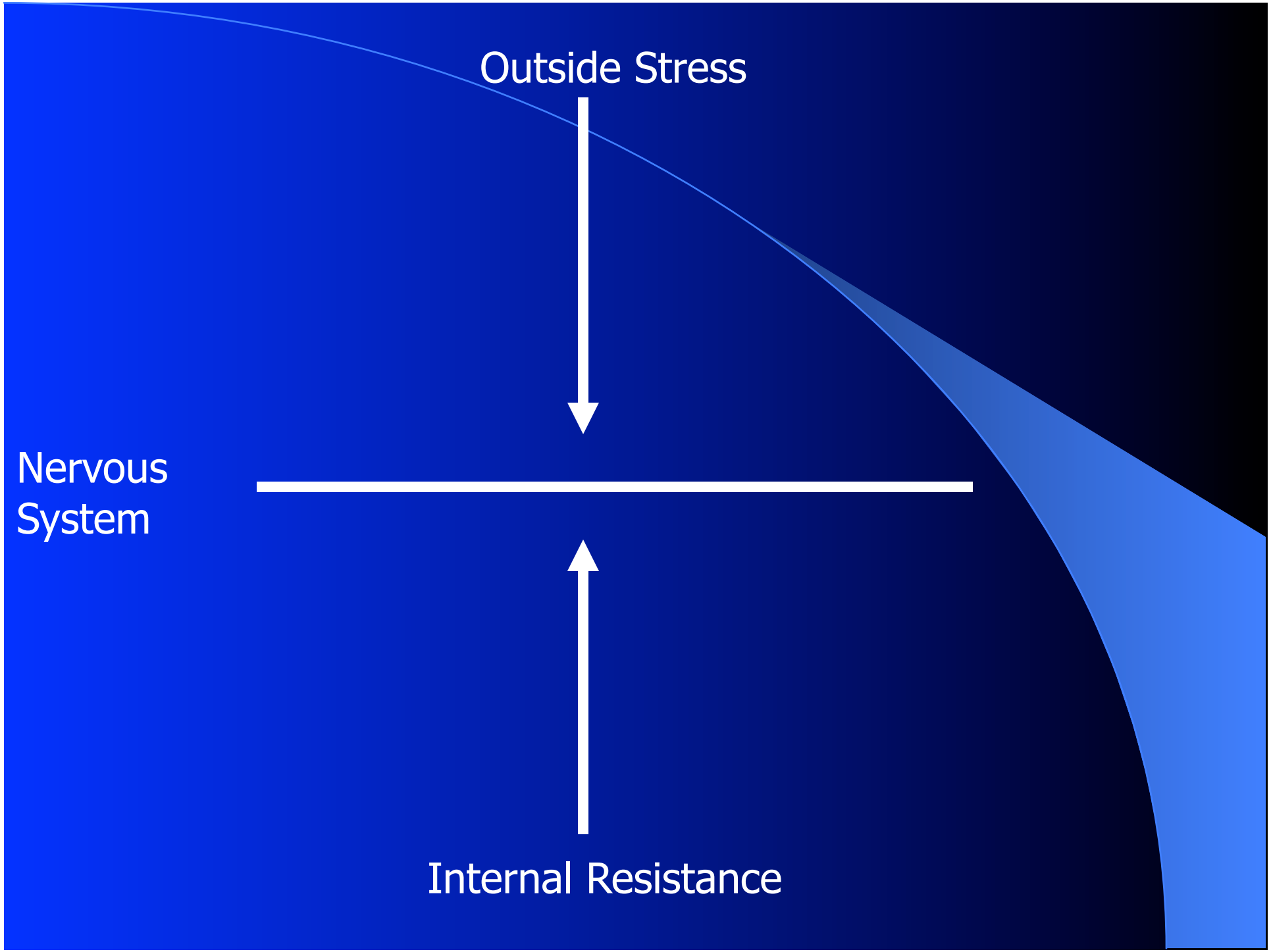
Maladaptive Responses to Vertebral Subluxation


Outside Stress
Nervous System
Internal Resistance

3 Reasons for Failure of This System:

1. Increase in Outside Stress
2. Decrease in internal resistance
3. Impaired Nervous System

Maladaptive Responses to Vertebral Subluxation

1. ↑ Fatigue
2. Impaired Immune Response
3. Altered Metabolism/Physiology
4. ↓ Clarity of Thought
5. Altered Behaviors (Reward Cascade)
6. Genetic Expression

Objective Physiologic Changes and Associated Health Benefits of Chiropractic Adjustments in AsymptomaticSubjects: A Review of the Literature

Sean M. Hannon, BA, DC

Statistically significant improvements in:

- Respiration
- Range of motion
- Heart rate variability
- Autonomic function
- Endocrine function
- Cardiovascular function
- Immune function
- Muscle strength
- Overall athletic ability

Hannon Con't…

- Neurocognitive functions
- Reaction-time
- Information processing,
- Visual acuity,
- Stress
- Reproductive hormones,
- Healing
- Recovery time,
- General health of senior citizens,
- Reduced labor times

Hannon - Conclusion

"Considering that these initial findings document objectively measured physiologic changes and their associated health benefits in nearly every major system of the human body, it is plausible that chiropractic care may benefit every function of the body.

Furthermore, these data are congruent with numerous *subjective* studies that suggest chiropractic care is associated with accruing, long-term, overall health benefits."

Impaired Immune Response

- Enhanced Respiratory Burst
- Increased CD 4 Counts
- Crohn's Disease
- Serum Thiol
- Cortisol

Enhanced Respiratory Burst

Brennan et al: Enhanced neutrophil respiratory burst as a biological marker for manipulation forces.

JMPT Vol. 15 # 2 Feb. 1992.

Increased CD 4 Counts

Selano, Grostic et al: The effects of specific upper cervical adjustments on the CD4 counts of HIV positive patients. CRJ. Vol 3. # 1. 1994.

"A 48% increase in CD4 cells was demonstrated over the six month duration of the study for the adjusted group."

CD 4

Five HIV+ subjects receiving six months of upper cervical chiropractic care.

These subjects were compared to 5 HIV+ controls that received sham adjustments for six months.

All 5 patients' CD4 cell counts in the adjusted group increased, two of which increased by more than 125% each.

Conversely, 4 of 5 patients in the sham adjustment group's CD4 values decreased, demonstrating a 7.96% overall decrease in CD4 cell counts.

Crohn's Disease

Takeda et al:

Long term remission and alleviation of symptoms in allergy and Crohn's disease patients following spinal adjustment for reduction of vertebral subluxations. JVSR Vol 4. # 4. 2002

Takeda – Crohn's

"Conclusion: According to the results of this study the possibility may be considered that chronic nerve compression secondary to vertebral subluxation in the thoracic and lumbar regions had a significant effect on the immune function of these allergy and Crohn's disease patients.

It is further postulated that this nerve compression leads to a chronic *functional* disorder having a significant effect on digestion, absorption of nutrients and liquids, conveyance of food as well as various other functions of the digestive tract extending to excretion."

Cortisol

- Whelan et al: The effects of chiropractic manipulation on salivary cortisol levels. JMPT. 2002 (25)3

Cortisol - Tuchin

Measured the effects of chiropractic adjustment on salivary cortisol levels in nine subjects.

Pre- and post- adjustment data revealed a statistically significant reduction of salivary cortisol over the 5-week study.

These findings are significant because salivary cortisol levels closely reflect serum cortisol levels. Elevated serum levels of cortisol have been associated with disturbed concentration, tremors, elevated heart rate and overall stress.

Immunoglobulins

Alcorn documented increases in immunoglobulins IgA, IgG, and IgM in 3 out of 4 subjects (75%) following two-weeks of chiropractic care.

Immunoglobulins increased concurrently with the subjective improvement in the subjects' neuromusculoskeletal conditions.

Chiropractic treatment and antibody levels. Alcorn, S. Journal of the Australian Chiropractic Association. 1977.

B- Lymphocytes

Vora and Bates showed a significant increase in circulating B-lymphocytes in 5 of 8 patients (63%) with radiographically proven NMS conditions following 4 weeks (eight sessions) of chiropractic adjustments.

All 5 patients demonstrated a statistically significant increase well over 100% of their initial value. One of the 5 patients demonstrated over a 200% increase in circulating B-lymphocytes.

Two patients showed a decrease that was statistically insignificant, and the remaining patient showed no significant change.

Vora G, Bates H. The effects of spinal manipulation on the immune system. Am Chiropr Assoc J Chiropr 1980; 4:S103-5

Prostaglandins

Kokjohn *et al.*

24 women into an experimental group

21 women into a control/sham group.

All women had a history of primary dysmenorrhea.

The experimental group received chiropractic adjustments to all clinically relevant vertebral levels within T10 and L5-S1, and the sacroiliac joints.

J Manipulative Physiol Ther. 1992 Jun;15(5):279-85.

The effect of spinal manipulation on pain and prostaglandin levels in women with primary dysmenorrhea.

Prostaglandins

Results:

A significant reduction in plasma levels of KDPGF2a (Prostaglandin Metabolite) in the adjusted group.

The control/sham group also demonstrated a significant reduction; however, pain and menstrual distress reductions were nearly twice as great in the chiropractic group.

J Manipulative Physiol Ther. 1992 Jun;15(5):279-85.

The effect of spinal manipulation on pain and prostaglandin levels in women with primary dysmenorrhea.

Lipids

The effects of regular chiropractic care to changes in lipid metabolism in ten randomly selected subjects exposed to a stressful environment.

