
ABSTRACTS OF ACC CONFERENCE PROCEEDINGS

Platform Presentations

Intractable Migraine Headaches During Pregnancy Under Chiropractic Care

Joel Alcantara, BSc, DC, International Chiropractic Pediatric Association and Private Practice, and **Martine Cossette**, DC, Private Practice

Background: Lifetime prevalence of migraine headaches in women vary from 11% to 32% while 1-year prevalence varies from 9% to 22%. Women are three times more likely to suffer from migraine headaches compared with men and peak during the reproductive years. Studies indicate an improvement in headache symptoms during pregnancy due to the absence of hormone fluctuations and/or the analgesic effects of increasing β -endorphins. Some, however, report worsening of symptoms regardless of nonpharmacological or pharmacological approaches. Risks of adverse events associated with medical care are of concern and are warranted. This report presents the successful care of a patient with intractable migraine headaches during pregnancy.

Clinical Features: A 24-year-old gravid female with chronic migraine headaches since age 12 years presented for chiropractic care. Previous care included osteopathy, physical therapy, medications, and massage with unsuccessful outcome. Medical care consisted of nonsteroidal anti-inflammatory medication with codeine at the maximum amount permitted during a pregnancy (ie, 1000 mg per day) as well

as caffeine intake through coffee to potentiate the medication. This resulted in only minor and temporary relief.

Intervention and Outcome: Chiropractic adjustments characterized as high-velocity, low-amplitude thrusts and the Activator instrument were applied to sites of vertebral subluxations. No reported adverse events were associated with this type of care. Massage, trigger point therapy, increased water intake, and change in sleeping posture were adjunctive care. The intensity of her migraine headaches had significantly reduced following the first three visits from a pain rating of 8–9/10 to 2/10 on the verbal pain scale and attack frequency improvement from once daily to once every 3 days. This resulted in self-withdrawal and decreased dependence on medication.

Conclusion: This case study provides supporting evidence on the safety and effectiveness of chiropractic care during pregnancy with a chief complaint of migraine headaches. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

A Survey Into Student's Health Behaviors and Health Awareness

Elizabeth Bezance and **Christina Cunliffe**, McTimoney College of Chiropractic

Objective: Previous studies have focused on the health status of students from the health professions, but there has been no research comparing health habits and health awareness of chiropractic students as they progress through their training. The purpose of this study was to ascertain whether students modify their health behaviors as they progress through a chiropractic program.

Methods: A precoded self-completed anonymous questionnaire was designed, piloted, amended, and distributed to 157

students in years 2 to 5 of a chiropractic program. Overall response rate was 53%.

Results: A total of 71.1% of students claimed to exercise three or more times a week; 19.8% claimed to do more exercise now than before starting the course, though there was no increasing trend across the years. Forty-two percent said the course had influenced their awareness of a healthy diet, and there was an increasing trend from year 2 (38.4%) to year 5 (63.3%). The percentage of students who frequently

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ate organic food was 52.9%, and this rose from 38.4% in year 2 to 70% in year 5. In addition, 31.4% ate more organic food, and this also increased across the years to 40% in year 5. "Learning about the human body and how it functions in health and disease" (30.3%), "understanding about chiropractic philosophy" (21.5%), and "influence from peers" (18.3%) were the main contributing factors leading a healthier lifestyle since starting the course. Those who felt it was very important that chiropractors pursue a

healthy lifestyle rose from 30.7% in year 2 to 60% in year 5.

Conclusion: As students progress through their training, they develop an increased awareness of a healthy lifestyle but do not necessarily adopt healthier habits. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Self-Perceived Skills Confidence: An Investigative Study of Students Entering a Chiropractic College's Clinic Program

Debra W. Bisiacchi, MS, DC, Life University, College of Chiropractic

Objective: In health care, good clinical skills are necessary for practice success. Throughout the educational process, students are subject to continuous assessment, and their own perception of their skills can be as significant as actual instructor evaluation. This study's purpose was to survey students entering the clinical area of a chiropractic curriculum to assess their perceived confidence in their spinal analysis and adjusting skills.

Methods: A Likert scale, web-based questionnaire was developed, with data collected from three consecutive 10-week terms. Respondents were identified only by term registered, though gender, transfer status, and attendance statistics were obtained for future study.

Results: Of the students registered, almost half participated in the study. The majority were in first-term student clinic. The others were in second-term student clinic or second-term outpatient clinic, or not participating in clinic. More students felt confident with analysis and adjusting than those who did not. Analysis categories included full spine (Gonstead type), descriptive listings, and motion palpation. Adjusting

categories included lumbar and pelvic side posture and prone moves, prone thoracic moves, and prone and supine cervical moves. Seated cervical and prone lumbar and pelvic adjusting moves were areas in which more students felt either less confident or unsure of their skills.

Discussion: Literature review identified numerous studies of student skills evaluation, and many of students' perceptions of their skills. This study illustrated the students' perspectives of their own readiness to enter clinic. Limitations were that the questionnaire did not distinguish students involved with technique/analysis clubs, students repeating the course or prerequisites, and the fact that not all registered students participated in the study.

Conclusion: This study identified that, in most categories, more than half of the students felt confident with spinal analysis and adjusting, a factor that could directly influence managing patients in clinic and in eventual practice. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Use of Student-Generated Test Questions as a Classroom Assessment Technique Within the Chiropractic Technique Classroom

Karen A. Bobak, DC, New York Chiropractic College

Objective: As an attempt to improve student understanding of basic chiropractic adjustive and analytical principles, the model of student-generated test questions was introduced. The goal of this application was to amend the traditional lecture format beyond the didactic confines so as to reach students with different learning preferences in a chiropractic technique course.

Methods: After a series of four to five traditional lectures were presented, students were asked to work in groups comprised of approximately four of their peers. Each group was required to write three to four multiple-choice test questions on the material that had been reviewed. After completing the task, the students presented their questions to the class and the questions were collected. As an incentive, students were assured that at least five of the questions that

they had written would appear on the upcoming exam. The students were encouraged to copy all of the questions into a single document and distribute it as a study guide.

Results: The majority of respondents, 88%, reported that small group work was helpful. Eighty-four percent of respondents perceived themselves as better prepared for the lecture exam when utilizing the study guide.

Discussion: The goal in utilizing the student-generated question method was to increase the development of both understanding and value of concepts by as many students as possible. While review of the survey data was important to determine the overall usefulness and functionality of the classroom assessment technique, written comments were helpful to assess this process relative to student mastery of

the subject matter. These comments were also valuable to guide the redevelopment of this process.

Conclusion: The survey data indicate that the utilization of this process may be an effective classroom assessment technique for the chiropractic technique classroom. Additional

follow-up studies within subsequent courses should be done to determine the long-term effectiveness. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Survey of Geriatric Courses in Chiropractic Programs

Cara L. Borggren, DC, Michael R. Wiles, MEd, DC, and Paul J. Osterbauer, DC, MPH, Northwestern Health Sciences University

Objective: As far back as the mid-1970s, a call was made to train doctors of chiropractic to care for the special needs of the aging population. Building on prior work, and in order to anticipate and prepare for the current demographic trends, we sought to describe the status of geriatric curricula in the 18 North American English-speaking chiropractic colleges by reviewing geriatric course syllabi.

Methods: A cross-sectional survey was conducted using syllabi and catalog information solicited from each English-speaking chiropractic college in North America, collected from January 1, 2007 through June 30, 2007.

Results: As of June 30, 2007, roughly 78% of colleges submitted their current geriatric course syllabus. Sixty-one percent of colleges offered a course that was solely dedicated to the topic of geriatrics. Thirty-eight percent of syllabi indicating credit load offer 4 or more credits to the course. Thirty-one percent of courses include nonclassroom clinical experience, while 50% require an independent study project. Forty-one percent of reported courses classify the teaching strategies as "lecture only."

Discussion: The response rate of 78% provides an accurate representation of current trends in chiropractic geriatric courses of the English-speaking North American chiropractic colleges. Although the Council on Chiropractic Education offers no specific directives, we believe that courses should be solely dedicated to the topic of geriatrics, and should offer 4 or more credit hours. Notably, it is appalling that the clinical experience component is extremely deficient in chiropractic geriatric curricula overall. Clinical experience is vital to chiropractic students, whether through the presence of discussion of interdisciplinary activities or actual participation of students in such activities.

Conclusion: These results warrant a proposal for improved curricula in this specialty population. It is proposed that more time be dedicated for this topic, more experiential learning be required, and more clinical focus be given on the needs of this population. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Diversified Chiropractic Adjusting in the Treatment of MRI-Confirmed Meniscus Injury

James W. Brantingham, DC, PhD, Glen Jukes, BS, Victor Tong, DC, Charles C. Bates, DC, and Gary Globe, DC, MBA, PhD, Cleveland Chiropractic College, Los Angeles

Introduction: Meniscus injuries produce pain, dysfunction, and disability for athletes and the others involved in exercise, sports, and work. Usually caused by trauma, but sometimes characterized by gradual onset, knee injuries make up 39.8% of sports injuries; 10.8% of these injuries involve medial meniscus lesions and 3.7% involve lateral lesions. Menisci function as shock absorbers, stabilizers, and proprioceptors and aid in lubrication and nutrition of cartilage. Thus even partial loss carries significant risk. Natural history remains unknown, but even routine surgical meniscectomy may cause serious degenerative joint disease and disability. Typically, meniscectomy is followed by significant rehabilitation, yet there is no consensus on appropriate rehabilitation. Therefore, it is proper to study conservative manipulative techniques for meniscal injury that might prevent the need for surgical intervention.

Case Report: Two patients presented with knee pain and stiffness to Cleveland Chiropractic College Los Angeles

Health Clinic (CCCHC). Based on history, physical, and regional examinations, diagnoses of meniscal injuries were made and confirmed by MRI. Each patient was treated specifically with two knee adjustments: genu-circumduction extension mobilization (for meniscus injury) and axial elongation. At the third visit, exercises were prescribed. Each patient was treated up to six times and asked to return for a 1-month follow-up. Prior to treatment, and at the 1-month follow-up, measurements were obtained for pain using the visual analogue scale (VAS), range of motion using digital inclinometry (DI), and dysfunction using the lower extremity function scale (LEFS).

Outcome: In both cases, the patients reported positive outcomes relative to treatment.

Conclusion: These outcomes suggest the possibility of benefit. Nevertheless, additional studies are needed with careful monitoring of risks and benefits before the true

efficacy, safety, and effectiveness of this approach can be determined. *(This is an abstract from a conference*

presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Effects of an Orthotics Intervention on Running Economy

Jeanmarie R. Burke and Owen Papuga, New York Chiropractic College

Objective: The objective of this research was to determine the effects of an orthotics intervention on running economy.

Methods: Three endurance-trained males and three endurance-trained females, who have worn the Foot Leveler's Spinal Pelvic Stabilizer for at least a period of 1 month and who perceived the orthotics intervention as comfortable, participated ($n = 6$). In two test sessions, running economy and lower extremity muscle activity during human gait were measured as a function of footwear conditions (orthotics intervention vs normal shoe condition). Subjects performed a sustained submaximal run at five different treadmill speeds in 5-minute stages. After a 15-minute rest period, the subjects performed a maximal treadmill run to volitional exhaustion. The main outcome variables were $\dot{V}O_2$ during each treadmill stage of the submaximal run, $\dot{V}O_{2\max}$, and predicted velocity at $\dot{V}O_{2\max}$ ($v\dot{V}O_{2\max}$). $v\dot{V}O_{2\max}$ is an estimate of endurance performance.

Results: The testing order of the footwear conditions did not influence the measurements of the main outcome variables.

The orthotics intervention improved running economy as indicated by a significant main effect of footwear condition across the five treadmill stages [$F(1, 5)_{\text{Footwear Condition}} = 10.37$; $p < .05$]. The orthotics intervention improved endurance performance as indicated by a significantly greater $v\dot{V}O_{2\max}$ for the orthotics intervention (10.94 ± 0.636 mph) as compared to normal shoe condition (9.81 ± 0.977 mph) ($t_5 = 4.20$; $p < .05$). $\dot{V}O_{2\max}$ values were similar for both footwear conditions ($t_5 = 0.05$; $p < .05$), which indicated that maximum performance, volitional effort, and physiological steady state were similar during each test of the footwear conditions. The $\dot{V}O_{2\max}$ values were 53.3 ± 6.57 mL/kg-min and 53.3 ± 6.14 mL/kg-min for the orthotics intervention and normal shoe condition, respectively.

Conclusion: The orthotics intervention improved movement economy and endurance performance during treadmill running. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Impact of Microbial Surveys on Disinfection Protocols in the Chiropractic College Environment

Kara Burnham, PhD, and David Peterson, DC, Western States Chiropractic College

Background: A microbial survey was conducted to identify the microbes present on the headpieces of chiropractic adjusting tables from across the Western States Chiropractic College facilities. This includes the instructional adjustive technique laboratories, the student health center, the campus outpatient clinic, and an off-site clinic.

Methods: A defined portion of each headpiece was sampled from chiropractic adjusting tables across the campus. The first sampling was done on 72 tables. Sampling was done directly to blood agar (5% sheep blood) plates. A second sampling of tables was conducted 2 months following the release of the results from the first sampling to the campus community. This was done to evaluate whether better compliance with existing policy or implementation of a new disinfection policy resulted in any changes in microbial populations.

Results: Identification of microbes by differential staining and biochemical analysis yielded a variety of Gram-positive bacteria. Methicillin-resistant *Staphylococcus aureus* (MRSA) was found on four separate adjusting tables. The

second sampling revealed lower colony counts in all areas sampled. MRSA was again identified in the clinics. MRSA was isolated from one table in the campus outpatient clinic and from one table in the student health center.

Conclusion: Various microbes were identified on the headpieces of adjusting tables in the college instructional technique laboratories and college clinics. The potential pathogen MRSA was found in the college clinics, but not in the laboratories. The clinic staff decided that the existing policy for clinics was sufficient but not properly applied and enforced. The chiropractic science faculty decided that a new and more comprehensive disinfection policy for the technique laboratories was needed. The results of the second sampling indicate that compliance with existing policy and the implementation of new policy have decreased microbial contamination of adjusting tables across campus. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Colorado Workers' Compensation: Medical Versus Chiropractic Costs for the Treatment of Low Back Pain

Laine Caddy, BS, Parker Chiropractic College, **David Gilkey**, DC, PhD, Colorado State University, **Thomas Keefe**, PhD, Colorado State University, **George Wahl**, MS, Pinnacle Assurance, **Kimberly Griffiths**, MHSM, Pinnacle Assurance, **Richard Mobus**, DC, Concentra Health, **Brian Enebo**, DC, PhD, University of Colorado, and **Kirby Duvall**, MD, MSHP, Woodward Governor Company

Objective: This investigation evaluated the differences in cost-related factors among a population of patients selecting chiropractic versus allopathic care for the treatment of nonspecific low back disorders (LBDs).

Methods: Over 10,000 cases of LBDs were extracted from an insurance company database of patients reporting work-related low back injuries who were treated with either chiropractic or allopathic approaches. Cases ($n = 2456$) were matched using ICD9 codes 722, 724, and 847. The data set included 76 chiropractic cases and 2380 medical cases. Variables of interest included: (1) amount of medical treatment benefits paid by the insurance company, (2) amount of indemnity benefits paid, (3) gross amount paid, (4) days between first service date and last service date, (5) days from injury to treatment, (6) number of services, and (7) days to claim closure. Comparisons were made between cases managed by DCs versus MDs.

Results: The amount paid for treatment was greater for DCs than for MDs ($p < .001$). The number of services and days

from first service to last service were significantly greater for DCs than for MDs ($p < .001$). The total amount paid by the insurance company was 1.7 times higher for patients treated by DCs compared with those treated by MDs, and the cost of clinical treatment was 3.3 times higher for the DCs than for the MDs.

