MUSCLES WERE SELECTIVELY ACTIVATED DURING ABDOMINAL HOLLOWING (LA) AND HIP ABDUCTION (MT) EXERCISES WHEN COMPARED TO MOST OTHER EXERCISES**

Bressel E, Dolny DG, Vandenberg C, Cronin JB: Trunk Muscle Activity During Spine Stabilization Exercises Performed In A Pool. *Phys Ther Sport* 2012;13(2):67-72

OBJECTIVES: To compare trunk muscle activity levels among a variety of therapeutic aquatic exercises designed for patients with low back pain.

STUDY DESIGN: Quantitative observational laboratory study.

SETTING: Sports medicine clinic housed in a University.

PARTICIPANTS: Eleven physically active males aged  $25.7 \pm 5.53$  years.

MAIN OUTCOME MEASURES: Surface electromyographic (EMG) data from muscles rectus abdominis (RA), external oblique (EO), lower abdominals (LA), multifidus (MT), and erector spinae (ES) were recorded and then normalized to a maximal voluntary contraction.

RESULTS: EMG values during abdominal bracing and Swiss ball exercises for muscles RA, EO, LA, and ES were significantly greater than most other exercises tested that included pelvic tilt, marching, hip abduction, and alternating arm exercises ( $P = .04-.001$ ). EMG values of muscle LA were also greater for the abdominal hollowing exercise, whereas muscle MT displayed the greatest EMG values during the hip abduction exercise when compared to most other exercises tested ( $P = .02-.001$ ).

CONCLUSIONS: The aquatic exercises that maximize trunk muscle activity in the healthy males studied are abdominal bracing and Swiss ball exercises. Some muscles were selectively activated during abdominal hollowing (LA) and hip abduction (MT) exercises when compared to most other exercises.

## **LOWER DIETARY SELENIUM INTAKES ARE ASSOCIATED WITH AN INCREASED RISK OF MAJOR DEPRESSION**

Pasco, JA; Jacka, FN; Williams, LJ; Evans-Cleverdon, M; Brennan, SL; Kotowicz, MA; Nicholson, GC; Ball, MJ; Berk, M: Dietary Selenium And Major Depression: A Nested Case-Control Study. *Complement Ther Med* 2012;20(3):119-23

**OBJECTIVES AND METHODS:** Alterations in redox biology are established in depression; however, there are no prospective epidemiological data on redox-active selenium in depression. We aimed to determine if low levels of dietary selenium are associated with an increased risk for de novo major depressive disorder (MDD). In this nested case-control study, women aged 20 years or more were identified from a randomly selected cohort being followed prospectively for the Geelong Osteoporosis Study. Cases were individuals with incident MDD, identified using the Structured Clinical Interview for DSM-IV-TR (SCID-I/NP); controls had no such history. Dietary selenium intake was measured using a food frequency questionnaire at baseline, together with anthropometric and lifestyle measures.

**RESULTS:** Eighteen women who developed de novo MDD were classified as cases; there were 298 controls. Low dietary selenium intakes increased the likelihood of developing MDD; OR 2.74 (95%CI 0.95-7.89). After adjusting for age and SES, compared with a high selenium intake, a low intake (<8.9µg/MJ/day) was associated with an approximate trebling of the likelihood for developing de novo MDD; OR 2.95 (95%CI 1.00-8.72). Smoking, alcohol consumption and physical activity did not confound the association.

**CONCLUSION:** These data suggest that lower dietary selenium intakes are associated with an increased risk of subsequent de novo MDD. We propose that selenium's function as an antioxidant, and as a constituent of selenoproteins that are important in redox homeostasis, warrants further investigation as a risk factor for depression, and suggest a potentially novel modifiable factor in the primary prevention and management of depression.

## **A COMPREHENSIVE YOGA PROGRAMS IMPROVES PAIN, ANXIETY AND DEPRESSION IN CHRONIC LOW BACK PAIN PATIENTS MORE THAN EXERCISE**

Tekur, P; Nagarathna, R; Chametcha, S; Hankey, A; Nagendra, HR: A Comprehensive Yoga Programs Improves Pain, Anxiety And Depression In Chronic Low Back Pain Patients More Than Exercise: An RCT. *Complement Ther Med* 2012;20(3):107-18

**INTRODUCTION:** Previously, outpatient Yoga programs for patients with chronic low back pain (CLBP) lasting several months have been found to reduce pain, analgesic requirement and disability, and improve spinal mobility. This study evaluated changes in pain, anxiety, depression and spinal mobility for CLBP patients on short-term, residential Yoga and physical exercise programs, including comprehensive yoga lifestyle modifications.