Retrospective study

Assessed lab values over a period of one to three years.

The impact of chiropractic care on established cardiac risk factors: a case study. Childs, N., Freerksen S and Plourde A. Chiropractic: the J of Chiropractic Research and Clinical Investigation. Vol. 8 No. 2, July 1992.

Lipids - II

Results showed:

- Total Cholesterol (TC) and Low Density Lipid (LDL) levels decrease in 70% of subjects.
- Sixty-six (66%) percent of subjects classified as “borderline high to high risk” for TC fell to desirable range
- Eighty (80%) percent of subjects initially classified as “borderline high to high risk” for LDL fell to desirable levels
- Fifty (50%) percent of subjects attained optimal range for Cardiac Risk Factors
- 90% of subjects, Triglyceride levels dropped while under regular chiropractic care.

The impact of chiropractic care on established cardiac risk factors: a case study. Childs, N., Freerksen S and Plourde A. Chiropractic: the J of Chiropractic Research and Clinical Investigation. Vol. 8 No. 2, July 1992

Lipids III

This study demonstrated a tentative correlation between regular chiropractic care and improvement of the blood lipid levels. The correlation established is of significance since it is widely accepted that blood lipid levels are excellent in assessing the risk associated with premature coronary heart disease.

The impact of chiropractic care on established cardiac risk factors: a case study. Childs, N., Freerksen S and Plourde A. Chiropractic: the J of Chiropractic Research and Clinical Investigation. Vol. 8 No. 2, July 1992.

Altered Metabolism/ Physiology

Tran & Kirby: Decreased pulse pressure & increased diastolic pressure

- 18 males, 2 females, 20–30 years
- C/S HVLA

Outcome Measures:

- HR, systolic and diastolic BP

Authors concluded HVLA increased systolic and diastolic BP

Tran TA, Kirby JD. The effects of upper thoracic adjustment upon the normal physiology of the heart. ACA J Chiropr 1977a;8:S25–8.

Blood Pressure

McKnight & Deboer: Statistically significant changes in blood pressure in normotensive" subjects with upper cervical subluxations.

McKnight M, DeBoer KF. Preliminary study of blood pressure changes in normotensive subjects undergoing chiropractic care. J Manipulative Physiol Ther 1988;11(4):261–6.

Blood Pressure

- 75 subjects
- 20–35 years of age
- C/S HVLA
- (n = 53) C/S motion
- Palpation (n = 22)
- Systolic and diastolic BP Decreased

McKnight M, DeBoer KF. Preliminary study of blood pressure changes in normotensive subjects undergoing chiropractic care. J Manipulative Physiol Ther 1988;11(4):261–6

Blood Pressure

Yates *et al.*

*R*andomized, controlled trial examining the effects of upper thoracic chiropractic adjustments on blood pressure in twenty-one subjects with elevated blood pressure.

Only subjects demonstrated to have thoracic vertebral subluxations were randomly assigned to one of three groups: active, placebo, or control.

J Manipulative Physiol Ther. 1988 Dec;11(6):484-8.
Effects of chiropractic treatment on blood pressure and anxiety: a randomized, controlled trial.

Blood Pressure – Yates II

Results:

- Subjects in the active group showed statistically significantly decreases in both systolic and diastolic blood pressure.
- Placebo and control groups demonstrated no such changes and did not differ significantly from each other.
- Results support that adjustment of thoracic subluxation significantly reduces blood pressure of patients with elevated blood pressure.

J Manipulative Physiol Ther. 1988 Dec;11(6):484-8.
Effects of chiropractic treatment on blood pressure and anxiety: a randomized, controlled trial.

Dysrhythmias

- Jarmel and Zatkin demonstrated improvement of cardiac autonomic regulation following chiropractic adjustments in eleven subjects presenting with dysrhythmic abnormalities.

- Following one month of chiropractic care, a positive trend in the number of ventricular beats, ischemic events, maximum time of ST segment depression, elimination of after-depolarizations, and enhanced heart rate variability was observed. Findings were measured with a 24-hour ECG.

Improvements of cardiac autonomic regulation following spinal manipulative therapy. Jarmel ME, Zatkin JL, Charuvastra E, Shell WE. Presented at the July 1995 Chiropractic Centennial event in Washington, DC.

Dysrhythmias - Results

Following one month of chiropractic care there was positive trend in:

- The number of ventricular beats,
- Ischemic events,
- Maximum time of ST segment depression,
- Elimination of after-depolarizations,
- Enhanced heart rate variability was observed.

Improvements of cardiac autonomic regulation following spinal manipulative therapy. Jarmel ME, Zatkin JL, Charuvastra E, Shell WE. Presented at the July 1995 Chiropractic Centennial event in Washington, DC.

Sudden Cardiac Death

Sudden cardiac death may arise from abnormal nerve firings. The author proposes that mechanical irritation of upper thoracic vertebral joints may cause abnormal heart nerve firings.

In this study, eleven patients without a prior history of myocardial infarction who had signs of heart rhythm abnormalities received “spinal manipulative therapy.” After one month, heart rhythm and function improved. The author writes “Spinal manipulative therapy significantly enhance(s) cardiac autonomic balance.”

Improvements of cardiac autonomic regulation following spinal manipulative therapy. Jarmel ME, Zatkin JL, Charuvastra E, Shell WE. Presented at the July 1995 Chiropractic Centennial event in Washington, DC.

Cardiac Dysfunction

Lott *et al.*

- Described four case studies of patients presenting with cardiac dysfunction as monitored by ECG.
- Patients received osseous chiropractic adjustments (and diet/exercise recommendations) over a time period ranging from 5 to 16 months.

Lott GS, Sauer AD, Wahl DR, Kessinger J "ECG Improvements Following the Treatment Combination of Chiropractic Adjustments, Diet, and Exercise Therapy" Chiropractic: The Journal of Chiropractic Research and Clinical Investigation 1990; 6(2): 37-39.

Cardiac Dysfunction - Lott

- Improvements in ECG recordings were seen in all four cases.
- Significant improvements were seen in three of four subjects as indicated on ECG.
- Two subjects had significant reductions in blood pressure and pulse rate and one subject showed probable elimination of ischemia in the myocardium.

Lott GS, Sauer AD, Wahl DR, Kessinger J "ECG Improvements Following the Treatment Combination of Chiropractic Adjustments, Diet, and Exercise Therapy" Chiropractic: The Journal of Chiropractic Research and Clinical Investigation 1990; 6(2): 37-39.

Diabetes

Dickinson:

- 31 diabetic volunteers receiving chiropractic spinal adjustments and interferential therapy. Volunteers were measured using the Imex 301 Doppler Ultrasound Tracings multiple times over the course of the 5-week study.
- 27 of 31 volunteers (87%) demonstrated increased circulation.
- No measurable changes were observed in 3 volunteers. Dramatic subjective improvement was also noted in nearly all volunteers.

Dickinson RL “Effects of Chiropractic Spinal Adjustments and Interferential Therapy in the Restoration of Peripheral Circulatory Impairment in the Lower Extremities of Diabetics” Chiropractic 1988;1(1): 18-24.

Ulcers

Pikalov and Kharin:

- Chiropractic adjustments for the treatment of 11 adults with duodenal ulcers experienced clinical remission an average of 10 days earlier than 24 control subjects receiving traditional medical care for the same condition.

- Remission was confirmed with endoscopy.

Pikalov AA, Kharin VV “Use of Spinal manipulative Therapy in the Treatment of Duodenal Ulcer: A Pilot Study” J Manipulative Physiol Ther 1994; 17(5): 310-313.

Autonomics - HRV

- Zhang measured the effect of chiropractic care on the autonomic nervous systems of twenty-six “normal” volunteers measured by way of Heart Rate Variability (HRV), After one year of chiropractic care the LF/HF ratio changed significantly indicating an increased parasympathetic stimulation, which is associated with a slower heart rate and less anxiety and worry. Zhang notes that this finding is significant because a reduced heart rate can potentially reduce heart attack and other cardiovascular diseases by increasing cardiac reserve and nutrient supply to cardiac muscles.

Zhang J. “The Effects of Chiropractic Care on Short-Term Power Spectrum Analysis of Heart Rate Variability: Abstract from the Sixth Annual National Subluxation Conference” J Vertebral Subluxation Res. 1998; 2(4).

Autonomics

Gibbons et al. studied thirteen “healthy male subjects… without a history of eye disease of central or autonomic nervous system pathologic conditions.”

They demonstrated that upper cervical adjustment can produce a significant, measurable increase in speed of the autonomically mediated edge light pupillary cycle time (ELPCT), that is, a decrease in the time it takes to complete constriction and redilation of the pupil when exposed to light.

These findings suggest an interrelation between somatic and autonomic function and therefore, a more diverse effect on cortical function.

Gibbons, PF, Gosling, CM, Holmes, M. “Short-Term Effects of Cervical Manipulation on Edge Light Pupil Cycle Time: A Pilot Study” J Manipulative Physiol Ther 2000; 23(7): 465-469.

Autonomic Responses

Briggs and Boone measured:

Autonomic response monitored as a change in pupillary diameter in eight subluxated subjects.

All subjects were “screened by a licensed optometrist for visual acuity of 20/20, an accommodative convergence / accommodative ratio of 5 or less, and an accommodative system free of pathology.”

Briggs L, Boone WR “Effects of a Chiropractic Adjustment on Changes in Pupillary Diameter: A Model for Evaluating Somatovisceral Response” J Manipulative Physiol Ther 1988; 11(3): 181-189.