Conclusion: The cost for treatment by doctors of chiropractic was greater than that of medical doctors for similar conditions affecting the low back. The amount paid by the insurance company was related to the number of services given by each provider. Because costs can greatly increase due to repeated treatments, the difference in expenses is mainly due to more services and longer treatment periods. Further research is needed to evaluate quality of life and patient satisfaction related to different treatment approaches, as well as follow-up of patients' functional status and stability upon return to work and impacts of relapses. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Factors Influencing a Parent's Decision to Choose Chiropractic Care for Their Child in the United Kingdom

Patricia Carlton, **Ian Johnson**, and **Christina Cunliffe**, McTimoney College of Chiropractic

Rationale: The decision to seek chiropractic care for children is usually made by the parent or guardian; however, little is known about the factors influencing this decision-making process.

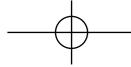
Objective: The purpose of this study was to identify those factors likely to encourage or discourage parents or guardian adults when seeking chiropractic care for their children.

Design: An anonymous questionnaire sent to parent/guardians with at least one primary aged child attending schools within a typical UK county. Of 987 questionnaires distributed, 259 were returned with 175 eligible for inclusion within the study (26% response rate).

Methods: After obtaining the permission of the head teacher, questionnaires were distributed in the schools with a covering letter explaining the purpose of the survey. Questionnaires were returned in sealed envelopes to the school.

Results: Ninety-six percent of respondents were mothers. Those who exerted most influence on the mothers' decision to use chiropractic for their children were the general practitioner (20%), friend or relative (16%), and the chiropractor (11%). These results were similar for those not choosing chiropractic care. Fourteen percent cited cost as a deciding factor for those not seeking chiropractic care for children. Journal articles or other media made little difference to mothers' decisions to use chiropractic for their children. Talks given by chiropractors positively influenced 10% of mothers seeking chiropractic care for their children but had no influence on those who did not choose chiropractic care.

Conclusion: When chiropractic care is chosen for a child, mothers are the main decision makers, influenced heavily by opinions of the family general practitioner and friends. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)



Back and Hip Extensor Muscle Fatigue in Healthy Subjects: Comparison of Two Sorensen Test Variants

Annick Champagne, MSc, **Martin Descarreaux**, DC, PhD, and **Danik Lafond**, PhD, Université du Québec à Trois-Rivières

Introduction: Sorensen's test has been extensively used to study back muscle endurance. The aim of the study was to evaluate the rate of back and hip extensor muscles fatigue using two Sorensen test variants and to verify the hypothesis of a task dependency effect on lumbo-pelvic muscle fatigue.

Methods: In this cross-sectional study, 10 healthy subjects performed a body weight-dependent isometric back extension (Sorensen test) according to two positions: on a horizontal table (S1) and on a 45° roman chair (S2). Surface electromyography (EMG) of lumbar muscles at T10 and L5 levels (gluteus maximus and biceps femoris) was recorded. Muscle fatigue was assessed by calculating the median power frequency (MPF) and other spectral variables of the recorded EMG signals.

Results: Significant differences between S1 and S2 variants were found for all EMG fatigue indices. For the MPF/time

slope, only the longissimus thoracis lumbarum (T10) does not seem to be affected by the test variants.

Discussion: The most important finding in this study was that EMG fatigue indices differed in the S1 compared with S2 variant, supporting the hypothesis of task-dependent effects on lumbo-pelvic muscle fatigue. The results of the present study showed that the S1 variant induced a greater fatiguing effect than the S2 variant.

Conclusion: The present study found that task dependency factor has to be considered when EMG variables are compared between two types of lumbo-pelvic muscle fatiguing tasks. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Relationship of Pelvic Torsion and Anatomical Leg Length Inequality: A Review of the Literature

Robert Cooperstein, MA, DC, Palmer College of Chiropractic West

Background: Chiropractic leg checking involves determining the relative "length" of the legs—more precisely, determining the relative position of the distal legs—in either a supine or prone patient, by careful observation of the location of the feet. It is commonly stated, by many of the mainstream chiropractic technique systems, that there is a posterior-inferior ilium subluxation on the side of the short leg, although it is not always clear whether this is contingent on anatomic or functional leg length inequality (LLI) or both. On the other hand, several studies have shown that this association must be called into question.

Methods: This review of the literature gathers nine primary studies that investigate the relation of pelvic torsion to anatomical LLI.

Results: Eight of these studies created artificial and transient LLI, while the ninth looked at naturally occurring LLI.

A variety of methods were used to measure pelvic torsion and leg length. In all cases, posterior innominate rotation occurred on the side of an anatomic long leg and/or anterior rotation on the side of an anatomic short leg.

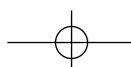
Discussion and Conclusion: Chiropractic techniques and clinicians who adjust patients in accordance with the hypothesis that posterior innominate rotation covaries with a short leg may be using inappropriate vectors. Although the traditional thinking may be accurate for functional short leg, the literature says it is not true for anatomic short leg, which is associated with relative anterior innominate rotation. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Interexaminer Reliability of Prone End-Feel Motion Assessment Using Continuous Data

Robert Cooperstein, MA, DC, **Michael T. Haneline**, DC, MPH, and **Nika Bodner**, Palmer College of Chiropractic West

Background: There have been many studies aimed at determining the reproducibility and clinical utility of motion palpation of the spine and sacroiliac joints, and also a

number of review articles assessing the quality and findings of the primary studies. Some studies show acceptable levels of intraexaminer reliability, but very few show



acceptable interexaminer reliability. The kappa statistic used in the great majority of these studies, which determines segmental reliability in a discrete manner, may not be the best method of detecting reliability, given accumulating information that both diagnostic and adjustive specificity remain difficult to achieve. A rationale exists for attempting to use the intraclass correlation coefficient (ICC) to assess concordance.

Methods: Twenty-nine minimally symptomatic or asymptomatic students volunteered to be examined by two motion palpators, blinded as to each other's results, who had spent many years performing the same method of prone palpation. For each subject, the distance between the spot found most fixated by each examiner and a mark at S1 was measured in centimeters. In addition, the location of the most tender

spot, as established by an investigator after the palpators were done, was also measured.

Results: The ICC (3,1) value was 0.201 ($p = .143$) and judged to be unacceptable. Neither examiner's findings correlated with the most tender segment. The second examiner had a noticeably smaller range for his fixation findings than the other examiner.

Discussion and Conclusion: The interexaminer agreement, although poor in this study, exceeded what has been obtained in many other studies, suggesting either a trend for these examiners to agree above chance levels, or that continuous measures and computation of ICC may be more sensitive to detecting concordance. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Assessing Cavitation and Z Joint Gapping Following Side-Posture Spinal Adjusting: A Feasibility Case Series

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Introduction: This Institutional Review Board-approved project was completed to determine the feasibility of conducting larger studies assessing the relationship between cavitation and Z joint gapping following spinal adjusting using the same methods.

Methods: Five healthy volunteer subjects (ages 25–27 years; average 25.4) were screened and examined against inclusion and exclusion criteria. A high-signal magnetic resonance imaging (MRI) marker was fixed to T12, L3, and S1 spinous processes. Scout images were taken to verify the location of the markers. Axial images of the L4/L5 and L5/S1 levels were obtained in the neutral supine position. Each subject was then positioned on the side, and accelerometers were placed over the T12, L3, and S1 spinous processes. Recording from the accelerometers was done during spinal adjusting. The accelerometers were removed and the subject was immediately scanned in the side-posture position. The greatest anteroposterior distance between the articular processes at the center of the Z joints were measured (using a digitizer) from the first and second MRI scans. Values obtained from the first scan (to 0.1 mm) were subtracted from those

of the second, a positive result indicating an increase in gapping following the spinal adjustment. Gapping difference was compared between the upside (adjusted) joints versus the downside (nonadjusted) joints and between upside cavitation versus noncavitation joints.

Results: The methods were successfully implemented. Cavitations were recorded in four Z joints during spinal adjusting or during positioning. No cavitation was recorded from the other six segmental levels. Greater gapping was found in Z joints that were adjusted (0.5 ± 0.6 mm) versus nonadjusted (0.0 ± 0.99 mm), and vertebral segments with cavitation gapped more than no cavitation (0.8 ± 0.6 mm vs 0.4 ± 0.5 mm).

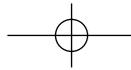
Conclusion: A future clinical study is quite feasible. Sixty subjects would be needed for appropriate power (0.80). This study was partially funded by NIH/NCCAM (#2R01AT000123). *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Levels of Awareness and Attitudes to Chiropractic Care in Pregnancy and Infancy That Exist Among Midwives (in Herefordshire, UK)

Veronica Dance, **Christina Cunliffe**, and **Ian Johnson**, McTimoney College of Chiropractic

Rationale: There is an increasingly high use of complementary and alternative medicines/therapies (CAM/T) during pregnancy and childbirth. Midwives are able to refer or

recommend, and so need adequate, accurate information with regard to CAM/T, in this case chiropractic.



Objective: The purpose of this study was to survey the midwives of Herefordshire (United Kingdom) to determine their awareness and attitudes toward chiropractic in respect to the care of pregnant and infant patients. The study aimed to identify positive and negative attitudes, in order to target outreach opportunities for the chiropractic profession to further the availability of chiropractic as a treatment option for pregnant women and their infants.

Method: After a small-scale pilot study to test the survey, a 20-question anonymous survey including open and closed questions under themed headings was sent out to all midwives (69) registered with Hereford County Hospital. Questionnaires were returned by post and analyzed.

Results: A response rate of 44% was obtained. Ninety percent of midwives had received no education regarding

chiropractic during their training, 60% had limited knowledge of chiropractic, and 30% had only heard of chiropractic. Seventy-three percent had never referred pregnant patients for chiropractic and 63% had never referred infants. Some awareness of the conditions commonly treated by chiropractors in pregnancy and infants/children was found. Eighty percent of midwives would like to know more about chiropractic, especially the research base/evidence for the effectiveness of commonly treated conditions.

Conclusion: Midwives in Herefordshire had some awareness, limited knowledge, and mostly nonexistent education about chiropractic. Referral was minimal. A generally positive attitude was found, with a predominant desire (80%) for further knowledge. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Characterization of Force/Time Profiles of Toggle Recoil Practice Thrusts on a Speeder Board

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Background: Toggle recoil students practice thrusting on a speeder board to develop motor control. We are exploring the feasibility of evaluating student thrusts in comparison to their instructors. We first attempted to compare the peak force and thrust duration measured from recorded force/time profiles. However, we did not anticipate some of the variables in the observed force/time profiles.

Methods: The speeder board has a padded, hinged top portion supported by a “drop” mechanism that releases under pressure. We instrumented a speeder board with a load cell interfaced to a laptop computer. Students in a toggle recoil class were invited to participate and signed an Institutional Review Board-approved consent form. Thrusts were recorded at three time points during a term.

Results: The force/time profiles we recorded were not found to resemble previous reports. Instead of a smooth rise and fall from a single peak, the plot had two peaks of varying relative magnitudes. The first peak was relatively constant and

corresponded to the force required to trigger the speeder board drop mechanism. The second peak varied from being smaller than the first peak to being much larger. It corresponded to the maximum force applied after the drop. There was considerable variation among the profiles of the instructors as well as among the profiles of the students.

Conclusion: The force/time profile generated by thrusting on a speeder board is complex and variable. The triggering of the drop mechanism can be seen in plots and its position and amplitude relative to the doctor’s thrust are new variables that must be considered in comparisons of students’ and teachers’ thrusts. Before profiles can be used as an effective teaching tool, decisions will have to be made about what constitutes an optimal profile. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Chiropractic Management of a Patient With Systemic Lupus Erythematosus

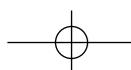
Karol A. Donaubauer, DC, Palmer College of Chiropractic

Objectives: The purpose of this paper is twofold. First, it reviews current literature on systemic lupus erythematosus (SLE) that relates to this specific case, and second, it presents a case study of SLE.

Methods: We reviewed MEDLINE databases using PubMed search engines and the terms “systemic lupus erythematosus,” “lupus,” and “SLE.” Literature was found, reviewed, and summarized. For the case study, we reviewed

an SLE patient’s file and extrapolated information regarding the patient and her disease. Bibliographies from several articles were used to identify additional literature that was pertinent to the subject.

Results: SLE is a chronic, inflammatory autoimmune disorder with no specific known cause. It affects 1 in 4000 people in the United States, with 9 times more women than men. It is more prevalent in Africans, Asians, Hispanics, and



Native Americans; and it affects skin, joints, blood vessels, and vital organs. Symptoms vary from person to person and may go through cycles of exacerbations and remissions. Diagnosis of SLE may take months or years to determine. The medical goal for SLE patients is to relieve symptoms and prevent involvement of the vital organs by decreasing inflammation. Chiropractic adjustments help keep joints moving properly as well as stimulate the immune system.

Conclusion: A cooperative, multidisciplinary approach and a flexible care plan should meet the needs of patients with

SLE. The best way to treat lupus is to listen to the patient. Patients also need to be educated in what it means to have SLE. They need to be reminded of consequences (exacerbations) if they do not follow the recommended regimen by their primary and secondary health care providers. People with SLE can maintain a high quality of life overall. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Patient Characteristics, Consultation Request Patterns, and Utilization of Services Within a VA Medical Center Chiropractic Clinic

Andrew S. Dunn, DC, MEd, MS, and **Steven R. Passmore**, DC, MS, New York Chiropractic College, VA of Western New York

Objectives: Chiropractic services initially became available at the VA of Western New York (VAWNYHS) in September 2004. Chiropractic clinics are currently established at 32 VA medical facilities nationally. The purpose of this study was to investigate the 354 completed chiropractic consultations at the VAWNYHS in 2006 with respect to patient characteristics, consultation request patterns, and utilization of clinical services.

Methods: This study involved a retrospective chart review of 354 chiropractic consultation requests completed in 2006. Descriptive statistics were utilized along with chi-squared and *t*-tests for comparing frequencies and means as appropriate.

Results: The average chiropractic patient within this study was a 55-year-old, overweight or obese male with low back pain. There was a mean percentage of service-connected disability of 29.76% and a diagnosis of posttraumatic stress disorder (PTSD) in 16.95% of veteran patients. Primary care providers were the main source of consultation requests with variation in the volume of requests among the panel of providers. Management consisted mainly of spinal manipulation coupled with either flexion-distraction or

mobilization directed at the region of chief complaint. The utilization of chiropractic services within this VA medical facility was less than that reported in the general public.

Discussion: Veteran chiropractic patients differ from those seen in the general public in terms of age and gender. The influence of obesity, service-connected disability, and PTSD on clinical outcomes with veteran chiropractic patients is unknown. With variations in consultation patterns identified and access to chiropractic services dependent upon consultations, further investigation is warranted. Re-evaluations and analysis of outcome measures after every fourth visit helped to identify clinical end points early on within courses of care and to regulate patient visit average.

Conclusion: Additional health systems and clinical research are needed with a focus on access to chiropractic services and the influence of veteran patient characteristics on clinical outcomes with chiropractic management. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Effects of Chronic Ankle Instability on Cervical Spine Proprioception

Dennis Enix, DC, MBA, **David Lenihan**, DC, PhD, and **Rodger Tepe**, PhD, Logan College of Chiropractic

Introduction: Proprioception is influenced by an array of peripheral sensory receptors in muscle, tendon, and joint afferents; the spinal dorsal columns; and the cerebellum. Although damage to any of these systems can result in a decrease in kinesthetic awareness, little research has been done investigating the effects of these changes on cervical proprioception.

The objective was to evaluate whether chronic ankle sprain/strains result in proprioceptive deficits in the cervical spine as determined by joint position sense testing (JPS).

Method: Cervical spine proprioception was evaluated with JPS testing using the BTE Technologies Multicervical Unit.

