

# The Global Burden of Vertebral Subluxation

## Florida Chiropractic Society
Palm Beach August 4, 2023


Matthew McCoy DC, MPH

Free Human Being

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CEO - ChiroFutures Malpractice Insurance Program

Vice President – Foundation for Vertebral Subluxation

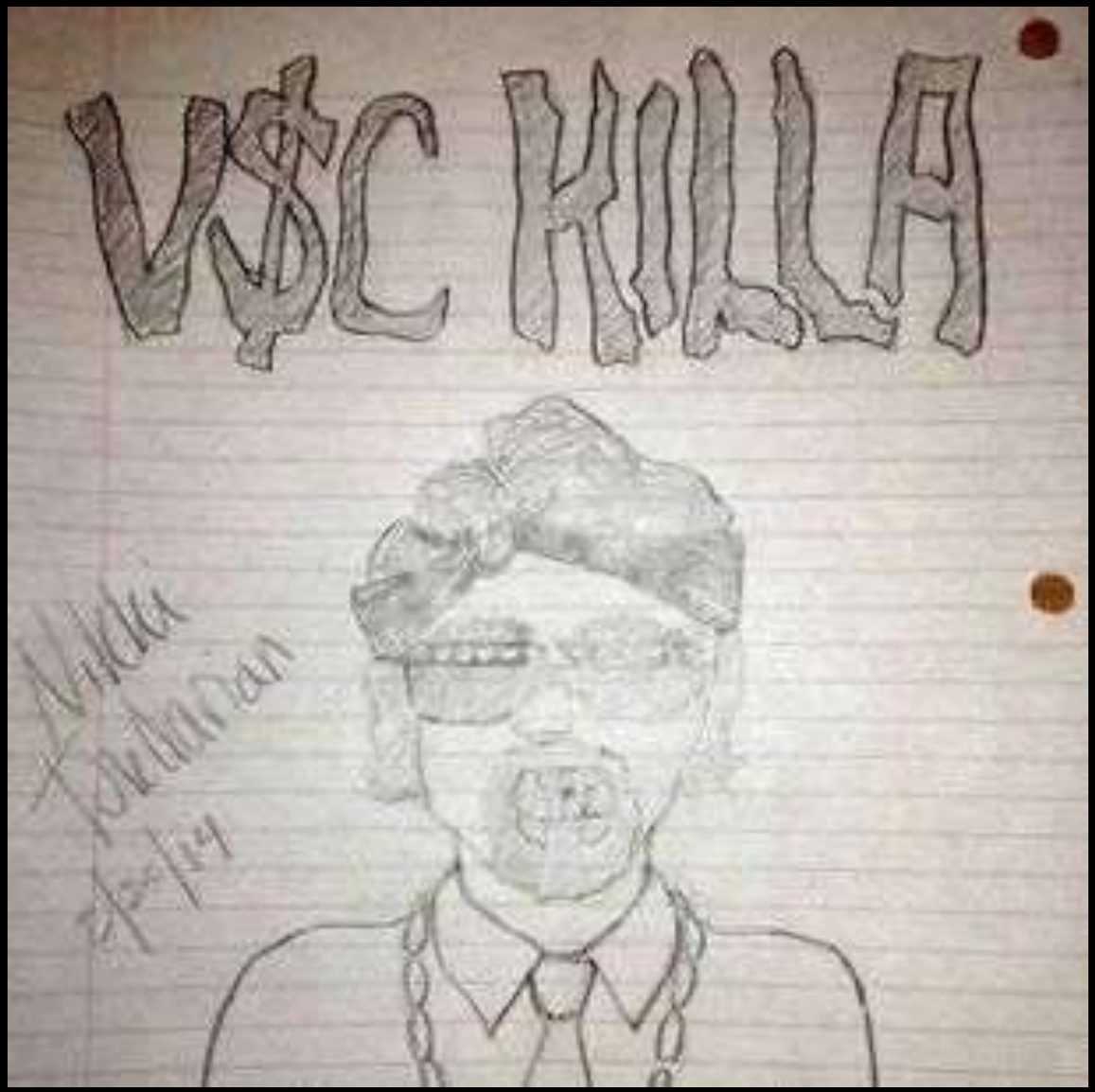

ChiroFutures
Malpractice Insurance Program
www.chirofutures.org


You sure he's absorbing all of this?
COURT 5

# War Horses



"A great profession can only be sustained through the authentic transmission of its principles from generation to generation."


V$C KILLA



# "NO EVIDENCE MY ASS"

Amy Haas DC, Ph.D



**Hold onna yo ass Fred . . .**

# Cultural Authority

**Strategic Competitive Advantage**

**Vertebral Subluxation**

# Epidemiology

- Role of subluxation in health & disease
- Global Burden of Vertebral Subluxartion

# Global Burden

What disables and kills people – morbidity & mortality

Incidence & Prevalence

Risk factors

Relative harm

Comparison of effects

Crucial to Policymaking

# Health Policy



# Policy



**Chiropractors:** “Every man woman and child should be checked for vertebral subluxations throughout their lives!!!”



**Policymakers:** Why?

"The analysis and correction of vertebral subluxation for the fullest quality and expression of life."

# Sufficient Evidence

There is sufficient evidence to support the management of vertebral subluxation in a vitalistic, salutogenic model.

*Foundation for Vertebral Subluxation*

Foundation for Vertebral Subluxation

# The Big Idea

**The idea that knows cause, that can correct cause of dis-ease, is one of the biggest ideas known.**

**Without it, nations fall;**

**with it, nations rise.**

**The idea is the BIGGEST I know of.**



**Dr. B. J. Palmer**

# A Slip on the Sidewalk

**A slip on the snowy sidewalk, in winter, is a small thing. It happens to millions.**
**A fall from a ladder, in the summer, is a small thing. That also happens to millions.**
**The slip or fall produces a subluxation. The subluxation is a small thing.**
**The subluxation produces pressure on a nerve. That pressure is a small thing.**
**The pressure cuts off the flow of mental impulses.**

**That decreased flowing is a small thing.**
**That decreased flowing produces a dis-eased body and brain.**

**That is a big thing to that man.**
**Multiply that sick man by a thousand, and you control the physical and mental welfare of a city.**
**Multiply that man by a million and you shape the physical and mental destiny of a State.**
**Multiply that man by one hundred thirty million,* and you forecast and can prophesy the physical and mental status of a nation.**

**B.J. Palmer**

SPECIAL ARTICLE

# The Spread of Obesity in a Large Social Network over 32 Years

Nicholas A. Christakis, M.D., Ph.D., M.P.H., and James H. Fowler, Ph.D.


## ABSTRACT

### BACKGROUND

The prevalence of obesity has increased substantially over the past 30 years. We performed a quantitative analysis of the nature and extent of the person-to-person spread of obesity as a possible factor contributing to the obesity epidemic.

### METHODS

We evaluated a densely interconnected social network of 12,067 people assessed repeatedly from 1971 to 2003 as part of the Framingham Heart Study. The body-mass index was available for all subjects. We used longitudinal statistical models to examine whether weight gain in one person was associated with weight gain in his or her friends, siblings, spouse, and neighbors.

### RESULTS

Discernible clusters of obese persons (body-mass index [the weight in kilograms divided by the square of the height in meters], ≥30) were present in the network at all time points, and the clusters extended to three degrees of separation. These clusters did not appear to be solely attributable to the selective formation of social ties among obese persons. A person's chances of becoming obese increased by 57% (95% confidence interval [CI], 6 to 123) if he or she had a friend who became obese in a given interval. Among pairs of adult siblings, if one sibling became obese, the chance that the other would become obese increased by 40% (95% CI, 21 to 60). If one spouse became obese, the likelihood that the other spouse would become obese increased by 37% (95% CI, 7 to 73). These effects were not seen among neighbors in the immediate geographic location. Persons of the same sex had relatively greater influence on each other than those of the opposite sex. The spread of smoking cessation did not account for the spread of obesity in the network.

### CONCLUSIONS

Network phenomena appear to be relevant to the biologic and behavioral trait of obesity, and obesity appears to spread through social ties. These findings have implications for clinical and public health interventions.


From the Department of Health Care Policy, Harvard Medical School, Boston (N.A.C.); the Department of Medicine, Mt. Auburn Hospital, Cambridge, MA (N.A.C.); the Department of Sociology, Harvard University, Cambridge, MA (N.A.C.); and the Department of Political Science, University of California, San Diego, San Diego (J.H.F.). Address reprint requests to Dr. Christakis at the Department of Health Care Policy, Harvard Medical School, 180 Longwood Ave., Boston, MA 02115, or at christakis@hcp.med.harvard.edu.

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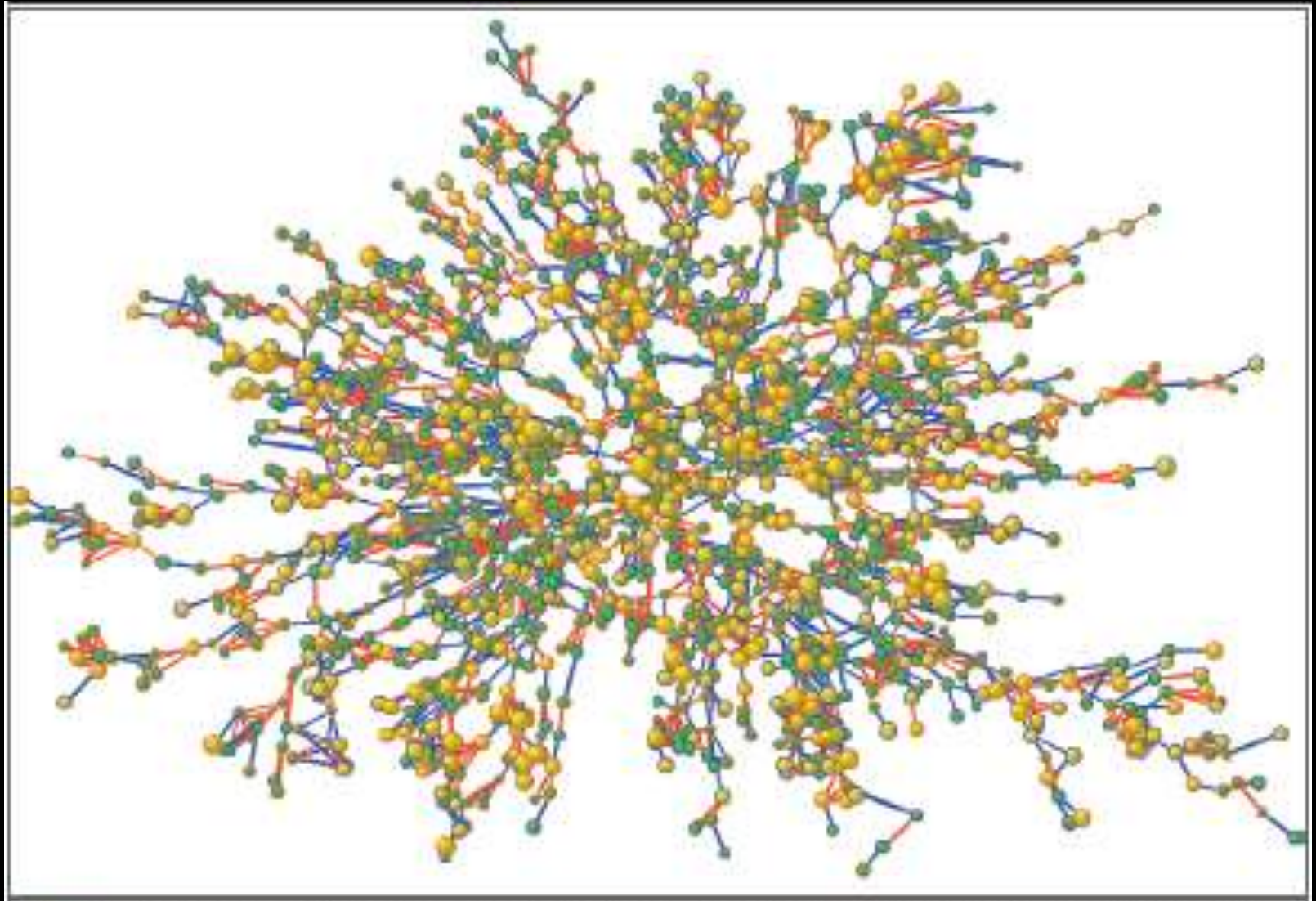


**Figure 1. Largest Connected Subcomponent of the Social Network in the Framingham Heart Study in the Year 2000.**

Each circle (node) represents one person in the data set. There are 2200 persons in this subcomponent of the social network. Circles with red borders denote women, and circles with blue borders denote men. The size of each circle is proportional to the person's body-mass index. The interior color of the circles indicates the person's obesity status: yellow denotes an obese person (body-mass index, ≥30) and green denotes a nonobese person. The colors of the ties between the nodes indicate the relationship between them: purple denotes a friendship or marital tie and orange denotes a familial tie.

SPECIAL ARTICLE

# The Collective Dynamics of Smoking in a Large Social Network

Nicholas A. Christakis, M.D., Ph.D., M.P.H., and James H. Fowler, Ph.D.


## ABSTRACT

### BACKGROUND

The prevalence of smoking has decreased substantially in the United States over the past 30 years. We examined the extent of the person-to-person spread of smoking behavior and the extent to which groups of widely connected people quit together.

### METHODS

We studied a densely interconnected social network of 12,067 people assessed repeatedly from 1971 to 2003 as part of the Framingham Heart Study. We used network analytic methods and longitudinal statistical models.

### RESULTS

Discernible clusters of smokers and nonsmokers were present in the network, and the clusters extended to three degrees of separation. Despite the decrease in smoking in the overall population, the size of the clusters of smokers remained the same across time, suggesting that whole groups of people were quitting in concert. Smokers were also progressively found in the periphery of the social network. Smoking cessation by a spouse decreased a person's chances of smoking by 67% (95% confidence interval [CI], 59 to 73). Smoking cessation by a sibling decreased the chances by 25% (95% CI, 14 to 35). Smoking cessation by a friend decreased the chances by 36% (95% CI, 12 to 55 ). Among persons working in small firms, smoking cessation by a coworker decreased the chances by 34% (95% CI, 5 to 56). Friends with more education influenced one another more than those with less education. These effects were not seen among neighbors in the immediate geographic area.

### CONCLUSIONS

Network phenomena appear to be relevant to smoking cessation. Smoking behavior spreads through close and distant social ties, groups of interconnected people stop smoking in concert, and smokers are increasingly marginalized socially. These findings have implications for clinical and public health interventions to reduce and prevent smoking.


From the Department of Health Care Policy, Harvard Medical School, Boston (N.A.C.); the Department of Medicine, Mt. Auburn Hospital, and the Department of Sociology, Harvard University — both in Cambridge, MA (N.A.C.); and the Department of Political Science, University of California, San Diego, San Diego (J.H.F.). Address reprint requests to Dr. Christakis at the Department of Health Care Policy, Harvard Medical School, 180 Longwood Ave., Boston, MA 02115, or at christakis@hcp.med.harvard.edu.

N Engl J Med 2008;358:2249-58.
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THEORY

# Subluxation as a Social/Cultural Imitation: Resolving a Phylobiological Epiphenomenon

*Mark R. Filippi, D.C.*[1]

**Abstract** — This is part one of a two part article. This article investigates the possibility of viewing subluxation as a part of a larger pattern of collective, survival-based adaptations common to every human being's ongoing growth and development. By examining personal connections to the "non-local" social self, it may be better understood as to why humans subluxate and how social patterns of adaptation through octal coding can be better recognized and regulated. This process reframes subluxation as a meme, a unit of cultural imitation, that possesses an unbounded capacity to be non-verbally communicated intra- and/or interpersonally. Chiropractic acknowledges that every nervous system is composed of a voluntary or phasic aspect, and an involuntary or tonal aspect. This ongoing "conversation" between these two divisions forms the tapestry of individual and collective existence.

Even at the core, humans remain social in nature. However, clinical chiropractic has historically focused on the evaluation of physical and/or mental levels of well-being as they relate to the indicators of the vertebral subluxation complex, (VSC). By viewing subluxation as a cultural undertow that extends beyond the borders of individual physical bodies, the chiropractor is free to work within the sphere of life common to both doctor and patient, that of social well-being. With both doctor and patient focusing on common targets for clinical outcomes, the emphasis shifts from normalizing the spine to optimizing nerve function for whole body benefits on both a personal and communal level. This article concludes with the theoretical rationale for a virtual adjustment, based on the evidence presented.

*Key Words: Pattern recognition, cotention, ditention, phylobiology, chaotic systems, emergence, virtual adjustment, non-locality, memes, stochastic resonance, cardiac coherence, recursion.*

## Introduction

### *The Primacy of Pattern Recognition as a Signature of Humanity*

For the better part of the first one hundred years of chiropractic, practitioners relied on subjective indicators elicited from direct interaction with patients to assess for the presence, degree and severity of vertebral subluxation.[1] In the last decade, a shift has occurred, and more frequently both the practitioner and the public are turning to evidence-based criteria to monitor clinical progress.[2] It is the central thesis of this paper to demonstrate that the binding force between these two approaches involves the recognition of patterns. Further, it is proposed that subluxation, as a process distinct from vertebral subluxation, works at both the organismic and symbolic levels of human interaction to innate patterns of adaptation that promote self-preservation. In this sense, the human body and the languages developed to recognize patterns through semantic and experiential mediums serve as reflecting mirrors that project the degree of coherence within each individual organism and humanity as a whole.

Before understanding the primacy of pattern recognition in human affairs, a further elucidation of subluxation is required. D.D. Palmer, the founder of chiropractic,[3] was not the first to use the word subluxation.[4] In fact, the word is used in the medical literature to literally mean a "partial dislocation."[5] Chiropractic

1. Dr. Mark Filippi is in private practice in Larchmont, NY.

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65 Wendt Avenue, Larchmont, NY 10538

# Subluxation as Cultural Undertow

"Subluxation is part of a larger pattern of collective, survival based adaptations common to every human being's ongoing growth and development"

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**Mark Filippi, DC**

**Subluxation as a social cultural imitation: resolving a phylobiological epiphenomenon.**

**J. Vertebral Subluxation Res. V.3 # 3 - 1999**

# So What?



- If subluxations exist - what evidence do we have that we can objectively identify them using valid and reliable means?
- If subluxations exist and can be identified - what evidence do we have that their existence leads to adverse health (or other) outcomes?
- If subluxations exist and we have some evidence that their existence leads to adverse health outcomes – what evidence do we have that we can actually correct subluxations?
- And if we have evidence that we can correct them – what evidence do we have that correcting them leads to improved health outcomes?

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# THE EPIDEMIOLOGY OF VERTEBRAL SUBLUXATION

WHAT IS THE INCIDENCE & PREVALENCE OF VERTEBRAL SUBLUXATION?



SUBLUXATIONS POSE A HINDRANCE TO THE FULLEST EXPRESSION OF LIFE

# Epidemiology

- What percentage of the population is subluxated?
- Does vertebral subluxation lead to increased morbidity and mortality?



# KWON AWARDED PUBLIC HEALTH RESEARCH SCHOLARSHIP BY FOUNDATION FOR VERTEBRAL SUBLUXATION

FOCUS ON PUBLIC HEALTH, PREVENTION SCIENCE & VERTEBRAL SUBLUXATION

Christie Kwon DC, MS was recently awarded an Advancing Futures Research Scholarship by the Foundation for Vertebral Subluxation (FVS) to complete her Master's in Public Health at Emory University in Atlanta, Georgia.

Dr. Kwon, who is a chiropractor and also holds a Master's Degree in Biomedical Engineering, stated "Emory's focus on health promotion and prevention fits perfectly with the Foundation's research agenda. I look forward to obtaining additional skills to more effectively study the nature of subluxation and its role in health and well-being, and I am incredibly grateful for this opportunity to do so."

Remarking on the awarding of the Advancing Futures Scholarship, Dr. Christopher Kent DC, JD President of the FVS, and Professor and Director of Evidence Informed Practice at Sherman College of Chiropractic stated: "Christie Kwon is an underappreciated polymath. Her commitment to chiropractic is steadfast. This scholarship will enable Dr. Kwon to be even more effective in securing the future of chiropractic research."



"I COULD NOT BE MORE EXCITED THAT DR. KWON WAS AWARDED THIS SCHOLARSHIP AND FOR THE CRUCIAL WORK OF THE FOUNDATION THAT SHE WILL BE ADDRESSING. DR. KWON EPITOMIZES EVERYTHING WE NEED TO SECURE A FUTURE FOR CHIROPRACTIC RESEARCHERS WHO FOCUS ON THE VERTEBRAL SUBLUXATION WITHOUT THE COMPROMISE SO MANY OTHERS HAVE GIVEN IN TO."

MATTHEW MCCOY DC, MPH -
VICE PRESIDENT FOUNDATION
FOR VERTEBRAL SUBLUXATION

Vice President of the FVS, Matthew McCoy DC, MPH commented on the awarding of the scholarship to Dr. Kwon stating "I could not be more excited that Dr. Kwon was awarded this scholarship and for the crucial work of the Foundation that she will be addressing. Dr. Kwon epitomizes everything we need to secure a future for chiropractic researchers who focus on the vertebral subluxation without the compromise so many others have given in to."

Dr. Kwon anticipates that the program will create tremendous opportunities for knowledge and the building of new, professional relationships for exploring subluxation research.

# Epidemiology

Secondary Analysis of a Dataset to Estimate the Prevalence of Vertebral Subluxation and its Implications for Health Promotion and Prevention

*Christie Kwon DC, MS, MPH, Jose Binongo Ph.D, Matthew McCoy DC, MPH*

# Epidemiology

- ***What percentage of the population is subluxated?***

- 1,851 subjects | 7 chiropractic clinics | 4 states
- Average age: 43.48 yoa
- The overall prevalence of VS was **78.55%**

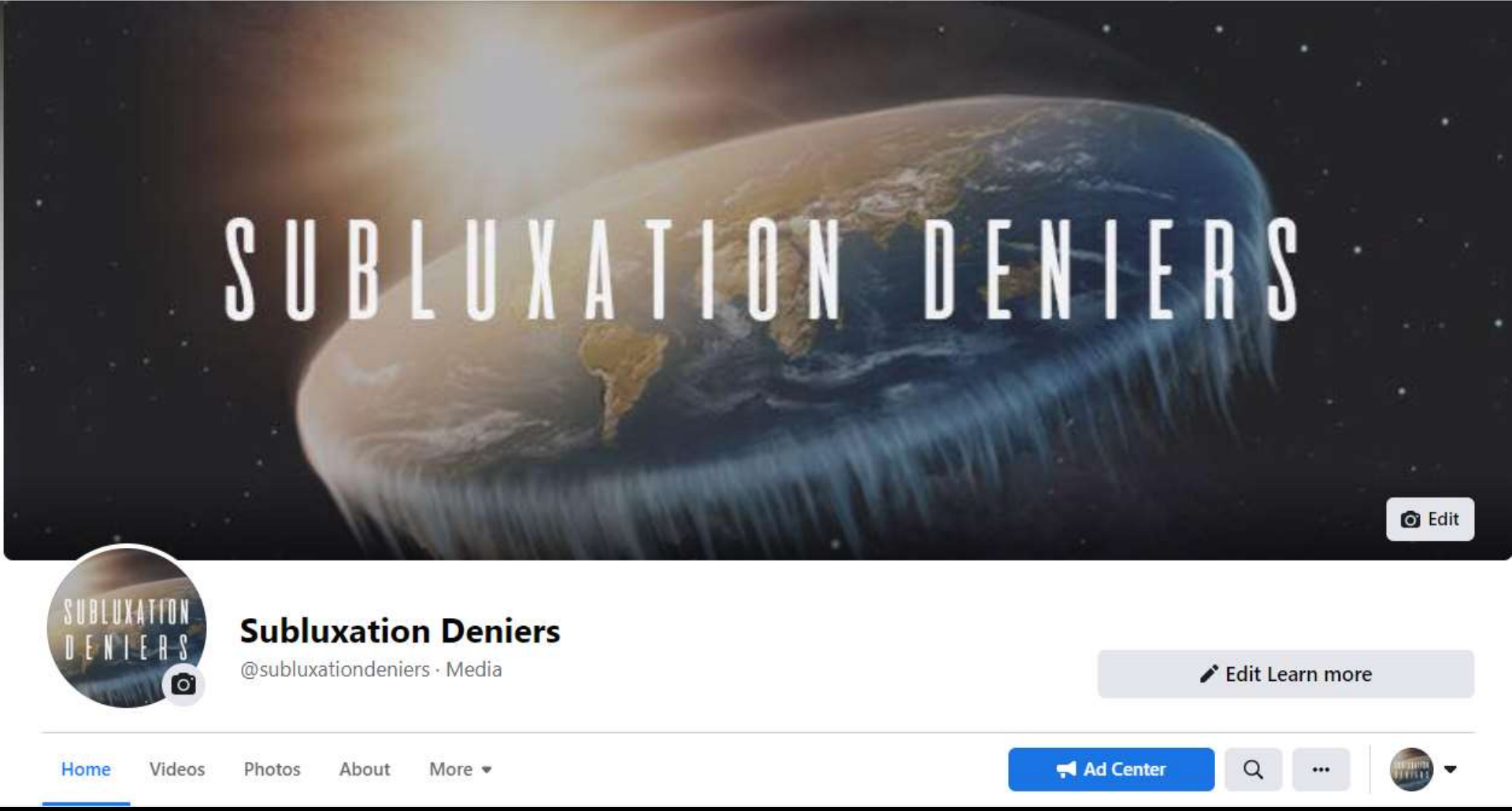
"The authors quote Gray's Anatomy about the idea that the nervous system controls and coordinates all organs and structures. This is not relevant to the study and is **untrue.** Many organs function well without nervous system control"

## What is a Subluxation Denier?



### Dogma Over Data

A number of chiropractors representing the radical fringe of the chiropractic profession, are suggesting that the term vertebral subluxation and the concept be abandoned. They seem to think that subluxation-based chiropractic is based on the antiquated monocausal theory espoused by early chiropractors, or the limited model of intraforaminal nerve-root compression. Anyone with even a passing knowledge of the literature knows this is not true. So, what gives? By bantering about terms such as integration and evidence-based practice, members of this fringe element have achieved a degree of success in hijacking some colleges and political organizations in an apparent attempt to pander to third-party payers and fit into the medical system. We are reminded of an organization known as the Flat Earth Society, whose members stubbornly choose to ignore the overwhelming evidence contrary to




facebook.com/subluxationdeniers

# Epidemiology

- ***Does vertebral subluxation lead to increased morbidity and mortality?***

- Patients reported various spinal or extremity pain, numbness, or tingling; headaches; ear, nose, and throat-related issues; visceral symptoms; mental health concerns; neurocognitive issues; and concerns about general health as well as overall wellness

## Research Agenda

# Vertebral Subluxation Research: An Agenda to Explore the Epidemiology of Vertebral Subluxation and the Clinical Outcomes Related to Management

*Matthew McCoy DC, MPH*[1]
*Christopher Kent DC, JD*[2]

1. *Professor, Clinical Sciences – Life University, College of Chiropractic Marietta, GA*
2. *President – Foundation for Vertebral Subluxation*

**Abstract**

**Background:** Since its inception the chiropractic profession has been mired in debate regarding its clinical application – specifically surrounding the concept of vertebral subluxation. Despite over 100 years and some effort at developing a research agenda, the factions that embrace vertebral subluxation as a clinical entity warranting epidemiological study continue to be confronted with basic questions regarding the existence, measurement and clinical meaningfulness of vertebral subluxation. These questions form the basis for a proposal to develop a Research Agenda and related program centered on vertebral subluxation in order to elucidate the clinical manifestations of the founding principles and tenets of the chiropractic profession.

**Methods:** The vertebral subluxation research agenda will involve defining the current state of the science, art and literature base to determine what is known and not known about each research objective. This will allow for the most efficient use of limited resources. The agenda centers on five areas including: operational models, measurement, epidemiology, clinical strategies and health outcomes.

**Discussion:** In order to accomplish the goals and objectives of the research agenda, a long term project is proposed that includes creating and supporting the next generation of subluxation centered scientific researchers to carry out these projects. The research program will need to identify and continuously update a manifest of research projects directly relevant to the agenda and will need to involve a large segment of subluxation centered groups, organizations, associations, vendors, practitioners and patients. The development and implementation of central data repositories will need to be undertaken and the program and its results will need to be marketed to chiropractors, students, patients, legislators, policy makers and the general public through an integrated campaign.

**Conclusion:** This research agenda seeks to validate the profession's focus on the location, analysis and correction of vertebral subluxation and position chiropractic as a vitalistic, scientific, evidence-informed clinical practice. This research is expected to assist the profession in gaining a higher degree of respect, understanding and acceptance in the health care marketplace, the scientific community and among the patients it serves. Current evidence suggests that vertebral subluxation is detrimental to human health and function and as such chiropractors who manage subluxation feel an ethical and moral obligation to screen and educate the public on what it believes is a significant public health threat. To that effect this agenda also includes the marketing of the agenda itself and the results of its research endeavors in an effort to increase utilization of vertebral subluxation screening and management.

**Key words:** *Chiropractic, vertebral subluxation, research agenda, epidemiology, vitalism, evidence informed practice.*



Foundation for Vertebral Subluxation

# Research Agenda

The agenda centers on five areas including:

- Operational models
- Measurement
- **Epidemiology**
- Clinical Strategies
- Health outcomes

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# Epidemiology of VS

Vertebral subluxation is a pathophysiological process that can be measured, quantified and characterized.

Vertebral subluxation also has rates of occurrence, distribution, determinants, and incidence rates.

Because of this, it is possible to relate the incidence and prevalence of subluxation to such things as genetic and environmental factors.

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# Previous Efforts

- Decken B, Santos M, Santos J. The Prevalence of Vertebral Subluxation in Children Ten Years of Age and Younger. Proceedings of the 8th Annual International Research and Philosophy Symposium. Sherman College of Chiropractic Spartanburg, South Carolina. October 22-23, 2011 A. Vertebral Subluxation Res. November 28, 2011

- Bowler B. The Prevalence of Subluxation of the Occipital-Atlanto-Axial Complex in a Population Seeking Chiropractic Care. Proceedings of the 14th Annual International Research and Philosophy Symposium. Sherman College of Chiropractic Spartanburg, South Carolina. October 7-8, 2017. Journal of Philosophy, Principles & Practice of Chiropractic. Volume 2017. December 4, 2017.

Foundation for Vertebral Subluxation

# The Prevalence of Subluxation of the Occipital-Atlanto-Axial Complex in a Population Seeking Chiropractic Care

*Brigette Bowler BA DC*

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**Background:** During a presentation at the International Research and Philosophy Symposium (IRAPS) at Sherman College in 2015, a group of orthospinologists were discussing a grant application to the National Institute of Health. During the interview, they were asked: "What is the prevalence of vertebral subluxation?" Having studied public health as part of my bachelor degree at Rutgers I decided to keep track of each patient that checked clear of subluxation at the Occipital-Atlanto-Axial Complex (OAA) from the inception of my practice. This paper is a report of those findings.

**Methods:** Using eight data points to determine the presence of OAA subluxation, each time a new patient exam turned up zero positive data points the person was not accepted as a patient. A simple tabulation on a piece of paper was maintained throughout the 29 years of practice in the same location. Only patients over the age of 18 were included.

**Discussion:** Out of 11,000 consultations, 122 women and 111 men have presented for an initial exam and have checked free of OAA subluxation. This calculates as roughly 99% of patients seeking care at Essential Chiropractic did have a subluxation at the OAA.

**Conclusion:** Can this data be extrapolated to show the prevalence of OAA subluxation in the general population at large? No. More practitioners would have to use the same data points and find a way to check the general population. Epidemiology is defined as a branch of medicine that deals with the incidence, distribution, and possible control of diseases and other factors relating to health.[1] Tabulating the presence of subluxation regardless of symptoms is a form of salutogenic epidemiology.

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**Original Research**

# Prevalence of Abnormal Findings Associated with Components of Vertebral Subluxation in 737 Patients Referred for MRI Examination & Potential Neurological Consequences

*Christopher Kent DC, JD[1]*
*Kathleen Costello MS, DC[2]*

1. *President - Foundation for Vertebral Subluxation, Kennesaw, GA & Director Center for Scholarly Activity Sherman College of Chiropractic*
2. *Research Fellow - Foundation for Vertebral Subluxation Kennesaw, GA*

**Abstract**

**Objective:** This study sought to determine the prevalence of abnormal MRI findings associated with components of vertebral subluxation in a cohort of 737 patients.

**Methods:** This was a retrospective, cross sectional MRI imaging study. This anonymized retrospective study was determined to be exempt by the Institutional Review Board of the Foundation for Vertebral Subluxation. MRI reports on 737 consecutive cases referred by Doctors of Chiropractic were obtained from a private, free standing imaging center. MRI reports of patients referred by chiropractors who attended the imaging center in a three and one half year period were assessed for spinal pathologies. Six hundred ninety-seven spinal MRI reports and 40 extremity reports were obtained. The spinal MRI reports consisted of 325 cervical, 11 thoracic, and 361 lumbar reports. Extremity MRIs included 27 knee and 13 shoulder MRIs. The images were obtained using a low field strength (0.064T), open MRI (Toshiba Access®). All MRIs included sagittal and transaxial T1-weighted and T2-weighted sequences.

**Results:** Three hundred twenty-five MR studies of the cervical spine were reviewed with 91% presenting spinal abnormalities, while 28 of 325 had no abnormalities noted. These abnormalities consisted of components of vertebral subluxation including: 35% had disc degeneration, 17% exhibiting osteophytosis, 6% posterior ridging, and 1% arthrosis of Joints of Luschka. Two hundred twenty-five disc lesions were present with many reports indicating multiple lesions at different segments. Three hundred sixty-one MR lumbar spine reports were reviewed with 89% presenting with spinal abnormalities including components of vertebral subluxation, while 39 of 361 had no abnormalities noted. Two hundred fifty-one (70%) of 361 had disc degeneration. Two hundred twenty four disc lesions were identified along with 24 showing canal stenosis. There were 11 thoracic spine studies, and 40 extremity studies.

**Conclusion:** Degenerative and other changes in the spine may be associated with vertebral subluxations. Vertebral subluxations are changes in the position or motion of a vertebra, which result in the interference of nerve function. Possible neurobiological mechanisms associated with vertebral subluxations include compression, stretch, dysafferentation, dyskinesia, dysponesis, dysautonomia, neuroplasticity and ephaptic transmission.

**Key Words:** *Magnetic Resonance Imaging, cervical spine, thoracic spine, lumbar spine, vertebral subluxation, chiropractic*

**Introduction**

Doctors of Chiropractic are responsible for determining the safety and appropriateness of chiropractic care. This responsibility includes the detection and characterization of vertebral subluxations, congenital and developmental



- First ever study of the prevalence of vertebral subluxation components on magnetic resonance scans.
- 91% of MRI scans of the cervical spine and 89% of lumbar spine scans had spinal abnormalities consistent with subluxation.
- The study included 737 subjects making it one of the largest studies conducted on vertebral subluxation in the history of the chiropractic profession.
- Looked at MRI reports on 737 consecutive cases referred by Doctors of Chiropractic to a private, free standing imaging center.
- Three hundred twenty-five MR studies of the cervical spine were reviewed with 91% presenting spinal abnormalities.
- Only 28 of 325 had no abnormalities noted.

**Original Research**

# Prevalence of Abnormal Findings Associated with Components of Vertebral Subluxation in 737 Patients Referred for MRI Examination & Potential Neurological Consequences

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**Conclusion:** Degenerative and other changes in the spine may be associated with vertebral subluxations. Vertebral subluxations are changes in the position or motion of a vertebra, which result in the interference of nerve function. Possible neurobiological mechanisms associated with vertebral subluxations include compression, stretch, dysafferentation, dyskinesia, dysponesis, dysautonomia, neuroplasticity and ephaptic transmission.

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**Introduction**

Doctors of Chiropractic are responsible for determining the safety and appropriateness of chiropractic care. This responsibility includes the detection and characterization of vertebral subluxations, congenital and developmental



- Abnormalities consisted of components of vertebral subluxation including disc degeneration, osteophytosis, posterior ridging, and arthrosis.
- Two hundred twenty-five disc lesions were present with many reports indicating multiple lesions at different segments.
- 361 MR lumbar spine reports were reviewed with 89% presenting with spinal abnormalities consistent with components of vertebral subluxation
- 39 of 361 had no abnormalities noted.
- Two hundred fifty-one (70%) of 361 had disc degeneration.
- Two hundred twenty four disc lesions were identified
- 24 showed canal stenosis.

# Not Studied

The chiropractic profession has not studied how many people have vertebral subluxation, who gets specific types of subluxations and what factors (such as environment, occupation, family patterns, and personal habits, such as smoking and diet) play in the development of vertebral subluxation.

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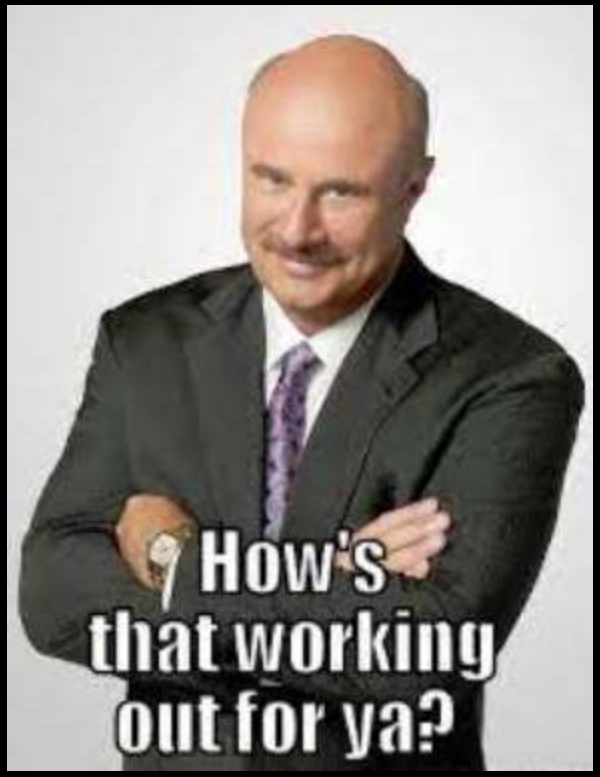
# Barriers (Excuses)

A multitude of internal and external factors have existed to thwart the profession from engaging in such a systematic study.

These include internal cultural issues within certain factions of chiropractic where research and science are not valued as they should be and they include factions with chiropractic worldviews in which subluxation is not viewed as a pathophysiological process.

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# One Spine at a Time



# Barriers (Excuses)

External factors include the historical struggles the profession has faced in regards to legitimization, licensing, insurance equality, the AMA boycott and a host of other issues that vied for scant resources.

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ChiropracticCartel.com

# Time is Up

These factors can no longer be used as excuses for developing and implementing the infrastructure needed to elucidate the epidemiology of vertebral subluxation. The profession has run out of time to answer these questions.

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# Subluxation Surveillance

In the field of public health, large networks are established for syndromic surveillance.

Once a disease is identified as reportable, such as cancer or STDs, this information is transmitted immediately by emergency room personnel or practice-based physicians to these computerized networks.

Similarly, medical insurance companies and managed care organizations maintain large centralized patient databases to: monitor costs, comply with reporting requirements to regulatory agencies, and conduct market forecasting.

In many instances, they use these powerful data sets to influence health policy reform.

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# Groping in the Dark

Chiropractic has no such similar surveillance data, nor infrastructure to gather it, in regards to the very clinical entity for which it exists to manage.

As a result, the profession does not know the incidence, prevalence, distribution, occurrence and determinants of vertebral subluxation - while at the same time believing that it is a significant public health threat.

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What about EHR systems?

# Time to Catch Up

The monitoring of public health threats, practitioner outcomes, choice of outcome measures, favorable and adverse events are the concern of all health professions because such monitoring allows the field to evolve newer strategies, procedures and technologies while maintaining the highest assurance of quality in patient care.

In an age of evidence-based health care the need for central data repositories and linked clinical research sites is quickly becoming a standard that the profession must embrace.

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# Challenges

- Gathering data from disparate sources
- Gathering data from different techniques
- Comparing data
- Agreement on what constitutes a vertebral subluxation (measurements)
  - Example: Cancer is always present

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MORBIDITY

MORTALITY

SALUTARY

# Salutogenesis, Stress Responsivity, and Neurobiological Mechanisms Associated with Vertebral Subluxation. Review and Commentary.

Christopher Kent
Sherman College of Chiropractic



# What About Just Because?

REVIEW OF THE LITERATURE

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

*Sean M. Hannon, BA, DC*


## ABSTRACT

**Objective:** To review existing literature documenting objectively measured physiologic changes and their associated health benefits subsequent to chiropractic adjustments, primarily in asymptomatic individuals.

**Data Collection:** "Asymptomatic" "normal" "pain-free" and "healthy" subjects were keywords used to search for articles pertaining to the objective. Data was collected directly from the bound journals of the Palmer College of Chiropractic library in Davenport, IA, Life University library in Marietta, GA, and the Sherman College of Chiropractic library in Spartanburg, SC. Some articles were downloaded from peer-reviewed journals accessible through campus Internet subscription.

**Results**: More than twenty studies were found documenting objective health benefits in subjects who were specifically described as "asymptomatic," "healthy," "normal," or "free from physical injury." Nearly an equal number of studies were found documenting objectively measured health benefits in subjects to which no symptomatic presentation was described.

**Conclusion:** The data reviewed lend support to the contention that chiropractic adjustments, often for the purpose of correcting vertebral subluxation, confer measurable health benefits to people regardless of the presence or absence of symptoms. A significant amount of preliminary evidence supports that people without symptoms can benefit from chiropractic care. Improved function can be objectively measured in asymptomatic individuals following chiropractic care in a number of body systems often by relatively non-invasive means. It is plausible that chiropractic care may be of benefit to every function of the body and have the potential for long-term, overall health benefit to those receiving chiropractic care.


**Key words:** *chiropractic adjustment, subluxation, objective measurement, health benefit*

## Introduction

A recent survey of 658 randomly selected US chiropractors revealed some surprising data.[1] Eighty-eight percent (88.3%) of respondents agreed or strongly agreed that the purpose of maintenance care was "to maintain or optimize state of health." Eighty-percent (80.2%) of respondents agreed or strongly agreed that the purpose of maintenance care was to "determine and treat subluxation." Furthermore, US chiropractors agreed that "maintenance care was of value to all age groups, with the value increasing slightly with an increase in a patient's age." However, only forty-percent (40.2%) agreed that "adequate research existed to support the concept of maintenance care," and ninety-three percent (93.4%) agreed "there was a need for more research." It seems that US chiropractors agree and are of the opinion that correcting subluxation is of value to all people, but nearly 60% do not think there is sufficient evidence to verify their opinion. One chiropractor expressed this frustration in a Letter to the Editor in the August 6, 2000 issue of *Dynamic Chiropractic*, a trade journal of the chiropractic profession:

> "I try to encourage my patients who are open to continue maintenance care… However, I have yet to see a single research finding that indicates that those patients who do receive regular chiropractic care, regardless of symptomotology, benefit in any measurable way."
> -Scott Rogers, MA,DC

Others have expressed their opinions on the subject in peer-reviewed literature:

> "Many chiropractors will continue to adjust imaginary subluxations in the spines of perfectly healthy patients, perpetuating unsubstantiated claims and discouraging chiropractors who wish to specialize in the treatment of neck and back pain…[2] Chiropractors who believe that vertebral alignment has something to do with general health often encourage their patients to submit to regular and frequent manipulation, even when these patients are asymptomatic… I cannot personally justify manipulating the spine of a healthy, symptom-free patient… It is unfair to patients to allow them to believe that they must have regular spinal adjustments in order to stay healthy… I cannot see any basis or justification for routinely manipulating the spine of a healthy patient for the purpose of maintaining health or preventing disease."[3]
> *-Samuel Homola, DC*

Sean M. Hannon, BA, DC, Private Practice, Denver, CO



Respiration
ROM
HRV
Autonomic function
Endocrine function
Cardiovascular function
Immune Function
Muscle strength
Athletic ability
Neurocognitive function
Reaction time
Information processing
Visual acuity
Stress
Reproductive hormones
Healing
Recovery time
Health of senior citizens
Reduced labor times

**Original Research**

# Improved Glycosylated Hemoglobin, Hyperglycemia, and Quality of Life Following Thoracic Hypokyphosis Vertebral Subluxation Correction Using Chiropractic BioPhysics®: A Prospective Case Report


*Curtis Fedorchuk, DC[1]*
*Douglas F Lightstone, DC[1]*
*Robert D Comer, DC[1]*
*Michael T Weiner, DC[2]*
*Matthew McCoy, DC[3]*

1. *Institute for Spinal Health and Performance, Cumming, GA*
2. *Private Practice of Chiropractic, Tucker, GA*
3. *Foundation for Vertebral Subluxation, Kennesaw, GA*



**Abstract**

**Objective:** Spinal misalignment increases spinal cord tension and is linked to various health conditions. There has never been a study on the impact of spinal alignment on blood glucose metabolism. This prospective case with long-term follow-up explores spinal alignment and its impact on type 1 diabetes mellitus.

**Case and methods:** A 26-year-old male presented with chronic mid-back pain for 9 years and type 1 diabetes mellitus. Radiography and MRI revealed hypokyphosis of the thoracic spine with spinal misalignment from thoracic vertebrae 6 through 9 consistent with vertebral subluxation. Glycosylated hemoglobin and blood-glucose averages were obtained by continuous glucose monitoring. Back pain, paraspinal muscle tension, and quality of life were also measured. The patient received Chiropractic BioPhysics® care including Mirror Image® corrective spinal exercises, adjustments, and traction.

**Results:** After 36 visits, the patient reported improvement in his mid-back pain and quality of life. Thoracic x-rays showed correction of thoracic hypokyphosis. Surface EMG measuring paraspinal muscle tension improved and continuous glucose monitoring showed dramatic drop in blood glucose immediately following the onset of each visit and improvement in blood glucose averages, percentage of time of blood glucose in a healthy target range, and glycosylated hemoglobin. The patient reported he reduced his basal insulin by approximately half during chiropractic care.

**Conclusions:** This case suggests that correction of thoracic hypokyphosis using Chiropractic BioPhysics® care protocols may result in improved glycosylated hemoglobin and blood glucose metabolism for a person with type 1 diabetes mellitus, as well as back pain, paraspinal muscle tension, and quality of life.



**Key Words:** Chiropractic BioPhysics®, adjustments, traction, vertebral subluxation; spine, Type 1 diabetes, thoracic hypokyphosis, continuous glucose meter, HbA1c


## Introduction

Type 1 diabetes mellitus (T1DM) has serious short-term and long- term health implications. The disorder has a strong genetic component, but the factors that trigger onset of clinical disease remain largely unknown.[1] Hyperglycemia predisposes people with diabetes to serious health conditions and complications such as cardiovascular disease, stroke, nephropathy and kidney failure, retinopathy and blindness. report from the US Centers for Disease Control [CDC] recently estimated that a 10-year- old boy or girl developing [type 1] diabetes in the year 2000 would lose, on average, 18.7 and 19.0 life-years, respectively, compared with their non-diabetic peers".[12]

There is no known way to prevent or cure T1DM.

