

---

## Poster Presentations

---

### Specific Yoga Sequence Affects Sacroiliac Joint Function

**Julie Fisher Addante, D.C., Mark Addante, D.C., Roger Tepe, Ph.D., and John Zhang, M.D., Ph.D.,** Logan College of Chiropractic

Low back pain (LBP) is one of the most common problems in healthcare today, accounting for nearly 33% of all indemnity costs. Currently, US lifetime prevalence of simple LBP is 60% to 80% and point prevalence 15% to 30%. Low back pain has many etiologies, among which sacroiliac joint (SI) dysfunction is a primary cause in 19.3% to 47.9% of all cases. Dissatisfaction with mainstream medicine in the treatment of LBP is leading to increased use of complementary and alternative therapies for this condition. Yoga postures and movements have demonstrated effects on symptoms associated with joints and soft tissues with several studies supporting yoga as a valuable adjunct in the treatment of some LBP cases. The "sun salutation" is a yoga sequence that utilizes 11 static positions bilaterally for a total of 22 positions and the associated movements between positions. Completing a sun salute moves the SI joints through all normal ranges of motion and accordingly moves and balances both the direct and associated soft-tissue attachments. This investigation evaluated the effects of three sessions of five sun salutes each on 16 subjects with SI dysfunction. Two hypotheses were tested: (1) that there would be a significant reduction in SI joint dysfunction from the beginning to the end of the series of three trials; and (2) that there would be a significant reduction in SI joint dysfunction from the beginning to the end of each individual trial.

#### MATERIALS AND METHODS

Subjects were 16 consecutively selected consenting volunteers recruited from the student body at a chiropractic college. Age ranged from 18 to 50 with 8 males and

8 females. SI joint assessment was conducted using the Cibulka-Koldehoff protocol. The Cibulka-Koldehoff protocol was performed by four investigators, each executing a single test as follows: standing forward bending test; supine long sitting test; sitting posterior-superior iliac spine palpation test; and prone knee flexion test. The inclusion criteria were at least 3 positive tests, and a positive standing forward bending test.

#### RESULTS

The results support the first hypothesis with 8 of 10 subjects showing improvement; critical value of the two-tailed sign test showing 0.008. Trial 1 supports hypothesis 2 with 8 of 12 subjects showing improvement; sign value = 0.04. Trial 3 also supports hypothesis 2 with 8 of 9 subjects showing improvement; sign value = 0.008. Trial 2 did not support hypothesis 2 with 6 of 7 subjects showing improvement; sign value = 0.124.

#### DISCUSSION

Of the 10 participants who completed the full protocol, 8 completed the post-study reassessment with no dysfunction and 2 experienced no change for an improvement rate of 80%. This suggests that the yoga sun salutation could be used as a protocol for reducing sacroiliac joint dysfunction in certain individuals. We did not analyze for maintenance of improvement from trial to trial, although the data suggested deterioration in condition in some subjects between trials. This suggests that the yoga sequence has to be performed at least three times for maintenance of improvement to occur. Given that adherence to the protocol is critical for success, patient compliance is necessary.

## CONCLUSION

The results support the clinical utility of the sun salute in improving SI joint function in subjects with SI joint

dysfunction. Considering the results of the current study and that no similar studies appear in the literature, the authors believe continued investigation is warranted.



## Chiropractic Care of a Patient with Vertebral Subluxations and Bell's Palsy

**Joel Alcantara**, D.C., International Chiropractic Pediatric Association and Gonstead Clinical Studies Society, **Gregory Plaucher**, D.C., Life Chiropractic College West and Gonstead Clinical Studies Society, and **Darwin L. Van Wyngarden**, D.C., Private Practice

The purpose of the paper is to describe the chiropractic care of a patient medically diagnosed with Bell's palsy and discuss issues clinically relevant to this disorder such as its epidemiology, etiology, diagnosis, care, and prognosis.

The patient's left TMJ was also adjusted. The initial symptomatic response to care was positive and the patient made continued improvements during the 6 months of care.

## CLINICAL FEATURES

A 49-year-old Caucasian female with a history of dental care and a medical diagnosis of Bell's palsy sought chiropractic care for her complaints associated with this disorder. The patient's symptoms included a right facial paralysis, extreme phonophobia, pain in the right temporomandibular joint (TMJ), and neck pain. Signs of cervical vertebral and TMJ subluxations included edema, tenderness, asymmetry of motion and posture, and malalignment detected from plain-film radiographs.

## CONCLUSION

There are indications that patients suffering from Bell's palsy may benefit from a holistic chiropractic approach that not only includes a focus of examination and care of the primary regional areas of complaint (e.g., face, TMJ) but also potentially from significant vertebral subluxation concomitants. The chiropractor is well placed, by virtue of their emphasis on examination of the nervous system, as well as articular biomechanics, to care for individuals suffering from afflictions in both areas.

## INTERVENTION AND OUTCOME

The patient was cared for with full spine contact-specific, high-velocity, low-amplitude adjustments (i.e., Gonstead technique) to sites of vertebral and occipital subluxations.

## ACKNOWLEDGMENTS

This study was funded by the Gonstead Clinical Studies Society, Santa Cruz, CA, and Life Chiropractic College West, Hayward, CA.



# A Pilot Investigation into the Role of a Foreign Clinical Outreach Trip in Chiropractic Students' Clinical Confidence

Virginia A. Barber, D. C., and Thomas S. Ring, D.C., Palmer College of Chiropractic

There has been a trend toward globalization of healthcare education in the United States in the past two decades. Many programs exist for American medical and nursing students to participate in foreign clinical outreach programs, with reports in the literature of various benefits to practitioners from these trips, such as increased knowledge and clinical skills. The only program of this type within chiropractic education, the Clinic Abroad program, has never been studied to see if its participants also experience benefits similar to those reported by the medical and nursing students studied in the education literature. The authors selected a set of skills reported in their college's institutional analysis surveys of graduating students to be lacking in their education, and attempted to see if these skills were affected by participation in the Clinic Abroad program.

## METHODS

A 14-question survey using a 5-point Likert scale was administered to 8th- and 9th-trimester students just before the June Clinic Abroad trips departed. Two hundred twenty-seven students completed the survey, including 106 students who were not planning to ever participate in Clinic Abroad, 98 students about to leave on a Clinic Abroad trip, and 23 who had already completed a trip the previous trimester. The same survey was administered at the beginning of the July trimester to 9th- and 10th-trimester students, 53 of whom had not participated, 72 of whom had just completed a trip, and 9 of whom had finished a trip the previous trimester.

## RESULTS

The July surveys have just been collected and tabulated. Raw data show increases in self-rating in all skills areas for

participants of Clinic Abroad trips. There were also increases for nonparticipants. The authors stress that these data are descriptive only, and no judgments can be reached about the value of this program for clinical skill acquisition until an inferential analysis is performed.

## DISCUSSION

The upcoming inferential analysis will allow the authors to discern any gains in confidence in different areas of clinical chiropractic related solely to participation in Clinic Abroad trips. In addition, the raw data suggest consistent areas of low confidence across a wide sample of students. There may be certain skill areas in which our traditional clinical education falls short, and a foreign outreach program such as Clinic Abroad may provide the diversity of patients and conditions that can ameliorate these skills.

## CONCLUSION

This preliminary investigation may shed some light on the areas in which a foreign outreach program can benefit the clinical skills development of chiropractic students. The Clinic Abroad program, now budgeted at over \$1 million per year, has never been evaluated for its efficacy. A program such as this, which can bring chiropractic to the world and the diversity of the world to chiropractic students, has a tremendous amount to offer chiropractic educators and students alike. However, we must understand its strengths and weaknesses before developing such programs further.



## Orthopedic Block Placement and Its Effect on the Lumbosacral Spine and Discs

### Three Case Studies with Pre- and Post-MRIs

Charles L. Blum, D.C., Vincent Esposito, D.C., and Carmine Esposito, D.C., Private Practice

Research substantiating the chiropractic treatment of lumbar herniated discs is relatively new, particularly within the

past two decades. With the advent of the new radiographic diagnostic tools, computerized tomographic (CT) scans and

magnetic resonance imaging (MRI), pre- and poststudies can now be used to determine the effectiveness of conservative management of disc herniations. Three lumbar herniated disc cases were chosen to evaluate the effectiveness of chiropractic sacro-occipital technique (SOT), and specifically SOT pelvic block placement in the treatment of lumbar herniated discs.

## FEATURES

Three separate case histories are evaluated of subjects who sustained trauma, which appeared to be directly related to the creation of a lumbar disc herniation(s). In each case, SOT block placement was used in treatment to help reduce the herniation(s). Pre- and post-MRI studies were used to determine the effectiveness of the SOT pelvic blocks: Case Study 1 had pre- and post-MRIs, with the post taken while SOT pelvic blocks were in place, Case Study 2 had pre- and post-MRIs, with post taken shortly following SOT pelvic block removal, and Case Study 3 had pre- and post-MRIs, with post following approximately 6 months of treatment.

## INTERVENTION AND OUTCOME

The rationale of the use of SOT pelvic blocks is presented. Pelvic blocks or wedges have been shown to create changes

radiographically and affect pain patterns and muscle strength, and have been proposed for orthopedic examinations. Cranial manipulation and cervical and thoracolumbar adjustments were also used when indicated to aid the reduction of the subject's disc herniation. In each case significant reduction of symptomatology, neurologic, orthopedic, and chiropractic findings were found along with a reduction of the lumbar disc herniation as visualized on the post-MRI, as compared to the initial pretreatment MRI.

## CONCLUSION

Conservative methods have been shown to help reduce disc herniation. However, the significance of the three studies presented in this paper show that there was an immediate response by the herniated lumbar disc to the SOT pelvic blocks, and this sustained itself while on and off the blocks. Later, 6 months of treatment still evidenced a successful indication that most likely SOT pelvic block treatment was helping to reduce the herniated lumbar disc. SOT treatment uses SOT pelvic blocks and cranial manipulation as a major portion of its method of care. While it is clear that positive changes occurred during pelvic block placement and sustained itself shortly after, the third case history could also have been attributed to a natural progression. Further investigation into chiropractic treatments, and specifically SOT pelvic block techniques, is indicated, due to their effectiveness and the low level of contraindications for this conservative chiropractic therapy.



# Awareness of Learning Style Preference Phase I A Literature Review

**Linda Carlson, B.S., R.T., and Rita Nafziger, M.B.A.,** Palmer College of Chiropractic

Learning style has been described as a certain pattern of behavior and/or performance that an individual applies to a learning experience, the manner in which an individual processes new information and develops new skills, and the process by which retention of new information or skills is accomplished. Being able to tap into these highly individualized learning processes has become a new way for teachers to think about their craft.

Until recently the American educational system favored some learning styles over others because of traditional pedagogical teaching methods. Now that pedagogy has shifted to a student-centered focus, the emphasis on learning as an interactive process comes with increased student responsibility. It is because of this shift that this literature review seeks to examine what we know about learning style preferences.

## METHODS

A search using Google's World Wide Web search engine and the keywords "learning styles," "learning styles preference," and "assessing learning styles," resulted in more than 983,000 hits. The first 50 matches were narrowed down to 15 articles most relevant to the learning styles topic. A search of a consortium of several public library collections resulted in 80 titles which were narrowed to 24 texts using the same criteria. These articles and texts were reviewed in detail to provide the information presented here.

## RESULTS

As early as 1921, the Swiss psychologist Carl Jung argued that people "take in" information differently. He described

four types: feelers, thinkers, sensors, and intuitors. The term “learning style” first appeared in research literature but did not enter the education arena with any real interest until the 1970s.

Since then, much research has emerged on the specific subject of learning styles. David Kolb (1986), a professor of organizational behavior and management, developed a model based on his theory that people approach new situations primarily in two ways—through “feeling” or through “thinking.” From this standpoint, he divided learners into four distinct major learning styles: Imaginative, Analytic, Common Sense, and Dynamic learners.

The theories of Anthony Gregorc and Kathleen Butler; Ronald and Sabrenia Sims; Bernice McCarthy; John N. Harb, S. Olani Durrant, and Ronald Terry; and Lynne Celli Sarasin are reviewed. Although each presents a different set of descriptors, there are similarities among all theories.

## DISCUSSION

Initially, interest in learning styles seemed to focus on the methods of the teacher rather than the study habits of the student. Educators began to assess learning styles in order to

make better decisions regarding curriculum development and instruction as well as to counsel individuals about problems, strengths, and opportunities.

Since that time there has been a monumental shift in focus from teaching strategies to learning styles. However, it is apparent that there is minimal information and research on a students’ awareness of their learning styles and whether modification in study habits has an impact on their academic success.

## CONCLUSION

Each student can learn, and each student best learns in a different way. The acknowledgment of individual leaning styles may be a significant component of overall success of each student. In the future, the authors plan to continue their study of the impact that students’ awareness of their learning styles has on their academic achievement. Whatever the systems for understanding how people learn and whatever the labels used, there are tools and techniques that can help us better understand our students and help them to better understand and apply their natural skills and strengths for more effective learning.



# Determination of Origins of Low Back Pain in Teenage Female Volleyball Players

**Kim Carpenter**, B.S., **Dennis Nosco**, Ph.D., and **John Zhang**, M.D., Ph.D., Logan College of Chiropractic

A recent study indicated that 7% to 11% of female college volleyball players would lose practice or match time due to low back pain (LBP). It is therefore surprising that no volleyball-specific studies dealing with the causes of LBP in females have been published. This student research project was undertaken to determine cause(s) for symptoms of LBP in adolescent female volleyball players. The hypothesis was that LBP is probably not caused by volleyball as much as volleyball participation exacerbates the already-existing potential for LBP.

## METHODS

This research was approved by the Institutional Review Board, and carried out, at Logan Chiropractic of College. Parents signed witnessed informed consent forms. Inclusion criteria were female gender, enrollment in grades 8–11, and history of LBP ( $\geq 2$  two episodes of  $\geq 1$  day duration in the past 6 months). Age-matched asymptomatic controls

were used. Exclusion criteria included previous back surgery, serious or congenital back pathology, current acute low back pain, pregnancy, or inability to perform study tasks. Surveys were completed to collect data on demographics, LBP, volleyball-LBP, and previously identified predictors of LBP in adolescents. Subjects underwent abdominal muscle and back strength testing, and flexibility testing of hamstrings, quadriceps, and hips. Subjects were videotaped using fluorescent dots at locations on the shoulder, hip, and navel, the last two being placed on their clothing. Videotapes were assessed qualitatively for flexion and torsion. Other data were assessed quantitatively using descriptive statistics and paired *t* tests, where appropriate.

## RESULTS

Ten subject/control pairs participated. There were three juniors, three sophomores, two freshman, and two 8th graders in each group. In the LBP group, 4/10 had diagnosed mild

scoliosis. No controls had diagnosed scoliosis. Of the LBP group, 2/10 had been involved in some kind of accident that they (or their parents) felt initiated their low back pain, and 9/10 had parents who suffered from LBP (compared to 3/10 of controls). The mean duration of LBP episodes was  $5 \pm 3$  days with a range of 1–10. Also, 5/10 of the LBP group had missed either school or sports as a result of LBP and 4/10 had seen chiropractors more than once and sought chiropractic care when their back hurt. In the LBP group, 8/10 indicated that their back hurt when they spiked and served (as compared to 0/10 among controls).