**METHODS:** A seven day randomized control single blind active study in a residential Holistic Health Centre in Bangalore, India, assigned 80 patients (37 female, 43 male) with CLBP to yoga and physical exercise groups. The Yoga program consisted of specific asanas and pranayamas for back pain, meditation, yogic counselling, and lectures on yoga philosophy. The control group program included physical therapy exercises for back pain, and matching counselling and education sessions.

**RESULTS:** Group×time interactions ( $p<0.05$ ) and between group differences ( $p<0.05$ ) were significant in all variables. Both groups' scores on the numerical rating scale for pain reduced significantly, 49% in Yoga ( $p<0.001$ ,  $ES=1.62$ ), 17.5% in controls ( $p=0.005$ ,  $ES=0.67$ ). State anxiety (STAI) reduced 20.4% ( $p<0.001$ ,  $ES=0.72$ ) and trait anxiety 16% ( $p<0.001$ ,  $ES=1.09$ ) in the yoga group. Depression (BDI) decreased in both groups, 47% in yoga ( $p<0.001$ ,  $ES=0.96$ ,) and 19.9% in controls ( $p<0.001$ ,  $ES=0.59$ ). Spinal mobility ('Sit and Reach' instrument) improved in both groups, 50%, in yoga ( $p<0.001$ ,  $ES=2.99$ ) and 34.6% in controls ( $p<0.001$ ,  $ES=0.81$ ).

**CONCLUSION:** Seven days intensive residential Yoga program reduces pain, anxiety, and depression, and improves spinal mobility in patients with CLBP more effectively than physiotherapy exercises.

### **SHOCKING ERRORS IN RADIOLOGIST INTERPRETATION OF METASTATIC DISEASE, FRACTURE, BONE SCANS, CHEST INTERPRETATION**

Donald, JJ; Barnard, SA: Common Patterns In 558 Diagnostic Radiology Errors. J Med Imaging Radiat Oncol 2012;56(2):173-8

**Introduction:** As a Quality Improvement initiative our department has held regular discrepancy meetings since 2003. We performed a retrospective analysis of the cases presented and identified the most common pattern of error.

**Methods:** A total of 558 cases were referred for discussion over 92 months, and errors were classified as perceptual or interpretative. The most common patterns of error for each imaging modality were analysed, and the misses were scored by consensus as subtle or non-subtle.

Results: Of 558 diagnostic errors, 447 (80%) were perceptual and 111 (20%) were interpretative errors. Plain radiography and computed tomography (CT) scans were the most frequent imaging modalities accounting for 246 (44%) and 241 (43%) of the total number of errors, respectively. In the plain radiography group 120 (49%) of the errors occurred in chest X-ray reports with perceptual miss of a lung nodule occurring in 40% of this subgroup. In the axial and appendicular skeleton missed fractures occurred most frequently, and metastatic bone disease was overlooked in 12 of 50 plain X-rays of the pelvis or spine. The majority of errors within the CT group were in reports of body scans with the commonest perceptual errors identified including 16 missed significant bone lesions, 14 cases of thromboembolic disease and 14 gastrointestinal tumours. Of the 558 errors, 312 (56%) were considered subtle and 246 (44%) non-subtle.

Conclusion: Diagnostic errors are not uncommon and are most frequently perceptual in nature. Identification of the most common patterns of error has the potential to improve the quality of reporting by improving the search behaviour of radiologists.