Boone – Pupillary Rxn.

Eight out of eight (100%) subluxated subjects demonstrated a 50% or greater change in variables following a single adjustment to the upper cervical spine.

Six of seven sham-adjusted subjects acting as controls demonstrated no such change. The authors conclude that autonomic somato-visceral reflexes of a non-specific nature can be elicited following a chiropractic adjustment.

Briggs L, Boone WR "Effects of a Chiropractic Adjustment on Changes in Pupillary Diameter: A Model for Evaluating Somatovisceral Response" J Manipulative Physiol Ther 1988; 11(3): 181-189.

Visual Acuity

- Measured visual acuity in 67 subjects following six weeks of upper cervical chiropractic care.
- Statistically significant improvements for the whole population were demonstrated in the right & left eye.
- Kessinger concluded that vision changes do occur following upper cervical chiropractic adjustments.

Kessinger R, Boneva D “Changes in Visual Acuity in Patients Receiving Upper Cervical Specific Chiropractic Care” J Vertebral Subluxation Res. 2(1) 1998; pp. 43-49.

Autonomic Reactions – Blood Flow

Harris and Wagnon studied the effects of chiropractic adjustments on distal skin temperatures in 196 subjects.

Demonstrated that chiropractic adjustments significantly affect temperature in tissues distant from the spine and that these changes will vary depending upon which area of the spine is adjusted.

Harris W, Wagnon RJ "The Effects of Chiropractic Adjustments on Distal Skin Temperature" J Manipulative Physiol Ther 10(2) 1987; pp. 57-60.

Autonomics - Blood Flow

- 84% of adjustments given in the C1-C7 area and/ or L4-L5 area inhibited sympathetic nervous system outflow (a temperature increase),
- Adjustments in the T1- L2 region stimulated the SNS (a temperature decrease) 67% of the time.
- These findings suggest a regulatory effect of chiropractic adjustments and an important aspect of maintaining proper homeostasis.

Harris W, Wagnon RJ "The Effects of Chiropractic Adjustments on Distal Skin Temperature" J Manipulative Physiol Ther 10(2) 1987; pp. 57-60.

Pulmonary Effects

- Miller
- Menon
- Masarsky & Weber
- Kessinger

Cardiopulmonary Physiology

Miller et al:

The effects of manipulation and soft tissue massage on human endurance and cardiac and pulmonary physiology. J. Sports Chiro. & Rehab. March 2000.

Cardiopulmonary Physiology

Miller Studied several variables related to endurance or cardiac and pulmonary physiology in nine “healthy, active”volunteers following chiropractic adjustment to the cervical and thoracic spine.

The chiropractic group demonstrated a 6.1% increase in Maximal Aerobic Capacity (VO2 max), a 3.9% increase in Overall Work (Power Output), a 2.6% increase in Peak Heart Rate and peak systolic blood pressure. Neither control nor secondary intervention (soft tissue massage) subjects demonstrated such changes.

The effects of manipulation and soft tissue massage on human endurance and cardiac and pulmonary physiology. J. Sports Chiro. & Rehab. March 2000.

Pulmonary Effects - Menon

Menon *et al.* Studied the effect of thoracic spinal adjustment on the peripheral airway function of twenty-two “normal, asymptomatic” subjects.

Using dry spirometry, Forced Expiratory Flow Rate (FEF) was measured as an indicator of airway function. Paired t-tests were performed between pre- and post-measurements. FEF values showed a significant post-intervention reduction.

Menon M, Plaugher G, Jansen R, Dhami MSI, Sutowski J “Effect of Thoracic Spinal Adjustment on Peripheral Airway Function in Normal Subjects - A Pilot Study” Conference Proceedings of the Chiropractic Centennial Foundation 1995; July 6-8: 244-245.

Pulmonary Effects - Masarsky

Report on the lung volumes of 50 patients. 43 of 50 (86%) subjects were essentially “lung normal” in FVC by spirometric criteria.

Improved FVC values were noted in 35 of these 43 “lung-normal” subjects.

Results were significant at the .01 level.

Improved FEV- 1 values were also observed in 29 subjects and were significant at the .05 level.

The authors specifically stated that it was of particular interest to observe the improved lung volumes in a group of essentially “lung-healthy” patients.

Masarsky CS, Weber M “Chiropractic and Lung Volumes - A Retrospective Study” ACA Journal of Chiropractic 1986; 20(9): 65-67.

Pulmonary Effects - Kessinger

Kessinger measured changes in pulmonary function associated with upper cervical chiropractic adjustments on 55 subjects. Twenty-two of 55 (40%) were “typical” subjects, that is, they presented within “normal” range of Forced Vital Capacity (FVC) values.

Following two weeks of chiropractic care 73% of these “typical,” normal range subjects further improved FVC values by 6%.

Kessinger R “Changes in Pulmonary Function Associated with Upper Cervical Specific Chiropractic Care” J Vertebral Subluxation Res. 1997; 1(3): 43-49.

Pulmonary Effects - Kessinger

Overall results of the study indicated that pulmonary function improves significantly in subjects under upper cervical chiropractic care.

Kessinger R "Changes in Pulmonary Function Associated with Upper Cervical Specific Chiropractic Care" J Vertebral Subluxation Res. 1997; 1(3): 43-49.

Altered Behavior

- Anxiety
- Addiction
- Depression
- ADHD
- Relaxation
- Cognitive Function

Anxiety

Goff et al: Explored the relaxation response as it relates to the correction of subluxation via chiropractic adjustment.

Relaxation response measured through:

- EMG potentials
- Spinal ROM
- Anxiety levels

Goff PJ, McConnell E, Paone P "The Effect of Chiropractic Adjustment on Frontalis EMG Potentials, Spinal Ranges of Motion and Anxiety Level" Chiropractic: The Journal of Chiropractic Research and Clinical Inverstigation 1991; 7(1): 4-9.

Anxiety – Goff et al

Twenty-six adults determined to have a subluxation, "but not having a diagnosis of other clinically significant disorders" were used.

Results indicated a significant change occurred in the chiropractic group as compared to the 23 controls. Adjustments facilitated a considerable decrease in patient muscle tension.

Goff PJ, McConnell E, Paone P "The Effect of Chiropractic Adjustment on Frontalis EMG Potentials, Spinal Ranges of Motion and Anxiety Level" Chiropractic: The Journal of Chiropractic Research and Clinical Inverstigation 1991; 7(1): 4-9.

Anxiety - Behrendt

- Patient history revealed physical, emotional, and chemical stresses including multiple motor vehicle accidents, childhood emotional abuse from an alcoholic father, and smoking daily since age 17.
- Exams and EMG scans revealed evidence of chronic vertebral subluxations in multiple locations, and altered spinal curves in cervical and thoracic areas.
- Diversified Technique was utilized, with adjustments applied to specific vertebra to promote restoration of proper nerve function. Improvement was noted after the first adjustment.
- 50% reduction in anxiety, 30% reduction in headache symptoms, and increased mobility in neck.

The Impact Of Subluxation Correction On Mental Health: Reduction Of Anxiety In A Female Patient Under Chiropractic Care. Madeline Behrendt, D.C., Nathan Olsen, D.C. Journal of Vertebral Subluxation Research ~ September 20, 2004 ~ Pages 1-10

Athletic Performance

Lauro measured changes in:

- agility
- balance
- kinesthetic perception
- power
- speed reaction

24 “asymptomatic” athletes, measured at six and twelve weeks care and compared to 22 control athletes.

Lauro A, Mouch B “Chiropractic Effects on Athletic Ability” Chiropractic: The Journal of Chiropractic Research and Clinical Investigation 1991; 6(4): 84-87.

Athletic Performance - Lauro

Results of the first six weeks revealed a 10.57% improvement in the chiropractic group and only a 4.5% improvement for controls.

The twelve week evaluation demonstrated further improvement of 16.7%.

The authors stated that the data supports that *"the correction of the subluxation complex enables the body to function and perform at a higher level."*

Lauro A, Mouch B "Chiropractic Effects on Athletic Ability" Chiropractic: The Journal of Chiropractic Research and Clinical Investigation 1991; 6(4): 84-87.

Athletic Performance - Dancers

Waters & Boone investigated subluxation indicators such as:

- Leg imbalance
- Pelvic distortion,
- Cervical syndrome

and their correlation with a poorer performance of fourteen “female dancers.”

Waters, KD, Boone, WR. “The Relationship of Spinal Misalignment Elements to Muscle Imbalance in Dance Performance” Chiropractic: The Journal of Chiropractic Research & Clinical Investigation 1988; July pp. 49-57.

Athletic Performance - Dancers

- The presence of indicators associated with subluxation were negatively associated with the overall dance performance relative to muscle balance.
- Overall dance performance was rated high in individuals exhibiting no spinal misalignment elements
- Lower in individuals exhibiting spinal misalignment elements.

Waters, KD, Boone, WR. “The Relationship of Spinal Misalignment Elements to Muscle Imbalance in Dance Performance” Chiropractic: The Journal of Chiropractic Research & Clinical Investigation 1988; July pp. 49-57.

Muscle Strength - Unger

Sixteen patients underwent a course of chiropractic pelvic blocking of the Sacro-occipital Technique (SOT) protocol.

Using a dynamometer, measurements of muscle strength were assessed before and immediately after the chiropractic adjustments.

Unger J "The Effects of a Pelvic Blocking Procedure Upon Muscle Strength: A Pilot Study" Conference Proceedings of the Chiropractic Centennial Foundation 1995; July 6-8: 376-377.