Factors that appeared to correlate with LBP included reduced hamstring flexibility bilaterally, greater hip flexion, hip flexion asymmetry, and greater vertical leap. No correlation with LBP compared to controls was found with back strength, onset of menstrual cycle, height, weight, bad volleyball shoes, after-school jobs, amount of sports activity, abdominal muscle strength, quadriceps flexibility, balance, weight training, sleep, growth spurts, or TV/computer/video game usage.

Qualitatively, girls with LBP had slightly more torsion when they spiked but no more back flexion than controls.

Analysis of serving did not provide any correlation with LBP.

## DISCUSSION

In this study the correlating factors with low back pain were parental history of LBP, hamstring flexibility, hip flexion, hip flexion asymmetry, and vertical leap. The correlation of flexibility and strength-related factors may be related to volleyball skills such as jumping. Specifically, correlation with hip flexion asymmetry may be due to volleyball-specific jumping from unusual starting positions (i.e., feet staggered when jumping to spike).

## CONCLUSION

Despite small sample size, this study suggests that there are probably risk factors for LBP in adolescent female volleyball players. Larger studies need to be done to identify those factors.



# Correlation of Ankle Joint Complex Range of Motion, Leg Checks, PSIS Measurements, and Radiological Findings

**Robert Cooperstein**, M.A., D.C., and **Anthony Lisi**, D.C., Palmer College of Chiropractic West and Palmer Center for Chiropractic Research

The chiropractic, physical therapy, and osteopathic professions all use leg-checking methods, and each has some concept of distinguishing a functional short leg from an anatomical short leg. Although finding accurate ways of measuring the anatomic length of the legs has not been without difficulties, identifying (i.e., validating) and reliably measuring the functional short leg has been far more difficult. The authors conducted a series of small studies to devise reliable leg checks and determine if their findings correlated with either the sitting or standing PSISs, or the radiological parameters of femur heads or inferior SI joints.

## METHODS

A triaxial foot posturometer was constructed, consisting of two orthogonally placed inclinometers and a compass mounted on a surgical boot, screwed to a wood “footprint.” This allowed measurement of the six end ranges, two for each direction of rotation around each of three axes for the foot-ankle joint complex. The first study looked for covariance in these end range rotations, the second study investigated the interexaminer reliability of two novel methods on

leg checking (compressive and triaxial), the third evaluated possible correlation of the leg checks with both each other and pelvic landmarks, and the fourth the possible correlation of the leg checks with radiological parameters.

## RESULTS

Plantarflexion, abduction, and inversion of the foot-ankle joint complex tend to covary; this triad of findings was termed the “triaxial foot.” The values were: inversion-abduction  $r = .96$ ,  $p = .01$ ; inversion-plantarflexion  $r = .87$ ,  $p = .0530$ ; and plantarflexion-abduction  $r = .98$ ,  $p = .004$ . Noninstrumented (subjective) ratings of two examiners for degree of triaxial foot were highly correlated ( $\kappa = .85$ ) as were their ratings for compressive leg checking ( $\kappa = .67$ ). The triaxial foot correlated with posterior innominate rotation in the group with a relatively small amount of torsion ( $r = .58$ ,  $p = .17$ ). The compressive leg check covaried with the difference between sitting and standing PSIS discrepancies,  $r = .44$ ,  $p = .07$  (a surrogate value for anatomic leg length inequality (LLI)). The compressive leg check covaried with the radiological inferior SI joints,  $r = .87$ ,  $p = .003$ ,

a surrogate for anatomic LLI. Looking at subjects in whom delta PSIS sitting was  $>3$  mm, a high torsion group, the triaxial and compressive leg checks were more highly correlated,  $r = .85$ ,  $p < .001$  and were unrelated in the low torsion group.

## DISCUSSION

Using the difference between the sitting and standing delta PSIS as a surrogate measure for anatomic LLI, compressive leg checking tended to correlate with the “delta of the deltas,” suggesting it detects primarily anatomic LLI. This impression is further supported by the correlation between compressive leg checking and radiographic inferior sacroiliac joints. It was more difficult to determine the significance of the triaxial foot, except to see that in a low torsion group it

predicted standing PSIS deltas, occurring on the side of the weightbearing low hip.

## CONCLUSIONS

Since the results of compressive and triaxial leg checking covaried among the 17 subjects, it is reasonable to assume that the triaxial pattern serves as an easily identified surrogate for the more traditional identification of the short leg. We believe the triaxial foot to correspond under some circumstances to what clinicians generally call the functional short leg and the compressive short leg more to an anatomic short leg. Having reliable leg checks facilitates the conduct of validity studies, which might determine what pathological significance (if any) leg length asymmetry may denote. Ultimately, we hope to validate or refute the suggestion that leg checks provide clinically useful information about pelvic function.



# The Effect of a Unique Nutritional Supplement on Memory and Other Cognitive Functions

## A Randomized Clinical Trial

**Dwain M. Daniel**, B.A., D.C., **Cheryl L. McKinzie**, M.S., M.A., **Ronald Rupert**, M.S., D.C., Parker College of Chiropractic Research Institute, and **W. Paul Jones**, Ed.D., University of Nevada, Las Vegas

Cognitive function and nutritional status is a relationship that has been studied with increasing interest over the past two decades. Numerous studies have shown a positive relationship between nutritional supplementation and cognitive function. The purpose of this study is to determine if a unique nutritional supplement which was specifically developed to maximize cognitive function can have a measurable positive effect.

## METHODS

This study was a double-blinded, randomized controlled clinical trial conducted over a 2-week period. Sixty-eight subjects completed initial screening and 54 completed the study. The treatment group ( $n = 30$ ) received either 4 or 8 tablets daily of a unique nutritional supplement, Focus Factor®, and the control group ( $n = 24$ ) received either 4 or 8 tablets daily of a placebo. Test instruments utilized in this study were the Repeatable Battery for Assessment of Neurological Status (RBANS), a portion of the Automated Neuro-Psychological Assessment Metrics Battery (ANAM), and the Dot Test.

## RESULTS

The placebo and treatment groups differed in terms of average age ( $31 \pm 9$  and  $37 \pm 13$ , respectively,  $t(52) = -2.02$ ,

$p < .05$ ). However, correlation analyses revealed that age was only modestly correlated with the majority of the RBANS variables. Using the individual RBANS subtests as a set of dependent variables (except for Coding which was tested separately), none of the multivariate interactions reached conventional levels of significance. While the multivariate Group by Testing interaction fell short of significance [ $F(7, 44) = 1.27$ ,  $p = .28$ ] it is notable that the univariate Group by Testing interaction for Figure Copy was significant [ $F(1, 50) = 5.12$ ,  $p = .03$ ]. Consistent with the RBANS results, the paired  $t$  test results revealed that the treatment group showed significant improvement in DOT test-performance (i.e., less error and better visuospatial working memory) from pretest to post-test, while the placebo group did not show any improvement in performance. A paired  $t$  test found a statistically significant difference in cognitive efficiency scores between baseline-pretest in both 4 and 6 letter tests. With the mathematical processing data, the paired  $t$  test analysis of the treatment group found a difference between baseline pretest and post-test ( $20.2 \pm 6$  and  $21 \pm 8$ , respectively) that was not statistically significant. Of the 22 RBANS, Dot, and ANAM variables, the placebo group showed significant improvement on 5 measures over baseline while the treatment group showed significant improvement in 10 over baseline. No statistically significant differences were noted in the treatment group between those participants receiving 4 or 8 tablets daily.

## CONCLUSION

The results of this study do not show absolute superiority of the treatment group over the placebo. However, overall

the treatment group did perform better than the placebo, although statistical significance was not often achieved. There was sufficient evidence to suggest that a second study with a longer treatment period and an older subject group is warranted.



# Effects of Hydrate II and Acetylcholine in a Patient with Premature Ventricular Contractions and Generalized Muscle Tremors A Case Report

**Rose Fischer**, R.N., D.C., Private Practice, **John Zhang**, M.D., Ph.D., and **Dennis Nosco**, Ph.D., Logan College of Chiropractic

Difficult to diagnose and treat cases occur in daily practice in the offices of healthcare practitioners. Some of the most difficult to treat are neuromuscular conditions of unknown origin. Many patients with difficult conditions have turned to alternative medicine. Two nutritional supplements, hydrate II and acetylcholine, were used in this case study in addition of chiropractic adjustment to treat a patient with widespread bodily pain, muscle tremors, and premature ventricular contractions (PVCs).

## CASE REPORT

A 54-year-old nonsmoking, white male who is an accomplished and regular golfer presented with sharp, stabbing (9/10 on visual analog scale) low back pain that had been ongoing for 12 months and was exacerbated when walking up hills. After initial examination, a course of chiropractic treatment (made less effective by infrequent return visits) proved to be ineffective. The patient was referred for lumbar computed tomography (CT) and anteroposterior (AP) and lateral plain films that showed mild abnormalities but were essentially nondiagnostic. Subsequent muscle biopsy indicated myopathy in the extremities due to a possible neuropathy. Inclusion of hydration into the patient's regimen had little change. Subsequent electrocardiography (ECG) testing showed occasional PVCs apparently exacerbated by physical exertion. Electromyography (EMG) results showed consistent involuntary muscle contractions at a frequency of 1.5 per second in all extremities. The patient had homeopathic acetylcholine 5X (0.00001) added to the daily regimen.

Within 6 weeks the patient no longer showed evidence of PVC or involuntary muscle contractions. Pre- and post-treatment EMG measurements showed disappearance of the muscle tremors.

## DISCUSSION

This patient presented with muscle weakness and premature ventricular contractions. Chiropractic treatment and chiropractic treatment combined with hydration produced no cessation of symptoms. The addition of homeopathic amounts of acetylcholine led to remission of symptoms. These findings were confirmed by EMG and ECG scans pre- and post-treatment. These findings are not unique to homeopathy but are, nevertheless, significant.

## CONCLUSION

The combination therapy of homeopathic acetylcholine, hydration, and chiropractic care has proven to be an effective treatment in alleviating the symptoms and dramatically improving this patient's quality of life. However, it is not clear whether this outcome can be extended to other patients with similar, difficult to treat symptoms. It is also not clear if chiropractic care, hydration, and homeopathic acetylcholine were working in combination or separately. Additional studies are clearly indicated, starting with a case series to determine the effect of each of the three interventions.



# Chiropractic Name Techniques in Canada A Continued Look

**Brian Gleberzon, D.C.,** Canadian Memorial Chiropractic College

This article reports on the results obtained over a 6-year period from student projects investigating their perceived preference for greater exposure to different named techniques while at the Canadian Memorial Chiropractic College (CMCC). Moreover, during the 1999 academic year, the College undertook a curricular transformation, as well as an emphasis on evidence-based practices (EBP). The combination of the curricular transformation project and the emphasis on EBP provided a unique opportunity to observe whether or not perceptions differed between those students educated under the “old” curriculum and those students educated under the “new” curriculum.

## METHOD

Students, working in small groups of two or three, chose a name technique and investigated it in terms of its history, philosophy, diagnostic, and therapeutic methods and reviewed the available evidence supporting or refuting a technique’s clinical effectiveness. Students then presented their findings to the other students in a larger problem-based learning group, which then voted as to their preference to have the technique included into the core curriculum, taught as an elective, taught through the continuing education department, or to continue to have the technique excluded from the college’s curriculum.

## RESULTS

Students expressed an interest in learning Thompson terminal point, Activator methods, Gonstead, and active release therapy (ART) techniques in the core curriculum, as an elective course, or in the continuing education program. Students continue to be ambivalent with respect to learning Logan Basic, sacro-occipital, torque release, and cranio-sacral technique therapies. Lastly, students reported minimal interest in learning Palmer HIO and other upper cervical techniques, applied kinesiology, and network spinal analysis (NSA).

## DISCUSSION

Careful inspection of the cumulative results gathered between 1996 and 2001 reveals some interesting trends. Over this 6-year period, six 4th-year classes and two 2nd-year classes, representing approximately 1250 students, have submitted a total of 595 investigative reports. Overall, students have consistently expressed an interest in learning Thompson terminal point (94%), Activator methods (93%), Gonstead (90%), and active release therapy (89%), while the interest expressed in learning other techniques has waxed and waned over time.

When studied in controlled isolated trials, many of the diagnostic tests used by chiropractors often fail to show inter-rater reliability, sensitivity, or specificity. However, a bewildering array of chiropractic therapeutic approaches demonstrates favorable clinical results. No satisfactory explanation has been shown to adequately explain these paradoxical findings. Given this frustration at what has been called the research-clinical interface, it should not be surprising to learn that most field practitioners have become reliant on a wide variety of different diagnostic inputs to achieve a tentative diagnosis. Similarly, students may have adapted the same iterative approach to patient care. It must be emphasized that students want to add those techniques most congruent with a diversified model of care to their armamentarium of clinical tools rather than replace the diversified adjustive techniques they are taught in the core curriculum.

## CONCLUSION

Students at this college continue to express interest in learning certain chiropractic technique systems in addition to diversified technique. Over the past several years, their opinions have gravitated toward those name techniques that would best integrate with the functional-based curricular model underpinning the program at CMCC, and have moved away from those techniques systems that may be less congruent with a diversified approach.



# Chiropractic Technique Systems and Jurisprudence Examples from Canada

**Brian Gleberzon, D.C.,** Canadian Memorial Chiropractic College

The increasing use of chiropractic technique systems other than diversified technique by Canadian chiropractors has been well documented, and several areas of jurisprudence now require constant re-evaluation. This article explores some of these areas of Canadian law as they apply to chiropractic technique systems. Examples from several cases in Canada are discussed, with interpretation and synthesis by the author.

## DISCUSSION

In the broadest sense, a chiropractic adjustment is any load or force applied to a specific body tissue with therapeutic intent. In turn, this load can vary in terms its velocity, amplitude, duration, and frequency, as well as anatomical location, choice of levers, and direction of force. Using this approach, vastly different techniques can all be grouped under the umbrella term of a chiropractic technique. However, while all manipulations are adjustments, not all adjustments are manipulations.

These subtle differences between chiropractic adjustments and manipulations are more than just semantic. Understanding the different therapeutic goals of chiropractic care requires an appreciation of cultural or contextual differences among chiropractic practitioners. This appreciation is of particular importance to those individuals responsible for the development of professional quality assurance standards and guidelines. Rather than be seen as a cookbook from which policy is built, legal restrictions imposed, or cost containment derived, guidelines must reflect the ideological differences that exist throughout the profession.

In a recent case before the Supreme Court of Nova Scotia, the Board of the Nova Scotia College of Chiropractors sought an interlocutory injunction against an individual accused of practicing chiropractic without a license. The defendant held himself as a "spinologist" who was performing the Blair Technique Correction on his patients. Since it was decided that the Blair Technique was a chiropractic technique, the

injunction was in fact granted. This is an important landmark in Canadian chiropractic law because it demonstrated the ability of a chiropractic regulatory body to both regulate and protect itself.

While some techniques are taught at all accredited chiropractic colleges, and other techniques are taught at some but not all accredited chiropractic colleges, there are also a number of chiropractic techniques used by field practitioners that are taught only at technique seminars. Thus, jurisdictions are faced with the dilemma of permitting a technique to be utilized according to practitioner preference, despite the potential lack of proper instruction, quality assurance, or guarantee of minimal competency performance. Some regulatory boards are attempting to develop standards of practice to address these concerns. The College of Chiropractors of Ontario, for example, has proposed that a practitioner who plans on using a "technique, technology, device or procedure" that is not accepted by a "responsible and substantial segment of the chiropractic community" obtain written consent from the patient explicitly describing the intervention to be performed.

