

*It is an excitement of life to keep up on the literature concerning back and extremity pain. Please enjoy this month's (February 2006's) pearls. They are truly inspirational to the serious practitioner of chiropractic medicine. Please enjoy them as much as I do each day when the articles published yesterday arrive via email to me.*

*James M. Cox, D.C., D.A.C.B.R.*

## **80% OF ELDERLY EXERCISE BECAUSE IT AIDS THEIR HEALTH**

Mailloux, J; Finno, M; Rainville, J. Long-term exercise adherence in the elderly with chronic low back pain. AMERICAN JOURNAL OF PHYSICAL MEDICINE & REHABILITATION 2006; 85 (2):120-126

Exercise behaviors of elderly adults with a history of chronic back pain before and 2 yrs after treatment in an exercise-oriented rehabilitation program were studied. Improvements in flexibility and strength occurred during treatment. The percentage of patients who performed at least some exercise increased from 49% before treatment to 72% at the 2-yr follow-up. The changes in disability or pain observed during treatment did not influence exercise compliance. The most frequently stated reasons for nonadherence was that exercise did not help or aggravated pain (33%). For those who exercised regularly, 80% did so because of the health benefits from exercise.

## **F WAVE INCREASED LATENCY VALUES AID IN DIAGNOSIS OF NEUROGENIC INTERMITTENT CLAUDICATION**

Bal, S; Celiker, R; Palaoglu, S; Cila, A. F wave studies of neurogenic intermittent claudication in lumbar spinal stenosis. AMERICAN JOURNAL OF PHYSICAL MEDICINE & REHABILITATION 2006; 85 (2):135-140

Lumbar spinal stenosis (LSS) may result in neurogenic claudication which is thought to be a result of transient ischemia claudication (NC), during exercise. F wave changes were evaluated before and immediately after walking stress in patients with NC.

After completion of the baseline electrophysiological examination, a walking stress test was performed using a treadmill, and 16 patients (61.5%) experienced neurogenic claudication during the trial. In the control group 18 subjects (90%) completed the trial without any symptoms, and 2 (10%) subjects had to stop at an average of 10 mins because of generalized fatigue. Within 5 mins after the

walking stress test, tibial F wave studies were repeated in both groups. There were significant increases in F latency values bilaterally in the patient group but not in control subjects. F wave studies after walking stress test provide more information for the diagnosis of NC.

## **GENE TRANSFER INHIBITS IL-1 ACTION THAT CAUSES DISC DEGENERATION**

Le Maitre, CL; Freemont, AJ; Hoyland, JA. A preliminary in vitro study into the use of IL-1Ra gene therapy for the inhibition of intervertebral disc degeneration. INTERNATIONAL JOURNAL OF EXPERIMENTAL PATHOLOGY 2006; 87 (1): 17-28

Approximately 40% of cases of low back pain is caused by degeneration of the intervertebral disc (DIVD). Targeting therapies to inhibit the process of degeneration would be a potentially valuable treatment for LBP. There is increasing evidence for a role for IL-1 in DIVD. A natural inhibitor of IL-1 exists, IL-1Ra, which would be an ideal molecular target for inhibiting IL-1-mediated effects involved in DIVD and LBP. In this study, the feasibility of ex vivo gene transfer of IL-1Ra to the IVD was investigated. Monolayer and alginate cultures of normal and degenerate human intervertebral disc (IVD) cells were infected with an adenoviral vector carrying the IL-1Ra gene (Ad-IL-1Ra) and protein production measured using an enzyme-linked immunosorbent assay. The ability of these infected cells to inhibit the effects of IL-1 was also investigated. In addition, normal and degenerate IVD cells infected with Ad-IL-1Ra were injected into degenerate disc tissue explants and IL-1Ra production in these discs was assessed. This demonstrated that both nucleus pulposus and annulus fibrosus cells infected with Ad-IL-1Ra produced elevated levels of IL-1Ra for prolonged time periods, and these infected cells were resistant to IL-1. When the infected cells were injected into disc explants, IL-1Ra protein expression was increased which was maintained for 2 weeks of investigation. This in vitro study has shown that the use of ex vivo gene transfer to degenerate disc tissue is a feasible therapy for the inhibition of IL-1-mediated events during disc degeneration.

## **SMOKING, BUT NOT PASSIVE SMOKE, IS ASSOCIATED WITH INTERMITTENT CLAUDICATION**

Jensen, SA; Vatten, LJ; Nilsen, TIL; Romundstad, PR; Myhre, HO The association between smoking and the prevalence of intermittent claudication. VASCULAR MEDICINE 2005; 10 (4):257-263

19748 participants aged 40-69 years were studied for the prevalence of smoking and intermittent claudication. No association between passive smoking and IC

in either men or women was found. Current and previous smoking habits were positively associated with the prevalence of IC, and smoking cessation was negatively associated in men and women. Passive smoking was not associated with IC in this study.