Muscle Strength – Unger II

There was a significant difference in muscle strength noted in the Left and Right (L&R) pectoralis major sternal, Left pectoralis major clavicular, L&R anterior deltoid, L&R Latismus dorsi, L&R psoas, L&R tensor fascia lata, L&R adductor muscle, and L&R gluteus medius.

The results of this study suggest that the chiropractic SOT pelvic blocking procedure produced a general increase in muscle strength.

Unger J "The Effects of a Pelvic Blocking Procedure Upon Muscle Strength: A Pilot Study" Conference Proceedings of the Chiropractic Centennial Foundation 1995; July 6-8: 376-377.

Muscle Strength

Rebechini-Zasadny *et al.* Noted significant increases in the strength of the first dorsal interosseous muscle during isometric contraction following chiropractic adjustments to the cervical spine.

The twelve volunteers involved were measured using EMG. Improvement in finger muscle strength following adjustment to the cervical spine demonstrates how chiropractic adjustments can have benefit distal to the locality of adjustment.

Zasadny HR, Tasharski CC, Heinze WJ "Electromyographic Analysis Following Chiropractic Manipulation of the Cervical Spine: A Model to Study Manipulation Induced Peripheral Muscle Changes" J Manipulative Physiol Ther 1981; 4(2): 61-63.

Muscle Strength - McCoy

- Results showed significant differences in three range of motion variables at presentation; left cervical rotation, right and left lateral cervical flexion, and one muscle strength variable at the point of MCI, right shoulder rotation.
- Collectively, in association with subluxation-based chiropractic care, the subject population showed significant increases in cervical flexion and extension, muscle strength, and a decrease in the neck pain disability index.
- Atlas/axis and Jackson's angles varied inversely from presentation to MCI, providing information for a model describing possible cervical dynamics during the restorative process following whiplash injury.

A Multiple Parameter Assessment of Whiplash Injury Patients Undergoing Subluxation Based Chiropractic Care: A Retrospective Study. Harold McCoy, D.C. and Matthew McCoy, D.C.
Journal of Vertebral Subluxation Research ~ Volume 1 ~ Number 3 ~ Pages 1-11

Muscle Inhibition & Activation

- Effects of sacroiliac spinal adjustments on 18 patients w/ knee pain.
- Torque, muscle inhibition and muscle activation for the knee extensor muscles were measured using a Cybex dynamometer before and after chiropractic adjustments.
- Increases in knee extensor torque and muscle activation were observed following adjustments.
- A decrease in muscle inhibition was also observed. Furthermore, muscle inhibition was decreased in both legs following adjustments for patients with bilateral anterior knee pain.

Suter E, McMorland G, Herzog W, Bray R "Decrease in Quadriceps Inhibition After Sacroiliac Joint Manipulation in Patients with Anterior Knee Pain" J Manipulative Physiol Ther 1999; 22(3): 149-153.

Cognitive Function

Kessinger and Boneva demonstrated significant improvements in neurocognitive function in 30 subjects receiving 4 weeks of upper cervical care compared to 10 control subjects who did not demonstrate a similar trend.

Cognitive function was measured via the computer administered and scored test, Microcog.

Kessinger R, Boneva D "Neurocognitive Function and the Upper Cervical Spine" CRJ 1999; 6(2): 88-89.

Cognitive Function - Kessinger

Microcog measures:

- Attention/mental control
- Memory
- Reasoning/calculation
- Spatial processing
- Reaction time
- Information processing speed
- Information processing accuracy
- General cognitive functioning
- General cognitive proficiency

Kessinger R, Boneva D "Neurocognitive Function and the Upper Cervical Spine" CRJ 1999; 6(2): 88-89.

Cortical Processing

Kelly, Murphy, and Backhouse:

Utilized a mental rotation reaction-time paradigm to assess changes in cortical processing following chiropractic adjustments. Thirty-eight volunteers were tested in this study. The average decrease (improvement) in reaction time for the experimental group was 14.9%. The control group improvement of only 8% was attributed to a learning curve effect. The study demonstrated a small but statistically significant improvement in cognitive function after a single adjustment.

Kelly DD, Murphy BA, Backhouse DP "Use of a Mental Rotation Reaction-Time Paradigm to Measure the Effects of Upper Cervical Adjustments on Cortical Processing: A Pilot Study" J Manipulative Physiol Ther 2000; 23(4): 246-252.

Cortical Processing - Kelly

The average decrease (improvement) in reaction time for the experimental group was 14.9%. The control group improvement of only 8% was attributed to a learning curve effect.

The study demonstrated a small but statistically significant improvement in cognitive function after a single adjustment.

Kelly DD, Murphy BA, Backhouse DP "Use of a Mental Rotation Reaction-Time Paradigm to Measure the Effects of Upper Cervical Adjustments on Cortical Processing: A Pilot Study" J Manipulative Physiol Ther 2000; 23(4): 246-252.

Hemisphericity

- Double blind study
- 500 subjects
- Demonstrated, by way of visual field blind spot analysis, that adjustment activates specific neurological pathways associated with cortical hemisphericity.
- The clinical results attributed to upper cervical spinal adjustment occur as a consequence of the integration of variables that sum to promote human brain function.

Carrick FR “Changes in Brain Function after Manipulation of the Cervical Spine” J Manipulative Physiol Ther 1997; 20(8): 529-545.

Athletic Performance

Schwartzbauer *et al.* Demonstrated significant improvement in the performance of twenty-one male college "athletes" who were "free from physical injury."

After fourteen weeks of chiropractic care the athletes showed significant improvement in muscle strength, long jump distance, and capillary counts.

Schwartzbauer J, Kolber J, Schwartzbauer M, Hart J, Zhang J "Athletic Performance and Physiological Measures in Baseball Players Following Upper Cervical Chiropractic Care: A Pilot Study" J Vertebral Subluxation Res. 1997; 1(4): 33-39.

Athletic Performance

Grimston *et al*

- 16 female distance runners w/ SI subluxation
- 12 sessions adjustments (& Rehab) over 4-weeks
- 4 control subjects
- Statistically significant decrease in lumbo-pelvic asymmetry was observed.
- All 12 subjects with sacroiliac subluxation had reinstated their preinjury training mileage.
- 5 of 12 (» 40%) reported their personal best in 10K
- 2 subjects had personal best times for marathon
- All subjects reported enhanced awareness of posture and flexibility in addition to reduced symptoms.

GrimstonSK, Engsberg JR, Shaw L, Vetanze NW "Muscular Rehabilitation Prescribed in Coordination with Prior Chiropractic Therapy as a Treatment for Sacroiliac Subluxation in Female Distance Runners" Chiropractic Sports Medicine 1990; 4(1): 2-8.

Serum Thiol

Senior Citizens

Coulter assessed the characteristics of older people who utilize chiropractic care.

414 seniors

23 were called “chiropractic users.”

Coulter ID, Hurwitz EL, Aronow HU, Cassata DM, Beck JC “Chiropractic Patients in a Comprehensive Home-Based Geriatric Assessment, Followup and Health Promotion Program” Topics in Clinical Chiropractic 1996;3(2): 46-55.

Coulter - II

Coulter found that senior citizen chiropractic users were more likely to report:

- Strenuous levels of exercise
- More likely to report leaving their neighborhood in good weather five or more times per week
- Less likely to report their health status as “fair” or “poor”
- Less likely to report having arthritis than non-chiropractic users

Coulter ID, Hurwitz EL, Aronow HU, Cassata DM, Beck JC “Chiropractic Patients in a Comprehensive Home-Based Geriatric Assessment, Followup and Health Promotion Program” Topics in Clinical Chiropractic 1996;3(2): 46-55.

Coulter - III

Chiropractic users:

- Reported fewer depressive symptoms
- Were less likely to have used a nursing home
- 73.9% of chiropractic users had not been hospitalized in 3 years.
- Were associated with a tendency to use less over-the-counter (OTC) and prescription medications than those not using chiropractic care.

Coulter ID, Hurwitz EL, Aronow HU, Cassata DM, Beck JC "Chiropractic Patients in a Comprehensive Home-Based Geriatric Assessment, Followup and Health Promotion Program" Topics in Clinical Chiropractic 1996;3(2): 46-55.

Coulter IV

"These observations suggest the possible long-term health benefits of chiropractic utilization regardless of the presence or absence of symptoms."

Coulter ID, Hurwitz EL, Aronow HU, Cassata DM, Beck JC "Chiropractic Patients in a Comprehensive Home-Based Geriatric Assessment, Followup and Health Promotion Program" Topics in Clinical Chiropractic 1996;3(2): 46-55.

Senior Citizens

Rupert reported on 311 senior citizens under chiropractic "maintenance care"

Seventy-three percent (73%) of chiropractors reported that maintenance care was being given to their patients to *prevent or control subluxation.*

Rupert RL, Manello D, Sandefur R "Maintenance Care: Health Promotion Services Administered to US Chiropactic patients Ages 65 and Older, Part II" J Manipulative Physiol Ther 2000; 23(1): 10-19.

Rupert - II

Those seniors using maintenance care:

- Made approximately half the number of visits to a medical provider compared to the national average.
- The longer one was under maintenance care the less likely they are to use non-prescription drugs.
- Only 36% of patients reported frequent use of non-prescription drugs

Rupert RL, Manello D, Sandefur R "Maintenance Care: Health Promotion Services Administered to US Chiropactic patients Ages 65 and Older, Part II" J Manipulative Physiol Ther 2000; 23(1): 10-19.