Currently, the use of an activator or other mechanical device is prohibited in Saskatchewan. However, considering the popularity of mechanical devices for patient care, the evidence of its clinical effectiveness, a favorable safety record, and its diverse clinical utility, the continued prohibition against the use of an activator may not be defensible at this time in terms of an evidence-based approach.

## SUMMARY

Demographic trends show that there is an increase in the utilization rates of name techniques by Canadian chiropractors, and this will influence chiropractic jurisprudence. Issues requiring constant re-evaluation include: issues of informed consent; self-regulation; and ensuring current standards of care and guidelines that are congruent with the current best clinical evidence, and thus defensible.



# Quantitative Measurement of Grip Strength Improvement for Chiropractic Treatment of Cervical Radiculopathy Misdiagnosed as Bilateral Carpal Tunnel Syndrome

## A Case Study with 14-Year History and 8-Year Follow-up

**Marc S. Gottlieb**, B.S., D.C., Private Practice

This case report reviews a common disorder, cervical radiculopathy frequently seen by chiropractic physicians and medical doctors alike, with a potentially challenging differential diagnosis of carpal tunnel syndrome. Mistakes in diagnosis can lead to poor treatment outcomes as well as unnecessary surgery.

### METHODS

This case report describes and discusses the chiropractic management of a patient with cervical radiculopathy affecting bilateral upper extremities and complicated by degenerative spondylosis of the cervical spine. The diagnostic and assessment process is covered, including time series radiographs, which were available before the symptomatic episode unfolded. Imaging is also included during the time of symptom climax, including magnetic resonance imaging and 8-year postresolution follow-up radiographs. In addition to documentation of the degenerative changes that occurred over time, quantitative measurement with grip strength dynamometer was used to document myotomal strength improvement with chiropractic treatment.

### RESULTS

A successful outcome was achieved for this patient with cervical radiculopathy as determined by a resolution of symptoms in bilateral upper extremities, including pain, numbness, tingling, and a profound improvement of grip strength. Additionally, unnecessary bilateral carpal tunnel surgeries were avoided.

### DISCUSSION

In this case, chiropractic treatment included segmental spinal manipulation of cervical and thoracic vertebrae, as well as home care and dietary/nutritional recommendations.

This patient's condition was complicated by prominent osteoarthritic changes, and stiffness in the cervical spine. The patient had a chronic history of neck pain for which she sought the care of two different chiropractors in years prior to consulting with the author of this case study. She conceded poor patient compliance, as she did not follow the recommendations or treatment plan of the two previous chiropractic physicians. This did yield historical x-rays, which were available for review. Clinical features of this middle-aged white female patient included profound weakness of the hands, wrists, and arms, and dull aches reported in the C6 dermatomes. Cervical spine radiographs demonstrated a reversed cervical lordosis with disc space narrowing from C3 to C7. Concomitant osteophytic spurs and intervertebral foramina encroachment were apparent bilaterally. Magnetic resonance imaging demonstrated a slight C5–C6 impression on the dural sac. Nerve conduction tests demonstrated some prolonged latency of values.

Progressive degeneration documented by radiography initially motivated the patient to be more compliant with treatment recommendations. The use of a grip strength dynamometer to quantitatively assess the patient's status and record progress with treatment proved to be clinically useful for the doctor in this case as well as provided positive feedback for the patient.

### DISCUSSION

Although no firm conclusions can be reached from the results of a single case study, the author suggests chiropractic care appears to provide benefits for patients with cervical radiculopathy complicated by degenerative changes and cervical spondylosis. The author has an 8-year practice history with hundreds of similar cases documenting similar improvements in grip strength with quantitative measurements. Aside from the good treatment outcome, the author wishes to emphasize the value of quantitative, reproducible outcome measures in clinical practice. Validating outcome measures is equally important to documenting successful outcomes in the pursuit of reliable treatments.



# Pre- and Post-testing in a Chiropractic Capstone Course

Donald Gran, M.S.Ed., D.C., and Michael Bovee, M.S.Ed., D.C., Palmer College of Chiropractic

In recent years, assessment of what is actually learned and accomplished in a college career has gained increasing attention. The authors of this study, instructing a 7th-trimester capstone technique course, constructed a 15-question multiple-choice pretest and administered it to all subjects prior to any stimulus in order to assess students' previously acquired knowledge. The pretest/post-test design measures in terms of a dependent variable (pretest), exposure to a stimulus representing an independent variable (capstone course), and then measures in terms of the dependent variable (post-test). Differences noted between the first and second measurements of the dependent variable are then attributed to the independent variable.

## METHODS

Subjects were 35 7th-trimester students enrolled in the Technique Principles and Practice course, which serves as a capstone course in the technique curriculum. A capstone course by our definition represents a terminal course, which focuses on assimilating all previously delivered technique course material into a useful package for the students. To enroll in the course, each student had to have successfully completed all previous technique courses.

The pretest administered on the first day of class was designed to test key competencies from previously taught technique courses. The students were required to demonstrate comprehension, integration, and application of their knowledge. The post-test consisted of the same 15 multiple-choice questions within a 45-question multiple-choice final examination administered on the last day of class. Since the study was conducted over a 15-week period, there was little concern for the students becoming "test-wise."

## RESULTS

The data collected included the descriptive statistics on the participants. Results revealed a pretest minimum percentage of .13 and a maximum percentage of .87, while the post-test revealed a minimum percentage of .60 and a maximum

percentage of 1.00. A paired *t* test was conducted on the pretest percentage showing a mean of .606, with a standard deviation of .1503, while the post-test percentage showed a mean of .865, with a standard deviation of .1160. The paired samples correlation for the pretest and the post-test was .488, which is considered high correlation and a significance of .003. Based on an alpha level of .05, it was found the stimulus of the independent variable was highly significant.

## DISCUSSION

The pretest and post-test were written to evaluate the students' ability to recall and apply previously presented material; however, it should be noted that the course was not specifically taught to the test.

After conducting the statistical analysis on the test scores, it was found that the students performed significantly better on the post-test following the capstone technique course. Since the technique curriculum was taught specific to different regions of the spine and extremities, this method of enhancing previously taught material demonstrated definite benefits to the students' assimilation of material.

The authors recognize there may have been internal validity problems present in this study since the subjects were unaware of the test administration on the first day of class. There also may have been randomization problems since only those students who attended the first day of class were included in the study. One additional concern may be the lack of a control group.

## CONCLUSION

Based on the results of this study, it can be concluded that this chiropractic technique course did enhance the performance of the students. In situations in which the objective of instruction is to develop mastery level skills and clinical reasoning, the method of instruction may be a significant factor. Any college whose curriculum does not include a capstone course may want to consider the introduction of such a course.



# The Relative Sensitivity of Three Different Types of Clinical Outcome Measures on Chiropractic Low Back Pain Patients in Two Countries

**Niels Grunnet-Nilsson**, D.C., M.D., Ph.D., **Lene Hare**, B.Sc., **Henrik Lauridsen**, D.C., M.Sc., University of Southern Denmark, **Cheryl Hawk**, D.C., Ph.D., and **Cynthia R. Long**, Ph.D., Palmer Center for Chiropractic Research

Randomized controlled trials on the efficacy of spinal manipulation therapy on low back pain traditionally use functional scales, such as the Oswestry questionnaire and the Roland-Morris questionnaire, to assess the clinical effectiveness of spinal manipulation therapy. It seems fair to say that it has been extremely difficult to document any clinically significant treatment effects with this type of outcome scale.

In contrast to this, the outcome variable "patient satisfaction" often registers clinically significant differences in favor of spinal manipulation therapy and the discrepancies between results from those two different types of outcome scales need to be investigated. The explanation most commonly given for the discrepancy between the scales is that the Oswestry/Roland-Morris type of scales are "objective" measures of outcome and therefore implicitly reflect reality, whereas "patient satisfaction" is regarded as a "subjective" measure reflecting the patients state of mind, rather than his or her low back pain status.

The problems with documenting the treatment effects experienced in musculoskeletal primary sector practice are not unique to chiropractors. Virtually all practitioners who deal with musculoskeletal patients in the primary healthcare sector seem to have similar problems, and recent studies from the medical field suggest that perhaps the "objective" functional type of outcome scale is simply not sensitive enough to permit its application on primary sector musculoskeletal patients. Bearing in mind that most (if not all) of the "objective" functional outcome scales were developed at secondary or tertiary sector treatment centers, and validated on musculoskeletal patients from these centers, it is a distinct possibility that these "objective" scales are simply not suited for musculoskeletal patients in the primary healthcare sector.

## STUDY AIM

This study investigates the relative sensitivity of examples of three different types of outcome scales (the Roland-Morris questionnaire, patient's prospective (pre vs. post)

global low back pain assessment, and patient's retrospective global assessment of treatment outcome) in primary sector chiropractic low back pain populations in Denmark.

## METHODS

A pilot study has determined that a sample size of 150 patients results in a statistical power of 0.80 with alpha set at 0.05. The study will be multicenter based on patients seeking care in participating primary sector chiropractic practices with low back pain as their primary complaint. Previous studies show that these patients experience considerable improvement in their low back pain within the first 3 weeks of care, and their status will therefore be assessed at the start of treatment and again by mail 3 weeks later.

Inclusion criteria are: low back pain as the primary complaint; aged 18 years or older; no chiropractic care within the last 2 months; and command of English or Danish. There are no exclusion criteria.

Those patients willing to participate were asked on day 1 to fill in a questionnaire containing demographic data, low back pain history, the Roland-Morris questionnaire on low back pain, and a visual analog scale (VAS) on their global assessment of low back pain over the last 3 days. On day 21 the patients were mailed a questionnaire containing the Roland-Morris questionnaire on low back pain, a VAS on their global assessment of low back pain over the last 3 days, and a VAS on their global assessment of improvement over the last 3 weeks.

## RESULTS

The study was completed by Christmas 2002. Preliminary results will be presented at the RAC/ACC in 2003. A similar study is being planned in the United States in cooperation with the Palmer Center for Chiropractic Research.



# Statistical Performance of a Female College Athlete Utilizing Activator Instrument Adjusting Procedures

**Timothy D. Guest, D.C., and Jennifer Eames, D.C.,** Sherman College of Straight Chiropractic

The purpose of the paper is to describe changes in player game statistics in three phases of the season. The first phase is classified as preinjury. While the case history does not indicate a specific traumatic event, this term was chosen to indicate the period prior to the point at which the athlete first began to present with symptoms and reported to the team trainer. The second phase is classified as the injury period. This represents the period during the season when the athlete was under the care of the team trainer and the team physician(s) only. The third phase is the chiropractic care period of the season, when the athlete was receiving Activator-based chiropractic care and had discontinued other forms of care (i.e., MD and trainer care).

## METHODS

The method of care was Activator analysis and adjusting protocols. The Activator III<sup>®</sup> adjusting instrument was the only instrument used. On the first visit The Basic Scan (Track I) protocol was the only analysis and adjustive procedures used. On the second visit the decision was made to begin incorporating the advanced scan procedures (Track II). The patient returned for a total of 14 visits over a 12-week period.

While our objective was to improve the patient's symptomatic presentation and improve her level of health, the patient's desire was to improve game performance. Therefore, during the three phases described above (preinjury, injury, and care), data were collected on several performance categories. These were: (a) minutes played per game; (b) field goal percentage; (c) points per game; and (d) rebounds per game (offensive and defensive combined).

## RESULTS

The patient reported an improvement in the symptomatic findings after the first office visit. During the preinjury period (6 games), the average field goal percentage was 39%, average points per game was 11, average rebounds per game was 6, and average minutes played was 22. During the injury period (10 games) the average field goal percentage was 45%, average points per game was 10, average rebounds per game was 6, and average minutes played was 25. During the care

period (11 games), the average field goal percentage was 50%, average points per game was 13, average rebounds per game was 9, and average minutes played was 30.

While the results did not show a statistically significant change in the respective numbers or percentages during the study period, they did reflect an upward trend in player performance concurrent with chiropractic care that is significant for the sport of basketball.

## DISCUSSION

While it has been proposed professionally for several years that chiropractic care improves performance of athletes, it has been difficult to assess such claims due to several confounding factors. An athlete will "naturally" improve as a season develops. Performance-based tests tend to stimulate the athlete to perform at a higher level when it is known the test is valued. Any assessment procedures are artificial in nature, and therefore are not true reflections of athletic ability or sport-oriented skills. Because a dedicated athlete will always be working toward a "personal best," it is often difficult to establish a baseline from which to judge. The authors believe this particular study avoids the issues of performance test bias since the statistical information was recorded as part of the coaches' game-to-game routine and was done in a "real-life" setting rather than an artificial one. A secondary consideration to this case study in regarding player performance would be a recognition that while the athlete was competing at her best performance level in each game, there was another athlete on the opposing team attempting to prevent her from succeeding, and the skill level of that player will vary from game to game.

## CONCLUSION

A patient with subjective symptoms, which had an adverse effect on game performance that did not respond to other treatment, had an upward trend in game statistics while under chiropractic care. This case suggests the need to do more research with individual athletes and teams to measure performance outcomes over longer periods.



# Increasing the Cervical Lordosis with CBP Seated Combined Extension-Compression and Transverse Load Cervical Traction with Cervical Manipulation

## A Nonrandomized Clinical Control Trial

**Deed E. Harrison**, D.C., Private Practice, **Donald D. Harrison**, Ph.D., D.C., M.S.E., Université du Québec à Trois-Rivières, **Joeseph J. Betz**, D.C., Private Practice, **Tadeusz J. Janik**, Ph.D., CompMath R/C, **Burt Holland**, Ph.D., Temple University, **Christopher J. Colloca**, D.C., Private Practice, and **Jason W. Haas**, D.C., Private Practice

Cervical lordosis has been shown to be an important outcome of care. However, few conservative methods of rehabilitating sagittal cervical alignment have been reported. The authors conducted a Nonrandomized, prospective, clinical control trial.

### METHODS

Thirty pro-selected patients, after diagnostic screening for tolerance to cervical extension with compression, were treated with cervical manipulation for the first 3 weeks of care and a new type of cervical extension-compression traction (vertical weight applied to the subjects' foreheads in the sitting position, with a transverse load at the area of kyphosis). Pretreatment and post-treatment visual analog pain rating scales were compared along with pretreatment and post-treatment lateral cervical radiographs analyzed with the posterior tangent method for changes in alignment. Results are compared to a control group of 33 subjects, receiving no treatment, matched for age, sex, weight, height, and pain.

### RESULTS

Control subjects reported no change in visual analog pain scale ratings and had no statistical significant change in segmental or global cervical alignment on comparative lateral cervical radiographs (difference in all angle means  $<1.3^\circ$ ) repeated an average of 8.5 months later. For the

traction group, visual analog ratings were 4.1 pretreatment and 1.1 post-treatment. On comparative lateral cervical radiographs repeated after an average of 38 visits over 14.6 weeks, 10 angles and 2 distances showed statistically significant improvements, including anterior head weightbearing (mean improvement of 11 mm), Cobb angle at C2–C7 (mean improvement of  $13.6^\circ$ ), and the angle of intersection of the posterior tangents at C2–C7 (mean improvement of  $17.9^\circ$ ). Twenty-one (70%) of the treatment group subjects were followed for an additional 14 months and improvements in cervical lordosis and anterior weightbearing were maintained.