#### **HYDROALCOHOLIC EXTRACT OF DRIED CLOVE BUDS HAS BONE-PRESERVING EFFICACY AGAINST HYPOGONADAL OSTEOPOROSIS.**

Karmakar, S; Choudhury, M; Das, AS; Maiti, A; Majumdar: Clove (*Syzygium Aromaticum* Linn) Extract Rich In Eugenol And Eugenol Derivatives Shows Bone-Preserving Efficacy. *Natural Product Research* 2012;26(6):500-509

This study examined the efficacy of hydroalcoholic extract of dried clove buds, which is rich in phenolic compounds namely eugenol and eugenol derivatives (precursors of flavones, isoflavones and flavonoids), on different primary and secondary osteoporotic marker changes in an ovariectomised (OVX) rat model of osteoporosis. Female Wistar rats were randomly divided into three groups: sham-operated control (A), OVX (B) and OVX plus 50% hydroalcoholic extract of dried clove buds for 4 weeks (C). Results indicated that, compared to control, serum alkaline phosphatase (AP; 48.25%,  $p < 0.01$ ), serum tartrate-resistant acid phosphatase (TRAP; 63.48%,  $p < 0.01$ ), urinary calcium (14.70%,  $p < 0.01$ ), urinary phosphate (50.30%,  $p < 0.01$ ) and urinary creatinine (122.44%,  $p < 0.01$ ) were significantly altered in OVX rats. All these altered responses were significantly restored (AP: 27.53%,  $p < 0.01$ ; TRAP: 33.51%,  $p < 0.01$ ; calcium: 53.15%,  $p < 0.01$ ; phosphate: 27.49%,  $p < 0.01$ ; creatinine: 46.40%,  $p < 0.01$ ) by supplementation with hydroalcoholic extract of dried clove buds. Results of bone density, bone mineral content, bone tensile strength and histological analysis also showed similar trend of results, which supported initial observations of this study. It is proposed that hydroalcoholic extract of dried clove buds has bone-preserving efficacy against hypogonadal osteoporosis.

**SPINAL STABILIZATION EXERCISES DECREASE THE ANTERIOR POSTERIOR SWAY OF THE SPINE AND PELVIS TO HELP PREVENT FURTHER INJURY BY LIMITING AN INDIVIDUAL'S RESPONSE RATE TO EXTERNAL PERTURBATIONS.**

Rhee, HS; Kim, YH; Sung, PS: A Randomized Controlled Trial To Determine The Effect Of Spinal Stabilization Exercise Intervention Based On Pain Level And Standing Balance Differences In Patients With Low Back Pain. *Medical Science Monitor* 2012;18(3):CR174-CR181

Background: A number of studies have evaluated exercise interventions compared with other treatment strategies for subjects with recurrent low back pain (LBP); however, subject pain level and balance were not carefully considered. The purpose of this study was to investigate the effectiveness of spinal stabilization exercises (SSE) for managing pain and increasing balance strategy changes following unexpected perturbations in patients diagnosed with recurrent LBP.

Material/Methods: Twenty-one age- and gender-matched patients participated in a supervised SSE or control exercise program 5 times a week over a 4-week period. The Million Visual Analogue Scale (MVAS) and Oswestry Disability Index (ODI) were used to measure each patient's level of pain and disability. Balance measurements were derived from recordings of the anterior-posterior (A/P) and medio-lateral (M/L) center of pressure (COP) displacements during 3 consecutive, unexpected random perturbations.

Results: The level of reported pain and disability significantly decreased following treatment for both groups. Although the M/L sway was not significantly different in either group ( $p=0.86$ ), there was a significant difference between group and measurement time during A/P sway ( $p=0.04$ ). The A/P displacement of the SSE group significantly decreased compared with the control group. The decreased A/P displacement can be linked to the SSE intervention, which helps prevent further injury by limiting an individual's response rate to external perturbations.

Conclusions: Clinicians might consider SSE for LBP patients as a possible rehabilitation strategy to reduce A/P displacement.

**ANKYLOSING SPONDYLITIS DIAGNOSIS AND TREATMENT WERE CORRELATED TO RADIOLOGICAL SEVERITY; THEY PROGRESSIVELY DECREASED OVER 6 DECADES**

Salvadorini, G; Bandinelli, F; Delle Sedie, A; Riente, L; Candelieri, A; Generini, S;

Possemato, N; Bombardieri, S; Matucci-Cerinic, M: Ankylosing Spondylitis: How Diagnostic And Therapeutic Delay Have Changed Over The Last Six Decades.