Rupert - III

The annual health care cost for US senior citizens in 1994 was conservatively estimated at $10,041.00 per person.

- The annual health care cost associated with those under chiropractic maintenance care was $3,106.00 per person.
- This represents an annual cost of less than 2/3 that of the national average among chiropractic recipients.
- Those patients receiving maintenance care required far less medical intervention.

Rupert RL, Manello D, Sandefur R "Maintenance Care: Health Promotion Services Administered to US Chiropactic patients Ages 65 and Older, Part II" J Manipulative Physiol Ther 2000; 23(1): 10-19.

Labor Times Reduced

- Fallon Investigated the relationship of labor time as a function of chiropractic care versus non-chiropractic care.
- The labor times of 65 women who had received chiropractic care from at least the 10th week of pregnancy through labor and delivery compared to statistically averaged mean labor times.
- Chiropractic users were found to have significantly reduced
- labor times of 24% and 39% for primigravidae and multiparous
- pregnancies, respectively.
- Fallon concluded that chiropractic can significantly reduce mean labor time.

Fallon J "The Effect of Chiropractic Treatment on Pregnancy and Labor: A Comprehensive Study" Proceedings of the World Federation of Chiropractic 1991: pp. 24-31.

Seven Types of Cellular Junk

- Cross links – glues cells to one another
- Failing Mitochondria due to age
- Junk within cells
- Junk in the spaces between cells
- Cells that no longer work but hang around
- Cells that dies & poison other cells
- Old cells that mutate

ORIGINAL RESEARCH

A Retrospective Assessment of Network Care Using a Survey of Self-Rated Health, Wellness and Quality of Life.

Robert H. I. Blanks, Ph.D.[1,2]
Tonya L. Schuster, Ph.D.[3] *Marnie Dobson, B.A.*[1]

Abstract — The present study represents a retrospective characterization of Network Care, a health care discipline within the subluxation-based chiropractic model. Data were obtained from 156 Network offices (49% practitioner participation rate) in the United States, Canada, Australia, and Puerto Rico. Sociodemographic characterization of 2818 respondents, representing a 67-71% response rate, revealed a population predominately white, female, well-educated, professional, or white collar workers. A second objective of the study included the development and initial validation of a new health survey instrument. The instrument was specifically designed to assess wellness through patients' self-rating different health domains and overall quality of life at two "time" points: "presently" and retrospectively, recalling their status before initiating care ("before Network"). Statistical evaluation employing Chronbach's alpha and theta coefficients derived from principle components factor analyses, indicated a high level of internal reliability in regard to the survey instrument, as well as stable reliability of the retrospective recall method of self-rated perceptions of change as a function of duration of care. Results indicated that patients reported significant, positive perceived change ($p < 0.000$) in all four domains of health, as well as overall quality of life. Effect sizes for these difference scores were all large (>0.9). Wellness was assessed by summing the scores for the four health domains into a *combined wellness scale*, and comparing this combined scale "presently" and "before Network." The difference, or "wellness coefficient" spanning a range of -1 to +1, with zero representing no change, showed positive, progressive increases over the duration of care intervals ranging from 1-3 months to over three years. The evidence of improved health in the four domains (physical state, mental/emotional state, stress evaluation, life enjoyment), overall quality of life from a standardized index, and the "wellness coefficient," suggests that Network Care is associated with significant benefits. These benefits are evident from as early as 1-3 months under care, and appear to show continuing clinical improvements in the duration of care intervals studied, with no indication of a maximum clinical benefit. These findings are being further evaluated through longitudinal studies of current populations under care in combination with investigation of the neurophysiological mechanisms underlying its effects.

Key Words: Network spinal analysis, vertebral subluxation, chiropractic, self-rated outcomes assessment, wellness, overall quality of life.

Introduction

Network Care is a health care discipline within the subluxation-based chiropractic model[1] practiced by members of the Association for Network Chiropractic (ANC), nationally and internationally. Building from a base of consistent clinical observations, and repeated anecdotal reports of health benefits, the present study was conducted to fulfill the following three objectives: (1) to characterize the patient population undergoing Network Care; (2) to develop a new survey instrument of sufficient design and scope to allow assessment of a non-medical health discipline, and (3) to assess changes in patients' self-rated health, wellness, and overall quality of life.

Network Care is founded on the premise that individuals free of the complex of factors precipitating from, or leading to, vertebral subluxation experience a greater range of inherent adaptability and, hence, a greater sense of relative health or wellness. In a large percentage of individuals, Network Care evokes spontaneous self-perpetuating contractions of the paraspinal musculature.[1] The movements may be subtle, barely perceptible, or very

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e-mail: rhblanks@uci.edu

Blanks et al.

J. Vert. Subluxation. Res. 1997

1. **Largest study ever conducted in the history of the chiropractic profession**
2. **Involved 2818 patients and over 150 chiropractic offices in four countries.**
3. **Care intervals studied were from 1-3 months to over three years making it the longest study ever conducted.**
4. **Most significant, is that the benefits of chiropractic care (improved physical and mental health) were evident from as early as one month and showed continuing clinical improvements over three years with "no indication of a maximum clinical benefit."**

Blanks et al.

Journal of Alternative and Complementary Medicine

Explored the dynamic between wellness, health lifestyle practices and chiropractic.

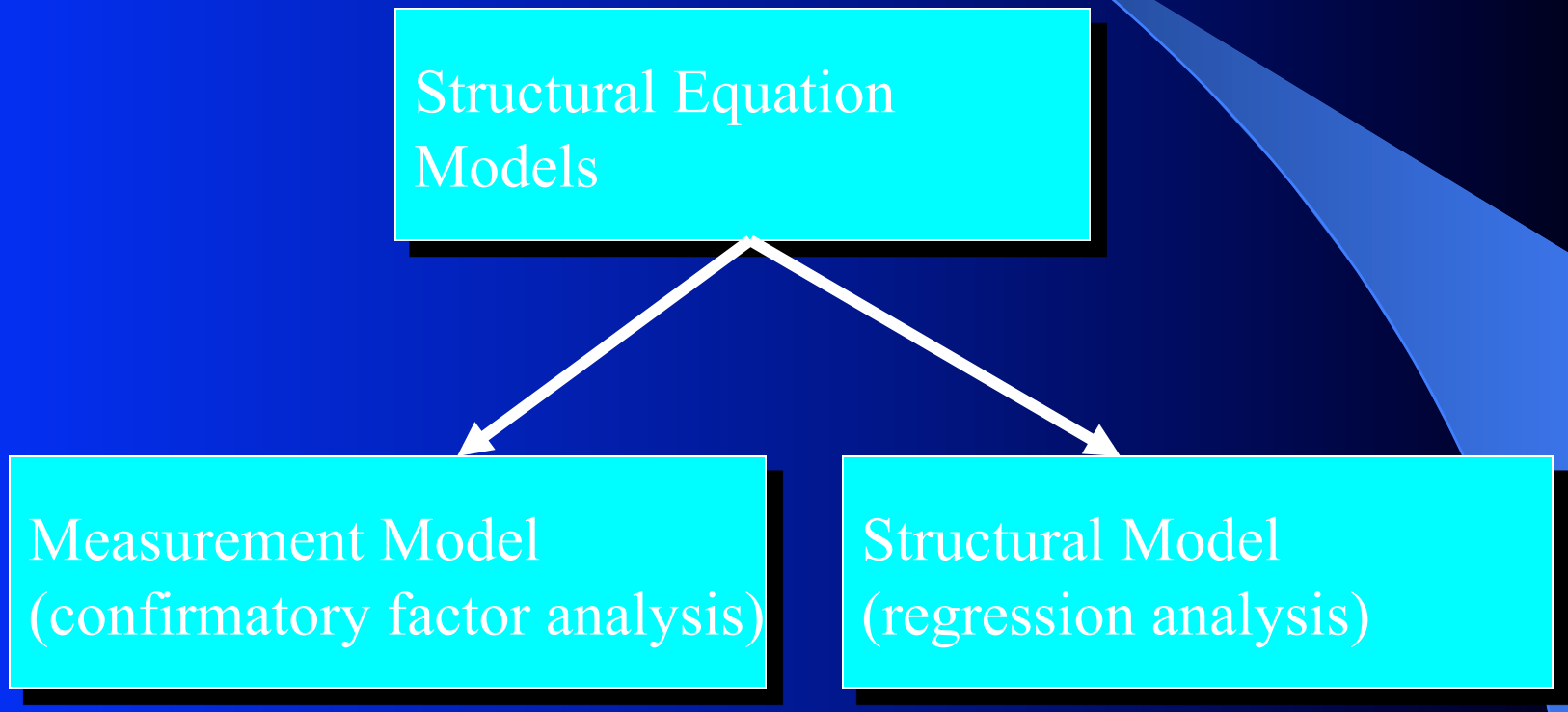
2596 patients

Conclusion: Patients under chiropractic care tended toward practices associated with a positive health lifestyle which further led to reported improvements in physical and mental wellness.