Type 1




Three arm randomized clinical trial with two control groups

Residential addiction treatment setting.

A total of 98 subjects (14 female and 84 male) were enrolled in the year and a half study.

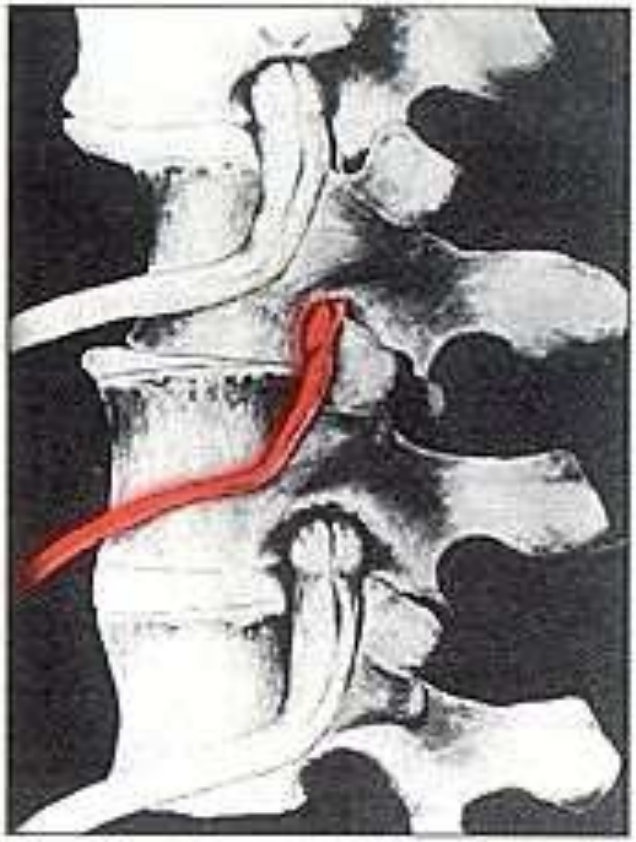
100% of the Active (chiropractic) group completed the 30-day program, while only 24 (75%) of the Placebo group and 19 (56%) of the Usual Care group completed 30 days.

Decreased anxiety and depression

Decreased nursing station visits.

Poor performance by the placebo group suggests that the chiropractic care had no positive placebo effect.

# The Silent Killer?



*This is one type of vertebral subluxation (nerve interference) – the "silent killer."*

ORIGINAL RESEARCH

# Atlas Vertebra Realignment and Achievement of Arterial Pressure Goal in Hypertensive Patients: A Pilot Study

*George L. Bakris, M.D[1]., Marshall Dickholtz, Sr., D.C[2]., Peter Meyer, Ph.D.[1], Glenda Kravitz, M.S[1], Elizabeth Avery, MS[1], Martha Miller BA[3], Jonathan Brown, D.C[2], C. Woodfield[4], Bruce M. Bell, M.D[3]*

**ABSTRACT**

Anatomical abnormalities of the cervical spine at the level of the Atlas vertebra are associated with relative ischemia 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 lowering BP. Fifty drug naïve (n=26) or washed out (n=24) subjects with Stage 1 hypertension were evaluated using a randomized, double blind, placebo-controlled study design at a single center.

Subjects received no antihypertensive meds during the eight-week study duration. After baseline measures subjects were randomized to receive a National Upper Cervical Chiropractic (NUCCA) procedure or a sham procedure. Statistical analysis was performed comparing baseline and week 8 visits. The study was designed with 90% power to detect an 8/5 mmHg reduction difference in arterial pressure at eight weeks over the placebo group. The study cohort consisted of 70% males, 2% Hispanic, mean age 52.7+9.6 years. There were no major differences in baseline demographics found between the two treatment groups.

The primary results of the study are noted in the Table. No adverse effects were recorded. We conclude that restoration of Atlas alignment is associated with marked reductions in blood pressure similar to the use of two-drug combination therapy. Larger studies are needed to validate these findings.

**Key Words:** *atlas; vertebra; antihypertensive therapy*

**Background**

Studies note that arterial compression of the left lateral medulla oblongata by looping arteries of the base of the brain in 51 of 53 hypertensive patients undergoing left retromastoid craniotomy and microvascular decompression for unrelated cranial nerve dysfunctions; 76% of these individuals had marked lowering of blood pressure following surgery.

Such compression was **not** noted in normotensive patients (1). Studies to clarify the mechanism by which decompression of the left rostral ventrolateral medulla alleviate neurogenic hypertension have been performed. They indicate that a sub-

*Reproduced with permission from an Abstract of the original: G Bakris, M Dickholtz Sr, PM Meyer, G Kravitz, E Avery, M Miller, J Brown, C Woodfield, B Bell. Atlas*

Demonstrated an effect similar to taking two hypertensive medications daily.

# The Genotoxic Aspect of the Vertebral Subluxation: Transcript of Lecture Given by Ronald W. Pero Ph.D

Ronald W. Pero, Ph.D[1]


## ABSTRACT

This is looking at life at the chemical level. There are, basically, three main events that organize information. Duplication, transcription, of that information that's present in the DNA molecule, and then translation of that material into protein which carries out the metabolic functions in the cell. The crucial event is in duplication. That is really genetic toxicology. If the cell can't do that, it's the end. It can live with a lot of abnormalities in translation and transcription, it can't live with abnormalities in the DNA duplication. So that is what Harry Truman says, "The buck stops here". The responsibility stops here. That's it. The DNA molecule. You can't go back any further. That's what I'm offering you as a basic from which to look at the scientific basis of chiropractic. That's chemically speaking. Now this is kinetically speaking. What happens is this is just taking the human cells, the cell division cycle, it's usually about 8 hours, and this is what happens, these are different phases. We can recognize the phases in the cell very nicely. "M' is the mitosis, when the cell actually divides and the chromatin is very condensed."G1" is when the cell is preparing to replicate its DNA, "S" is when the replication actually takes place. "G2" is it begins to condense, and "M1", it actually comes apart. The events themselves are very nicely seen and very important in the duplication of cell information.


**Keywords:** *chiropractic, subluxation, adjustment, manipulation, oncogenes, genotoxicity, stress, immunity, cancer, mutagenesis, neuropathophysiology*

**Publication Note:** This paper is a reprint of the transcript from a lecture given by Ronald W. Pero Ph.D circa 1980.

## Introduction

By Dr. Joseph Flesia

Every one of you knows Dr. Pero. His introduction will consist mostly of some of the new things he is doing. He is, as you all know, a member of the Chiropractic Advisory Board of Renaissance.

He is the Chairman of the newly founded Chiropractic Basic Science Research Foundation, the fund granting foundation we talked about earlier, and he is on the Peer Review Committee who will be giving out the funds to the various scientists for more conclusive research.

He is also the director of Molecular Genetics at the University of Lund in Lund, Sweden. Director of the Division of Cancer Research at the Preventive Medicine Institute, Strang Clinic, downtown Manhattan. He is the Director of the PMI Research Center for Preventive Medicine, and a Scientific Editor for the Keyser/Strang Lung Research Center.

Dr. Pero is a friend of Renaissance and, therefore, a friend of chiropractic. He will be one of the two men receiving a partial grant from the donations upstairs, to immediately begin large amounts of genetic testing of patients in Phases I and III of subluxation degeneration under long term chiropractic care.

*Dr. Ronald Pero*

Okay, are we ready? (A loud "Yes" from the audience). (Dr. Pero is standing with his back to the camera). Lights! Camera! Action! Let's get the camera in focus. We should get it on the right people- the audience. They're the ones who've got to be

1. Director of Molecular Genetics University of Lund, Sweden

# Biochemical & Endocrinological Changes Due to Neuropathologic States That Can Lead to Gentoxic Consequences: A Testable Hypothesis for Health Effects Induced by Spinal Pathomechanics

Desmond B. Johnson, B.Sc., Ph.D[1], Ronald W. Pero, Ph.D[2], J.M. Flesia Jr., D.C.[1]


## ABSTRACT

Anatomical, histopathological and neuropathological consequences of spinal cord injury have been reviewed previously. The present review concentrates on literature published since then, and is particularly concerned with the molecular events following spinal cord injury, with the emphasis on such events that relate to genotoxicity. Modern theories relating to oncogenes, to initiation and promotion, and to co-carcinogens are dealt with. There is overwhelming evidence in the literature for the role of hormones in the etiology of cancer.

As co-carcinogens, or agents of promotion, hormones have a prominent role in tumorigenesis through their influence on cellular environment and on the expression of growth capacity. In addition, some writers have suggested that hormones may also be important as initiators of neoplasia as well as being promoters of neoplasia initiated by other agents.

Because of the chronic nature of the results of many spinal injuries, to whatever degree of debilitation, the impact of stress on the human organism must be considered. Hormonal changes elicited by physical and psychological stress are summarized. While pain is included in the general context of stress, it is also treated from other viewpoints: recent literature on pain perception, on endogenous opiates, and on pain control are included in the review. In addition, attention is drawn to the side effects of some drugs, including analgesics as it is clear that some drugs are closely connected with carcinogenesis.


**Key words:** *chiropractic, subluxation, adjustment, manipulation, oncogenes, stress, immunity, cancer, mutageneis, neuropathophysiology*

**Publication Note:** This paper is a reprint of the original with the addition of an abstract and key words.

## Background

Anatomical, histopathological and neuropathological consequences of spinal cord injury have been reviewed previously (Stiga & Flesia, ref.1). The present review concentrates on literature published since then, and is particularly concerned with the molecular events following spinal cord injury, with the emphasis on such events that relate to genotoxicity.

Because cancer is a main research thrust today in the health care sciences as a measure of genotoxic events, this report has an oncological orientation. Modern theories relating to oncogenes, to initiation and promotion and to cocarcinogens are dealt with. There is overwhelming evidence in the literature for the role of hormones in the etiology of cancer. As cocarcinogens, or agents of promotion, hormones have a prominent role in tumorigenesis through their influence on cellular environment and on the expression of growth capacity. In addition, some writers have suggested that hormones may also be important as initiators of neoplasia as well as being promoters of neoplasia initiated by other agents. Because of the chronic nature of the results of many spinal injuries, to whatever degree of debilitation, the impact of stress on the human organism must be considered. Hormonal changes elicited by physical and psychological stress are

1. Chiropractic Basic Science Research Foundation

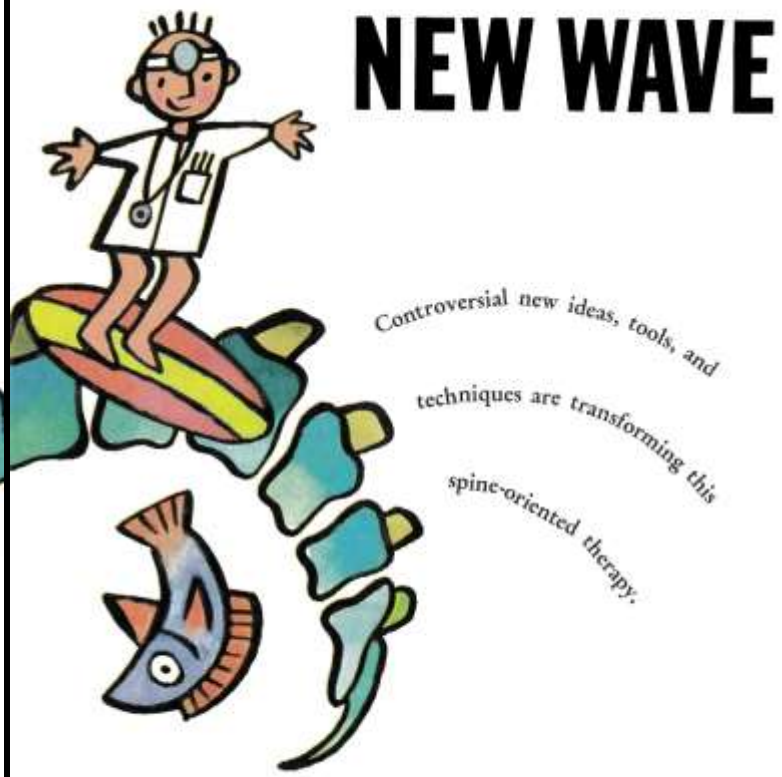
# CHIROPRACTIC'S NEW WAVE

BY MARK N. MEAD

Lying motionless on her left side, Kay Kennedy scans a wall covered by anatomical and acupuncture charts and drawings. A man in white medical attire gently palpates her neck and spine, then reaches for a small black device that measures infrared heat given off from the spine. Holding the instrument perpendicular to and a half inch from her back, he slowly follows the entire spine from the tailbone to the base of the skull. Churning out a small ticker tape, the device graphs temperature readings which show a "cold area" in the upper back.

Next Kennedy stands before a high-tech x-ray machine and is asked to twist slowly in each direction. A nearby screen shows the vertebrae rotating as she moves, while video tape records the action for later review. Then, using a machine that projects curved lines on her back, the man Kennedy calls "Doc" checks the lines to determine muscle contour, hence structural asymmetries in her body.

After applying pressure to various points along the spine, the physician places his thumbs at the base of her neck and presses down hard. At this point, Kennedy gives a vigorous nod of approval. "That time you got those kinks in my brain too, Doc," she



Controversial new ideas, tools, and techniques are transforming this spine-oriented therapy.

Illustration by Mary Anne Lloyd

# BOOSTING YOUR IMMUNITY THROUGH CHIROPRACTIC

In 1975, Ronald Pero, Ph.D., chief of cancer prevention research at New York's Preventive Medicine Institute and professor of medicine in Environmental Health at New York University, began developing scientifically valid ways to estimate individual susceptibility to various chronic diseases. Pero and his colleagues found strong evidence that susceptibility to cancer could be gauged by the activities of various enzymes involved in metabolic and genetic changes due to exposure to carcinogenic or "mutagenic" chemicals. An individual's immune system responsiveness, or "immune competence," also was directly linked to certain DNA-repairing enzymes, which provided an objective way to assess disease susceptibility. Lack of those enzymes, Pero said, "definitely limits not only your lifespan, but also your ability to resist serious disease consequences."

Pero was also fascinated by various hormones' synergistic relationship with other cancer-inducing agents to promote the disease. For example, thyroid hormones affect the early phases of radiation- and chemically-induced cancers. If the thyroid produces too much of either thyroxine or thyroid-stimulating hormone, cancer risk greatly increases. And since the nervous system regulates hormonal balances, it too can influence susceptibility to cancer. Along these lines, various kinds of spinal cord injury are accompanied by a high risk of developing cancer, particularly lymphomas and lymphatic leukemias. This connection led Pero to consider chiropractic as a potential alternative for reducing the risk of immune breakdown and disease.

In 1986 Pero collaborated with Joseph Flesia, D.C., chairman of the board of directors for the Chiropractic Basic Science Research Foundation, Inc. With a hefty grant from CBSRF, they began a research project at the University of Lund in Lund, Sweden. Using Pero's tests to gauge resistance to hazardous environmental chemicals, they hypothesized that people with cancer would have a suppressed immune response to such a toxic burden, while healthy people and people receiving chiropractic care should have a relatively enhanced response.

Measuring 107 individuals who had received long-term chiropractic care, Pero's team turned up some surprising findings. All chiropractic patients were "genetically normal"—that is, they had no obvious genetic reasons for increased resistance or susceptibility to disease. Any difference, therefore, had to be accounted for by environmental or therapeutic factors. The chiropractic patients also had 200 percent greater immune-competence than people who had not received chiropractic, and 400 percent greater immune-competence than people with cancer or other serious diseases. Surprisingly, despite a wide range of ages in this study, the immune-competence did not show any decline with age—it was uniform for the entire group.

Pero concluded that "chiropractic may optimize whatever genetic abilities you have" so that you can fully resist serious disease. "I'm very excited to see that without chemical intervention . . this particular group of patients under chiropractic care did show a very improved response," he told CBSRF. "These changes occur from chiropractic treatment."

One shortcoming of this study, however, was its failure to distinguish the effects of dietary practice, which were also part of the treatment. When questioned on this point, Pero conceded that this would have to be answered in the next phase of the study. But he was unaware of any research showing that such differences could be accounted for by nutritional changes alone. Pero, who has published over 160 papers in peer review journals, firmly believes that chiropractic care was the critical factor in this study. —*M.N.M.*

findings at We Care Chiropractic Research Center in Dravosburg, Pennsylvania. "Anyone who practiced upper cervical work had the best track record."

Another theory, conceived by Logan Chiropractic College in Missouri, asserts that if the *base* of the spine is leveled, the rest will follow. Despite the apparent split between the Palmer and Logan schools, many chiropractors find merit in using both approaches interchangeably. Pierce says he practiced upper cervical strictly for nearly four years before beginning pelvic work. Today, however, almost all of Pierce's practice focuses on cervical adjustment, which he believes reflects how widespread upper cervical problems are in America.

Still other chiropractors are beginning to look beyond mechanical correction of body structure to explore more subtle problems of the spine and nervous system. This second school of thought, far less popular than the first, considers subluxations as one aspect of a more subtle problem involving the protective membranes of the brain and spinal cord, the meninges. Both schools, however, share a common emphasis on balanced nutrition and health-promoting lifestyle.

## New Tools of the Trade

Among the many tools chiropractors use for assessing body structure and spinal alignment, the hands are the most fundamental. Palpation of the back enables one to detect muscular, mechanical, and anatomical abnormalities. Areas of tenderness or stiffness may suggest neurological problems. But touch is insufficient for giving chiropractors all they need to know about the condition of the spine—a realization Palmer arrived at through his experience with two types of patients: city people and country people. The urbanites came more frequently to Palmer's office because they lived close by. To Palmer's surprise, those who came three times a week—the city folks—had *poorer* results than those who came in once every three weeks. Eventually realizing that there were times to adjust and times not to adjust, Palmer invented the neurocalometer, which he said monitored heat given off by the nerves. With the device, Palmer took measurements of heat changes along the spine and correlated them with the success of chiropractic adjustments.

Although Palmer didn't realize it at the time, he was actually measuring infrared heat given off by the blood vascular system, not by the nerves themselves. When a misaligned vertebra impinges on

# Pero

"It is clear from the literature review and the data presented above that spinal pathomechanics can cause hormonal changes that, in turn can lead to genotoxic responses, altered physiological states of health and disease. Hence it becomes imperative to research the possible scientific molecular basis for chiropractic."

Johnson D, Pero R, Flesia J. Biochemical and endocrinological changes due to neuropathologic states that can lead to genotoxic consequences. A testable hypothesis for health effects induced by spinal pathomechanics. Chiropractic Basic Science Research Foundation.



# Normal



# Abnormal – Phase 3

TECHNIQUE

# Scientific Rationale, Clinical Protocols, and Positive Patient Outcomes of the EPIC Technique Spinal Procedure

*Stan Pierce, Jr D.C.*[1]

## ABSTRACT

Inside the chiropractic profession, there are many diverse procedures and approaches to spinal care. Although each individual Doctor of Chiropractic (DC) may practice chiropractic with their own individual systems and techniques of care, those procedures are rooted in established techniques taught in the curriculum of various chiropractic colleges and universities. One of those established techniques is called EPIC. "EPIC" is an acronym for Evolutionary Percussive Instrument Corrections. It is a chiropractic technique that focuses on the use of progressively advancing diagnostic and adjusting technology to correct the craniocervical junction alignment. Its mission statement is: "We believe in challenging the status quo in healthcare, as well as in chiropractic. Forever striving to improve our quality of care, we will always look for the next conceptual or technological breakthrough that will help us achieve better spinal corrections for optimal patient health."

**History**

The EPIC technique is a direct genealogical descendant of the technique originally developed by the founding family of chiropractic. In 1895, Daniel David "DD" Palmer, DC first discovered and termed the spinal "subluxation", defined as a condition of the spine where a vertebra has lost its correct juxtaposition to the extent of disrupting the nervous system function. His son, Bartlett Joshua "BJ" Palmer, DC spent a lifetime of chiropractic research and concluded the premise of ADIO (Above-Down-Inside-Out) in referencing the flow of the nervous system primarily going from the brain, down the spinal cord, out the nerves to the effected/controlled areas. Based upon this concept, Dr. BJ Palmer focused on refining a procedure to analyze and adjust the 2 upper cervical vertebral misalignments calling that area "the true subluxation" and, in the early 1900s, developed a technique called Hole-In-One (HIO)/Toggle focusing on adjusting this unique area. The existence of the subluxation's neurologic imbalance was

ASLP, AIRP, etc.) to give a general understanding of what direction the chiropractor needed to adjust it. The axis (C2) malposition was given a separate general designation from the radiographs and required a separate adjustment. Following the adjustment, the neurophysical criteria were re-examined to assess change, but post adjustment radiographs were not standardized to be taken. His approach was the foundation of the science, results, and public perspective of the beginning of the chiropractic profession and was called the Toggle technique.

In the 1930s, John Grostic, DC, refined the radiographs and measured angles used to assess the cervical malposition, quantified these malpositioned vertebrae on a mathematical engineering platform. He refined the adjusting art to reduce the amount and depth of thrust, and to improve the accuracy of the adjusting line of drive. He utilized a post x-ray analytical



# First Documented Evidence of **Increased Telomere Length** Following Chiropractic

There is an old saying that chiropractic "adds life to years and years to life". Actually there are a lot of services and products that claim to do this.

In regards to chiropractic – one things is for sure: Research over the past 100 years has shown that chiropractic does indeed add "life" to years – meaning research has shown that chiropractic improves the quality of life in people who get chiropractic care.

In regards to the second claim of adding "years to life" there is a way to go in terms of research before such a statement can be made with certainty.

However, recent research reporting on a 35-year-old female undergoing chiropractic care showed that she experienced an increase in her ***telomere length*** following 3 months of chiropractic care. This is the first documented evidence showing increase in telomere length following chiropractic. The woman reported on in the study also experienced resolution of her neck and back pain as well as problems with frequent urination.

What does that have to do with life span you ask?

Telomeres are the caps at the end of each strand of DNA that protect our chromosomes (our genes), like the plastic tips at the end of shoelaces. Without the coating, shoelaces become frayed until they can no longer do their job. Without telomeres our DNA



# Mortality

# Telomere Length

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Author Manuscript
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## Telomeres, lifestyle, cancer, and aging

**Masood A. Shammas**
Harvard (Dana Farber) Cancer Institute, Boston, Massachusetts, USA

### Abstract

**Purpose of review—**There has been growing evidence that lifestyle factors may affect the health and lifespan of an individual by affecting telomere length. The purpose of this review was to highlight the importance of telomeres in human health and aging and to summarize possible lifestyle factors that may affect health and longevity by altering the rate of telomere shortening.

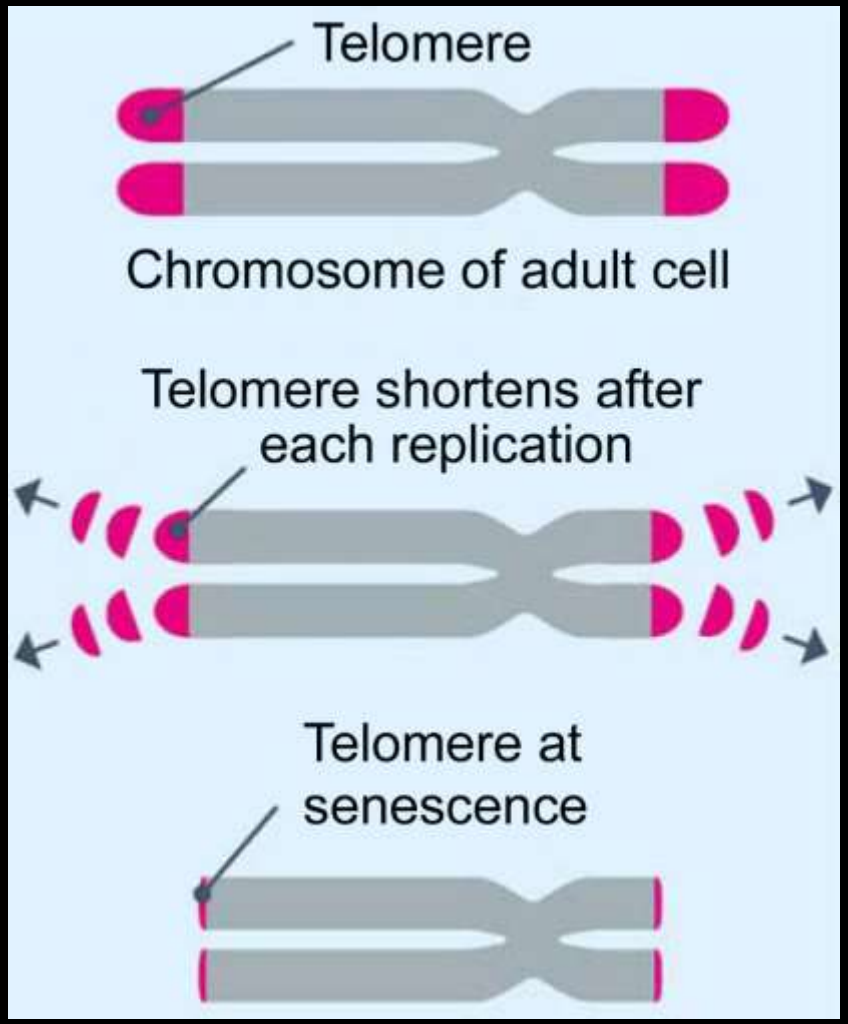
**Recent findings—**Recent studies indicate that telomere length, which can be affected by various lifestyle factors, can affect the pace of aging and onset of age-associated diseases.

**Summary—**Telomere length shortens with age. Progressive shortening of telomeres leads to senescence, apoptosis, or oncogenic transformation of somatic cells, affecting the health and lifespan of an individual. Shorter telomeres have been associated with increased incidence of diseases and poor survival. The rate of telomere shortening can be either increased or decreased specific lifestyle factors. Better choice of diet and activities has great potential to reduce the rate telomere shortening or at least prevent excessive telomere attrition, leading to delayed onset of age-associated diseases and increased lifespan. This review highlights the role of telomeres in aging and describes the lifestyle factors which may affect telomeres, human health, and aging.

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Foundation for Vertebral Subluxation

# Telomere Length




Telomeres are the caps at the end of each strand of DNA that protect our chromosomes, like the plastic tips at the end of shoelaces.

Without the coating, shoelaces become frayed until they can no longer do their job, just as without telomeres, DNA strands become damaged and our cells can’t do their job

Foundation for Vertebral Subluxation

## Case Study

# Increased Telomere Length & Improvements in Dysautonomia, Quality of Life, Neck & Back Pain Following Correction of Sagittal Cervical Alignment Using Chiropractic BioPhysics® Technique: a Case Study

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*Doug Lightstone, D.C*[1]
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**Abstract**

**Objective:** To present a prospective case study on the increase of telomere length, improvement in nocturnal polyuria, neck and mid-back pain, autonomic nervous system adaptability, and health-related quality of life following correction of the sagittal cervico-thoracic spinal alignment and posture using chiropractic biophysics® (CBP®) technique.

**Clinical features:** A 35-year-old white female elementary school teacher presented with chronic neck and mid- back pain for 5 years following a motor vehicle collision as well as nocturnal polyuria. Examination and radiography revealed forward head posture and loss of cervical lordosis consistent with vertebral subluxation. Patient telomere length was derived from nucleated white blood cells obtained from a blood test. Quality of life measures were determined by the Short-Form 36 health survey and heart rate variability was measured.

**Intervention and outcome:** The patient received CBP® spinal care including Mirror Image® corrective spinal exercises, adjustments, and traction. Full spine and drop table adjustments were administered. After 36 visits, she reported improvement in her nocturnal polyuria, neck and mid-back pain, and quality of life. Cervical x-rays showed correction of cervical lordosis and forward head posture. A blood test showed significant improvement in patient telomere length and heart rate variability improved from a health risk to within normal limits.

**Conclusion:** Our case suggests that correction of cervical lordosis and forward head postures by CBP® Mirror Image® methods improved the sagittal spinal alignment and posture and was temporally associated with lengthened telomeres, improved nocturnal polyuria, neck and mid-back pain, quality of life, and autonomic nervous system adaptability.

**Key Indexing Terms:** *Chiropractic BioPhysics®; CBP®; Adjustments; Traction; Cervical spine posture; Lordosis; Telomere length; Quality of life; Nocturnal polyuria; Vertebral subluxation*

### Introduction

Human telomere length (TL) is affected by genetic and environmental factors.[1] TL is longest at birth and decreases with advancing age.[2] As such, telomere length is considered a biomarker of biological aging.[2,3] As telomeres shorten, cells can lose their ability to undergo cellular sequencing (replication and division) and may undergo apoptosis (cell diseases,[3,7-10] psychological and stress disorders,[3] neurodegenerative diseases,[3] cancer,[3,11] chronic and serious illnesses,[3] and mortality.[3,10] Additionally, TL is associated with lifestyle choices such as diet, tobacco and alcohol use,[12] physical activity, and sleep.[3] Fewer studies have focused on the dynamic change and regulation of TL by implementing

# 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.**

Foundation for Vertebral Subluxation

# Wenban – Genetic Effects

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:

- Myospasm
- Ligamentous stretching
- Nociceptor afferrent stimulation
- Articular derangement

Foundation for Vertebral Subluxation

# Wenban – Genetic Effects

Review of the experimental evidence revealed the following consequences of vertebral subluxation:

- Transcription coupling
- Cell Death
- Information processing impairment
- Memory changes

Foundation for Vertebral Subluxation



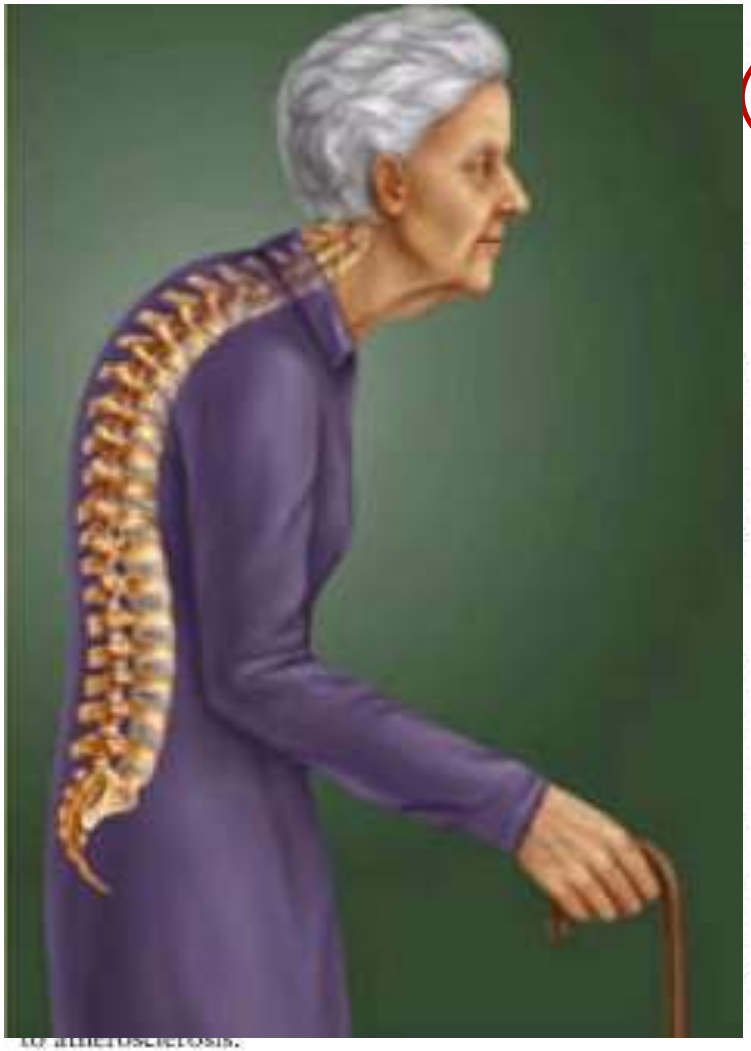

Stand up Straight!

# MORTALITY

Can being subluxated kill you?

# 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,† and Gail A. Greendale, MD**



**CONCLUSION:** Older men and women with hyperkyphotic posture have higher mortality rates. J Am Geriatr Soc 52:1662–1667, 2004.

**Key words: kyphosis; hyperkyphosis; kyphotic posture; mortality; cohort study**

to atherosclerosis.

Hyperkyphosis, commonly known as the dowager's hump, is frequently observed in older persons, yet little is known about its clinical significance. For example, its exact prevalence rates are unknown, and its causes other than vertebral fractures are not well defined. However, it is known that, in addition to being cosmetically undesirable, hyperkyphosis is associated with restrictive pulmonary disease[1] and poor physical function,[2–4] suggesting that hyperkyphosis might be also associated with other adverse health outcomes.

Few studies have investigated the association between hyperkyphosis and mortality. One study reported that hyperkyphotic men, but not women, had an age-adjusted greater rate of mortality,[5] but other possible confounding factors that might represent the true cause of increased mortality were not considered. It has previously been shown that older women with hyperkyphosis are at greater risk of pulmonary deaths, but there was limited power to adjust for possible confounders, and the risk of all-cause mortality was not investigated.[6]

Many methods have been used to measure the extent of kyphosis, but even a simple external physical measurement,

# 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,† and Gail A. Greendale, MD**

**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. **J Am Geriatr Soc 52:1662–1667, 2004.**

**Key words: kyphosis; hyperkyphosis; kyphotic posture; mortality; cohort study**

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Hyperkyphosis, commonly known as the dowager's hump, is frequently observed in older persons, yet little is known about its clinical significance. For example, its exact prevalence rates are unknown, and its causes other than vertebral fractures are not well defined. However, it is known that, in addition to being cosmetically undesirable, hyperkyphosis is associated with restrictive pulmonary disease[1] and poor physical function,[2–4] suggesting that hyperkyphosis might be also associated with other adverse health outcomes.

Few studies have investigated the association between hyperkyphosis and mortality. One study reported that hyperkyphotic men, but not women, had an age-adjusted greater rate of mortality,[5] but other possible confounding factors that might represent the true cause of increased mortality were not considered. It has previously been shown that older women with hyperkyphosis are at greater risk of pulmonary deaths, but there was limited power to adjust for possible confounders, and the risk of all-cause mortality was not investigated.[6]

Many methods have been used to measure the extent of kyphosis, but even a simple external physical measurement, suitable for clinical use, can be used to predict the risk of adverse health outcomes.[3,7] It was hypothesized that hyperkyphosis, assessed using a simple clinical measurement of the occiput-to-table distance (when lying supine on an examination table), would be associated with increased mortality in older men and women.

## METHODS

### Subjects

Relationship between hyperkyphotic posture (hunchback) and the rate of mortality (deaths) in older persons.

1300 subjects

Followed for an average of 4 years

Those with hyperkyphotic posture had a greater rate of death than those who did not.

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

The worse the curve was - the greater the rate of mortality.

For deaths due to atherosclerosis those who had hyperkyphotic posture had two and a half times the rate of death. Greater than even smoking.

Hyperkyphotic posture reflects an increased rate of physiological aging (inability to adapt).

# Progressive Spinal Kyphosis in the Aging Population

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Thoracic kyphosis tends to increase with age. Hyperkyphosis is defined as excessive curvature of the thoracic spine and may be associated with adverse health effects. Hyperkyphosis in isolation or as a component of degenerative kyphoscoliosis has important implications for the surgical management of adult spinal deformity. Our objective was to review the literature on the epidemiology, etiology, natural history, management, and outcomes of thoracic hyperkyphosis. We performed a narrative review of literature on thoracic hyperkyphosis and its implications for adult spinal deformity surgery. Hyperkyphosis has a prevalence of 20% to 40% and is more common in the geriatric population. The cause is multifactorial and involves an interaction between degenerative changes, vertebral compression fractures, muscular weakness, and altered biomechanics. It may be associated with adverse health consequences including impaired physical function, pain and disability, impaired pulmonary function, and increased mortality. Nonoperative management may slow the progression of kyphosis and improve function. Surgery is rarely performed for isolated hyperkyphosis in the elderly due to the associated risk, but is an option when kyphosis occurs in the context of significant deformity. In this scenario, increased thoracic kyphosis influences selection of fusion levels and overall surgical planning. Kyphosis is common in older individuals and is associated with adverse health effects and increased mortality. Current evidence suggests a role for nonoperative therapies in reducing kyphosis and delaying its progression. Isolated hyperkyphosis in the elderly is rarely treated surgically; however, increased thoracic kyphosis as a component of global spinal deformity has important implications for patient selection and operative planning.

**KEY WORDS:** Adult spinal deformity, Dowager's hump, Proximal junctional kyphosis, Senile kyphosis, Thoracic hyperkyphosis

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Degenerative changes affecting the spine accumulate and contribute to an overall trend of kyphosis with increased age.[1] Hyperkyphosis, defined as excessive curvature of the thoracic spine in the sagittal plane, is commonly referred to as "dowager's hump." The prevalence of hyperkyphosis in older individuals is not precisely known but has been reported to be between 20% and 40%.[2,3] In general, a thoracic kyphosis angle greater than 40 degrees, which represents the 95th percentile of normal in young adults, is defined as hyperkyphosis.[4,5] Mean thoracic kyphosis (TK) increases as we age: from 20 to 29 degrees in individuals under 40 years of age[4] to 53 degrees in 60 to 74 year olds, and 66 degrees in those older than 75 years of age.[6] The kyphosis angle increases more rapidly with age in women than in men.[7] This progression makes it difficult to establish uniform thresholds that distinguish pathological hyperkyphosis from "normal" changes associated with aging.

Hyperkyphosis may negatively impact several aspects of an afflicted individual's health including physical function, pulmonary function, pain and disability, and even mortality. Although

**ABBREVIATIONS: ASD,** adult spinal deformity; **BMD,** bone mineral density; **DDD,** degenerative disc disease; **LL,** lumbar lordosis; **OR,** odds ratio; **PI,** pelvic incidence; **PJK,** proximal junctional kyphosis; **PT,** pelvic tilt; **SSV,** sagittal stable vertebra; **TK,** thoracic kyphosis; **UIV,** upper-most instrumented vertebra

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# 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**

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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 interaction with concurrent coronal plane deformities or coronal imbalance. The extent of symptoms might also be related to the etiology of the positive sagittal balance, whether primary or postsurgical. The purpose of the present study was to examine patients with adult deformity with positive sagittal balance to define parameters within that group that might differentially predict clini-

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OXFORD

# PAIN & AGING SECTION

*Original Research Article*

# Inverse Association Between Neck Pain and All-Cause Mortality in Community-Dwelling Older Adults

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Disclosure and conflicts of interest: None concerning any of the authors.

## Abstract

**Objective. In a previous study, we found an apparent protective effect of neck pain on all-cause mortality in subjects older than age 85 years. The present longitudinal investigation was performed to verify this unexpected finding in a larger sample and to establish its significance.**

**Design. Population follow-up study.**

**Setting. Three towns of Northern Italy.**

**Subjects. We examined 5,253 community-dwelling residents age 65–102 years (55% female).**

**risk factors, self-rated health, physical activity, cardiovascular events, medical therapy, and presence of pain in the main joints. Seven-year all-cause mortality was the end point.**

**Results. During follow-up, 1,250 people died. After adjustment for age, sex, anti-inflammatory drugs, physical activity, and main risk factors, neck pain was inversely associated with mortality (hazard ratio = 0.74, 95% confidence interval = 0.64–0.86, $P<0.001$). This association was present, with high significance, in each of the eight following subgroups: men, women, age 65–74 years, age 75–84 years, age ≥85 years and residents of each of the three towns. The subjects without neck pain (N = 3,158) were older, more often men, less often hypercholesterolemic, less physically active, and had more frequently had a stroke than the subjects with neck pain (N = 2,095). There were no differences in the causes of death between subjects with or without neck pain.**

**Conclusions. This study has confirmed the existence of an independent inverse association between neck pain and mortality in the elderly, suggesting that reduced sensitivity to neck pain may be a new marker of frailty.**

**Key Words. Elderly; Epidemiological Study; Frailty; Mortality; Neck Pain**

## Introduction

The determinants of mortality and survival in the elderly may differ even to a great extent from the traditional risk factors of middle-aged subjects [1–3]. In fact, in the elderly, survival is more influenced by functional and nutritional status than by cardiovascular risk. In particular, in the geriatric field, the concept of risk tends to coincide

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- Women with hyperkyphotic posture are at greater risk for deaths due to pulmonary problems.
- 20-40% of the population has hyperkyphosis caused by structural spinal shifts and the resulting spinal degeneration that happens when the spine is shifted for several years.
- ". . . hyperkyphosis is associated with adverse health consequences including impaired physical functioning, pain, disability, impaired pulmonary function and increased mortality **(death)".**
- In women, a greater degree of kyphosis is correlated with increased likelihood of subsequent vertebral fractures. The researchers describe what they call a "cascade" of events starting with structural spinal shifts leading to a downward spiral of health effects.
- A loss of the normal curve in the neck is correlated with thoracic kyphotic angles.
- The adverse health consequences of thoracic hyperkyphosis are varied and include impairment in physical function, diminished pulmonary function, increased vertebral fractures, increased falls,
- and **an increase in mortality**.
- Women with hyperkyphosis have worse balance, wider stance, and slower gait velocity; all have been associated with an increased risk of falls.

# MORTALITY

Can being unsubluxated decrease your chances of dying?

Can being unsubluxated decrease your

**risk** of dying from certain things?

Does being unsubluxated decrease

**All Cause Mortality?**

ORIGINAL RESEARCH

# Improved Health Correlated With Ratio of Chiropractors in Mississippi River States

*John Hart, DC, MHS*[1]


## ABSTRACT

**Purpose:** The news that Minnesota ranks first in health and Louisiana last, suggests that their connecting medium, the Mississippi River, or some other north-to-south phenomenon might be a factor. Consequently, correlations were assessed for various outcomes for states along the Mississippi River in an effort to better understand possible mechanisms for the health disparity along the River. Doctor ratios were also correlated with the outcomes.

**Methods**: Each state along the Mississippi River was ranked according to its north-to-south position. The position ranks were correlated with various outcomes in the areas of health, education, and socioeconomics. Doctor (physician [medical and osteopathic] and chiropractor) ratios for these river states were also correlated with these outcomes.

**Results**: Except for generosity index, the outcomes had a tendency to worsen from north-to-south but tended to improve with increased doctor ratios. Chiropractors had stronger correlations for improved outcomes in 20 of the 25 outcomes compared to physicians, whereas physicians had stronger correlations in four of the 25 outcomes compared to chiropractors. The correlation was the same for both doctor types for one of the 25 outcomes

**Discussion:** Decreased health along the Mississippi River, from north-to-south, is likely a multi-factorial phenomenon, i.e., a decrease in income, educational attainment, and quality of health care. The ratios for both doctor types (physician and chiropractor) were correlated with improved outcomes, especially for chiropractor ratios.

**Conclusions**: Correlation does not necessarily show causation but it can give clues. Except for generosity index, the outcomes tended to worsen when proceeding south along the Mississippi River. Chiropractors had stronger correlations for improved health outcomes when compared to physicians. Further study is indicated into other possible causative mechanisms such as the quality of drinking water and health care delivery.


**Keywords:** *Mississippi River, medicine, chiropractic, health outcomes*

## Introduction

The news that Minnesota ranks first in health and Louisiana last suggests that their common geographical link, the Mississippi River, might be a factor.[1] It would seem that a river becomes more polluted downstream and that this would be a concern when many communities along the Mississippi use its water for drinking.[2-3] Given the high amount of industrialization of the U.S. however, the contaminants in the Mississippi River are surprisingly low.[4] For chemicals that *are* present however, it would seem that their concentration generally increases downstream.

Mercury, during a test period in 1991, was found to exist in higher concentrations downstream while the level of lead (in 1991) tended to *decrease* downstream.[5] The author was unable to locate information on contamination levels in the Mississippi River that were more recent than the 1995 report cited here.

Curious as to whether the position of a state along the Mississippi River is correlated with its health rank, a correlation test was performed for overall health rank as well as for individual outcomes (i.e., those that are contained in the

ORIGINAL RESEARCH

# 1990 Death Rates in the U.S. in Relation to: Chiropractors and Medical Doctors Per Capita, Age, Income, and Education

*John Hart, MHS, D.C.*[1]


## ABSTRACT

**Objective:** Previous studies have found that purported health determinants of chiropractors per capita and medical doctors per capita, as well as other purported determinants of health, have an influence on health outcomes such as death rates. This study assesses the affects of the purported health determinants of age, educational attainment, chiropractors per capita, medical doctors per capita, and per capita income on death rates for the year 1990 in the United States.

**Methods:** Health determinants of educational attainment for 1989, per capita income in 1990, percent of population 65 and older in 1990 (age), chiropractors per capita in 1990 and medical doctors per capita in 1990 for the 50 U.S. States and District of Columbia were correlated with the top three causes of death (heart disease, cancer, and cerebrovascular disease). Differences were also assessed by comparing death rates in jurisdictions having *low* versus *high* determinant values (i.e., jurisdictions having low versus high income).

**Results:** Correlation of determinants with death rates, on average was strongest for age, followed by educational attainment, chiropractors per capita, per capita income, and medical doctors per capita. There were statistically significant differences in *low* versus *high* jurisdictions for age and educational attainment (four years of high school and four or more years of college) for all three death rate categories ($p < 0.05$). When considering medical doctors per capita, statistically significantly lower death rates were recorded for cerebrovascular disease.

**Conclusion:** For the determinants assessed in this study, age showed the strongest relationship with the death rates, followed by educational attainment. The determinants of chiropractors per capita, medical doctors per capita, and per capita income exhibited weaker relationships with the death rates. Future research will seek to determine whether these findings are common to other years.


**Key Words:** *Chiropractic, Chiropractors per capita, medical doctors per capita, death rates, age, educational attainment, income*

## Introduction

Previous reports on health outcomes and chiropractors and medical doctors per capita have shown that as the per capita increases, outcomes such as cancer and heart disease death rates generally decrease, particularly for chiropractors/capita.[1-4] Age[5] and educational attainment[6-7] are thought to have an influence on mortality rates. Although income is also thought to be inversely correlated with mortality rates, there is evidence that contradicts this traditional notion, reporting that higher income groups have higher mortality rates.[8] The purpose of the present study, which is based on data from 1989 and 1990, is to compare its findings for consistency with purported health determinants of age, educational attainment, health insurance coverage, income, chiropractors per capita and medical doctors per capita, and their effects on mortality rates.

## Methods

The three leading causes of death in 1990 were identified as follows: cancer, heart disease, and cerebrovascular disease.[9] The 1990 death rates were studied relative to chiropractors per capita[10] and medical doctors[11] per capita in the 50 U.S. States and District of Columbia (referred to as *jurisdictions*)

ORIGINAL RESEARCH

# Correlation of U.S. Mortality Rates with Chiropractor Ratios and other Determinants: 1995

*John Hart MHS, D.C.*[1]


## ABSTRACT

**Introduction:** A previous study found that chiropractor ratios were more strongly correlated with improved health outcomes in the U.S., for years 2001-2005, compared to physician (medical and osteopathic) ratios. This study seeks to determine if such correlations exist for an earlier year (1995). The variables of income, education and health insurance coverage were also assessed in relation to the health outcomes.