The ability of a subject to reproduce specific joint angles during cervical flexion established the absolute joint angle error.

Subjects: Forty-eight consenting participants (26 men and 22 women) between 22 and 48 years of age (28.1 ± 6.42) participated in this study. Inclusion criteria included multiple grade II or III ankle sprain/strains as defined by the Functional Ankle Instability Index.

Results: Statistically significant differences between the normal group and ankle injury group were seen at 15° ($t = 2.324$, $p = .024$) and 30° ($t = 3.438$, $p = .001$). No

significant difference was seen at 45° ($t = 1.564$, $p = .124$). JPS error slightly decreased as the joint angles increased from 15° to 45°.

Conclusion: When a condition of dysafferentation exists such as is commonly seen with ankle sprains, changes in proprioception are not limited to the affected joint but can

have systemic effects. Current theories involving neuroplastic remodeling could account for the decreases seen in cervical spine proprioception. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Cloth-Covered Chiropractic Treatment Tables as a Source of Allergens and Pathogenic Microbes

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Introduction: Vinyl chiropractic tables have been found to harbor pathogenic bacteria. An assessment of cloth chiropractic tables does not appear anywhere in the peer-reviewed literature. The aim of this study was to assess the presence of microbes and other allergens or pathogens on these apparatuses and to point out needed infection control measures based on the results.

Methods: Tables were identified that were cloth covered and samples were taken from the facial piece and hand rests with RODAC plates containing nutrient agar followed by confirmatory testing when indicated.

Results: Numerous microbacteria strains were found, including *Staphylococcus aureus* and acne-causing bacteria *Propionibacterium*. Allergen-producing molds, including *Candida*, were found as well.

Discussion: It is difficult to ascertain how cloth surfaces may be effectively cleaned in a health care environment. Our study indicates a problem. The flora we found may be the transient flora of the day. Other more harmful pathogenic organisms

may be present seasonally, such as influenza or drug-resistant strains of other microbes. Patients probably do not suspect that they are being exposed to such pathogens in a health care environment such as this, and they should expect that a certain level of disinfection is being performed. Cloth tables may not offer this level of disinfection by the nature of their porous surface. Hospital surfaces such as chairs and couches made from cloth have been deemed hazardous and their use is discouraged.

Conclusion: Cloth tables contain pathogenic microbacteria and allergens and represent a difficult surface to disinfect. The chiropractic profession needs to establish an infection control protocol in the United States and discard the use of cloth-covered treatment tables as part of this process. Other routine infection control measures need to be taught to students, interns, and field practitioners. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

B Vitamins Reduce Inflammation and Thermal Hyperalgesia in Rats With Achilles Tendonitis

Jeffrey C. Fiero, **Scott A. Folsom**, **Brian P. Milligan**, **Zhi-Jiang Huang**, **Ronald L. Rupert**, and **Xue-Jun Song**, Parker College Research Institute

Objective: Tendonitis can be defined as inflammation, or a response of body tissues to injury or irritation, of a tendon and characterized by swelling, pain, redness, and heat. Inflammation is also seen as a tightly regulated multistep process that is crucial for the prevention of infection, removal of debris, and initiation of the healing response. In the present study, we examined the inflammation and hyperalgesia and the treatment effects of vitamin B₁, B₆, B₁₂, and vitamin B complex in rats with Achilles tendonitis (AT).

Methods: We used the AT model produced by percutaneous injection of collagenase in rats. Thermal hyperalgesia was determined by a shortened latency of foot withdrawal to radiant heat.

Results: Our results showed that subcutaneous injection of collagenase produced significant pain and thermal hyper-

algesia and inflammation evidenced by the local swell. Intraperitoneal injection of B₁ (100 mg/kg), B₆ (100 mg/kg), B₁₂ (2 mg/kg), and VBC (B vitamin combination including B₁ [33 mg/kg], B₆ [33 mg/kg], and B₁₂ [0.5 mg/kg]) significantly reduced thermal hyperalgesia in both severity and duration and the swelling. B₆ seemed to display the most effective results followed by B₁₂, VBC, and B₁, respectively.

Conclusion: The present study demonstrates the effects of B vitamins in the treatment of Achilles tendonitis and suggests the possibility of clinical usage of the B vitamin treatment of Achilles tendonitis accompanied by injury or inflammation in human beings. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Conflict of Interest Policies Among Institutions and Organizations Offering Chiropractic Continuing Education

Matthew F. Funk, DC, and **Anthony J. Lisi**, DC, University of Bridgeport College of Chiropractic

Objective: It would be useful for chiropractic continuing education (CE) presenters, sponsoring institutions, and attendees to know the details of institutional policies concerning what must be disclosed and how potential conflicts are communicated to participants in their educational activities. The purpose of this study is to document and describe the policies governing conflict of interest (COI) among select organizations and institutions offering chiropractic CE.

Methods: Surveys were sent to the following: all North American chiropractic colleges, major national chiropractic organizations, and state chiropractic organizations in states with more than 3500 licensed doctors of chiropractic. Each organization or institution was mailed a survey to determine if it has in place a written COI policy. If a written policy existed, it was requested that a copy be returned with the survey. These documents were reviewed to extract data. If a written policy did not exist or could not be obtained, the organization or institution was asked by the survey to provide details of any verbal policies.

Results: Fourteen replies were obtained out of 38 possible. Half of the respondents in this survey indicated that they had written policies for management of COI, whereas half did not. Content varied among the policies available for review. Relevant financial interest is the issue most often defined and respondents generally prohibit presenters from selling products or services directly during presentations.

Discussion and Conclusion: Overall, these results suggest that processes for managing COI in chiropractic CE are substantially lacking when compared with those previously described for continuing medical education (CME). Only half of respondents had policies in place and none included most of the common elements typically outlined in CME COI policies. This study provides preliminary insight into the status of COI management in chiropractic CE. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Upper Gastrointestinal Hemorrhage Following Nonresponsive Thoracic Spine Pain

James W. George, DC, and **Clayton D. Skaggs**, DC, Logan College of Chiropractic

Objective: The purpose of this study was to discuss an upper gastrointestinal hemorrhage in a patient with nonresponsive thoracic spine pain.

Clinical Features: A 61-year-old female presented with worsening middle thoracic spine pain of 3 months' duration along with recent abdominal pain. Medications, physical therapy, and spinal manipulation had not provided significant improvement. The patient was taking between 10 and 12 Advil per day to cope with the spinal pain.

Intervention and Outcome: The initial physical exam demonstrated mild increased tissue tension in the thoracic paraspinal muscles left greater than right along with mild restriction of thoracic spine range of motion secondary to the patient's pain. There was pain on palpation of the T4–5 and T7–8 spinal segments. The physical exam

findings did not correlate to the patient's pain presentation and she was referred back to her primary care physician. Two days following the initial exam, the patient suffered an upper gastrointestinal hemorrhage and underwent emergency surgery. It was determined postoperatively that she had a medication-induced duodenal ulcer that subsequently ruptured.

Conclusion: An upper gastrointestinal bleed should be considered in the differential diagnosis of a patient with a history of prolonged aspirin or nonsteroidal anti-inflammatory drug use with nonspecific abdominal symptoms. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

A Rare Cause of Posterior Element Osteolysis in the Lumbar Spine: A Case Report of Gorham-Stout Disease

Michael Gilbert, DC, **Jean-Nicolas Poirier**, DC, and **Celia Plattner Maguire**, DC, Parker College of Chiropractic

Introduction: Gorham-Stout disease represents an extremely rare, idiopathic pathology of the musculoskeletal system,

characterized by angiomatous invasion of bone, resulting in osteolysis with subsequent replacement by vascular

fibrous tissue. It commonly affects the pelvic and shoulder girdles of young adults, but may be seen at any age. There is no gender preference. Prognostically, the disease is unpredictable. An effective treatment is not known; however, surgery and radiation have become most widely used. The natural history of the disease is one of relentless progression. Involvement of visceral and spinal structures may occur, resulting in an increased morbidity and mortality. Early, accurate diagnosis can be made with a high index of suspicion clinically combined with characteristic radiographic and histopathological findings.

Clinical Features and Outcome: A 38-year-old male powerlifter with a history of trauma to his low back about 20 years prior presented to a chiropractor complaining of bilateral sacroiliac pain. Physical examination revealed absence of the normal palpable bony prominence of the spinous processes of the third and fourth lumbar segments. Findings consistent with osteolysis characterized by dissolution of the neural arch components of L3 and L4 were seen on

conventional radiography and computerized tomography. Magnetic resonance imaging demonstrated low and high signal intensity on T1- and T2-weighted images, respectively. Bone scan revealed focal photopenia. Laboratory studies were normal. Biopsy showed exuberant vessel proliferation with endothelial hyperplasia and minimal residual trabecular bone. No cellular atypia or mitotic figures were noted. A watchful waiting protocol was advocated by the oncologist with periodic re-examination, and, at last report, the patient remains asymptomatic.

Conclusion: The diagnosis of Gorham-Stout disease is supported by associated imaging findings and biopsy results. The disease is potentially life-threatening, complicated by neural and visceral involvement. Imaging findings consistent with osteolysis are common. Practitioners should be cognizant of this potential differential diagnosis. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Radiographic Evidence of Vertebral Artery Calcification in a 71-Year-Old Female

Joseph Guagliardo, DC, and Kathleen Linaker, DC, Life University

Objective: Although there is much information in the literature regarding the calcification of the carotid, basilar, or intercranial arteries, little information is found about the calcification of the vertebral artery as seen on plain film. This paper presents a case of calcification of the vertebral artery visible on plain-film radiography.

Case Report: A 71-year-old white female had complaints of hip and leg pain of approximately 1-year duration. She had a past history of neck pain and headaches that were intermittent in nature. However, she had not experienced neck pain or headache for approximately 1 year. She had normal vital signs. She had mild postural abnormalities as well as limited left lateral flexion in the cervical spine with muscular tension noted in the upper trapezius musculature on the left side. Vertebral artery screening utilizing Maigne's and George's tests and cervical orthopedic evaluation were negative. There was no evidence of upper or lower motor neuron disease. Cardiovascular, respiratory, and abdominal physical examinations were within normal limits. Plain-film radiography of the cervical spine was ordered to

rule out any underlying osteoarthritic conditions and revealed extensive conduit wall calcification bilaterally at the level of the carotid bulbs. Conduit wall calcification was also noted on the APOM projection just lateral to the C2 vertebral body in the expected location of the vertebral arteries.

Intervention and Outcome: These findings resulted in a diagnosis of extensive atherosclerosis of both the carotid and vertebral arteries along with osteopenia and degenerative facet, uncinata, and disc disease. MR angiography was strongly recommended; however, the patient refused further evaluation.

Conclusion: We believe that this case of vertebral artery calcification seen on plain film, while rare, is important to demonstrate to the chiropractor so that when it does appear he or she will be less likely to miss this important finding. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Spinal Motion Palpation: A Comparison of Studies That Assessed Intersegmental End-Feel Versus Excursion

Michael T. Haneline, DC, MPH, Robert Cooperstein, MA, DC, and Kristopher Birkeland, BA, Palmer College of Chiropractic West

Background: Spinal motion palpation (MP) is a procedure used by chiropractors and manual therapists to detect intersegmental hypomobility/hypermobility. However, its validity has not been established and reliability studies have reported low indices of agreement. Different means of

assessing intersegmental motion have been described, assessing either excursion of the segments (quantity of movement within the normal range of motion) or end-feel (quality of motion when stressed into the parapsychological space).

Objectives: To our knowledge, no reviews have assessed whether the findings of reliability of studies that used dissimilar methods of MP (ie, excursion vs end-feel) were different. The objective of this literature review was to classify the studies as to which method was used, allowing for the possibility that a study may have used both methods at the same or at different segments.

Methods: A search of four databases was conducted for “motion palpation,” “spine,” and “sacroiliac.” The retrieved citations were independently screened for inclusion by two of the authors consistent with the inclusion and exclusion criteria. Included studies were appraised for quality, and data were extracted and recorded in tables.

Results: The search strategy generated 436 citations and 28 were harvested from reference lists. After removing

duplicates and articles that did not meet the inclusion criteria, 44 were found to be relevant, which were appraised for quality. Sixteen studies strictly focused on MP excursion, 22 focused on end-feel, and six used both. There was an apparent difference in the reported reliability when the method of MP varied, favoring the end-feel method.

Discussion: Nine of the studies reported high levels of reproducibility, although four were not of acceptable quality, four were only marginally acceptable, and one only reported percentage of agreement. Seven out of 29 end-feel studies reported good reliability as compared with 2 out of 21 excursion studies. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

A Feasibility Study of Acute Neck Pain in a Practice-Based Research Setting

Michael T. Haneline, DC, MPH, Robert Cooperstein, MA, DC, and Shaner Bongalon, BS, Palmer College of Chiropractic West

Background: Neck pain is a very common neuromusculoskeletal system disorder, with reported prevalence rates ranging from 13% to 16% in the United States. A report from the United Kingdom indicated that 44% of respondents had at least 1 day of neck or upper limb pain in the previous week, and 43% of a Swedish sample had neck pain. Very little information is available on cervical spine manipulation (CSM) for acute neck pain (ANP) because it has been difficult to investigate. This is because recruitment and preliminary evaluations in randomized controlled trials often encompass weeks, after which, the patient’s condition may no longer be acute. We therefore employed a practice-based research (PBR) methodology wherein participating chiropractors recruited subjects very early in the evolution of the disorder.

Objectives: The purpose of the study was to determine the feasibility of a chiropractic PBR network to investigate the treatment of ANP in preparation for a larger study and to examine the resulting data and perform preliminary statistical analyses.

Methods: Sequentially presenting ANP patients were recruited on their initial visit to the chiropractor’s office. Data were prospectively collected by having patients complete the Neck Disability Index, Characteristic Pain Intensity score, and a patient satisfaction questionnaire. Questionnaires were completed during routine office visits at baseline and then at weeks 1, 2, 4, 8, and 26, or by mail.

Results: Twenty-eight chiropractors agreed to participate and 12 of them supplied data. The mean number of cases contributed was 6.75, ranging from 1 to 24. Our goal was to include 100 patients; 80 were actually obtained. Follow-through is presented, represented by the number of questionnaires that were completed at the various points of care.

Discussion: The PBR methodology utilized in this study was considered to be a feasible way to investigate CSM for ANP and much of its methodologies could be used to plan future research. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

The Utility of Diagnostic Musculoskeletal Ultrasound in a Chiropractic Teaching Clinic: A Retrospective Case Series

Daniel W. Haun, DC, Thomas Clark, DC, RVT, and Norman W. Kettner, DC, Logan College of Chiropractic

Objective: Diagnostic musculoskeletal ultrasound (MSKUS) has been reported to be a valid technique for imaging many types of pathology of the neuromusculoskeletal (NMS) system. The specific utility of MSKUS in a chiropractic setting has yet to be described. The purpose of this case series is to illustrate the potential utility of MSKUS in the diagnostic assessment of patients presenting to a chiropractic teaching clinic.

Methods: Logan Health Center cases with MSKUS images were reviewed from the period April 9, 2007-August 15, 2007, totaling 105. Three cases were selected based on clinical and imaging impact. Case 1 presented with chronic shoulder pain that was not responding to treatment. Case 2 presented with numbness and tingling in the hand of 1-month duration. Case 3 presented with thigh pain after a track meet.

Intervention and Outcomes: MSKUS was able to accurately demonstrate a full-thickness tear of the rotator cuff, median neuritis, and a tear of the rectus femoris muscle. These findings enabled prompt and accurate diagnosis.

Discussion: MSKUS may be beneficial in the chiropractic clinic setting due to the high percentage of patients with NMS complaints undergoing diagnosis and treatment. Imaging of the rotator cuff is one of the principal uses of MSKUS and has been described as the imaging gold standard.