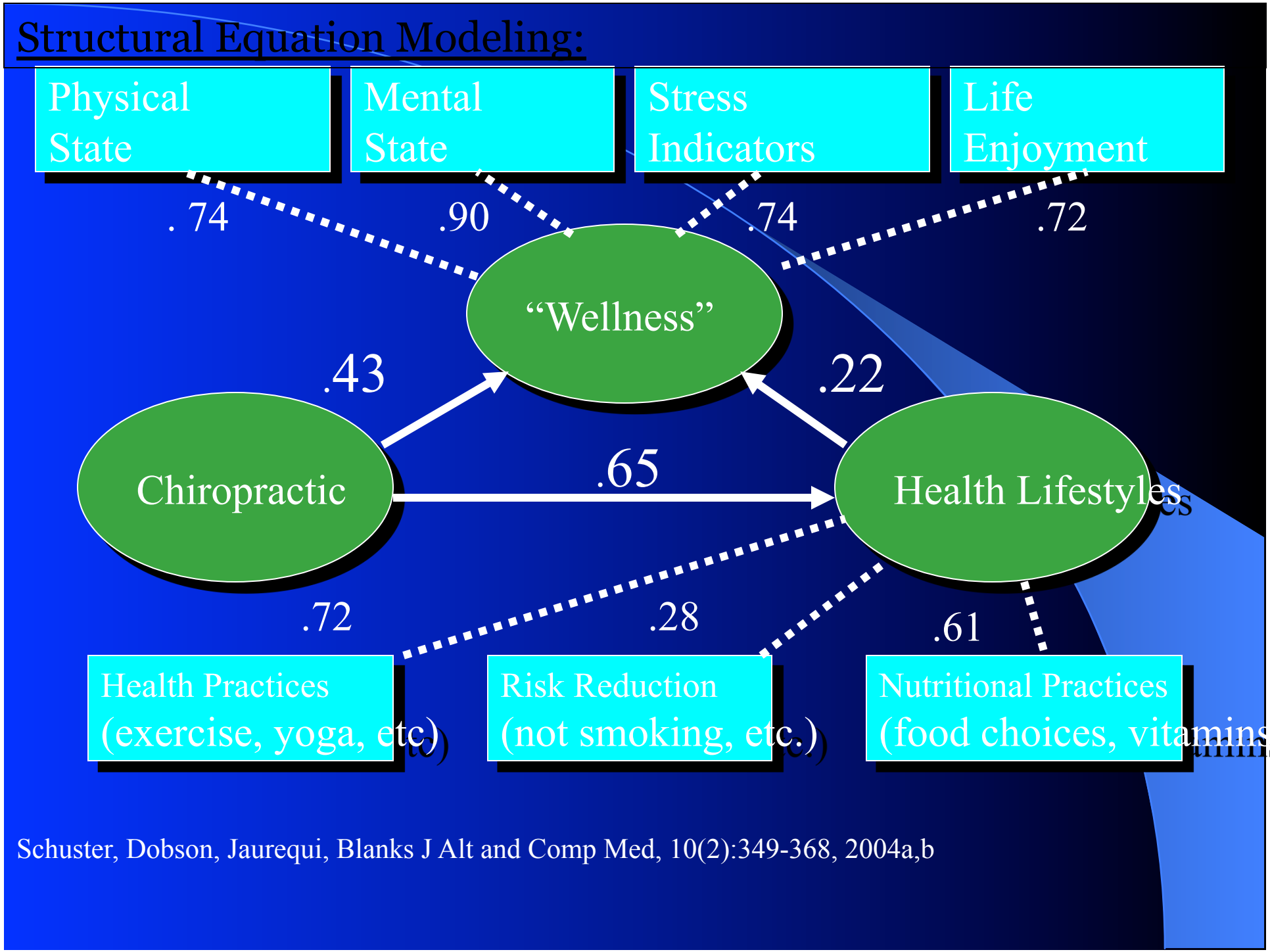
Health/Vitality Construct

Physical State	Mental/ Emotional State	Stress Evaluation	Life Enjoyment
15% higher scores	**17%** higher scores	**20%** higher scores	**17%** higher scores

Structural Equation (Path Analysis) Modeling:



Structural Equation Modeling:



Schuster, Dobson, Jaurequi, Blanks J Alt and Comp Med, 10(2):349-368, 2004a,b

Enhanced Neutrophil Respiratory Burst

Brennan et al: Enhanced neutrophil respiratory burst as a biological marker for manipulation forces.

JMPT Vol. 15 # 2 Feb. 1992.

Increased CD 4 Counts

"A 48% increase in CD4 cells was demonstrated over the six month duration of the study for the adjusted group."

Selano, Grostic et al: The effects of specific upper cervical adjustments on the CD4 counts of HIV positive patients. CRJ. Vol 3. # 1. 1994.

CD 4

Five HIV+ subjects receiving six months of upper cervical chiropractic care.

These subjects were compared to 5 HIV+ controls that received sham adjustments for six months.

All 5 patients' CD4 cell counts in the adjusted group increased, two of which increased by more than 125% each.

Conversely, 4 of 5 patients in the sham adjustment group's CD4 values decreased, demonstrating a 7.96% overall decrease in CD4 cell counts.

ORIGINAL RESEARCH

Long Term Remission and Alleviation of Symptoms in Allergy and Crohn's Disease Patients Following Spinal Adjustment for Reduction of Vertebral Subluxations‡

Yasuhiko Takeda D.C.,[1] Shouji Arai D.C.,[2] Hideaki Touichi D.C.[3]

ABSTRACT

Background: An association between visceral disease and immune dysfunction from sympathetic segmental disturbances secondary to vertebral subluxation has been put forward by chiropractic, osteopathic and medical practitioners. We report on the positive results of a controlled study using chiropractic adjustments to reduce subluxations in patients with Crohn's disease and allergies. We also discuss possible mechanisms for the relationship between visceral and immune dysfunction and subluxation.

Methods: We divided 57 Crohn's disease patients into two groups. A treatment group consisting of 17 patients and a control group consisting of 34 patients. 6 patients were excluded from the study because of their symptoms, progress and changes in blood test values and because vertebral subluxations were present only in the lumbar region. With all patients continuing their present medication, we subjected the treatment group of 17 patients to spinal adjustment in order to reduce the vertebral subluxations in the thoracic and lumbar regions and compared them with the 34 patients who did not receive spinal adjustments.

Results: Of the 17 patients who received spinal adjustments, 12 showed long-term and stable remission of their symptoms and 9 experienced an alleviation effect. We found that vertebral subluxation is a common and characteristic finding in patients with allergies and Crohn's disease.

Conclusion: According to the results of this study the possibility may be considered that chronic nerve compression secondary to vertebral subluxation in the thoracic and lumbar regions had a significant effect on the immune function of these allergy and Crohn's disease patients. It is further postulated that this nerve compression leads to a chronic functional disorder having a significant effect on digestion, absorption of nutrients and liquids, conveyance of food as well as various other functions of the digestive tract extending to excretion.

Key words: *Vertebral misalignment, vertebral subluxation, Crohn's Disease, allergies, immunity, radiographs, eosinophils, c-reactive protein*

Background and Introduction

This study on Crohn's disease has its origin in the observation that of 3,013 patients with atopic dermatitis, bronchial asthma, pollinosis (hay fever), allergic coryza, drug allergies, food allergies, etc. a high ratio also had Crohn's disease.

As result of a treatment that involved chiropractic care directed at improving spinal misalignment, subluxation and loss of curvature of 4 Crohn's disease patients who concurrently suffered from atopic dermatitis and bronchial asthma, it was shown that the Crohn's symptoms, such as diarrhea, abdominal pain, and enteritis improved along with the atopic dermatitis and bronchial asthma symptoms.

As result of a follow-up study of these 4 patients, it was found that the eosinophil count and CRP values improved toward normal. As it was surmised that allergies, such as very severe atopic dermatitis and bronchial asthma, have a strong connection to Crohn's disease, a multi-faceted comparative study and detailed analysis was continued on patients with allergies and Crohn's disease.

1. *Director - Nerve Information & Blood Circulation Research Institute. Tottori, Japan*
2. *Assistant Researcher - Nerve Information & Blood Circulation*

ORIGINAL RESEARCH

Surrogate Indication of DNA Repair in Serum After Long Term Chiropractic Intervention – A Retrospective Study

Clayton J. Campbell[†], *Christopher Kent*[††], *Arthur Banne*[‡], *Amir Amiri*[‡], *and Ronald W. Pero*[‡‡]

ABSTRACT

Objective: To assess the effects of short-term and long-term chiropractic care on serum thiol levels in asymptomatic subjects.

Summary of background data: Serum thiols are a measure of human health status. It is a surrogate estimate of DNA repair enzyme activity, most notably poly ADP – ribose polymerase or PARP. While it is suggested that chiropractic care improves general health, the effect of chiropractic care on serum thiol levels has not been investigated.

Methods: A case controlled retrospective analysis. Serum thiol levels in patients with active disease (N=46) were compared with serum thiol levels in primary wellness subjects with 8-52 weeks of chiropractic care (N=21) and those who had been under chiropractic care for 52-312 weeks (N=25). Patients were age matched to be 40 years of age or older.

Results: There were statistically significant differences in the serum thiol levels of the three groups. Mean serum thiol levels were lowest in patients with active disease as well as patients with initial musculoskeletal complaints. Asymptomatic subjects under chiropractic care demonstrated higher mean serum thiol levels than patients with active disease. Mean serum thiol levels were highest in the group with 52-312 weeks of chiropractic care.

Conclusion: Asymptomatic or primary wellness subjects under chiropractic care demonstrated higher mean serum thiol levels than patients with active disease and produced some values that were higher than normal wellness values.