**Methods:** The following variables, considered as determinants having a possible effect on mortality rates, were obtained for the 50 states and District of Columbia for the year 1995: Ratios for chiropractors and physicians (medical doctors), percent of persons below poverty level, median income, personal per capita income, health insurance, and educational attainment (high school diploma or higher, and bachelor degree or higher). Mortality rates for the top three causes of death in 1995 were obtained as follows: Heart disease, cancer, and cerebrovascular disease. Mortality rate from all causes was also included. Correlations were performed between the determinants and mortality rates using the Spearman correlation test.

**Results:** Increased median income showed the strongest correlation with reduced mortality rates (from all causes, $r = -0.480$, $p = 0.000$). Between chiropractor and medical doctor ratios, chiropractors showed stronger correlations for reduced mortality rates for cancer ($r = -0.378$, $p = 0.007$), heart disease ($r = -0.344$, $p = 0.01$), and all causes ($r = -0.402$, $p = 0.004$). Medical doctor ratios showed a stronger correlation with reduced cerebrovascular mortality ($r = -0.259$, $p = 0.07$) compared to chiropractor ratios.

**Discussion:** Determinants of median income, educational attainment and chiropractor ratios were more strongly correlated with decreased mortality compared to determinants of health insurance or medical doctor ratios.

**Conclusion:** Correlation does not necessarily show causation but it can provide clues. Increases in median income, educational attainment, and chiropractor ratios were most strongly correlated with reduced (improved) mortality rates. Health insurance coverage and medical doctor ratios showed the least correlation with reduced mortality rates.


**Key Words:** *Chiropractic, Chiropractor ratios, physician ratios, mortality rates, heart disease, cancer, cerebrovascular*

## Introduction

A previous study, using a secondary source for outcomes data, found that chiropractor ratios (number of chiropractors per 100,000 population) were more strongly correlated with improved health outcomes in the U.S. from 2001-2005 compared to physician (medical and osteopathic) ratios (number of physicians per 100,000 population).[1] Another study, which also used a secondary source for outcomes data, showed similar findings though the years for the outcomes preceded the years for the doctor ratios[2] (i.e., the year for the cancer death rates used *preceded* the year used for the doctor ratios). The present study seeks to determine if such data from primary (governmental) sources. In addition to the determinants of doctor ratios, the determinants of income, educational attainment, and health insurance coverage were also correlated with the health outcomes. The health outcomes for 1995 used in the present study consist of the top three causes of death for that year (1995).

## Methods

Doctor ratio determinants were obtained for each of the 50 states and the District of Columbia as follows: chiropractor

**ORIGINAL RESEARCH**

# Association of Hypertension Mortality Rates with Geographic Concentrations of Chiropractors and Medical Doctors in the U.S., 2008

*John Hart, DC, MHSc*[1]

1. *Private Practice of Chiropractic, Spartanburg, SC*

**Abstract**

As concentration (dose) of health care providers increases, health outcomes (responses) are expected to be favorable (e.g., decrease in mortality rates). Accordingly, this data-driven, ecological study compares hypertension mortality rates in the U.S. by state to concentrations of doctors of chiropractic (DC) and medical doctors (MD). DC and MD concentrations (per 10,000 population) were separately compared to 2008 hypertension death rates using Spearman correlation analysis and linear regression (where appropriate). DC concentrations revealed a stronger beneficial association with hypertension death rates ($r = -0.430$, $p = 0.0020$) compared to MD concentrations ($r = -0.029$ with an observed outlier, and $r = -0.085$ without the outlier; both coefficients not statistically significant). Linear regression revealed that an average national decrease of approximately one hypertension death per 100,000 population (95% CI = −1.4 to −0.4) would be expected with an increase of one DC per 10,000 population within the range in this study (1.0 to 5.2 DCs per 10,000 population). Since this is an observational study, causal inference is not claimed. The study is intended as a first step to research having other designs such as case-control.

**Key Words:** *Physician, chiropractic, hypertension, mortality*

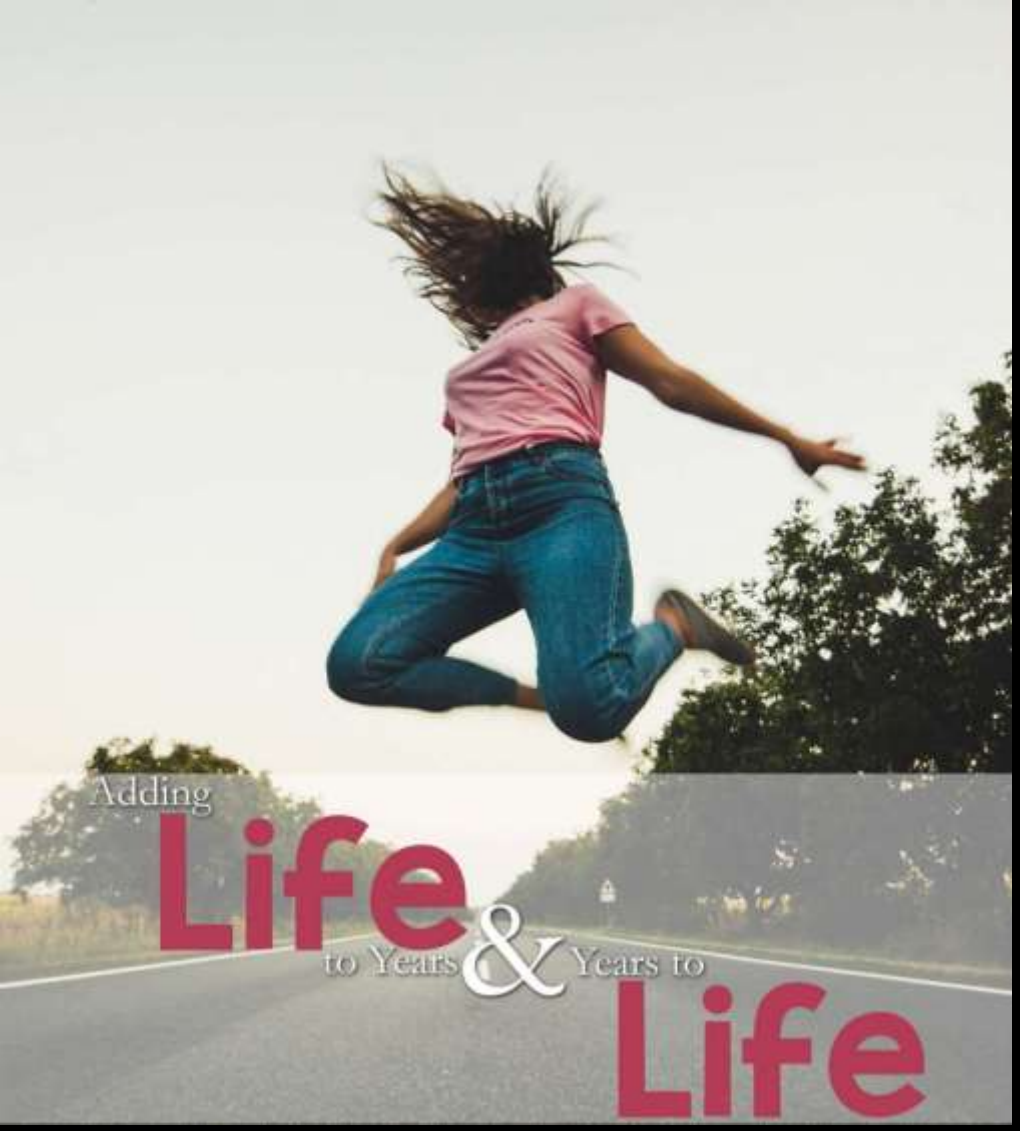
## Introduction

As concentrations of health care practitioners increases, access to their services is expected to also increase, with an expected decrease in adverse health outcomes (such as hypertension mortality rates). The present ecological, data-driven study compares correlations of 2007 MD and DC concentrations with 2008 hypertension mortality rates.

The condition of hypertension was selected because there is some evidence that a reduction in blood pressure in hypertensive patients occurs following chiropractic care. Whedon (2013) reported on a case study where blood pressure decreased from 134/98 to 114/80 following chiropractic care. In a practice-based setting, Torns (2012) found statistically significant reductions in systolic and diastolic blood pressures in 18 patients with hypertension following chiropractic care that focused on the upper cervical spine. Welch and Boone (2008) found a significant reduction in diastolic blood pressure in a convenience sample of asymptomatic chiropractic students. In another practice-based pilot study, Plaugher et al. (2002) also found a statistically significant reduction in diastolic blood study where patients with Stage 1 hypertension were randomized into a chiropractic group or sham group. Here, statistically significant reductions were observed in the chiropractic group (that also focused on the upper cervical spine, in particular, C1) compared to reductions in the sham group for systolic and diastolic blood pressures.

Approximately two-thirds of chiropractors in North America address a condition known as subluxation (McDonald et al., 2004) which in concept includes a neurological component (Chiropractic, 2013). Consequently, the mechanism for a possible beneficial effect on hypertension from adjusting subluxation presumably pertains to neurological pathways in the spine and peripheral nervous system (Bolton, 2000; Budgell, 2000).

While the aforementioned chiropractic studies assessed changes in hypertension morbidity following chiropractic care, the present study assesses hypertension mortality in the context of chiropractic care, and compares this correlation to medical




- Improved health was correlated with the ratio of chiropractors. This means **the more chiropractors there were - the better the health of the population.**

- In another one of Dr. Hart's studies he looked at death rates in the U.S. in relation to chiropractors and medical doctors and found that **the ratio of chiropractors were correlated with reduced death rates for cancer, heart disease, and cerebrovascular disease.**

- Hart did another study looking at the correlation of U.S. mortality rates and compared them to the ratio of chiropractors and medical doctors. He found that between chiropractor and medical doctor ratios, **there were strong correlations for reduced death rates from cancer, heart disease, and all causes with an increase in chiropractors.**

- Hart looked at the association of deaths from high blood pressure with geographic concentrations of chiropractors and medical doctors in the U.S. and found that there was **a reduction in death rates from high blood pressure in relation to the concentration of chiropractors.**

REVIEW OF THE LITERATURE

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

*Sean M. Hannon, BA, DC*

**ABSTRACT**

**Objective:** To review existing literature documenting objectively measured physiologic changes and their associated health benefits subsequent to chiropractic adjustments, primarily in documenting objectively measured health benefits in subjects to which no symptomatic presentation was described.

**Conclusion:** The data reviewed lend support to the contention that chiropractic adjustments, often for the purpose of correct-

# Remember Hannon?

**Introduction**

A recent survey of 658 randomly selected US chiropractors revealed some surprising data.[1] Eighty-eight percent (88.3%) of respondents agreed or strongly agreed that the purpose of maintenance care was "to maintain or optimize state of health." Eighty-percent (80.2%) of respondents agreed or strongly agreed that the purpose of maintenance care was to "determine and treat subluxation." Furthermore, US chiropractors agreed that "maintenance care was of value to all age groups, with the value increasing slightly with an increase in a patient's age." However, only forty-percent (40.2%) agreed that "adequate research existed to support the concept of maintenance care," and ninety-three percent (93.4%) agreed "there was a need for more research." It seems that US chiropractors agree and are of the opinion that correcting subluxation is of value to all people, but nearly 60% do not think there is sufficient evidence to verify their opinion. One chiropractor expressed this frustration in a Letter to the Editor in the August 6, 2000 issue of *Dynamic Chiropractic*, a trade journal of the chiropractic profession:

"I try to encourage my patients who are open to continue maintenance care… However, I have yet to see a single research finding that indicates that those patients who do receive regular chiropractic care, regardless of symptomotology, benefit in any measurable way."
-Scott Rogers, MA,DC

Others have expressed their opinions on the subject in peer-reviewed literature:

"Many chiropractors will continue to adjust imaginary subluxations in the spines of perfectly healthy patients, perpetuating unsubstantiated claims and discouraging chiropractors who wish to specialize in the treatment of neck and back pain…[2] Chiropractors who believe that vertebral alignment has something to do with general health often encourage their patients to submit to regular and frequent manipulation, even when these patients are asymptomatic… I cannot personally justify manipulating the spine of a healthy, symptom-free patient… It is unfair to patients to allow them to believe that they must have regular spinal adjustments in order to stay healthy… I cannot see any basis or justification for routinely manipulating the spine of a healthy patient for the purpose of maintaining health or preventing disease."[3]
*-Samuel Homola, DC*

Sean M. Hannon, BA, DC, Private Practice, Denver, CO



- Respiration
- ROM
- HRV
- Autonomic function
- Endocrine function
- Cardiovascular function
- Immune Function
- Muscle strength
- Athletic ability
- Neurocognitive function
- Reaction time
- Information processing
- Visual acuity
- Stress
- Reproductive hormones
- Healing
- Recovery time
- 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."



From the beginning . . .

# Relation of disturbances of craniosacral mechanisms to symptomatology of the newborn: Study of 1,250 infants



VIOLA FRYMANN, M.B., B.S., D.O., F.A.A.O.
La Jolla, California

This study explores the possibility of a relation between symptomatology in newborn infants and anatomic-physiologic disturbances of the craniosacral mechanism. The primary respiratory mechanism hypothesis postulates a rhythmic cranial motion, palpable externally, that is the combined effect of the inherent motility of the central nervous system, fluctuation of the cerebrospinal fluid, the reciprocal tension mechanism of the dural membranes and their folds, and articular mobility of the cranial bones and of the sacrum between the ilia. Labor apparently has a traumatic effect on the craniosacral mechanism in some circumstances. Strain patterns within the developmental parts of the occiput appear significant in producing nervous symptoms. Flexion strain at the sphenobasilar symphysis, sacral extension strain, and compression of the sphenobasilar symphysis were noted in nervous infants. A significant relation is suggested between torsion strain of the sphenobasilar symphysis with restriction in temporal mobility and respiratory and circulatory symptoms.

The full-term skull is designed to provide the maximum accommodation to the forces of labor, the minimum trauma to the delicate nervous system within, and the utmost capacity for restitution after labor is complete.

At the time of birth ossification of the skull bones is not complete: the occipital, temporal bones, sphenoid, frontal bone, and mandible consist of more than one piece. Each portion of these bones may be regarded functionally as a separate bone, capable of moving in relation to its neighbor both physiologically in response to the forces from within the cranium and pathologically as a result of trauma from without. A thorough knowledge of the anatomy involved is essential to an understanding of the symptomatology which may result from a particular strain pattern. It will, moreover, direct the physician toward the prime cause behind a presenting symptom.

Time does not permit a detailed consideration of all these important areas. Only the highlights will be considered here.

## Anatomic and physiologic considerations[1]

The *occipital bone* at birth is in four parts: the basilar part, two lateral condylar parts, and the squama which is formed by the union, during the third fetal month, of the interparietal occiput formed in membrane and the supraocciput formed in cartilage. These four parts form the anterior, lateral, and posterior margins of the foramen magnum respectively. Distortion of their mutual relationships may and frequently does distort the foramen magnum (Figs. 1-6). The hypoglossal nerve passes through the cartilage between the basilar part and the lateral or condylar part (Figs. 2, 3, 5). The hypoglossal is the motor nerve to the tongue and its physiologic function is of primary importance to the sucking and swallowing mechanism. Immediately anterolateral to the



1250 newborn infants

17% of them had occipital “strains”

# Blocked Atlantal Nerve Syndrome
## *In Infants and Small Children*

BY G. GUTMANN

*(Published in "Manuelle Medizin" © Springer-Verlag 1987. The "ICA Review" thanks the Barge Chiropractic Clinic of LaCrosse, Wisconsin, for having the original paper translated into English by Ronald M. Mazur, PhD; Winona State University, Minnesota. Translation published with permission of "Manuelle Medizen" publishers.)*

Summary: Three case reports are reviewed to illustrate a syndrome that has so far received far too little attention, which is caused and perpetuated in infants and small children by blocked nerve impulses at the atlas. The clinical picture ranges from central motor impairment and development through idencephalic impairments of vegetative regulatory systems to lowered resistance to infections, especially to ear-, nose- and throat-infections. The theoretical background to this syndrome is indicated. The main factor in the causation concerns the neurophysiological connections between the area of the atlanto-occipital joint and centers in the brain stem. In addition to the case history (birth trauma, etc.) and the pediatrician's diagnosis, chiropractical and radiological examination are of decisive importance for the diagnosis of this syndrome. If the indications are correctly observed, chiropractic can often bring about amazingly successful results, because the therapy is a causal one.

Key words: Babies, infants, atlas, blocked nerves, dysregulation, motor, vegetative, impaired development, resistance lowered to infections, diagnosis and therapy, chiropractical.

***REPRINTED BY PERMISSION OF THE "ICA REVIEW" AND DR. FRED BARGE.***

We described this syndrome for the first time in 1953, and then again in 1968, with the complex designation, cervical-diencephalic-static syndrome (C.D.S.). In 1984 we described it as cervical-diencephalic-kinesiological syndrome in small children.

Even though it is among the most satisfying indications of the effectiveness of manual therapy, evidently even experts in our own ranks have hardly gained access to this occurrence at all. Only the pediatrician Mohr (30) has checked our reports and confirmed them in full measure. Lewit, (26, 27) and later Seifert (35) expressed a similar opinion in the German Democratic Republic.

### CASE STUDIES

**V.S., 10-month-old male child**
Congenital torticollis after suction-belljar delivery. Post-natal haemotoma of the sternocleidic mastoid on the right side.

In spite of intensive therapeutic gymnastics, no improvement in the torticollis. A clear-cut asymmetry had developed in the skull and face. Crawling, let alone sitting, was impossible. The orthopedic institute treating the patient diagnosed cerebral disturbances of movement.

*Our X-ray findings:* Moderate degree of inferior location of the atlas with kyphotic position of the HWS and dislocation of the occiput (al) on the right side across from Cl and C2.

No clear blockage could be felt manually. Targeted manual impulse treatment (Cl/C2 from the left with counter-support of the occiput (al).) In the course of the next 12 months, the first clear improvement in posture and motor responses, confirmed by colleagues collaborating in the treatment.

The second treatment was after 4 months. The parents reported that the child had literally made a great leap forward after each treatment.

Later reports from the parents and treating doctors confirmed unanimously that both motor responses and the previously retarded mental and linguistic development were now pro-



Blocked Atlantal Nerve Syndrome

Gutmann found that these infants suffered from lowered resistance to infections, especially to ear-nose- and throat infections, insomnia, cranial bone asymmetry, torticollis, walking problems, language delays, conjunctivitis, tonsillitis, rhinitis, earaches, extreme neck sensitivity, scoliosis, delayed hip development, and seizures.

# Incidence of Somatic Dysfunction in Healthy Newborns

Erica L. Waddington, DO; Karen T. Snider, DO; Michael D. Lockwood, DO; and Vanessa K. Pazdernik, MS

From Tri Town Community Action Agency, Alpert School of Medicine at Brown University in Johnston, Rhode Island (Dr Waddington); the Department of Family Medicine, Preventive Medicine and Community Health at the A.T. Still University–Kirksville College of Osteopathic Medicine in Missouri (Dr Snider); the Liberty University College of Osteopathic Medicine in Lynchburg, Virginia (Dr Lockwood); and Research Support at A.T. Still University in Mesa, Arizona (Ms Pazdernik).

Financial Disclosures: None reported.

Support: None reported.

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Submitted September 3, 2014; final revision received May 26, 2015; accepted June 24, 2015.

**Context:** Recent evidence suggests that osteopathic manipulative treatment of somatic dysfunction in newborns may decrease complications and hospital length of stay. Such dysfunction may result from external forces related to the birth process, but its incidence is unknown.

**Objective:** To identify the incidence and patterns of somatic dysfunction in healthy newborns at least 6 hours after birth and to correlate those findings with maternal and labor history, gestational age, and findings of the initial newborn assessment performed immediately after birth.

**Methods:** Healthy newborns aged 6 to 72 hours were physically examined and assessed for somatic dysfunction, including asymmetry and motion restriction of the cranial, cervical, lumbar, and sacral regions. The total somatic dysfunction identified was summarized in a somatic dysfunction severity score (SDSS), calculated by assigning 1 point for each identified finding; the SDSS could range from 0 (no somatic dysfunction) to 34 (all somatic dysfunctions assessed present). Findings were correlated with maternal and newborn characteristics and labor history. Descriptive analyses were performed, and findings were compared between the initial newborn assessment and the research examination.

**Results:** One hundred newborns were examined (mean gestational age, 38.5 weeks). In 99 newborns (99%), at least 1 sphenobasilar synchondrosis strain pattern was present, with sidebending rotations being the most common (present in 63 newborns [63%]). Condylar compression was found in 95 newborns (95%), temporal bone restrictions in 85 (85%), motion restriction of at least 1 cervical vertebral segment in 91 (91%) and at least 1 lumbar vertebral segment in 94 (94%), and a posterior sacral base in 80 (80%). The SDSS was not associated with mode of delivery or labor augmentation ($P$=.49 and $P$=.54, respectively), but it was positively associated with the duration of labor; each 1-hour increase in labor increased the predicted SDSS by 0.12 points ($P$=.04).

**Conclusion:** Somatic dysfunction of the cranial, cervical, lumbar, and sacral regions was common in healthy newborns, and the total somatic dysfunction (SDSS) was related to the length of labor. (ClinicalTrials.gov number NCT01496872)

*J Am Osteopath Assoc.* 2015;115(11):654-665
doi:10.7556/jaoa.2015.136



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100 Newborns

*Somatic dysfunctions*

Extremely common in newborns.

Examined “healthy” newborns 6 to 72 hours old

99% of them had somatic dysfunction

Severity was related to the length of labor.

Siefert studied over 1000 infants and found that 11% of them suffered from subluxations in the upper neck and they also had scoliotic (curved) postures.

What makes Siefert's study so important is that none of those infants had any symptoms whatsoever.

J Manual Medicine (1992) 6:151–156

Journal of Manual Medicine
© Springer-Verlag 1992

# Kinematic imbalances due to suboccipital strain in newborns

H. Biedermann

Surgical Department, University of Witten-Herdecke, Schützenstrasse 9, W-5840 Schwerte, Federal Republic of Germany

**Summary.** Using case histories and catamneses, the pathogenetic potential of the craniovertebral junction in newborn and young children is discussed. Supporting neurophysiological findings are presented. The symptom complex of "kinematic imbalances due to suboccipital strain" (KISS syndrome) has a wide range of clinical signs and can in many cases be dealt with effectively by manual therapy. The main symptoms are torticollis, unilateral microsomy, C-scoliosis and motoric asymmetries, often accompanied by unilaterally retarded maturation of the hip joints and slowed motor development. Risk factors seem to be: intrauterine misalignment, application of extraction aids, prolonged labor and mulitple fetuses.

**Key words:** Manual therapy – Craniovertebral junction – Cervical spine – C-scoliosis – Motor asymmetry – Torticollis

The pathogenetic importance of asymmetric posture and motion in small children is often played down if recognized at all. Quite regularly, parents complaining about the bent position of their baby get the advice "to cantilever the baby during sleep, and it will go away"; this proves to be wrong in many cases. Vojta and Bobath went beyond the mere diagnostic description of "C-scoliosis" or "torticollis" and developed treatment schemes based on refined methods of examination and a deeper understanding of neuromotor development. These forms of therapy were developed for children with minimal cerebral damage (MCD) and greatly improved the changes of rehabilitation in these little patients. Both methods require a lot of discipline from parents and physiotherapists alike. In many cases the duration of the treatment can be shortened by combining and/or replacing it with manual therapy of the suboccipital segments of the upper cervical spine.

## Patients and methods

### *Patients*

Of the more than 600 children (age ≤24 months) treated to date, we chose a group of 135 babies referred to us by a pediatric orthopedist between 1981 and 1990; 114 of them could be reached for follow-up.

Most of the babies were refered to us because of asymmetric posture. The case histories included the following (Table 1):

- Tilt posture of the head, torticollis.
- Opisthotonos, head held in retroflexion. Unable to lie on the back, as this forces the head into anteflexion.
- Uniform sleeping posture; the child cries if the mother tries to change its position.
- Asymmetric motor patterns.
- Asymmetric posture of trunk and extremities, sometimes combined with a tilted head position reminiscent of a persisting asymmetric tonic neck reflex.
- Sleeping disorders; the baby wakes up crying every hour.
- Extreme sensitivity of the neck.
- Cranial scoliosis, swelling of one side of the facial soft tissues.
- Blockages of the iliosacral points, asymmetries of the gluteis muscles.
- Asymmetric development and range of movement of the hips.
- Fever of unknown origin; loss of appetite and other symptoms of central nervous system disorders.

Needless to say, these symptoms cover a wide range of pathological conditions and cannot always be attributed to the suboccipital joints, but if we encounter a combination of motor asymmetries, sleeping disorders and a facial scoliosis, it is worthwile to look at the suboccipital joints.

**Table 1.** Findings at first examination

| | KISS |
|---|---|
| Mobility of the cervial spine reduced more than 30%[a] | 85 (74.6%) |
| Torticollis | 44 (38.6%) |
| C-scoliosis | 40 (35.1%) |
| Unilateral microsomy | 47 (41.2%) |
| Retarded development of the hip joints (sonographically verified) | 50 (43.9%) |
| Opisthotonos | 11 (9.7%) |
| Mobility of the vertebral spine reduced more than 30% | 12 (10.5%) |
| Feet deformities | 12 (10.5%) |
| Pathological reflexes[b] | 3.2 of 7 |

[a] Including cases of torticollis
[b] Tested: Vojta, traction test; Peiper, Collis, vertical and horizontal; Landau, axiallary hanging test (see [37])

600 children less than two years old.

"suboccipital strain"

This area can literally be a **chokepoint.**

Biedermann found the infants and children effected by these subluxations in the neck experienced **birth trauma, prolonged labor and the use of things like forceps** during their births

Number one thing that brought these infants into Biedermann's clinic: **Asymmetric posture**.

Tilted head, the head held backwards, awkward sleeping positions, movements on one side of the body that don't match the other side, sleeping disorders, extreme sensitivity, swelling of one side of the face, abnormalities of the hips and spine, unexplained fevers, loss of appetite.

Biedermann found that their necks were stiff, had reduced range of motion, one side of the head sometimes larger than the other, abnormal reflexes, muscle spasms of the back so severe that the infants' backs were arched

Biedermann **took x-rays** which he used to help determine how to fix the misalignments

Biedermann

“The birth canal is one of the most dangerous obstacles we ever have to traverse.”





# Australian Chiropractic Board BANS Spinal Manipulation in Infants

Thursday, March 14, 2019 - 11:39

NEWS STAFF



***Interim Policy in Place Until Government Investigation is Over***

In a shocking and unprecedented move, the **Chiropractic Board of Australia has banned the practice of spinal manipulation in children by chiropractors**. The move comes after calls from the Victorian Health Minister and Australian Medical Association's President to stop the chiropractic care of children.

CLICK HERE to review the policy

Incredibly, the Chiropractic Board either lies in their announcement or reveals deep seated ignorance stating:

**". . . the Board acknowledges there is no current clinical guideline, or peer-reviewed publication to guide chiropractors with respect to the care of infants and young children, and the use of spinal manipulation in particular."**

# Appalling

"It's **appalling** that young children and infants are being exposed to potential harm. Newborn babies are extremely fragile and it's important to be aware that the damage done to an infant may not be obvious immediately and may not manifest until years later. The [CBA] **must condemn this practice** as unprofessional and unacceptable, and AHPRA must act quickly to **stop these rogue practitioners in their tracks**."

**Victorian Health Minister Jenny Mikakos**
**Statement regarding chiropractic care of infants**

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# Dangerous Practice

"There is no credible evidence for this [chiropractic], it is a dangerous practice in itself and it potentially impedes the proper assessment and management of an infant."

**Julian Rait MD**
**President – Australian Medical Association**
**June 21, 2019**

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# No Evidence

"There is **no evidence chiropractic care benefits babies** or can treat them for medical conditions and there is not enough evidence to suggest it [chiropractic] can achieve general wellness or treat various organic diseases and infections."

The Chiropractic Board of Australia
At-risk advertising by Australian chiropractors and physiotherapists
J. Keith Simpson. Chiropractic & Manual Therapies June 13, 2019 27:30

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# No Research

"The Board acknowledges there is no current clinical guideline, or peer-reviewed publication to guide chiropractors with respect to the care of infants and young children, and the use of spinal manipulation in particular"

**Chiropractic Regulatory Board of Australia**

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# Not Definitive

"Is the care likely to be effective or of benefit to young babies? Look, while there is some positive, moderate level of evidence, its not definitive at this stage. Certainly not at the level of evidence where we would feel confident advertising it on a website"

Anthony Coxon DC
President of the Australian Chiropractic Association

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# Submission to the Safer Care Victoria

## Independent Review | chiropractic spinal care for children under 12 years

June 2019

Our discussions with government and other stakeholders are not about philosophy, nor is philosophy central in our marketing and communications. **Professionalism and best outcomes for patients AND OUR PROFESSION IS OUR MANTRA.**




Anthony Coxon DC - ACA President



Aboriginal and Torres Strait Islander Health Practice
Chinese Medicine
Chiropractic
Dental
Medical
Medical Radiation Practice
Nursing and Midwifery
Occupational Therapy
Optometry
Osteopathy
Pharmacy
Physiotherapy
Podiatry
Psychology

Australian Health Practitioner Regulation Agency

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# GUIDELINES FOR **ADVERTISING REGULATED HEALTH SERVICES**

May 2014

# APPENDIX “N”

More on this later . . .

# ACA Says Not Enough Research to Prove Chiropractic Works in Kids

Thursday, September 15, 2022 - 15:19

NEWS STAFF




***Claims We Can't Really Say For Sure What's Happening***

In an interview for the Washington Post on the role of chiropractic for children, the **President of the American Chiropractic Association's (ACA) Council on Chiropractic Pediatrics** stated:

**"We still haven't been able to demonstrate in the research the effectiveness that we've seen clinically. We can't really say for sure what's happening. It's sort of like a black box. But, what we do know is that, clinically, what we're doing is effective because we see a change in the symptoms of the child."**

# ACA Endorses Car Seats, Mattresses & COVID Vaccine But Isn't Sure About Chiropractic for Kids

Thursday, September 15, 2022 - 15:59



ACA President Maiers

***Is Money Buying ACA Endorsements?***

The **American Chiropractic Association (ACA)** was recently interviewed by the Washington Post about the chiropractic care of children and threw the profession under the bus telling the *Post* that we haven't been able to demonstrate effectiveness, that we can't say for sure what's happening and that the focus is on symptoms.

CLICK HERE for that story

# WFC Claims Vibrating Chair Will "Rejuvenate Your Entire Body" - But There is No Credible Evidence for Chiropractic/Immune Connection

Saturday, April 4, 2020 - 12:49

NEWS STAFF




***WFC Claims to Have Thoroughly Investigated Vibrating Chair Claims Before Endorsing***

The World Federation of Chiropractic (WFC) and the American Chiropractic Association (ACA) along with William Morgan President of Parker University and Katherine Pohlman Director of Research at Parker have falsely claimed that there is no credible evidence supporting the beneficial relationship between chiropractic, the nervous system and immune function.


IF YOU'RE NOT
OUTRAGED
YOU'RE NOT PAYING
ATTENTION

# Risk = Hazard + Outrage



# Components of Outrage

| | | |
|---|---|---|
| Voluntary | vs | **Coerced** |
| Familiar | vs | **Exotic** |
| Not memorable | vs | **Memorable** |
| Individual control | vs | **Controlled by others** |
| Fair | vs | **Unfair** |
| Trustworthy | vs | **Untrustworthy** |



# Four Kinds of Risk Communication (p. 1)

*Copyright © 2003 by Peter M. Sandman*

## 1. Public Relations (also health education) -- high-hazard, low-outrage

| | |
|---|---|
| Audience: | Apathetic and inattentive; but undefended, uninterested in talking back. Huge -- most people, most of the time, on most issues. |
| Task: | To produce brief messages that reinforce whatever appeals are most likely to predispose the audience toward your goals. For serious hazards, this usually means provoking more outrage. |
| Medium: | Monologue via the mass media. |
| Barriers: | Audience inattention; audience size; media resistance; need to package everything into short sound bites; policy implications of trying to provoke outrage. |
| "Silver lining": | There is little need to listen, or to address audience concerns, reservations, or objections; this audience has few if any. |

## 2. Stakeholder Relations -- medium-hazard, medium-outrage

| | |
|---|---|
| Audience: | Interested and attentive, but not too upset to listen: The ideal audience ... but a fairly unusual one. |
| Task: | To discuss the issues openly and rationally, explaining your views and responding to audience questions and concerns. |
| Medium: | Dialogue in person, supplemented by specialized media (web site, newsletter, etc.). |
| Barriers: | None, except perhaps the inefficiency of one-on-one dialogue. And you have to be prepared to explain the technical details; this is the only audience that really wants to hear them. |
| "Silver lining": | This is the easiest communication environment. Duplicating it is the goal of the other three kinds of risk communication. |

## 3. Outrage Management -- low-hazard, high-outrage

| | |
|---|---|
| Audience: | Outraged, largely at you. A small group of "fanatics" is usually accompanied by a larger, less outraged constituency watching to see how the controversy evolves. |
| Task: | To reduce audience outrage by listening, acknowledging, apologizing, sharing control and credit, etc. The controversy ends when the "fanatics" declare victory or their constituency thinks they have won enough. |

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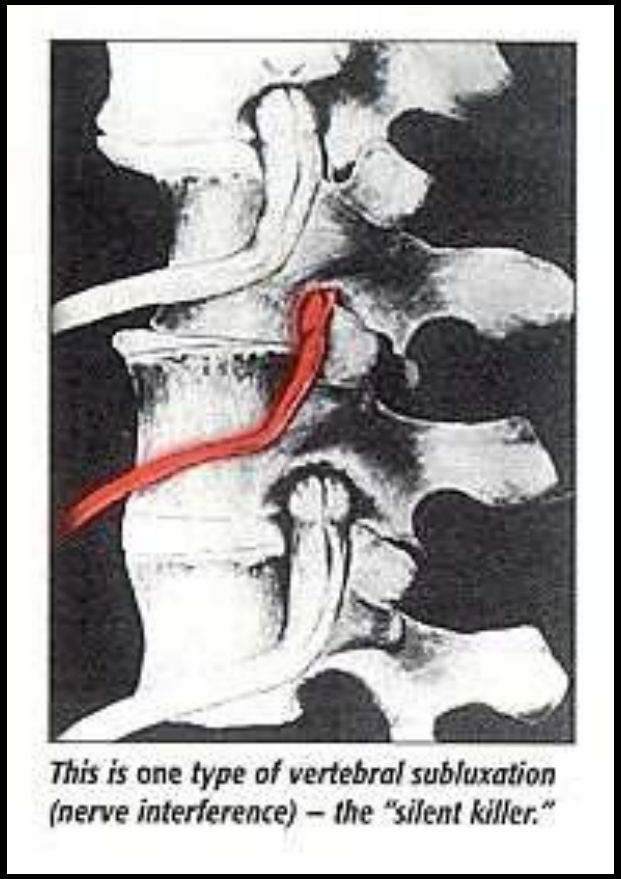
Phone: 1-609-683-4073
Fax: 1-609-683-0566

Consulting, Training, and Research in Risk Communication

## 1. Public Relations (also health education) – high-hazard, low-outrage

| | |
|---|---|
| Audience: | Apathetic and inattentive; but undefended, uninterested in talking back. Huge -- most people, most of the time, on most issues. |
| Task: | To produce brief messages that reinforce whatever appeals are most likely to predispose the audience toward your goals. For serious hazards, this usually means provoking more outrage. |
| Medium: | Monologue via the mass media. |
| Barriers: | Audience inattention; audience size; media resistance; need to package everything into short sound bites; policy implications of trying to provoke outrage. |
| "Silver lining": | There is little need to listen, or to address audience concerns, reservations, or objections; this audience has few if any. |

# The Silent Killer



*This is one type of vertebral subluxation (nerve interference) – the "silent killer."*

RESEARCH INFRASTRUCTURE

# Uncovering the Global Burden of Vertebral Subluxation: The Need for Centralized Data Repositories

*Matthew McCoy, D.C.*[1] *Robert H. Blanks, Ph.D*[2]

**ABSTRACT**

All too often, chiropractic is criticized as an "unscientific" discipline, lacking empirical research to validate the assertion that vertebral subluxations have an adverse affect on the human nervous system, on general health and well-being and by extension, society as a whole.

It is the extension to society as a whole where subluxation has been theorized to have its most detrimental effects. If this is true, then this is also where its elucidation holds the greatest promise for influencing and affecting communal expression.

The systematic study of the epidemiology and global burden of vertebral subluxation should be carried out by individuals and groups with a worldview towards chiropractic that is consistent with the theory that subluxations pose a hindrance to the fullest expression of life. The results of this type of research can then be used to drive policy, not only in health care, but in education and other sociocultural arenas.

A model of training and linking chiropractic practitioners, researchers and teaching institutions through a centralized network and a web-based, electronic data repository in order to provide comprehensive, consistent and comparable information supporting such a worldview on the global burden of vertebral subluxation is described.

**Key Words**: *Chiropractic, subluxation, health, quality of life, central data repository, computer networks, electronic medical records*

## Introduction

For more than one hundred years forces from outside the chiropractic profession have attacked it for various reasons. Those attacks have focused on the purported unscientific nature of chiropractic and its ties to a distinctive philosophical worldview. In recent years the health care landscape has changed and many talk of a *paradigm shift* in health care and display evidence of a move toward a more patient centered approach by allopathic medicine. Enthusiasts who promote the concept of this paradigm shift also point to studies that demonstrate the large numbers of people seeking out complementary and alternative health care.[1-3] Taking this a step further we have evidence of a move from outside the profession toward the provision of care once thought to be distinctly chiropractic by other types of health care providers.[4-8]

1. Director of Research - Life University Marietta, Georgia
2. Professor of Biomedical Science - Florida Atlantic University Boca Raton, Florida

Adding momentum to the move of non-chiropractic providers offering our services we have two recent court decisions that will profoundly impact the application of chiropractic services. First, is the loss of the Trigon case which has established a federal precedent permitting discrimination against chiropractors by third party payors. Additionally, the loss of the IICFA suit has established that chiropractors do not have exclusivity regarding the management of subluxations.[9-10]

Most disconcerting is that coupled with the above events is the systematic movement within the chiropractic profession itself to move away from a focus on the analysis and correction of vertebral subluxation. There is a strong and powerful faction within chiropractic that fervently maintains that since subluxation management remains an untested, and therefore an unscientific practice, that we should abandon the term, abandon the practice and instead morph ourselves into a profession that cares for spinal disorders only.[11-15]

What should be the most frightening reality is that the research touted as demonstrating chiropractic's effects in these areas is not uniquely chiropractic. For the most part this research focuses on the use of the common domain procedure of spinal manipulation. One would be hard pressed to find research that:

1. Utilized an analysis for the presence of subluxation.
2. Quantified that subluxation objectively.
3. Applied an intervention in the form a precisely administered chiropractic adjustment to reduce or correct the identified subluxation.
4. Followed by an analysis performed to determine if the subluxation was reduced or corrected.
5. Even harder to find would be studies that demonstrate that the reduction or correction of the subluxation actually led to improved health outcomes.

A longitudinal time-series population-based clinical outcomes study is established as a systematic and ongoing analysis of the clinical indicators (outcome measures) that characterize vertebral subluxation. This process is designed:

1. To evaluate and document outcomes information, the health benefits, risks, utilization, and efficacy of approved and existing chiropractic procedures.
2. To provide a measure of continuous quality assurance and improvement.
3. To evaluate long-term benefits and risks of chiropractic care.
4. To provide scientific evidence for efficacy in large populations of patients under chiropractic care.
5. To allow comparison of the risks and benefits of several available techniques used to manage the same condition.
6. To identify disparities in health status and use of chiropractic health care by race/ethnicity, socio-economic status, region, and other population characteristics.
7. To monitor trends in chiropractic health care delivery.
8. To support health research.
9. To provide information for making changes in public policies and programs related to chiropractic.
10. To evaluate the impact of health policies and programs related to chiropractic.

Through the use of a centralized data repository, important data is generated, controlled for socio-demographic, clinical and other patient variables (e.g., confounding medical conditions, etc.). Scientific questions that can be addressed by such a network include such things as:

- Incidence of vertebral subluxation worldwide.
- Benefits (primary and secondary) of chiropractic.
- Optimal duration and frequency of care.
- Health conditions benefited by chiropractic care.
- Effects of age, gender, ethnicity and prior existing conditions.
- Health, social and economic impact of subluxation.

# Obstacles

- No uniformity
- Numerous operational models
- Objective, valid & reliable measures not used
- Data not centralized
- EHR systems geared toward payment
- Disparate data (think of techniques & x-ray)
- Will of the subluxation faction is missing

And then there’s this nonsense . . .

# Subluxation is a Fraud




ChiroFutures

# Outdated Methods

I can careless (sic) of what chiropractors do to get people better, everyone has their own way of treating. My issue is using outdated methods like full spine X-rays and subluxations.

Brandon Rhodes DC

Boynton Beach, Florida

SUBLUXATION DENIERS

SUBLUXATIONDENIERS.COM

# Unproven Myth

Subluxation is an **unproven myth** that is an inappropriate inclusion in any chiropractic education. The term subluxation shall be considered by all authorities outside of the chiropractic community as a **myth** and therefore an inappropriate standard and is contrary to evidence-based practice.

---

Roderic Lacy DC, MD
CEO Chiropractic Physicians Association America

Florida Chiropractic Physicians Association

Programmes promoting and teaching unorthodox explanatory frameworks, such as *life force, innate intelligence, vitalism* and a belief that manipulating the spine to remove restrictions or *'chiropractic subluxations'* can restore health more broadly, will not meet these Education Standards




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Innes et al. Chiropractic & Manual Therapies (2022) 30:30
https://doi.org/10.1186/s12998-022-00440-6

Chiropractic & Manual Therapies

RESEARCH Open Access

# Who are the chiropractic students favouring a limitless scope of practice? Exploring the relationship with personality, magical thinking, and academic achievement

Stanley Innes[1,3*], Guillaume Goncalves[2,3] and Charlotte Leboeuf-Yde[4]

**Abstract**

**Introduction:** Some chiropractors seem to have an inflated belief in the powers of spinal manipulation (SMT), for example aiming at preventing future spinal degeneration and health problems, activities that are without supporting evidence. Non-evidenced health beliefs have been shown to be associated with a tendency toward magical thinking. Holding such beliefs about SMT is associated with a limitless scope of practice (LLSoP). Recent studies have shown that "chiropractic conservatism" (ChiroCon) is also associated with such approaches. We wanted to understand ChiroCon and these attitudes toward SMT by exploring three different factors: intolerance to uncertainty, academic achievement, and tendency toward magical thinking and how they relate to ChiroCon and LLSoP.

**Method:** A cross-sectional survey of 243 chiropractic students from an Australian chiropractic program was conducted in May 2020. Students answered a questionnaire involving a patient case-scenario for LLSoP, levels of ChiroCon, validated questionnaires on (i) Intolerance of uncertainty, (ii) Academic achievement, and (iii) Magical thinking. LLSoP was defined as wanting to treat with SMT a 5-year-old asymptomatic child for future (i) Musculoskeletal (MSK) problems and/or (ii) Non-musculoskeletal diseases. Logistic regression models were used to confirm if there was an association between ChiroCon and LLSoP and to explore associations between LLSoP and (i) Intolerance of uncertainty, (ii) Academic achievement, and (iii) Magical thinking. We repeated the same analyses using ChiroCon as the outcome variable.

**Results:** We confirmed that chiropractic students in the more extreme ChiroCon group were more likely to want to prevent future spinal disorders in an asymptomatic 5-year-old child as compared to those with lower levels (OR = 3.9, (95%CI 1.97–7.72). This was also the case for the prevention of future diseases in the same child (OR = 6.9, (95%CI 3.11–15.06). Of the three predictor variables, magical belief was positively associated with both ChiroCon and LLSoP.

**Conclusion:** Not surprisingly, ChiroCon is closely related to LLSoP and both were linked to magical thinking. Therefore, the questionnaire 'Magical Health Beliefs' could be a useful instrument to screen future chiropractic students to prevent a mismatch between student and institution. Depending on the outlook of the school, some schools would welcome these students, whereas other institutions would want to avoid them in their education program.

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Full list of author information is available at the end of the article

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# Inflated Beliefs

Some chiropractors seem to have an **inflated belief** in the powers of spinal manipulation (SMT), for example aiming at preventing future spinal degeneration and health problems, activities that are **without supporting evidence**.

**Non-evidenced health beliefs** have been shown to be associated with a **tendency toward magical thinking**.

Holding such beliefs about SMT is associated with a limitless scope of practice (LLSoP). Recent studies h shown that “chiropractic conservatism” (ChiroCon) is associated with such approaches

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# Magical Thinking

Logistic regression models were used to confrm if there was an association between ChiroCon and LLSoP and to explore associations between LLSoP and (i) Intolerance of uncer- tainty, (ii) Academic achievement, and (iii) **Magical thinking.**

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# Magical Thinking?

Wanting to treat with SMT a 5-year-old asymptomatic child for future (i) Musculoskeletal (MSK) problems and/or (ii) Non-musculoskeletal diseases.

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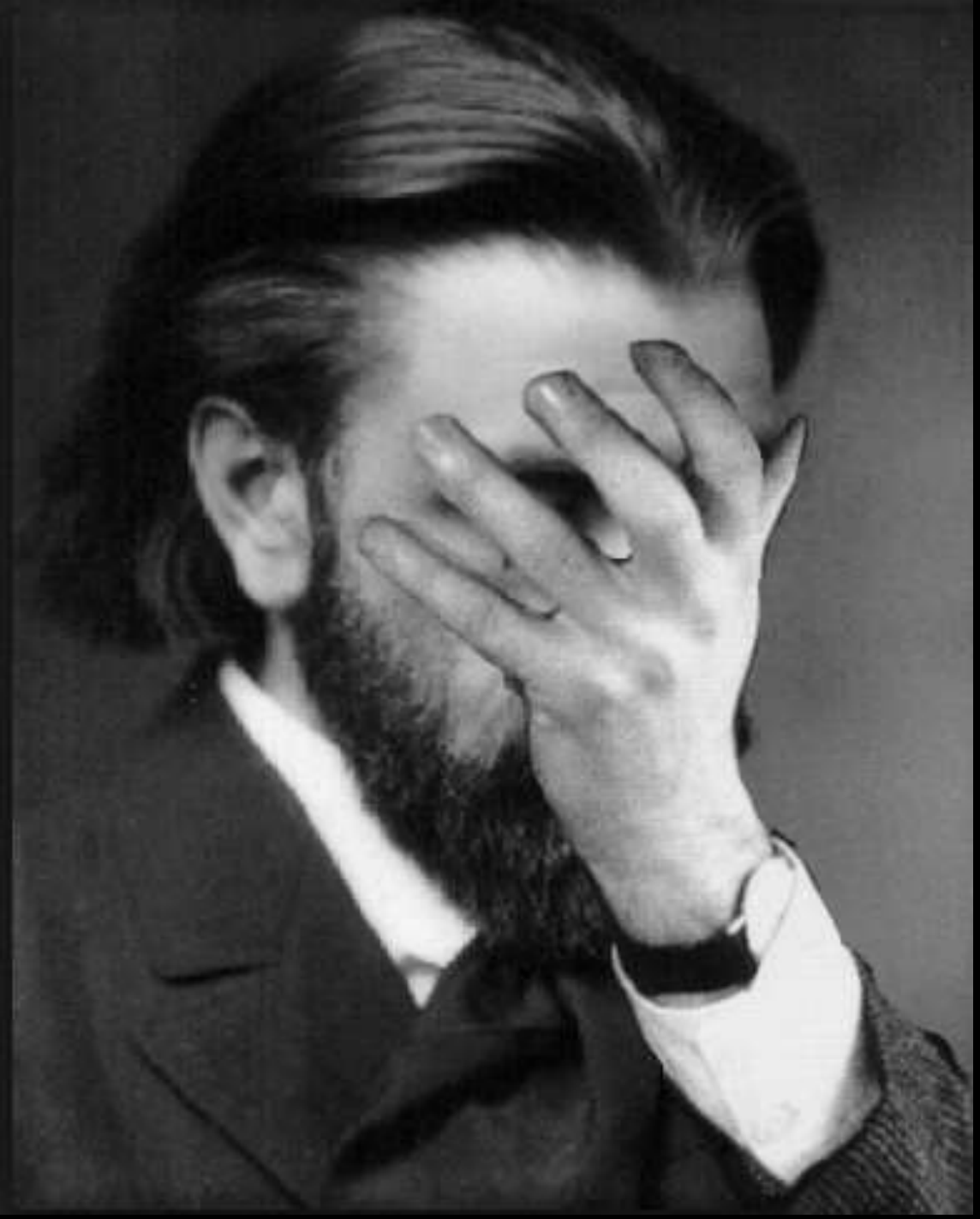



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# Thought Police

“Depending on the outlook of the school, some schools would welcome these students, whereas other institutions would want to avoid them in their education program.”