**OBJECTIVES:** Ankylosing spondylitis (AS) is a chronic, progressive, and disabling disease, but the diagnosis is often missed and markedly delayed. An early diagnosis is important to establish a treatment to reduce disability and modify the natural course of disease. The aim of this study was to investigate the diagnostic (DD) and therapeutic (TD) delay according to the decade of diagnosis. The DD and TD correlation with radiological severity score and the new imaging techniques used in diagnosis (magnetic resonance [MRI], computerised tomography, scintigraphy for sacroiliac joints) were also investigated.

**METHODS:** 135 AS patients (45 female and 90 male,  $36.5 \pm 10.2$  years old at diagnosis) with disease onset between 1950 and 2008, were investigated; the time from onset to diagnosis (DD) and treatment (TD), the New York and ASAS criteria fulfilment, the New York sacroiliac radiological score, bamboo spine presence at first visit and the new imaging technique used at diagnosis were recorded and their correlations were analysed.

**RESULTS:** The New York and ASAS criteria were met at the first visit, by 87% and 96%, respectively. The delay from onset of symptoms to diagnosis and treatment was  $9 \pm 8$  and  $12 \pm 11$  years, respectively, but decreased significantly between different decades ( $p < 0.001$ ). The severity of sacroiliitis (mean  $2 \pm 1$ ; 17/135, 12.5% - IV grade sacroiliitis at diagnosis) and bamboo spine (3.7% at diagnosis) correlated with DD and TD ( $p < 0.001$ ). Sacroiliac MRI use at diagnosis significantly decreased both DD and TD ( $p > 0.001$  and  $p < 0.05$ , respectively).

**CONCLUSIONS:** DD and TD were correlated to radiological severity; they progressively decreased over 6 decades.

#### **ELECTROACUPUNCTURE MAY BE EXPECTED TO INDUCE AN APPARENT ANALGESIC EFFECT BY DECREASING EXPRESSION AND INHIBITING P2X(3) RECEPTORS IN DRG NEURONS OF CHRONIC CONSTRICTED INJURY RATS**

Tu, WZ; Cheng, RD; Cheng, B; Lu, JK; Cao, F; Lin, HY; Jiang, YX; Wang, JZ; Chen, H; Jiang, SH: Analgesic Effect Of Electroacupuncture On Chronic Neuropathic Pain Mediated By P2X(3) Receptors In Rat Dorsal Root Ganglion Neurons. *Neurochemistry International* 2012;60(4):379-386

Adenosine 5'-triphosphate disodium (ATP) gated P2X receptors, especially the subtype P2X(3), play a key role in transmission of pain signals in neuropathic pain, ATP has been

documented to play a significant role in the progression of pain signals, suggesting that control of these pathways through electroacupuncture (EA) is potentially an effective treatment for chronic neuropathic pain. EA has been accepted to effectively manage chronic pain by applying the stimulating current to acupoints through acupuncture needles. To determine the significance of EA on neuropathic pain mediated by P2X(3) receptors in the dorsal root ganglion (DRG) neurons, mechanical withdrawal threshold (MWT) and thermal withdrawal latency (TWL) were recorded, and the expression of P2X(3) receptors in the DRG neurons was assessed by immunohistochemistry (IHC) and in situ hybridization (ISH). In addition, the currents which were evoked in DRG neurons isolated from rats following chronic constriction injury (CCI) by the P2X(3) receptors agonists i.e. ATP and alpha,beta-methylen-ATP (alpha,beta-meATP) were examined through the experimental use of whole cell patch clamp recording. The present study demonstrates that EA treatment can increase the MWT and TWL values and decrease the expression of P2X(3) receptors in DRG neurons in CCI rats. Simultaneously, EA treatment attenuates the ATP and alpha,beta-meATP evoked currents. EA may be expected to induce an apparent analgesic effect by decreasing expression and inhibiting P2X(3) receptors in DRG neurons of CCI rats. There is a similar effect on analgesic effect between rats with contralateral EA and those with ipsilateral EA.

**FUSION PLUS DISC REPLACEMENT PROCEDURE HAS LESS SEVERE BIOMECHANICAL EFFECTS ON ADJACENT LEVELS WHEN COMPARED TO BI-LEVEL FUSION PROCEDURE. BI-LEVEL DISC REPLACEMENT PROCEDURE DID NOT HAVE ANY ADVERSE MECHANICAL EFFECTS ON ADJACENT LEVELS**

Faizan, A; Goel, VK; Biyani, A; Garfin, SR; Bono, CM: Adjacent Level Effects Of Bi Level Disc Replacement, Hi-Level Fusion And Disc Replacement Plus Fusion In Cervical Spine- A Finite Element Based Study. *Clinical Biomechanics* 2012;27(3):226-233

Background: Studies delineating the adjacent level effect of single level disc replacement systems have been reported in literature. The aim of this study was to compare the adjacent level biomechanics of bi-level disc replacement, bi-level fusion and a construct having adjoining level disc replacement and fusion system.