### CONCLUSION

CBP technique's extension-compression two-way cervical traction combined with spinal manipulation decreased chronic neck pain intensity and improved cervical lordosis in 38 visits over 14.6 weeks as indicated by increases in segmental and global cervical alignment. Anterior head weightbearing was reduced by 11 mm, Cobb angles averaged an increase of  $13^\circ$ – $14^\circ$ , and the angle of intersection of posterior tangents on C2 and C7 averaged  $17.9^\circ$  of improvement.

### ACKNOWLEDGMENTS

The authors acknowledge Dr. Sanghak O. Harrison, for art work and CBP, Nonprofit, Inc., for support.



# The Chiropractic College Assessment Test (CCAT) An Investigation of Its Relationship to Students' Grade Point Averages and National Chiropractic Boards Performances

**Steve Haslund**, Ph.D., **Toilynn Carson**, Ed.D., L.M.F.T., L.P.C., N.C.C., **Karlene Trebesiner**, D.C., and **Jason Flanagan**, D.C., Texas Chiropractic College

In the Fall of 1998, the National Board of Chiropractic Examiners began the administration of the Chiropractic College Assessment Test (CCAT). The CCAT is eventually to be used as an indicator of students' performances at chiropractic colleges. For data collection purposes, Texas Chiropractic College (TCC) was selected as one of the pilot sites for which the CCAT would be administered. It is administered on the first day of classes during new student orientation each trimester. Three graduating classes will provide the data outcomes for this study.

The study described in this proposal was developed in a cooperative effort between the Dean of Students, Director of Guidance and Counseling, Registrar, and the Dean of Academics. This group was interested in investigating the relationship between students' performance on the CCAT and their grade point average (GPA) and, independently, their performance on the National Board Examinations. Limited research on the CCAT, the need for such an examination, and the desire to enhance the quality and performances of chiropractic students as future chiropractors further supported the desire to complete this study.

The authors of this proposal have hypothesized that students' CCAT scores will positively correlate with students' GPAs, and that students' CCAT scores will positively correlate with students' National Board scores.

## METHODS

Several aspects of the data were needed to complete this study. The students' cumulative CCAT scores were used. Their GPAs following trimesters 1, 5, 7, and the cumulative GPA for trimester 10 or their graduating trimester were included. Students' average scores on each part of the Board Examinations were also considered. As of Summer 2002,

three classes will have graduated since the initial administration of the CCAT. The total number of subjects for this study is approximately 150. Through the use of correlation statistics, the results of this study will be derived.

## RESULTS

As all the data needed for the completion of this study could not be obtained by the submission date of this proposal (i.e., for the Summer 2002 graduating class), specific results are not available at this time

## DISCUSSION

Congruent with the purposes for the development and administration of the CCAT, the authors of this study are investigating students' performance at Texas Chiropractic College based on those scores. It is hoped that this study will help further support the validity of the CCAT being considered as an entrance examination at chiropractic colleges.

The authors concede that an effective examination tool such as the CCAT is definitely needed. It is hoped that this study will concur with the use of the CCAT as it is presently designed. The authors perceive that the CCAT could be helpful as an admissions tool. Further, it could be helpful as a career counseling tool, as students, with scientific support from studies such as this one, could anticipate their academic and professional performances as a chiropractor given their score on the CCAT. As additional studies are completed, the utility of the CCAT or a similar instrument could be better understood.



# Whole-Body Vibration and Low Back Pain Areas of Research Evidenced in a Review of the Literature

**Dennis M.J. Homack**, D.C., C.C.S.P., New York Chiropractic College

Proper management of low back pain (LBP) must include identification and control of causative factors. Understanding the effects of vibration to the human body, particularly as a contributing factor to LBP is important if we are to identify influences that can injure or hinder recovery of patients. This study looks at the literature to establish the current state of knowledge and investigate new research correlating whole-body vibration with LBP and several physiologic effects independent of LBP.

## METHODS

All relevant epidemiologic articles were obtained through a search in several computer databases, including *MEDLINE*, *PUBMED*, *Index to Chiropractic Literature*, *OCLC First-Search*, *ERIC*, and *NLM Gateway*. Three hundred forty-eight abstracts were reviewed for relevance in terms of two general criteria: (1) literature reviews of the subject to establish accepted baseline levels of current knowledge, and (2) recent (1995–2002) published articles that either seek to clarify existing relationships to whole-body vibration exposure and low back pain, or report on new areas of research.

## RESULTS

Twenty-four articles were retained fulfilling the two general criteria described above. Several literature reviews have concluded whole-body vibrations may contribute to various health effects, such as low back pain, spinal degeneration, gastric motility changes, and other various physiologic changes. With respect to low back pain, specific causal relationships have proven to be difficult to identify, and specific exposure-response mechanisms have been difficult

to establish. Recent research has revealed specific effects of vibration on the nervous system, vestibular system, vascular system, and even vision; however, their involvement in promoting LBP remains unclear. Some aspects of research such as the involvement of facet joints seems wholly ignored.

## DISCUSSION

There is a strong correlation between long-term exposure of whole-body vibration and back complaints, such as early degenerative changes and low back pain. There is little direct evidence to clarify our level of understanding as to how these are connected, although specific physiologic changes have been documented. There is a moderate amount of information describing both the resonance frequencies of the human body and vibrational exposure given a particular activity; however, it is the opinion of the author that more work needs to be done in this area. Investigations into the behavior of low back musculature and reactive tissue response have thus far been inconclusive in many respects. Further investigation of the effect of vibration on the proprioceptive and vestibular systems is also needed. Investigation as to the contribution vibration plays in promoting osteopenia, such as whether we can detect biochemical changes through blood chemistry, is needed. Of the research reviewed, there is no evidence as to the effects of whole-body vibration on the facet joints in the spine. Studies should investigate the effect of vibration on these small joints, and investigate the contribution they make to LBP.

Despite the lack of definite evidence, the author found sufficient reasons for the reduction of whole-body vibration-exposure to the lowest possible level. If new knowledge is to be produced, good prospective studies with repeated measurements of exposure and analyses of the effect of posture are needed.



# The Significance of Biophotons in Chiropractic

**Marius R.V. Hossu**, B.Sc., M.D., and **Ronald L. Rupert**, M.S, D.C., Parker College of Chiropractic

Chiropractic assumes that the human organism has innate mechanisms that maintain homeostasis, creating the state of well-being called health. The major chiropractic intervention is to help these processes by precisely performed adjustments.

## BACKGROUND

The authors consider an adjustment as a concentrated mechanical energy delivered in a proper way for purpose of correcting imbalances existing in the organism. This energy then distributes to cells and molecules, it dissipates, or it transforms into other forms of energy. A component of these energies is the electromagnetic energy in the visible domain. It is called bioluminescence, or biophotons. The authors reviewed the properties of biophotons, and consider some of them to be significant for chiropractic profession. Biophotons have a high energy per photon compared with thermal or regular chemical activation energies. While the average intensity is low, so that bioluminescence is not visible with naked eyes, it is  $10^{10}$  higher than predicted by the Boltzmann distribution. Most of the tissues have been shown to emit light: embryonic tissue, neurons, tendons, heart, liver, blood cells, and skin. There are implications in fundamental cellular processes, such as mitosis, phagocytosis, neural activity, and oxidative stress. Biophotons demonstrate coherence, signifying that the photons are related to synchronized

or simultaneous processes in spatial domains of about 10 cm. Biophotons also have the ability to form a stationary field, due to their coherence and existence of optical interfaces between biological structures. This stationary field maintains its property and energy distribution without physical substrate.

## DISCUSSION

These properties raise the possibility of using bioluminescence as an investigational tool for pathophysiological processes that refer to intimate molecular events. The authors also advance the hypothesis that the spinal canal forms a resonant cavity for electromagnetic radiation, particularly for the radiation produced by the cells inside the cavity, mostly neurons. Some patterns of distribution of an electromagnetic stationary field into a cylindrical cavity are presented and it is suggested that this field interacts with underlying structures influencing their electromagnetic properties: membrane potential, ion movement, and chemical energy of activation. Further, the authors consider that any misalignment of the vertebra will modify this distribution and will change the normal neural activity. In this way, the alteration of an internal energy field, that could be studied in forms of biophotons, could stand for some of the effects of what a subluxation complex is considered to be, and for its correction.



# Teaching Professionalism to Students

**Stuart Kinsinger**, D.C., F.C.C.R.S.(c), Canadian Memorial Chiropractic College

The word “professionalism” is used in publications relating to the conduct of health professionals, particularly in the context of patient care. The more recently published journal articles and monographs reveal that much of this activity discusses the role of biomedical ethics involving life-and-death decision making. In no reference was an actual definition of the word stated, and there was not a high degree of agreement in discussing the various issues on this topic.

This abstract outlines the content that the Canadian Memorial Chiropractic College uses in the teaching of professionalism as a part of chiropractic principles, drawn from both traditional and more recent references.

## OBJECTIVES

Our present culture has seen significant change in society’s values over the past 20 years. Moral relativism has allowed public standards to be affected by the prevailing winds of change in all aspects of life. The modern chiropractic student has been raised and educated in a climate of materialism, entitlement, and self-indulgence. Accordingly, all colleges and universities have seen changes in the behaviors of students that have been described as uncivil and disruptive.

Educators now must assume that students enrolled in chiropractic college have not been subjected to any teaching in

those concepts and standards of what the public demands. Regulatory colleges are also increasingly dealing with inappropriate and in some cases illegal activity.

## PROFESSIONS

Professionalism is work using specialized training, skills, and experience to serve both the client and one's colleagues in a legal, ethical, and virtuous way. Work accorded the standard of being "a profession" is characterized by the following:

1. A defined body of knowledge and skills; this knowledge built upon rational theories and established fact;
2. A long and formal education process, culminating in qualifications sufficient to meet working admission standards;
3. The work and knowledge being controlled and organized by associations;
4. The mandate of these associations being formalized by written documents which include state or jurisdictional laws governing authority, licensure, continuing education and conduct;
5. Individual members practicing under the authority of these associations remaining completely autonomous;
6. A commitment to serve in one's area of expertise including the ameliorating of pain and suffering, participating in researching newer and safer practices, serving as an authority in public affairs related to one's domain, valuing performance and the public's interest above financial reward; and
7. Its members being held to a higher standard of behavior than nonmembers, ensuring public trust.

## ETHICS

All chiropractors must practice ethically. The seven basic ethical tenets most appropriate for chiropractic practice (justice, beneficence, nonmaleficence, autonomy, veracity,

confidentiality, and paternalism) form the framework for all doctor-patient interactions.

## VIRTUES

Regulatory bodies' codes of conduct and standards of behaviors set out what is strictly forbidden in professional offices. Understanding the virtues that professionals can avail themselves of strives for optimal practice behaviors, and further maintains the public's trust in the professions as follows: accountability, compassion, excellence, fortitude, integrity, prudence, and temperance.

## TENETS OF PROFESSIONALISM

- Professionals subordinate their own interests to the needs of the patient.
- Professionals hold to high ethical and moral standards.
- Professionals respond to the needs of society within their community.
- Professionals are honest, caring, respectful and trustworthy.
- Professionals are accountable for themselves, and for and to their colleagues.
- Professionals are competent by committing themselves to scholarship and life-long learning.
- Professionals are held to higher standards in competence, behavior, decision making, and accountability.

## CONCLUSION

Society gives over great powers to the professions, particularly in healthcare. Professionals are obligated to maintain their patients' trust. Accordingly, it is imperative for chiropractic colleges to advocate for the principles of professionalism to all students.



# Radiographic Evaluation of the Effect of Orthotics on the Unlevel Pelvis

**D. Robert Kuhn, D.C., D.A.C.B.R., Sarah Smasal, D.C., Alethea Pappas, D.C., and Dennis Nosco, Ph.D.,** Logan College of Chiropractic

The purpose of this study was to determine if there was an effect on pelvic unleveling with the use of custom-made flexible orthotics in subjects with asymmetrical flexible pes planus.

## METHODS

Approval for the study was sought and obtained from the Logan institutional review board. Thirty-five asymptomatic

1st-trimester students with pelvic unleveling of at least 4 mm and asymmetrical pes planus were identified and signed informed consent. Anteroposterior (AP) and lateral full-spine radiographs were taken on the subjects without the orthotics in place. The subjects then wore their orthotics for a minimum of 2 weeks. After this interval, the subjects underwent a second radiographic examination consisting of AP and lateral full-spine views. Iliac crest height measurements were obtained from the first and second AP radiographic examinations. The researchers then analyzed the percentage of the subject population that improved, were unchanged, and those whose measurements worsened. A comparison of the results was also performed using a *t* test analysis.

## RESULTS

The use of custom-made orthotics demonstrated a normalizing effect on pelvic measurements in 20/35 subjects. In 10/35 the values remained the same and worsened in 5/35. The average unleveling before the insertion of the orthotics was 10 mm and the average unleveling after the insertion of the orthotics was 8.9 mm. Of the subject population who

improved, there was a preorthotic measurement average of 8.8 mm and a postorthotic measurement average of 6.5 mm. The *t* test did not reach statistical significance ( $p = .09$ ).

## DISCUSSION AND CONCLUSION

The data clearly show a qualitative trend to more pelvic leveling after wearing the orthotics, although without achieving statistical significance. Potential confounding variables such as other impacts on pelvic unleveling, brevity of the study, use of asymptomatic subjects, and uncontrolled subject compliance with wearing the orthotics may have biased the data. More work on larger patient populations should be done to assess the exact magnitude of the efficacious effect that orthotics could have on patients with unlevelled pelvis.

## ACKNOWLEDGMENT

The authors acknowledge Foot Levelers, Inc., for their financial support for this research.



# The Effects of Manipulation on a Functionally Unstable Ankle

**Henrik Lauridsen, M.Sc., D.C., René Fejer, D.C., Annette Ravn Nørregaard, B.Sc., and Charlotte Søgaard Hansen, B.Sc.,** University of Southern Denmark

Most people have experienced a sprained ankle with all of the aftereffects such as pain, edema, discoloration, and reduced movement. The most common location is the lateral ankle following an inversion trauma involving the anterior talofibular and the calcaneofibular ligaments. In more severe sprains, the posterior talofibular ligament is also involved. Up to 40% of these injured ankles subsequently develop functional instability.

The clinical picture of functional instability is one of decreased movement of the ankle joints, decreased strength of the peroneus muscles, and decreased sense of balance and “giving way” as a result of reduced proprioception. Most patients experience this as recurrent ankle sprains.

The proprioceptive mechanoreceptors are located in ligaments, muscles, skin, and joint capsule and become activated mainly by stretching of the surrounding tissues. Some authors suggest that the mechanism behind functional instability is a proprioceptive deafferentiation of the ligaments and joint capsule around the ankle joint, leading to poor muscle coordination and postural control. Others suggest that joint dysfunction of the ankle joints is a common consequence of ankle sprains and therefore an important factor in functional instability.