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NOT MY CIRCUS
NOT MY MONKEYS

Bronfort et al. Chiropractic & Osteopathy 2010, 18:3
http://www.chiroandosteo.com/content/18/1/3

CHIROPRACTIC & OSTEOPATHY

REVIEW Open Access

# Effectiveness of manual therapies: the UK evidence report

Gert Bronfort[1*], Mitch Haas[2], Roni Evans[1], Brent Leininger[1], Jay Triano[3,4]

**Abstract**

**Background:** The purpose of this report is to provide a succinct but comprehensive summary of the scientific evidence regarding the effectiveness of manual treatment for the management of a variety of musculoskeletal and non-musculoskeletal conditions.

**Methods:** The conclusions are based on the results of systematic reviews of randomized clinical trials (RCTs), widely accepted and primarily UK and United States evidence-based clinical guidelines, plus the results of all RCTs not yet included in the first three categories. The strength/quality of the evidence regarding effectiveness was based on an adapted version of the grading system developed by the US Preventive Services Task Force and a study risk of bias assessment tool for the recent RCTs.

**Results:** By September 2009, 26 categories of conditions were located containing RCT evidence for the use of manual therapy: 13 musculoskeletal conditions, four types of chronic headache and nine non-musculoskeletal conditions. We identified 49 recent relevant systematic reviews and 16 evidence-based clinical guidelines plus an additional 46 RCTs not yet included in systematic reviews and guidelines.
Additionally, brief references are made to other effective non-pharmacological, non-invasive physical treatments.

**Conclusions:** Spinal manipulation/mobilization is effective in adults for: acute, subacute, and chronic low back pain; migraine and cervicogenic headache; cervicogenic dizziness; manipulation/mobilization is effective for several extremity joint conditions; and thoracic manipulation/mobilization is effective for acute/subacute neck pain. The evidence is inconclusive for cervical manipulation/mobilization alone for neck pain of any duration, and for manipulation/mobilization for mid back pain, sciatica, tension-type headache, coccydynia, temporomandibular joint

# Language




Foundation for Vertebral Subluxation

# Vertebral Subluxation: Semantic Pathology, Epistemic Trespassing, and Ethics

Christopher Kent, DC, JD[1,2]

**Abstract**

Language should be a tool for minimizing ambiguity, and establishing precision in communication. This necessitates the use of terminology that communicates the uniqueness of the thing being described. The use of terms that homogenize rather than differentiate foster ambiguity and imprecision. The pernicious amalgam of semantic pathologies, epistemic trespassing, denialism, conflation of terms, and the Dunning-Kruger Effect cannot be dismissed as mere "minutia and semantics." We must ensure a clear understanding of vertebral subluxation and our unique approach to unleashing human potential.

**Key words:** *Chiropractic, vertebral subluxation, adjustment, manipulation, semantics, ethics, denialism, veracity, professional identity*

> "If one wished to kill a profession, to remove its cohesion and its strength, the most effective way would be to forbid the use of its characteristic language."
>
> *Kenneth Hudson (1978)*
> *The Jargon of Professions*

**Role of Language: Differentiation vs. Homogenization**

A function of language is differentiation. Language should be a tool for minimizing ambiguity, and establishing precision in communication. This necessitates the use of terminology that communicates the uniqueness of the thing being described. The use of terms that homogenize rather than differentiate foster ambiguity and imprecision. The practice of conflating terms, such as vertebral subluxation, joint dysfunction, adjustment, and spinal manipulation has ethical and political implications.

One example is the suggestion that the terms vertebral subluxation, joint fixation, joint dysfunction are interchangeable. They are not the same thing. There are significant operational and epistemological differences. Implicit in the term vertebral subluxation are both biomechanical and neurological elements. Vertebral subluxation is a relational neurological process that impacts the human experience, not merely a fixated joint. A fixated or tender joint might represent one manifestation of vertebral subluxation, not a synonym for vertebral subluxation. The notion that they are the same leads to confusion and ambiguity.

Reddy[1] coined the term semantic pathologies. "These are instances in which two or more ideas that are important to distinguish are lumped unnoticed together in the same linguistic expression." The suggestion that vertebral subluxation and joint dysfunction are synonymous, or that chiropractic adjustment is identical to spinal manipulation are examples of semantic pathologies. Significant epistemic and operational differences exist.

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2. President, Foundation for Vertebral Subluxation. Kennesaw, GA

More on this later . . .

# Models of Vertebral Subluxation

Component Models
Subluxation Degeneration Model
Nerve Compression Hypothesis
Proprioceptive Insult
Somatosympathetic Reflex
Viscerosomatic Reflex
Somato-Somato Reflex
Neurodystrophic
Dentate Ligament Cord Distortion
Psychogenic
Cord Compression
Brain Hibernation
Neuroplasticity
Spinal Learning
Dysafferentation

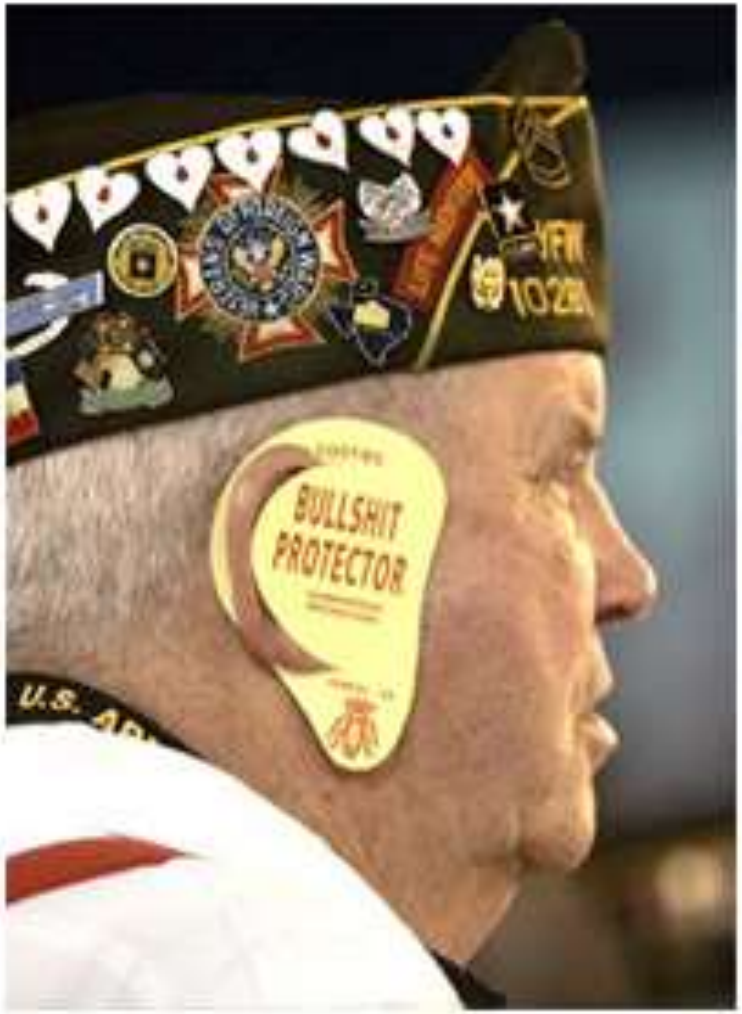


# Why Bother?

"Chiropractors can't even agree on the definition of subluxation"



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# Commonalities

1. Biomechanical Component
2. Neurological Component

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# Outcome Assessment

**Objective, Valid & Reliable** tools exist to MEASURE components of vertebral subluxation

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# Measures

- X-ray
- Videoflouro
- CT
- MRI

- Computerized Muscle Testing
- Surface Electromyography
- Needle Electromyography

- Somatosensory Evoked Potentials
- Dermatomal Evoked Potentials
- Current Perception Threshold

- Visual & Auditory Evoked Potentials
- Nerve Conduction Velocity

- Thermography
- Heart Rate Variability

- fMRI
- SPECT
- PET

- Laboratory (Blood) Work

- Quality of Life Surveys



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"WE HAVE A PROFESSION THAT SUBSTITUTES EGO FOR EVIDENCE CHARISMA FOR KNOWLEDGE SPIZZ FOR SKILL."

- CHRISTOPHER KENT

# Health Policy



# Change Strategies

- Strategic Competitive Advantage
  - –Marketing
  - –Politics
  - –Research

# Previous & Current Strategies

- **Marketing**
  - One Spine at a Time, Tell the Story, 100th Monkey, Free Chicken Dinners
  - Scare Care
- **Politics**
  - Change from within (Chiropractic Cartel)
- **Research**
  - Get our foot in the door

# A Strategic Model for the Purpose of Propagating a Subluxation Correction Paradigm for the Purpose of Increasing Public Utilization

Marc Swerdlick MS, DC, ACP, DPhCS[1]

**ABSTRACT**

As chiropractic celebrates its one hundred and twentieth birthday, a question that has to be asked is "Where are we?" While there are many ways to answer that question, this particular paper will focus the spotlight on the concept of a Subluxation Correction Paradigm (SCP).

For the subluxation-centered fragment within the chiropractic profession this paper provides a strategic model for the propagation of a Subluxation Correction Paradigm for the purpose of increasing public utilization. For doctors whose focus is on the detection and correction of vertebral subluxation, we have a very rare and exciting opportunity to take back what we are about to lose.

A strategy is a process, and the key to any process is the planning and the blueprinting. Once in place, then and only then are we prepared to implement and execute the strategy to secure social proof, to reach critical mass, to have Cultural Authority and to better the lives of all humanity.

**Key words:** *Chiropractic, utilization, subluxation, marketing, strategy, social proof, cultural authority, paradigm shift*

## Background

As chiropractic celebrates its one hundred and twentieth birthday, a question that has to be asked is "Where are we?" While there are many ways to answer that question, this particular paper will focus the spotlight on the concept of a Subluxation Correction Paradigm (SCP).

In the twenty-first century, the chiropractic profession is fragmented. The definition of chiropractic is about as clear as mud, and the definition of a chiropractor is equally ambiguous. In fact, the typical conventional chiropractor may offer his or her patients a myriad of services, ranging from electro muscular stimulation to a wide variety of spa treatments. The conventional chiropractors justify this self-propagated expansion of scope by taking the position that their state license "permits" them to offer these services. The perspective of "Should I?" has been trumped with "Because I can!"

The dilution of chiropractic is not a new phenomenon, In fact, BJ Palmer, the developer of chiropractic and son of D.D. Palmer, the man who founded chiropractic, stated the following in his 1924 Lyceum speech*:

> A man or a woman has a right to be a chiropractor. Some go so far as to say that because he is a chiropractor he can think, say and do anything he pleases in exercising his right, but we have the right also to suffer the reaction of a destroyed public confidence with a ruined business when we do, - and that is what our problem is today.

Jump forward from 1924 to 2015. Chiropractic colleges still have homecomings, and yes, one of the colleges still refers to its homecoming as a "Lyceum." The homecomings, along with many of the "rah-rah" chiropractic motivational, recharge your batteries mega-weekends, share a common thread: the mandate that chiropractic needs to somehow transform itself

Marketing




Politics

ChiropracticCartel.com

# Research . . .

# Big Data

- The technical means exist

- The will of the profession is missing




Foundation for Vertebral Subluxation

## Research Agenda

# Vertebral Subluxation Research: An Agenda to Explore the Epidemiology of Vertebral Subluxation and the Clinical Outcomes Related to Management

*Matthew McCoy DC, MPH*[1]
*Christopher Kent DC, JD*[2]

1. *Professor, Clinical Sciences – Life University, College of Chiropractic Marietta, GA*
2. *President – Foundation for Vertebral Subluxation*

**Abstract**

**Background:** Since its inception the chiropractic profession has been mired in debate regarding its clinical application – specifically surrounding the concept of vertebral subluxation. Despite over 100 years and some effort at developing a research agenda, the factions that embrace vertebral subluxation as a clinical entity warranting epidemiological study continue to be confronted with basic questions regarding the existence, measurement and clinical meaningfulness of vertebral subluxation. These questions form the basis for a proposal to develop a Research Agenda and related program centered on vertebral subluxation in order to elucidate the clinical manifestations of the founding principles and tenets of the chiropractic profession.

**Methods:** The vertebral subluxation research agenda will involve defining the current state of the science, art and literature base to determine what is known and not known about each research objective. This will allow for the most efficient use of limited resources. The agenda centers on five areas including: operational models, measurement, epidemiology, clinical strategies and health outcomes.

**Discussion:** In order to accomplish the goals and objectives of the research agenda, a long term project is proposed that includes creating and supporting the next generation of subluxation centered scientific researchers to carry out these projects. The research program will need to identify and continuously update a manifest of research projects directly relevant to the agenda and will need to involve a large segment of subluxation centered groups, organizations, associations, vendors, practitioners and patients. The development and implementation of central data repositories will need to be undertaken and the program and its results will need to be marketed to chiropractors, students, patients, legislators, policy makers and the general public through an integrated campaign.

**Conclusion:** This research agenda seeks to validate the profession's focus on the location, analysis and correction of vertebral subluxation and position chiropractic as a vitalistic, scientific, evidence-informed clinical practice. This research is expected to assist the profession in gaining a higher degree of respect, understanding and acceptance in the health care marketplace, the scientific community and among the patients it serves. Current evidence suggests that vertebral subluxation is detrimental to human health and function and as such chiropractors who manage subluxation feel an ethical and moral obligation to screen and educate the public on what it believes is a significant public health threat. To that effect this agenda also includes the marketing of the agenda itself and the results of its research endeavors in an effort to increase utilization of vertebral subluxation screening and management.

**Key words:** *Chiropractic, vertebral subluxation, research agenda, epidemiology, vitalism, evidence informed practice.*



Foundation for Vertebral Subluxation

# Research Agenda
# Long Term Plan

The agenda centers on five areas including:

- Operational models
- Measurement
- Epidemiology
- Clinical Strategies
- Health outcomes

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**Goal Number One:**

To encourage and support the development of the next generation of subluxation centered chiropractic researchers.

**Objectives**

A. Fund 20 scholarships over 20 years for post DC students to go on and get advanced degrees.
B. Develop an educational and outreach program to reach potential candidates.
C. Develop a subluxation centered research team and related infrastructure.
D. Create centers for clinical research to support the training of practitioner-scientists in the area of subluxation centered chiropractic.

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**Goal Number Two:**

To elucidate the nature of vertebral subluxation.

**Objectives**

A. Complete research focused on the description and identification of the various models of vertebral subluxation.
B. Complete research focused on the validity and reliability of measures to identify and characterize vertebral subluxation.
C. Complete research on the epidemiology of vertebral subluxation including its incidence, prevalence, morbidity and mortality.
D. Complete research on clinical strategies for preventing, arresting, reducing and correcting vertebral subluxations.
E. Complete research on health outcomes and salutogenesis following management of vertebral subluxation.

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**Goal Number Three:**

Increase utilization of vertebral subluxation screening and management.

**Objectives**

A. Determine current utilization rates from reliable sources.
B. Develop an evidence informed, worldwide, public health communications plan centered on the need for screening and management of vertebral subluxation.
C. Develop a related training program in public health communications for practicing chiropractors.

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**Goal Number Four:**

To improve health policy and regulation in relation to the management of vertebral subluxation.

**Objectives**

A. Write policy on the federal and state level that explicitly includes and protects the management of vertebral subluxation and the public health.
B. Assist health policy experts to implement subluxation centered health policy.
C. Provide evidence in regulatory environments to ensure the adoption of regulations that support subluxation centered practice and the public health.
D. Provide evidence in regulatory environments to ensure the repeal of regulations that are detrimental to subluxation centered practice and the public health.

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**Goal Number Five:**

To help ensure the survival of the clinical practice of locating, analyzing and correcting vertebral subluxations.

**Objectives**

A. Develop and compile the epidemiological and clinical evidence regarding vertebral subluxation and its detrimental effects on populations.
B. Develop and provide the epidemiological and clinical evidence regarding the vertebral subluxation and its detrimental effects to chiropractic educational institutions, trade organizations and practitioners.
C. Provide the evidence needed to develop mentoring, coaching, business training, and the development and provision of information and resources for chiropractors, trade organizations and associations to communicate the necessary public health messages for a subluxation-centered public health agenda.

Foundation for Vertebral Subluxation

# Foundation for Vertebral Subluxation

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KATHRYN HEIDT BS, MS, DC


NIKKI HIRSHOWITZ DC


GABRIEL HREBIEN BA


CHRISTIE KWON MS, DC


DOUG LIGHTSTONE BA, MS (C), DC


HUI ZHEN LIN BS, DC


CHRISTOPHER LONG BS


CHRISTI MCRAE BS, DC


BROOKE MILLS


SHANNON O'BRIEN BS, DC


RACHAEL PRATT MS, DC


STACY RAINEY BS, DC


ANDREW RUPP DC


SIMON SENZON DC


ANQUONETTE STILES DC, MPH


ERIC ZIELINSKI BA, DC

# Best Practices/Practice Guidelines

## Best Practices for the Chiropractic Care of Children

*Joel Alcantara, DC[1], Joey D. Alcantara, DC[2], Junjoe Alcantara, DC[3], Christopher Kent DC, JD[4], Matthew McCoy DC, MPH[5], Christie Kwon DC, MS, MPH[6], Anquonette Stiles DC, MPH[6], Jeanne Ohm DC[7], Veronica Gutierrez DC[8], Andrew Rupp DC[8], Shannon O'Brien DC[8], Anne Bishop DC[8], Stacey Rainey DC[8], Bethany Carilli DC[8] Hui Zhen Lim DC[6], Gabriel Hrebien BA[6], Justin Bedrosian DC[6], Suzzanne M. Candelaria-Perez BSc, DC[6], Christopher Long DC[6]*

**RECOMMENDATION**

**Rating: Established**
**Evidence: E, L**

**Since vertebral subluxation may affect individuals at any age, chiropractic care may be indicated at any time after birth. As with any age group, however, care must be taken to select adjustment methods most appropriate to the patient's stage of development and overall spinal integrity. Parental education by the chiropractor concerning the importance of evaluating children for the presence of vertebral subluxation is encouraged as are public health initiatives geared toward screening of children for vertebral subluxation beginning at birth.**

### Introduction

Since its inception, the chiropractic care of children has been an integral part of the practice of chiropractic.[1] Today, the chiropractic care of children remains an important aspect in chiropractic practice. In 2007, Barnes and colleagues[2] estimated the complementary and alternative medicine (CAM) use among U.S. adults and children from the 2007 National Health Interview Survey (NHIS), conducted by the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS). Barnes and colleagues[2] found that approximately one in nine children used some type of CAM therapy with children having a greater likelihood of using biologically based therapies, mind-body therapies or manipulative and body-based therapies than other alternative healthcare approaches. Of the practitioner-based CAM therapies, the investigators found that chiropractic was the most popular form of non-allopathic healthcare for children. Overall, CAM therapies were used by children to address complaints associated with the musculoskeletal complaints, head or chest colds, anxiety or stress and ADHD/ADD. In a follow-up study, Black et al.[3] found similarly among 4-17 year-olds in terms of motivation for care and the utilization of chiropractic by parents for their children. In 2000, Lee et al.[4] characterized the chiropractic care of children in a survey of Boston chiropractors. Lee et al.[4] examined socio-demographics, practice characteristics, and fee structures involved in the care of children. In addition, chiropractor responders were asked about their recommendation of childhood vaccinations and their approach to care in a child with a fever. Based on the response of 90 predominantly white male chiropractors, Lee et al.[4] found an average weekly visit of 122 patients of which 11% involved the care of children and adolescents. The average visit fees were $82 and $38 for the initial and follow-up visits, respectively with only 49% of the fees covered by 3rd party payors.

1. *Director of Research International Chiropractic Pediatric Association*
2. *Private Practice of Chiropractic Alberta, Canada*
3. *Private Practice of Chiropractic Pasig City, Philippines*
4. *President Foundation for Vertebral Subluxation & Director of Center for Scholarly Activity Sherman College of Chiropractic*
5. *Vice President Foundation for Vertebral Subluxation*
6. *Research Fellow Foundation for Vertebral Subluxation*
7. *Executive Director International Chiropractic Pediatric Association (Past)*
8. *Guidelines Committee Foundation for Vertebral Subluxation*

*Copyright Foundation for Vertebral Subluxation 2022 – NOT for Distribution*

# Best Practices/Practice Guidelines

## Best Practices for Chiropractic Care During Pregnancy

*Authors…*

---

**RECOMMENDATION**

**Rating: Established**
**Evidence: E, L**

**During pregnancy a woman's body experiences numerous biomechanical adaptations and physiological changes. These changes often have an adverse effect on her neuro-musculo-skeletal system affecting quality of life in pregnancy, birth outcome and the future well-being of her baby. Because of these physiological compensations, care must be taken by the chiropractor to select the specific analysis and adjustment procedures most appropriate for the complex changes throughout the various stages of pregnancy. The increased potential for spinal instability in the mother and the related subluxations in the woman's spine and pelvis throughout pregnancy affect the health and well-being of both her and her baby. This warrants regular chiropractic screening in all women throughout pregnancy. Patient education pertinent to the role of chiropractic care in pregnancy is encouraged.**

---

### Introduction

With many physiological and neuro-biomechanical adaptations while carrying a fetus to full term, the expectant mother is challenged with many physical, mental and biochemically related alterations in her physiology. With concerns of adverse events associated with medications and other interventions for the unborn fetus and mother, many pregnant women turn to complementary and alternative medicine (CAM).

In a systematic review of the primary literature (2008-2013) describing views and experiences of CAM use during pregnancy by women and healthcare professionals, Pallivalappila et al.1 found high levels of systemic CAM use by both women and healthcare professionals during pregnancy. In fact, prior CAM use was an independent predictor for CAM use during pregnancy. Worldwide, the prevalence of CAM use by women ranges from 56% to 88% among UK women, over 50% of middle aged and older Australian women and over 90% of menopausal Canadian

# Best Practices/Practice Guidelines

## Immunity & Chiropractic Clinical Practice

*Matthew McCoy DC, MPH[1], Christopher Kent DC, JD[2], Anquonette Stiles DC, MPH[3], Christie Kwon DC, MS, MPH[3], Amy Haas DC, Ph.D[3], Jon Chung DC[4], Ian Shtulman DC, DAACP[5], Suzzanne M. Candelaria-Perez BSc[3], Christopher Long BS[3], Brooke Mills AA[3], Veronica Gutierrez DC[6]*

**RECOMMENDATION**

**Rating: Established**
**Evidence: E, L**

**A growing body of evidence supports our understanding of the role of the nervous system in immune system function. Basic science studies and clinical reports in the scientific literature provide supportive evidence of the beneficial effects of chiropractic care in improving function, including immune system function and quality of life. These guidelines support chiropractic practice in an evidence-informed, patient centered model. Evidence-informed practice involves the integration of the knowledge and experience of the chiropractor, the best available research evidence, and the needs and preferences of individual patients. Furthermore, chiropractors must be free to discuss, publish, and otherwise disseminate the best available evidence, and in practice, apply it to the needs of individual patients.**

***Foundation for Vertebral Subluxation Best Practices Initiative***

**Introduction**

It is well established that the nervous system controls and coordinates all functions and systems of the human body including immunity and the immune system.[1] Consistent with this simple maxim of human physiology, many chiropractic practitioners hold that the impacts of chiropractic adjustment on the nervous system can confer overall salutogenic benefits in people undergoing chiropractic care.[2-4] Indeed, for well over a century, chiropractors around the world have accrued a significant body of collective clinical experience establishing that patients under chiropractic care often experience health improvements not limited to simple musculoskeletal complaints or resolution.

1. *Vice President Foundation for Vertebral Subluxation*
2. *President Foundation for Vertebral Subluxation & Director of Center for Scholarly Activity Sherman College of Chiropractic*
3. *Research Fellow Foundation for Vertebral Subluxation*
4. *Private Practice – Palm Beach, Florida*
5. *Private Practice – Lake Worth, Florida*
6. *Guidelines Committee Foundation for Vertebral Subluxation*

Recent events related to the Coronavirus Pandemic have brought this relationship between chiropractic care and overall promotion of health and wellness to the forefront, both within and outside of the chiropractic profession. Within the chiropractic profession, broad stroke assertions by researchers to the effect that no "credible" published scientific evidence supports claims of clinically relevant effectiveness of spinal adjustment and/or manipulation in boosting or strengthening the immune system.[5]

As a consequence of the assertions of the small cadre of researchers, certain chiropractic regulatory boards, chiropractic trade organizations and chiropractic educational institutions from around the world are claiming that there exists no credible, scientific evidence that would permit claims of effectiveness for conferring or enhancing immunity through spinal adjustment and/or manipulation to be made in communications by chiropractors.[6] Essentially, chiropractors have been effectively muzzled and throttled from discussing any connection between the nervous and immune systems. The conclusions of the flawed document have been refuted along with exposing the biases of the authors and the flaws of

# Historic, First Ever Conference on Chiropractic & Immunity Reveals Widespread Evidence for Role of the Profession

Monday, November 2, 2020 - 14:50

RESEARCH NEWS STAFF



### *Thousands Raised for Ongoing Projects*

On October 24-25 2020 over 120 chiropractors, faculty, students and laypeople attended the **historic, first ever Conference on Chiropractic and Immunity** in Spartanburg South Carolina. The event was hosted by the Foundation for Vertebral Subluxation and Sherman College's Center of Scholarly Activity.

The Conference hosted 13 speakers including DC's, MD's, MPH's and Ph.D's, who held two days of incredible discussions on the impact of chiropractic on immune function.

Speakers and their topics included:

- **Christopher Kent DC, JD - Science, Law & Policy Issues**
- **Jonathon Chung DC - The Vagus Nerve, HRV, and Immunity**
- **Ian Shtulman DC, DACCP - Immunity Starts in the Womb**
- **Amy Haas MS, DC, Ph.D - Coordination, Integration & Cytokines**
- **William Decken DC, L.C.P, D.Ph.CS - Adaptability, Expression & Immunity**
- **Christie Kwon DC, MS, MPH - Vertebral Subluxation Epidemiology & Immunity**
- **Anquonette Stiles DC, MPH - Looking Forward - Best Practices & Immunity**
- **Matthew McCoy DC, MPH - Autonomy, Consent & Medical Paternalism**
- **Joel Alcantara DC, Ph.D (C) - Salutogenesis, Coherence & Immunity**
- **Monique Andrews MSc, DC, DNM - The Brain, Gut & Immunity**
- **Parkash Kumar MD, MPH - Immune System Anatomy**
- **Terry Lancaster MA, Ph.D (C) - Immune System Physiology**
- **Simon Senzon MA, DC, Ph.D (C) - Identity, Discourse, and the COVID Crisis**
- **Stephen Marini DC, Ph.D - Natural Immunity & the Role of Chiropractic**

The Foundation for Vertebral Subluxation Presents:

# Conference on Immunity & Chiropractic: The Global Burden of Vertebral Subluxation

**OCTOBER 24-25, 2020**

**SHERMAN COLLEGE OF CHIROPRACTIC SPARTANBURG, SOUTH CAROLINA**

Foundation for Vertebral Subluxation

CENTER FOR SCHOLARLY ACTIVITY-SHERMAN COLLEGE OF CHIROPRACTIC

**TO REGISTER PLEASE VISIT - TINYURL.COM/IMMUNITYCONFERENCE**

# Immunity, Chiropractic & Best Practices Document Published

Wednesday, March 31, 2021 - 12:45

**FOUNDATION FOR VERTEBRAL SUBLUXATION**




***Document Addresses Research, Autonomy, Consent & Free Speech Issues***

The Foundation for Vertebral Subluxation has just released a **Best Practices/Practice Guidelines** document on the role of **chiropractic in immune function**.

CLICK HERE for a copy

# Immunity Research Agenda

- Project Outline
- Scoping Review of Chiropractic & Immunity
- Scoping Review of Biomarkers
- Development of Protocols
- Database & Website
- Conference
- Integrative Review
- Best Practices Statement
- Feasibility Study
- Health Outcomes Studies
- Health Care Policy

# Steering Committee

- Christopher Kent DC, JD
- Amy Haas DC, Ph.D
- Jon Chung DC
- Ian Shtulman DC DACCP
- Joel Alcantara DC, Ph.D (C)
- Matthew McCoy DC, MPH
- Anquonette Stiles DC, MPH
- Christie Kwon DC, MS, MPH

# Sherman Students Awarded Research Fellowship Scholarships From Foundation for Vertebral Subluxation

Friday, August 26, 2022 - 15:47

FOUNDATION FOR VERTEBRAL SUBLUXATION




### *Students Will Join Best Practices Team*

Three students from **Sherman College of Chiropractic** in Spartanburg, South Carolina were recently awarded **Research Fellowships** through the **Foundation for Vertebral Subluxation** (FVS). The students will join the Foundation's research team and will be immediately focused on assisting with one of the Foundation's ongoing projects: **Best Practices and Guideline Development for Management of Vertebral Subluxation.**

Those students include:

- **Aquil Holden BS**
- **Vega Cordero BA**
- **Trystan Wertley**

# Five More Sherman Students Awarded Research Fellowships from Foundation for Vertebral Subluxation

Sunday, January 12, 2020 - 19:28

FOUNDATION FOR VERTEBRAL SUBLUXATION



***Fellowships Focus on Best Practices & Guideline Development for Management of Vertebral Subluxation***

Five students from Sherman College of Chiropractic in Spartanburg, South Carolina were recently awarded Research Fellowships through the Foundation for Vertebral Subluxation (FVS). The students will join the Foundation's research team and will be immediately focused on assisting with one of the Foundation's ongoing projects: **Best Practices and Guideline Development for Management of Vertebral Subluxation**.

# Two More Sherman Students Awarded Research Fellowships from Foundation for Vertebral Subluxation

Monday, November 26, 2018 - 22:09

FOUNDATION FOR VERTEBRAL SUBLUXATION




***Fellowships Focus on Best Practices & Guideline Development for Management of Vertebral Subluxation***

**Kathryn Heidt MS** and **Hui Zhen Lim** both students at Sherman College of Chiropractic in Spartanburg SC, were recently awarded Research Fellowships from the Foundation for Vertebral Subluxation (FVS). The Research Fellowships focus on Best Practices & Guideline Development for Management of Vertebral Subluxation.

# Sherman Student Awarded Research Fellowship from Foundation for Vertebral Subluxation & ChiroFutures Malpractice Program

Thursday, October 4, 2018 - 22:22

FOUNDATION FOR VERTEBRAL SUBLUXATION



***Fellowship to Focus on Epidemiology & Salutogenesis Related to Subluxation***

Kathleen Costello MS, a student at Sherman College of Chiropractic in Spartanburg SC, was recently awarded a research Fellowship from the Foundation for Vertebral Subluxation (FVS). The funding for the Fellowship is being provided by the ChiroFutures Malpractice Insurance Program.

# Salutogenesis, Stress Responsivity, and Neurobiological Mechanisms Associated with Vertebral Subluxation. Review and Commentary.

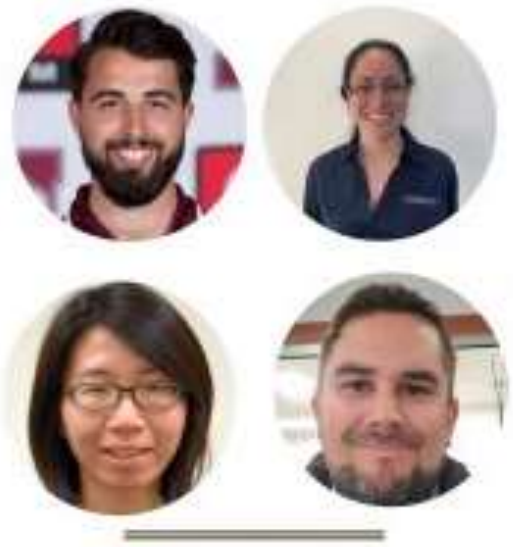
Christopher Kent
Sherman College of Chiropractic



# Young Chiropractic Researchers Honored by Foundation for Vertebral Subluxation

Friday, August 26, 2022 - 14:02

FOUNDATION FOR VERTEBRAL SUBLUXATION



### *Awards Recognize Dedication to Subluxation Research*

When the **Foundation for Vertebral Subluxation** (FVS) was founded it realized that the profession desperately needed chiropractic researchers who embraced the concept of vertebral subluxation. In addition to actually conducting research the FVS also supports a team of researchers through its scholarship program with 20 Fellowships having been granted. The FVS, through its ***Advancing Futures*** program, seeks to provide scholarships to individuals who assist in carrying out the Research Agenda of the organization.

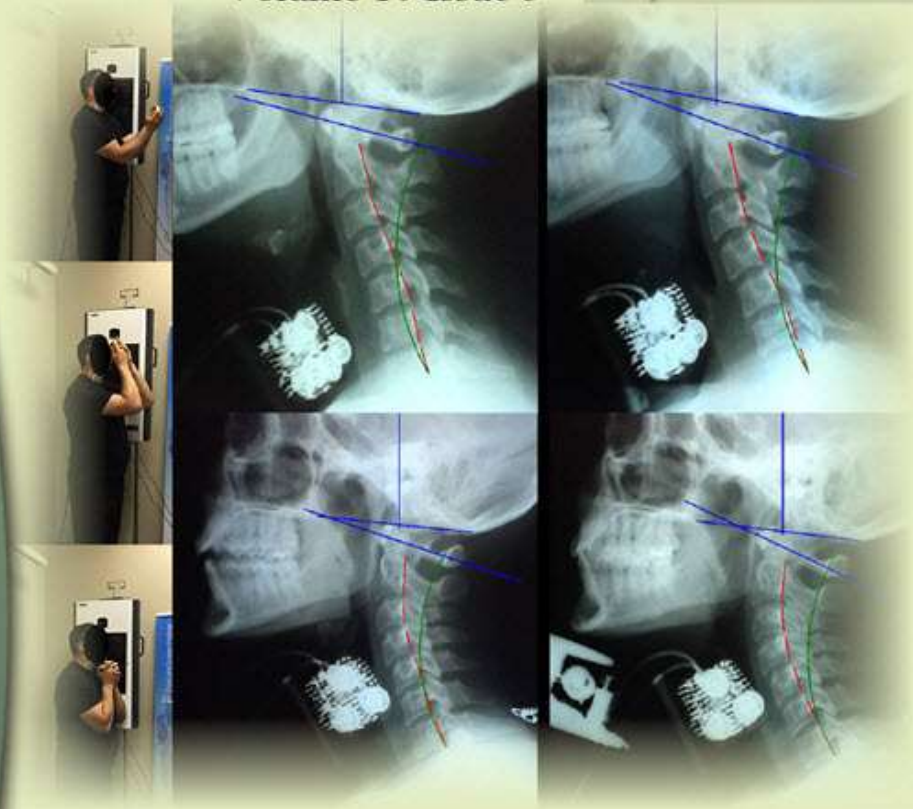
JRCR

THE JOURNAL OF

# RADIOLOGY CASE REPORTS

Volume 10 Issue 9 September 2016

WWW.RADIOLOGYCASES.COM



Impact of Isometric Contraction of Anterior Cervical Muscles on Cervical Lordosis *by Curtis A Fedorchuk et al.*

EDURAD PUBLISHING
ISSN 1943-0922

Foundation for Vertebral Subluxation

# Impact of Isometric Contraction of Anterior Cervical Muscles on Cervical Lordosis

Curtis A Fedorchuk[1*], Matthew McCoy[2], Douglas F Lightstone[1], David A Bak[1], Jacque Moser[3], Brett Kubricht[4], John Packer[5], Dustin Walton[6], Jose Binongo[7]

*1. Private Practice, Cumming, GA, USA*

*2. FVS Non-Profit, Kennesaw, GA, USA*

*3. Private Practice, Pittsburgh, PA, USA*

*4. Private Practice, Charlotte, NC, USA*

*5. Private Practice, Atlanta, GA, USA*

*6. Private Practice, Peachtree City, GA, USA*

*7. Emory University, Atlanta, GA, USA*

*** Correspondence:** Curtis A. Fedorchuk, D.C., 425 Peachtree Parkway, Suite 315, Cumming, GA 30041, USA (*cfedorchuk@comcast.net*)

Radiology Case. 2016 Sep, 10(9):13-25 :: DOI: 10.3941/jrcr.v10i9.2885

## ABSTRACT

Objective: This study investigates the impact of isometric contraction of anterior cervical muscles on cervical lordosis. Methods: 29 volunteers were randomly assigned to an anterior head translation (n=15) or anterior head flexion (n=14) group. Resting neutral lateral cervical x-rays were compared to x-rays of sustained isometric contraction of the anterior cervical muscles producing anterior head translation or anterior head flexion. Results: Paired sample t-tests indicate no significant difference between pre and post anterior head translation or anterior head flexion. Analysis of variance suggests that gender and peak force were not associated with change in cervical lordosis. Chamberlain's to atlas plane line angle difference was significantly associated with cervical lordosis difference during anterior head translation (p=0.01). Conclusion: This study shows no evidence that hypertonicity, as seen in muscle spasms, of the muscles responsible for anterior head translation and anterior head flexion have a significant impact on cervical lordosis.

ORIGINAL RESEARCH

# Kwon Awarded Scholarship for Advanced Imaging Fellowship

Friday, July 13, 2018 - 11:39

**FOUNDATION FOR VERTEBRAL SUBLUXATION**



## *FVS Developing Advanced Imaging Research Agenda*

Christie Kwon DC, MS was recently awarded a scholarship by the Foundation for Vertebral Subluxation (FVS) to participate in a Functional MRI Visiting Fellowship. The Fellowship took place earlier this year and has resulted in a flurry of activity and excitement at the FVS because of the potential this holds for subluxation research.

It's been known for almost 100 years that neural activity causes localized changes in blood flow and researchers have demonstrated that neural activity

# Kwon Awarded Public Health Research Scholarship by Foundation for Vertebral Subluxation

Friday, July 13, 2018 - 11:49

FOUNDATION FOR VERTEBRAL SUBLUXATION



***Focus on Public Health, Prevention Science & Vertebral Subluxation***

Christie Kwon DC, MS was recently awarded an ***Advancing Futures Research Scholarship*** by the Foundation for Vertebral Subluxation (FVS) to complete her Master's in Public Health at Emory University in Atlanta, Georgia.

Dr. Kwon, who is a chiropractor and also holds a Master's Degree in Biomedical Engineering, stated "Emory's focus on health promotion and

# Simon Senzon Awarded Academic Scholarship by Foundation for Vertebral Subluxation

Thursday, October 4, 2018 - 23:15

FOUNDATION FOR VERTEBRAL SUBLUXATION



***Focus is on Errors in Literature Regarding Vertebral Subluxation***

Simon Senzon MA, DC, a prolific historical researcher on the chiropractic profession, has been awarded an Advancing Futures Scholarship by the Foundation for Vertebral Subluxation (FVS).

The scholarship is for Dr. Senzon to complete a Ph.D at Southern Cross University located in Australia. The focus of his scholarship and dissertation will be correcting the errors in the literature regarding vertebral subluxation placed by numerous "subluxation deniers" who have peppered the scientific and historical literature with unreferenced and unsupported statements regarding the nature and historical issues surrounding vertebral subluxation.

# The Senzon Papers – Exposing the Lies & Deception of the Subluxation Deniers

Tuesday, May 28, 2019 - 12:43

SIMON SENZON MA, DC, FOUNDATION FOR VERTEBRAL SUBLUXATION




## *An Overview of Simon Senzon's Ten Part Series - The Chiropractic Vertebral Subluxation: 1897-1997*

A new series of ten papers was recently published in the Journal of Chiropractic Humanities, all written by **Simon Senzon, Ph.D. candidate at the School of Health and Human Sciences at Southern Cross University and recipient of the Foundation for Vertebral Subluxation's post-graduate scholarship.**

# Liars Lie

## The Senzon Papers – Exposing the Lies & Deception of the Subluxation Deniers

Tuesday, May 28, 2019 - 12:43

SIMON SENZON MA, DC, FOUNDATION FOR VERTEBRAL SUBLUXATION




***An Overview of Simon Senzon's Ten Part Series - The Chiropractic Vertebral Subluxation: 1897-1997***

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## Simon Senzon Awarded Academic Scholarship by Foundation for Vertebral Subluxation

Thursday, October 4, 2018 - 23:15

FOUNDATION FOR VERTEBRAL SUBLUXATION

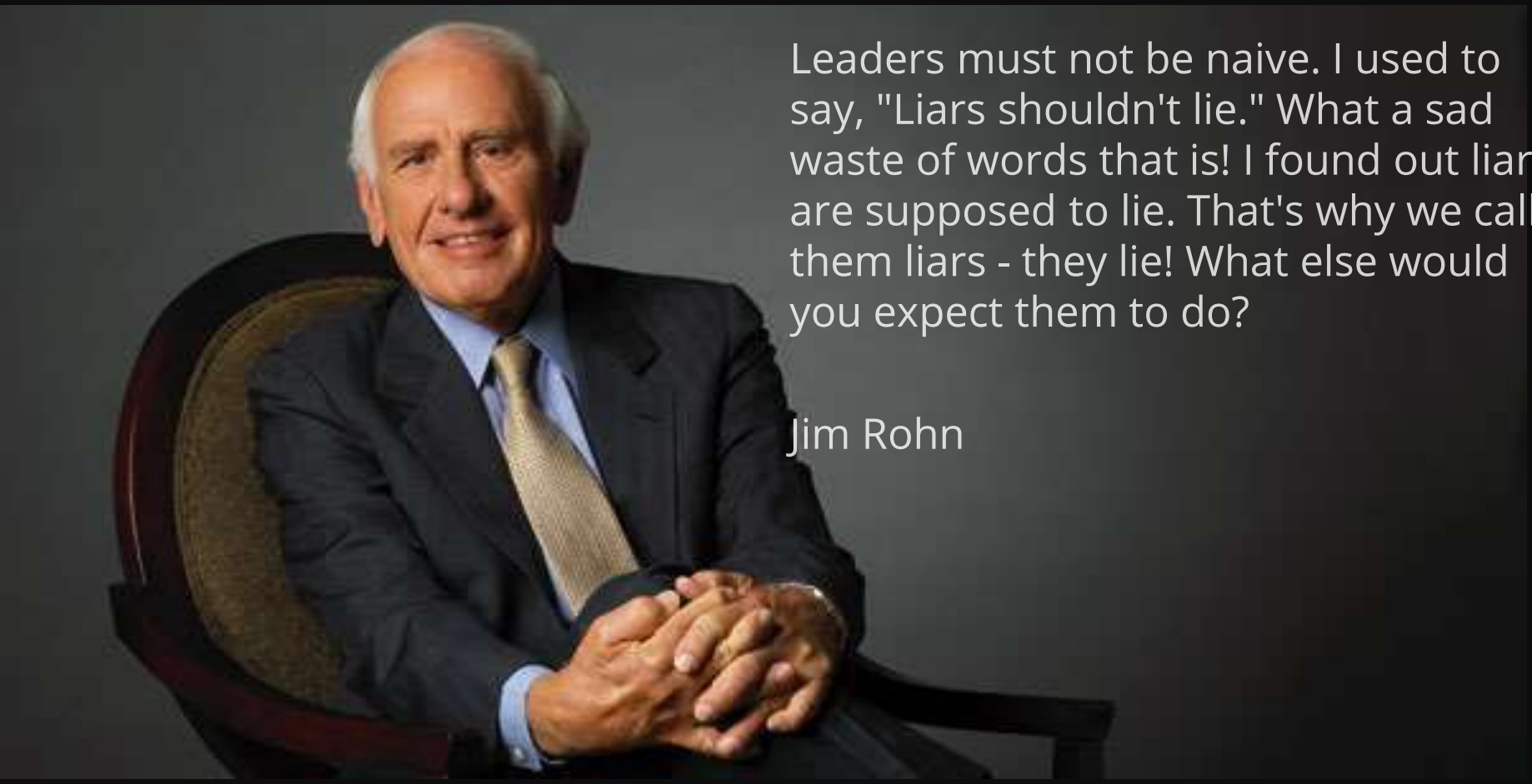


***Focus is on Errors in Literature Regarding Vertebral Subluxation***

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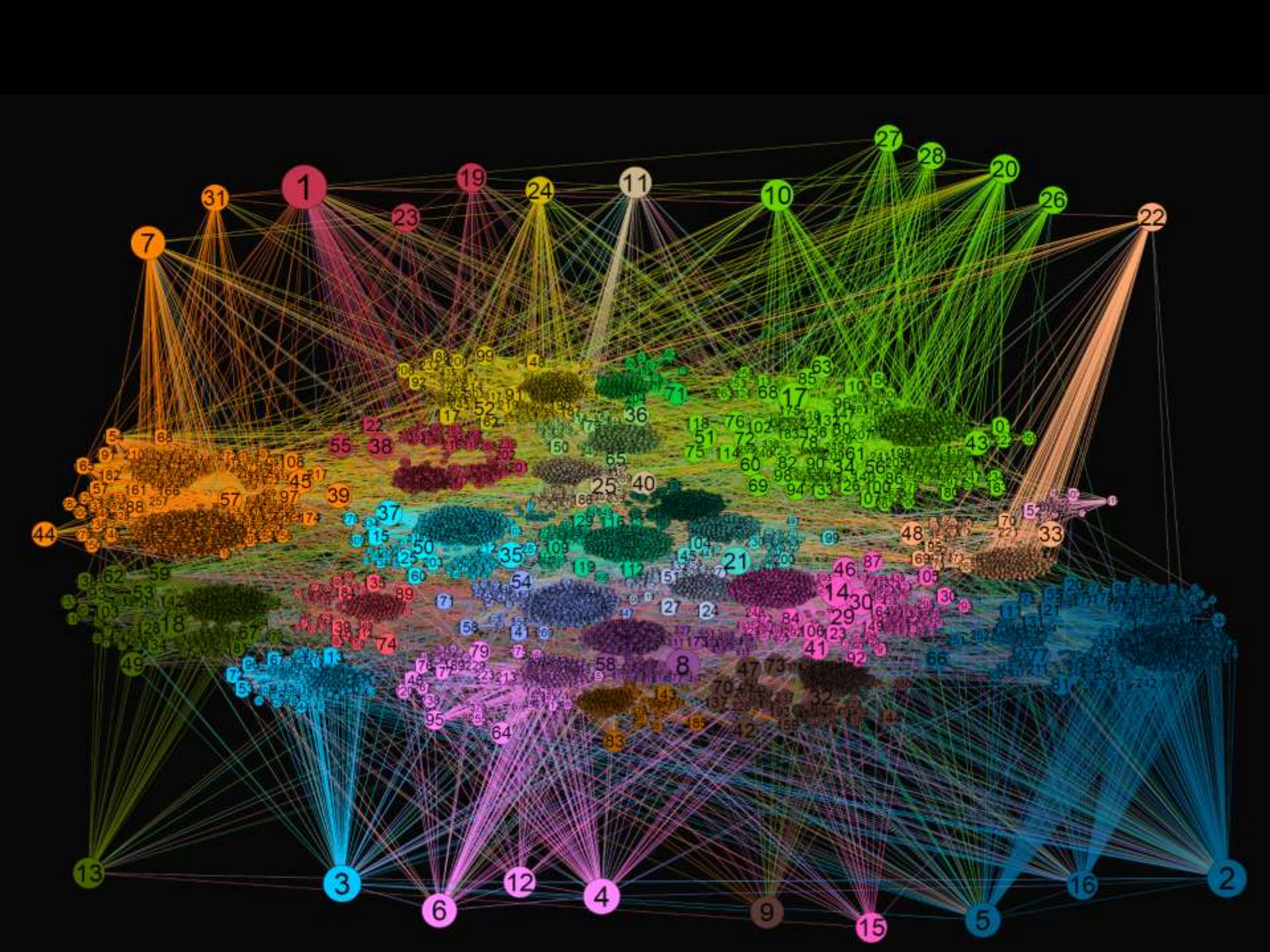
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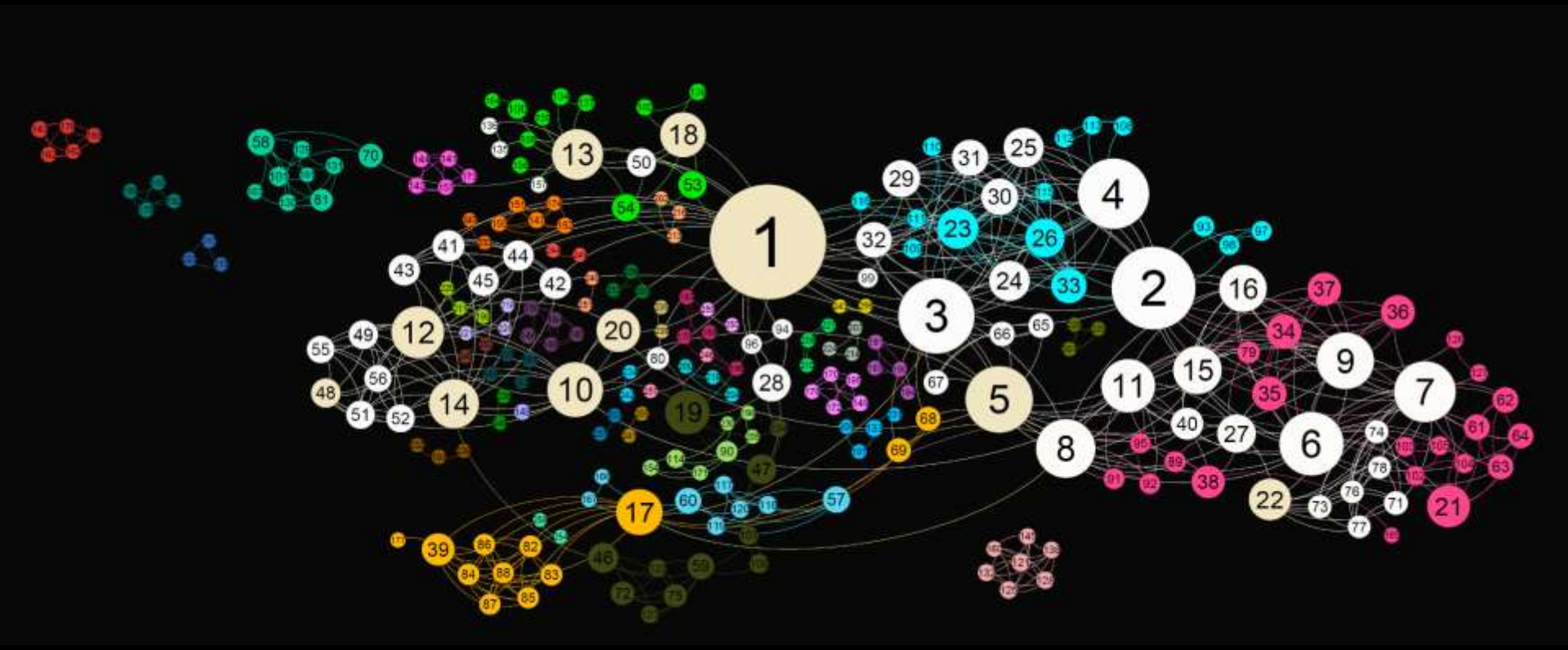
# Don’t be Naïve . . .