Methods: In total, biomechanics of four models- intact, bi level disc replacement, bi level fusion and fusion plus disc replacement at adjoining levels- was studied to gain insight into the effects of various instrumentation systems on cranial and caudal adjacent levels using finite element analysis (73.6 N + varying moment).

Findings: The bi-level fusion models are more than twice as stiff as compared to the intact model during flexion-extension, lateral bending and axial rotation. Bi-level disc replacement model required moments lower than intact model (1.5 Nm). Fusion plus

disc replacement model required moment 10-25% more than intact model, except in extension. Adjacent level motions, facet loads and endplate stresses increased substantially in the bi-level fusion model. On the other hand, adjacent level motions, facet loads and endplate stresses were similar to intact for the bi-level disc replacement model. For the fusion plus disc replacement model, adjacent level motions, facet loads and endplate stresses were closer to intact model rather than the bi-level fusion model. Except in extension.

Interpretation: Based on our finite element analysis, fusion plus disc replacement procedure has less severe biomechanical effects on adjacent levels when compared to bi-level fusion procedure. Bi-level disc replacement procedure did not have any adverse mechanical effects on adjacent levels.

### **1 MG/KG, OR 5 MG/KG OF INTRAVENOUS LIDOCAINE, AND PLACEBO WAS EFFECTIVE IN PATIENTS WITH NEUROPATHIC PAIN ATTRIBUTABLE TO FBSS, BUT EFFECT OF LIDOCAINE DID NOT DIFFER FROM PLACEBO SALINE**

Park, CH; Jung, SH; Han, CG: Effect Of Intravenous Lidocaine On The Neuropathic Pain Of Failed Back Surgery Syndrome. Korean J Pain 2012;25(2):94-8

**BACKGROUND:** An intravenous infusion of lidocaine has been used on numerous occasions to produce analgesia in neuropathic pain. In the cases of failed back surgery syndrome, the pain generated as result of abnormal impulse from the dorsal root ganglion and spinal cord, for instance as a result of nerve injury may be particularly sensitive to lidocaine. The aim of the present study was to identify the effects of IV lidocaine on neuropathic pain items of FBSS.

**METHODS:** The study was a randomized, prospective, double-blinded, crossover study involving eighteen patients with failed back surgery syndrome. The treatments were: 0.9% normal saline, lidocaine 1 mg/kg in 500 ml normal saline, and lidocaine 5 mg/kg in 500 ml normal saline over 60 minutes. The patients underwent infusions on three different appointments, at least two weeks apart. Thus all patients received all 3 treatments. Pain measurement was taken by visual analogue scale (VAS), and neuropathic pain questionnaire.

**RESULTS:** Both lidocaine (1 mg/kg, 5 mg/kg) and placebo significantly reduced the intense, sharp, hot, dull, cold, sensitivity, itchy, unpleasant, deep and superficial of pain. The amount of change was not significantly different among either of the lidocaine and placebo, or among the lidocaine treatments themselves, for any of the pain responses,



except sharp, dull, cold, unpleasant, and deep pain. And VAS was decreased during infusion in all 3 group and there were no difference among groups.

**CONCLUSIONS:** This study shows that 1 mg/kg, or 5 mg/kg of IV lidocaine, and placebo was effective in patients with neuropathic pain attributable to FBSS, but effect of lidocaine did not differ from placebo saline.