Imaging of abnormal nerves, in particular, median neuritis, is easily performed and is a predictor of clinical carpal tunnel syndrome. Muscle injury is also readily imaged by MSKUS. Pathologies of joints, as seen in rheumatologic diseases, can be optimally imaged with MSKUS. MSKUS is an accurate, relatively inexpensive, fast, and readily available means to image the NMS system. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Neuroscience: A Bridge Between Chiropractic Education and Chiropractic Practice

Xiaohua He, MD, MS, James La Rose, MD, and Niu Zhang, MD, MS, Palmer College of Chiropractic Florida

Introduction: Chiropractic is a profession with the emphasis on prevention and restoration of health. The efforts were achieved through special attention on the subluxation. The close relationship between subluxation and nervous system makes neuroscience a particularly important course in chiropractic schools. The Palmer College of Chiropractic Florida (PCCF) has developed and implemented a neuroscience teaching program. The overall goals of the program have been to bring neuroscience to students, excite students about interrelationship of neuroscience and chiropractic, improve students' understanding of neuroscience, and help to interpret the mechanism underneath the subluxation. This study is to evaluate the effectiveness of neuroscience teaching program in PCCF.

Methods: A formal multiple-choice survey questionnaire was conducted among 339 students. The survey questionnaire was made by the faculty members who were involved in neuroscience teaching and administrated at the classroom by the faculty members who were not involved in the study.

Results: The results indicated that student perception of their neuroscience knowledge, self-confidence, learning strategies, and knowledge application increased impressively through quarters, especially the 2nd-year students.

Discussion: Increase in neuroscience knowledge can enhance students' performance on national boards, expand students' ability to interpret clinical cases, and inspire students to become excited about chiropractic research. The survey provided valuable information for teaching faculty to make the course content more relevant to chiropractic students who had different college majors. It is important that the teaching faculty with different educational backgrounds at PCCF be prepared to deal with searching questions by students.

Conclusion: Although this survey was designed for teachers at PCCF, it may also aid teaching faculty at other institutes who may benefit from an awareness of this framework. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Innervation of the Knee Joint of the Guinea Pig

Xiaohua He, MD, MS, James La Rose, MD, Niu Zhang, MD, MS, Palmer College of Chiropractic Florida, and Se-pyo Hong, Ph.D., Palmer College of Chiropractic Davenport

Introduction: Besides spinal conditions, knee joint problems are one of the most common ailments of the musculoskeletal system. Problems with the knee can be classified into (1) poor mechanics, (2) traumatic injury, and (3) arthritic changes. All these problems can produce pain. Conservative treatment such as chiropractic can be helpful in alleviating some of the pain. The present study was carried out to investigate the extrinsic and intrinsic innervation of the knee joint of the guinea pig.

Methods: A total of 16 guinea pigs were used in the present study. Microdissection was performed to reveal gross anatomy of nerve innervation. Histology was also performed to identify nerve endings in different articular tissues, namely joint capsule, ligaments, synovium, and soft pad.

Results: Gross dissection showed that the guinea pig knee joint was innervated by two groups of articular nerves: the

primary and the accessory articular nerve groups. By using AChE whole mount and gold chloride preparations, various kinds of nerves and terminals or endings were identified in these tissues. These nerve endings in the articular tissues were classified into four types (I-IV).

Discussion: The distribution of the different nerve endings showed a characteristic pattern in different articular tissues. They were considered to be mechanoreceptors and pain receptors. The type I (Pacinian) and II endings resembled Ruffini corpuscles and were located mainly in the joint capsule. The type III or so-called Golgi corpuscle was confined to the ligaments of the knee joint. The type IV or free nerve endings composed of fine unmyelinated fibers were located mainly in the synovium of the joint capsule, ligaments, and fat pad.

Conclusion: The structural characteristics and distribution patterns of the different types of nerve endings suggest that the roles of the different nerve endings vary in different parts

of the articular tissues. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Reliability of Rehabilitative Ultrasound Imaging of the Transverse Abdominis and Lumbar Multifidus Musculature

Jeffrey J. Hebert, DC, University of Utah, **MJR Shane Koppenhaver**, MPT, University of Utah, United States Army, **Julie M. Fritz**, PT, PhD, ATC, University of Utah, Intermountain Health Care, and **Eric Parent**, PT, MSc, PhD, University of Utah

Objective: The purpose of the study was to determine the intrarater, interrater, and interday reliability of rehabilitative ultrasound imaging (RUSI) measurements of the transverse abdominis (TrA) and lumbar multifidus (LM) muscles at rest and during submaximal contractions, in persons with low back pain (LBP).

Methods: Following Institutional Review Board approval, 20 participants with LBP (11 male, 40.1 ± 11.0 years, 173.2 ± 8.6 cm, 80.8 ± 20.9 kg) underwent two measurement sessions, 1 to 3 days apart. RUSI was used to quantify the thickness of the TrA and LM muscles during conditions of rest and submaximal contraction. For the LM, the contraction was elicited by using a contralateral arm lift (CAL) with a small hand weight. The abdominal drawing-in maneuver (ADIM) and the active straight leg raise (ASLR) were used to elicit a contraction of the TrA. Intraclass correlation coefficients [ICC (2,1)] with 95% confidence intervals and standard errors of measurement were calculated as measures of reliability.

Results: Intrarater ICC (2,1) values ranged from 0.91 to 0.99 (within days) and from 0.80 to 0.97 (between days). The range of interrater ICC (2,1) values was 0.78–0.90 for the within-day comparison and 0.82–0.89 for the between-day comparison, except for the ASLR whose between day ICC (2,1) value was 0.56.

Conclusion: These data demonstrate good intrarater reliability, both within and between days for the TrA and LM at rest and during contraction. Within-and between-day interrater reliability was good for the LM at rest and during the CAL as well as for the TrA at rest and when performing the ADIM. Interrater reliability for the TrA during the ASLR was only moderate. Moreover, it appears that the ADIM leads to more reliable measurements of TrA thickness during submaximal contraction than the ASLR. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Patterns of Depression and At-Risk Alcohol Use in Chiropractic Students

Sean Herrin, DC, Western States Chiropractic College, **Adele Mattinet Spelman**, PhD, Geisinger Center for Health Research, **Kenneth Hoekstra**, PhD, and **Shireesh Bhalerao**, DC, Western States Chiropractic College

Purpose: This study continues the examination of stress throughout chiropractic student education. The purpose of this study is to describe the presence and prevalence of depression and alcohol use among chiropractic students. The findings were examined in relation to academic performance, educational debt, major life events, and demographic information.

Methods: The study was approved by the Institutional Review Board of Western States Chiropractic College. Questionnaires were distributed to 362 chiropractic students; all matriculated students were invited to participate. Validated instruments were used to examine the prevalence of depression and alcohol use, along with academic and demographic information. The primary analysis involved descriptive summary statistics and correlation and logistic regression to identify predictors of high alcohol use and a positive depression score, controlling for gender.

Results: A total of 189 (52.2%) students responded to the survey. At-risk alcohol use was present in 82 (43%) individuals surveyed and 110 (58%) chiropractic students who

participated had a positive screen for depression. While at-risk alcohol use and depression tended to decrease ($p < .06$) among more senior-year students, at-risk alcohol users had significantly positive ($p < .04$) screens for depression compared with no-risk alcohol users.

Conclusion: Depression and at-risk alcohol use is a serious issue in this population of chiropractic students. The significant correlation between depression and at-risk alcohol consumption shows the negative effects of a high-stress environment. Academic performance, educational debt, and personal life events also demonstrated a strong relationship to these behaviors. Comparisons to students in medical school showed similar depression rates, but higher alcohol use in our sample, suggesting similar and/or possibly higher levels of student distress in chiropractic students compared with medical students. There is a need for larger and more detailed studies into chiropractic student distress to further determine the scope of the problem. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Schwannoma: A Case Report and Literature Review

Kathryn T. Hoiriis, DC, Life University, Private Practice

Objective: The purpose of this paper is to discuss the clinical presentation of a 55-year-old female patient with Schwannoma.

Clinical Features: The patient presented with a complaint of pain in the right (Rt) knee and change in sensation at the level of L3 on the right and lateral to the spine. The sensation (paresthesia) was described as “hot nerve pain.” She reported prior episodes of similar pain occurring three to four times in the past, with the first episode at 1 year ago, which was described as “severe.” Upon examination, there were no positive orthopedic tests including SLR, Kemps, Nachlas, Ely, or Valsalva’s tests. Lower extremity reflexes and sensory tests were within normal limits. There was no muscular weakness noted in the lower extremities, and she was able to perform heel and toe walk. She stated that the position of comfort was lying down; sitting and standing worsened the complaint.

Intervention and Outcome: Minimal objective findings led to conservative chiropractic care; however, no sustainable or

consistent subjective improvements resulted in four visits. Advanced imaging was indicated to obtain appropriate diagnosis and surgical intervention.

Literature Search: Using several search strategies combining key words “Schwannoma,” “chiropractic,” “spinal,” “thoracic,” and “lumbar” in the chiropractic and medical databases while setting limits for the search (eg, published in the last 10 years, humans, English) ultimately resulted in the selection of 12 case reports for review.

Conclusion: Bizarre pain and/or paresthesia of rapid onset and progression necessitate advanced imaging. All three tumors were benign and the patient recovered well from her surgery. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Sensory Neuron Mechanisms Underlying Thiamine-Induced Inhibition of Hyperalgesia in Rats With Chronic Compression of Dorsal Root Ganglion

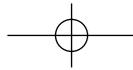
Z.J. Huang, X.S. Song, and X.J. Song, Parker College Research Institute

Background and Objective: Neuropathic pain is severe and often intractable and continues to pose major clinical challenges. Our recent studies show that B vitamins thiamine, pyridoxine, and cyanocobalamin and their combinations may relieve pain and hyperalgesia in rats with sciatic nerve injury or dorsal root ganglion (DRG) compression, suggesting the possible clinical utility of B vitamins in treatment of neuropathic painful conditions following injury, inflammation, degeneration, or other disorders of the nervous systems in patients. Neural mechanisms underlying such analgesia remain unknown. Injury or inflammation affecting the axons or somata of sensory neurons having their somata in DRG often causes hyperexcitability that may lead to spontaneous firing and neuropathic pain. We further investigated possible roles of the B vitamins in hyperexcitability of the sensory neurons in rats with DRG compression.

Methods: Intracellular and whole cell patch-clamp recordings were made in vitro from intact and/or dissociated DRG neurons.

Results: Administration of thiamine in vitro (1–10 mM, DRG perfusion) or in vivo (i.p., 33–100 mg/kg/day, 7–10 days until the day of electrophysiological recording) significantly reversed the decreased threshold current and increased the discharge rate of action potential of the DRG somata. DRG compression-induced reduction of slow sodium currents in the nociceptive neurons was significantly reversed by thiamine treatment in vivo or in vitro.

Conclusion: These results suggest that thiamine may reduce pain and hyperalgesia by depressing the neural hyperexcitability via modulating the abnormal expressed sodium currents. This study was supported by PCCBRF-VB002. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*



Learning Styles and Classroom Performance of Chiropractic Students

Laura L. Huber, DC, Life University College of Chiropractic

Background: Learning styles of students have been investigated for several decades and invite vigorous debate.

Objective: The purpose of this study was to compare learning styles of students to the students' performance in a chiropractic course.

Methods: A total of 381 1st-year chiropractic students completed the online VARK (Visual, Auditory, Read/write, and Kinesthetic) learning assessment. Students with final grades greater than or equal to 95% were designated as highest grade achievers, and those less than or equal to 75% were lowest.

Results: The response rate was 74% ($n = 283$). In lecture, 25% ($n = 71$) of respondents met the highest grade category and 15% ($n = 43$) met the lowest. The highest responses were single mode with 30% ($n = 22$) having a kinesthetic (K) style, and 18% ($n = 13$) with read/write (R/w). Of the lowest achievers, 30% ($n = 13$) were quad-modal (VARK), utilizing all preferences, and 16% ($n = 8$) indicated K. Both genders had a high K preference. In lab, the 21 highest grade

respondents had a K preference, and of the 12 respondents for lowest achievers, 4 had the VARK, 3 had K, and 3 had R/w.

Discussion: The grade separation points of greater than or equal to 95 and less than or equal to 75 were chosen to reflect the bell curve distribution of the grades and to eliminate 5 points extra credit. It had been expected that the quad-modal (VARK) style would account for a greater percentage of the highest achievers, assuming them to be able to adjust to any learning environment. Ironically, the kinesthetic learners were in the majority in both the highest and lowest achievers. Not all of the lowest lab respondents had the lowest lecture grades.

Conclusion: It appears that certain fields of study attract a particular learning style, but should not be used to exclude students from certain curriculum. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Higher Stresses in the Anterior-Lateral Region of the Annulus Due to Strains in the Nucleus: A Cervical Intervertebral Disc Under Pure Compression

Mozammil Hussain, PhD, and Rodger Tepe, PhD, Logan College of Chiropractic

Introduction: Neck pain is often associated with disc rupture, herniation, degeneration, and aging. These morphological and structural changes occur in the disc due to cascading activities over a period of time leading to internal tissue failure stresses and strains. Although it has been shown that stresses and strains vary in different regions of the lumbar disc, to the best of our knowledge, there has been only one study of the cervical spine documenting the stresses along the anterior-posterior diameter of the disc, but no regional changes in the tissue strains were recorded.

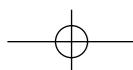
Objective: The purpose of the study was to compute the stresses and strains within different regions of the annulus and nucleus.

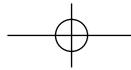
Methods: A three-dimensional finite element model of a C5-C6 disc was developed. The geometric dimensions and material property of the annulus and nucleus were taken from the literature. The annulus and nucleus were further subdivided into four quadrants each: anterior, posterior, right

lateral, and left lateral. An axial compressive load of 100 N was applied on the top surface while the bottom surface of the disc was fixed.

Results: The stresses in the annulus were about 70% higher than in the nucleus and the strains in the nucleus were about 20% higher than in the annulus. No significant difference was observed within the regional stresses of the nucleus and the regional strains of the annulus. The stress in the annulus and the strain in the nucleus were recorded to be maximum in the anterior region (0.99 MPa, 0.17 mm/mm), intermediate in the lateral region (0.81 MPa, 0.15 mm/mm), and minimum in the posterior region (0.62 MPa, 0.13 mm/mm).

Conclusion: The anterior-lateral region of the cervical disc was more susceptible to an early tissue injury or degeneration due to higher annular stress and nuclear strain. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*





Peripheral, Circumferential, and Radial Components of Stresses and Strains Within Different Regions of the Annulus and Nucleus: A Cervical Intervertebral Disc Under Pure Compression

Mozammil Hussain, PhD, and Rodger Tepe, PhD, Logan College of Chiropractic

Introduction: Neck pain is generated as a result of the ingrowth of nerve endings inside the avascular disc tissues that are hosted by tears (peripheral, circumferential, and radial tears). The tissue failure accounts for the tear formation. Although some work has been undertaken in the lumbar spine to study the tissue failure mechanisms by investigating the regional stresses and strains along the three vector directions, this area is still poorly understood. To date, no such study has been conducted in the cervical spine.

Objective: The purpose of the study was to compute the distribution of stresses and strains along the three vector planes within different regions of the annulus and nucleus.

Methods: A three-dimensional finite element model of a C5–C6 disc was developed. The geometric dimensions and material property of the annulus and nucleus were taken from the literature. The annulus and nucleus were further subdivided into four quadrants each: anterior, posterior, right lateral, and left lateral. An axial compressive load of 100 N

was applied on the top surface while the bottom surface of the disc was fixed.

Results: The regional stresses and strains were highest in the axial direction and lowest in the radial direction. The directional stresses were found to be higher in the annulus and the directional strains were higher in the nucleus. The anterior-lateral location of the annulus and nucleus predicted the tissue failure region due to localized stresses and strains.