## **VITAMIN D AND CALCIUM GUIDELINES FOR DIET SUPPLEMENTATION ARE NOT FOLLOWED**

Bayly, JR; Hollands, RD; Riordan-Jones, SE; Yemm, SJ; Brough-Williams, I; Thatcher, M; Woodman, NM; Dixon, T. Prescribed vitamin D and calcium preparations in patients treated with bone remodelling agents in primary care: a report of a pilot study. CURRENT MEDICAL RESEARCH AND OPINION 2006; 22 (1):131-137

Recent guidelines recommend that patients receiving treatment for osteoporosis should also receive supplementation with calcium and vitamin D unless they are calcium and vitamin D replete. A pilot audit of nine general practices covering a population of 61202 showed that 1.1% (n = 662) of patients were receiving treatment for osteoporosis; of those, only 34.1% of patients were co-prescribed calcium or calcium and vitamin D. Levels of co-prescription varied considerably across practices from 74.0% to 12.2%. Despite national guidelines, co-prescription of calcium and vitamin D with treatment for osteoporosis remains sub-optimal with considerable variation between practices. Strategies should be adopted to increase physician awareness of widespread vitamin D inadequacy, the rationale for supplementation and poor compliance.

## **VITAMIN D LEVELS ARE INADEQUATE IN PATIENTS WITH FRAGILITY FRACTURES**

Ryan, P; Dixon, T: Prevalence of vitamin D inadequacy in patients attending a metabolic bone clinic in Medway. CURRENT MEDICAL RESEARCH AND OPINION 2006; 22 (1): 211-216

Vitamin D levels are sub-optimal in the elderly and that adults with fragility fracture have low levels of serum vitamin D. Of the 420 patients with fragility fracture, 78.1% were women and the mean age was 66.6 years (SD = 12.22). The mean vitamin D level was 45.3 nmol/L (18.1 ng/mL), SD = 25.8 (10.3). In patients not receiving supplementation (n = 222) the mean vitamin D level was 40.5 nmol/L (16.2 ng/mL), SD = 20.9 (8.4) and 95.9% of patients had a vitamin D level < 80 nmol/L, 89.6% < 70 nmol/L and 71.2% < 50 nmol/L. The prevalence of vitamin D inadequacy is high in patients attending a metabolic bone clinic, in particular in those patients with fragility fractures.

## **CHRONIC DORSAL ROOT GANGLION CREATES ION CHANGES RESULTING IN PAIN**

Tan, ZY; Donnelly, DF; LaMotte, RH Effects of a chronic compression of the dorsal root ganglion on voltage-gated Na<sup>+</sup> and K<sup>+</sup> currents in cutaneous afferent neurons. JOURNAL OF NEUROPHYSIOLOGY 2006; 95 (2):1115-1123

Chronic compression of the dorsal root ganglion (CCD) produces ipsilateral cutaneous hyperalgesia that is associated with an increased excitability of neuronal somata in the compressed ganglion, as evidenced by spontaneous activity and a lower rheobase. Differences in the properties of voltage-gated Na<sup>+</sup> and K<sup>+</sup> currents between somata of CCD- and control (unoperated) rats was studied. CCD was produced in adult rats by inserting two rods through the intervertebral foramina, one compressing the L 4, and the other, the ipsilateral, L 5 dorsal root ganglion (DRG). After 5-9 days, DRG somata were dissociated and placed in culture for 16-26 h. In comparison with control neurons, CCD neurons had steady-state activation curves for TTX-sensitive (TTX-S) Na<sup>+</sup> currents that were shifted in the hyperpolarizing direction, and CCD neurons had enhanced TTX-resistant (TTX-R) current. CCD neurons also had smaller, fast-inactivating K<sup>+</sup> currents (K<sub>a</sub>) at voltages from -30 to 50 mV. The reduction in K<sub>a</sub>, the hyperpolarizing shift in TTX-S Na<sup>+</sup> current activation, and the enhanced TTX-R Na<sup>+</sup> current may all contribute to the enhanced neuronal excitability and thus to the pain and hyperalgesia associated with CCD.

## **OLDER PATIENTS ARE FOUND TO HAVE SPONDYLOLYSIS WITH FACET DEGENERATION**

Van der Wall, H; Magee, M; Reiter, L; Frater, CJ; Qurashi, S; Loneragan, R Degenerative spondylolysis: a concise report of scintigraphic observations. RHEUMATOLOGY 45 (2). FEB 2006. p.209-211 OXFORD UNIV PRESS, OXFORD

Spondylolysis has been found in association with hypertrophic zygapophyseal joint disease in the lumbar spine in an older age group, as opposed to adolescence and childhood. 94 patients (aged 33-80, 53 males, 41 females) presenting with low back pain were examined and a pattern of intense zygapophyseal joint uptake in association with extended uptake in the pars interarticularis was ascribed as degenerative spondylolysis. The finding of hypertrophic zygapophyseal joint disease in association with spondylolysis is easily recognized by scintigraphic tomographic imaging.

## **PHYSICIANS DO NOT FOLLOW FEDERAL GUIDELINES IN TREATING LOW BACK AND SCIATIC PAIN**

[Webster BS](#), [Courtney TK](#), [Huang YH](#), [Matz S](#), [Christiani DC](#). **Physicians' initial management of acute low back pain versus evidence-based guidelines. Influence of Sciatica.** [J Gen Intern Med.](#) 2005 Dec;20(12):1132-5.