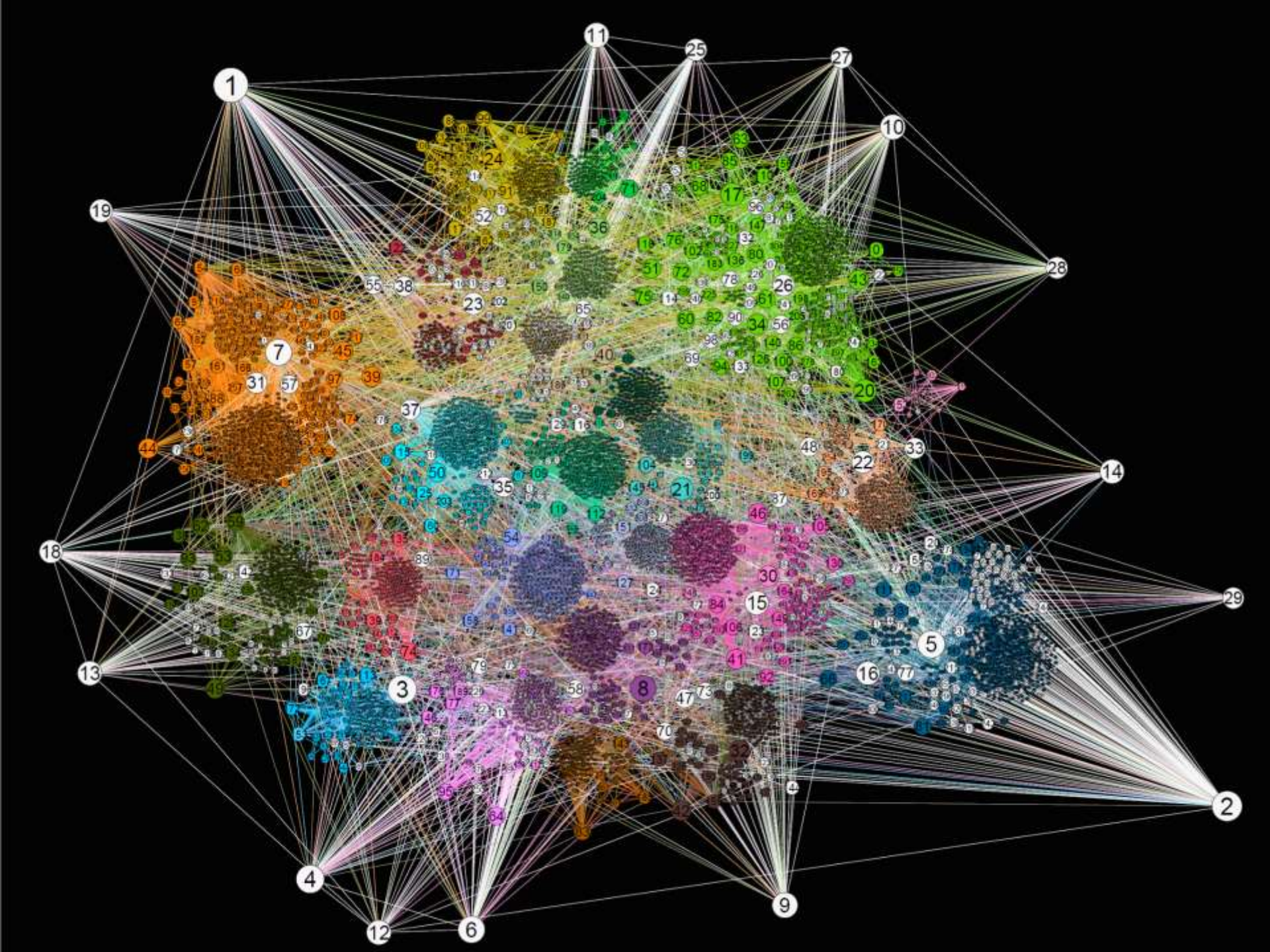


Leaders must not be naive. I used to say, "Liars shouldn't lie." What a sad waste of words that is! I found out liars are supposed to lie. That's why we call them liars - they lie! What else would you expect them to do?

Jim Rohn




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# Simon Senzon Honored with "Defender of Chiropractic" Award from Foundation for Vertebral Subluxation

Monday, October 17, 2022 - 22:07

FOUNDATION FOR VERTEBRAL SUBLUXATION



***Senzon's Recent Work Focused on Correcting False Claims in Literature by Subluxation Deniers***

Simon Senzon MA, DC, Ph.D (C) a prolific historical researcher on the chiropractic profession, has been honored with the **"Defender of Chiropractic"** Award from the **Foundation for Vertebral Subluxation (FVS).**

Dr. Senzon has been working on completing his Ph.D at Southern Cross University located in Australia. He was awarded a scholarship by the



# Immunity & Chiropractic

NEWS

## Boost your immunity through **chiropractic** care

Lahaina News

How **chiropractic** care boosts your immunity: The upper cervical region consists of the head, the C1 and C2 neck vertebrae and the spinal cord.



Flag as irrelevant

## Review

# A Scoping Review of Chiropractic, Vertebral Subluxation and Immune Function with Implications for Development of a Protocol for Measurement of Immune Biomarkers in Chiropractic Research & the Development of Related Policy

*Matthew McCoy DC, MPH*[1]
*Christopher Kent DC, JD*[2]
*Suzzanne M. Candelaria-Perez BSc*[3]
*Anquonette Stiles DC, MPH*[3]
*Christie Kwon DC, MS, MPH(C)*[3]
*Christopher Long BS*[3]
*Brooke Mills AA*[3]

1. *Vice President – Foundation for Vertebral Subluxation*
2. *President – Foundation for Vertebral Subluxation & Director of Center for Scholarly Activity Sherman College of Chiropractic*
3. *Research Fellow – Foundation for Vertebral Subluxation*

**Abstract**

**Objective:** To discuss the existing literature on chiropractic, vertebral subluxation and immune function in order to inform the development of an integrative review of the literature, a review of immune biomarkers in relation to chiropractic, development of a research protocol, the implementation of future studies and the development of related policy.

**Methods/Results:** We conducted a scoping review of existing literature available to the authors and conducted further searches and gathering of documents based on that available literature. 125 papers were gathered and included in this review.

**Conclusions:** This is a scoping review of the literature regarding chiropractic and its relationship to neuroimmunology. It is intended to inform a larger project and give that team as much background as possible in a short period of time. The results of the already available research demands that we further explore the neuro-immuno-regulatory effects of chiropractic, adjustment and spinal manipulation and it provides a starting point for doing so. While adjustments reduce pain and inflammation, they also improve immune-regulatory function. How and to what extent is the subject of this current multi-pronged project.

***Key Words:*** *Chiropractic, immunity, neuroimmunity, neuroimmunology, psychoneuroimmunology, neuroimmunoendocrine system, immune biomarkers, supersystem, vertebral subluxation, adjustment, spinal manipulation*

### Introduction

It is well established that the nervous system controls and coordinates all functions and systems of the human body including immunity and the immune system.[1] Many in chiropractic consider that this relationship confers salutogenic benefits in people undergoing chiropractic care.[2-4]

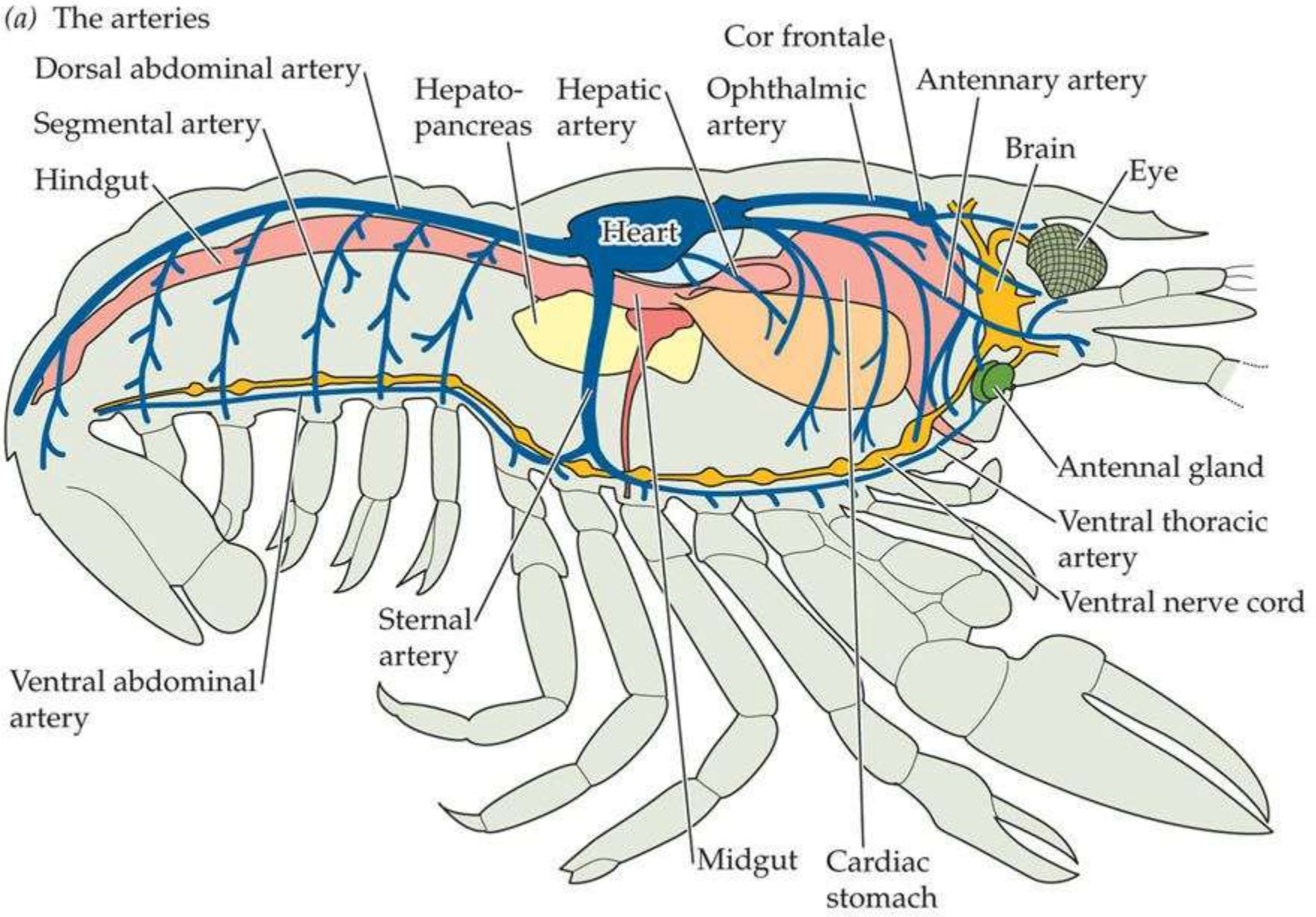
Recent events related to the Coronavirus Pandemic have brought this relationship to the forefront within and outside of the chiropractic profession. This includes assertions by researchers within the chiropractic profession that there is no credible evidence supporting claims of effectiveness of spinal adjustment and/or manipulation in boosting or strengthening the immune system and that there is no credible, scientific evidence that spinal adjustment and/or manipulation has any clinically relevant effect on the immune system.[5]

As a result of the assertions by these researchers, some chiropractic regulatory boards, chiropractic trade organizations and chiropractic educational institutions from around the world are claiming that there exists no credible, scientific evidence that would permit claims of effectiveness for conferring or enhancing immunity through spinal adjustment and/or manipulation to be made in communications by chiropractors.[6] Essentially, chiropractors have been effectively muzzled and banned from discussing any connection between the nervous and immune systems.

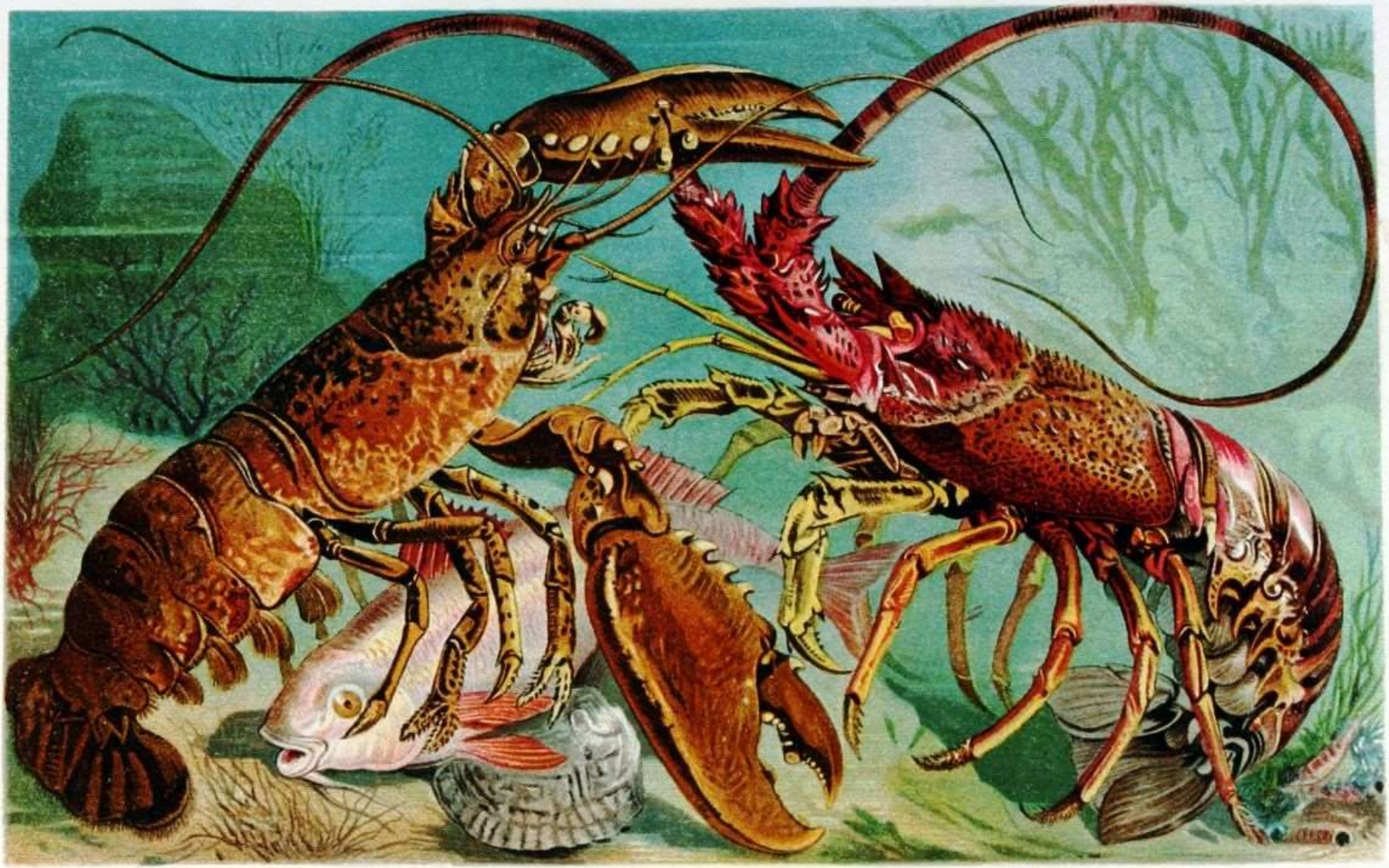
- But first . . .



# Figure 23.22 Circulation through the body of a crayfish or lobster (Part 1)




*ANIMAL PHYSIOLOGY*, Figure 23.22 (Part 1) © 2004 Sinauer Associates, Inc.



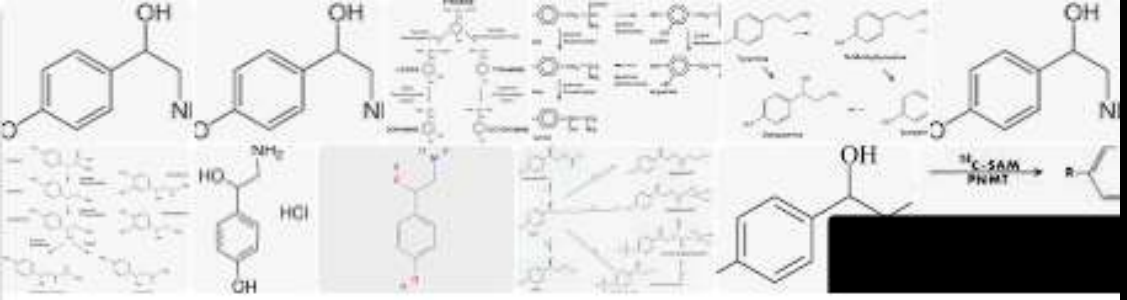
HUMMER UND LANGUSTE.

# Chemistry

- Serotonin
- Octopamine

- Ratio of two brain chemicals that modulate communication between lobster neurons

- Winning increases the ratio of serotonin to octopamine



# Octopamine

Octopamine is an organic chemical closely related to norepinephrine, and synthesized biologically by a homologous pathway. Its name derives from the fact that it was first identified in the salivary glands of the octopus. In many types of invertebrates octopamine is an important neurotransmitter and hormone.

**Molar mass:** 153.178 g/mol

**CAS ID:** 104-14-3

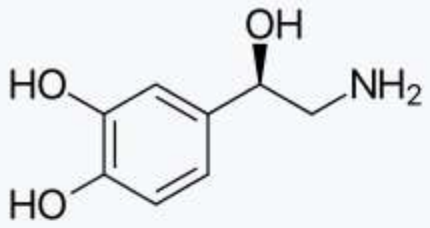
**Classification:** Organic compound

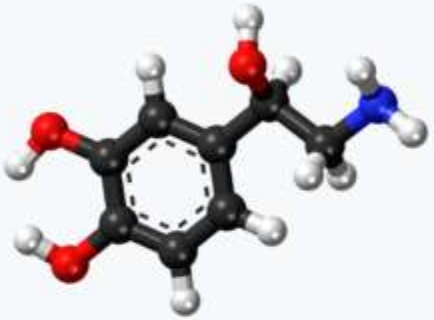
**Receptors:** TAAR1 (mammals); OctαR, OctβR, TyrR (invertebrates), Oct-TyrR

**Source tissues:** invertebrate nervous systems; trace amine in vertebrates

**Agonists:** Formamidines (amitraz (AMZ) and chlordimeform (CDM))

## Norepinephrine



| Clinical data | |
|---|---|
| Other names | NE, NA, Noradrenaline, (*R*)-(−)-Norepinephrine, l-1-(3,4-Dihydroxyphenyl)-2-aminoethanol |
| **Physiological data** | |
| Source tissues | locus coeruleus; sympathetic nervous system; adrenal medulla |
| Target tissues | system-wide |
| Receptors | $\alpha_1$, $\alpha_2$, $\beta_1$, $\beta_3$ |
| Agonists | sympathomimetic drugs, clonidine, isoprenaline |
| Antagonists | Tricyclic antidepressants, beta blockers, antipsychotics |
| Precursor | dopamine |
| Biosynthesis | dopamine β-monooxygenase |
| Metabolism | MAO-A; COMT |

# Serotonin

Serotonin or 5-hydroxytryptamine is a monoamine neurotransmitter. Its biological function is complex and multifaceted, modulating mood, cognition, reward, learning, memory, and numerous physiological processes such as vomiting and vasoconstriction. Wikipedia

**Formula:** $C_{10}H_{12}N_2O$

**Molar mass:** 176.215 g/mol

**Boiling point:** 780.8°F (416°C)

**Melting point:** 333.9°F (167.7°C)

**Metabolism:** MAO

**IUPAC ID:** 3-(2-aminoethyl)-1H-indol-5-ol, 5-Hydroxytryptamine

# Lobster Posture

- A lobster with high levels of serotonin and low levels of octopamine is a cocky, strutting shellfish
- This is because serotonin helps regulate postural flexion.
- A flexed lobster extends its appendages so it can look tall and dangerous

# Lobsters

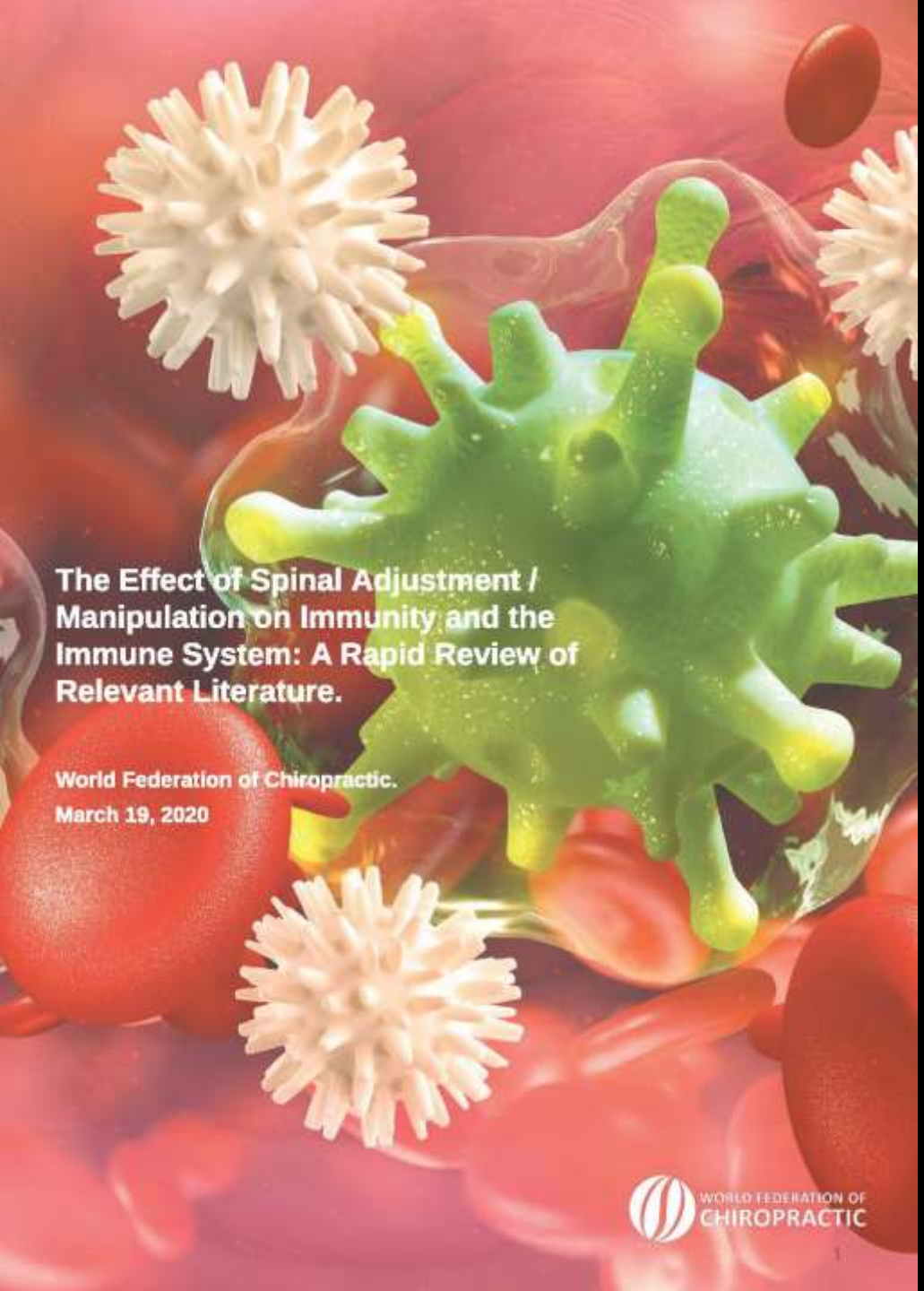
- If the dominant lobster is defeated its brain basically dissolves and it grows a new subordinate brain.

- Its original brain is not sophisticated enough to manage the transition from dominator to dominated.



Lobtsers

140 Million Years

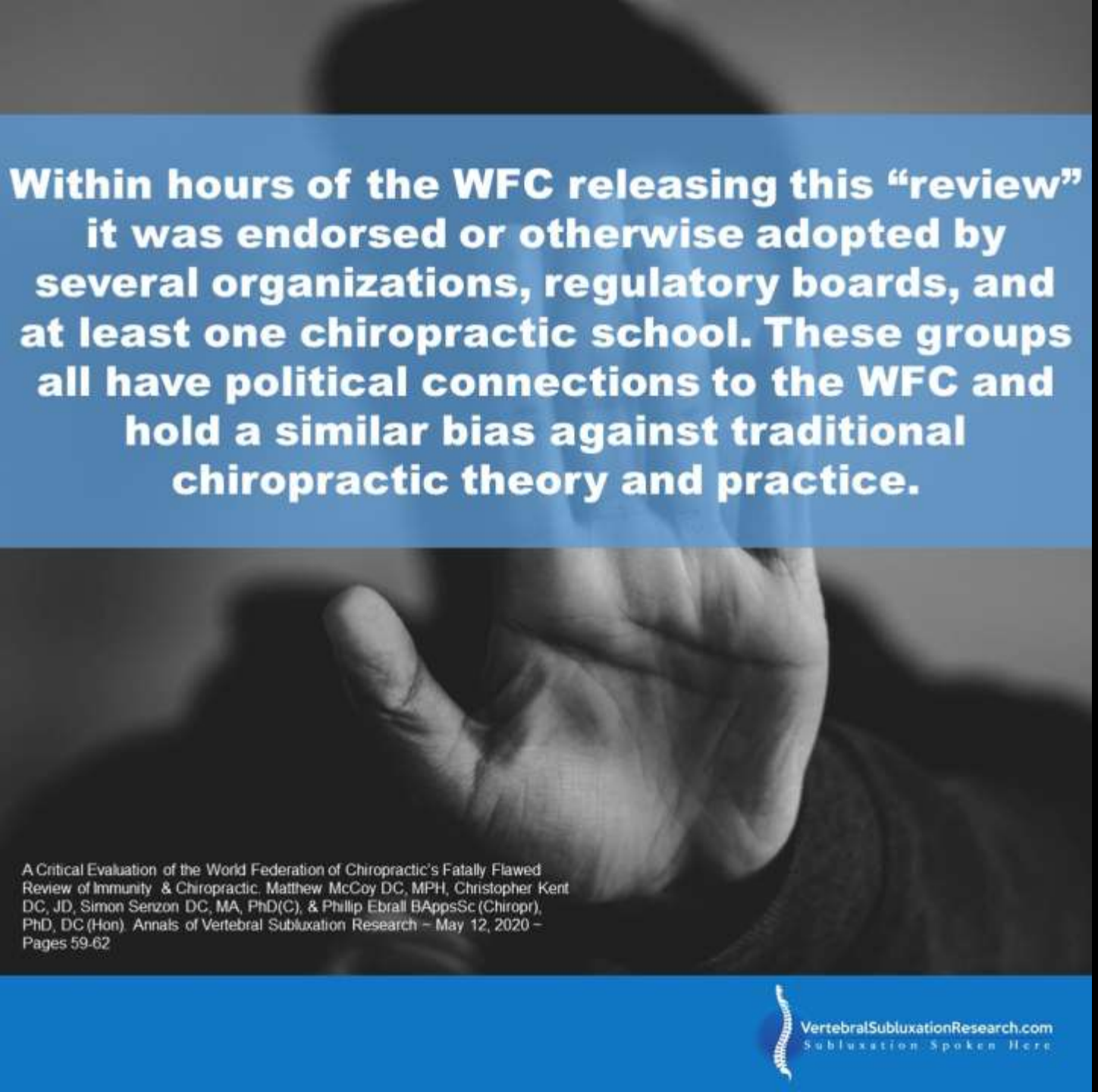


# The Effect of Spinal Adjustment / Manipulation on Immunity and the Immune System: A Rapid Review of Relevant Literature.

World Federation of Chiropractic.

March 19, 2020

WORLD FEDERATION OF CHIROPRACTIC



**Within hours of the WFC releasing this "review" it was endorsed or otherwise adopted by several organizations, regulatory boards, and at least one chiropractic school. These groups all have political connections to the WFC and hold a similar bias against traditional chiropractic theory and practice.**

A Critical Evaluation of the World Federation of Chiropractic's Fatally Flawed Review of Immunity & Chiropractic. Matthew McCoy DC, MPH, Christopher Kent DC, JD, Simon Senzon DC, MA, PhD(C), & Phillip Ebrall BAppsSc (Chiropr), PhD, DC (Hon). Annals of Vertebral Subluxation Research – May 12, 2020 – Pages 59-62

VertebralSubluxationResearch.com
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**The regulatory boards then used the document as a rationale to outright threaten their licensees for communicating any inference that chiropractic plays a role in immunity.**



A Critical Evaluation of the World Federation of Chiropractic's Fatally Flawed Review of Immunity & Chiropractic. Matthew McCoy DC, MPH, Christopher Kent DC, JD, Simon Senzon DC, MA, PhD(C), & Phillip Ebrall BAppsSc (Chiropr), PhD, DC (Hon). Annals of Vertebral Subluxation Research ~ May 12, 2020 ~ Pages 59-62

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## Review

# A Scoping Review of Chiropractic, Vertebral Subluxation and Immune Function with Implications for Development of a Protocol for Measurement of Immune Biomarkers in Chiropractic Research & the Development of Related Policy

*Matthew McCoy DC, MPH*[1]
*Christopher Kent DC, JD*[2]
*Suzzanne M. Candelaria-Perez BSc*[3]
*Anquonette Stiles DC, MPH*[3]
*Christie Kwon DC, MS, MPH(C)*[3]
*Christopher Long BS*[3]
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1. *Vice President – Foundation for Vertebral Subluxation*
2. *President – Foundation for Vertebral Subluxation & Director of Center for Scholarly Activity Sherman College of Chiropractic*
3. *Research Fellow – Foundation for Vertebral Subluxation*

**Abstract**

**Objective:** To discuss the existing literature on chiropractic, vertebral subluxation and immune function in order to inform the development of an integrative review of the literature, a review of immune biomarkers in relation to chiropractic, development of a research protocol, the implementation of future studies and the development of related policy.

**Methods/Results:** We conducted a scoping review of existing literature available to the authors and conducted further searches and gathering of documents based on that available literature. 125 papers were gathered and included in this review.

**Conclusions:** This is a scoping review of the literature regarding chiropractic and its relationship to neuroimmunology. It is intended to inform a larger project and give that team as much background as possible in a short period of time. The results of the already available research demands that we further explore the neuro-immuno-regulatory effects of chiropractic, adjustment and spinal manipulation and it provides a starting point for doing so. While adjustments reduce pain and inflammation, they also improve immune-regulatory function. How and to what extent is the subject of this current multi-pronged project.

***Key Words:*** *Chiropractic, immunity, neuroimmunity, neuroimmunology, psychoneuroimmunology, neuroimmunoendocrine system, immune biomarkers, supersystem, vertebral subluxation, adjustment, spinal manipulation*

### Introduction

It is well established that the nervous system controls and coordinates all functions and systems of the human body including immunity and the immune system.[1] Many in chiropractic consider that this relationship confers salutogenic benefits in people undergoing chiropractic care.[2-4]

Recent events related to the Coronavirus Pandemic have brought this relationship to the forefront within and outside of the chiropractic profession. This includes assertions by researchers within the chiropractic profession that there is no credible evidence supporting claims of effectiveness of spinal adjustment and/or manipulation in boosting or strengthening the immune system and that there is no credible, scientific evidence that spinal adjustment and/or manipulation has any clinically relevant effect on the immune system.[5]

As a result of the assertions by these researchers, some chiropractic regulatory boards, chiropractic trade organizations and chiropractic educational institutions from around the world are claiming that there exists no credible, scientific evidence that would permit claims of effectiveness for conferring or enhancing immunity through spinal adjustment and/or manipulation to be made in communications by chiropractors.[6] Essentially, chiropractors have been effectively muzzled and banned from discussing any connection between the nervous and immune systems.

## Scoping Review

# A Scoping Review of Salivary Tests for Immunoglobulin A, Cortisol, and C-Reactive Protein in Consideration of Their Use as Immune Biomarkers in Chiropractic Research

*Matthew McCoy DC, MPH*[1]
*Suzzanne M. Candelaria-Perez BSc*[3]
*Christopher Kent DC, JD*[2]
*Christie Kwon DC, MS, MPH(C)*[3]
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3. *Research Fellow – Foundation for Vertebral Subluxation*

**Abstract**

**Objective:** To perform a scoping review of the existing literature on salivary tests for immunoglobulin A (IgA), cortisol and C-reactive protein (CRP) to inform researchers in regards to their use as measurements of immune biomarkers following chiropractic intervention.

**Methods/Results:** We conducted a scoping review of existing literature available to the authors and conducted further searches and gathering of documents based on that available literature. 46 papers were gathered and included in this scoping review.

**Conclusions:** This is a scoping review of the existing literature on salivary tests for immunoglobulin A, cortisol and C-reactive protein. Its purpose is to inform researchers on the existing science in order to inform their use as measurements of immune biomarkers following chiropractic intervention. It is intended to inform larger projects and give that team as much background as possible in a short period of time. The results of this scoping review reveal the potential use and utility of salivary tests as measurements of immune biomarkers to explore the neuro-immuno-regulatory effects of chiropractic, adjustment and spinal manipulation.

*Key Words: Chiropractic, immunity, neuroimmunity, neuroimmunology, psychoneuroimmunology, neuroimmunoendocrine system, immune biomarkers, supersystem, vertebral subluxation, adjustment, spinal manipulation, Immunoglobulin A, C-Reactive Protein, cortisol, salivary tests*

### Introduction

Salivary testing has gained in popularity as a monitoring tool for human health. Saliva is a rapidly and easily available biological fluid, its analysis is non-invasive and is utilized in disciplines including medicine, dentistry, psychology, pharmacotherapy and epidemiology.[1] Saliva is a safe and low-cost alternative to the use of serum and research has shown that levels of some salivary markers correlate well with those in serum.[2]

Saliva refers to the clear, slightly acidic, hypotonic and mucoserous exocrine fluid synthesized and secreted by the salivary glands.[1] The major salivary glands include the parotid, submandibular and sublingual glands and produce 90% of saliva. Whole mouth saliva, as opposed to saliva produced by specific glands, is a mixture of oral fluids made up of 99% water, inorganic salts, enzymes, polypeptides and proteins. Alterations in the composition of blood may be mirrored by changes in the biochemical composition of saliva because blood-based molecules enter the highly vascularized salivary glands. Whole mouth saliva has also been proposed to resemble plasma in its composition.[3,4]

Salivary compounds can derive from plasma by passive diffusion or active transport and because of this, salivary analysis has great potential as a diagnostic tool as several

# Proposal

# Chiropractic, Vertebral Subluxation and Immune Function: A Multi-Pronged Project to Address Fundamental Questions in an Evidence Informed Framework

*Matthew McCoy DC, MPH*[1]
*Christopher Kent DC, JD*[2]
*Anquonette Stiles DC, MPH*[3]
*Christie Kwon DC, MS, MPH(C)*[3]
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3. *Research Fellow – Foundation for Vertebral Subluxation*

**Abstract**

**Objective:** To briefly outline a multi-pronged project to address fundamental questions regarding chiropractic, vertebral subluxation and immune function.

**Background:** Recent events related to the coronavirus pandemic have brought the relationship between the nervous and immune systems to the forefront within and outside of the chiropractic profession. This includes assertions by researchers within the chiropractic profession that there is no credible evidence supporting claims of effectiveness of spinal adjustment and/or manipulation in boosting or strengthening the immune system and that there is no credible, scientific evidence that spinal adjustment and/or manipulation has any clinically relevant effect on the immune system.

**Methods:** An ad hoc team made up of individuals with experience in research, law, public health, and chiropractic from the Foundation for Vertebral Subluxation and Sherman College of Chiropractic developed a rapid outline to serve as a guideline for the development of projects related to chiropractic and immunity.

**Discussion:** This outline describes a multi-pronged approach to complete a scoping review of chiropractic, immunity and biomarkers, a comprehensive, integrative review of the scientific literature on chiropractic and immunity, the development of research protocols, feasibility studies, development of a prospective longitudinal health outcomes study, and the development of policy and best practice statements for practitioners and patients in an evidence informed framework.

**Conclusion:** It is well established that the nervous system controls and coordinates all functions and systems of the human body including immunity and the immune system. Many in chiropractic consider that this relationship confers salutogenic benefits in people undergoing chiropractic care. The chiropractic profession is encouraged to further explore these relationships.

***Key Words:*** *Chiropractic, immunity, neuroimmunity, neuroimmunology, psychoneuroimmunology, neuroimmunoendocrine system, immune biomarkers, supersystem, vertebral subluxation, adjustment, spinal manipulation, best practices, health policy*

## Background

It is well established that the nervous system controls and coordinates all functions and systems of the human body including immunity and the immune system.[1] Many in chiropractic consider that this relationship confers salutogenic benefits in people undergoing chiropractic care.[2-4]

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# Credible Evidence?



# Impaired Immune Response



Foundation for Vertebral Subluxation

## Review

# A Scoping Review of Chiropractic, Vertebral Subluxation and Immune Function with Implications for Development of a Protocol for Measurement of Immune Biomarkers in Chiropractic Research & the Development of Related Policy

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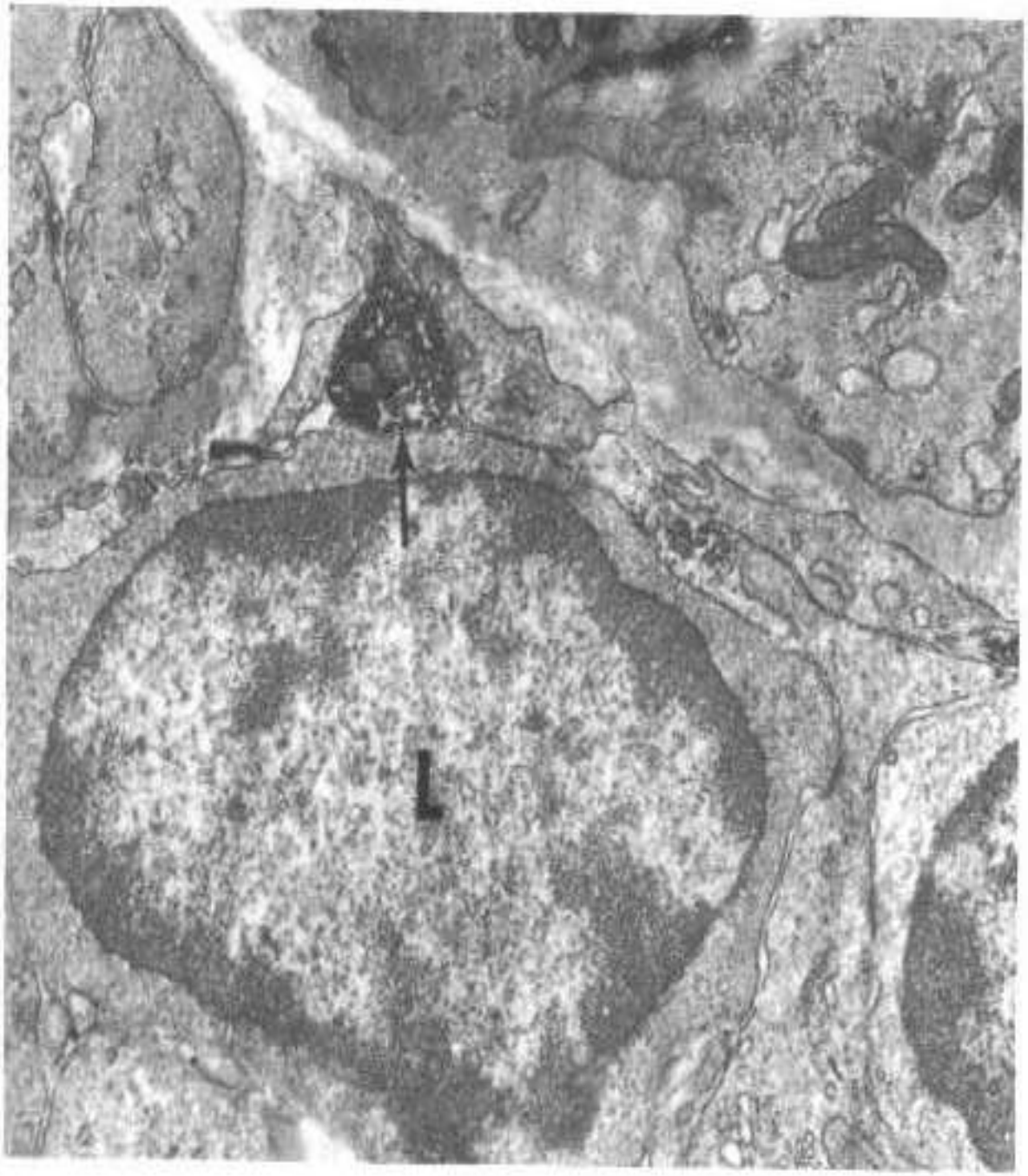
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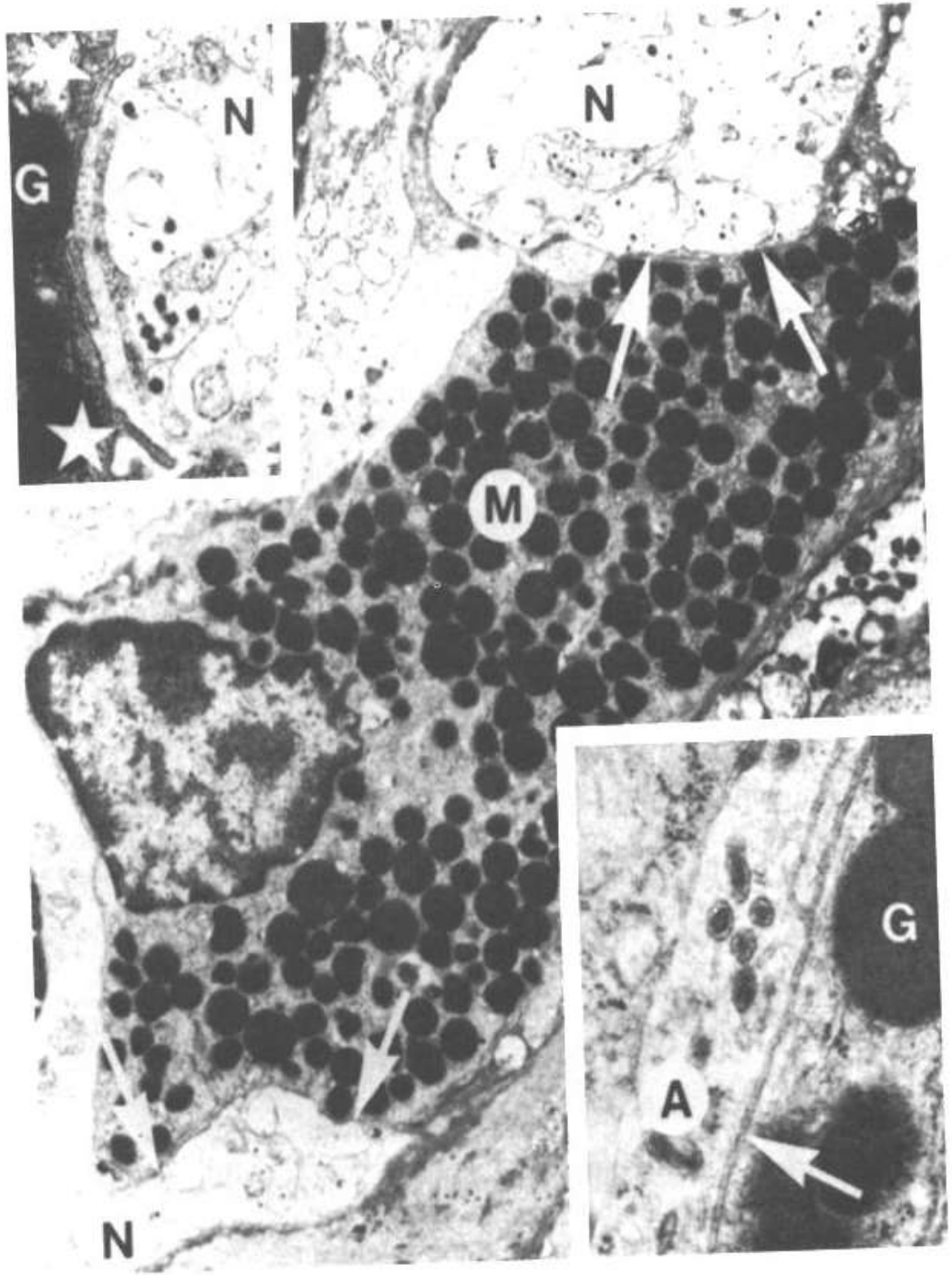
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Intimate association between neuropeptide fiber and lymphocyte

Foundation for Vertebral Subluxation




N= unmyelinated nerves

M= Intestinal mucosal mast cell

Foundation for Vertebral Subluxation



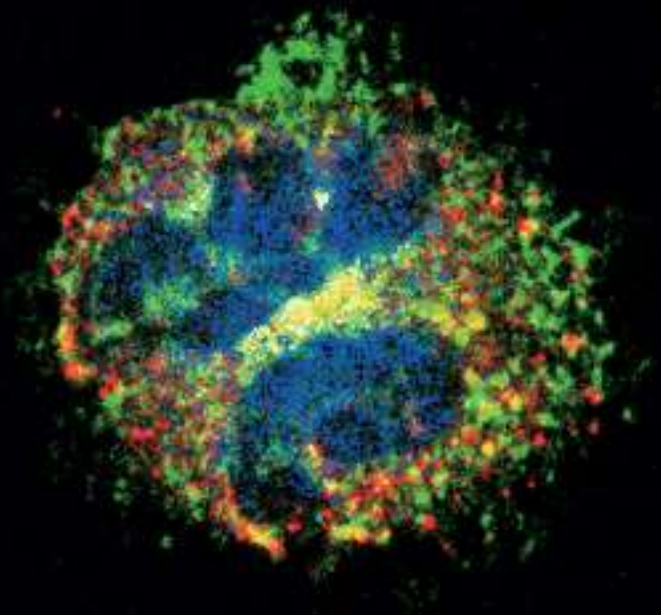
# Enhanced Neutrophil Respiratory Burst

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

JMPT Vol. 15 # 2 Feb. 1992.