Conclusion: The disc tissue behavior was mostly dependent upon the axial mechanics of the anterior-lateral region under pure compression. The initial disc tissue failure and any kind of morphological degeneration due to stress concentration was anticipated in the annulus, while the biochemical degradation and poor nutrient supply mostly govern the poor strain resistance of the nucleus tissues. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

A Support Vector Machine Classifier as a Machine-Learning Tool to Assess Severity of Vertebral Subluxation

Tadeusz Janik, PhD, MathComp Consulting, Deed Harrison, DC, Private Practice, CBP Nonprofit, Inc., Donald Harrison, PhD, CBP Nonprofit, Inc., Université du Québec à Trois-Rivières, and Joseph Ferrentelli, DC, Private Practice

Introduction: Sensitivity and specificity are important parameters in validating clinical procedures. Support Vector Machine (SVM) is a new computer classification technique that calculates efficiency, sensitivity, and specificity.

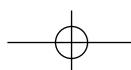
Methods: Previous data from two sets of normal and pain groups were analyzed with this new SVM technique. Group 1 included normal ($N = 50$) and chronic low back pain (CLBP) subjects ($N = 50$), while group 2 was composed of normal ($N = 72$), acute cervical pain ($N = 52$), and chronic cervical pain subjects ($N = 70$). For group 1, eight radiographic variables were used: lumbar lordosis (ARA T12–S1), Cobb T12–S1 angle, sacral tilt to vertical (PT S1), elliptical ratio b/a , sacral endplate to horizontal (SBA), and three new measures of pelvic morphology (angle of pelvic incidence [API], PR-S1, and posterior tangent pelvic incidence angle [PTPIA]). For group 2, six radiographic variables were used: cervical lordosis (ARA C2–C7), Cobb angle C2–C7, Cobb angle C1–C7, height-to-length ratio of C2–C7, atlas-to-horizontal angle (APL), and translation Tz of C2–C7. While the algorithm starts with all radiographic features, at every iteration, the variable with the lowest score is removed until

there is only one variable left. The efficiency, sensitivity, and specificity are evaluated at every iteration.

Results: A global angle of lumbar lordosis (ARA T12–S1) represents the most ability to discriminate between the normal and CLBP groups followed by the elliptical ratio b/a . The sensitivity with three items (ARA T12–S1, SBA, and PTPIA) is 0.86 ± 0.13 , its specificity equals 0.74 ± 0.14 , and its efficiency is 0.80 ± 0.08 . For group 2, all radiographic variables demonstrated very high efficiency (≈ 1.0).

Discussion: In group 1, just using three of the radiographic variables (ARA T12–S1, SBA, and PTPIA) provides satisfactory efficiency of 0.86. In group 2, all variables had high efficiency, sensitivity, and specificity.

Conclusion: Using SVM, cervical and lumbar radiographic variables can discriminate between normal and pain groups. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*



Neuro Emotional Technique Intervention for Children With Clinically Diagnosed Attention-Deficit/Hyperactivity Disorder: Preliminary Data From a Randomized Controlled Trial

Fay Karpouzis-Isakidis, GradDipChiro, DO, Henry Pollard, PhD, GradDipChiro, GradDipAppSc, MSportSc, and Rod Bonello, DO, DC, MHA, Macquarie University

Background and Objective: Evidence supports a multidisciplinary management approach for children with attention-deficit/hyperactivity disorder (ADHD). The objective of this study was to report on 37 consecutive cases and discuss the first month's outcomes. To determine whether adding Neuro Emotional Technique (NET) to existing treatment protocols can improve outcomes for ADHD children by decreasing inattention, hyperactivity, and impulsivity, as measured by Conners' Parent and Teacher Rating Scales (CPRS-R:L and CTRS-R:L).

Methods: A double-blind, randomized controlled trial (RCT) was used. Participants were children, aged 5 to 12 years, who were diagnosed by a pediatrician or clinical psychologist with ADHD. The Conners' rating scales were used pre- and postintervention to measure outcomes, which were scored and interpreted by independent psychologists. Participants were randomized to three groups. Group C continued on the existing treatment program, groups B and A continued with the existing program and NET treatment and sham protocols were added, respectively. Groups A and B attended a clinical facility for the first month and received eight interventions.

Results: Treatment group participants demonstrated significant reductions in *t*-score averages for primary and

secondary outcome measures (POM, SOM), compared with sham and control groups, utilizing a clinically significant difference of five subscale points. POM treatment group average *t*-score decreases were -8.21 and -9.32 as compared with sham (-2.00 , -2.44) and control (-1.89 , -3.00) groups. SOM treatment group average *t*-score decreases were -7.32 , -9.11 , and -9.32 as compared with sham (-2.33 , -4.22 , -2.89) and control ($+0.56$, -1.56 , -0.89) groups. SOM demonstrated a statistically significant improvement ($p < .05$) for the treatment group when compared with sham and control groups, for the DSM-IV: Inattentive and Total subscales.

Conclusion: Results revealed clinical significance for all POM and statistical significance for two SOM for the treatment group when compared with sham and control groups. If treatment effects continue to exhibit significance in the large-scale RCT, the authors hypothesize that the addition of the NET protocol to existing treatment programs will produce better outcomes for ADHD children than existing programs alone. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Acupuncture Effects on the Resting State Networks of the Human Brain

Norman W. Kettner, DC, Logan College of Chiropractic, Polly Dhond, PhD, Logan College of Chiropractic, Massachusetts General Hospital, and Vitaly Napadow, PhD, Logan College of Chiropractic, Massachusetts General Hospital

Introduction: Functional magnetic resonance imaging (fMRI) has identified the neural correlates of acupuncture stimuli. Low-frequency fluctuations in cerebral hemodynamics (0.01–0.1 Hz) can be identified in fMRI data obtained during rest and task stimulation periods and are temporally correlated, characterizing a functional resting state network (RSN).

Methods: We used fMRI to evaluate the RSN present in nontask, resting fMRI data both pre- and postacupuncture. Changes in functional connectivity associated with the "default mode" (DMN) and "sensory-motor networks" (SMN) were obtained. Data were collected for 15 healthy, right-handed adults, aged 18 to 50 years. Manual acupuncture (MA) and sham acupuncture (SA) were used at left PC-6. During rest blocks, there was no acupuncture intervention and subjects lay still and fixated on a centrally presented plus sign. The order of MA and SA runs was randomized across subjects. Data were acquired using a Siemens Trio 3T MRI system equipped for echo planer imaging. Independent component analysis (ICA) was performed on all rest runs

using FSL-MELODIC. Group analysis was performed on the selected component maps using a mixed-effects model. Paired and unpaired *t*-tests between resting state networks (DMN and SMN) were performed before and after the acupuncture runs.

Results: Changes in connectivity (after vs before) stimulation were observed for both MA and SA. The MA increased connectivity of the DMN with limbic and memory-related areas (amygdala, hippocampus, middle temporal gyrus) and attentional (cingulate), antinociceptive (PAG), somatomotor (SMA), and spatial/associative (posterior parietal) regions. For SA, only the temporo-occipital junction demonstrated increased connectivity with the DMN, while the middle and inferior temporal gyri demonstrated decreased connectivity. Changes in the SMN for MA (but not SA) involved increased connectivity within somatomotor areas.

Conclusion: This study supports the modulation of resting state networks in the brain by acupuncture that are sustained

for at least minutes after any active stimulation. *(This is an abstract from a conference presentation only and does*

not represent a full work that has been peer-reviewed and accepted for publication.)

Implementing a Campus-Based Weight Loss/Fitness Challenge

Ron Kirk, MA, DC, and Pat Banks, Life University

Introduction: Numerous studies indicate that obesity and sedentary living are increasing in America at alarming rates. Obesity is associated with many prevalent disorders that compromise the quality of life, including back pain and spinal disorders.

Objectives: The principal objective of this project was to design and implement a weight loss/fitness challenge beginning on World Spine Day in collaboration with the Bone and Joint Decade. It was hoped that this fitness challenge would help to empower members of the campus community in healthy behaviors and choices.

Methods: A work group was formed to develop a World Spine Day plan. The Wellness Center director agreed to organize and coordinate the World Spine Day Weight Loss/Fitness Challenge as the centerpiece of campus activities. The director of the Wellness Center conducted group meetings with her staff, personal trainers, health coaches, and interested students. The plan included diverse exercise and nutrition classes, and prizes for incentives. Challenge participants completed anonymous feedback surveys, which were

Institutional Review Board exempt because they were descriptive educational research.

Results: Twenty-eight of the original 108 challenge participants completed the challenge. Four survey respondents (22%) reported losing no weight. Three participants (17%) reported losing 1 to 2 pounds; three challengers (17%) lost 2 to 4 pounds; three individuals (17%) lost 5 to 9 pounds; four (22%) lost 10 to 15 pounds; and one lost more than 20 pounds. Most responding participants reported that the challenge helped them to improve their health habits and feel better about themselves. Participants appreciated the classes, health coaches, and prizes.

Discussion and Conclusion: The continuing trend toward sedentary living and weight gain in America needs to be addressed aggressively. It is vital that health care institutions offer incentives and programs that promote healthy behavior. The challenge is now being conducted each school term on a continuing basis. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Initiating Participation in Community Educational Outreaches on World Spine Day: A Collaborative Methodology

Ron Kirk, MA, DC, and Richard Franz, DC, Life University

Introduction: Bone and joint disorders, afflicting hundreds of millions of individuals globally, are the leading cause of pain and disability. The Bone and Joint Decade (BJD) is an international coalition committed to reducing the burden of musculoskeletal conditions. Spinal disorders are an area of priority for the BJD.

Objective: The principal objective was to design and implement a global strategy to initiate World Spine Day community spinal health outreaches.

Methods: In May of 2006 the project coordinator conducted a series of dialogues with leaders of the BJD, the President's Council on Physical Fitness and Sports, COCSA, ACC, ACA, and ICA regarding World Spine Day. A coordinated plan of action was created, including increasing awareness of the burden of spinal disability, promoting positive spinal health behaviors, conducting spinal health presentations, developing educational tools, and gaining presidential endorsement.

Results: The International Bone and Joint Decade adopted Straighten Up as its central theme for World Spine

Day globally, attributing program leadership to the chiropractic profession. President Bush issued a World Spine Day presidential message. Several public websites were created to empower doctors, patients, and the public to participate in Straighten Up and World Spine Day. The national launch celebration of World Spine Day was extremely successful with a program including grade-school students and many stakeholder leaders. Community spinal health posture outreaches were initiated globally with the involvement of several chiropractic colleges.

Discussion and Conclusion: The BJD celebrated World Spine Day with significant national and international recognition. The success of this project has strengthened the chiropractic profession's relationships with other powerful partners/stakeholders. It has positioned the profession as the global leader in collaborative patient-active spinal health promotion. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

An Intercollegiate Comparison of Prevalence of Injuries Among Students During Technique Class From Five Chiropractic Colleges Throughout the World: A Preliminary Retrospective Study

Erica Kuehnel, DC, Private Practice, Anne Beatty, DC, Private Practice, and Brian J. Gleberzon, DC, Canadian Memorial Chiropractic College

Objective: A recently published retrospective study characterized the nature of injuries sustained in technique class by chiropractic students at Canadian Memorial Chiropractic College (CMCC). The purpose of this study was to compare the prevalence of injuries among chiropractic colleges throughout the world to CMCC and each other.

Methods: The Ethics Review Board of the CMCC approved this study. Representatives from English-speaking chiropractic colleges in North America, Europe, Asia, and Australia were contacted and asked to participate in the study. The only requirement for participation was that chiropractic students were either currently, or had previously been, instructed in manipulation. Each student was required to complete a consent form and fill out the questionnaire anonymously if he or she so chose.

Results: In addition to the data from CMCC, data sets from four chiropractic colleges have thus far been collected. One respondent college was from North America, one from Europe, one from Australia, and one from Africa. The total number of respondents from the other four colleges was 405, eight of which were not filled out properly. In general, 98

students reported having been injured during technique class, while 284 reported not being injured during technique class. The percentages from the four colleges of students reporting an injury while in technique class were 7%, 18%, 22%, and 53%, respectively. This compares with a reported rate of injury among chiropractic students at CMCC of 43%.

Discussion: The reported rates of injury among chiropractic students during technique class at various colleges ranged from a low of 7% to a high of 53%, with the highest reported rate of injury from the North American college. It is unknown if this is attributable to differences in teaching methods or other ethnocultural factors.

Conclusion: Out of the four colleges that have thus far participated in this study, one college reported a higher number of injury sustained in technique class by students as compared with CMCC, whereas the other colleges reported a lower rate of injury. This study is ongoing. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Barriers and Opportunities to the Implementation of Best Practice Recommendations in Chiropractic: Report of a Focus Group

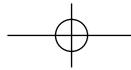
Dana J. Lawrence, DC, MMedEd, Judith Polipnick, DC, PHD, MS, and Emorie Colby, MA, Palmer Center for Chiropractic Research

Objective: The purpose of this paper is to describe the perspectives of stakeholders in leadership positions within the chiropractic profession regarding implementation of best practice guidelines.

Methods: A focus group of eight individuals involved in leadership positions within the chiropractic profession participated. A meeting was held at a national chiropractic research/educational conference.

Results: Our findings suggest that delivery capacity can be strengthened if the system as a whole is taken into consideration, and a multifaceted strategy is used for the dissemination and implementation of the best practice recommendations.

Conclusion: The perspectives of stakeholders in leadership positions in chiropractic about the implementation of best practice recommendations are presented. The data generated from the focus group will guide the development of an implementation strategy for best practices for the chiropractic profession. Lessons learned may benefit the broader complementary and alternative medicine community. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*



Chiropractic and the Clinical Educator: Identifying and Developing Effective Teacher Attributes

Cynthia Lund, CT, and Tim Gross, MS, DC, Life University

Background and Purpose: Doctor as teacher—the etymology is ancient. Can we identify and develop the attributes of effective clinical educators in our chiropractic college clinics? Faculty clinicians must be doctors of chiropractic, skilled in technique, diagnosis, and case management, but they may have limited training as teachers to student interns. The task that is central to their role is the one for which they may be least prepared. Research shows that students exposed to high-quality instruction learn more and may have a transformational educational experience. It may be possible to structure programs to “teach the teachers” in the chiropractic college clinic setting.

Methods: After a literature search and the compilation of relevant survey data, a three-phase program was created. The course was approved for CEU credit; Institutional Review Board approval was received. The 6-week, 6-hour

course topics included reading lists, teacher identity, group exercises, experiential segments on enthusiasm and critical thinking, and application in the real world of the chiropractic college clinic. Limitations of the project included lack of pre- and postdata gathering and assessment and flaws in the survey design; these will be addressed in the next phases of the training program.

Results and Conclusion: Clinic administrators at this chiropractic college were satisfied with the relevant research and structure of the course and concluded that effective teacher attributes can be identified and developed through the creation and implementation of a training program for chiropractic faculty clinicians. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Musculoskeletal Complaints Suffered by Equitation Students: A Descriptive Study of the Demographics and Pilot Study of the Use of Chiropractic Management

Aurelie Malfot, Sylvianne de Vergie, DC, and Michelle A. Wessely, DC, Cert Med, Institut Franco-Europeen de Chiropratique

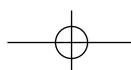
Introduction: The equitation profession is a group of the population subjected to specific activities, leading to the development of back pain, alterations in the posture, and trauma. The prevalence of low back pain is in general higher than that of the general population. Low back pain is the primary cause of consultation by jockeys. The equitation profession consists not only of the jockeys, but also those who care for the animals.