Researchers assess whether physicians' management decisions are consistent with the Agency for Health Research Quality's guideline and whether responses varied with the presentation of sciatica or by physician characteristics. Seven hundred and twenty surveys were completed with occupational medicine as the referent specialty, general practice had the greatest odds of noncompliance followed by internal medicine and emergency medicine. A majority of primary care physicians continue to be noncompliant with evidence-based back pain guidelines. Sciatica dramatically influenced clinical decision-making, increasing the extent of noncompliance, particularly for internal medicine and family practice. Physicians' misunderstanding of sciatica's natural history and belief that more intensive initial management is indicated may be factors underlying the observed influence of sciatica.

## **EPIDURAL STEROID ARTICLES ON BENEFITS VERSUS COST AND OUTCOME**

### **EPIDURAL STEROID WITH STEROID YIELDS NO BETTER RELIEF THAN SALINE AT 6 WEEKS**

[Arden NK](#), [Price C](#), [Reading I](#), [Stubbing J](#), [Hazelgrove J](#), [Dunne C](#), [Michel M](#), [Rogers P](#), [Cooper C](#); [WEST Study Group](#). **A multicentre randomized controlled trial of epidural corticosteroid injections for sciatica: the WEST study.** [Rheumatology \(Oxford\).](#) 2005 Nov;44(11):1399-406. Epub 2005 Jul 19.

Researchers determine the effectiveness and predictors of response to lumbar epidural corticosteroid injections (ESI) in patients with sciatica, a 12-month, multicentre, double-blind, randomized, placebo-controlled, parallel-group trial with 228 patients with a clinical diagnosis of unilateral sciatica of 1-18 months'

duration were randomized to either three lumbar ESIs of triamcinolone acetonide or interligamentous saline injections at intervals of 3 weeks. At 3 weeks, the ESI group demonstrated a transient benefit over the placebo group (patients achieving a 75% improvement in ODQ, 12.5 vs 3.7%; number needed to treat, 11.4). No benefit was demonstrated from 6 to 52 weeks. ESIs did not improve physical function, hasten return to work or reduce the need for surgery. There was no benefit of repeated ESIs over single injection. ESIs offered transient benefit in symptoms at 3 weeks in patients with sciatica, but no sustained benefits in terms of pain, function or need for surgery. Sciatica is a chronic condition requiring a multidisciplinary approach. To fully investigate the value of ESIs, they need to be evaluated as part of a multidisciplinary approach.

## **EPIDURAL STEROID INJECTIONS DO NOT PROVIDE GOOD VALUE FOR MONEY**

[Price C](#), [Arden N](#), [Coglan L](#), [Rogers P](#). **Cost-effectiveness and safety of epidural steroids in the management of sciatica.** [Health Technol Assess.](#) 2005 Aug;9(33):1-58, iii.

Researchers investigate the safety and cost-effectiveness of lumbar ESIs in patients with sciatica, a total of 228 patients listed for ESI with clinically diagnosed unilateral sciatica, aged between 18 and 70 years, who had a duration of symptoms between 4 weeks and 18 months, received up to three injections of epidural steroid and local anaesthetic (active), or an injection of normal saline into the interspinous ligament (placebo). Acute sciatica seemed to respond no differently to chronic sciatica. There were no significant differences in any other indices, including objective tests of function, return to work or need for surgery at any time-points. Although ESIs appear relatively safe, it was found that they confer only transient benefit in symptoms and self-reported function in a small group of patients with sciatica at substantial costs. ESIs do not provide good value for money if NICE recommendations are followed.

## **AT 3 MONTHS, NO DIFFERENCE IN RELIEF AND SURGICAL NEED SEEN BETWEEN STEROID EPIDURAL STEROID INJECTION COMPARED WITH SALINE INJECTION**

[Carette S](#), [Leclaire R](#), [Marcoux S](#), [Morin F](#), [Blaise GA](#), [St-Pierre A](#), [Truchon R](#), [Parent F](#), [Levesque J](#), [Bergeron V](#), [Montminy P](#), [Blanchette C](#). **Epidural corticosteroid injections for sciatica due to herniated nucleus pulposus.** [N Engl J Med.](#) 1997 Jun 5;336(23):1634-40.

A randomized, double-blind trial, administering up to three epidural injections of methylprednisolone acetate or isotonic saline to 158 patients with sciatica due to a herniated nucleus pulposus showed at three weeks, the Oswestry score had improved by a mean of -8.0 in the methylprednisolone group and -5.5 in the placebo group (95 percent confidence interval for the difference, -7.1 to 2.2). Differences in improvements between the groups were not significant, except for improvements in the finger-to-floor distance ( $P=0.006$ ) and sensory deficits ( $P=0.03$ ), which were greater in the methylprednisolone group. After six weeks, the only significant difference was the improvement in leg pain, which was greater in the methylprednisolone group ( $P=0.03$ ). After three months, there were no significant differences between the groups. The Oswestry score had improved by a mean of -17.3 in the methylprednisolone group and -15.4 in the placebo group (95 percent confidence interval for the difference, -9.3 to 5.4). At 12 months, the cumulative probability of back surgery was 25.8 percent in the methylprednisolone group and 24.8 percent in the placebo group ( $P=0.90$ ). Although epidural injections of methylprednisolone may afford short-term improvement in leg pain and sensory deficits in patients with sciatica due to a herniated nucleus pulposus, this treatment offers no significant functional benefit, nor does it reduce the need for surgery.