### **ACUTE LOW BACK PAIN WITH INSTABILITY ARE GOOD CASES FOR SPINAL MANIPULATION AND EXERCISE OF THE MULTIFIDUS MUSCLES**

Koppenhaver, SL; Fritz, JM; Hebert, JJ; Kawchuk, GN; Parent, EC; Gill, NW; Childs, JD; Teyhen, DS: Association Between History And Physical Examination Factors And Change In Lumbar Multifidus Muscle Thickness After Spinal Manipulation In Patients With Low Back Pain. *J Electromyogr Kinesiol* 2012:[Epub ahead of print]

Understanding the clinical characteristics of patients with low back pain (LBP) who display improved lumbar multifidus (LM) muscle function after spinal manipulative therapy (SMT) may provide insight into a potentially synergistic interaction between SMT and exercise. Therefore, the purpose of this study was to identify the baseline historical and physical examination factors associated with increased contracted LM muscle thickness one week after SMT. Eighty-one participants with LBP underwent a baseline physical examination and ultrasound imaging assessment of the LM muscle during submaximal contraction before and one week after SMT. The relationship between baseline examination variables and 1-week change in contracted LM thickness was assessed using correlation analysis and hierarchical multiple linear regression. Four variables best predicted the magnitude of increases in contracted LM muscle thickness after SMT. When combined, these variables suggest that patients with LBP, (1) that are fairly acute, (2) have at least a moderately good prognosis without focal and irritable symptoms, and (3) exhibit signs of spinal instability, may be the best candidates for a combined SMT and lumbar stabilization exercise (LSE) treatment approach.

### **ERECTILE DYSFUNCTION INCIDENCE IN PATIENTS YOUNGER THAN 50 YEARS WITH NONFRACTURE-RELATED LUMBAR SPINE DISEASE UNDERGOING SURGERY WITHOUT RISK FACTORS WAS 34.3% AND DESPITE IMPROVEMENT IN VAS, ODI, AND NS SCORES POSTOPERATIVELY, ED DID NOT IMPROVE. PATIENTS WITH NEUROLOGICAL SIGNS OVER 70 POSTOPERATIVELY WERE MORE LIKELY TO HAVE ED REFLECTING POSSIBLE PERMANENT NERVE DAMAGE FROM LUMBAR SPINE PATHOLOGY.**

Siddiqui, Mashfiqul A; Peng, Benedict; Shanmugam, Nidumaran; Yeo, William; Fook-Chong, S; Li Tat, John Chen; Guo, Chang Ming; Tan, Seang Beng; Yue, Wai Mun: Erectile

Dysfunction in Young Surgically Treated Patients With Lumbar Spine Disease: A Prospective Follow-up Study. *Spine* 2012;37(9):797–801

Study Design: This is a prospective study.

Objective: The prevalence of erectile dysfunction (ED) in patients younger than 50 years with fracture-unrelated lumbar spine disease requiring surgical decompression without other risk factors for ED is evaluated.

Summary of Background Data: There is little literature documenting ED in young patients with atraumatic lumbar spine disease.

Methods: All male patients younger than 50 years who underwent lumbar spine surgery during June 2006 to November 2007 without risk factors for ED were included. Patient demographics, neurological dysfunction, visual analogue scale (VAS) for back and leg pain, Oswestry Disability Index (ODI), North American Spine Society score for neurogenic symptoms (NS), and the International Index of Erectile function (IIEF-5) scores were recorded preoperatively, at 1, 3, and 6 months.

Results: There were 61 patients with mean age 38.4 years (SD = 7.0; range, 20–49). Most of patients had (43 or 70.5%) prolapsed intervertebral disc with discectomy being the commonest operation. Mean VAS scores, ODI, and NS improved significantly postoperatively. However, the mean IIEF-5 scores did not. Preoperatively, there was no correlation between ED and VAS scores on back pain ( $P = 0.70$ ), leg pain ( $P = 0.91$ ), ODI ( $P = 0.93$ ), or NS ( $P = 0.51$ ). At 6 months, patients with NS > 70 had an increased risk of ED ( $P = 0.03$ ). Eighty percent of patients with NS > 70 had ED compared with 30% of patients with NS ≤ 70. There was, however, no correlation between ED with ODI ( $P = 0.38$ ) and VAS scores on back pain ( $P = 0.20$ ) or leg pain ( $P = 0.08$ ) at 6 months.

Conclusion: The incidence of ED in patients younger than 50 years with nonfracture-related lumbar spine disease undergoing surgery without risk factors was 34.3%. Despite improvement in VAS, ODI, and NS scores postoperatively, ED did not improve. Patients with NS > 70 postoperatively were more likely to have ED reflecting possible permanent nerve damage from lumbar spine pathology.