The treatment of the decreased proprioception and poor muscle coordination following ankle sprains has mostly

focused on balance training on wobble or rocker boards. Studies have shown that regular balance training for 6 weeks had a positive effect on “postural sway” compared to a control group. At 4 months’ follow-up, this positive effect had disappeared; however, the trial group showed a significantly smaller recurrence rate in ankle sprains compared to the control group. Other studies have shown a measurable difference in anteroposterior and mediolateral sway up to 2 years after intervention with balance training. To the authors’ knowledge there are to date no studies investigating the effects of manipulation on functional instability of the ankle. The aim of this study was to investigate the effects of manipulation of the dysfunctional ankle 4 weeks after a grade I or II ankle sprain using stabilometry.

## METHODS

Twelve participants were selected for the project. Inclusion criteria were inversion sprain grade I and II after the O’Donoghue classification; the sprain had to be at least 4 weeks old; there had to be symptoms of functional instability; and there had to be a mechanical dysfunction of the

foot as measured by motion palpation. Exclusion criteria were inversion sprain grade III; ear infections within the last 2 months; distal neuropathies or other pathological conditions affecting the proprioception or balance; the other foot free of trauma; previous manipulation of the foot; and illness 2 weeks prior to the experiment.

Participants were randomized into a control group and a trial group. The trial group received chiropractic manipulation to the foot, whereas the control group received no treatment.

The postural sway was measured using a Kistler 9281B force platform with the subjects performing a "one leg stance." A standardized protocol was used for all the participants to reduce bias. The subjects in the trial group were

measured before treatment, immediately after treatment, and 1 hour after treatment. The control group was measured at the starting point and after 1 hour. At each measurement all subjects were measured three times. Based on the current literature and the software running the force platform, the parameter chosen as an indicator for postural sway was the total sway amplitude in the form of a confidence ellipse.

## RESULTS, DISCUSSION, AND CONCLUSION

The study was completed by Christmas 2002. Preliminary results will be presented at the RAC/ACC in 2003.



# Incidence and Nature of Injuries Presenting for Chiropractic Care at an Endurance Cycling Event A Descriptive Study

**Christine M. Lemke, D.C., and Robert W. Ward, D.C.,** Southern California University of Health Sciences

This presentation describes the types and frequencies of complaints seen by a chiropractic team on a large endurance cycling event. The authors are unaware of any previous attempt to quantitatively describe the injuries and care provided at an event of this type. The information collected has potential value for improving event logistics and reducing injury to cyclists.

## METHODS

In May 2002, an 11-person team from the Southern California University of Health Sciences provided chiropractic care for a 600-mile, 7-day cycling event. Care was available to 742 cyclists and the 285 members of the support crew.

Patients were free to select care from the chiropractic, physical therapy, medical team, or massage, without triage. All chiropractic patients completed an intake form, including questions on demographics, cycling equipment, training, and previous chiropractic experience. Clinical information was collected from patient files.

Patient files were reviewed and compiled into a spreadsheet. Demographic data included age, gender, zip code, and previous chiropractic experience. Cycling data included bicycle type, recent changes in bicycle fit, duration of training, weekly days and distance of training, and longest training ride. Clinical data included date of presentation, main symptom, body region, prior history of symptom, prior injury to the area, presence of impairment, diagnosis, type(s)

of therapy, and whether the patient returned. Data collected were subjected to descriptive statistics.

## RESULTS

A total of 233/1017 (23%) participants sought chiropractic care; 195/233 (84%) were cyclists, 31/233 (13%) were support crew, and 7/233 (3%) were unclassified. 143/233 (61%) were male, 89/233 (39%) were female, and 1 was unknown. 60/233 (26%) had no previous chiropractic care, 161/233 (69%) indicated previous chiropractic care, and 12/233 (5%) were undeclared.

Bicycles types used were road (125/195, 64%), mountain (32/195, 16%), hybrid (16/195, 8%), and recumbent (5/195, 3%). 136/195 (70%) of cyclists denied recent bicycle adjustments, and of these, 44/136 (32%) gave a zip code distant from the starting point, implying vehicle shipment prior to the event. 43/195 (22%) claimed a recent change in equipment fit, and of these 20/43 (47%) provided a zip code distant from the starting point. Median training time was 4 months, median days per week of training was 3, median miles per week of training was 100, and median longest training ride was 100.

The main complaint was dull achy pain in 100/233 (43%), sharp or stabbing pain in 47/233 (20%), pins and needles in 16/233 (7%), burning pain in 4/233 (2%), with 66/233 (28%) declining to state. Area of complaint was lumbar, 75/233 (32%); cervical, 48/233 (21%); shoulder, 31/233

(13%); knee, 29/233 (12%); thoracic, 20/233 (9%); upper extremity, 11/233 (5%); head, 5/233 (2%); hip, 5/233 (2%); feet/ankles, 4/233 (2%); thigh, 1/233 (<1%); calf, 1/233 (<1%); chest, 1/233 (<1%); and abdomen, 1/233 (<1%). For 169/233 (73%) the problem began on the event and prior for 48/233 (21%). 98/233 (42%) noted previous injury and 121/233 (52%) denied previous injury. 90/233 (39%) reported functional impairment, and 122/233 (52%) reported no impairment.

Treatments received were manipulation (202/233, 87%); soft tissue therapy (189/233, 81%); and self-care instructions (90/233, 39%). 41/233 (18%) returned for the same complaint and 30/233 (13%) for a new complaint. 158/233 (68%) did not return.

## DISCUSSION

These data are insufficient for establishing risk factors, as it is necessary to compare injured and noninjured participants. This requires collection of data from all participants, which is currently in progress.

Assessment of risk factors associated with equipment requires more complete data. Cyclists reported on recent bicycle alteration, but not if there had ever been a professional bicycle fit. Data were not collected on the type or orientation of foot restraint used which may be related to lower extremity injuries.



# Examining Responses to Questions on Understanding Chiropractic Philosophy-Based Patient Education Materials, Referencing a Clinical Outreach Program to Native Americans

**Cynthia Lund**, C.T., A.L.C.P. (Hon), and **Nita Allen**, A.S., Palmer College of Chiropractic

Is there a relationship between the chiropractic philosophy of healthcare in patient education to another cultures' health beliefs? Is "translation" of materials necessary even though there is not a language barrier?

Cultural diversity in patient education has been examined to some extent by the nursing profession, but to a much lesser extent by the chiropractic profession. It is predicted that by the year 2050 more than half of the United States population will consist of ethnic and minority groups, so it is important to study the comprehension and adaptive possibilities of patient education materials. We cannot assume that different cultures will assimilate into a melting pot, so we must adjust our communication and education methods.

Native Americans speak English, yet still embrace traditional beliefs including views of healing as the restoration to harmony and as a universal force. Many Native Americans do not subscribe to the germ theory of modern medicine, and believe healing involves time and personal relationship. There may be a correlation between these cultural beliefs and the commonly accepted definitions and components of chiropractic philosophy.

## METHODS

A review of the relevant literature was conducted, and a clinical outreach program to the Blackfeet Nation Reservation in Browning, Montana was determined to be an appropriate choice for the first in an anticipated series of studies. Native American patients were given chiropractic philosophy-based education material, originally written for

a non-native population, and then surveyed by the use of open-ended questions about health beliefs and effectiveness of care.

## RESULTS

The patient education material, as presented, did not appear to hold the patient's interest or cause a connection to be made between the patient's personal and/or traditional view of health and the relevance of chiropractic care to that view. The responses to the survey questions indicated an appreciation of the chiropractic adjustment, and also a view of health and healing that apparently correlates with chiropractic philosophy, but the connection was not made by the Native American patients. Even though many responses mentioned the totality of body, mind, and spirit working together to create good health through harmony, and all responses to the question "Does chiropractic fit in to your own view of health?" were "yes," the message did not get across that chiropractic philosophy and traditional beliefs have some similar elements. Without that connection being made, the need and desire for continued chiropractic care may not be as personally relevant or significant.

## CONCLUSION

Differing languages provide an obvious challenge to effective communication, but the same challenges can exist without a language barrier. These challenges come from

cultural differences and must be considered in order to use patient education materials for best results. It is apparent that educational and philosophical ideals are relevant beyond their founding cultures, and patient education materials can be adapted and written for the beliefs of the specific population,

encouraging that relevance to transcend cultural differences. If patient education materials are designed with an appreciation of the cultural beliefs held by the patients, chiropractic care may be seen as an intrinsic, natural choice and an essential part of healthcare.



## Qualitative and Quantitative Assessment of a University-Based 40-Hour Online Training Course on Chiropractic for Medical Physicians and Osteopaths

**J. Michael Menke, M.A., D.C., and Robert Lutz, M.D., M.P.H.,** University of Arizona

Consumers prefer medical physicians for their provide primary care needs, and seek chiropractic as an ancillary therapy. Consumers tend to utilize all nonconventional therapies for less serious healthcare matters and for serious conditions that do not respond to medical management. This implies that the management midrange of health concerns, or secondary interventions, is largely medically managed. Such conditions can also be managed successfully through life and health style habits encouraged by chiropractors.

Chiropractic is the most frequently requested nonconventional healthcare practice identified by patients. Therefore, primary care physicians serve as de facto gatekeepers for chiropractic care. Medical physicians would like more factual knowledge about chiropractic to provide to their patients. In addition, chiropractic services offer support or solutions to specific problems often not addressed effectively.

For chiropractic to grow a larger consumer base, it must present itself in terms of outcomes, evidence, and task in a manner that informs other health professions about what chiropractic has to offer. The segment of the chiropractic profession that is oriented toward integrative services has to be skilled in the chiropractic approach to health, and must understand how to communicate chiropractic effectively. This means conveying the chiropractic contribution in terms of condition-based application, discussing levels of research and clinical evidence, and a willingness to discover and consider other healing models.

The purpose of this project was to assess whether attitudes toward chiropractic could be evaluated, relative to an Internet-based content course with discussion for the medical profession on chiropractic. The hypothesis was that an evidence-based informal content approach could lead to increased comfort and receptivity to working with chiropractors.

### METHODS

A 40-hour online course was designed with a precourse assessment on attitudes toward chiropractic, osteopathy, and massage therapy. The learning objectives were to provide

facts on chiropractic, including history, development, education, licensing, safety, risks, and research. The course was designed with three phases of chiropractic curriculum: content on chiropractic; field experience with a chiropractor; and critiquing a published chiropractic or spinal manipulation research trial. Controversial issues were presented, such as the centrality of subluxation, mixers versus straights, and chiropractic's distinctiveness from physical therapy and osteopathy. Likert scale data were collected and will be analyzed in terms of categorical contingency table analysis for pre- and postmodule differences and differences between manual medicine approaches.

### RESULTS

Forty medical physicians took the course from May 5 through July 30, 2002. A comparison of the three manual medicine courses showed a relatively greater precourse acceptance and comfort with massage and osteopathy versus chiropractic. Qualitatively, MDs described their top concerns in referring to a chiropractor and attributes of a compatible chiropractor. Postcourse, physicians commented on their changed attitudes toward chiropractors and 100% of the physicians claimed they would refer to chiropractors those conditions they thought chiropractors could help. This was surprising, especially since a few medical physicians refused to visit a local chiropractor themselves.

### DISCUSSION

Much of medical attitudes about chiropractors are based on a lack of knowledge of the profession. Also, there are concepts that need to be discussed about chiropractic as to its unique contribution in terms of a healthcare solution, not a so-called "philosophy." Changes can be made through knowledge and discussion, and personal contact with chiropractors as patients, leading to a greater understanding and trust of chiropractors and the chiropractic profession.

## CONCLUSION

An increase in medical referrals to chiropractors is possible, given evidence-based knowledge content, personal

experience with a chiropractor, and better communications between the professions. Appropriate utilization of chiropractic services by or within a medical setting may be enhanced by an "application-based" approach to explaining the chiropractic paradigm.



# Prompt Resolution of a Hypertensive Emergency Following a Chiropractic Upper Cervical Chiropractic Adjustment A Case Report

**Paul Mullin, D.C.**, Palmer College of Chiropractic, and **Robert Sinnott, D.C.**, Private Practice

It is well known that hypertension is a primary risk factor for coronary artery disease, stroke, congestive heart failure, end-stage renal disease, and peripheral vascular disease. It is also known that modest reduction in the blood pressure of hypertensive individuals results in a significant decrease in risk of morbidity. None of the previously reported cases or trials were emergent in nature, hence we feel this case is worth sharing.

## CASE REPORT

A retired 71-year-old white male originally presented for care of a low back complaint. At that time he reported concurrent illnesses, including diabetes, hypertension, osteoarthritis, acid reflux, and depression. Medications included Amaryl, Humulin, potassium, Captopril, Lasix, Zocor, Plavix, glucosamine sulfate, Pepcid, and Serzone. He also reported unstable angina and a pacemaker to maintain cardiac rhythm. The patient denied a history of surgeries, but related multiple farm-related injuries.

The patient took his blood pressure at home and found it to be elevated beyond his typical level, and increasing over time. He went to bed and awoke with extreme dizziness and called 911. The emergency room reported his blood pressure as 300/204. The hospital unsuccessfully treated the spiked blood pressure with antihypertensive drugs over a 4-day period. The patient became frustrated and discharged himself on day 5.

The patient drove himself to the chiropractic office where he had previously sought care. Upon presentation he was so dizzy and nauseous that he had to be carried to the neurocalograph reading chair. Following a brief interview, the attending chiropractor performed an upper cervical subluxation assessment.

## ASSESSMENT

Temperature measurements of the cervical spine indicated that there was a recurrence of an upper cervical subluxation

complex (diagnosed at that earlier encounter). Analysis of cervical radiographs, also taken when the patient was initially seen, indicated that the atlas vertebra had misaligned anterior, superior, and to the left in relation to the occipital condyles. It was assumed that this patient would have a propensity to subluxate/misalign in the same manner.

## UPPER CERVICAL ADJUSTMENT

The patient was in the right lateral recumbent position upon a toggle table. The tip of the left atlas transverse process was contacted with the pisiform of the arched left hand. The adjustment was delivered using the upper cervical specific toggle recoil thrust in accordance with the vector derived from the original radiograph, implementing a counterclockwise torque.

Upon arising the patient found immediate relief of the dizziness. Cervical spine temperature pattern was reassessed and found to be normal. After returning home the patient checked his blood pressure, and it had returned to precrisis level. Thermal measurements of the cervical spine were repeated 4 and 12 days later, and found to be normal. The patient continued to monitor his blood pressure daily and reported there had been no significant increases and no dizzy spells or other related symptoms.

## DISCUSSION

The attending doctor may not have intended or expected to treat a hypertensive crisis by upper cervical adjustment, but the immediate resolution of the attendant dizziness and the rapid reduction in blood pressure implies a causal relationship in this particular case. We can only speculate about the exact mechanism involved. Previously hypothesized mechanisms include mechanical stimulation of the vagus nerve, release of traction on the brainstem, release of traction or pressure on vascular structures, and autonomic reflexes involving upper cervical Golgi tendon organs.

## CONCLUSION

A 71-year-old male experiencing a hypertensive emergency (sustained blood pressure of 300/204 with symptoms

of encephalopathy) found immediate and prolonged relief from an upper cervical adjustment when other measures had failed. The authors encourage other chiropractors to report similar findings. Further controlled studies regarding hypertension need to be conducted.



## Logan Basic Technique and Soft-Tissue Manipulation for the Reduction of Menstrual Distress

**Marion Joseph Gauntt**, B.S., and **Dennis Nosco**, Ph.D., Logan College of Chiropractic

Menstrual distress covers a wide variety of symptoms including premenstrual syndrome (PMS), primary and secondary dysmenorrhea, and painful syndromes related to the menstrual cycle. Problems arising from menstrual distress range from mild discomfort to debilitating pain and conditions that include depression, mood swings, insomnia, anemia, dizziness, water retention, heart palpitations, decreased sexual desire, changes in blood glucose levels, hormone levels, and vitamin deficiencies. It has been estimated that 100–600 million work hours are lost every year to menstrual distress complications.