## **SALINE EPIDURAL STEROID INJECTION IS EQUALLY EFFECTIVE WITH SALINE THAN STEROIDS**

[Valat JP](#), [Giraudeau B](#), [Rozenberg S](#), [Goupille P](#), [Bourgeois P](#), [Micheau-Beaugendre V](#), [Soubrier M](#), [Richard S](#), [Thomas E](#). **Epidural corticosteroid injections for sciatica: a randomised, double blind, controlled clinical trial.** [Ann Rheum Dis](#). 2003 Jul;62(7):639-43.

Three epidural injections (two day intervals) of 2 ml prednisolone acetate (50 mg) or 2 ml isotonic saline were administered to patients with sciatica presumably due to a disk herniation lasting 15-180 days. Self evaluation was the main judgment criterion at day 20. 42 patients were included in the control group (CG), 43 in the steroid group (SG). The efficacy of isotonic saline administered epidurally for sciatica cannot be excluded, but epidural steroid injections provide no additional improvement.

# **EPIDURAL STEROID INJECTIONS ARE RECOMMENDED ONLY IN ACUTE PHASE OF CONSERVATIVE LUMBOSCIATIC PAIN TREATMENT**

[Buchner M](#), [Zeifang F](#), [Brocai DR](#), [Schiltenswolf M](#): Orthopaedic Clinic, University of Heidelberg, Germany: **Epidural corticosteroid injection in the conservative management of sciatica.** [Clin Orthop Relat Res.](#)2000 Jun;(375):149-56.

Thirty-six patients with radicular lumbosciatic pain and positive straight leg raising test because of confirmed prolapsed intervertebral lumbar discs were randomized into two groups with (17 patients) and without (19 patients) epidural corticosteroid injection. Epidural corticosteroid injections can be recommended as additional therapy only in the acute phase of the conservative management of lumbosciatic pain.

# **ACUPUNCTURE CARE WAS SIGNIFICANTLY MORE EFFECTIVE IN REDUCING BODILY PAIN THAN USUAL CARE AT 24-MONTH FOLLOW-UP.**

[Thomas KJ](#), [MacPherson H](#), [Ratcliffe J](#), [Thorpe L](#), [Brazier J](#), [Campbell M](#), [Fitter M](#), [Roman M](#), [Walters S](#), [Nicholl JP](#). **Longer term clinical and economic benefits of offering acupuncture care to patients with chronic low back pain.** [Health Technol Assess.](#) 2005 Aug;9(32):iii-iv, ix-x, 1-109.

Patients aged 18-65 years with non-specific low back pain of 4-52 weeks' duration, assessed as suitable for primary care management by their general practitioner, underwent a trial protocol up to ten individualised acupuncture treatments per patient. A total of 159 patients were in the 'acupuncture offer' arm and 80 in the 'usual care' arm. Patients receiving acupuncture care did not report any serious or life-threatening events. Patients receiving acupuncture care reported a significantly greater reduction in worry about their back pain at 12 and 24 months compared with the usual care group. At 24 months, the acupuncture care group was significantly more likely to report 12 months pain free and less likely to report the use of medication for pain relief. The acupuncture service was found to be cost-effective at 24 months. Traditional acupuncture care delivered in a primary care setting was safe and acceptable to patients with non-specific low back pain. Acupuncture care and usual care were both associated with clinically



significant improvement at 12- and 24-month follow-up. Acupuncture care was significantly more effective in reducing bodily pain than usual care at 24-month follow-up.

## **1/3 OF LUMBAR SPINAL STENOSIS PATIENTS WILL GAIN RELIEF WITH EPIDURAL STEROID INJECTIONS**

[Delpont EG](#), [Cucuzzella AR](#), [Marley JK](#), [Pruitt CM](#), [Fisher JR](#). Treatment of lumbar spinal stenosis with epidural steroid injections: a retrospective outcome study. [Arch Phys Med Rehabil](#). 2004 Mar;85(3):479-84

One hundred forty patients at or over the age of 55 years diagnosed with lumbar spinal stenosis (LSS) who received epidural steroid injections (ESI) via transforaminal or caudal fluoroscopically guided ESIs showed that 32% reported more than 2 months of pain relief, 39% reported less than 2 months of pain relief, and 29% reported no relief from the injection(s). Twenty percent subsequently had surgery. Fifty-three percent reported improvement in their functional abilities. Seventy-four percent were at least somewhat satisfied with ESI as a form of treatment. One third of the patients had sustained relief and more than half with sustained improvement in function.