Keywords: *chiropractic, wellness, adjustment, thiol, DNA repair, oxidative stress*

Introduction

Alternative and complementary health care

Eisenberg et al[1] reported in 1993 that 34% of adults in the United States used at least one form of "unconventional" health care. Unconventional care was defined as those practices "neither taught widely in U.S. medical schools nor generally available in U.S. hospitals." Extrapolation of the survey indicated that the number of visits to alternative providers exceeded the number of visits to all U.S. primary care physicians.

A follow-up study[2] published in 2001 reported 67.6% of respondents had used at least one CAM (complementary and alternative) method in their lifetime. Lifetime use steadily increased with age across three age cohorts: approximately 3 of every 10 in the pre-baby boom cohort, 5 of 10 in the baby boom cohort, and 7 of 10 in the post-baby boom cohort reported using some form of CAM by age 33 years.

Chiropractic care

Chiropractic is the best established of the alternative health care professions, and it is now more than a century old. Chiropractic is a licensed healthcare profession in the United States, Canada and over 60 other countries worldwide.[3,4]

According to the Association of Chiropractic Colleges[5] "Chiropractic is concerned with the preservation and restoration of health, and focuses particular attention on the subluxation. A subluxation is a complex of functional and/or structural and/or pathological articular changes that compromise neural integ-

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[††]Chiropractic Leadership Alliance, One International Blvd. - Suite 750,

Serum Thiol

- 46 Subjects
- Serum Thiol Levels Following Short & Long term care
- 2-868 weeks
- Network, Diversified & Activator
- Oxidative stress, free radicals, DNA repair
- Endogenous production of oxid. Stress
- Serum thiols are an estimate of mortality, longevity and active disease

Serum Thiol

- Serum Thiol status correlated with:
  - Life span
  - HIV survival
  - Nutritional interventions

Serum Thiol

In summation, these data indicate that whereas chiropractic care can help overcome oxidative stress induced by musculoskeletal stress discomfort, it takes over two years of regular chiropractic treatments to accomplish successful reversal to control levels.

Serum Thiol

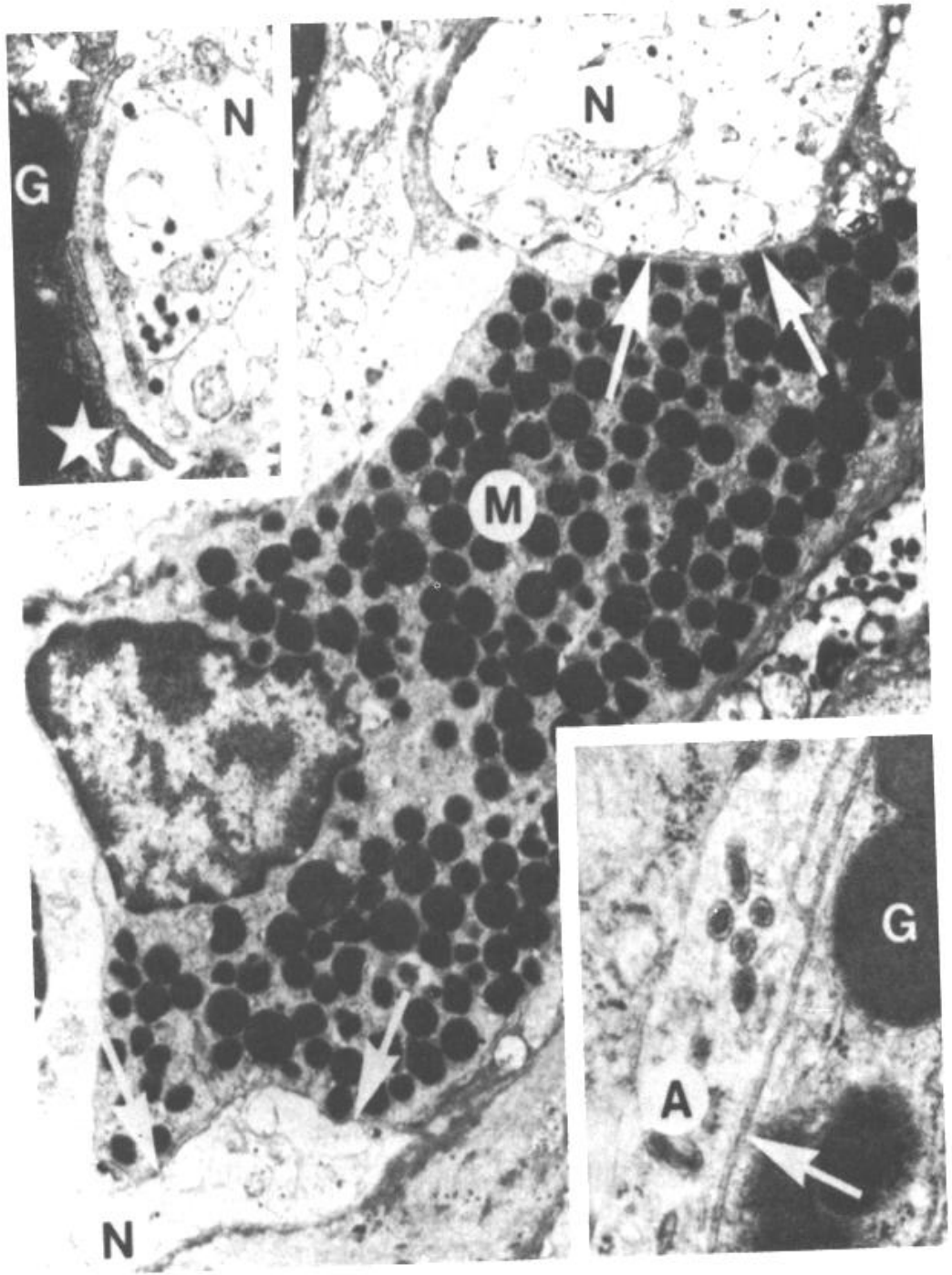
If indeed chiropractic care could reverse in vivo oxidative stress, then what clinical parameters would chiropractic care be expected to influence?

Most scientists now agree that the lifethreatening hazards of oxidative stress are most strongly associated to aging phenomena. Chiropractic care would be expected to limit free radical damage to DNA, RNA and proteins preventing or limiting:

(i) mutation,
(ii) altered genetic expression and
(iii) The incidence of age-associated disorders such as immune suppression, inflammation and cancer.

In this regard, the scientific logic already established is as follows: Thiols are antioxidants reducing DNA damage, stimulating DNA repair and immune function and thus they can retard at least some of the consequences of aging such as poor nutrition, viral infection and autoimmune diseases.

Intimate association between neuropeptide fiber and lymphocyte



N= unmyelinated nerves

M= Intestinal mucosal mast cell

Journal of Human Hypertension (2007), 1–6

www.nature.com/jhh

ORIGINAL ARTICLE

Atlas vertebra realignment and achievement of arterial pressure goal in hypertensive patients: a pilot study

G Bakris[1], M Dickholtz Sr[2], PM Meyer[1], G Kravitz[1], E Avery[1], M Miller[3], J Brown[3], C Woodfield[4] and B Bell[3]

[1]*Department of Preventive Medicine, Rush University Hypertension Center, Chicago, IL, USA;* [2]*Chiropractic Health Center, Chicago, IL, USA;* [3]*Barrington Family Medical Clinic, Barrington, IL, USA and* [4]*Atlas Research Foundation, Barrington, IL, USA*

Anatomical abnormalities of the cervical spine at the level of the Atlas vertebra are associated with relative ischaemia of the brainstem circulation and increased blood pressure (BP). Manual correction of this mal-alignment has been associated with reduced arterial pressure. This pilot study tests the hypothesis that correcting mal-alignment of the Atlas vertebra reduces and maintains a lower BP. Using a double blind, placebo-controlled design at a single center, 50 drug naïve ($n=26$) or washed out ($n=24$) patients with Stage 1 hypertension were randomized to receive a National Upper Cervical Chiropractic (NUCCA) procedure or a sham procedure. Patients received no antihypertensive meds during the 8-week study duration. The primary end point was changed in systolic and diastolic BP comparing baseline and week 8, with a 90% power to detect an 8/5 mm Hg difference at week 8 over the placebo group. The study cohort had a mean age 52.7 ± 9.6 years, consisted of 70% males. At week 8, there were differences in systolic BP (−17 ± 9 mm Hg, NUCCA versus −3 ± 11 mm Hg, placebo; $P<0.0001$) and diastolic BP (−10 ± 11 mm Hg, NUCCA versus −2 ± 7 mm Hg; $P=0.002$). Lateral displacement of Atlas vertebra (1.0, baseline versus 0.04° week 8, NUCCA versus 0.6, baseline versus 0.5°, placebo; $P=0.002$). Heart rate was not reduced in the NUCCA group (−0.3 beats per minute, NUCCA, versus 0.5 beats per minute, placebo). No adverse effects were recorded. We conclude that restoration of Atlas alignment is associated with marked and sustained reductions in BP similar to the use of two-drug combination therapy.

Journal of Human Hypertension advance online publication, 2 March 2007; doi:10.1038/sj.jhh.1002133

Keywords: atlas; vertebra; antihypertensive therapy

Introduction

It is well known that achievement of blood pressure (BP) goals in more than 70% of hypertensive individuals requires two or more antihypertensive agents.[1] Based on the most recent NHANES 1999–2000 data, BP control in the US has not improved significantly.[2] Moreover, many people have searched for alternative methods for lowering arterial pressure.

Since the early 1940s, a small cadre of chiropractic

Atlas relies solely upon soft tissue (muscles and ligaments) to maintain alignment; therefore, the Atlas is uniquely vulnerable to displacement. Displacement of C-1 is pain free and thus, remains undiagnosed and untreated, whereas health-related consequences are attributed to other aetiologies.