Modern medicine has focused, to some extent, on treating chemical imbalances related to menstrual distress. Fluoxetine, as it pertains to depression, hormones such as Lupron (a gonadotropin-releasing hormone agonist (GnRH)), Danazol, oral contraceptives, and surgical intervention have been used as treatment for relief of menstrual distress. There are several studies on the effects of chiropractic care on menstrual distress. These indicate that menstrual distress responds favorably to manipulation.

This case series study was conducted as an IRB-approved, student research project at Logan College of Chiropractic. Its goal was to determine the effects of the combination therapy of Logan Basic technique and soft-tissue manipulation for the reduction of menstrual distress.

## MATERIALS AND METHODS

This study recruited five volunteers from students and staff who responded to posters placed on campus. All subjects suffered from severe menstrual distress and signed consent forms. All chiropractic treatments were done in the presence of a licensed chiropractor.

The study included three phases: pretreatment (enrollment), 12-week treatment, and 12-week post-treatment (observation). Subjects received a physical examination and underwent a pregnancy test before entry into the study. A questionnaire was used as the primary outcome measure and was administered on three separate occasions, once at

pretreatment, once at the end of the treatment phase, and once at the end of the observation phase. The instrument consisted of 18 questions derived from a previously published study on low-force adjusting with menstrual distress. Sixteen were life-style questions related to symptoms of menstrual distress (1–5 rating scale) and two were visual analog scale (VAS) questions (1–10) related to severity of abdominal pain and overall distress related to menstruation. The subjects received treatment twice weekly for 12 weeks using Logan Basic protocol with movement of the patient to allow soft-tissue manipulation in the area of the ovaries in conjunction with the apex contact.

## RESULTS

Subjects ranged from 23 to 41 years old (mean = 29). Four of five subjects showed a significant (>30%) decrease post-treatment in symptoms as defined by the sum of the responses to life-style and pain/distress questions. Two subjects regressed to nearly pretreatment symptom levels after the observation phase. No subject increased to pretreatment levels in symptoms, pain, or distress. Postobservation scores for two subjects were close to their post-treatment scores with one actually showing a decrease in symptoms during the observation period. The distress and pain VAS scores mirrored closely the changes seen in symptom scores for these subjects. The subjects who were in the most distress (scores of 10 in the pretreatment VAS questions) during pretreatment showed a small drop in symptoms (2%) and distress (10%) during the two postenrollment phases of the study.

## DISCUSSION

The results showed a clear trend of decrease in symptoms and pain/distress levels post-treatment. Unfortunately, these

lower symptom/pain/distress levels were not maintained after cessation of treatment. The patient showing the greatest distress had only a very small decrease in symptoms in postenrollment phases. The extent of indicated vertebral rotation was found to be commensurate with the degree of stress and/or pain each woman experienced.

## CONCLUSION

The efficacy of Logan Basic technique and soft-tissue manipulation in combination shows promise for the reduction of menstrual distress. Further investigation of this protocol through a pilot study is indicated.



## Validation of a Bilateral Weight Scale as an Assessment Tool in a Chiropractic Research Laboratory

**Dennis Nosco, Ph.D., Jeff Birkenmeier, B.S., Steve Costantino, B.S., and Raymond A. Wiegand, D.C.,** Logan College of Chiropractic

Bilateral weight scales were developed by chiropractors to measure balance in their patients. It has been part of chiropractic culture that if subluxation is a major problem and is corrected to a significant degree, the patient will normally have better balance. Two papers have been published, though none recently, describing bilateral (or 4-quadrant) weight scale validation as it relates to obtaining a reproducible and reliable measurement on the patient. However, no papers have been published that deal with the validation of the actual operation of the scales. Before any tool is used to make predictions about the results of chiropractic research or care, the instrument should be validated to demonstrate that its results are actually usable. The following student research project, done at Logan College of Chiropractic, describes one such validation of a weight scale used in the college's research department.

## MATERIALS AND METHODS

The Chirotron model 6800 Weight Analyzer (Chirotron, Seattle, WA) contains six separate force plates, two for the front of each foot and one for each heel. The scale averages readings for 8 seconds during the measurement. It presents a printout showing total weight, weight in each quadrant, percent weight shift from neutral LR and AP and the ratio of LR to AP. The scale, which is essentially a 4-way weight scale, was tested for accuracy, precision, sensitivity, linearity (or operating range), reproducibility, and system suitability (including ruggedness), using a combination of precalibrated free weights and human subjects. The human subject research required an IRB approval, which was obtained. The data were treated with appropriate statistical treatments.

## RESULTS

It was found in a small trial that with human subjects the optimal time to make a balance measurement using this

scale is around 20 seconds. The main error observed for each plate is an electronic rounding error of 1 pound per force plate, which could lead to a maximum error of 7% A/P and 10% L/R error. Standard deviations from repeated measurements set the actual standard deviation at <3%, well below the limits for subtle change that occur from artificially inducing small changes in the weight distribution of the subject. All total weight measurements were accurate to the nearest pound, irrespective of rounding errors from the electronics for individual pads. It was found that moving the equipment from one place in the lab to another may introduce additional error, but it was difficult to separate that from error generated by making a single measurement without subject equilibration time.

## DISCUSSION

The weight scale used in this study is very accurate for measuring total weight and weight distribution. The linearity of each pad is good at least up to 75 pounds. Rounding errors of 1 pound per plate, if they are additive, could cause relatively large (10–15%) error for 120 to 160-pound individuals, although this is not likely and the standard deviation is more likely the <3% measured in this study. Care should be taken in moving the machine from one place to another and then using it immediately.

## CONCLUSION

The weight scale tested in this experiment was shown to be highly accurate and reliable. The electronic averaging may create data scatter in lower weight individuals. However, this could probably be substantially eliminated by repeated measurements or waiting a slightly long time (>20 seconds) before making the measurement after the

subject steps on the scale. More detailed subject parameters to ensure that readings obtained are the most diagnostic will be the subject of future experiments on this weight scale.

## ACKNOWLEDGMENTS

The authors and Logan College would like to thank Foot Levelers, Inc. for their financial support of this project.



## The Bonus Point A Method of Increasing Student Attendance During a Lab Class

**Kevin W. Paustian**, D.C., Palmer College of Chiropractic

Student attendance and active participation during self-directed practice sessions or laboratory classes may waver as the class hour goes on. Research shows there is a positive relationship between class attendance and course grades or performance, yet many students do not make use of this important class time. The purpose of this study was to see if student attendance and participation in a lab class could be increased or influenced by offering a bonus point worth 0.5% of the course grade.

## METHODS

Two different courses from two different trimesters in a chiropractic college were evaluated for class attendance during practice lab sessions. Attendance was taken at the beginning of class where attendance is mandatory. Attendance was again taken toward the end of the hour on 3 different days. This group of days would be considered the control. On 3 other days in the same classes it was announced that participation in the practice session would result in a bonus point (0.5%) given at the end of the hour. These days were the experimental group. Comparison was done to see

if offering a bonus point was enough motivation to keep the student from leaving class prematurely.

## RESULTS

The study showed that on regular practice days (control) there was an average attrition between the two courses of 29% compared to the experimental group (bonus point) that had a 1.4% average attrition.

## DISCUSSION AND CONCLUSION

The offering of a bonus incentive appears to be an effective way to motivate students to stay in class. This may be especially useful as more and more curricula are designed to follow a problem-based learning format, where students spend more time in self-directed study. The author recognizes that the study was small and that further study on a larger scale may be warranted.



## Treatment of a Symptomatic Lumbar Disc Herniation Utilizing Sacro-occipital Chiropractic Technique

**Mark T. Pfefer**, M.S., D.C., Cleveland Chiropractic College, Kansas City, **Stephanie Rasmussen**, D.C., Private Practice, **Stephan R. Cooper**, and **Nathan L. Uhl**, Cleveland Chiropractic College, Kansas City

The purpose of the paper is to describe a case of a symptomatic lumbar disc herniation, successfully treated using sacro-occipital chiropractic technique procedures.

## CLINICAL FEATURES AND OUTCOME

A 53-year-old male with significant low back and radicular pain presented for chiropractic evaluation following

mild injury. MRI findings included large uncontained central disc herniation at the L4–L5 level. Chiropractic intervention consisted of sacro-occipital category 3 procedures. Patient responded well to a 6-week intervention. Follow-up MRI at 5 months demonstrated significant reduction in the size of the herniation.

## CONCLUSION

This report suggests that chiropractic treatment of symptomatic lumbar disc disorders may, in certain cases, be

effectively treated via use of sacro-occipital technique procedures. The procedures utilized in this technique are low force and do not involve placing torsional stress on the low back, and potentially may be well tolerated and safe for patients in high-level acute pain that is often associated with symptomatic lumbar disc herniations. Further study is needed to determine the most effective and best tolerated strategies to be used in the chiropractic setting for the treatment of symptomatic lumbar disc herniations.



## Chiropractic Treatment of Older People Protocol Development for the Upper Extremities

**Richard Printon**, D.C., Private Practice, **Paul Osterbauer**, D.C., M.P.H., **P. Thomas Davis**, M.U.P., D.C., and **James R. Hulbert**, Ph.D., Northwestern Health Sciences University

Carpal tunnel syndrome (CTS) and related conditions of the upper extremities often occur in older patients, but manual treatment protocols for this age group have not been developed or assessed. Further, the natural history of these conditions is poorly understood. This research initiates a program identifying the conditions of the upper extremities and concomitant comorbidities as well as promising accommodations and chiropractic treatments in this age group. While treatment and post-treatment follow-up data are still being collected from participants, sufficient experience with older patients permits some “first thoughts” about what appears to be beneficial management and treatment. Findings at this early point are clinical narratives, but are no less important in this “young” research program than quantitative information that will be developed from observational and self-report data in a few months.

## METHODS

The research design is a single-group cohort involving participants in a three-phase project: (1) a 5-week, three-interview natural history phase; (2) a 5-week chiropractic treatment phase; and (3) a 6-month post-treatment follow-up phase. Treatment involved one to three treatments per week for the 5-week treatment period. The basic treatment has involved manual manipulation of the joints and soft tissues of the area extending from the wrist to the spine, inclusive of both cervical and thoracic areas. These areas include the joints of the carpal bones, wrist, elbow, shoulder, and the articulations of the cervical and thoracic spine. Also included are the soft tissues of the musculature surrounding the joints,

consisting of areas of the forearm, upper arm, shoulder, the upper back, and neck.

## RESULTS

Two of 48 participants seen and qualified had evidence for risk of vertebral basilar incident, and were treated with modified protocols. Age range was 60 to 84 years old, averaging 67.7 years (SD: 6.7 years). There were 16 male and 32 female participants. Diagnoses of research participants include carpal tunnel syndrome (CTS); tendinitis; trigger points; degenerative and inflammatory osteoarthritis of the hands; and osteoarthritis of the wrist, elbow, shoulder, neck, and upper back. Poor postural syndrome, positional nerve compression, and referred pain from the cervical spine to the upper extremity have also been noted. Preliminary treatment outcomes have been favorable for mild to moderate CTS and degenerative osteoarthritis. Chiropractic treatments may also be favorable for tendinitis or joint restrictions and poor postural syndromes. Results have not been favorable for CTS or advanced osteoarthritis.

## DISCUSSION

The age distribution and the characteristics of the group of participants indicate they are the younger old, from 60 to 84. The participants did not appear to have significant

problems with transportation or with their general health statuses. Further data analyses will offer more information about the participants in this project. The two case studies are the first analyses made of the authors' experience in providing chiropractic care to older people presenting with conditions of the hand and wrist. The juxtaposition of good versus poor outcome, even with  $n = 2$ , appears informative, indicating that osteoarthritis is probably less amenable to chiropractic than tendinitis. This research sample contains several people with either diagnosis, so time and more

cases will allow the authors to make more definitive statements.

## CONCLUSION

It is highly likely that chiropractic manipulative therapy can offer meaningful benefit, through decreased pain and increased function, to older persons with several types of upper extremity pain.



## Eliciting Curricular Feedback from Students Focus Groups

**Jaan Reitav**, Ph.D., C.Psych., Canadian Memorial Chiropractic College

Curricular design and development is an ongoing process that requires active input from the students, who experience all aspects of the curriculum. What is the most effective way for faculty and clinical supervisors to learn of the needs and perspectives of the student? This presentation reports on focus groups as an effective way to elicit feedback from students regarding their courses. It has provided a unique perspective on student experiences and has enriched the process of evaluating and improving our curriculum.

### METHODS

Students from the 1st, 2nd, and 3rd years were asked to participate in providing input into the improvement of the curriculum. The focus group project involved four students, chosen by class representatives, who met with a faculty facilitator to provide feedback that could improve the program. Three meetings were held, and the facilitator made notes and provided transcripts for review of the students. When all individual points were agreed on, each student rated each individual concern as: (1) critical, (2) important, (3) optional, or (4) a frill.

### RESULTS

The focus groups project provided specific feedback on about 10 courses requiring improvements in each of 3 years of study. After completion of the academic year, the facilitator met individually with every division director and every instructor whose course was discussed, to allow each of the concerns to be known, understood, and to be considered for course planning in the next year. Each instructor was

asked to provide an action plan for addressing the identified concerns.

The action plans were compiled and students from the focus groups were debriefed about changes being implemented by instructors for the new year. A written summary of the original concerns, along with the instructor's proposed response, was detailed in the report. Students were urged to post these reports so that the broader student community would know what issues were raised, and what responses were made. The focus group project was continued into 2002.

### DISCUSSION

Overall, the focus groups initiative has served as an invaluable vehicle through which communication of outstanding concerns has been reviewed, and action taken wherever possible. It has contributed to student participation in the development of the curriculum in a very helpful way, and students have indicated their positive evaluation of the focus groups in a number of ways.

The focus group process has been very constructive, and ultimately provides a very useful way to collect and prioritize a range of inputs from the student body. All student members of the focus groups were diligent, and the feedback was both balanced and thoughtful. Faculty also rose to the occasion and were motivated to look freshly at course content.

However, focus groups cannot provide a systematic review of all courses in the curriculum. If no specific concern emerged about a course, the course instructor received no feedback. Focus groups are therefore ideal for providing a lightning rod for key concerns and fleshing out these issues, but cannot provide a systematic review of the strengths and weaknesses of a course.

## CONCLUSION

Administrators and faculty have a number of choices when it comes to eliciting feedback from students about their experiences with the curriculum. Focus groups provide

an in-depth review of key concerns, provide a mechanism for determining priorities among the individual issues, and develop a stronger sense of partnership among the stakeholders. Administrators are urged to consider it as an effective tool to obtain feedback and develop consensus between stakeholders.



## Eliciting Curricular Feedback from Students Survey Questionnaires

**Jaan Reitav**, Ph.D., C.Psych., and **Kurt Moeller**, B.Sc., Canadian Memorial Chiropractic College

Curricular design and development is an ongoing process that requires active input from the students, who experience all aspects of the curriculum. What is the most effective way for faculty and clinical supervisors to learn of the needs and perspectives of the student? This presentation reports on the authors' experiences with survey questionnaires as a way to elicit feedback from students regarding their courses.

analyze. A follow-up administration in the fall is planned to collect these data. If that works, we will also have data from the 1st and 2nd year to review.