## **SPONTANEOUS FOOT LIFTING DUE TO C FIBER INFLAMMATION IN THE DORSAL ROOT GANGLION**

Djoughri, L; Koutsikou, S; Fang, X; McMullan, S; Lawson, SN. Spontaneous pain, both neuropathic and inflammatory, is related to frequency of spontaneous firing in intact C-fiber nociceptors. JOURNAL OF NEUROSCIENCE 26 (4). JAN 25 2006. p.1281-1292

Spontaneous pain, a poorly understood aspect of human neuropathic pain, is indicated in animals by spontaneous foot lifting (SFL). This study suggests that SFL occurs due to C-nociceptor stimulation via neuroinflammation of the dorsal root ganglion.

## **GARLIC OIL SUPPRESSES BONE LOSS, OSTEOPOROSIS, DUE TO ESTROGEN DEFICIENCY**

Mukherjee, M; Das, AS; Das, D; Mukherjee, S; Mitra, S; Mitra, C Effects of garlic oil on postmenopausal osteoporosis using ovariectomized rats: Comparison with the effects of lovastatin and 17 beta-estradiol. PHYTOTHERAPY RESEARCH 2006; 20 (1):21-27

The antiosteoporosis effects of garlic oil in an ovariectomized (Ovx) rat model of osteoporosis and to compare its efficacy with lovastatin (a synthetic hypocholesterolemic drug) and 17 beta-estradiol (a potent antiosteoporotic agent) was studied. The development of a high rate of bone turnover and osteoporosis in the ovariectomized animals were confirmed by significant alterations of serum alkaline phosphatase activity, serum tartrate-resistant acid phosphatase activity, urinary excretion of calcium, phosphate, hydroxyproline and urinary calcium to creatinine ratio, when compared with the sham-operated control group. Supplementation of these animals with either garlic oil or lovastatin or 17 beta-estradiol, in addition to their hypocholesterolemic effect, could counterbalance all these changes. The results revealed that all three compounds significantly protected the hypogonadal bone loss as reflected by higher bone densities and higher bone mineral contents than the ovariectomized group of animals. The results emphasize that, like 17 beta-estradiol, the hypocholesterolemic compounds garlic oil and lovastatin are also effective in suppressing bone loss owing to estrogen deficiency and their efficacy in the order of lower to higher is garlic < lovastatin < 17 beta-estradiol.

## **NUTRITIONAL ARTICLES**

### **GLUCOSAMINE COMPLEX RELIEVES LOW BACK PAIN AND STIFFNESS AND IMPROVES QUALITY OF LIFE**

Tant, L; Gillard, B; Appelboom, T. Open-label, randomized, controlled pilot study of the effects of a glucosamine complex on low back pain. CURRENT THERAPEUTIC RESEARCH-CLINICAL AND EXPERIMENTAL 2005; 66 (6): 511-521

Studies suggest some efficacy of glucosamine in arthrosis of the knee, but virtually no documentation exists regarding its effects on low back pain. This study was to examine whether a 12-week course of a glucosamine complex (GC) could benefit patients having low back pain despite a course of noninvasive physical therapy. Male and female outpatients aged 40 to 80 years with low back pain (duration,  $\geq 12$  weeks; pain score on 10-cm visual analog scale [VAS] [0 = none to 10 = worst imaginable],  $\geq 3$  cm) despite noninvasive physical therapy (massage, stretching, heat application, and analgesics for  $>4$  weeks) were included. Patients were randomly assigned to receive, in addition to conventional treatment (CT) (physical therapy plus analgesics/antiinflammatories), a GC (enriched with sulfonyl methane, silicon, and a botanical extract of *Ribes nigrum*) or CT alone (control) for 12 weeks. Pain at rest and on movement (effort) and early morning lumbar stiffness were measured every 4 weeks using the VAS. The primary end point was improvement in VAS score for pain at rest at 12 weeks. Possible adverse events were monitored.

32 of 36 enrolled patients completed the study (18 men, 14 women; mean [SE] age, 64 [2] years; 17 in the GC group and 15 in the control group). At week 4, changes from baseline VAS scores for pain at rest and lumbar stiffness were significantly greater in the GC group compared with the control group. At week 4, quality of life was found to be improved, as measured using the ODQ, in the GC group compared with the control group ( $P = 0.028$ ), but the between-group difference as measured using the RMDQ was not significant. The improvements from baseline on the questionnaires were sustained over the 12-week period in the GC group (all,  $P < 0.001$ ). Gastrointestinal adverse effects were reported by 1 GC-treated patient and 1 patient in the control group, but neither patient withdrew from the study. Of the 17 GC-treated patients, 9 considered themselves responders, but the profile of a responder could not be delineated.

Conclusions: In this study in patients with low back pain, analgesic effect and improvement in QOL were found with the use of GC. GC was well tolerated.