Methods: A partnership was created with an equitation school, “la Maison Familiale Rurale de Vimoutiers dans l’Orne,” and IFEC (l’Institut Franco Européen de Chiropratique) of Paris, France. All students who entered the study were given a health checkup consisting of an evaluation of the musculoskeletal system. If treatment was necessary, this was provided by 13 chiropractic 5th-year clinic students under the active supervision of the clinical director or one of the senior chiropractors on site at the equitation school. Re-evaluation and treatment was provided over a period of 2 years.

Results: Six classes of equitation students participated in the study, consisting of 131 young adults, with a ratio

of 3:1 females to males. The average age of the student was 16.5 years. Of the 131 students studied, 11% were not symptomatic. Twenty percent had the major symptom in an extremity, 52% in the spine, and 17% had a major symptom in both the extremity and the spine. In the spine, the region most affected was the lumbar region in 55% of the students, as compared with 19% in the thoracic region and 8% in the cervical region. No student in the group followed dropped out of the equitation teaching program, as compared with previous years, which had an average dropout rate due to physical incompetence of 5 to 10 students per year. The satisfaction questionnaire demonstrated that 50% of the students were satisfied or very satisfied with the care that they had received.

Conclusion: The study allowed for the identification of students with musculoskeletal complaints during their training. Treatment was provided to the students and response and satisfaction with the treatment were determined. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*



A Demographic and Epidemiological Study of a Mexican Chiropractic College Public Clinic

Daniel A. Martinez, MA, DC, and Ronald L. Rupert, MS, DC, Parker College of Chiropractic

Introduction: The purpose of this study is to describe the patient population who visited a Mexican chiropractic college public clinic with respect to demographics and clinical characteristics. This study may also be used to provide an information base that can be used for future studies.

Methods: This study was reviewed and approved by the Institutional Review Board of Parker College of Chiropractic and the Universidad Estatal del Valle de Ecatatepec. This cross-sectional study used existing patient files for data collection. Five hundred patient files from May 2005 to May 2007 were selected at random from a pack of 3700. Information was collected for demographics (age, sex, marital status, and occupation), chief complaints (nature, duration, cause, visual analog score (VAS), and associated complaints), and previous care (physician previously attended and treatment plan).

Results: The sample was comprised of 306 (61.2%) females. The mean of the patient's age was 43.4 years. Most (44.2%)

of the patients were between the ages of 40 and 59 years. The most frequent areas of complaint were pain in the lumbar area (29.4%) and pain related to the extremities (27.6%). Most (59.0%) of both sexes and all age groups described their complaints as greater than 1 year. Trauma in 46.6% of cases was indicated as the initial cause. Twenty percent classified their pain as 8/10 according to the VAS. Most did not seek care initially.

Conclusion: The primary patient is female, married, within the ages of 40–59, and does housework or office work. The patient most commonly presented with low back pain complicated by an extremity problem. The condition is usually chronic and initiated by trauma. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Does Collaborative Testing Lead to an Increase in Student Performance in the Chiropractic College Setting?

Christopher A. Meseke, PhD, Palmer College of Chiropractic Florida, Rifa Nafziger, MBA, Palmer College of Chiropractic, and Jamie K. Meseke, MSM, University of Central Florida

Objective: This large-scale, follow-up study investigated the efficacy of collaborative testing on student performance at a chiropractic college.

Methods: Two cohorts of students taking a neuroanatomy course were compared: a control group ($n = 73$) and an experimental group ($n = 80$). The control cohort completed weekly quizzes as individuals. The experimental cohort completed the quizzes in small groups. Both groups took all unit exams and the summative exam individually. Scores examined for each cohort included weekly unit quizzes, unit examinations, and a comprehensive summative exam. Multivariate statistics were used for statistical analysis.

Results: Overall, the experimental group differed from the control group (Wilks' Lambda = 0.300; $F = 33.081$; $df = 10.142$; $p < .01$). The weekly quizzes, first two unit exams, summative exam scores, the final point totals, and grades

were all significantly higher in the experimental group ($p < .10$). Similar to the aforementioned results, but not examined in the preliminary study, the aggregate quiz scores and the aggregate exam scores were significantly higher in the experimental group ($p < .05$).

Conclusion: Collaborative testing provided students the opportunity to discuss with other group members their understanding and rationale, thus enhancing understanding of course material. Students were also encouraged to become more active in the course, as the groups relied on all members to further discussions. Based on the increase in individual unit and summative exam scores and final grades, collaborative testing appears to have increased student performance. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Low Back Pain Response to Pelvic Tilt Position: A Preliminary Report

Salvatore J. Minicozzi, DC, Private Practice, and Brent da Silva Russell, DC, Life University

Introduction: The pelvic tilt exercise is sometimes associated with core-strengthening concepts and has often been

recommended for relief of low back pain (LBP). We noticed that it causes an increase in LBP for some patients whose

clinical response to treatment is suboptimal, and we propose that the maneuver may be useful as an orthopedic examination procedure.

Methods: We recorded data for 47 patients from the principal investigator's chiropractic practice for their relief or aggravation response to the pelvic tilt, physical attributes, symptom characteristics, amount of care to discharge, and treatment response, and calculated means and percentages. Because the total number of patients was small, we did not attempt more complex statistical analysis. The Life University Institutional Review Board approved our use of the patients' information.

Discussion: The group of patients who reported increased pain from a pelvic tilt exercise were more likely to report lower extremity pain in addition to LBP, were more likely to report both pain and paresthesia, had a slightly more severe mean level of "usual" pain, and were rated at a lower

mean level of improvement than the group who reported pain relief from the exercise position. One weakness is that the treating doctor subjectively rated the postcare responses; a follow-up study will use established outcome measures before and after care.

Conclusion: This is a first step, done retrospectively with a small group of patients from the private chiropractic practice of the principal investigator. The findings are encouraging but weak, and will be followed later by additional data prospectively collected from other chiropractic practices. The information gained from this project may establish a new examination procedure that could be useful to doctors who examine and treat patients with low back pain and radicular pain. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Use of Extension Palpation to Identify the Lowest Movable Lumbar Segment

Linda Mullin, DC, Lynn Krothe, DC, Life University, and James McFadden, DC, Gonstead Clinical Studies Society

Background: In an attempt to locate specific spinal levels, practitioners of diverse backgrounds have studied the relationship between anatomical landmarks and spinal segments. These studies have been shown to be unreliable for pelvic and lumbar landmarks.

Objective: The purpose of this study is to evaluate the use of extension palpation as a valid procedure in identifying the lowest movable lumbar segment.

Methods: Patients scheduled for radiographs in a private chiropractic practice were asked to participate in this study with a formal process of informed consent. In a seated position, the patient's lumbar spine was palpated during active lumbar extension. An x-ray-visible pellet was taped to the back of the patient at the level of the spinous process felt to be the lowest movable lumbar segment.

Results: Sixty-seven consecutive participants were recruited and all completed the study. The subject's average age was 40.2 years (range 8–69 years). There were 30 male

and 37 female subjects. Specificity of the procedure was high because the correct identification of the lowest lumbar was made in 91% of the patients ($n = 61$).

Discussion: The sacroiliac ligaments are the strongest ligaments in the body, limiting sacral motion during flexion and extension. In contrast, the lumbosacral joint has been shown to have 17° to 23° of motion on the sagittal plane. Therefore, the motion of the lumbosacral articulation should be palpable during flexion and extension.

Conclusion: These data suggest that extension palpation may be a more valid means of identifying the lowest movable lumbar segment than bony pelvic landmarks. This critical topic should be further explored if chiropractic research involving segment identification and evidenced-based clinical practice is to continue. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

A Nonsurgical Approach to the Management of Pregnancy-Related Lumbopelvic Pain

Donald R. Murphy, DC, Rhode Island Spine Center, Brown University, New York Chiropractic College, Eric L. Hurwitz, DC, PhD, University of Hawaii, and Ericka E. McGovern, DC, Rhode Island Spine Center

Objective: The purpose of this paper is to describe and discuss the clinical outcomes of patients with pregnancy-related lumbopelvic pain (PRLP) treated according to a rigorous diagnosis-based clinical decision rule.

Methods: A prospective observational cohort of consecutive patients with PRLP participated in the study. Data on 73 consecutive patients were collected at baseline and at the end of the active treatment. Disability was measured using the Bournemouth Disability Questionnaire (BDQ). Pain

intensity was measured using the numerical rating scale for pain (NRS). Patients were also asked to self-rate their improvement.

Results: Complete outcome data were available in 73 patients. Fifty-three patients (72.5%) reported their improvement as either "Excellent" or "Good." The mean patient-rated improvement was 60%. The mean improvement in BDQ was 16.7 points. The mean percent improvement in BDQ was 37.2% and the median was 43%. Mean improvement

in pain was 2.6 points. Thirty-five (48%) of the patients in this cohort experienced clinically significant improvement in disability and 47 (63.5%) patients in this cohort experienced clinically significant improvement in pain. Patients were seen an average 6.8 visits.

Conclusion: The management strategy studied here yielded favorable outcomes in this patient population and appears to be a safe option for patients with PRLP. However, the

absence of randomization and a control group limits interpretation with regard to clinical effectiveness. Randomized, controlled trials are necessary to distinguish treatment effects from the natural history of PRLP. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Predictors of Success in a Chiropractic Technology Program

Jean Murray, MBA, PhD, and Cathy Eberhart, MBA, Palmer Chiropractic College

Introduction: This study examined undergraduate program student data from the Palmer College of Chiropractic-Davenport campus chiropractic technology program, which has trained chiropractic paraprofessionals for more than 40 years. Acceptance into the program requires a 2.0 GPA (grade point average), and a minimum grade of C in the disciplines of mathematics, English, and science. A number of applicants to the program have been out of school for a period of time. Others have had marginal grades in math and English but their expressed, strong interest in the program led to their acceptance. The research centered on the ability of any of the current admissions factors (high school GPA and discipline-specific GPA) to predict success in the chiropractic technology program.

Methods and Results: After Institutional Review Board approval was granted, records of students in the program from 1997 to present were reviewed and were blinded for the study. The term “success” was operationally defined to include (1) graduation from the paraprofessional program and (2) acceptance into the Doctor of Chiropractic program. Students who had achieved either of these goals would be

considered as “successful” in the paraprofessional program. Point-biserial analyses were conducted on each factor (high school GPA; English, math, and science GPA; and length of time since last education) against the success variable. Results of these analyses were significant ($\alpha = .01$) and indicated that no one factor had a strong correlation with success ($r = .268$, $r = .242$, $r = .147$, $r = .172$, and $r = .045$, respectively).

Conclusion: Although previous studies have shown a strong correlation between incoming GPA and success in professional and paraprofessional programs, the current study revealed no such strong correlation, leading the researchers to question whether other factors might yield stronger results and to counsel reducing the emphasis on these factors in the decision to admit marginal students. Future research examining other factors for success and record-gathering procedure changes are also outcomes of this study. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Characterization of Health Status and Modifiable Risk Behavior of Individuals Across the United States Using Chiropractic Care as Compared to General Medical Care

Harrison Ndetan, MSc, Parker College Research Institute, Sejong Bae, PhD, University of North Texas, Will M. Evans, DC, PhD, Cleveland Chiropractic College, Ronald Rupert, MS, DC, Parker College Research Institute, and Karan Singh, PhD, University of North Texas

Introduction: The actual causes of death in the United States have drifted from infectious through chronic diseases to modifiable behavioral risk factors. Simultaneously, there has been a paradigm shift in health care provision with increased emphases on prevention and health promotion/education campaign. Particularly, usage of professional complementary and alternative medicine (CAM) such as chiropractic care has increased substantially. This study characterizes typical conditions of chiropractic patients and explores how chiropractic influences modifiable behavioral risk factors in the United States.

Methods: The study used data from the Sample Adult Core component of the 2005 National Health Interview Survey (NHIS). Logistic regression, chi-square, and *t*-test

were used to explore association between variables. All statistical analyses were performed with SAS 9.1.2. The study was approved by the Institutional Review Boards of Parker College of Chiropractic and University of North Texas Health Science Center.

Results: There were 31,428 respondents. Males comprised 43.79%. The percentage of those who saw/talked to chiropractors (DCs) within the past 12 months was 8.73% ($n = 2705$). Among these, 21.37% ($n = 578$) did not see the general medical doctor (MD). There was no significant difference in the smoking and alcohol consumption status of respondents who saw/talked to DCs than MDs. DC patients were more likely to be physically active [OR = 1.45 (1.20, 1.75)] and less likely to be obese [OR = 0.74 (0.59, 0.92)]

than MD patients. Patients with acute migraine, neck, and low back pain were more likely to see DCs, but patients with arthritis and chronic conditions were more likely to see MDs.

Conclusion: Americans are using chiropractic care for acute migraine, neck, and low back pain. DCs may be doing some health promotion and addressing modifiable risk factors with patients but this is not obvious from this data set.

Questions dealing with prevention and health promotion are not well delineated within the NHIS2005 data set. Future research with health promotion-specific questions among CAM providers is recommended. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Variable Origin of the Posterior Humeral Circumflex Artery and Relationship to the Posterior Cord of the Brachial Plexus

Anthony Olinger, PhD, Western States Chiropractic College

Introduction: Anatomical variations in the branching pattern of the axillary artery are common, and typically include the subscapular artery, lateral thoracic artery, and the posterior humeral circumflex artery. Previous investigations of single specimen dissections demonstrate numerous variations to axillary artery branching, but the frequency of these occurrences is unclear. The purpose of this study is to quantify the frequency of variant branching of the posterior humeral circumflex artery, how it relates to the posterior cord of the brachial plexus, and the course of this vessel and the axillary nerve to the deltoid muscle.

Methods: Axillae of 152 right and left cadavers were dissected to allow examination of the axillary artery and its branches. Data were collected regarding the origin of the posterior humeral circumflex artery and its course to the deltoid muscle. The position of the subscapular artery in relation to the posterior cord of the brachial plexus was also recorded.

Results: Variations included the lateral thoracic artery producing the subscapular artery as well as the circumflex

scapular, thoracodorsal, and posterior humeral circumflex arteries in the absence of a subscapular artery. The subscapular artery also produced the lateral thoracic artery and the posterior humeral circumflex artery. The posterior humeral circumflex artery also originated from the deep brachial artery and traversed the triangular interval to the deltoid muscle.

Discussion: These findings are relevant to both anatomical and clinical fields because they provide evidence as to the frequency of variant axillary artery branching as well as the potential for neurovascular elements to exist in a location other than the classical anatomical location.

Conclusion: The posterior humeral circumflex artery typically arises from the distal third of the axillary artery, but is capable of originating from the subscapular and deep brachial arteries. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Changes in the Flexion Relaxation Response Induced by Hip Extensor Muscle Fatigue

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Introduction: The lumbar flexion relaxation phenomenon (FRP) can be influenced by several factors, such as loading of the trunk, trunk velocity, and muscular fatigue. Some studies have documented the myoelectric silent period of the hamstring muscles during trunk flexion, whereas others have failed to demonstrate a constant pattern of muscle activation. Current data indicate that the erector spinae and hip extensors interact to provide adequate lumbopelvic stabilization. The objective of this study was to quantify the effect of hip extensor muscle fatigue on erector spinae FRP.

Methods: Twenty-seven healthy subjects gave their informed consent and completed blocks of three trunk flexions under four different experimental conditions: no fatigue/no load, no fatigue/load, fatigue/no load, and fatigue/load. Fatigue of the hip extensors was induced using isometric hip extension contraction. Lumbar spine flexion angle

and sEMG of the erector spinae, gluteus maximus and hamstrings were recorded during a flexion-extension task. Trunk flexion angles corresponding to the onset and cessation of FRP were compared across the experimental conditions.

Results: The angle corresponding to the onset of myoelectric silence was significantly reduced after the fatigue task at the right and the left erector spinae muscle. The fatigue condition did not affect FRP cessation angle.