Minor misalignment of the Atlas vertebra can potentially injure, impair, compress and/or compromise brainstem neural pathways. The relationship between hypertension and presence of circulatory

SPINE Volume 30, Number 18, pp 2024–2029

The Impact of Positive Sagittal Balance in Adult Spinal Deformity

Steven D. Glassman, MD,* Keith Bridwell, MD,‡ John R. Dimar, MD,* William Horton, MD,§ Sigurd Berven, MD,† and Frank Schwab, MD‖

Study Design. This study is a retrospective review of 752 patients with adult spinal deformity enrolled in a multicenter prospective database in 2002 and 2003. Patients with positive sagittal balance (N = 352) were further evaluated regarding radiographic parameters and health status measures, including the Scoliosis Research Society patient questionnaire, MOS short form-12, and Oswestry Disability Index.

Objectives. To examine patients with adult deformity with positive sagittal balance to define parameters within that group that might differentially predict clinical impact.

Summary of Background Data. In a multicenter study of 298 adults with spinal deformity, positive sagittal balance was identified as the radiographic parameter most highly correlated with adverse health status outcomes.

Methods. Radiographic evaluation was performed according to a standarized protocol for 36-inch standing radiographs. Magnitude of positive sagittal balance and regional sagittal Cobb angle measures were recorded. Statistical correlation between radiographic parameters and health status measures were performed. Potentially confounding variables were assessed.

Results. Positive sagittal balance was identified in 352 patients. The C7 plumb line deviation ranged from 1 to 271 mm. All measures of health status showed significantly poorer scores as C7 plumb line deviation increased. Patients with relative kyphosis in the lumbar region had significantly more disability than patients with normal or lordotic lumbar sagittal Cobb measures.

Conclusions. This study shows that although even mildly positive sagittal balance is somewhat detrimental, severity of symptoms increases in a linear fashion with progressive sagittal imbalance. The results also show that kyphosis is more favorable in the upper thoracic region but very poorly tolerated in the lumbar spine.

Key words: adult spinal deformity, positive sagittal balance, lumbar kyphosis. **Spine 2005;30:2024–2029**

From the Departments of Orthopaedic Surgery, *University of Louisville School of Medicine and the Kenton D. Leatherman Spine Center,

Adult spinal deformity is a broad diagnostic classification that encompasses both stable asymptomatic curves and progressive or disabling deformities. Most previous studies of adult spinal deformity have focused on the incidence of clinical symptoms or identification of radiographic findings that might prognosticate curve or symptom progression.[1–6] Although some of these studies have included a relatively large number of patients, the sample size has been too small for a meaningful analysis of diagnostic subgroups. To establish a better understanding of this diverse clinical entity, investigators have begun to apply reproducible evaluation techniques, including standardized radiographs,[7] gait analysis,[8] and validated health status measures.[9–13] Optimally, the combination of larger study populations and more standardized data collection should facilitate a more accurate characterization of the critical elements within the spectrum of adult spinal deformity.

In a recent multicenter study of 298 adults with spinal deformity, positive sagittal balance was identified as the radiographic parameter most highly correlated with adverse health status outcomes.[14] Positive sagittal balance was defined as an anterior deviation of the C7 plumb line measurement. Positive sagittal balance was more significantly associated with pain and disability than curve magnitude, curve location, or coronal imbalance. Although there is a well-recognized incidence of pain and disability with syndromes of postoperative sagittal imbalance such as flat back deformity,[15,16] this study showed a similar occurrence in unoperated deformities. Despite a relatively large study group, the data pool was still insufficient to analyze individual factors contributing to the fact that positive sagittal balance was so poorly tolerated.

Important issues to consider in evaluating patients with positive sagittal balance include the magnitude of the deformity, location of the deformity, and any inter-

Journal of the
AMERICAN GERIATRICS SOCIETY

Hyperkyphotic Posture Predicts Mortality in Older Community-Dwelling Men and Women: A Prospective Study

Deborah M. Kado MD, MS, Mei-Hua Huang DrPH, Arun S. Karlamangla MD, PhD, Elizabeth Barrett-Connor MD, Gail A. Greendale MD

Article first published online: 23 SEP 2004

DOI: 10.1111/j.1532-5415.2004.52458.x

Issue

Journal of the American Geriatrics Society

Volume 52, Issue 10, pages 1662–1667, October 2004

Keywords:
kyphosis; hyperkyphosis; kyphotic posture; mortality; cohort study

Objectives: To determine the association between hyperkyphotic posture and rate of mortality and cause-specific mortality in older persons.

Design: Prospective cohort study.

Setting: Rancho Bernardo, California.

Participants: Subjects were 1,353 participants from the Rancho Bernardo Study who had measurements of kyphotic posture made at an osteoporosis visit between 1988 and 1991.

Measures: Kyphotic posture was measured as the number of 1.7-cm blocks that needed to be placed under the participant's head to achieve a neutral head position when lying supine on a radiology table. Demographic and clinical characteristics and health behaviors were assessed at a clinic visit using standard questionnaires. Participants were followed for an average of 4.2 years, with mortality and cause of death confirmed using review of death certificates.

Results: Hyperkyphotic posture, defined as requiring one or more blocks under the occiput to achieve a neutral head position while lying supine, was more common in men than women (44% in men, 22% of women, $P<.0001$). In age- and sex-adjusted analyses, persons with hyperkyphotic posture had a 1.44 greater rate of mortality (95% confidence interval (CI)=1.12–1.86, $P=.005$). In multiply adjusted models, the increased rate of death associated with hyperkyphotic posture remained significant (relative hazard=1.40, 95% CI=1.08–1.81, $P=.012$). In cause-specific mortality analyses, hyperkyphotic posture was specifically associated with an increased rate of death due to atherosclerosis.

Conclusion: Older men and women with hyperkyphotic posture have higher mortality rates.

Spinal Curvatures & Health

- Abnormal thoraco-lumbar alignment and back and neck pain in children and adolescents
- Hyper-kyphosis-round back and health perceptions and function in adolescents
- Hyper-kyphosis and rigid anterior head translation and functional impairments in seniors
- Hyper-kyphosis and early mortality in seniors
- Abnormal cervical spine postures in women with chronic pelvic pain
- Abnormal forward head posture and neck pain, headaches, disability, range of motion, respiratory muscle function, and carpal tunnel syndrome


Molecular
Psychiatry
Ten Years of Molecular Psychiatry
Original Research Articles

Holder et al.

Journal of Molecular Psychiatry

1. Three arm randomized clinical trial with two control groups
2. Residential addiction treatment setting.
3. A total of 98 subjects (14 female and 84 male) were enrolled in the year and a half study.
4. 100% of the Active (chiropractic) group completed the 30-day program, while only 24 (75%) of the Placebo group and 19 (56%) of the Usual Care group completed 30 days.
5. Decreased anxiety and depression
6. Decreased nursing station visits.
7. Poor performance by the placebo group suggests that the chiropractic care had no positive placebo effect.

The Genetic Effects of Subluxation: Immediate Early Genes (IEG's)

Adrian Wenban B.Sc., B.App.Sc., M.M.Sc. & Michelle Nielsen D.C.

Abstract

Introduction - During the past decade a great deal of evidence has accumulated linking neuronal activation events to the regulation of gene expression. The first observations of transient IEG expression in the central nervous system were made after seizure activity(1-3) and following noxious peripheral stimulation(4). Since then, multiple studies have shown that many different stimuli lead to IEG expression and that short term induction of IEG's, like c-fos, in the nervous system result in long-term alterations in both gene expression and cellular phenotype.(5-7) Moreover, IEG's have now been shown to couple short-term neurological signals, elicited by many of the components of the vertebral subluxation(8), (low back/neck myospasm, ligamentous stretching, neural interference, articular derangement)(9-14), to long-term changes in gene expression.(15-21) The objective of this review is 3 fold: To examine the experimental evidence linking components of the vertebral subluxation to IEG expression in the central nervous system; to review the molecular mechanisms involved in vertebral subluxation-transcription coupling; and to review the experimental evidence which examines the consequences of vertebral subluxation-transcription coupling.

Method - A search was made of the MEDLINE database using Medical Subject Headings and free text words. The search was carried out with the intention of obtaining information from the scientific peer reviewed literature concerning human and animal studies of c-fos expression in the nervous system. The following key words were used: c-fos; Proto-oncogene; Immediate Early Gene; Nervous System; Immunohistochemistry; Spine.

Results -

- Review of the experimental evidence revealed diverse patterns of IEG expression in the central nervous system that result from the key components of vertebral subluxation(8) [low back/neck myospasm(9-11), ligamentous stretching(12), nociceptor afferent stimulation(13), articular derangement(14)].
- After reviewing the experimental evidence of c-fos regulation in the nervous system the likely molecular mechanisms of vertebral subluxation-transcription coupling are postulated.
- Review of the experimental evidence revealed the following consequences of vertebral subluxation-transcription coupling: Cell death(15-18), information processing impairment(19), and memory changes(20-21).

Conclusion - IEG's have, in animal studies, been shown to couple short-term neurological signals, elicited by many of the components of the vertebral subluxation, (myospasm, ligamentous stretching, nociceptor afferent stimulation, articular derangement), to long-term changes in cellular phenotype.

Key Indexing Terms: Chiropractic; Vertebral Subluxation; c-fos; Proto-oncogene; Immediate Early Gene; Nervous System.