## **SCOLIOSIS PAPERS**

### **LESS PAIN IN SURGICAL FUSED THAN BRACED SCOLIOSIS PATIENTS 10 YEARS LATER**

Andersen, MO; Christensen, SB; Thomsen, K. Outcome at 10 years after treatment for adolescent idiopathic scoliosis. *SPINE* 2006; 31 (3):350-354  
215 consecutive patients were studied 9.7 years after treatment to determine the long-term outcome in a group of brace (BT) or surgical treated (ST) patients suffering adolescent idiopathic scoliosis (AIS). The mean age at follow-up was 26.0 years. The level of back or leg pain was relatively low, and the BT patients had more pain than their ST peers. No significant difference between BT and ST patients in activities of daily living were noted.

# **LONG TERM OUTCOME OF NON OPERATIVE SCOLIOSIS PATIENTS SHOWS GOOD QUALITY OF LIFE. GREATER CURVES SHOW GREATER PAIN LATE IN LIFE**

Haefeli, M; Elfering, A; Kilian, R; Min, K; Boos, N. Nonoperative treatment for adolescent idiopathic scoliosis - A 10-to 60-year follow-up with special reference to health-related quality of life. SPINE 2006; 31 (3):355-366

Long-term outcome with regard to pain, disability, psychological disturbance, and health-related quality of life (HRQOL) in 135 nonoperatively treated patients with adolescent idiopathic scoliosis (AIS) was studied with a minimum follow up of 10 years.

Nonoperative treatment consisted of bracing (n = 60), physiotherapy (n = 59), and electrical stimulation (n = 2). The overall follow-up rate was 89.6%. The mean age at follow-up was 38.0 years (range, 20-73 years.).

In general, patients achieved a satisfactory outcome 10 to 60 years (mean, 23 years) after nonoperative treatment with regard to pain, disability, and HRQOL.

The average curve at first diagnosis measured 29.5 (range, 15-59) for the thoracic spine, 21.3 degrees (range, 15 degrees-28 degrees) for the thoracolumbar spine, and 26.8 degrees (10 degrees-44 degrees) for the lumbar spine. Thirteen patients showed a substantial change in curve size (+/- 10 degrees) between first diagnosis and end of growth: 11 curves progressed more than 10 showing an average increase of 19.0 degrees (range, 12 degrees-30 degrees) and 2 patients presented with less severe curves at follow-up (-10 degrees and -13 degrees). After end of growth, 7 patients showed a substantial average increase of 16.3 degrees (range, 10 degrees-31 degrees). Five of eight patients with thoracic curves greater than 80 degrees had restrictive pulmonary disease. Patients with curves greater than 45 degrees reported significantly higher pain levels than those with smaller curves. Patients only showed a minimal absolute disability (Oswestry and HFAQ), and no significant correlation was found between curve size and curve type, Respectively. No significant differences in pain, disability, or HRQOL were found between patients with and without brace treatment.

Curve size was found to be a significant predictor for pain in a long-term follow-up.

## **ANTEROLISTHESIS SUBLUXATION INCREASES FORAMINAL SIZE ON AND RETROLISTHESIS DECREASES THE FORAMINAL SIZE**

Ebraheim, NA; Liu, JY; Shafiq, Q; Lu, J; Pataparla, S; Yeasting, RA; Woldenberg, L: Quantitative analysis of changes in cervical intervertebral foramen size with vertebral translation. *SPINE* 2006; 31 (3):E62-E65

Intervertebral foraminal areas were studied in 20 embalmed cadaver cervical spines were measured and compared on CT before and after translation of the C5 vertebra. The common feature of clinical instability and adjacent diseases of the cervical spine is malalignment of the cervical spine (i.e., there is ventral and dorsal translation of vertebral body with respect to the adjacent upper and lower vertebral body, respectively). To our knowledge, no previous study has analyzed the quantitative effect of vertebral translation on the size of the intervertebral foramina.

Following dorsal translation of C5 vertebra, anterolisthesis of C4 relative to C5 and retrolisthesis of C5 relative to C6 was noted. When compared with normal values, there was an increase in the C4-C5 intervertebral foraminal area with anterolisthesis of C4 relative to C5 and a 12% decrease in the C5-C6 intervertebral foraminal area, with each 1-mm incremental retrolisthesis of C5 relative to C6 vertebra. There is a significant increase in size with anterolisthesis and decrease in size with retrolisthesis of upper and lower adjacent vertebral intervertebral foramina, respectively.

## **NEUROPATHIC PAIN FOUND DUE TO EXPRESSION OF CYCLOOXYGENASE AND NITRIC OXIDE AND PROSTAGLANDIN E-2**

O'Rielly, DD; Loomis, CW. Increased expression of cyclooxygenase and nitric oxide isoforms, and exaggerated sensitivity to prostaglandin E-2, in the rat lumbar spinal cord 3 days after L5-L6 spinal nerve ligation. *ANESTHESIOLOGY* 2006; 104 (2): 328-337