Discussion and Conclusion: In healthy subjects, fatigue of the gluteus maximus and the hamstring muscles decreased the onset angle of the FRP. A similar effect has been reported with erector spinae muscle fatigue and an extended EMG silent period has been observed with prolonged cyclic lumbar flexion. It seems that hip extensor muscles, which are believed to play an important role in lumbopelvic

stabilization, may be unable to carry out their stabilizing function when in a state of muscular fatigue. Muscular fatigue of hip extensor muscles may temporarily reduce spinal stability during flexion and subsequently put previously

injured structures at risk. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

A Descriptive Analysis and Checklist Critique of the Articles in the *Journal of Clinical Chiropractic Pediatrics*, 1996–2007

K.A. Pohlman, DC, **D. Lawrence**, DC, MMedEd, and **E. Potocki**, DC, Palmer Center for Chiropractic Research

Objective: The purpose of this study was to conduct a bibliographic analysis and critical assessment of the literature published in the *Journal of Clinical Chiropractic Pediatrics* (JCCP).

Methods: The 13 issues of the JCCP were analyzed as follows: (1) all articles were categorized by type; (2) authors' affiliation, academic credentials, and gender were noted; and (3) critical appraisal checklists were applied to the all studies except commentaries. Each criterion for each checklist was noted for its full description ("yes" = 2), partial description ("half" = 1), or lack of description ("no" = 0). A quality rank was then determined by calculating the percentage for each article. An a priori score of 50 or higher was set to signify that an article had high quality.

Results: Fifty-three different authors contributed to the 57 articles that were included in the author characteristics. Seventy-seven percent of the authors were private practitioners, 26% had secondary degrees, and 43% held diplomate certificates. Sixty-eight percent of the authors were female

and 83% of the articles had only one author. Fifty-three percent of the papers to which a checklist was applied had a rating of 50 or higher. Of the 34 case reports in JCCP, 22 had scores above 50 (mean = 54; SD = 13.2; range 25–79). One-third of the total nine case series articles received a high quality score (mean = 40; SD = 11.2; range 25–55). Two of the seven narrative literature review articles received a score of 50 or better (mean = 39; SD = 9.0; range 25–50). The only cross-sectional article scored 20 out of 100.

Conclusion: Scientific articles need to follow specific protocols and should present new relevant information because of the standards of evidence-based health care. A current lack in the training of specialists in chiropractic pediatrics is in instruction with regard to scientific writing. This paper demonstrates that there is room for improvement in this rapidly growing chiropractic specialty. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Intramuscular Involvement of the Lower Extremities and Abdomen in a Patient With Cysticercosis: A Case Report

Jean-Nicolas Poirier, DC, and **Melissa Loschiavo**, DC, Parker College of Chiropractic

Objective: An educational retrospective case report of a patient with intramuscular cysticercosis involving the lower extremities and abdomen diagnosed with conventional radiographic examination is presented.

Clinical Features: The patient is a 60-year-old Hispanic female who emigrated from Mexico to the United States 12 years previously. She reported an average of biweekly consumption of pork in her diet. A radiographic examination of the knees was performed to rule out a fracture following a recent fall. Multiple small linear, nodular, and curvilinear opacities were visualized bilaterally in the musculature of the lower thigh and upper leg. Upon additional radiographic examination, similar calcified soft tissue opacities were found in the gluteal, pelvic, and lower abdominal musculature. These dystrophic calcifications were consistent with the classic appearance of dead cysticerci. There was no evidence of soft tissue hypertrophy, edema, or osseous involvement. The patient was referred to an allopathic physician to rule out possible concomitant lesions or intestinal taeniasis.

Conclusion: Dystrophic muscular calcifications are commonly encountered on radiographic examinations. In most cases, these calcifications are the result of old traumatic events. However, it is important for the chiropractic doctor to be aware of the typical appearance of unusual causes of intramuscular calcifications such as a parasitic infection. In the body, cysticercosis involves most commonly the central nervous system, skeletal muscles, and the subcutaneous tissues. The diagnosis is usually performed by diagnostic imaging procedures complemented by serological evaluation and biopsy samples. The course of the disease is variable depending on the stage of infection, the number of larvae present, and the region of the body affected. Patients affected should undergo advanced imaging examination to rule out cerebral, ocular, and intestinal infection. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

An Epidemiological Survey of Shoulder Pain in Chiropractic Practice

Mario Pribicevic, MChiro, Private Practice, **Henry Pollard**, GradDipChiro, GradDipAppSc, MSportSc, PhD, and **Rod Bonello**, DC, DO, MHA, Macquarie University

Background and Objective: The prevalence of shoulder pain in clinical practice ranges from 4.7% to 46.7% with most of the data derived from medical publications. The chiropractic literature contains no evidence about shoulder pain prevalence and very little information on shoulder syndromes and clinical management strategies. The objective of this study was to document the prevalence of shoulder pain symptoms seen in weekly chiropractic practice, to determine the sources of shoulder pain, to determine the prevalence of shoulder clinical syndromes, and to determine therapeutic strategies.

Methods: A survey questionnaire was conceived by the authors seeking background information about the respondents, information on weekly shoulder pain patient presentations (prevalence), questions about the causes and sources of shoulder pain, and the diagnosis options chosen by the practitioner. The survey instrument asked further questions related to therapeutic strategies used by the individual practitioners. The survey was mailed to all practitioners based in the Australian state of New South Wales with individual details derived from Yellow Pages online listings.

Results: The data were analyzed using descriptive statistical methods. The survey was mailed to 1037 practitioners

and achieved a response rate of 21% (192 respondents). The prevalence of shoulder pain was 12% of the total weekly patients. Most of the shoulder pain symptoms were subacute (34%), with most causes due to overuse (32%). The most prevalent causes of referred pain were myofascial (30%) and cervical spine (26%). The most prevalent working diagnosis of shoulder pain was shoulder impingement syndrome (13%), followed by impingement syndrome with rotator cuff tendinosis (17%). The major manipulative technique utilized includes Diversified (81%) and peripheral manipulation (82%). Soft tissue management strategies were used by 92% of the practitioners and rehabilitation strategies by 89%.

Conclusion: The results concur with previous MEDLINE-indexed publications and suggest a moderate prevalence of shoulder pain with the most common structure involved being the rotator cuff tendon. Most of the responding practitioners utilize a multimodal therapeutic treatment approach in managing disorders of the shoulder. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Effects of Posture Correction Interventions During Lessons Involving Computers on the Incidence of Musculoskeletal Problems in School Children

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Introduction: Musculoskeletal problems reported by school children using computers have often been linked to bad posture. This study investigates whether posture education affects the reported prevalence of musculoskeletal symptoms among secondary school children using computers.

Methods: A prospective, blinded, randomized, controlled trial was conducted of 71 school children, aged 11 to 12 years, from a school in Leicestershire, UK. Both intervention and control groups received posture training delivered by teachers at the school and both were assessed on their knowledge of correct posture. A follow-up lesson was delivered 1 week later, during which the intervention group also received automated posture warnings and tips on their personal computers. The prevalence and severity of musculoskeletal symptoms were measured at the start of the study and at end of the follow-up lesson.

Results: By the end of the follow-up lesson, the incidence of musculoskeletal problems in the intervention group had fallen

from 32% to 5%, while that for the control group had only fallen from 29% to 21%. Visual analog pain scale representation of the degree of discomfort due to the musculoskeletal problems had fallen from 1.53 to 0.39 for the intervention group, while that for the control group had only fallen from 1.23 to 1.13.

Conclusion: Postural interventions that include reminders during the course of the lesson are effective in reducing the reported incidence of musculoskeletal problems and severity of pain in school children. This approach should be considered by those devising ergonomic correction programs for school children. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

A Pilot Mixed-Methods Study of Patient Satisfaction With Chiropractic Care for Back Pain

Robert M. Rowell, DC, Palmer College of Chiropractic, and Judith Polipnick, DC, PhD, United Health Group

Background and Objectives: Patient satisfaction is important to third-party payers, clinicians, and patients. Several studies have reported higher satisfaction among patients receiving chiropractic care than those receiving medical care. The concept of satisfaction, however, is multifactorial and measurement is a challenge. The objective of this study was to conduct a pilot mixed-methods study to explore patient responses to satisfaction with care and to test the feasibility of our design, compare quantitative and qualitative satisfaction data, and compare data from two qualitative interviews for each patient using two different interviewers.

Methods: Patients were treated 3 times per week for 3 weeks using Diversified technique and flexion-distraction technique. Outcome measures were the Roland Morris Back Pain Disability Questionnaire (RMQ) and the visual analog scale for pain (VAS) and satisfaction with care measured using the patient satisfaction scale (PSS). Quantitative and qualitative outcomes were at week 3 and again at week 4. Interviews were recorded and transcribed verbatim and analyzed for themes and constructs of satisfaction.

Results: All patients reported high levels of satisfaction with care in this study. We categorized patient comments regarding satisfaction into the same constructs of satisfaction identified by Cherkin et al for the PSS but found subcategories and an additional category that patients described, while one construct from the PSS was not described by patients at all. Clinical outcomes were mediocre with little change noted on VAS and RMQ scores in this 3-week study.

Discussion and Conclusion: The constructs of satisfaction from the PSS were: Quality of Care, Information, Effectiveness, and Caring. Caring was not identified by patients in this study. An additional construct (Quality of Care) was identified. Satisfaction with care is not explained by outcome alone. We successfully conducted a pilot mixed-methods study and can use these methods in a larger study. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Effectiveness of the Activator Adjusting Instrument on a 16-Year-Old Female Elite Gymnast With Low Back Pain

Drew Rubin, DC, Life University

Objective: The purpose of this paper is to present a case study of a 16-year-old female elite gymnast with a chief complaint of severe lower back pain. This study will showcase the use of the Activator adjusting instrument in the resolution of the young female's pain and her return to competition.

Clinical Feature: This is a case study of a significantly injured female teenage competitive gymnast presenting to a private chiropractic practice. Her reason for consultation was an increasingly severe lower back and left sacroiliac pain. The pain had become so unrelenting that she was forced by her coach to sit out of a competition for fear of further injury.

Intervention and Outcome: A full consultation, examination, and x-rays were performed. Of note on the radiographs

were a left scoliosis and unusually sharp sacral angle. A course of treatment was recommended utilizing the Activator adjusting instrument. After 1 month of care, she returned for light gymnastic practice. Three months to the day of her first adjustment, she won three of four gymnastic events in the state competition.

Conclusion: The technique utilizing the Activator adjusting instrument was of great benefit to this specific pediatric case, who was a young athlete at a high level of performance. Further research using the Activator adjusting instrument is needed in areas of pediatrics and sports-related injuries. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Disability Services in a Chiropractic University Setting

Lisa Rubin, MA, PhD, Life University

Objective: The purpose of the study was to create a preliminary examination of the population in the disability services area within a chiropractic school program and determine how the students compare with other chiropractic schools and national norms.

Methods: All chiropractic schools in the United States were e-mailed to establish their contact person for disability services. Five schools responded and were sent a brief questionnaire; four sent back data responses. These data were compared with the university's information collected in the

Disability Services Department as well as national norms for colleges.

Results: Between 2% and 8% of the chiropractic student populations had reported disabilities. More males than females self-identified and requested accommodations in three out of the five schools. The most frequently be either ADHD (attention-deficit/hyperactivity disorder) or LD (learning disorder).

Conclusion: The information found is consistent with the national data which report that in a 4-year doctoral program, one of the four main disabilities to be expected is ADHD, and

that men will more likely be identified with disabilities than women. Academic accommodations are federally mandated for any student that self-identifies as having a disability. The population of students who have self-identified at this specific university is similar to other chiropractic schools that responded to an e-mail questionnaire. This study was a preliminary look at the similarities among chiropractic schools and the populations they serve for disabilities. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Modulation of Musculoskeletal Disorders in a Knowledge Worker Population With Chiropractic Care and Ergonomics: A Review and Feasibility Study

Charles W. Sherrod, DC, MPH, Robert E. Dubro, DC, and Dale F. Johnson, PhD, Life Chiropractic College West

Introduction and Purpose: There was a 1200% increase in the prevalence rates of musculoskeletal disorders (MSDs) in the United States from 1982 to 1994. This epidemic was recognized and addressed with extensive research and the implementation of many ergonomic safety management programs. The interventions from government agencies, safety management personnel, and health service providers resulted in a 30% decrease in MSDs for workers in all industries from 1995 through 2000. However, MSD-related injuries for knowledge (ie, "office") workers plateaued during the same period at 20 out of 26 new cases per 10,000 workers per year, accounting for nearly 80% of the MSD-related injuries of all workers in the United States. This feasibility study was undertaken to assess and characterize the prevalence of MSDs of knowledge workers and to correlate their complaints with the conditions of their ergonomic work environments. This study is the first of a series with the ultimate programmatic objective being to study the effectiveness of ergonomic intervention as an adjunct to chiropractic care for the knowledge worker.

Materials and Methods: Specialized assessment instruments were developed to characterize the ergonomic work environments and presenting complaints of a representative

population of knowledge workers ($n = 20$) at Life Chiropractic College West. Statistical correlations between the human factors, exposure risk variables, and the volunteers' self-reported complaints have been examined with SPSS statistical software.

Results: Sixteen of 20 participants (80%) reported neck pain in combination with either low back or extremity pain in the wrist or forearm. The observed ergonomic risk exposures and the root causation data from the assessments reveal a probable association with the reported neck, wrist, and back symptomatology. The principal causal factors indicated to correlate with these symptoms were (1) extended functional reach distances, (2) poor postural positioning at workstations, (3) prolonged sitting, and (4) repetitive tasking.

Discussion and Conclusion: There is strong evidence from both a comprehensive literature search and the results of this work that a clinically controlled study is necessary to determine the efficacy and effectiveness of ergonomics as an adjunct protocol in the chiropractic care of knowledge workers. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Spinal Manipulative Therapy Depresses Hyperalgesia and Abnormal Expression of c-Fos and PKC γ in the Dorsal Horn of the Spinal Cord in Rats With Lumbar Intervertebral Foramen Inflammation

Xue-Jun Song, MD, PhD, Xue-Song Song, MD, PhD, and Ronald L. Rupert, DC, MS, Parker College of Chiropractic Research Institute

Introduction: The authors have recently shown that Activator-assisted spinal manipulative therapy (SMT) significantly reduces pain and hyperalgesia following intervertebral foramen (IVF) inflammation in rats. This study further examined effects of SMT on IVF inflammation-induced expression of c-Fos and protein kinase C γ (PKC γ) representing neural hyperactivity and central sensitization in the spinal dorsal horn (DH).

Methods: Experiments were performed on 72 adult, male Sprague-Dawley rats. IVF inflammation was produced by injecting inflammatory soup (IS, 10 μ L) into IVF at L5. SMT was applied to the spinous process of L5 and L6. Thermal hyperalgesia was evaluated by measuring changes in latency of hindpaw foot withdrawal to radiant heat stimulation. DAB immunostaining for c-Foc and fluorescence

immunohistochemistry for PKC γ were used to stain c-Fos and PKC γ expression.

Results: The results showed that IVF inflammation produced significant hyperalgesia and increased expression of early gene c-Fos and PKC γ . Fos protein and PKC γ were rapidly increased in DH in response to IVF inflammation. Increase in expression of c-Foc and PKC γ began on day 1 to day 21, the last examined point, and peaked at 5 and 7 days after IVF inflammation. SMT significantly reduced hyperalgesia and the increased expression of c-Fos from day 5 to day 21, and PKC γ at day 5 and 7. The present studies confirm the authors' previous finding that

SMT significantly reduces severity and shortens duration of pain and hyperalgesia caused by lumbar IVF inflammation, and further demonstrate that SMT can reduce the neural hyperactivity and central sensitization exhibited by c-Fos and PKC γ in DH.