The 3rd-year students completed the greatest number of questionnaires, with 45 surveys returned (33% return rate). The results are being analyzed, and the presentation will highlight the primary trends emerging from the data.

## METHODS

Students from the 1st, 2nd, and 3rd years were asked to complete a survey questionnaire that would provide student input into the improvement of the curriculum. The survey project involved two phases: (1) pilot interviews with 25 students which led to the development of a Survey Questionnaire, and (2) the distribution of the questionnaire to the classes. Each questionnaire consisted of 139 to 149 questions on the courses taken that year. All items were answered using a 5-point Likert scale. To allow better comparability between courses, eight items from the course evaluation questionnaire (CEQ) of Broomfield and Bligh were administered for all courses given in that year. The frequencies of responses provided by students were computed for each course individually.

## DISCUSSION

This presentation reviews the advantages and disadvantages of using a survey methodology to elicit feedback from students on curricular matters. Surveys require a great deal of advance work, in conducting pilot interviews to define content domains and in designing the questions themselves. They are also very labor intensive in their demand on the student completing the survey, which led to unanticipated delays in completion of the project. At the end of the process, surveys provide comparable data on different courses, which can help identify specific courses and areas of the curriculum that require attention.

## RESULTS

The pilot interviews allowed the possibility of customizing the survey with specific questions for individual courses. The use of standardized questions from the CEG also permitted each student the opportunity to provide their input on a standard set of questions on all courses in the curriculum. The questionnaires were distributed at the end of the school year. First- and 2nd-year classes completed less than 20 questionnaires, which did not permit an adequate sample to

## CONCLUSION

Our experiences with survey questionnaires suggest that this approach has a number of features that recommend it for consideration in curricular review. It provides a flexible format for either standardized comparison between courses, or customized enquiry into matters of importance to instructors and administrators. It also allows quantification of differences between courses, and therefore provides a mechanism for determining priorities among the individual issues queried in the questionnaires.

The Survey approach is weak in that it cannot provide an elaboration of these concerns, or any in-depth probing of the

importance of issues raised by data analysis. If there was no specific concern about a given course raised in the pilot interviews, it was not specifically addressed in the Survey. Hence it provides comparable profiles of ratings on a set

of predetermined concerns, more than it provides a unique description of the strengths and weaknesses of courses in the curriculum.



## A Survey of Chiropractic College Students' Sleep Habits and Grade Point Averages

**Rodger Tepe**, Ph.D., **John Zhang**, M.D., Ph.D., and **Ken Wolf**, D.C., Logan College of Chiropractic

The purpose of the study was to investigate the sleep habits of chiropractic college students and to determine if a relationship exists between quantity of sleep and grade point average. This study was intended as a pilot to provide a starting place for continued study. A convenience sample of students was surveyed utilizing two self-report questionnaires of sleep habits and sleep-related information.

### METHODS

A 25-item sleep habit questionnaire and the Epworth Sleepiness Scale were administered to 200 consecutively selected consenting volunteer participants from the student body at Logan College of Chiropractic. Approximately equal numbers were recruited from the 1st, 2nd, and 3rd years of the academic program. Summary statistics were generated for all collected data and quantity of sleep was compared to grade point average (GPA) using Pearson's correlation.

### RESULTS

Sleep habits were not significantly different between 1st-, 2nd-, and 3rd-year students. Survey results indicated that most students were not getting adequate sleep (mean hours sleep per night =  $6.3 \pm 1.4$ ; mean hours sleep per week =  $43.6 \pm 13.8$ ). Most students (68%) believed that lack of sleep negatively impacted their academic performance, and 56% reported difficulty staying awake during afternoon classes. Pearson's correlation between mean hours of sleep per night/per week and GPA was not significant.

### CONCLUSION

Most chiropractic students sampled do not get adequate sleep and most believe that lack of sleep negatively impacts their academic performance. Further study is needed to understand the relationship between sleep, academic performance, and other variables in chiropractic student populations.



## Correlation of Lateral Pelvic Sway to Variances of Pain Along the Inguinal Ligaments A Pilot Study

**Dale M. Thompson**, D.C., **Rudolf P. Vrugtman**, M.B.A., **Kent M. Johnson**, D.C., **Shannon K. Dicks**, D.C., and **Mary Unger-Boyd**, D.C., Logan College of Chiropractic

Sacro-occipital technique utilizes several clinical tests within its protocols to determine the physical status of a patient. Two of the indicators to identify a category II subject are increased lateral pelvic sway with eyes closed and held inspiration, and the arm fossa test, which challenges the

inguinal ligaments. As a result of issues relating to intra- and interexaminer reliability of the arm fossa test, this research project tested a modification of the arm fossa test. To provide specific measurement data, the authors chose to challenge the inguinal ligaments with a pressure algometer to the point of

pain. The purpose of the study was to determine if there is a correlation between increased lateral pelvic sway greater than 1.2 cm (0.5 inch) and the asymmetry of pressure needed to induce pain along areas of the paired inguinal ligaments.

## METHODS

Subjects consisted of a single cohort of male and female chiropractic students between the ages of 20 and 40. Observation for increased lateral pelvic sway greater than 1.2 cm with eyes open and then with eyes closed, both with held inspiration, was determined with a postural analyzer (Foot Levelers). The subjects were then tested, to a maximum of 40 psi with a pressure algometer, to the point of pain along the inguinal ligaments. The inguinal ligament was divided into upper and lower fossae.

## RESULTS

Forty-seven subjects were tested. Five subjects were excluded due to the inability to produce pain below 40 psi in at least one of the fossae areas. Group 1 ( $n = 23$ ) had increased lateral pelvic sway with eyes open and eyes closed.

Group 2 ( $n = 11$ ) had increased lateral pelvic sway with eyes closed but not with eyes open. Group 3 ( $n = 6$ ) did not have increased lateral pelvic sway with eyes open or with eyes closed. Group 4 ( $n = 2$ ) had increased lateral pelvic sway with eyes open but not with eyes closed. There were no significant differences of the pressure needed to induce pain within or between groups.

## CONCLUSION

We did not find significant and meaningful differentiation among the required pressure to produce pain in the inguinal ligaments. As a result, we could not establish a relationship between increased lateral pelvic sway and the asymmetry of pressure needed to produce pain along the inguinal ligaments. However, the authors believe that there are some important findings from this pilot study. For example, since the sample sizes within some of the sway groups were too small for proper analysis, these data provide a baseline group percentage to calculate sample size with the power needed for similar studies. Also, since there was not an inclusion criteria for back pain with our subjects, the findings of the inguinal ligament mean pressures can begin to provide a baseline comparison for any further testing with known symptomatic low back or pelvic pain subjects.



# A Computer-Mediated Interactive Distance Learning Model for a Chiropractic Continuing Education Course in Cultural Competency

**Noni Hove Threinen, D.C.**, Northwestern Health Sciences University

Chiropractors are required to invest in their professional development through continuing education re-licensure requirements on a regular basis. In many states, specific courses are required to ensure that doctors receive information that is considered to be essential for maintaining professional and ethical standards. One such area is professional boundaries related to cultural competency. Since these requirements do not include practical and hands-on skill development, it is possible to create a distance learning model for meeting these standards. As the chiropractic profession progresses to become an integral part of a modern healthcare system, the importance of becoming more accessible to a greater part of the community is more and more clear.

There are three types of interaction in distance education: (1) learner–content, (2) learner–instructor, and (3) learner–learner. Problems in incorporating two of the three are apparent in the computer-mediated distance learning course. There are virtually no opportunities for the instructor to moderate a group of students for learner–learner interaction without negating the benefits to doctors as outlined previously. Learner–instructor interaction is possible, though limited by time and availability in this format. The most applicable

choice for the online model presented is the learner–content interaction and in the variety of ways to use it.

## METHODS

Planning and teaching methods for adult learners include several other principles that were identified as important to the learning process. “Scaffolding” can be defined as the process in which the instructor gives the students a structure to follow to achieve a task (answer the first case study questions in these courses). The next task (the second set of questions) is given and the student begins to see the pattern of learning and is able to apply it to new situations (other patients and cases). Another educational method referenced is “praxis” or “action with reflection.” Another author proposes to “motivate students before instruction starts and “to overcome the impersonal nature of distance learning and lack of direct human support.” To “help students self-discipline themselves,” specific questions were asked and had to be answered before being able to proceed with the next section and to complete the assessment questions and

receive continuing education credits. The course includes videos to deliver information about doctor/patient interaction and communication that would be otherwise impossible to observe in a natural setting, which is especially important to portray culturally diverse presentations.

## RESULTS

Two distance learning courses using the computer-mediated distance learning model presented here have been offered since June 2002. Data are being collected and analyzed as doctors take the course and will be presented at the ACC/RAC Conference.

## DISCUSSION

Potential benefits of a computer-mediated distance learning model to the doctors are numerous. They include:

(1) availability and currency of information, (2) expanded accessibility to selected references through the Internet, (3) opportunity to observe clinical situations via video, (4) time for self-reflection on questions and examples derived from personal and professional experiences, and (5) savings in time and resources for travel and loss of practice time. Survey results will be able to determine whether these benefits are confirmed.

## CONCLUSION

These courses are designed to incorporate the computer-mediated technology to provide an efficient and valuable way to receive continuing education information. With more integration and collaboration with other medical approaches, chiropractic must meet the same high levels of responsibility and responsiveness to all members of a culturally diverse community.



# Inter- and Intraexaminer Reliability of Radiographic Computer-Aided Measurements

**Raymond A. Wiegand**, B.S., D.C., Logan College of Chiropractic, **Mark T. Pfefer**, M.S., D.C., and **Kim R. Hamilton**, D.C., Cleveland Chiropractic College, Kansas City

Linear and angular measurements of osseous structures obtained from radiographs have been an historic part of the chiropractic diagnosis in determining subluxation. Measurements were typically obtained by hand using a pencil, ruler, and protractor. Computer-aided methods have been reported for collecting kinematic and geometric data. This includes motion segment rotations, translations, centers of rotations, and patterns of curvature. The purpose of this study was to assess the measurement accuracy and reproducibility using an electromagnetic grid and then investigate the intra- and interexaminer reliability of computer-aided measurements obtained from a lateral cervical radiograph.

## METHODS

A ruler and protractor were obtained from an office product supplier as might be purchased by a chiropractor for making measurements on a radiograph. These instruments were used to draw a 100-mm line and 30°, 60°, and 90° angles. A Neumonics A43BL electromagnetic grid and Spinal Analysis System software were used to perform the measurements. A lateral cervical radiograph was digitized 10 times by two chiropractors, one with 18 years experience and one with no experience. Twenty-two linear, angular, and radial measurements were computed and compared.

## RESULTS

The grid measurement of the 100-mm line was 99.7 mm  $SD \pm 0.24$ . The grid measurements of the 30°, 60°, 90° angles were 29.95°  $SD \pm 0.24$ , 60.08°  $SD \pm 0.25$ , and 89.7°  $SD \pm 0.16$ , respectively. Of the 22 measurements obtained from the lateral cervical radiograph, 20 measurements demonstrated a standard deviation of less than 10% of the average measured value. The average standard deviation was 6% of the measured value for the experienced doctor and 10% for the novice. Interexaminer standard deviations were within 1° or 1 mm for 20 of the 22 measurements.

## DISCUSSION

These results demonstrated that computer-aided measuring procedures are accurate and reproducible. The use of such devices offers the advantage of time efficiency, and the ability to investigate multiple geometric variables and to perform comprehensive data analysis from radiographic images.

## CONCLUSION

Replacing radiographic measurements done by hand with those done by computer-aided methods demonstrated a high degree of accuracy, reproducibility, and time efficiency.



# A Computer-Aided Spinal Displacement Model of the Neutral Lateral Cervical Curve to Determine Average and Optimum Geometry

Raymond A. Wiegand, B.S., D.C., Logan College of Chiropractic

Injury to the cervical spine is many times unidentified by traditional radiographic review. The objective of this study was to describe a spinal displacement model of the neutral lateral cervical spine to quantify shape, position, geometry, and loading. The purpose was to determine a range of average to optimized values as extracted from a database of over 12,000 lateral cervical radiographs. The values were used to describe a severity scale of pathogeometry which may be used to identify discreet injury or injury patterns.

## METHODS

Twenty-five geometric measurements of the cervical motion segments were described in a computer program which obtained spatial coordinates from lateral radiographs using an electromagnetic grid. The geometry of 12,629 neutral lateral radiographs obtained from a private practice was analyzed to determine average and optimized values. Optimization was investigated by applying sequential sorts, which constrained head position and specific ranges of curvature. Seventeen of the 25 geometric variables were combined to describe a biomechanical severity scale to assess a patient's departure from the mean of the optimized findings.

## RESULTS

An unsorted analysis of the 12,629 lateral cervical radiographs revealed an average cervical lordosis of  $18.9 \text{ cm} \pm 84.9 \text{ cm}$ . The linear approximation of this radial measurement using the intersection angle of tangent lines drawn off the posterior body of C2 and C7 was  $22.9^\circ \pm 3.2^\circ$ . The average disc angles were: C2  $3.4^\circ \pm 4.9^\circ$ , C3  $4.0^\circ \pm 4.8^\circ$ , C4  $3.1^\circ \pm 4.9^\circ$ , C5  $3.0^\circ \pm 4.6^\circ$ , C6  $3.8^\circ \pm 4.4^\circ$ , C7  $3.1^\circ \pm 4.7^\circ$ . The lateral cervical curve was forward in a flexion angle of  $11.6^\circ \pm 6.4^\circ$ . A gravity line originating at the pedicle-body junction of C2 passed  $6 \text{ mm} \pm 7 \text{ mm}$  in front of the superior posterior body margin of C5. The average geometric and loading departure compared to a fully optimized model was  $141.5 \text{ units} \pm 41.3$ . Sequential optimization sorts of head

position and positive radius of curvature revealed the angle of C1 and C2 increased in extension while the gravity line moved posterior toward the C5 reference point to  $0.2 \text{ mm} \pm 6.4 \text{ mm}$ . The disc angles sequentially increased as much as 200% while maintaining their relative interlevel proportions. The forward flexion angle of the cervical curve increased slightly to  $12.8^\circ \pm 6.2^\circ$ . The average departure from the optimized model was  $108.3 \text{ units} \pm 36.1$ .

## DISCUSSION

Using a computer-assisted spinal displacement model demonstrated a reliable, reproducible, and efficient method to collect data on the shape, position, geometry, and loading characteristics of the lateral cervical spine from neutral radiographs. The sample was from a symptomatic population that presented to a chiropractic office. Therefore, systematic sorting and the imposing of optimizing constraints was artificial in nature. However, the imposing constraints were ranges of values that have been reported in the literature. Statistical analysis identified a range of average to optimum geometric values and their relational interaction as optimization proceeded. Comparing the organization of a patient's geometry to that of an optimized model can identify discreet relational differences, which may represent injury.

## CONCLUSION

This study characterized the sagittal plane geometry and shape of the average cervical curve as lordotic and quantified the intersegmental geometry of the motion segment. Applying specific optimization constraints of head position and ranges of curvature demonstrated increased disc angles, posterior movement of gravitational loading, increased extension angles of C1 and C2, and a relatively constant forward flexion angle. A biomechanical model and severity scale can be used to identify pathogeometry which may represent injury, pathology, or developmental abnormalities.