Neuropathic pain was studied to determine the expression of cyclooxygenase and nitric oxide synthase (NOS) isoforms; in the lumbar, thoracic, and cervical spinal cord and the pharmacologic sensitivity to spinal prostaglandin E-2 (PGE<sub>2</sub>) after L5-L6 spinal nerve ligation (SNL) of Sprague-Dawley rats. Allodynia (paw withdrawal threshold :5 4 g) was evident 1 day after SNL and remained stable for 20 days. Cyclooxygenase 2, neuronal NOS, and inducible NOS were significantly increased in the ipsilateral lumbar dorsal horn after SNL. Enhanced sensitivity to PGE<sub>2</sub> was localized to lumbar segments of SNL animals

and attenuated by SC-51322 or S(+)-ibuprofen, but not R(-)- ibuprofen (100  $\mu$ m). The increased expression of cyclooxygenase-2, neuronal NOS, and inducible NOS and the enhanced sensitivity to PGE2 in spinal segments affected by SNL support the hypothesis that spinal prostanoids play an early pathogenic role in experimental neuropathic pain.

## **DORSAL ROOT GANGLION OR CORD INJURY SHOWS AXON DAMAGE UP TO 4 LEVELS ADJACENT TO THE LEVEL OF INJURY**

Huang, WL; Robson, D; Liu, MC; King, VR; Averill, S; Shortland, PJ; Priestley, JV: Spinal cord compression and dorsal root injury cause up-regulation of activating transcription factor-3 in large-diameter dorsal root ganglion neurons. EUROPEAN JOURNAL OF NEUROSCIENCE 2006; 23 (1):273-278

Spinal cord injury causes damage to ascending and descending tracts, as well as to local circuits, but relatively little is known about the effect of such injury on sensory neurons located within adjoining ganglia. Immunocytochemistry for activating transcription factor-3 (ATF3), a sensitive marker of axonal damage, was studied to examine the effects of spinal cord injury in rats on dorsal root ganglion (DRG) neurons. Compression injury applied to the dorsal surface of the T12 thoracic spinal cord led to an up-regulation of ATF3 that was maximal at 1 day and affected 12-14% of DRG neurons in ganglia caudal to the injury (T13-L3). A similar response was seen after a T12 hemisection in ganglia just rostral to the injury (T10, T11). A similar pattern of ATF3 expression was induced by dorsal rhizotomy. The data show for the first time that ATF3 is up-regulated after spinal cord and dorsal root injury, but that this up-regulation is confined to the large-diameter cell population.

## **SURGICAL EXPOSURE OF DORSAL ROOT GANGLIONS OR SPINAL NERVES CAUSES DAMAGE TO THESE STRUCTURES**

Shortland, PJ; Baytug, B; Krzyzanowska, A; McMahon, SB; Priestley, JV; Averill, S. ATF3 expression in L4 dorsal root ganglion neurons after L5 spinal nerve transection. EUROPEAN JOURNAL OF NEUROSCIENCE 2006; 23 (2):365-373

Damaged primary sensory neurons within the dorsal root ganglion show increased activating transcription factor 3 (ATF3) after spinal nerve damage. Activating transcription factor 3 (ATF3) is a widely used marker of damaged primary sensory neurons that is induced in essentially all dorsal root ganglion (DRG) neurons by spinal nerve axotomy. Whether such injuries induce its expression in neurons of adjacent DRGs remains unknown. Following L5 spinal nerve ligation, experimental but not sham-operated rats develop thermal and mechanical hypersensitivity. In the L4 DRG, 11-12% of neurons were ATF3 positive by 1 day post-surgery, and numbers remain unchanged at 2 weeks. Importantly, sham exposure of the L5 spinal nerve produced a nearly identical number of ATF3-positive neurons in the L4 DRG and also a substantial increase in the L5 DRG, with a similar time-course to experimental animals. Surgical exposure of spinal nerves induces ATF3 in the L4-5 DRG, irrespective of whether the L5 nerve is subsequently cut. This probably reflects minor damage to the neurons or their axons but nevertheless is sufficient to induce phenotypic plasticity. Caution is therefore warranted when interpreting the phenotypic plasticity of DRG neurons in adjacent ganglia in the absence of positive evidence that they are not damaged.

## **GAIT TRAINING IS IMPORTANT IN CHRONIC LOW BACK PAIN TREATMENT**

Lamoth, CJC; Meijer, OG; Daffertshofer, A; Wuisman, PIJM; Beek, PJ. Effects of chronic low back pain on trunk coordination and back muscle activity during walking: changes in motor control. EUROPEAN SPINE JOURNAL 2006; 15 (1): 23-40

Low back pain (LBP) is often accompanied by changes in gait diminished velocity-induced transverse counter-rotation between thorax and pelvis, and that it globally affects mean erector spinae (ES) activity. To examine these effects, the effect of walking velocity on global trunk coordination and ES activity as well as their variability were studied. Healthy and LBP individuals were studied during treadmill walking. Pain intensity, fear of movement and disability were measured before the experiment. The angular movements of thorax, lumbar and pelvis were recorded in three dimensions. ES activity was recorded with pairs of surface electrodes. Trunk - pelvis coordination and mean amplitude of ES activity were analyzed.