Foundation for Vertebral Subluxation

# Respiratory Burst



The chiropractic research abyss . . .



# Immune Biomarkers

*medicina*

MDPI

*Review*

# The Effects Induced by Spinal Manipulative Therapy on the Immune and Endocrine Systems

**Andrea Colombi and Marco Testa ***

Department of Neuroscience, Rehabilitation, Ophtalmology, Genetics, Maternal and Child Health, University of Genova, Campus of Savona, Via Magliotto, 2 17100 Savona, Italy

* Correspondence: marco.testa@unige.it

Received: 10 June 2019; Accepted: 2 August 2019; Published: 7 August 2019

check for updates

**Abstract:** *Background and Objectives*: Spinal manipulations are interventions widely used by different healthcare professionals for the management of musculoskeletal (MSK) disorders. While previous theoretical principles focused predominantly on biomechanical accounts, recent models propose that the observed pain modulatory effects of this form of manual therapy may be the result of more complex mechanisms. It has been suggested that other phenomena like neurophysiological responses and the activation of the immune-endocrine system may explain variability in pain inhibition after the administration of spinal manipulative therapy (SMT). The aim of this paper is to provide an overview of the available evidence supporting the biological plausibility of high-velocity, low-amplitude thrust (HVLAT) on the immune-endocrine system. *Materials and Methods*: Narrative critical review. An electronic search on MEDLINE, ProQUEST, and Google Scholar followed by a hand and "snowballing" search were conducted to find relevant articles. Studies were included if they evaluated the effects of HVLAT on participants' biomarkers. *Results*: The electronic search retrieved 13 relevant articles and two themes of discussion were developed. Nine studies investigated the effects of SMT on cortisol levels and five of them were conducted on symptomatic populations. Four studies examined the effects of SMT on the immune system and all of them were conducted on healthy individuals. *Conclusions*: Although spinal manipulations seem to trigger the activation of the neuroimmunoendocrine system, the evidence supporting a biological account for the application of HVLAT in clinical practice is mixed and conflicting. Further research on subjects with spinal MSK conditions with larger sample sizes are needed to obtain more insights about the biological effects of spinal manipulative therapy.

**Keywords:** spinal manipulative therapy; immune system; endocrine system; back pain; neck pain; physiotherapy

## 1. Introduction

Spinal disorders are conditions affecting an increasing number of people, and their associated

The aim of their paper was "to provide an overview of the available evidence supporting the biological plausibility of high-velocity, low-amplitude thrust (HVLAT) on the immune-endocrine system". Their search retrieved 13 relevant articles and two themes of discussion were developed. Nine studies investigated the effects of manipulation on cortisol levels and four studies examined the effects of manipulation on the immune system.

They concluded that spinal manipulation seems to trigger the activation of the neuroimmunoendocrine system and encouraged further research to obtain more insights about the biological effects of spinal manipulative therapy.[66]

Trigger"

# Cytokines

Cytokines are cell signaling protein molecules secreted by cells of the immune system and are a category of signaling molecules used in intercellular communication. Spinal manipulation has been shown to reduce the production of pro-inflammatory cytokines and increase the blood levels of cytokines that are immuno-regulatory in nature.

Clinical Trial > J Manipulative Physiol Ther. 1991 Sep;14(7):399-408.

# Enhanced phagocytic cell respiratory burst induced by spinal manipulation: potential role of substance P

P C Brennan [1], K Kokjohn, C J Kaltinger, G E Lohr, C Glendening, M A Hondras, M McGregor, J J Triano

Affiliations + expand

PMID: 1719112

## Abstract

The effect of spinal manipulation on the respiratory burst of polymorphonuclear neutrophils (PMN) and monocytes from treated adults was measured by zymosan-stimulated chemiluminescence (CL). Peripheral blood was collected 15 min before and 15 min after treatment (sham manipulation, thoracic spine manipulation, or soft tissue manipulation), the cells were isolated, challenged with a standardized, opsonized luminol-containing suspension of zymosan, and monitored for CL. Plasma from two subsets of subjects was radioimmunoassayed for Substance P (SP). PMN were also preincubated with SP in vitro over the dose range 5 x 10(-12) M to 5 x 10(-8) M and the CL response monitored. The CL responses of both PMN and monocytes from subjects who received spinal manipulation were significantly higher after than before treatment, and significantly higher than the response in sham or soft-tissue treated subjects. Measurement of the force applied by sham and spinal manipulation suggested a force threshold for the enhancement of the CL response. Plasma levels of SP before and after treatment in sham treated subjects did not differ significantly; however, elevated plasma SP was observed in subjects after spinal manipulation. Preincubation of PMN with 1 x 10(-11) M, 5 x 10(-11) M or 1 x 10(-10) M SP in vitro primed PMN for an enhanced respiratory burst when the cells were subsequently challenged.

Brennan, et al., demonstrated that upper thoracic spinal manipulation resulted in a significant increase in phagocytic activity of neutrophils and monocytes when compared to a sham manipulation or soft-tissue treatment.[67] In another study by Brennan, et al., they found that spinal manipulation results in viscero-somatic responses that affect the phagocytic activity of both neutrophils and mononuclear cells.[68]

"Enhancement"

Comment > J Manipulative Physiol Ther. 1992 Jun;15(5):334-5.

# Enhanced neutrophil respiratory burst as a biological marker for manipulation forces: duration of the effect and association with substance P and tumor necrosis factor

B S Polkinghorn

PMID: 1377220

*No abstract available*

Chiropractic Research Journal
Volume 3 • Number 1
© 1994 CRJ

# The Effects Of Specific Upper Cervical Adjustments On The CD4 Counts Of HIV Positive Patients

Jeffrey L. Selano, Brett C. Hightower, Bruce Pfleger,
Karen Feeley Collins, John D. Grostic

# THE EFFECTS OF SPECIFIC UPPER CERVICAL ADJUSTMENTS ON THE CD4 COUNTS OF HIV POSITIVE PATIENTS

Jeffrey L. Selano, D.C.
Brett C. Hightower, D.C.
Bruce Pfleger, Ph.D.
Karen Feeley Collins, D.C.
John D. Grostic, D.C.

## ABSTRACT

*The researchers of this project sought to demonstrate that upper cervical specific adjustments would have a profound effect on the physiology, serology and immunology of HIV positive individuals.*

*The effect of specific upper cervical adjustments on the immune system CD4 cell counts of HIV positive individuals was measured by CD4/mm3 in the blood. These tests were performed by the patients independent medical center where they were under medical supervision for the condition. The measured CD4 counts in the regular group were dramatically increased over the counts of the control group. A 48% increase in CD4 cells was demonstrated over the six month duration of the study for the adjusted group.*

**Key Indexing Terms:** Chiropractic, atlas, subluxation, CD4 count, immunology, dentate ligament, HIV.

**In a study of the effects of specific spinal adjustments on the immune system looking at CD4 cell counts of HIV positive Individuals, six subjects receiving real chiropractic adjustments experienced a 48% increase in CD4 cell levels over a period of six months.**



Chiropractic and the Neuroimmune Connection. Ari Cohn, DC. Journal of Vertebral Subluxation Research – September 30, 2008 – Pages 1-5

# Chiropractic & Immunity

VertebralSubluxationResearch.com
Subluxation Spoken Here

# SPINAL MANIPULATIVE THERAPY REDUCES INFLAMMATORY CYTOKINES BUT NOT SUBSTANCE P PRODUCTION IN NORMAL SUBJECTS

Julita A. Teodorczyk-Injeyan, PhD,[a] H. Stephen Injeyan, PhD, DC,[b] and Richard Ruegg, PhD, DC

Teodorczyk-Injeyan showed that chiropractic treated subjects have also shown attenuation of lipopolysaccharide induced production of the inflammatory cytokines unrelated to systemic levels of the neurotransmitter substance P.[70]


## ABSTRACT

**Objective:** To examine the effect of a single spinal manipulation therapy (SMT) on the in vitro product inflammatory cytokines, tumor necrosis factor α, and interleukin (IL) 1β, in relation to the systemic (in vivo) levels of neurotransmitter substance P (SP).

**Methods:** Sixty-four asymptomatic subjects were assigned to SMT, sham manipulation, or venipuncture control group. SMT subjects received a single adjustment in the thoracic spine. Blood and serum samples were obtained from subjects before and then at 20 minutes and 2 hours after intervention. Whole-blood cultures were activated with lipopolysaccharide (LPS) for 24 hours. Cytokine production in culture supernatants and serum SP levels were assessed by specific immunoassays.

**Results:** Over the study period, a significant proportion ($P \leq .05$) of sham and control subjects demonstrated progressive increases in the synthesis of tumor necrosis factor α and IL-1β. Conversely, in a comparable proportion of cultures from SMT-derived subjects, the production of both cytokines decreased gradually. Normalization of the observed alterations to reflect the changes relative to self-baselines demonstrated that, within 2 hours after intervention, the production of both cytokines increased significantly ($P < .001$ to .05) in both controls. In contrast, a significant ($P < .001$ to .05) reduction of proinflammatory cytokine secretion was observed in cultures from SMT-receiving subjects. In all study groups, serum levels of SP remained unaltered within 2 hours after intervention.

**Conclusions:** SMT-treated subjects show a time-dependent attenuation of LPS-induced production of the inflammatory cytokines unrelated to systemic levels of SP. This suggests SMT-related down-regulation of inflammatory-type responses via a central yet unknown mechanism. (J Manipulative Physiol Ther 2006;29:14-21)


**Key Indexing Terms:** *Manipulation; Spinal; Cytokines; Substance P; Inflammation; Spinovisceral Effect*

"Reduces"
"Attenuation"
"Down Regulation"

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Although the exact biologic mechanism(s) of systemic effects of spinal manipulative therapy (SMT) remain unclear, the current model of somatoautonomic or spinovisceral reflex provides a critical link between spinal manipulation, the autonomic nervous system, and various visceral functions.[1] Animal experiments have demonstrated that somatoautonomic reflex effects are apparent in multiple nonmusculoskeletal systemic responses, including those of the cardiovascular, digestive, urinary, endocrine, and the immune system.[2,3] On the other hand, similar studies in humans are still limited particularly with respect to the effect of SMT on the integrated biologic activities of the nervous and immune systems

# Reduction in high blood tumor necrosis factor-alpha levels after manipulative therapy in 2 cervicogenic headache patients

Gábor Ormos [1], J N Mehrishi, Tibor Bakács

Affiliations + expand

PMID: 19748410 DOI: 10.1016/j.jmpt.2009.08.006

## Erratum in

J Manipulative Physiol Ther. 2009 Oct;32(8):701

## Abstract

**Objective:** This case report discusses the treatment of 2 patients with cervicogenic h
attending the Outpatient Clinic of the Hungarian National Institute for Rheumatology
Physiotherapy (Budapest, Hungary) and reviews the pathophysiology, therapeutic str
problems associated with the treatment of CHA.

**Clinical features:** Patient 1 was a 27-year-old female who sustained a whiplash injury
shooting headache developed, readily induced, and aggravated by just bending the neck backward or
by turning her head. Magnetic resonance imaging revealed a disk protrusion at C4-C5 pressing the anterior cerebrospinal space. Patient 2 was a 62-year-old female who sustained a whiplash injury; her cervical movements became restricted, which precipitated headaches. Magnetic resonance imaging revealed a paramedian disk hernia between the C4 and C5 vertebrae that intruded into the right ventral cerebrospinal space.

**Intervention and outcome:** After 4 weeks of manipulative therapy for patient 1, both active and passive range of motion returned to normal, and the high tumor necrosis factor-alpha (TNF-alpha) level (63 pg/mL) was substantially reduced (28 pg/mL). Patient 2 was started on manipulative therapy twice a week for 4 weeks; after 2 months, the patient became symptom-free, and high TNF-alpha level (72 pg/mL) was reduced greatly (35 pg/mL).

**Conclusion:** Two patients with whiplash injury and disk herniation developed CHA associated with very high TNF-alpha levels. After manipulative therapy, these patients became symptom-free, and their TNF-alpha levels decreased substantially.

Research has explored the relationship of spinal manipulation, spino-autonomic reflexes and their influence on activity of immune and inflammatory cells. This research has shown a reduction in pro-inflammatory cytokines after spinal manipulation. This is includes reduction of inflammatory cytokines, tumor necrosis factor and interleukin-1ß.[71]

Spinal manipulation down-regulates inflammatory-type responses via a central mechanism and manipulation ameliorates the physiological responses of blood cells to an inflammatory stimulus suggesting that spino-visceral reflexes alter the functional activity of cells in the immune and inflammatory systems.

"Ameliorates"
"Decreased"
"Reduced"

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ELSEVIER

JOURNAL of CHIROPRACTIC MEDICINE

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# Inflammatory response following a short-term cours[e] of chiropractic treatment in subjects with and without chronic low back pain☆

**Richard A. Roy DC, MSc[a,b], Jean P. Boucher PhD, FACSM[c], Alain S. Comtois**

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Received 19 November 2009; received in revised form 17 May 2010; accepted 9 June 2010

**Key indexing terms:**
Manipulation;
Spinal;
Diagnosis;
Interleukins;
C-reactive protein

**Abstract**

**Objective:** Inflammatory markers interleukin-6 (IL-6) and C-reactive protein (CRP) have been evaluated in response to a short course of lumbar spinal manipulation. The p[urpose] of this study is to observe the responses of inflammatory markers (IL-6 and CRP) after a series of 9 chiropractic spinal manipulations.

**Methods:** Twenty-one participants were assigned to a treatment or a control group. Only the treatment group received 9 chiropractic interventions. Pre- and postintervention measures were recorded for blood samples for detection of proinflammatory cytokines IL-6 and CRP.

**Results:** Mediators of inflammation (IL-6 and high-sensitivity CRP) were modified by the intervention received in the treatment group, and the effect size demonstrated a tendency toward the control group values.

**Conclusion:** A total of 9 chiropractic lower back manipulations caused the mediators of inflammation to present a normalization response in individuals suffering from chronic low back pain.

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☆ Disclaimer: Nothing of value related to this research was received from a commercial entity.

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## Introduction

Many different outcome measures as a means of monitoring the treatment course of chiropractic adjust-

In 2010, Roy, et al., did pre- and post-intervention measures from blood samples and detected a reduction in pro-inflammatory cytokines interleukin 6 (IL-6) and C-reactive protein (CRP) after a series of nine chiropractic manipulations from T12-L5 using an adjusting instrument and related protocol in 10 chronic low back pain patients and 10 healthy subjects. Both IL-6 and CRP levels were lowered toward the values in healthy subjects showing that chiropractic is capable of attenuating the inflammatory response. The authors of the study suggest that it is plausible the inflammatory process can be reversed in those receiving adjustments.[72]

"Modified"
"Normalization response"
"Reversed"
"Attenuation"

# Interleukin-2 (IL-2)

Increased secretion of interleukin-2 (IL-2) has also been found following chiropractic care.

IL-2 is an important cytokine in T-cell-dependent immune responses.

It also plays a role in the development, maintenance and survival of regulatory T cells making it critically important in immune tolerance.

IL-2 is an immune-regulatory cytokine and signaling molecule necessary for the response to microbial infection as well as the body's ability to discriminate between self and non-self.

Chiropractic & Osteopathy

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Research

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# Enhancement of *in vitro* interleukin-2 production in normal subjects following a single spinal manipulative treatment

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## Abstract

**Background:** Increasing evidence supports somato-visceral effects of manual therapies. We have previously demonstrated that a single spinal manipulative treatment (SMT) accompanied by audible release has an inhibitory effect on the production of proinflammatory cytokines in asymptomatic subjects. The purpose of this study is to report on SMT-related changes in the production of the immunoregulatory cytokine interleukin 2 (IL-2) and to investigate whether such changes might differ with respect to the treatment approach related to the presence or absence of an audible release (joint cavitation).

**Methods:** Of 76 asymptomatic subjects, 29 received SMT with cavitation (SMT-C), 23 were treated with SMT without cavitation (SMT-NC) and 24 comprised the venipuncture control (VC) group. The SMT-C and SMT-NC subjects received a single, similar force high velocity low amplitude manipulation, in the upper thoracic spine. However, in SMT-NC subjects, positioning and line of drive were not conducive to cavitation. Blood and serum samples were obtained before and then at 20 and 120 min post-intervention. The production of IL-2 in peripheral blood mononuclear cell cultures was induced by activation for 48 hr with Staphylococcal protein A (SPA) and, in parallel preparations, with the combination of phorbol ester (TPA) and calcium ionophore. The levels of IL-2 in culture supernatants and serum were assessed by specific immunoassays.

**Results:** Compared with VC and their respective baselines, SPA-induced secretion of IL-2 increased significantly in cultures established from both SMT-C and SMT-NC subjects at 20 min post-intervention. At 2 hr post-treatment, significant elevation of IL-2 synthesis was still apparent in preparations from SMT-treated groups though it became somewhat attenuated in SMT-NC subjects. Conversely, IL-2 synthesis induced by TPA and calcium ionophore was unaltered by either type of SMT and was comparable to that in VC group at all time points. No significant alterations in serum-associated IL-2 levels were observed in any of the study groups.

**Conclusion:** The present study demonstrates that, the *in vitro* T lymphocyte response to a conventional mitogen (SPA), as measured by IL-2 synthesis, can become enhanced following SMT. Furthermore, within a period of time following the manipulative intervention, this effect may be independent of joint cavitation. Thus the results of this study suggest that, under certain physiological conditions, SMT might influence IL-2-regulated biological responses.

In one study, 76 asymptomatic subjects were randomized to receive an upper thoracic manipulation with cavitation or without cavitation, or were included in a control group. All subjects had their blood drawn before, 20 minutes and two hours after the intervention. Induced secretion of IL-2 increased significantly with the T-lymphocyte response becoming enhanced after spinal manipulation suggesting that manipulation may influence IL-2 immune regulated biological responses.[73]

"Increasing evidence supports . . ."
"Inhibitory effect"
"Can become enhanced following . . ."
"Influences"

Teodorczyk-Injeyan *et al. Chiropractic & Osteopathy* 2010, **18**:26
http://www.chiroandosteo.com/content/18/1/26

CHIROPRACTIC & OSTEOPATHY

RESEARCH Open Access

# Interleukin 2-regulated *in vitro* antibody production following a single spinal manip treatment in normal subjects

Julita A Teodorczyk-Injeyan[1], Marion McGregor[2], Richard Ruegg[3], H Stephen Injeyan[4*]

**Abstract**

**Background:** Our recent investigations have demonstrated that cell cultures from subjects, who rec spinal manipulative treatment in the upper thoracic spine, show increased capacity for the producti immunoregulatory cytokine, interleukin-2. However, it has not been determined if such changes infl response of the immune effector cells. Thus, the purpose of the present study was to determine whether, in the same subjects, spinal manipulation-related augmentation of the *in vitro* interleukin-2 synthesis is associated with the modulation of interleukin 2-dependent and/or interleukin-2-induced humoral immune response (antibody synthesis).

**Methods:** A total of seventy-four age and sex-matched healthy asymptomatic subjects were studied. The subjects were assigned randomly to: venipuncture control (n = 22), spinal manipulative treatment without cavitation (n = 25) or spinal manipulative treatment associated with cavitation (n = 27) groups. Heparinized blood samples were obtained from the subjects before (baseline) and then at 20 minutes and 2 hours post-treatment. Immunoglobulin (antibody) synthesis was induced in cultures of peripheral blood mononuclear cells by stimulation with conventional pokeweed mitogen or by application of human recombinant interleukin-2. Determinations of the levels of immunoglobulin G and immunoglobulin M production in culture supernatants were performed by specific immunoassays.

**Results:** The baseline levels of immunoglobulin synthesis induced by pokeweed mitogen or human recombinant interleukin-2 stimulation were comparable in all groups. No significant changes in the production of pokeweed mitogen-induced immunoglobulins were observed during the post-treatment period in any of the study groups. In contrast, the production of interleukin-2 -induced immunoglobulin G and immunoglobulin M was significantly increased in cultures from subjects treated with spinal manipulation. At 20 min post-manipulation, immunoglobulin G synthesis was significantly elevated in subjects who received manipulation with cavitation, relative to that in cultures from subjects who received manipulation without cavitation and venipuncture alone. At 2 hr post-treatment, immunoglobulin M synthesis was significantly elevated in subjects who received manipulation with cavitation relative to the venipuncture group. There were no quantitative alterations within the population of peripheral blood B or T lymphocytes in the studied cultures.

**Conclusion:** Spinal manipulative treatment does not increase interleukin-2 -dependent polyclonal immunoglobulin synthesis by mitogen-activated B cells. However, antibody synthesis induced by interleukin-2 alone can be, at least temporarily, augmented following spinal manipulation. Thus, under certain physiological conditions spinal manipulative treatment might influence interleukin-2 -regulated biological responses.

In another study of 74 subjects the increased production of interleukin-2 as a result of thoracic manipulation was associated with increased antibody synthesis from monocytes. The study showed that there was increased synthesis of immunoglobulin G (IgG) and immunoglobulin M (IgM) antibodies in peripheral blood mononuclear cells in those subjects who received thoracic manipulation. This means that antibody synthesis (IgG and IgM) induced by interleukin-2 is increased after manipulation.[74]

"Increased capacity"
"Augmentation"
"Modulation"
"Increased"
"Elevated"

# Induce & Enhance

Studies demonstrate evidence indicating that chiropractic and spinal manipulation may influence immune system response.

Studies suggest that manipulation consistently reduces the production of pro-inflammatory mediators associated with tissue damage and pain from articular structures.

Other studies provide evidence that manipulation may induce and enhance production of the immune-regulatory cytokine IL-2 and the production of immunoglobulins.

# THE EFFECT OF CHIROPRACTIC SPINAL MANIPULATIVE THERAPY ON SALIVARY CORTISOL LEVELS

PETER J. TUCHIN B.Sc., Grad.Dip.(Chiro), Dip.(OHS).*

**Abstract:**
Objective: This study examines the effect of chiropractic spinal manipulative therapy on salivary cortisol levels.
Design: Prospective case series over six weeks duration. The trial consisted of establishment of each individual's baseline cortisol level, a two week treatment period (4 treatments), and a two week post treatment period.
Setting: Macquarie University Chiropractic Research Centre.
Participants: Nine subjects (six male, three female), employed in a large corporation, volunteered to the trial of spinal manipulative therapy.
Main Outcome Measures: Saliva samples were analysed using an Amerlex Radioimmunoassay Kit to determine the cortisol concentrations present.
Results: Statistical interpretation, after exclusion of an apparent outlying subject, revealed results of statistical significance ($p<0.001$) for reduction of salivary cortisol over the complete five week study. In addition, there was no apparent alteration in salivary cortisol levels immediately preceding and 15 minutes after spinal manipulative therapy.
Conclusion: The initial evidence is inconclusive, however, the potential relationship demands further investigation. Additional research is necessary in measuring the physiological effects of Chiropractic spinal manipulative therapy. This method is currently being used in a larger randomised controlled trial.

**Key Indexing Terms (MeSH):** Salivary cortisol, chiropractic, spinal manipulation.

## INTRODUCTION

Stress, is a term which is gaining increasing notoriety in society today. Some doctors term stress the "RSI of the brain", as it is becoming more costly within our advancing society. Whether claims are legitimate or not, stress is already costing a lot in human resources and money. Compensation claims accepted for stress in public servants are increasing at a rate of 20% a year and are expected to cost $50 million by the end of this financial year (1). Since 1989, the number of claims accepted by the Commonwealth has almost doubled (2). In 1993/4 there were 1,600 claim
levelling off (3). Con
insurer, run by the
estimates that by June
been lodged. Based on
compensation claim, t
liability of up to $82 m

Selye defined stress as
body to any demand",
definition of essentiall
body. Selye assessed
body to stress and the
an individual. He propo
which indicate a reduction of the body's ability to tolerate stress. These signs include irritability, hyperexcitation, depression, many other psychological distortions, insomnia, migraines, neck pain and/or tension and back ache (5).

Research into the effectiveness of chiropractic intervention for spinal conditions has shown good results in reduction of back and neck pain (6-22). The relationship of pain in the development of stress or stress related illness is area which remains uncertain. However, some studies have indicated a possible causative relationship (5,7,23).

A number of studies have analysed the relationship of salivary cortisol with stressful events (24-27). These studies have shown that salivary cortisol levels often increase in relation to increases in the level of stress. A possible mechanism for this is that stressors have shown to be able to override the feedback systems, which leads to enhanced frequency and amplitude of cortisol pulses being released from the adrenal glands (27). This prompts a higher heart rate, shaking, tremors, churning of the stomach and sweat glands working overtime. As a result, it can lead to a loss of ability to concentrate and solve problems. From this it has been demonstrated that the level of stress of a patient can be correlated with secreted cortisols levels (24).

Glucocorticoids have widespread effects on the body

In a study examining the effect of chiropractic spinal manipulative therapy on salivary cortisol levels by Tuchin, nine subjects received chiropractic over six weeks revealing reduction of salivary cortisol over the complete time frame of the study.[75]

"Reduction"

# THE EFFECT OF CHIROPRACTIC MANIPULATION ON SALIVARY CORTISOL LEVELS

Tara L. Whelan, DC,[a] J. Donald Dishman, DC,[a] Jean Burke, PhD,[a] Seymour Levine, PhD,[b] and Veronica Sciotti, PhD[a]

ABSTRACT

**Background:** The stress response in humans is a healthy response and is necessary for life. ... of chiropractic manipulation (CM), if any, on stress are ill-defined. Cortisol has been used as a ... measure of the stress response system in humans. Salivary cortisol is a noninvasive technique ... accurately quantify biologically active cortisol.

**Objective:** To determine whether basal salivary cortisol levels can be properly detected and ... CM has any direct effect on basal salivary cortisol levels in humans.

**Methods:** Subjects were adult male students attending a chiropractic college. Salivary sample ... collected for 5 weeks. During Week 1, samples were collected by the students at home upon w... During Weeks 2 through 5, home samples were collected upon waking and were followed by a... additional time course of samples collected in a laboratory setting before and after CM. Salivar... was measured by enzyme-linked immunoassay.

**Results:** Chiropractic manipulative therapy did not significantly change basal salivary cortisol... The time course of acute changes to cortisol levels was independent of testing week and group. A decrease in salivary cortisol was detected over time on each trial testing day. Overall, cortisol levels significantly decreased from the time of the home samples until the pretreatment laboratory measurement ($P < .05$). Cortisol levels subsequently decreased from pretreatment to 15 minutes after treatment ($P < .05$). After treatment, there were progressive decreases in cortisol levels from the 15- and 30-minute time points to the 60-minute time point ($P < .05$).

**Conclusion:** The results of this pilot study suggest that there is no effect of CM on salivary cortisol levels in asymptomatic subjects. As such, we conclude that neither the anticipation of CM nor the spinal manipulative procedure itself induces a state of stress or anxiety. (J Manipulative Physiol Ther 2002;25:149-53)

**Key Indexing Terms:** *Chiropractic; Salivary Cortisol; Stress*

According to the study's authors chiropractic manipulative therapy did not significantly change basal salivary cortisol levels. A decrease in salivary cortisol was detected over time on each trial testing day. Overall, cortisol levels significantly decreased from the time of the home samples until the pretreatment laboratory measurement). Cortisol levels subsequently decreased from pretreatment to 15 minutes after treatment. After treatment, there were progressive decreases in cortisol levels. The authors concluded that neither the anticipation of manipulation nor the spinal manipulative procedure itself induces a state of stress or anxiety.[77]

## INTRODUCTION

Chiropractic manipulation (CM), with its hallmark high-velocity, low-amplitude (HVLA) impulsive thrust, has been documented to be efficacious in the treatment of neck and back pain.[1] However, the literature is scarce with regard to the effects of CM on physiologic stress.[2-4] CM may indeed result in some degree of physiologic stress, as a result of paraphysiologic joint space excursion and moderate forces being applied to paraspinal soft tissues. Alternatively, CM may actually attenuate stress-induced physiologic changes to the spine that might otherwise contribute to back pain. Methodologic limitations of previous research warrant further investigation into the relationship between CM and physiologic stress.

The level of stress an individual has can be positively correlated with secreted cortisol levels.[5,6] Cortisol circulates in plasma primarily bound to plasma proteins and is physiologically active in its unbound form. Salivary cortisol has been shown to be a valid and reliable measure of unbound "free" cortisol levels, compared with the unbound hormone levels in blood.[5] Salivary cortisol concentration is also

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This research study was supported by the New York Chiropractic College Research Committee.
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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

1 Director, Nerve Information & Blood Circulation Research Institute

# Widespread

To be sure, the literature base supporting the clinical role of chiropractic in supporting immune function is widespread and it is buttressed by the expanded depth and breadth of the literature on those manual methods, in general, that are directed at improving the structure and function of the spine and nervous system.

# Boost?

- Attenuates
- Reduces
- Down regulates
- Ameliorates
- Decreases
- Modifies
- Reverses
- Normalizes
- Inhibits
- Enhances
- Influences
- Increased capacity
- Modulates

Similar and opposite words

# boost

*verb*

help or encourage (something) to increase or improve.

Similar

improve raise uplift increase augment magnify swell amplify enhance encourage heighten help promote foster nurture arouse stimulate invigorate revitalize inspire perk up support bolster buttress shore up buck up jack up give a shot in the arm to

- push from below; assist.

  Similar

  lift raise hoist push thrust shove heave elevate help aid assist hoick give someone a leg up upheave

*noun*

a source of help or encouragement leading to increase or improvement.

Similar

uplift lift spur encouragement help inspiration stimulus pick-me-up fillip support bolster shot in the arm

- an increase or improvement.

  Similar

  increase expansion upturn upsurge upswing rise elevation escalation augmentation improvement development advance growth boom spurt hike step up jack up

# I manipulate spines to help with pain

Pain sensation has neural pathways that travel from joints to the brain

These pathways have secondary and tertiary connections to the immune system, mood, and bodily function

Subluxations don't exist and there's no connection between the spine and nervous system



imgflip.com

Noll et al. Osteopathic Medicine and Primary Care 2010, 4:2
http://www.om-pc.com/content/4/1/2

OMPC OSTEOPATHIC MEDICINE AND PRIMARY CARE

RESEARCH Open Access

# Efficacy of osteopathic manipulation as an adjunctive treatment for hospitalized patients with pneumonia: a randomized controlled trial

Donald R Noll[1*], Brian F Degenhardt[2], Thomas F Morley[3], Francis X Blais[4], Kari A Hortos[5], Kendi Hensel
Jane C Johnson[2], David J Pasta[7], Scott T Stoll[8]

**Abstract**

**Background:** The Multicenter Osteopathic Pneumonia Study in the Elderly (MOPSE) is a registered, doub
randomized, controlled trial designed to assess the efficacy of osteopathic manipulative treatment (OMT)
adjunctive treatment in elderly patients with pneumonia.

**Methods:** 406 subjects aged ≥ 50 years hospitalized with pneumonia at 7 community hospitals were ra
using concealed allocation to conventional care only (CCO), light-touch treatment (LT), or OMT groups. A
received conventional treatment for pneumonia. OMT and LT groups received group-specific protocols f
minutes, twice daily until discharge, cessation of antibiotics, respiratory failure, death, or withdrawal from
The primary outcomes were hospital length of stay (LOS), time to clinical stability, and a symptomatic and
functional recovery score.

**Results:** Intention-to-treat (ITT) analysis (n = 387) found no significant differences between groups. Per-p
(PP) analysis (n = 318) found a significant difference between groups (P = 0.01) in LOS. Multiple compar
indicated a reduction in median LOS (95% confidence interval) for the OMT group (3.5 [3.2-4.0] days) ver
CCO group (4.5 [3.9-4.9] days), but not versus the LT group (3.9 [3.5-4.8] days). Secondary outcomes of d
intravenous antibiotics and treatment endpoint were also significantly different between groups (P = 0.0
0.006, respectively). Duration of intravenous antibiotics and death or respiratory failure were lower for th
group versus the CCO group, but not versus the LT group.

**Conclusions:** ITT analysis found no differences between groups. PP analysis found significant reductions
duration of intravenous antibiotics, and respiratory failure or death when OMT was compared to CCO. G
prevalence of pneumonia, adjunctive OMT merits further study.

## Background

Pneumonia is the fourth most common hospital discharge diagnosis in the US with a mean (SE) length of stay (LOS) of 5.1 (0.1) days [1]. The elderly are a vulnerable population: the majority of pneumonia-related hospital admissions occur in persons 60 years and older, and the elderly have a longer mean LOS, higher severity of illness, and greater mortality than younger age groups [2-5]. Adjunctive nonpharmacologic treatments for pneumonia may enhance conventional antibiotic therapy. Chest physiotherapy, early mobil
continuous lateral rotational therapy have been investigated with mixed results [6-11]. Osteopathic manipulative treatment (OMT) is a nonpharmacologic manual therapy developed in the late nineteenth century before the use of antibiotics. OMT includes a number of manipulative techniques intended to enhance host defenses and physiologic function [12-16]. Many of these techniques, such as rib raising, doming the diaphragm, and the thoracic lymphatic pump, were specifically developed to treat pneumonia [15]. Two small randomized controlled trials of OMT for pneumonia suggest OMT may reduce LOS in the elderly [17,18].

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# 18 Studies

OMT has also been shown to aid in the recovery from pneumonia by enhancing the functioning of the immune system, and maximizing the effects of antibiotics. In addition, OMT has been associated with decreased hospital-stay duration, decreased use of intravenous antibiotics, and decreased incidence of respiratory failure or death in elderly patients hospitalized with pneumonia.[80-98]

Reduce LOS
Reduced time to clinical stability
Decreased antibiotics
Decreased death
Decreased respiratory failure

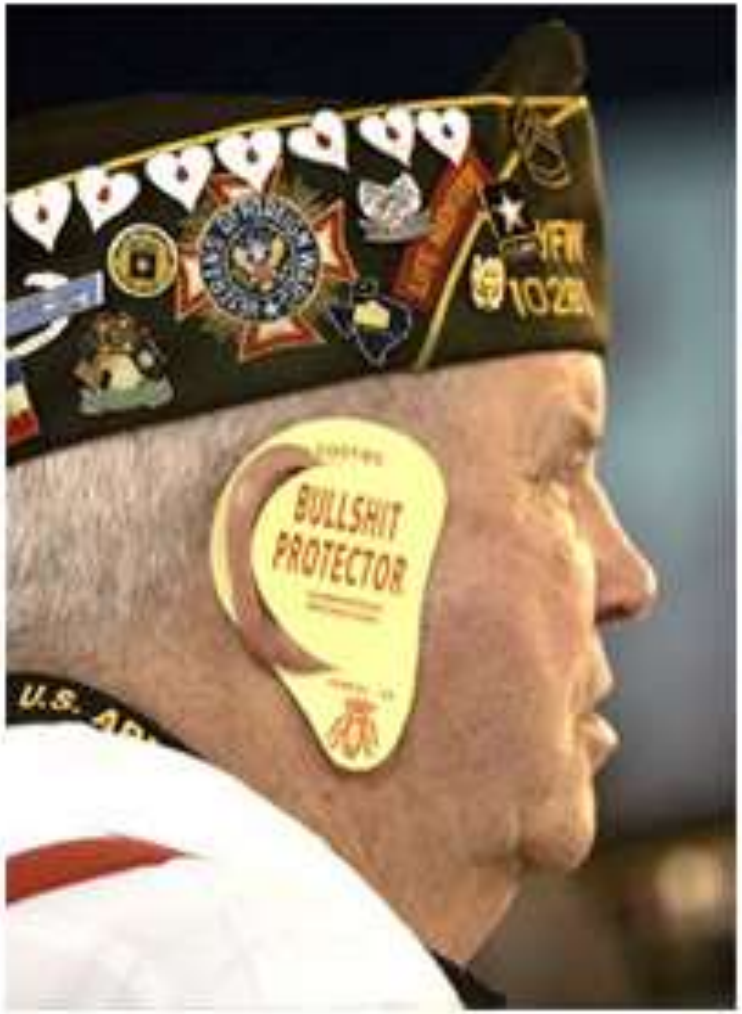
# Radical Science

# Why Bother?

"Chiropractors can't even agree on the definition of subluxation"



Foundation for Vertebral Subluxation







Foundation for Vertebral Subluxation

# Radical Science

"One that regards the boundaries between disciplines as useful constructs for helping focus on particular classes of problems.",

Decken W. Radical Science, 2017 IRAPS




RADICAL

# Chiropractic Paradigm

"In the absence of a chiropractic paradigm or some candidate for a chiropractic paradigm, all the facts that could possibly pertain to the development of a chiropractic science are likely to seem equally relevant."

Decken W. Radical Science, 2017 IRAPS



ACCORDING TO P.L. ROME THERE ARE 296 VARIATIONS AND SYNONYMS OF SUBLUXATION USED BY MEDICAL, CHIROPRACTIC, AND OTHER PROFESSIONS

"It is suggested that with so many attempts to establish a term for such a clinical and biological finding, an entity of some significance must exist."

---

PL Rome: Usage of Chiropractic Terminology in the literature.

J. of Chiropractic Technique, 1996



# Early Vertebral Subluxation Model

1. Vertebral misalignment
2. Occlusion of a spinal or intervertebral foramen
3. Pressure on nerves
4. Interference with the quantity flow of the mental impulse.

Palmer BJ. The subluxation specific-the adjustment specific. Davenport: The Palmer School of Chiropractic, 1934 (1986 printing): 115



# Mental Impulse

"It is important to include the fourth component, the mental impulse, since it has been proposed that its interference would result in loss of adaptive potential, ultimately depriving the organism of its health."

A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12



# Mental Impulse

"Organizing and coordinating information"

A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12



# Mental Impulse

- Organizing
- Coordinating
- Adaptability
- ?
- ?
- ?

# Mental Impulse III

"We might conceive of this mental impulse as being composed of certain kinds of physical energies, in proper proportions, which will balance other such forces in the Tissue Cell; as electricity, valency, magnetism, cohesion, etc., etc..

Perhaps some of these energies are not known to us in physics. What right do we have to assume that we have found them all?"

Stephenson: Chiropractic Textbook



# "My Innate intelligence is not God..."

B.J. Palmer:

The Science of Chiropractic & Stephenson: Chiropractic Textbook



“Chiropractic is not my religion, BJ Palmer is not my God and vertebral subluxation is not some vague metaphysical entity”

# Mental Impulse V

"It is clear that the mental impulse, as described by the Palmers, is not synonymous with Innate Intelligence or the neurochemical action potential. It is a 'thought' which may be expressed through a variety of neurobiological mechanisms. These mechanisms include synaptic and nonsynaptic processes“

Dr. Christopher Kent: The Chiropractic Journal Nov. 1998



# Non-Synaptic Messaging

AXOPLASMIC TRANSPORT

EPHAPSIS

VOLUME TRANSMISSION

NEUROPEPTIDES

FIELD EFFECTS



A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12

# AXOPLASMIC TRANSPORT

Substances "flow" bi-directionally.

Includes Proteins, Neurotransmitters & Growth Factors.

Propulsion is via actomyosin (contractile protein).

**Constructive functions**



A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12

# EPHAPSIS

Where two or more axons and/or dendrites touch without forming a typical synaptic contact.

Information flow to tissues can occur even with total lack of the action potential.

It still uses the nerve for conveyance.



A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12

# VOLUME TRANSMISSION

Involves the flow of ionic currents and chemical signals transmitted or radiated from neurons.

Neuroendocrine release appears to involve only volume transmission.

*There are over 50 informational substances modulating brain function. The signal specificity resides in distinct classes of recognition molecules (receptors) rather than through the synapse.*



A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12

# NEUROPEPTIDES

Neuropeptides and their receptors join the brain, glands and immune system in a network of communication between the brain and body

A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12



# FIELD EFFECTS

Mediated by large extracellular currents or generated by axons during growth and repair

A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12



# TOM JONES

## WHAT'S NEW PUSSYCAT?

*ALSO INCLUDING*

**WITH THESE HANDS**



158.014 S

DECCA

And was it needed or helpful . . .

Or just a politically motivated distraction . . .

# ASRF

"A vertebral subluxation is a diminished state of being, comprising of a state of reduced **coherence**, altered biomechanical function, altered neurological function and altered **adaptability.**"

ASRF – June 2017



# Coherence

- Connection
- Consistency
- Integration
- Hold together
- United
- Consistent

# Rubicon

"We currently define a chiropractic subluxation as a self-perpetuating, central segmental motor control problem that involves a joint, such as a vertebral motion segment, that is not moving appropriately, resulting in ongoing maladaptive neural plastic changes that interfere with the central nervous system's ability to self-regulate, self-organize, adapt, repair and heal."

(The Rubicon Group, May 2017.)



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1. Vertebral misalignment
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Palmer BJ. The subluxation specific-the adjustment specific. Davenport: The Palmer School of Chiropractic, 1934 (1986 printing): 115



# Rubicon

- Self regulate
- Self organize
- Adapt
- Repair
- Heal

# Rubicon

"We currently define a chiropractic subluxation as a self-perpetuating, **central segmental motor control problem** that involves a joint, such as a vertebral motion segment, that is not moving appropriately, resulting in ongoing maladaptive neural plastic changes that interfere with the central nervous system's ability to self-regulate, self-organize, adapt, repair and heal."

(The Rubicon Group, May 2017.)



# Semantic Pathology

CSMC “problem” aka joint dysfunction aka vertebral subluxation (*not*) = tight vertebral muscles, reduced intervertebral movement and tenderness to touch.

Taut and tender fibers

Stuck joint

Ouch

# Rubicon

"We currently define a chiropractic subluxation as a self-perpetuating, central segmental motor control problem that **involves a joint, *such as* a vertebral motion segment**, that is not moving appropriately, resulting in ongoing maladaptive neural plastic changes that interfere with the central nervous system's ability to self-regulate, self-organize, adapt, repair and heal."

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(The Rubicon Group, May 2017.)



# How Did We Get Here?

1. Vertebral misalignment
2. Occlusion of a spinal or intervertebral foramen
3. Pressure on nerves
4. Interference with the quantity flow of the mental impulse.

Chiropractic subluxation is a self-perpetuating, central segmental motor control problem that involves a joint, such as a vertebral motion segment, that is not moving appropriately, resulting in ongoing maladaptive neural plastic changes that interfere with the central nervous system's ability to self-regulate, self-organize, adapt, repair and heal.





# Beheading

“According to this definition a beheading can be classified as a subluxation”

Rob Sinnott

# Consensus

The selection of participants will significantly affect the outcome of the process.

Sackman H. “Delphi Critique.” Lexington Books. Lexington, MA, 1975.