# Assessment of a Free Learning Environment

Dan Weinert, D.C., M.S., D.A.C.R.B., Palmer College of Chiropractic

This project focused on the classroom environment. Current college classrooms predominantly focus upon a punitive environment. Attendance is often mandated. Students are directed what to study and when to study. Tasks are assigned and, if not completed, punishment is the result. The punishment is often in the form of a lesser grade or failure to advance beyond the class. The attempt here was to create a free learning environment and assess students' attitudes and perceptions.

## METHODS

One out of five classes (Fridays) per week in a 2nd-trimester biochemistry course was designated as a "free day." The students were not responsible for the material presented on those days. No attendance was taken on those days. Assessment of this environment was conducted after a 1-year period. The total number of students surveyed was 227. Topics presented and discussed did pertain to the core course material. For each topic, a literature review was conducted and a PowerPoint presentation was created.

After completion of 3 trimesters (1 year) of biochemistry, each of the 3 classes was asked to complete a survey. The survey's purpose was to gauge attendance to and student attitude toward the "Free Friday" environment. The survey also posed questions ascertaining the students' feelings as to whether the environment affected their classroom performance and their exercise/dietary habits. The questionnaire utilized a Likert scale for analysis.

## RESULTS

The percentages listed are the percentages of those who actually responded to that individual statement. Anyone stating that they had never attended a Free Friday lecture was asked not to complete the rest of the questionnaire. About 64% (or 145) reported regular attendance to the

Free Friday lectures. Regardless of whether they attended or not, 96% (or 185) reported the lectures were worth attending. Eighty percent (or 155) reported that the lectures helped them to understand testable course material. Seventy-eight percent (or 147) reported that there was a greater amount of discussion on Free Friday lectures. Eighty-four percent (or 162) reported that the Free Friday lectures helped positively change their attitude toward biochemistry. Forty-six percent (or 88) reported that they performed further research on the Free Friday topics. Fifty-eight percent (or 112) reported changing their exercise habits, while 65% (or 126) reported changing dietary habits due to the Free Friday lectures. Only 15% (or 29) thought there should have been mandatory attendance. Consistent with that, only 16% (or 31) thought the material should have been on the examinations. Ninety-eight percent (or 188) of those surveyed wanted the Free Friday lectures to continue in the future.

Seventy-five percent (or 144) of those surveyed reported that utilizing Microsoft PowerPoint increased the quality of the presentations and 81% (or 155) reported that referencing evidence-based literature increased the quality of the presentations.

## DISCUSSION

Impacting the affective domain of learning is crucial. This students' perception of this environment was that it engaged more discussion, influenced habits outside of the class (diet, exercise, and research), and should definitely continue. Even though the majority valued the free days, they did not wish to see them become mandatory or testable. Creating courses or a curriculum to reflect a more stress-free environment may be advantageous to learning.

This study was limited to a simplistic questionnaire. Actual correlation to student grades was not assessed. Impact on future courses, national boards, or future careers was not assessed. The survey was limited to the students' perception of the environment.



# Experimental Study on the Adverse Effects of the Popular Nonsteroidal Anti-inflammatory Drug Diclofenac Sodium (Voltaren) Application in Chiropractic Education and Clinical Practice

Isis Zaki, M.D., M.S., Ph.D., and Thomas L. Carpenter, D.C., Cleveland Chiropractic College, Los Angeles

Osteoarthritis is the most common type of joint disease causing severe pain and disability. In most countries treatment of osteoarthritis consists of nonsteroidal anti-inflammatory drugs (NSAIDs). One such drug is diclofenac sodium (Voltaren, Ciba-Gigy), which prevents prostaglandin biosynthesis (an important mediator of acute inflammation). However, there is no justification for using these drugs since inflammation is minimal. Moreover, they inhibit proteoglycan synthesis in cartilage, thereby increasing the progression of the disease, and affect other vital organs as well. The present study was planned with the aim of investigating the histological and histochemical changes that might occur in the liver, kidney, and stomach of male albinorats following intramuscular injection of diclofenac.

Although this study would normally be considered only in the basic science field, it has clinical relevance to chiropractic practice. Chiropractors treat various types of neuromusculoskeletal pain syndromes. These patients commonly use either prescription or over-the-counter medications including NSAID. The information and data produced by this study provide valuable practical information to be used in the classroom by chiropractic students as well as for consideration by the informed practitioner.

## MATERIALS AND METHODS

Fifteen male albino rats were used. Ten animals received daily injections of diclofenac for 30 consecutive days. Five rats served as controls and were given identical doses of distilled water. Both groups were sacrificed at the end of treatment. Specimens from the liver, kidney, and stomach were processed and examined using histological and histochemical techniques.

## RESULTS

Liver, kidney, and stomach showed dilation and engorgement of blood vessels, cellular infiltration with mononuclear cells (lymphocytes and monocytes), eosinophils, and

proliferating fibroblasts. Vacuolation of the cytoplasm of liver cells, proximal convoluted tubules of the kidney, and oxyntic cells of the stomach was also observed. Histochemical stains revealed depletion of glycogen and RNA content of these cells.

## DISCUSSION

The vascular changes observed in the liver, kidney, and stomach of experimental rats could be due to the weak inhibitory effect of the drug on prostaglandin synthesis in normal tissues. Vacuolar degeneration of hepatic, renal, and oxyntic cells of the stomach could be due to hypersensitivity to the drug or direct effect of some drug metabolites. Glycogen and RNA depletion could be due to enzymatic changes or cell damage.

For the chiropractor, patients may present with pain syndromes caused by the above-described adverse effects. It is known that stimulus of visceral receptors can activate (as of yet) poorly understood reflex mechanisms resulting in altered pain patterns and depressed motor activity, ailments commonly observed in patients with chronic complaints.

## CONCLUSION

Marked structural and histochemical changes were detected in experimental animals. Thus short-term medical therapy with diclofenac is recommended when absolutely necessary for pain palliation. When given for longer periods, it should be accompanied with continuous monitoring of hepatic and renal functions.

Conservative, alternative lines of treatment are highly recommended. This approach could include chiropractic manipulation, exercise and rehabilitation programs, and specific nutritional supplementation, which can positively affect the pathophysiology of osteoarthritis and maintain joint function. Patient response to treatment should be monitored by appropriate objective measures. These effective and safe alternatives are particularly indicated for patients suffering from hepatic, renal, or gastric disturbances.



# Time and Frequency Domain Analysis of Surface Electromyography of Doctor- and Subject-Initiated Muscle Strength Assessment

**John Zhang**, M.D., Ph.D., Logan College of Chiropractic, and **Nelson Marquina**, D.C., Ph.D., Clinical Technologies Research

Muscle strength testing is widely used by medical practitioners, physical therapists, and doctors of chiropractic. However, the subjective and descriptive nature of the muscle strength test has led some to question it.

## MATERIALS AND METHODS

Twenty-one volunteer chiropractors attending a chiropractic conference participated in the study. An additional 22 chiropractors and students served as subjects. Both the doctor-initiated and the subject-initiated muscle strength tests were performed three times for each doctor/subject pair. Each doctor was asked to perform the muscle strength testing on three subjects. All surface electromyography (sEMG) recordings were conducted in a quiet hotel conference room. A 5-minute rest was given before each sEMG data collection. Disposable electrodes (silver/silver chloride) were used for all bipolar EMG measurements. All tests consisted of 3- to 5-minute data recording of sEMG. MP 100 amplifiers were used for EMG amplification. The spectral analysis of sEMG signal was obtained from a successive discrete series of waveform values taken from the EMG signal sampled at 256 Hz and transformed by the Fast Fourier technique. Hoggan Health Industries, Inc. produced the force evaluation and testing system. The force evaluation system in the study measured the peak force output of the muscle strength. The placement of the force evaluation device was in the midsection of the subject's forearm.

## RESULTS

The study showed that the muscle contraction of the doctor and the patient starts and ends at the same time during doctor-initiated muscle strength testing. The duration

of muscle contraction for the doctor and the subject was about 2 seconds. In the subject-initiated testing, the subject started muscle contraction earlier than the doctor. The duration of the subject's muscle contraction was longer than 2 seconds, whereas the doctor's muscle contraction lasted less than 1 second. The results of mean frequency analysis and the power spectrum analysis of the sEMG show that the doctors had significant lower mean frequencies compared to the subjects during all four conditions, namely, the resting state, doctor-initiated testing, subject-initiated testing, and the pressure transducer testing. The power spectrum analysis found that the highest frequencies were higher in subjects than in the doctors in both the doctor- and the subject-initiated testing. The intensity of the sEMG was significantly higher in the subject's readings than in the doctor's.

## DISCUSSION

This study demonstrated that the doctors and subjects are very different in their sEMG responses in timing and frequency responses under the study muscle strength testing conditions. The reasons for the differences may stem from three possible courses: (1) the doctor's EMG signal was generated by the deltoid muscles and the subject's EMG was generated by the brachioradialis muscles; (2) facilitation of the doctor's muscles for muscle strength testing; and (3) the greater effort exerted by the subject to resist the gravity by holding his or her arm horizontally, whereas the doctor was pushing the subject's arm down using less effort.

This study also showed clear differences of sEMG responses in the doctor-initiated and subject-initiated muscle strength testing. The major difference is the time of muscle contraction. In the doctor-initiated testing, the doctor has longer muscle contraction. This is reversed, a shorter contraction, during the subject-initiated muscle strength testing. Both results have been consistent throughout the study.



# Scientific Testing of the Electromagnetic Field Triaxial Magnetometer and Sensometer for Body Surface Electromagnetic Field Measurement

**John Zhang**, M.D., Ph.D., **Dennis Nosco**, Ph.D., **Lori Vernor**, Logan College of Chiropractic, **Walter Balcavage**, Ph.D., and **Gabi Nindl**, Ph.D., Indiana University School of Medicine

It has been reported that electromagnetic field (EMF) treatment is beneficial for bone healing and inflammation. Some recent attempts to measure body surface EMF have been made but the diagnostic predictability of changes in the body's internal EMF have not been investigated. If a chiropractic assessment tool is to be successfully developed from EMF devices, it is important to determine the adequacy of the equipment used for the EMF measurement to capture the desired frequency and strength of body surface EMF. This study attempted to determine the frequency response of a triaxial magnetometer used in such a study. At the same time, it also compared Toftness Sensometer readings between Toftness practitioners and, most importantly, between Toftness practitioners and EMF devices used to measure body surface EMF.

## METHODS

A Telulex signal generator with variable power output was coupled to a Peavy audio amplifier that was operated at a constant volume setting. The output of the Peavy was fed to a 3-coil Merritt coil system. A 10-turn detector coil located in the Merritt coil was fed to a sensitive oscilloscope. The detector coil and oscilloscope were used to monitor the field generated in the Merritt coil. The triaxial magnetometer and the sensometer were tested under the lab testing conditions. The interexaminer reliability was evaluated by comparing four experienced Toftness practitioners. A technician with a hand-held EMF magnetometer evaluated body EMF. Subjects were five patients in separate, quiet, closed rooms. Each doctor was asked to rate all patients' body surface sensometer readings as low/medium/high. The EMF technician just recorded EMF readings. The first patient was re-evaluated by the first doctor at the end of the experiment to ensure that patient "drift" had not occurred by patients remaining in the prone position for the entire time (12:55).

## RESULTS

The triaxial magnetometer was determined to be moderately responsive to changes in magnetic field frequency

below 10 Hz but not above 10 Hz. The practitioners operating the Toftness sensometer were unable to detect magnetic fields at high frequencies (>10 Hz) even at very high Telulex power. The EMF detector was basically a DC/static magnetic field detector and like all such devices it has a limited frequency range and some low level of sensitivity at very low field frequencies. Moderate interexaminer reliability was observed between the four Toftness practitioners. The comparison of EMF to Toftness showed poorer reliability.

## DISCUSSION

The triaxial magnetometer currently used in the lab for body surface EMF study is best suited for static EMF or alternative EMF with a frequency below 10 Hz. This limits the magnetometer to determine specific ranges of body surface EMF. The real range of body surface EMF is unknown but it appears that it could be in the 0–70 Hz range.

The interexaminer reliability of the sensometer to detect body surface EMF changes showed mixed results. The most important finding, that EMF and sensometer were not highly correlated, was in line with the Telulex lab results. Within Toftness practitioners, doctors 2 and 3 had perfect correlation on the lumbar and sacral regions, while doctors 1 and 2 showed no correlation.

## CONCLUSION

If there are situations in which the sensometer and the magnetometer agree in detecting human spinal abnormalities, then it is very likely that the detected signal is in the 0–10 Hz range. The sensometer could not detect EMF reliably under lab testing conditions nor were EMF devices well correlated with sensometers.



# The Effect of Low-Force Chiropractic Adjustments for 4 Weeks on Body Surface Electromagnetic Field

John Zhang, M.D., Ph.D., and Brian J. Snyder, D.C., Logan College of Chiropractic

Extensive studies on the biological effect of electromagnetic field (EMF) on animals and humans have been reported in recent years but little was known about chiropractic adjustment over a 4-week period on body surface EMF. The current study extended the adjustment period to 4 weeks to determine the body surface EMF changes using a sensitive magnetometer after low-force chiropractic adjustments.

## METHODS

Thirty-five chiropractic students were recruited and randomly assigned into control (17 subjects) and experimental groups (28 subjects). The treatment period was 4 weeks. The triaxial fluxgate magnetometer FGM-5DTAA (Walker Scientific, Worcester, MA) with five-digit display and resolution of 1 nanotesla (nT) was used for EMF detection. The subjects' body surface (cervical, thoracic, lumbar, and sacral areas) EMF was determined in the prone position before and after chiropractic adjustments. A low-force chiropractic adjustment was applied to the cervical, thoracic, lumbar, and sacral areas as determined by the practitioner. HRV analysis was recorded once a week to determine autonomic nervous system activity in both the control and experimental groups. HRV for each subject was taken between 11:00 a.m. and 12:00 noon on each Monday or Wednesday.

## RESULTS

The EMF on the subjects' body surface decreased after chiropractic adjustment at the cervical, thoracic, lumbar, and sacral regions the 4-week treatment period. The EMF showed

a clear downtrend over the 4-week period after the low-force adjustments. The body surface EMF did not show any downtrend in the control group without chiropractic adjustments. The heart rate in the chiropractic adjustment group had a slight decrease over the 4-week treatment period but did not reach a statistically significant level. Heart rate variability (HRV) analysis did not find any consistent trend changes before and after the low-force adjustments during the treatment period.

## DISCUSSION

Body surface electromagnetic field was reduced at the cervical, thoracic, lumbar, and sacral regions after the low-force chiropractic adjustment over a 4-week period. No consistent changes were found in the control group. Given the trend in the results, it is possible that an increase in the number of subjects may produce more statistically significant long-term changes. The cause of the body surface EMF reduction after chiropractic adjustment was not well understood. It has been postulated that the reduction of body surface EMF may be related to muscle and nerve electrical activity before and after chiropractic adjustments.

## CONCLUSION

A low-force chiropractic adjustment in the cervical and thoracic areas resulted in a consistent reduction of the body surface EMF during 4 weeks of active treatment. No statistically significant differences were found in the heart rate and HRV in the 4-week study.