The gait of the LBP participants was characterized by a more rigid and less variable kinematic coordination in the transverse plane, and a less tight and more variable coordination in the frontal plane, accompanied by poorly coordinated activity of the lumbar ES. Clinically, the results imply that conservative therapy should consider gait training as well as exercises aimed at improving both intersegmental and muscle coordination.

## **PRESSURE POINT TENDERNESS IS LESS ON DISC HERNIATION SIDE**

Hirayama, J; Yamagata, M; Ogata, S; Shimizu, K; Ikeda, Y; Takahashi, K. Relationship between low-back pain, muscle spasm and pressure pain thresholds in patients with lumbar disc herniation. *EUROPEAN SPINE JOURNAL* 2006; 15 (1):41-47

Pressure pain thresholds (PPTs) of the lower back and low-back pain were examined in 52 patients ( 13 of 52 presenting sciatic scoliosis) with lumbar disc herniation who complained of radicular pain and in 15 normal subjects to determine if muscle spasm is caused by disc herniation.

In the normal subjects, there were no statistically significant differences between sides in mean PPTs at all sites examined. PPTs were not lower in the spasmodic side (concave side) than the convex side in patients with sciatic scoliosis. PPTs on the herniation side were significantly lower than those on the contralateral side in patients with low-back pain dominantly on the herniation side.

Furthermore, the areas of low PPTs were beyond the innervation area of dorsal ramus of L5 and S1 nerve root. It was considered that not only the peripheral mechanisms but also the hyper excitability of the central nervous system might contribute in lowering PPTs of the lower back on the herniation side.

## **SITE AND TYPE OF NERVE INJURY AFFECTS PAIN BEHAVIOR**

Obata, K; Yamanaka, H; Kobayashi, K; Dai, Y; Mizushima, T; Katsura, H; Fukuoka, T; Tokunaga, A; Noguchi, K: The effect of site and type of nerve injury on the expression of brain-derived neurotrophic factor in the dorsal root ganglion and on neuropathic pain behavior. *NEUROSCIENCE* 2006; 137 (3): 961-970

A number of rat neuropathy models have been developed to simulate human neuropathic pain conditions, such as spontaneous pain, hyperalgesia, and allodynia. In the present study, to determine the relative importance of injury site (proximal or distal to the primary afferent neurons) and injury type (motor or sensory), researchers examined pain-related behaviors and changes of brain-derived neurotrophic factor expression in the dorsal root ganglion in sham-operated rats, and in the L5 dorsal rhizotomy, L5 ventral rhizotomy, L5 dorsal rhizotomy + ventral rhizotomy, and L5 spinal nerve transection models. L5 ventral rhizotomy and spinal nerve transection produced not only mechanical and heat hypersensitivity, but also an increase in brain-derived neurotrophic factor mRNA/protein in the L5 dorsal root ganglion at 7 days after surgery. In contrast, rats in the L5 dorsal rhizotomy and dorsal rhizotomy + ventral rhizotomy groups did not show both pain behaviors at 7 days after surgery, despite brain-derived



neurotrophic factor upregulation in medium- and large-size neurons in the L5 dorsal root ganglion. On the other hand, L5 spinal nerve transection, but not dorsal rhizotomy, dorsal rhizotomy + ventral rhizotomy or ventral rhizotomy, increased the expression of brain-derived neurotrophic factor in the L4 dorsal root ganglion at 7 days after surgery. Taken together, these findings suggest that the upregulation of brain-derived neurotrophic factor expression in the L4 and L5 dorsal root ganglion neurons may be, at least in part, involved in the pathophysiological mechanisms of neuropathic pain and that the selective nerve root injury models may be useful for studying the underlying mechanisms of chronic pain after nerve injury.

## **ATHLETES NEED TO BE SYMPTOM FREE, FULL RANGE OF MOTION AND STRENGTH BEFORE RETURNING AFTER SPINE INJURY**

Eddy, D; Congeni, J; Loud, K. A review of spine injuries and return to play. CLINICAL JOURNAL OF SPORT MEDICINE 2005; 15 (6):.453-458

Return to play following spine injuries, including cervical spinal stenosis, congenital and developmental abnormalities of the cervical spine, stingers, herniated nucleus pulposus, and spondylolysis/spondylolisthesis shows most experts agree that with these problems or any other problem in sports medicine, an athlete needs to be symptom-free and have full active range of motion with near to full strength, even though there is a lack of research evidence in the literature.

## **LIPOMATOSIS OF SCIATIC NERVE AS CAUSE OF RADICULOPATHY**

Wong, BZY; Amrami, KK; Wenger, DE; Dyck, PJB; Scheithauer, BW; Spinner, RJ Lipomatosis of the sciatic nerve: typical and atypical MRI features. SKELETAL RADIOLOGY 2006; 35 (3):180-184

Lipomatosis of nerve, also known as fibrolipomatous hamartoma, is a rare condition of nerve, usually affecting the median nerve and the MRI appearance is characteristic. Two cases of lipomatosis of the sciatic nerve, an extremely unusual location for this lesion, in patients with sciatic neuropathy is presented. Recognition of the MRI appearance of this entity is important in order to avoid unnecessary attempts at surgical resection of this lesion.