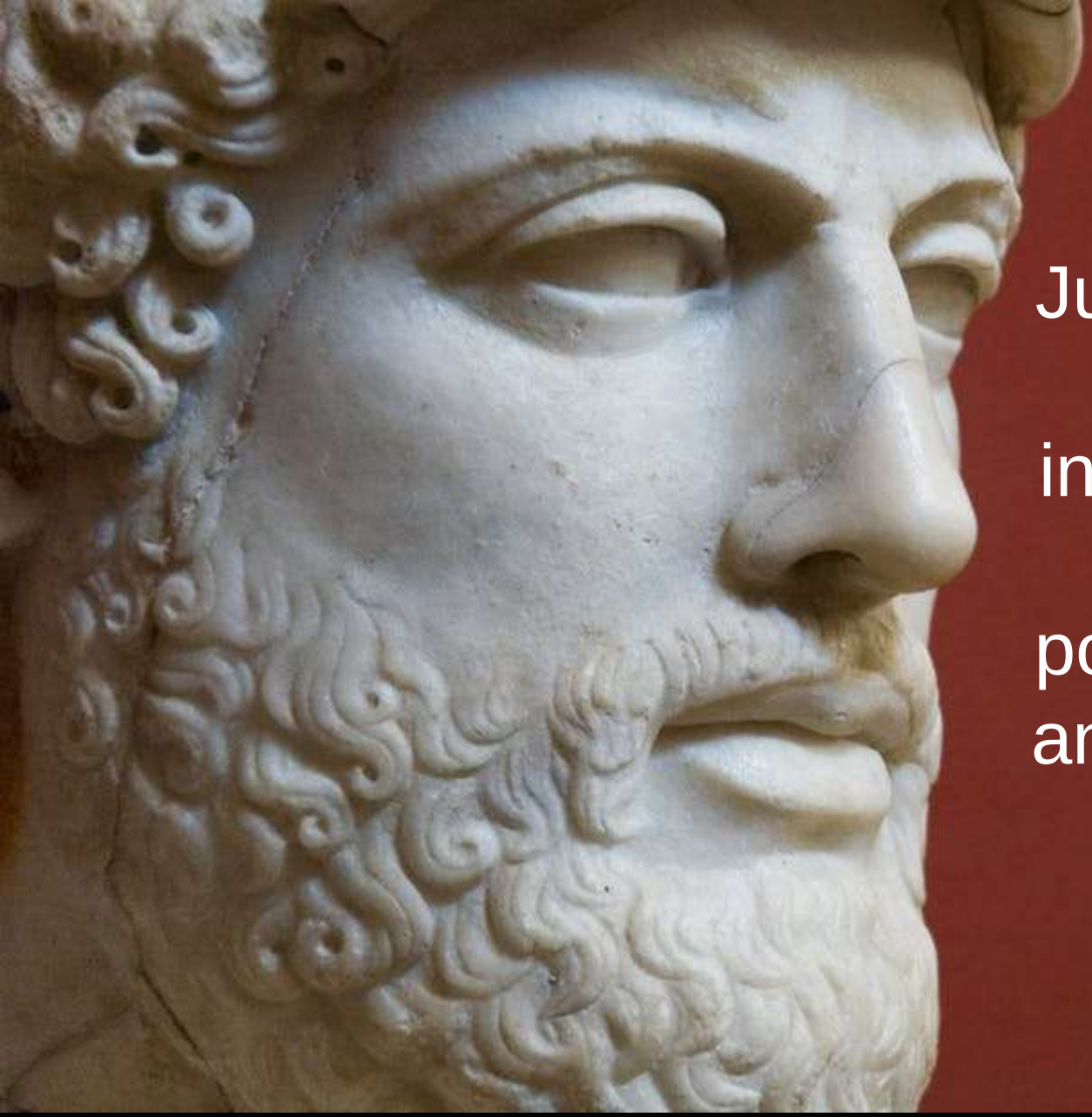
# Politics

"Attempts to define the term (subluxation) are regularly made, only to fall afoul of political considerations rather than scientific ones."

Dana Lawrence DC in:
The Role of Subluxation in Chiropractic. FCER. 1997



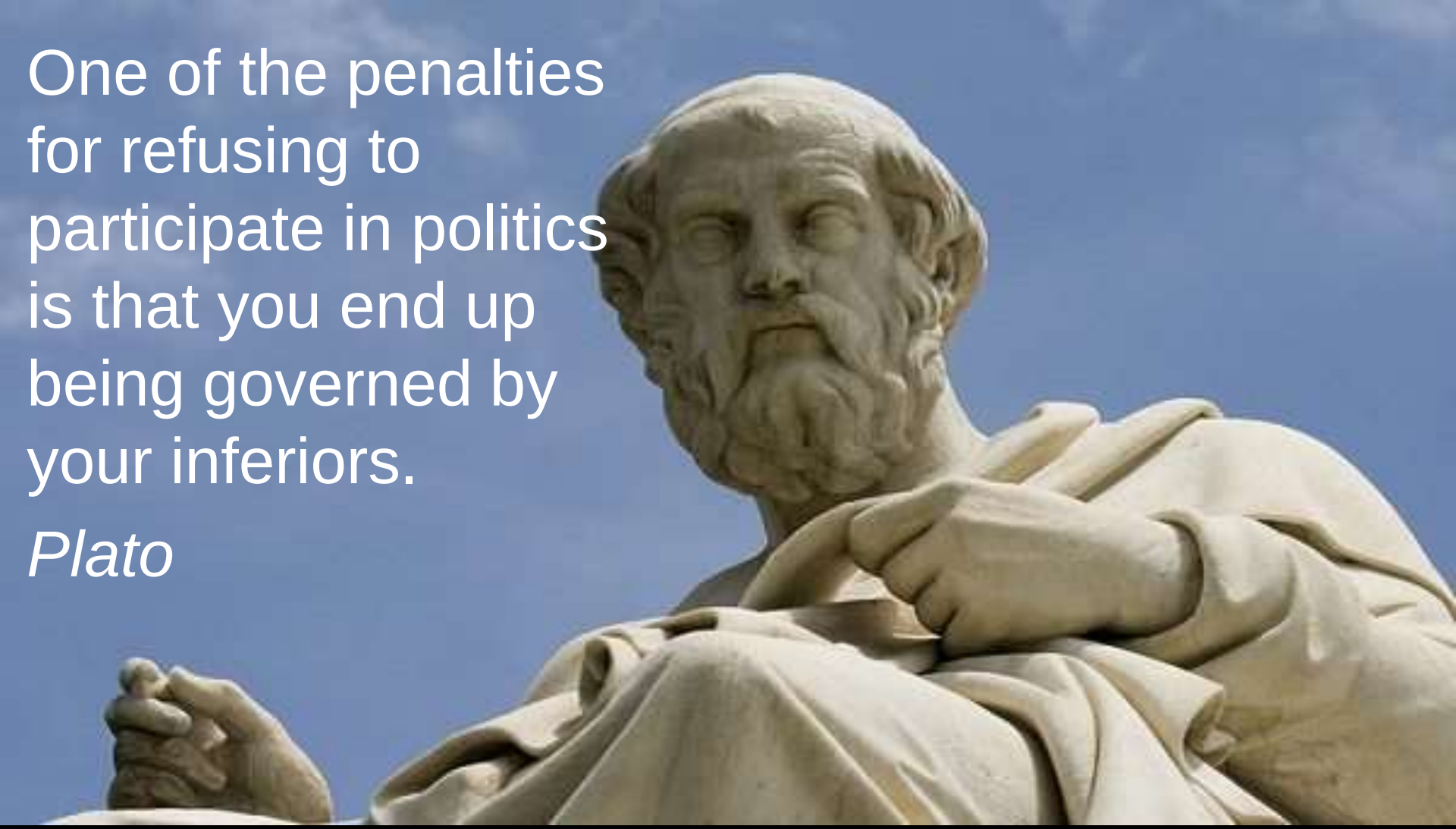


Just because you do not take an interest in politics doesn't mean politics won't take an interest in you.

~

Pericles


One of the penalties for refusing to participate in politics is that you end up being governed by your inferiors.
*Plato*

# Rubicon

Feedback thus far has fallen into three main categories; these can be grouped as coming from three distinct camps:

- those expressing philosophic issues,
- those reflecting a lack of understanding of the science reflected in the definition, and
- those that reject the concept of subluxation as an entity.
- those understanding the science not reflected in the definition
- those who don’t want to sell out chiropractic

Clum G. Defining Subluxation: A Balancing Act. Today's Chiropractic Leadership. September 7, 2017
Director, The Octagon Life University

# Dysafferentation

"A very significant, concern that was raised and I think it's a really valid one is well, what about all the other, you know, the subluxation statement is really one that supports dysafferentation theory and the question is what about all the other theories, right? What about neurodystrophic theory? What about axoplasmic flow theory? What about nerve compression theory?

And our response to it is, well those are all valid theories, it's just that when we start taking the level of evidence that's available to support them, the one that we can kind of wrap our arms around collectively right now and go out to do more research in it, to maybe pool our resources, is the one that's posited in the statement. So it's not that the others aren't valid and theirs shouldn't continue to be discussed and researched it's just that was the charge we had as a collective group."

---

Robert Scott DC, Ph.D

President – Life University

Disruptive Riffs – Todays Chiropractic Leadership September 19, 2017

https://www.facebook.com/TodaysChiropracticLeadership/videos/1577687658919208/?fallback=1

# Politics

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The selection of participants will significantly affect the outcome of the process.

Sackman H. “Delphi Critique.” Lexington Books. Lexington, MA, 1975.

**Bob Hoffman** and **The Masters Circle** shared a link.




**Dr. Heidi Haavik- Are you still telling the bone on nerve story?**
Dr. Heidi Haavik- Are you still telling the bone on nerve story? Dr. Heidi Haavik is a...
directory.libsyn.com



**Bob Hoffman**
Yesterday at 6:08 PM · Libsyn ·

Episode 158: Dr. Heidi Haavik- Are you still telling the bone on nerve

News Feed · Requests · Marketplace · Notifications

# NERVE ROOT COMPRESSION MODEL

"A pressure of only 10mm Hg produced a significant conduction block, the potential falling to 60% of its initial value in 15 minutes, and to half of its initial value in 30 minutes. After such a small compressive force is removed, nearly complete recovery occurs in 15 to 30 minutes. With higher levels of pressure, we have observed incomplete recovery after many hours of recording."

*Dr. Seth Sharpless*

*Research Status of Spinal Manipulative Therapy.*

*National Institutes of Health, 1975*



LITERATURE REVIEW

# The Effects of Mild Compression on Spinal Nerve Roots with Implications for Models of Vertebral Subluxation and the Clinical Effects of Chiropractic Adjustment

*R. Scott Alderson, D.C.[1], George J. Muhs, D.C., DABCN, CCN[2]*

**Abstract —** This review attempts to analyze the clinical relevance of nerve compression as a component of the vertebral subluxation and if the chiropractic adjustment can lead to the correction of the nerve pressure. Literature searches were conducted on the World Wide Web at the Pub Med website. There is evidence of nerve compression at the level of the intervertebral foramen (IVF) occurring anywhere from 15.4% to 78% of levels inspected. Most of the spines inspected were already prescreened to eliminate those that were definitely known to have nerve compression problems. Pressures as little as 10 mm Hg can alter the nerve root and dorsal root ganglion's abilities to function normally. In the normal range of motion the pressures generated in the IVF may exceed 30 mm Hg. When considering the concept of a joint fixated in a diminished sphere of its normal range of motion in conjunction with the mild pressure increases, it becomes apparent that nerve function can be significantly altered. The chiropractic adjustment can effect a restoration of normal H-reflex in compressed nerve roots without altering the H-reflex at uninvolved levels. The major variables of compression are the rate of onset, the amount of pressure generated, and the time maintained. Another major variable in the recovery is age. The younger the nerve tissue the better chance for a full recovery. The concept that a vertebral subluxation can induce pressure increases at the level of the IVF is supported by the literature. This increase, though seemingly mild, is enough to alter nerve function. The garden hose theory or hard bone - soft nerve explanation of vertebral subluxation is considered by some to be archaic but appears to be a valid entity at least in the lower cervical spine. More research is needed to decipher the susceptibility to mild pressure increases throughout the spine.

*Key Words: Spinal nerve root, compression, dorsal root ganglia, chiropractic, adjustment, vertebral subluxation, manipulation*

LITERATURE REVIEW

# The Effects of Mild Compression on Spinal Nerve Roots with Implications for Models of Vertebral Subluxation and the Clinical Effects of Chiropractic Adjustment

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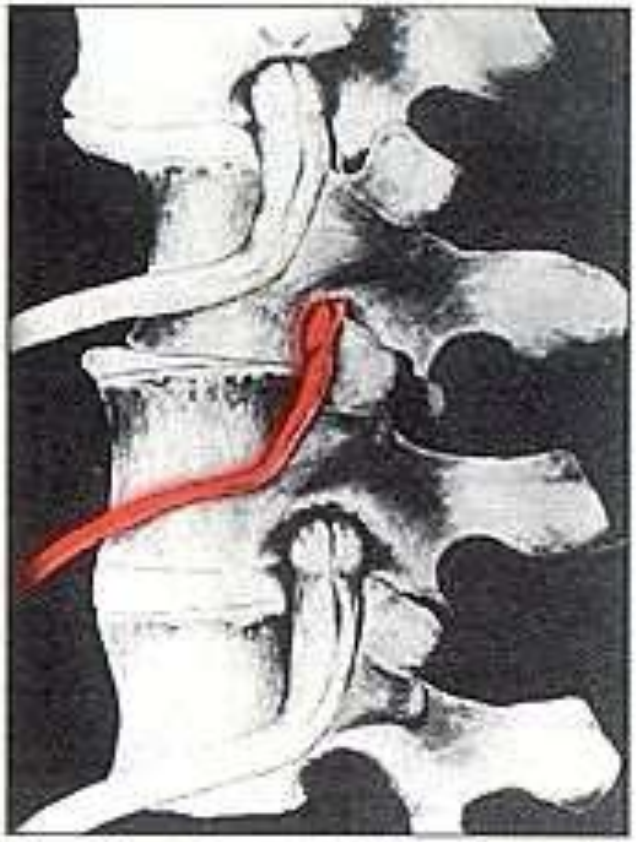
The garden hose theory or hard bone – soft nerve explanation of vertebral subluxation is considered by some to be archaic but appears to be a valid entity

The garden hose theory or hard bone – soft nerve explanation of vertebral subluxation is considered by some to be archaic but appears to be a valid entity

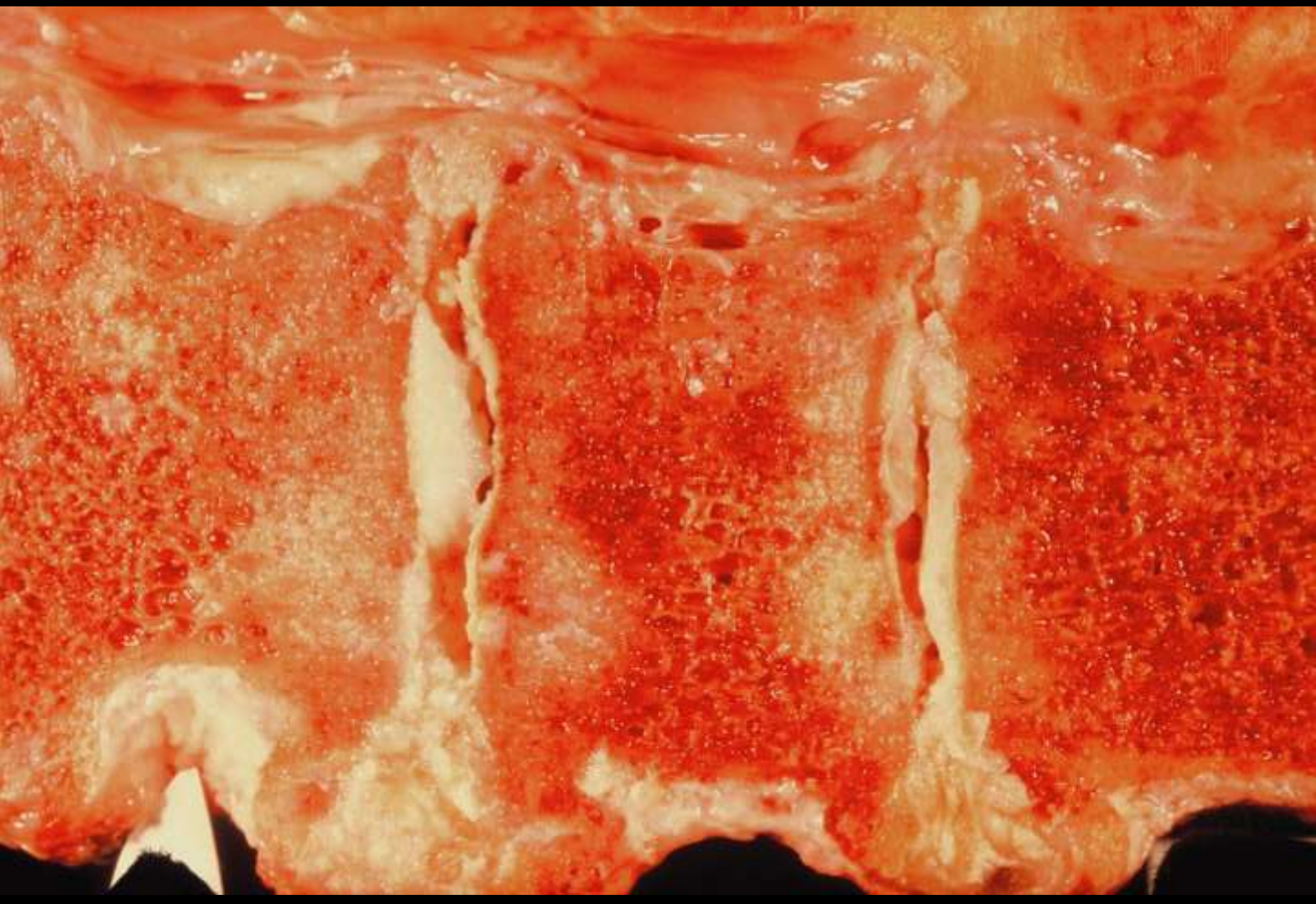
*Key Words: Spinal nerve root, compression, dorsal root ganglia, chiropractic, adjustment, vertebral subluxation, manipulation*



# The Silent Killer?



*This is one type of vertebral subluxation (nerve interference) – the "silent killer."*



# No Justification

Palmer's original concept of the vertebral subluxation has been redefined and/or remodeled in the absence of convincing research to justify such change

A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12



# Babies & Bath Water

"Since the literature contains considerable research which impacts positively and negatively on Palmer's hypothesis, it would be naive to categorically accept or negate the theory based on the current state of investigation regarding its tenets."



A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12

# Not Tested

Palmer's EVSM provides a theory which, to date, has not been adequately tested.



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# “The *Evolving* Vertebral Subluxation Model”

A vertebral subluxation is a potentially reversible and/or preventable alteration of the intervertebral relationships of one or more articulations of the spinal column or its immediate weight bearing components of the axial skeleton; accompanied by a change in the morphology of the tissue occupying the neural canal and/or intervertebral foramina; as well as an alteration of neural function sufficient to interfere with the transmission of **organizing information**, believed to be homologous to the mental impulse, thus contributing to negative health outcomes.

A Proposed Vertebral Subluxation Model Reflecting Traditional Concepts and Recent Advances in Health and Science. William R. Boone, Ph.D, D.C. and Graham J. Dobson, D.C. Journal of Vertebral Subluxation Research. Volume 1. Number 1. Pages 1-12



# IFCO

“A vertebral subluxation is an alteration of the intervertebral relationships of one or more articulations of the spinal column or the immediate weight bearing components of the axial skeleton; accompanied by a change in the morphology of the tissue occupying the neural canal and/or intervertebral foramina; as well as an alteration of neural function sufficient to interfere with the transmission of organizing information, considered to be homologous to the mental impulse.”



# Network

Vertebral subluxation is consequent to a neurological response to physical, emotional or environmental stress.

The neurological response may precipitate or be precipitated by misalignment(s) between articulations of the spinal column or its immediate weight bearing components of the axial skeleton.

The integrity of the nervous system is diminished as changes occur in **morphology/oscillation/tension** of the tissues occupying the neural canal and/or intervertebral foramina.

# ASRF

"A vertebral subluxation is a diminished state of being, comprising of a state of reduced **coherence**, altered biomechanical function, altered neurological function and altered **adaptability.**"

ASRF – June 2017



# Commonalities

- Coordination
- Coherence
- Adaptability
- Organization
- Tone

# ICA

"A subluxation is any alteration of the biomechanical and physiological dynamics of contiguous spinal structures which can cause neuronal disturbances. A subluxation is evaluated, diagnosed, and managed through the use of chiropractic procedures based on the best available rational and empirical evidence."

Chapter 2. Legal Authorities, Definitions, Responsibilities. ICA Best Practices and Practice Guidelines 2013. Arlington VA



# Association of Chiropractic Colleges

- 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 integrity and may influence organ system function and general health.
- A subluxation is evaluated, diagnosed, and managed through the use of chiropractic procedures based on the best available rational and empirical evidence.

# ACA

The ACA officially endorsed the ACC Paradigm that defines the subluxation as follows:

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 integrity and may influence organ system function and general health. A subluxation is evaluated, diagnosed, and managed through the use of chiropractic procedures based on the best available rational and empirical evidence.



# ACA

In September 2000, the full ACA House of Delegates (HOD) unanimously adopted the following resolution:

"The House of Delegates reaffirms the core principle of the subluxation. The ACA will strive to reiterate this principle and further state that the core treatment of chiropractic is manual manipulation/adjustment of the articulations, both spinal and extra-spinal, to reduce subluxations, when called upon in relation to federal legislative efforts, in addition to full scope of practice as allowed by state law. References to subluxation and chiropractic adjustments/manipulation should be made in ACA releases, whenever possible."



# ACA

**V. POLICY STATEMENT**

Doctors of chiropractic (chiropractic physicians) assert that they are the best trained and qualified provider group in chiropractic spinal manipulation/adjustment and reaffirm their inherent interest in this procedure for the purpose of preserving quality patient care and favorable outcomes. As competition in the field of health care delivery systems (HCDS) increases, multidisciplinary interest is developing in spinal manipulation primarily to expand the market share of certain providers. *Individuals with less training and expertise than doctors of chiropractic (chiropractic physicians) may provide outcomes that are less than optimal, and can pose unnecessary health and safety risks and possible complications for patients.*



The Chronicle of Chiropractic
The Source for News on Conservative, Traditional Chiropractic



# American Chiropractic Association Says Post X-rays Not Necessary

Tuesday, August 15, 2017 - 20:34

FOUNDATION FOR VERTEBRAL SUBLUXATION

## Urges Use of X-rays Only in the Presence of Red Flags

In what is sure to create a storm of controversy the American Chiropractic Association (ACA) released a list of five tests it states are commonly ordered but not always necessary in chiropractic care. The recommendation includes the admonition to not take spinal x-rays in acute low back pain patients unless there are so called Red Flags and to never take repeat x-rays to monitor progress. Teaming up with ABIM Foundation and Consumer Reports, the ACA's President David Herd DC referred to these as "unneeded or overused services" and that following these recommendations would yield the "best possible care".

CLICK HERE for the press release

The recommendations by the ACA, which has been pushing hard to remove subluxation language from Medicare and to expand the scope of practice of chiropractic nationwide including drugs, are at odds with what is considered to be a standard of care within chiropractic.

A number of chiropractic techniques rely on x-rays in order to determine the misalignment (biomechanical) component of the vertebral subluxation and imaging (especially plain film) is the only objective, valid and reliable method to make that determination.

Further, those techniques require the taking of follow-up x-rays in order to determine whether or not the misalignment has been reduced or corrected.

BLOGS

- Illinois Prairie State Chiropractic Assn. Rejects ACA X-Ray Guidelines
- New Research on Military Veterans and Disability
- New Research on Post Traumatic Stress Disorder and Military Veterans
- Chiropractic Helps Young Autistic Boy

READ MORE

BOX OF SUBLUXATION RESEARCH




ON PURPOSE - YOU ARE NOT ALONE



The Chronicle of Chiropractic
The Source for News on Conservative, Traditional Chiropractic



# ACA Members Must Now Pledge No X-rays for Subluxation Care

Thursday, September 14, 2017 - 13:31

NEWS STAFF

## ACA Re-Branding Includes New Controversial Practice Standards

The American Chiropractic Association (ACA) has recently launched a campaign to "re-brand" the trade organization that includes a new pledge, new logo and new tagline. The ACA claims on its website to be the **"largest professional chiropractic organization in the United States"** however, according to the most recent 990 forms available the ACA has approximately 4500 members which equals only 6% of the entire chiropractic profession. Making the membership numbers even more questionable are reports that some chiropractic schools automatically sign students up as ACA members whether they ask to be or not.

Considering that the ACA appears to be making membership eligibility stricter, their re-branding may actually lead to fewer members.

According to their website the ACA is going to be:

1. More rigid in their standards
2. Adopting new standards of care
3. Made up of the most principled and accomplished chiropractors

BLOGS

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READ MORE

BOX OF SUBLUXATION RESEARCH




ON PURPOSE - YOU ARE NOT ALONE



# ACA Says Not Enough Research to Prove Chiropractic Works in Kids

Thursday, September 15, 2022 - 15:19

NEWS STAFF




***Claims We Can't Really Say For Sure What's Happening***

In an interview for the Washington Post on the role of chiropractic for children, the **President of the American Chiropractic Association's (ACA) Council on Chiropractic Pediatrics** stated:

**"We still haven't been able to demonstrate in the research the effectiveness that we've seen clinically. We can't really say for sure what's happening. It's sort of like a black box. But, what we do know is that, clinically, what we're doing is effective because we see a change in the symptoms of the child."**

# ACA Endorses Car Seats, Mattresses & COVID Vaccine But Isn't Sure About Chiropractic for Kids

Thursday, September 15, 2022 - 15:59



ACA President Maiers

***Is Money Buying ACA Endorsements?***

The **American Chiropractic Association (ACA)** was recently interviewed by the Washington Post about the chiropractic care of children and threw the profession under the bus telling the *Post* that we haven't been able to demonstrate effectiveness, that we can't say for sure what's happening and that the focus is on symptoms.

CLICK HERE for that story

# Degrade Credibility

Others promote the use of x-rays on nearly every patient in order to determine biomechanical deviations from a theoretical "model" of a normal spine implying that this information is so essential to successful treatment that the benefit outweighs the very real risk of radiation exposure.

These and other business practices promoted across the profession are tolerated without challenge by the rank and file. These practices degrade the credibility of the profession and its members as competent clinicians and diminish the public's trust and level of cultural authority.

---

Craig F Nelson, Dana J Lawrence, John J Triano, Gert Bronfort, Stephen M Perle, R Douglas Metz, Kurt Hegetschweiler and Thomas LaBrot. Chiropractic as spine care: a model for the profession. Chiropractic & Osteopathy 200 513:9



# SUBLUXATION
## *EARLIEST ENGLISH DEFINITION*

"A dislocation or putting out of joynt."

---

Randall Holme, 1688



# HARRISON - 1821
# Neurological Consequences of Subluxation

"When any of the **vertebrae become displaced** or too prominent, the patient experiences inconvenience from a local **derangement in the nerves** of the part. He, in consequence, is tormented with a train of nervous symptoms, which are as obscure in their origin as they are stubborn in their nature..."

AJC Terrett: The search for the subluxation. Chiro. History, 1987

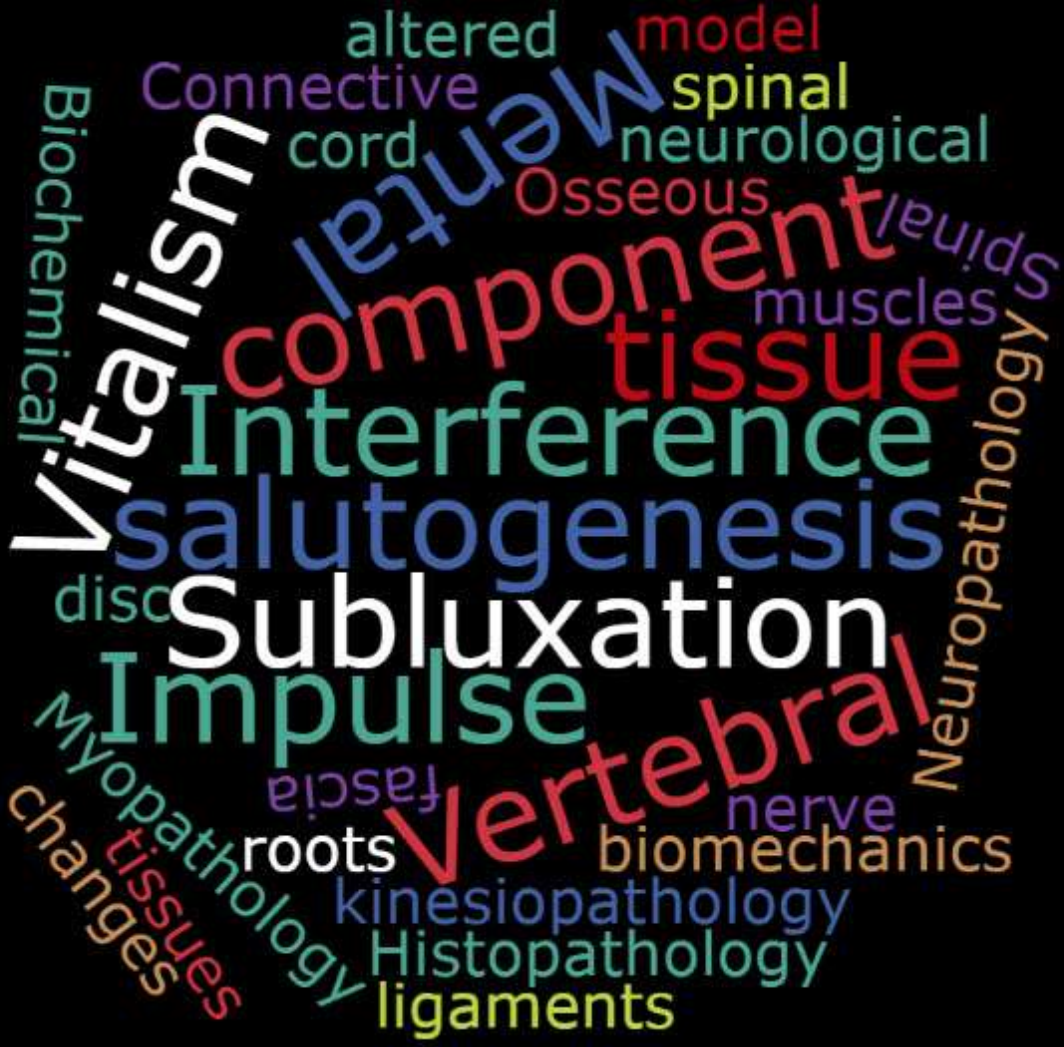
**"A subluxation means pressure on nerves, abnormal functions creating a lesion in some portion of the body, either in its action or its makeup."**

---

DD and BJ Palmer: The Science of Chiropractic



# Models of Vertebral Subluxation



# Models of Vertebral Subluxation

Component Models

Subluxation Degeneration Model

Nerve Root Compression Model

Dysafferentation Model

Neurodystrophic Model



# COMPONENT MODEL

*Flesia, Faye*

---

**1. Spinal Kinesiopathology**

**2. Neuropathology**

**3. Myopathology**

**4. Histopathology**

**5. Biochemical changes**



# VERTEBRAL SUBLUXATION COMPLEX

Kinesiopathology

Connective Tissue Pathology

Myopathology

Neuropathology

Vascular Pathology

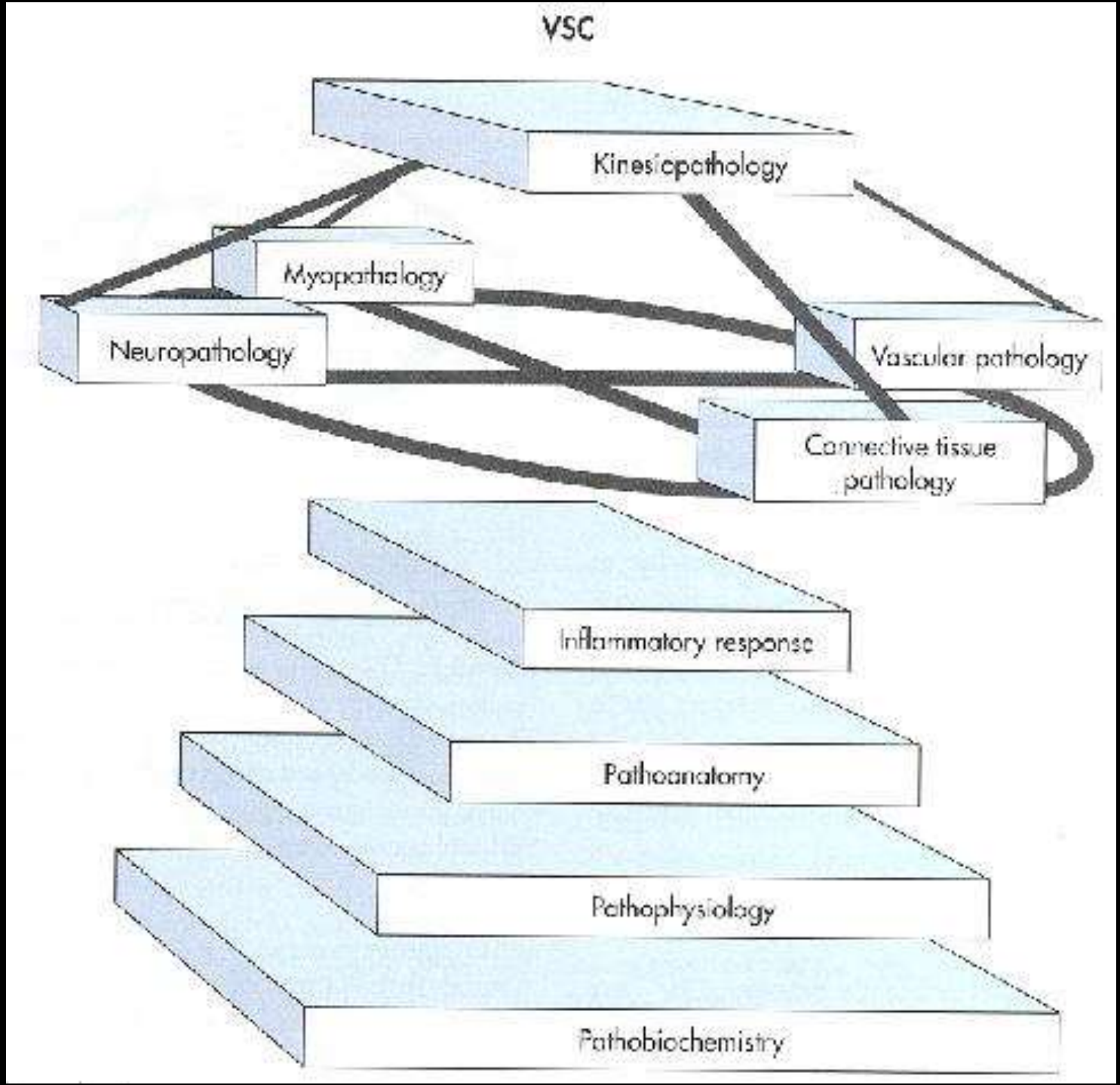
Inflammatory Response

Pathoanatomy

Pathophysiology

Pathobiochemistry




VSC
Kinesiopathology
Myopathology
Neuropathology
Vascular pathology
Connective tissue pathology
Inflammatory response
Pathoanatomy
Pathophysiology
Pathobiochemistry

# CHIROPRACTIC SUBLUXATION

**-Vertebral Subluxation Complex**

- **-Kinesiopathology**
- **-Connective Tissue Pathology**
- **-Myopathology**
- **-Neuropathology**
- **-Pathoanatomy**
- **-Pathophysiology**
- **-Pathobiochemistry**
- **-Vascular Pathology**

**-Nerve Compression Hypothesis**
**-Proprioceptive Insult**
**-Somatosympathetic Reflex**
**-Viscerosomatic Reflex**
**-Somato-Somato Reflex**
**-Neurodystrophic**
**-Dentate Ligament Cord Distortion**
**-Psychogenic**
**-Cord Compression**
**-Brain Hibernation**
**-Neuroplasticity/Spinal Learning**
**-Dysafferentation**



# NERVE ROOT COMPRESSION MODEL

"A pressure of only 10mm Hg produced a significant conduction block, the potential falling to 60% of its initial value in 15 minutes, and to half of its initial value in 30 minutes. After such a small compressive force is removed, nearly complete recovery occurs in 15 to 30 minutes. With higher levels of pressure, we have observed incomplete recovery after many hours of recording."

*Dr. Seth Sharpless*

*Research Status of Spinal Manipulative Therapy.*

*National Institutes of Health, 1975*



LITERATURE REVIEW

# The Effects of Mild Compression on Spinal Nerve Roots with Implications for Models of Vertebral Subluxation and the Clinical Effects of Chiropractic Adjustment

*R. Scott Alderson, D.C.[1], George J. Muhs, D.C., DABCN, CCN[2]*

**Abstract —** This review attempts to analyze the clinical relevance of nerve compression as a component of the vertebral subluxation and if the chiropractic adjustment can lead to the correction of the nerve pressure. Literature searches were conducted on the World Wide Web at the Pub Med website. There is evidence of nerve compression at the level of the intervertebral foramen (IVF) occurring anywhere from 15.4% to 78% of levels inspected. Most of the spines inspected were already prescreened to eliminate those that were definitely known to have nerve compression problems. Pressures as little as 10 mm Hg can alter the nerve root and dorsal root ganglion's abilities to function normally. In the normal range of motion the pressures generated in the IVF may exceed 30 mm Hg. When considering the concept of a joint fixated in a diminished sphere of its normal range of motion in conjunction with the mild pressure increases, it becomes apparent that nerve function can be significantly altered. The chiropractic adjustment can effect a restoration of normal H-reflex in compressed nerve roots without altering the H-reflex at uninvolved levels. The major variables of compression are the rate of onset, the amount of pressure generated, and the time maintained. Another major variable in the recovery is age. The younger the nerve tissue the better chance for a full recovery. The concept that a vertebral subluxation can induce pressure increases at the level of the IVF is supported by the literature. This increase, though seemingly mild, is enough to alter nerve function. The garden hose theory or hard bone - soft nerve explanation of vertebral subluxation is considered by some to be archaic but appears to be a valid entity at least in the lower cervical spine. More research is needed to decipher the susceptibility to mild pressure increases throughout the spine.

*Key Words: Spinal nerve root, compression, dorsal root ganglia, chiropractic, adjustment, vertebral subluxation, manipulation*

LITERATURE REVIEW

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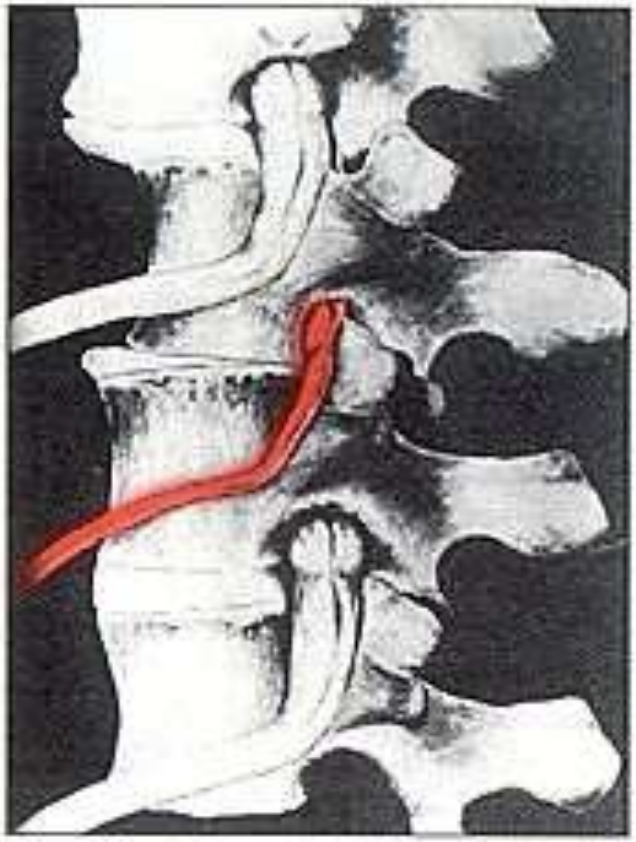
The garden hose theory or hard bone – soft nerve explanation of vertebral subluxation is considered by some to be archaic but appears to be a valid entity

The garden hose theory or hard bone – soft nerve explanation of vertebral subluxation is considered by some to be archaic but appears to be a valid entity

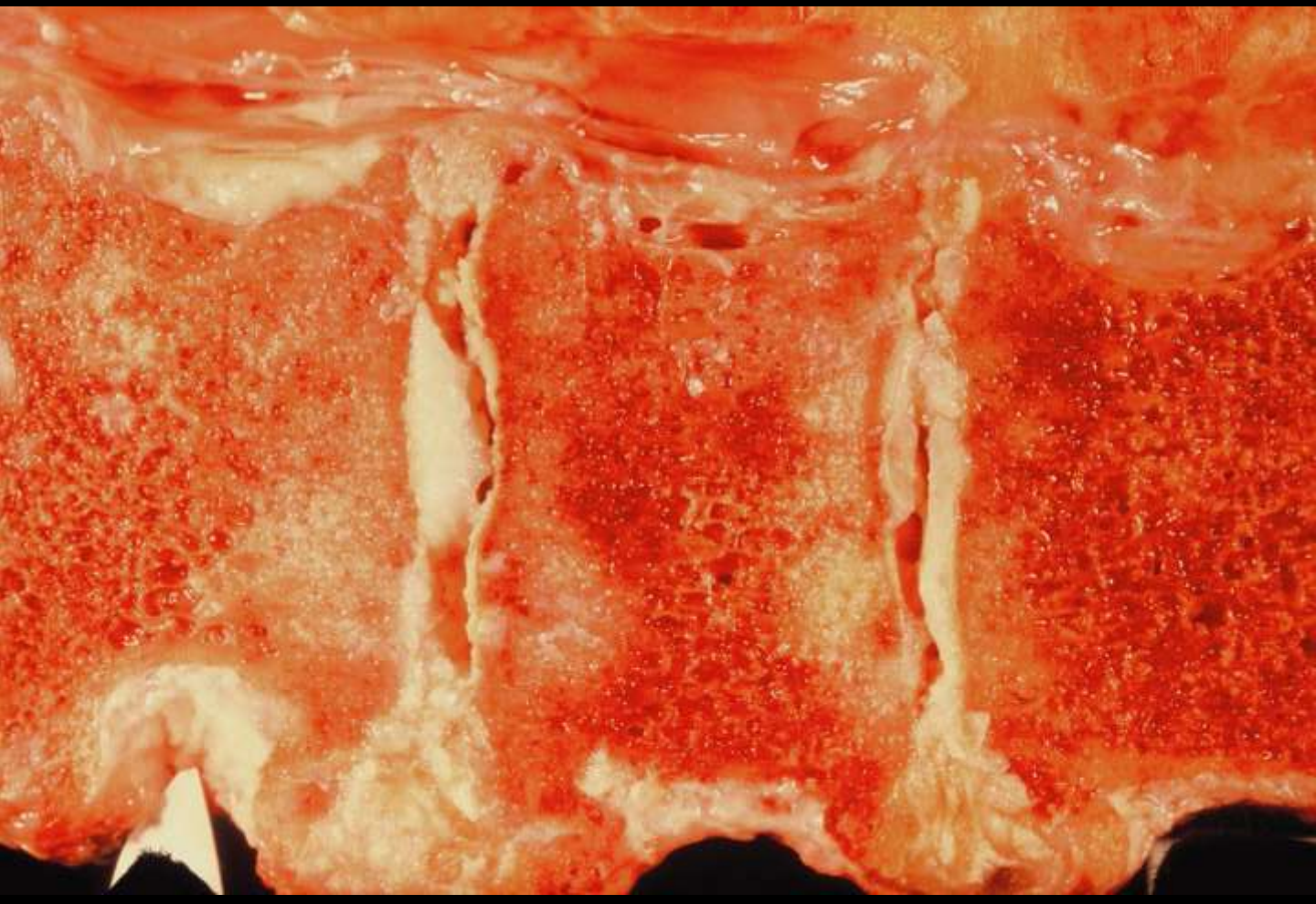
*Key Words: Spinal nerve root, compression, dorsal root ganglia, chiropractic, adjustment, vertebral subluxation, manipulation*



# The Silent Killer?



*This is one type of vertebral subluxation (nerve interference) – the "silent killer."*



# DYSAFFERENTATION MODEL
# AKA
# PROPRIOCEPTIVE INSULT HYPOTHESIS

"Weightbearing disc and mechanoreceptor functional integrity regulates and drives background postural neurologic information and function (muscular) through the unconscious mechanoreception anterior and posterior spinocerebellar tract, cerebellum, vestibular nuclei, descending medial longitudinal fasciculus(medial and lateral vestibulospinal tracts), regulatory anterior horn cell pathway."

---

Dan Murphy: Am J of Clin Chiro 1995



# NEURODYSTROPHIC MODEL SEGMENTAL FACILITATION

Decreased thresholds in efferent neurons arising from the anterior and lateral horn cells are postulated to result in increased impulse traffic to the somatic and visceral structures innervated by the affected neurons



# NEURODYSTROPHIC MODEL

Neural dysfunction is stressful to body tissues and lowered tissue resistance can modulate specific and nonspecific immune responses and alter the trophic function of the involved nerves.



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PHARM REV

# The Sympathetic Nerve—An Integrative Interface between Two Supersystems: The Brain and the Immune System

ILIA J. ELENKOV, RONALD L. WILDER, GEORGE P. CHROUSOS, AND E. SYLVESTER VIZI[1]

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PHARMACOLOGICAL REVIEWS

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# Kent
# 4 Dimensional Model

1. DYSAFFERENTATION
2. DYSKINESIA
3. DYSPONESIS
4. DYSAUTONOMIA



# Dysafferentation

The intervertebral motion segment is richly endowed with nociceptive and mechanoreceptive structures.

As a consequence, biomechanical dysfunction **caused by vertebral subluxation** may result in altered nociception and/or mechanoreception.

# Dyskinesia

Dyskinesia refers to distortion or impairment of voluntary movement.

Spinal motion may be reliably measured using inclinometry. Alterations in regional ranges of motion may be associated with vertebral subluxation



# Dysponesis

Dysponesis is evidenced by abnormal tonic muscle activity. Dysponesis refers to a reversible physiopathologic state consisting of errors in energy expenditure, which are capable of producing functional disorders. Dysponesis consists mainly of covert errors in action potential output from the motor and premotor areas of the cortex and the consequences of that output. These neurophysiological reactions may result from responses to environmental events, bodily sensations, and emotions.

The resulting aberrant muscle activity may be evaluated using surface electrode techniques. Typically, static SMEG with axial loading is used to evaluate innate responses to gravitational stress.



# Dysautonomia

The autonomic nervous system regulates the actions of organs, glands, and blood vessels. Acquired dysautonomia may be associated with a broad array of functional abnormalities.