Conclusion: It was concluded that SMT can effectively reduce IVF inflammation-induced pain and hyperalgesia via inhibition of central sensitization in addition to faster elimination of the dorsal root ganglion inflammation. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Behçet's Disease in a Chiropractic Office: A Case Report

Gerald L. Stevens, DC, MS, MPH, New York Chiropractic College

Introduction and Purpose: Behçet's disease is rare inflammatory disorder in the United States. Approximately 44% of patients with this condition experience arthralgias in various joints and may present at a chiropractic office. The purpose of this paper is to educate practitioners about this rare condition.

Case Report: A detailed history, physical, orthopedic, neurological, and diagnostic exam was performed to assess the patient's condition. The patient appeared to have L4/L5, L5/S1 disc herniations according to testing performed. No pathologies were found with diagnostic imaging performed.

Discussion: In a patient with Behçet's disease, all efforts should be made to rule out blood clots, strokes, meningitis,

aneurysms, multiple sclerosis, ankylosing spondylitis, ulcerative colitis, and Crohn's disease. Corticosteroids, antibiotics, interferon, and even surgery may help for some patients. In this case, due to patient noncompliance, it cannot be determined if chiropractic is an effective treatment of the joint arthralgias that accompany this condition.

Conclusion: Multiple pathologies need to be ruled out with a multidisciplinary approach and various treatments, possibly including chiropractic, should be employed to manage this condition. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Implementing an Evidence-Based Journal Club in a Complementary and Alternative Medicine University

Barbara M. Sullivan, PhD, Christopher C. Wolcott, DC, Lauren A. Ashley, BA, Jerrilyn B. Cambron, DC, PhD, and Gregory D. Cramer, DC, PhD, National University of Health Sciences

Introduction: This report describes the organization and launch of one of the first evidence-based, complementary and alternative medicine (CAM) oriented journal club programs integrated into a professional CAM curriculum, designed to teach essential evidence-based practice (EBP) skills and behaviors.

Methods: Journal clubs were structured as required clinical hours for all DC students in a clinical internship during the 9th and 10th trimesters. Faculty, staff, and supervising clinicians were assigned mentoring roles. An information specialist videotaped presentations, distributed copies of papers, and organized electronic resources and archives. Students, separated into teams, defined patient scenarios, developed a clinical question, performed a literature search, and selected, appraised, presented, and discussed a research paper as a team project, self-assigning roles. An assessment was administered at the beginning and end of the program. Instructional resources covered essential

EBP concepts, searching skills and resources, and critical appraisal.

Results: Twenty-seven student-led journal clubs produced over three trimesters were attended by at least one librarian, one research faculty, and one supervising clinician in addition to the instructor and interns. Participation increased each trimester. All 27 articles were from peer-reviewed journals and focused on chiropractic, acupuncture, nutrition, emerging technologies, general medicine, and musculoskeletal or metabolic topics. Randomized controlled trials, cohort studies, systematic reviews, and case studies were among study designs selected. At least 24% of the discussions supported or initiated new therapies in the clinic. Twenty-two percent (22%) of graduating students expressed interest in participating in a postgraduate journal club, and 30% commented that the journal club course added value to their clinical experience.

Conclusion: The initial organization and launch of the evidence-based, CAM-oriented, internship-integrated journal club was successful. Interns' attitudes toward using EBP skills as part of their clinical decision making became more positive after two trimesters of participation. Funding

was provided by NIH/NCCAM #1R25AT002872. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Altered Central Integration of Dual Somatosensory Input Following Cervical Spine Manipulation

Heidi Haavik Taylor and Bernadette Murphy, University of Auckland

Introduction: Spinal manipulation of dysfunctional cervical joints has recently been shown to alter cortical processing and sensorimotor integration. The aim of the current study was to further explore the mechanisms for these changes by investigating whether a session of spinal manipulation of dysfunction cervical joints alters intrinsic inhibitory interactions within the somatosensory system.

Methods: The dual peripheral nerve stimulation somatosensory evoked potential (SEP) ratio technique was utilized in 13 subjects with a history of reoccurring neck stiffness and/or neck pain, but no acute symptoms at the time of the study. SEPs were recorded before and after a spinal manipulation and passive head movement intervention. Median and ulnar nerves were stimulated at the wrist (1-ms square wave pulse, 2.47 Hz, 1 × motor threshold). SEP ratios were calculated for the N9, N11, N13, P14–18, N20–P25, and P22–N30 peak complexes from SEP amplitudes obtained from simultaneous median and ulnar (MU) stimulation divided by the arithmetic sum of SEPs obtained from individual stimulation of the median (M) and ulnar (U) nerves.

Results: There was a significant decrease in the MU/M+U ratio for the cortical P22–N30 SEP component

following the cervical spine manipulations. The P22–N30 cortical ratio change was due to an increased ability to suppress the dual input as there was also a significant decrease in the amplitude of the MU recordings for the same cortical SEP peak (P22–N30) following the manipulations. No changes were observed following a control intervention.

Discussion: This study suggests that cervical spine manipulation may alter cortical integration of dual somatosensory input. These findings may help to elucidate the mechanisms responsible for the effective relief of pain and restoration of functional ability documented following spinal manipulation.

Conclusion: Cervical spine manipulation increases cortical filtering of dual somatosensory input from the upper limb in areas associated with sensorimotor integration. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Interexaminer Reliability of Measures of Cervical Active Range of Motion and Isometric Muscle Strength in Healthy Young Adults

Rodger Tepe, PhD, Kristan Giggey, DC, and Dennis Enix, DC, Logan College of Chiropractic

Objective: The primary objective of the current study was to investigate the interexaminer reliability of cervical active range of motion (AROM) and cervical isometric muscle strength (CIMS) in a sample of healthy young adults using computerized equipment designed for this purpose, the Multi-Cervical Unit (MCU). Secondary objectives were to compare cervical AROM and CIMS values between men and women participants and to begin developing a pool of reference data for the MCU.

Methods: Thirty consenting, healthy young adult participants received AROM and CIMS measurements in two sessions 2 days apart performed by trained student examiners. In each session, AROM was taken for flexion, extension, rotation, and lateral flexion, and CIMS was taken for flexion, extension, and lateral flexion. All measurements were automatically recorded by the MCU computer system. Interclass correlation coefficients (ICCs) and independent samples *t*-tests were calculated in SPSS 15.

Results: There were one good ICC (0.851) and five high ICCs (0.917–0.962) for AROM and four high ICCs (0.979–0.987) for CIMS. Comparisons between male and female participants showed no difference between the cervical AROM measures and significant differences between the CIMS measures (*p* values ranging from .0006 to .0075).

Conclusion: The primary results of this study demonstrate good to high interexaminer reliability for cervical active range of motion and high interexaminer reliability for cervical isometric muscle strength using the Multi-Cervical Unit. Cervical active range-of-motion measures were not different between male and female participants. Cervical isometric muscle strength measures were significantly greater for male participants than for female participants. (*This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.*)

Rehabilitation of a Cervical Kyphosis in a Previously Unresponsive Adolescent With Chronic Cervicogenic Symptoms From a Motor Vehicle Collision: A Case Report

Michael L. Underhill, DC, Private Practice, and Deed E. Harrison, DC, Private Practice and CBP NonProfit, Inc

Objective: The purpose of this paper is to describe the treatment of an adolescent male with chronic neck pain, headaches, and cervical kyphosis following a motor vehicle collision (MVC) injury, who was previously unresponsive to traditional chiropractic treatments over the course of 1 year.

Clinical Features: A 13-year-old male involved in a rear-impact MVC developed chronic neck pain, headache, and dizziness. The patient was diagnosed with cervical strain/sprain injury and intersegmental joint dysfunction. Initially, he was treated with Diversified and cranial-sacral chiropractic over the course of the 1st year and received only transient symptomatic reduction.

Intervention and Outcome: After being released from treatment with the initial chiropractor and 1 year after the MVC, the patient presented to a second chiropractor with the same types and intensity of cervical spine complaints that he experienced following the MVC. The second chiropractor utilized Chiropractic Biophysics (CBP) technique adjustments, exercise, and cervical extension traction to reduce forward head posture and a persistent cervical kyphosis

as the primary treatment interventions. Outcome measures included neck pain intensity and disability, pressure algometry, cervical range of motion (dual inclinometry), and lateral cervical radiographs. Following a 16-week course of treatment with 20 in-office sessions with the second chiropractor, the adolescent's cervical kyphosis returned to lordosis. His initial Neck Disability Index (NDI) was 37.5% and the 0–10 numerical rating scale (NRS) was a 7/10. Following CBP treatment, the NDI was 0% and NRS was 0. The patient discontinued treatment and 1-year follow-up showed a gradual partial return of symptoms: NDI = 6% and NRS = 1.5/10.

Conclusion: A previous unresponsive adolescent patient with chronic cervicogenic impairments as a result of a MVC and cervical kyphosis experienced an improvement in symptoms and function after the use of CBP rehabilitation protocols. The authors speculate that the positive improvements were due to restoration of the cervical lordosis. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Sympathetic and Parasympathetic Responses to Specific Chiropractic Adjustments of Subluxation of the Cervical and Thoracic Spine

Arlene Welch, DC, Ralph Boone, DC, PhD, and John Hart, DC, MHS, Sherman College of Straight Chiropractic

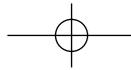
Objective: Chiropractors, and their patients as well, testify to the positive effects of chiropractic adjustments on their health, both musculoskeletal and visceral. Several studies have investigated the relationship between vertebral subluxation and autonomic function; however, few studies have been done to measure specific outcomes to specific levels adjusted. This study was conducted to investigate the response of the autonomic nervous system according to the area of the spine adjusted and to determine if a cervical adjustment elicits a parasympathetic response and a thoracic adjustment elicits a sympathetic response.

Methods: Institutional Review Board approval was obtained. Forty subjects were evaluated pre- and postadjustment for the following autonomic responses: heart rate variability, blood pressure, and pulse rate. A baseline was established for each subject. Subjects were adjusted twice on following visits. The subjects received either a cervical segment adjustment or a thoracic segment adjustment when indicated.

Results: Diastolic pressure dropped significantly postadjustment among those receiving cervical adjustments, indicating a sympathetic response, accompanied by a moderate (0.50)

clinical effect. Pulse pressure increased significantly among those receiving cervical adjustments, accompanied by a large effect size (ES, 0.82). Although the decrease in pulse pressure for those receiving thoracic adjustments was not statistically significant, the decrease was accompanied by a moderate ES (0.66). All other parameters associated with thoracic adjustments exhibited small to less than small ES. LF/LH ratios decreased following cervical adjustments due to increased parasympathetic activity, whereas increased LF/LH ratios following thoracic adjustments were due to increased sympathetic activity.

Conclusion: It is preliminarily concluded that cervical adjustments result in parasympathetic responses, whereas thoracic adjustments result in sympathetic responses. Further, it is concluded that these responses, sometimes significant and other times yielding a moderate to large clinical effect, but not statistically significant, serve collectively to demonstrate the specificity of autonomic responses in relation to the segment(s) adjusted. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*



Understanding Faculty Development Needs for Improving Participation in Scholarly Activities

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Introduction: Scholarship is a required function of faculty members at higher education institutions. In some institutions, the amount of published research is minimal. The reasons for the lack of publications, and thus scholarship, may be due to as yet unidentified knowledge barriers. Therefore, the purpose of this study was to assess the college faculty members' familiarity with various scholarship activities to assist in creating faculty development plans to increase scholarship performance.

Methods: An anonymous web-based survey (SurveyMonkey.com) was distributed to all full- and part-time faculty at an American university. The survey was designed to address the following five areas of scholarship: (1) familiarity with searching medical literature databases, (2) critical appraisal skills, (3) familiarity with study designs, (4) familiarity with statistics, and (5) information dissemination. The survey also had open-ended questions where faculty could provide additional comments regarding their performance of scholarship. Descriptive data from the survey were obtained through the use of the tools available in SurveyMonkey.

Results: An overall response rate of 47% was recorded. Of the 35 respondents, many self-reported adequate to excellent familiarity with case reports (87%), case series (72%), randomized controlled trials (RCTs) (66%), and surveys (57%); however, the number of faculty members who have engaged in these types of studies ranged from 7% (RCTs) to 47% (case reports). Sixty percent of these respondents also reported no to poor familiarity with statistics.

Conclusion: The results from this preliminary survey indicate faculty members have an adequate familiarity of various study designs; however, the number of faculty members engaged in clinical research is highly variable. The statistical section of the survey identified that there was limited familiarity in this area, which may represent a knowledge barrier to performing the more complex studies. Future development plans need to address these potential knowledge barriers and the faculty members' perceived lack of resources. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

Effects of Cooling Gel and Chiropractic Adjustments on Acute Low Back Pain

John Zhang, MD, PhD, Dennis Enix, DC, Brian Snyder, DC, Kristan Giggey, DC, and Rodger Tepe, PhD, Logan College of Chiropractic

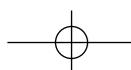
Introduction: This randomized controlled study was designed to determine the effect of Biofreeze body surface application on acute low back pain (LBP) subjects in conjunction with chiropractic care.

Methods: The data (LBP questionnaires, visual analog scale, heart rate variability [HRV], and EMG) were collected at the baseline, 2 weeks after treatments and at the end of 4 weeks of treatment for final analyses. Diversified manual adjustments twice a week for 4 weeks were provided by licensed chiropractors. All subjects were required to come to the Research Department to complete the adjustments. Biofreeze was applied to the lower back area three times a day for 4 weeks.

Results: A total of 36 subjects were recruited in the study with 25 males and 11 females. The average age was 34 years old. Significant pain reduction was found after 4 weeks of treatments ($p < .05$). Significant pain reduction was not

observed in the control group. Significant increase of the SDNN index in the HRV was found in the experimental group after 4 weeks of Biofreeze and chiropractic adjustments ($p < .05$). Significant increase of the RMSSD was found in the experimental groups after 4 weeks of Biofreeze and chiropractic adjustments ($p < .05$). No significant changes were found in heart rate and other HRV measurements. There were no statistically significant changes in the EMG readings between the two groups.

Conclusion: Significant reduction of acute low back pain was seen after using the body surface cooling gel when compared with a control group. Significant improvement was also seen in SDNN and RMSDD readings in the treatment group. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*



Laser Therapy for Chronic Knee Pain

John Zhang, MD, PhD, Logan College of Chiropractic, and **Nelson Marquina**, DC, PhD, Clinical Technologies Research

Introduction: The objectives of this study were to evaluate the safety and efficacy of laser therapy on knee pain. Chronic knee pain can be related to disease such as osteoarthritis or associated with overuse or untreated injuries to muscles, ligaments, or tendons. Other investigators have observed beneficial effects in randomized controlled trials of low-level laser irradiation in the treatment of knee pain associated with osteoarthritis.

Methods: A randomized placebo-controlled clinical trial to evaluate an adjunct treatment modality for pain associated with knee disorders utilizing a therapeutic (nonsurgical) laser is presented. A therapeutic laser was used as an adjunctive modality to standard treatment for knee pain using chiropractic techniques. The primary endpoint was measured by the visual analog scale (VAS) assessment of pain levels on a scale of 0–10. The success criteria for an individual patient in this study was an improvement of 30% or more in the VAS from baseline to 12th treatment and/or an improvement of 20% or more in the VAS from baseline to 30-day follow-up evaluation.

Results: Of the 122 subjects enrolled, 101 completed the 30-day follow-up evaluation. The data show the percent improvement in the pain level for the Active Laser (A) group of 52.9% as compared with 35.9% for the Sham Laser group between pretreatment baseline mean values and the mean values from the 12th-treatment VAS values. The data are inclusive of all participants, not just those meeting the success criteria.

Conclusion: The data obtained in the study demonstrated that the therapeutic laser provided significant relief in knee pain. *(This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*