Sympathetic tone may be evaluated by measuring skin temperature differentials using paraspinal infrared thermography

Such techniques have been used to monitor changes in neurological function associated with vertebral subluxations Heart rate variability is a reliable and valid technique for the assessment of changes in autonomic nervous system function.



# Other Models

DENTATE LIGAMENT

CORD DISTORTION

•

PSYCHOGENIC

•

BRAIN HIBERNATION



# Psychosocial Models

- Psychogenic concepts: mental/emotional  state influence on structure
- Somatopsychic concepts: structural influence on mental/emotional states



# Stress Response

- **Increases**
  - Cortisol
  - Catecholamines
  - Heart Rate
  - Blood Pressure
  - Blood Glucose
  - Blood Lipids
  - Insulin Resistance
  - Respiration
- **Decreases**
  - Digestion/metabolism
  - Serotonin
  - Bone Loss
  - Short Term Memory
  - Growth
  - Hormone
  - Hormone Balance
  - Cellular Immunity
  - Concentration
  - Testosterone

# Altered Behavior, Stress & Subluxation

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




Foundation for Vertebral Subluxation

# Technique Based Models

SEGMENTAL MODELS

•

POSTURAL MODELS

•

TONAL MODELS

---

From Kent (JVSR), Cooperstein (Advances in Chiropractic)

and Murphy (Seminar notes)



# SEGMENTAL MODELS

Gonstead

Diversified



# POSTURAL MODELS

Chiropractic Biophysics

Pettibon Spinal Biomechanics

Applied Spinal Biomechanical Engineering



# TONAL MODELS

Network Spinal Analysis

Torque Release Technique



# Operational Models - Kent

An operational definition is a description of the procedures used to determine the means for measuring or observing something. Smith et al stated,

“The potential exists for subluxation resolution to be conceptualized as a legitimate intermediate health outcome, pending the development of a sufficient and requisite body of scientifically derived clinical evidence.

This body of evidence must, by necessity, include (1) scientifically valid and reliable measures of subluxation, in order to (2) scientifically examine the relationship between a patient’s subluxation and that patient’s health.”



# WHO guidelines on basic training and safety in chiropractic. 2005.

Adjustment : Any chiropractic therapeutic procedure that ultimately uses controlled force, leverage, direction, amplitude and velocity, which is applied to specific joints and adjacent tissues. Chiropractors commonly use such procedures to influence joint and neurophysiological function.

# WHO guidelines on basic training and safety in chiropractic. 2005.

Joint manipulation: A manual procedure involving directed thrust to move a joint past the physiological range of motion,

without exceeding the anatomical limit.

# Sherman College Philosophic Lexicon 2017

Adjustment (adjustive thrust): A controlled force, employing leverage, direction, amplitude and velocity, applied to a specific vertebra for the purpose of correcting vertebral subluxation.

# Sherman College Philosophic Lexicon 2017

Manipulation: The forceful passive movement of a joint beyond its physiological range of motion; it is not done for the correction of vertebral subluxation and is not synonymous with adjustment.

# Stuck Joint Model

Goal is to unstick stuck joints

Accomplished via:

- Grip & Rip
- Bump Thumping
- Million Dollar Rolls

# The Cracker Study

Grip & Rip – Chiro

Grip & Rip – Self Cracker

LACVS - Chiro



# Language/Intent/Procedures




Foundation for Vertebral Subluxation

# Vertebral Subluxation: Semantic Pathology, Epistemic Trespassing, and Ethics

Christopher Kent, DC, JD[1,2]

**Abstract**

Language should be a tool for minimizing ambiguity, and establishing precision in communication. This necessitates the use of terminology that communicates the uniqueness of the thing being described. The use of terms that homogenize rather than differentiate foster ambiguity and imprecision. The pernicious amalgam of semantic pathologies, epistemic trespassing, denialism, conflation of terms, and the Dunning-Kruger Effect cannot be dismissed as mere "minutia and semantics." We must ensure a clear understanding of vertebral subluxation and our unique approach to unleashing human potential.

**Key words:** *Chiropractic, vertebral subluxation, adjustment, manipulation, semantics, ethics, denialism, veracity, professional identity*

> "If one wished to kill a profession, to remove its cohesion and its strength, the most effective way would be to forbid the use of its characteristic language."
>
> *Kenneth Hudson (1978)*
> *The Jargon of Professions*

**Role of Language: Differentiation vs. Homogenization**

A function of language is differentiation. Language should be a tool for minimizing ambiguity, and establishing precision in communication. This necessitates the use of terminology that communicates the uniqueness of the thing being described. The use of terms that homogenize rather than differentiate foster ambiguity and imprecision. The practice of conflating terms, such as vertebral subluxation, joint dysfunction, adjustment, and spinal manipulation has ethical and political implications.

One example is the suggestion that the terms vertebral subluxation, joint fixation, joint dysfunction are interchangeable. They are not the same thing. There are significant operational and epistemological differences. Implicit in the term vertebral subluxation are both biomechanical and neurological elements. Vertebral subluxation is a relational neurological process that impacts the human experience, not merely a fixated joint. A fixated or tender joint might represent one manifestation of vertebral subluxation, not a synonym for vertebral subluxation. The notion that they are the same leads to confusion and ambiguity.

Reddy[1] coined the term semantic pathologies. "These are instances in which two or more ideas that are important to distinguish are lumped unnoticed together in the same linguistic expression." The suggestion that vertebral subluxation and joint dysfunction are synonymous, or that chiropractic adjustment is identical to spinal manipulation are examples of semantic pathologies. Significant epistemic and operational differences exist.

1. Professor & Director of Evidence-Informed Curriculum & Practice, Sherman College of Chiropractic, Spartanburg, SC
2. President, Foundation for Vertebral Subluxation. Kennesaw, GA

# Semantic Pathologies

- “These are instances in which two or more ideas that are important to distinguish are lumped unnoticed together in the same linguistic expression.”

Reddy M: Semantic Pathologies and the “Laws” of Nature. EdgeScience 2017, No. 29.

# Subluxation Research: A Survey of Peer-Reviewed Chiropractic Scientific Journals

ADRIAN B. WENBAN

ABSTRACT: *Objective:* To determine the frequency (%) and type of original research that used the term *subluxation* in either the title, abstract or index terms of articles published in peer-reviewed chiropractic scientific journals (1990-99). *Design:* Survey of the title, abstract and index terms from all original research published in peer-reviewed chiropractic journals that met this survey's inclusion criteria, for the period 1990-99. *Main Outcome Measure:* Inclusion of the term *subluxation* in the title, abstract or index terms of peer-reviewed, original research articles. *Results:* Seven peer-reviewed chiropractic journals met the inclusion criteria for this survey: *Journal of Manipulative and Physiological Therapeutics* (JMPT), *Journal of the Canadian Chiropractic Association* (JCCA), *Chiropractic Journal of Australia* (CJA), *Journal of Sports Chiropractic and Rehabilitation* (JSCR), *European Journal of Chiropractic* (EJC), *Chiropractic Research Journal* (CRJ), and *Chiropractic Technique* (CT). During the period 1990-99, the term *subluxation* appeared in the title, abstract or index terms of 23/658 (3.5%) original research articles published in JMPT, 1/163 (0.6%) in JCCA, 9/186 (4.8%) in CJA, 6/155 (3.9%) in JSCR, 20/212 (9.4%) in CT, 36/71 (50.7%) in CRJ, and 0/74 (0%) in EJC. Overall, the mean frequency (%) of original research focused on chiropractic subluxation and published in 1 of 7 journals during the period 1990-99 was 95/1519 (6.3%). *Conclusion:* Only 6.3% of the original research published in 7 leading chiropractic scientific journals during the period 1990-99 included the term *subluxation* in the title, abstract or index terms. Furthermore, only 7 of the original research articles that included the term *subluxation* were clinical trials. The possibility that, and reasons why, subluxation-related research made up only a small percentage of the original research published in a number of leading chiropractic scientific peer-reviewed journals during recent years deserves further examination.

INDEX TERMS: (MeSH): CHIROPRACTIC; DATA COLLECTION.
(Other): SUBLUXATION.

Chiropr J Aust 2003; 33: 122-30.

## INTRODUCTION

Since its inception in 1895, the chiropractic profession has held as a fundamental principle that subtle biomechanical derangements of the spine, called subluxations, can affect the nervous system. Furthermore, due to the intimate anatomical relationship between the nervous system and the spine, chiropractors contend that correcting vertebral subluxations can improve health. These principles are the foundation of the care that many chiropractors provide today, and irrespective of where a chiropractor lies on the mixer/straight continuum, it is widely agreed that vertebral subluxation is central to the philosophy, science and practice of chiropractic.[1-4]

Events over the past 10 years within the global chiropractic community have reaffirmed the central place that most practising chiropractors and their national representative associations have for the term *subluxation*. One survey,[5] carried out in Victoria, Australia amongst all 554 registered chiropractors in 1994, had a response rate of 85% and found that the term *subluxation* was included in the preferred terms of 67% of practising chiropractors. Another survey,[6] that collected data using a questionnaire mailed to a random sample of 600 registered chiropractors in Canada, with a response rate of 68.3%, found that the majority of chiropractors (54.4%) agreed that "a chiropractic subluxation is detectable by x-ray." In reporting their findings, the authors of that survey stated, "...the majority of Canadian chiropractors...still believed in the concept of the subluxation as evidenced by their belief in its detection by x-ray."[6] In 1996 the U.S. government awarded a contract, and provided funding, to Palmer College of Chiropractic (PCC) to conduct a National Workshop to Develop a Research Agenda.[7] That project involved the creation of an interdisciplinary panel to recommend priorities for chiropractic research. In order to inform workshop panel members of the research priorities of practising chiropractors, a random survey of 2,280 chiropractors in the U.S. was performed. The study, published under the title, "American Chiropractors' Research Priorities,"[8] concluded that practising chiropractors believed the acceptance of chiropractic was the most important research objective. The study found that practising chiropractors felt acceptance would best be accomplished in the immediate future with basic science research on the nature of the subluxation complex and/or the physiological effects of adjustments. Furthermore, the survey asked, "If the

Adrian B. Wenban, BSc, BAppSc, MMedSc

# Quantitative corpus-based analysis of the chiropractic literature – a pilot study

Neil Millar PhD*
Brian S. Budgell DC, PhD†
Alice Kwong, Hons BScKin, CK§

*In this pilot study, a collection of peer-reviewed articles from the Journal of the Canadian Chiropractic Association was analyzed by computer to identify the more commonly occurring words and phrases. The results were compared to a reference collection of general English in order to identify the vocabulary which is distinctive of chiropractic. From texts with a combined word count in excess of 280,000, it was possible to identify almost 2,500 words which were over-represented in the chiropractic literature and therefore likely to hold special importance within this domain. Additionally, readability statistics were calculated and suggest that the peer-reviewed chiropractic literature is approximately as challenging to read as that of nursing, public health and midwifery. Certain words widely considered to be of importance to the profession, for example "subluxation and adjustment," were not particularly prevalent in the literature surveyed.*
(JCCA 2011; 55(1):56–60)

KEY WORDS: JCCA, chiropractic, corpus, linguistics

*Dans le cadre de la présente étude pilote, un ensemble d'articles évalués par les pairs tirés du Journal de l'Association chiropratique canadienne a été analysé par ordinateur afin de déterminer les mots et les phrases les plus communément utilisés. Les résultats ont été comparés à un corpus de référence en anglais général afin d'identifier le vocabulaire spécifique à la chiropratique. À partir de textes ayant un total combiné de mots dépassant les 280 000 mots, il a été possible de déterminer près de 25 000 mots surreprésentés dans la littérature chripratique et qui ont probablement une importance particulière dans ce domaine. Par ailleurs, des statistiques sur la lisibilité ont été calculées et indiquent que la littérature chiropratique évaluée par les pairs est aussi compliquée à lire que celle liée aux soins infirmiers, à la santé publique et à la profession de sage-femme. Certains mots considérés par de nombreuses personnes comme étant importants pour la profession, par exemple « subluxation and adujstment », n'étaient pas particulièrement prévalents dans la littérature en examen.*
(JCCA 2011; 55(1):56–60)

MOTS CLÉS : JACC, chiropratique, corpus, linguistique

# Language

*ition* and *injury(ies)*. *Adjust* and words derived from this root had a collective prevalence of 0.05%. *Subluxation* and *subluxations* had a collective prevalence of 0.04%.

In 12 instances, the word *subluxation*(*s*) collocated with the word *vertebral*. The other common collocation (7 instances) was with the word *chiropractic*. There was only one instance of the phrase *vertebral subluxation complex*. In approximately 40% of instances, the phraseology implied that the meaning of the term *subluxation* was apparent from context or common knowledge. In other instances, there was explicit reference to a specific definition or the need for a definition. Interestingly, in approximately 25% of instances, the reference to subluxation was emotive, politicized and even explicitly disparaging of the term.

**The Reality Check**
April 12 at 9:02pm

Like Page

Our resent study is getting a lot of attention. We will have to do an animation about it 🙂 Want to read more:
https://spinalresearch.com.au/research-beyond-doubt-adjust.../



## Research: Beyond A Doubt, Adjusting The Subluxated Spine Changes Brain Function - Australian...

We are very excited to announce that another Spinal Research Foundation facilitated research has been published in a highly reputable journal [1]. The...

SPINALRESEARCH.COM.AU

Hindawi Publishing Corporation
Neural Plasticity
Volume 2016, Article ID 3704964, 9 pages
http://dx.doi.org/10.1155/2016/3704964

Hindawi

*Research Article*

# Manipulation of Dysfunctional Spinal Joints Affects Sensorimotor Integration in the Prefrontal Cortex: A Brain Source Localization Study

**Dina Lelic,[1] Imran Khan Niazi,[2,3,4] Kelly Holt,[2] Mads Jochumsen,[3] Kim Dremstrup,[3] Paul Yielder,[5] Bernadette Murphy,[5] Asbjørn Mohr Drewes,[1,3] and Heidi Haavik[2,5]**

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*Objectives*. Studies have shown decreases in N30 somatosensory evoked potential (SEP) peak amplitudes following spinal manipulation (SM) of dysfunctional segments in subclinical pain (SCP) populations. This study sought to verify these findings and to investigate underlying brain sources that may be responsible for such changes. *Methods*. Nineteen SCP volunteers attended two experimental sessions, SM and control in random order. SEPs from 62-channel EEG cap were recorded following median nerve stimulation (1000 stimuli at 2.3 Hz) before and after either intervention. Peak-to-peak amplitude and latency analysis was completed for different SEPs peak. Dipolar models of underlying brain sources were built by using the brain electrical source analysis. Two-way repeated measures ANOVA was used to assessed differences in N30 amplitudes, dipole locations, and dipole strengths. *Results*. SM decreased the N30 amplitude by $16.9 \pm 31.3\%$ ($P = 0.02$), while no differences were seen following the control intervention ($P = 0.4$). Brain source modeling revealed a 4-source model but only the prefrontal source showed reduced activity by $20.2 \pm 12.2\%$ ($P = 0.03$) following SM. *Conclusion*. A single session of spinal manipulation of dysfunctional segments in subclinical pain patients alters somatosensory processing at the cortical level, particularly within the prefrontal cortex.

With this study, we set out to utilize brain electrical source analysis to explore which brain sources are responsible for changes in N30 amplitude following a single session of spinal manipulation. We hypothesized that a single session of chiropractic spinal manipulation would reduce the N30 amplitude and that this amplitude reduction would be attributed to decreased strength of one or more of the underlying brain sources. Therefore, the aims of this study were to

the screening session, a chiropractor assessed the subject's spine and history to assure that they fit the criteria for subclinical pain, had no contraindications to receiving spinal manipulation, and displayed the presence of spinal dysfunction. The subjects were excluded from the study if any of the following was true: no evidence of spinal dysfunction was present, they were in current pain, they had sought previous treatment for their spinal issues, or they had contraindications to receiving spinal manipulation.

*2.4.1. Spinal Manipulation.* The entire spine and both sacroiliac joints were assessed for segmental dysfunction (also referred to as vertebral subluxation by many members of the chiropractic profession) and treated where they were deemed necessary by a registered chiropractor with fifteen years of clinical experience. The clinical indicators that were used to assess the function of the spine prior to and after each spinal manipulation intervention included assessing for tenderness to palpation of the relevant joints, manually palpating for restricted intersegmental range of motion, assessing for palpable asymmetric intervertebral muscle tension, and any abnormal or blocked joint play and end-feel of the joints. All of these biomechanical characteristics are used by the chiropractic profession as clinical indicators of spinal dysfunction [13]. All of the spinal manipulations carried out in this study were high-velocity, low-amplitude thrusts to the spine or pelvic joints. This is a standard manipulation technique used by chiropractors and is also referred to as spinal adjustments. The mechanical properties of this type of central nervous system perturbation have been investigated; and although the actual force applied to the subject's spine depends on the therapist, the patient, and the spinal location of the manipulation, the general shape of the force-time history of spinal manipulations is very consistent [14] and the duration of the thrust is always less than 200 milliseconds

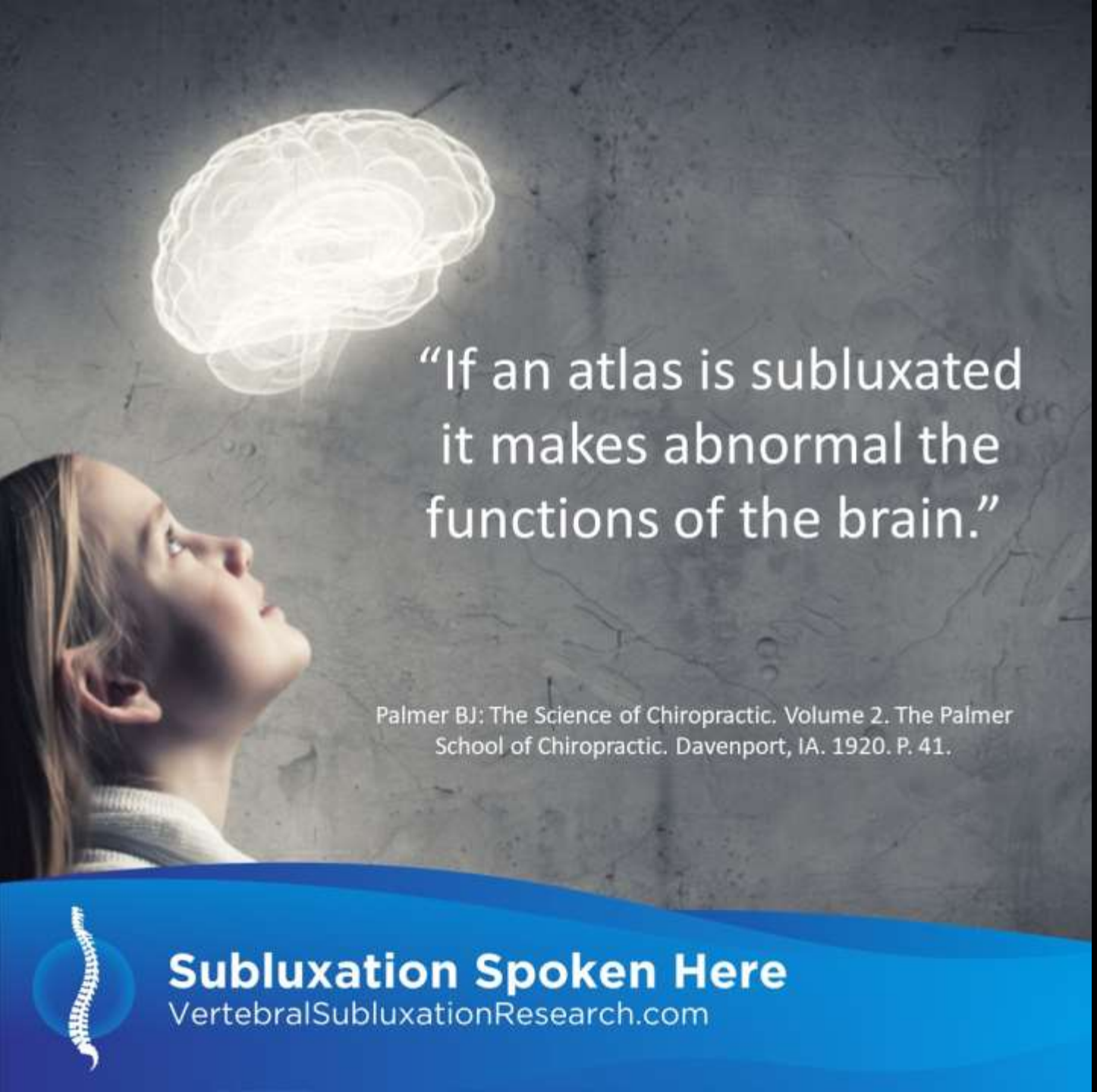
# Radical Science

- FOCUSED on vertebral subluxation.
- Use our profession's unique and distinct terminology in all research
- Vertebral subluxation is *not* the same thing as joint dysfunction.
- A specific spinal adjustment is *not* the same thing as spinal manipulation.
- Research focused on the **salutogenic** related outcomes that happen when people's subluxations are corrected.
- Research focused on the health outcomes that happen from people undergoing lifetime, family, subluxation centered chiropractic.

# Brains & Subluxation



Foundation for Vertebral Subluxation




**Subluxation Spoken Here**

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ORIGINAL RESEARCH

# Cerebral Metabolic Changes in Men After Chiropractic Spinal Manipulation for Neck Pain

Takeshi Ogura, DC, PhD; Manabu Tashiro, MD, PhD; Mehedi Masud, MD, PhD; Shoichi Watanuki; Katsuhiko Shibuya, MS; Keiichiro Yamaguchi, MD, PhD; Masatoshi Itoh, MD, PhD; Hiroshi Fukuda, MD, PhD; Kazuhiko Yanai, MD, PhD

**Abstract**

**Background** • Chiropractic spinal manipulation (CSM) is an alternative treatment for back pain. The autonomic nervous system is often involved in spinal dysfunction. Although studies on the effects of CSM have been performed, no chiropractic study has examined regional cerebral metabolism using positron emission tomography (PET).

**Objective** • The aim of the present study was to investigate the effects of CSM on brain responses in terms of cerebral glucose metabolic changes measured by [$^{18}$F]fluorodeoxyglucose positron emission tomography (FDG-PET).

**Methods** • Twelve male volunteers were recruited. Brain PET scanning was performed twice on each participant, at resting and after CSM. Questionnaires were used for subjective evaluations. A visual analogue scale (VAS) was rated by participants before and after chiropractic treatment, and muscle tone and salivary amylase were measured.

**Results** • Increased glucose metabolism was observed in the inferior prefrontal cortex, anterior cingulated cortex, and middle temporal gyrus, and decreased glucose metabolism was found in the cerebellar vermis and visual association cortex, in the treatment condition ($P < .001$). Comparisons of questionnaires indicated a lower stress level and better quality of life in the treatment condition. A significantly lower VAS was noted after CSM. Cervical muscle tone and salivary amylase were decreased after CSM.

**Conclusion** • The results of this study suggest that CSM affects regional cerebral glucose metabolism related to sympathetic relaxation and pain reduction. (*Altern Ther Health Med.* 2011;17(6):12-17.)

**The Reality Check**
April 12 at 9:02pm

Like Page

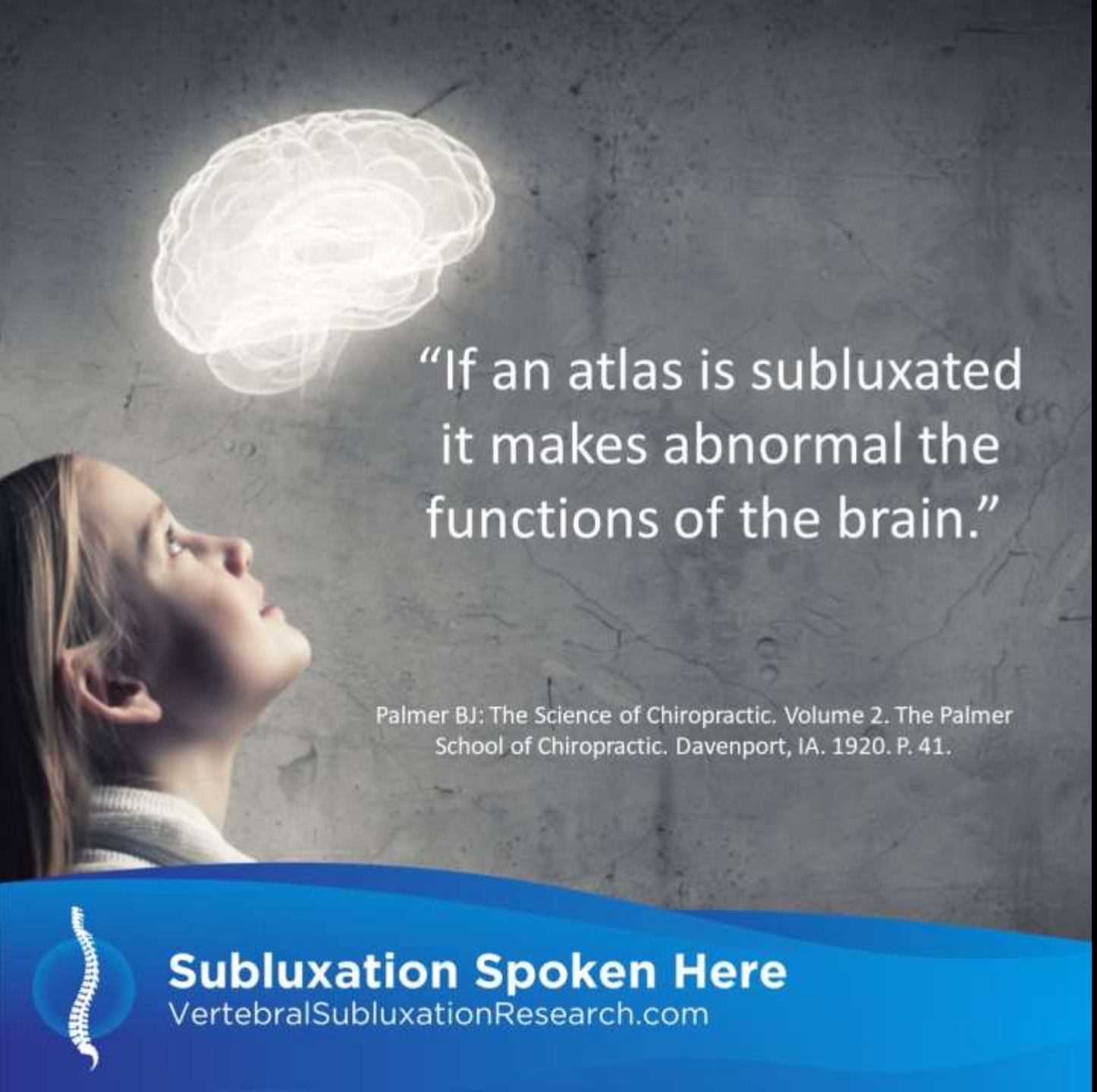
Our resent study is getting a lot of attention. We will have to do an animation about it 🙂 Want to read more:
https://spinalresearch.com.au/research-beyond-doubt-adjust.../



## Research: Beyond A Doubt, Adjusting The Subluxated Spine Changes Brain Function - Australian...

We are very excited to announce that another Spinal Research Foundation facilitated research has been published in a highly reputable journal [1]. The...

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Hindawi Publishing Corporation
Neural Plasticity
Volume 2016, Article ID 3704964, 9 pages
http://dx.doi.org/10.1155/2016/3704964

Hindawi

*Research Article*

# Manipulation of Dysfunctional Spinal Joints Affects Sensorimotor Integration in the Prefrontal Cortex: A Brain Source Localization Study

**Dina Lelic,[1] Imran Khan Niazi,[2,3,4] Kelly Holt,[2] Mads Jochumsen,[3] Kim Dremstrup,[3] Paul Yielder,[5] Bernadette Murphy,[5] Asbjørn Mohr Drewes,[1,3] and Heidi Haavik[2,5]**

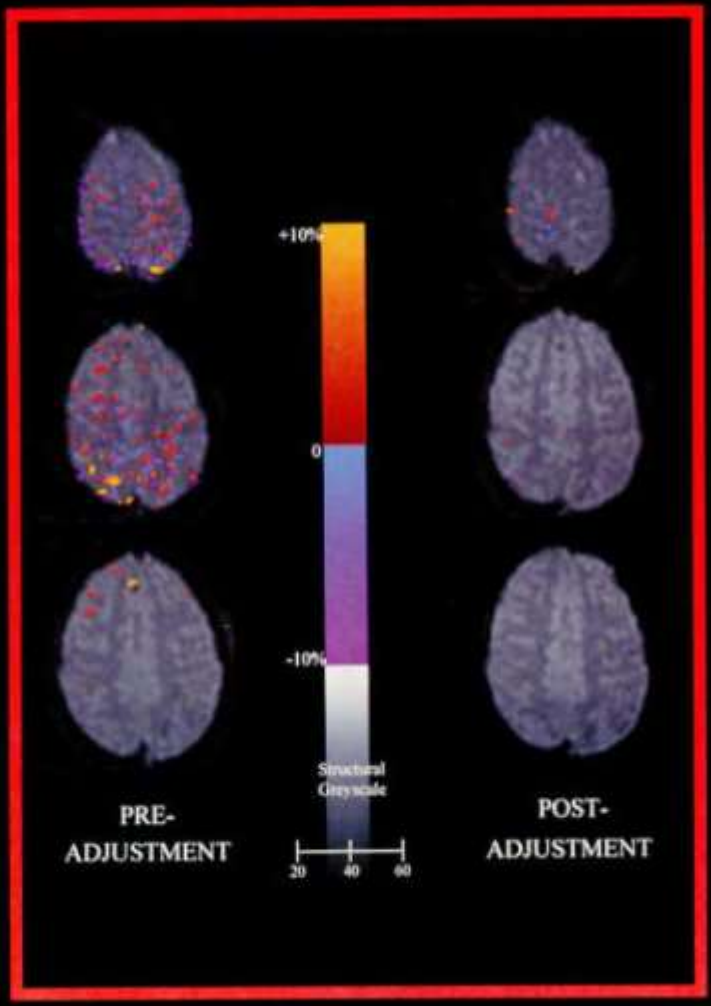
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Journal of
Vertebral Subluxation Research

A PEER-REVIEWED JOURNAL • VOL. 2, NO. 1, 1998




Functional Magnetic resonance Imaging (fMRI), measures the relative presence of oxy-hemoglobin. This technology may provide a useful assessment of cortical changes following chiropractic intervention.

Images of the patient depicted on the cover, on the left, reflect cortical activity (lighted areas in the parietal cortex, frontal cortex areas 9, 10; visual association areas 19, 37, and 39) associated with the learning process of a "novel" muscular maneuver of the foot.

Images on the right reflect cortical activity following a Network Spinal Analysis adjustment session, taken approximately 20 minutes after the first set of images, involving the same activity.

The decrease in "lighted" areas before and after the adjustment session suggests that less cortical "planning" or "activity" is associated with the "novel" foot maneuver.

The ability of fMRI to visualize changes in cortical activity may play a significant role in elucidating the consequences of vertebral subluxation correction on neurological function.

# 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.

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# 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

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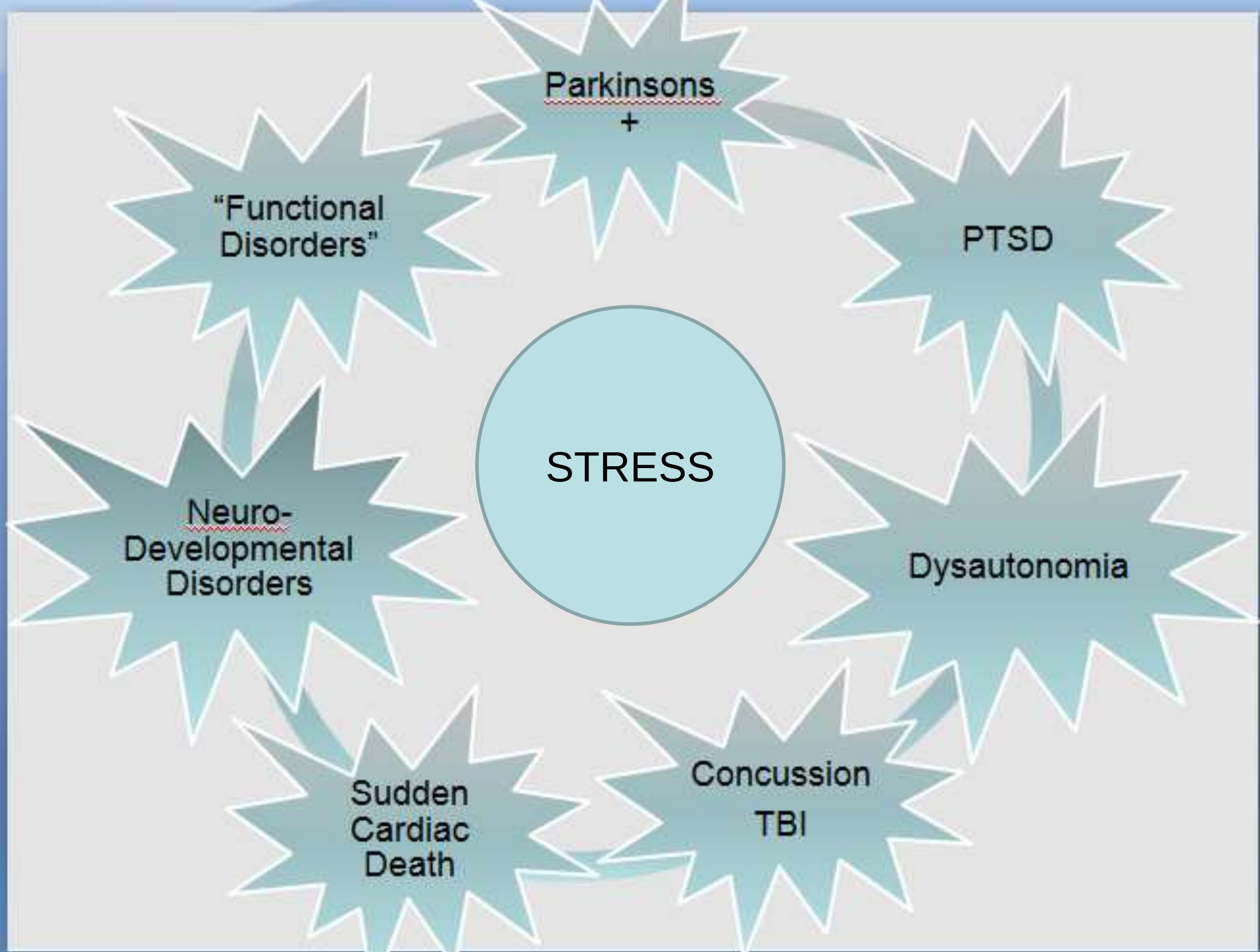
# Cortical Processing

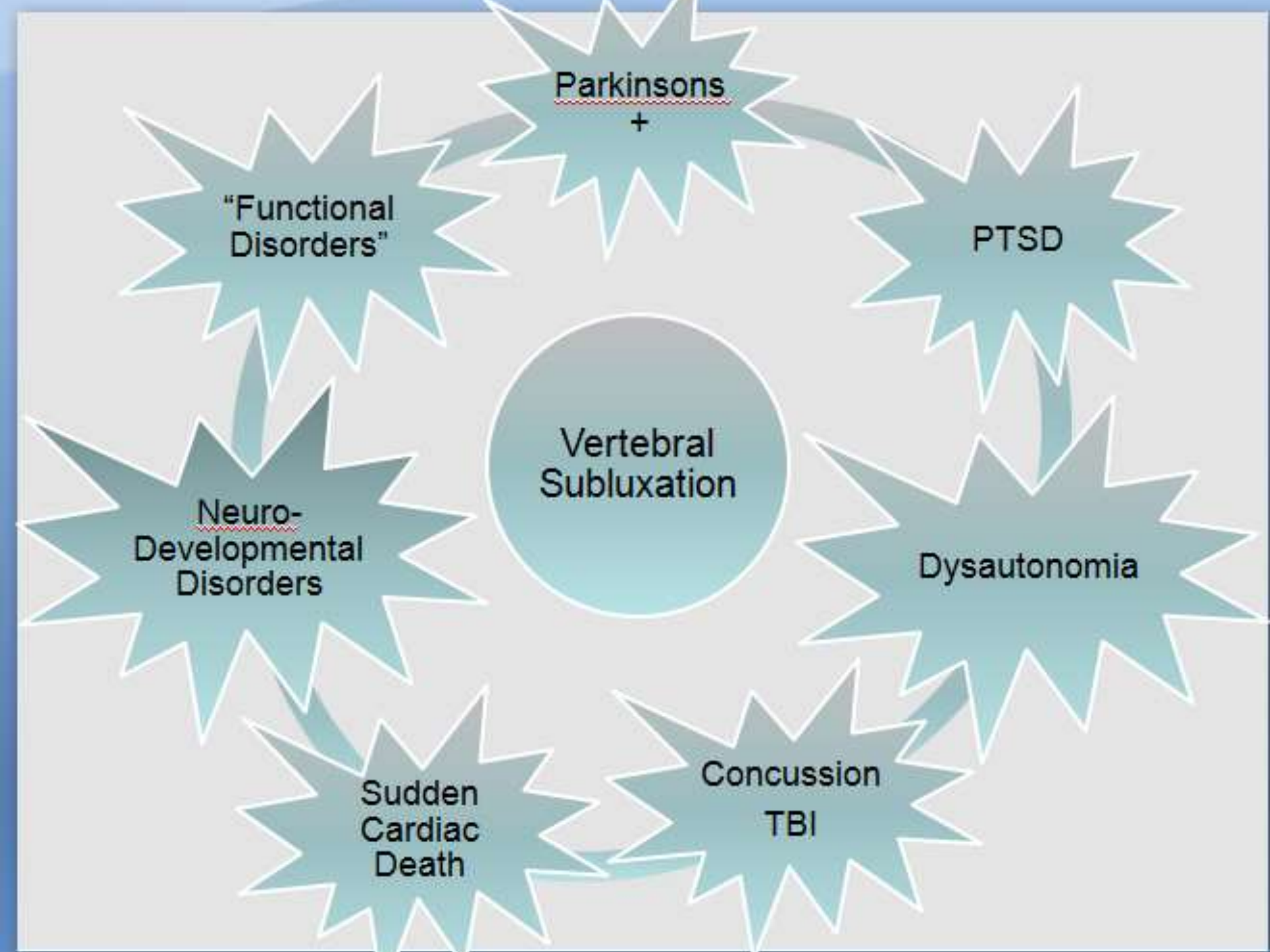
Kelly, Murphy, and Backhouse:

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.

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Parkinsons
+
"Functional Disorders"
PTSD
STRESS
Neuro-Developmental Disorders
Dysautonomia
Sudden Cardiac Death
Concussion TBI


Parkinsons
+
"Functional Disorders"
PTSD
Vertebral Subluxation
Neuro-Developmental Disorders
Dysautonomia
Sudden Cardiac Death
Concussion
TBI

# Stress Response

- **Increases**
  - Cortisol
  - Catecholamines
  - Heart Rate
  - Blood Pressure
  - Blood Glucose
  - Blood Lipids
  - Insulin Resistance
  - Respiration
- **Decreases**
  - Digestion/metabolism
  - Serotonin
  - Bone Loss
  - Short Term Memory
  - Growth
  - Hormone
  - Hormone Balance
  - Cellular Immunity
  - Concentration
  - Testosterone

# Altered Behavior, Stress & Subluxation

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




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# 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.




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.**

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**Original Research**

# P300 Wave Outcomes in Subluxation Based Chiropractic in Residential Addiction Treatment: A Randomized Controlled Clinical Trial

*Charles Daniel Vaden DC*[1]
*Jay M. Holder DC, DACACD*[2]
*Matthew McCoy, MPH, DC*[3]
*Joyce Sayers, DC*[4]
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3. *Foundation for Vertebral Subluxation, Kennesaw, GA*
4. *Life University College of Chiropractic, Marietta, GA*
5. *Holder Research Institute,*

**Abstract**

**Objective:** Research is needed to determine if P300 wave analysis has significance as an outcome assessment of subluxation-based chiropractic care in the addiction treatment setting.

**Methods:** Two groups of male subjects in residential addiction treatment are studied for 90 days. The chiropractic group received chiropractic adjustments using Torque Release Technique® and the Integrator® adjusting instrument three times per week. The Placebo group received a sham adjustment three times per week. Both groups were assessed with the Beck's Depression Inventory and the Speilberger State-Trait Anxiety Questionnaire at intake and every 30 days. P300 analysis was taken at intake and every week for both groups.

**Results:** In the chiropractic group; depression scores improved by 97%, anxiety scores improved by 36.5% with 100% retention rate in the chiropractic group and 0% retention rate in the Placebo group. P300 wave results improved in the chiropractic group.

**Conclusions:** We conclude that chiropractic care utilizing the Torque Release Technique® improves retention rates, psychosocial inventory assessments and prevents relapse. More research is warranted to determine the significance in the use of the P300 wave as an outcome strategy in chiropractic intervention. Subluxation-based chiropractic care should be considered as standard care in the management of addicted individuals.

**Key Words:** *P300, Depression, Anxiety, Addiction, ADHD, Electroencephalography, Torque Release Technique®, Subluxation, Adjustment, Chiropractic, Integrator®*

## Introduction

The nature of this study was to determine 1) if use of the P-300 wave has significance as an outcome assessment in the addiction treatment setting, 2) if use of the P-300 wave has significance as an outcome assessment of subluxation based chiropractic care, and 3) if the use of the P300 wave has significance as a biofeedback tool.

We hypothesized that P300 amplitude and latency will normalize with chiropractic intervention and positively correlate with favorable health and addiction outcomes including depression scores and anxiety scores. We hypothesized that P300 amplitude and latency will be more reluctant to normalize in the Placebo group and unfavorable health and addiction outcomes will be reflected.



The P300 wave appears on an electroencephalograph approximately 300ms after a stimulus. The P300 is composed of several parts that reflect an information-processing cascade when attentional and memory mechanisms are engaged.

The P300 is a correlate of neurocognitive function, meaning that conclusions can be drawn regarding a subject's cognitive processes by assessing his or her P300 wave characteristics.

Complementary Therapies in Medicine (2007) 15, 271–283

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Complementary Therapies in Medicine

www.elsevierhealth.com/journals/ctim

# Psychological response in spinal manipulation (PRISM): A systematic review of psychological outcomes in randomised controlled trials

**Nefyn H. Williams[a,*], Maggie Hendry[a], Ruth Lewis[a], Ian Russell[b], Alex Westmoreland[c], Clare Wilkinson[a]**

[a] *Department of General Practice, Cardiff University, Centre for Health Services Research/North Wales Clinical School, Gwenfro Building, Wrecsam Technology Park, Wrecsam LL13 7YP, United Kingdom*
[b] *Institute of Medical and Social Care Research, University of Wales Bangor, United Kingdom*
[c] *Wales Office of Research and Development for Health and Social Care, Cardiff, United Kingdom*

Available online 8 March 2007

**KEYWORDS**
Systematic review;
Back pain;
Neck pain;
Spinal manipulation;
Psychological outcome

**Summary**
*Background:* The most important risk factors for back and neck pain are psychosocial. Nevertheless, systematic reviews of spinal manipulation have concentrated on pain and spine related disability, and ignored psychological outcomes.
*Objective:* To assess whether spinal manipulation was effective in improving psychological outcome.
*Design:* Systematic review of randomised controlled trials (RCTs).
*Methods:* RCTs were identified by searching Medline, CINAHL, Embase, CENTRAL, AMED, PsycINFO until November 2005. Trials reporting psychological outcomes including the mental health components of generic outcomes were extracted, and combined where appropriate in meta-analyses.
*Results:* One hundred and twenty nine RCTs of spinal manipulation were identified; 12 had adequately reported psychological outcomes. Six trials with a verbal intervention comparator were combined in a meta-analysis, and found a mean benefit from spinal manipulation equivalent to 0.34 of the population standard deviation (S.D.) [95% confidence interval (CI) 0.23–0.45] at 1–5 months; 0.27 of the S.D. [95% CI 0.14–0.40] at 6–12 months. Eight trials with a physical treatment comparator were combined in a meta-analysis and found a mean benefit of 0.13 of the S.D. [95% CI 0.01–0.24] in favour of manipulation at 1–5 months; 0.11 of the S.D. [95% CI −0.02 to 0.25] at 6–12 months.
*Conclusions:* There was some evidence that spinal manipulation improved psychological outcomes compared with verbal interventions.
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## Introduction

Spinal pain is a common cause of disability and work loss,[1,2] and one of the main reasons for

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doi:10.1016/j.ctim.2007.01.008

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ORIGINAL RESEARCH

# Improvement in Depression Following Reduction of Upper Cervical Vertebral Subluxation Using Orthospinology Technique

*Glenndon C. Genthner[†],M.Div., Harris L. Friedman[†],PhD, Charles F. Studley, DC[††]*


## ABSTRACT

**Background:** It has been long speculated that chiropractic interventions may affect mental health problems. One such intervention, an Orthospinology technique to correct the occipito-atlantoaxial subluxation complex using the Grostic procedure, has been anecdotally noted to improve depressive symptoms.

**Methods:** Consequently, 15 adults were selected by their treating chiropractors as both clinically depressed and having an upper cervical subluxation, then treated with this intervention in 3 private practice settings in the southern United States. These participants were administered the Beck Depression Inventory II prior to an a Grostic correction of the upper cervical complex, as well as post-procedurally.

**Results:** A paired t-test demonstrated significant improvement in depression test scores ($t=3.96$, $df=14$, $p<0.001$).

**Conclusions:** The data supports the hypothesis that the orthospinology technique to correct the occipito-atlantoaxial subluxation complex using the Grostic procedure may relate to reduced depressive symptoms.


**Key words:** *Orthospinology, depression, occipito-atlantoaxial subluxation, upper cervical, Grostic, chiropractic*

## Introduction

The effects of chiropractic treatment on mental health variables have not been extensively studied, despite the increasingly recognized relationship between mind and body. Historically, interest in chiropractic as a mental health intervention commenced in the early 1920's. At that time, there was great optimism about chiropractic's role in treating such disorders. In fact, two major chiropractic psychiatric hospitals functioned successfully for nearly thirty years in Davenport, Iowa. Unfortunately, both hospitals closed in the 1950's, and most patient documents, including data meant for a seven-year follow-up, were destroyed. W. Heath Quigley, administrator at one of these hospitals in the 1940s, wrote clinical observations suggesting the success of chiropractic treatment on various mental illnesses, and there is some documentation supporting the fact that treatment results in these institutions were as successful, given the times, as those of comparable state psychiatric facilities.[1,2,3] For example, in one report the total admissions for one year was recorded as 72 patients with 39 discharged as "socially restored"—including patients diagnosed with such severe disorders as schizophrenia and psychotic depression.[1]

Since the pioneer days of chiropractic, numerous studies have demonstrated that a plethora of ailments may result when the vertebra are askew—and subsequently improve when they are adjusted[4]. Several of these studies linked chiropractic adjustments to reduction of mental health problems, leading to the formulation of this study's hypothesis, namely that chiropractic orthospinology may benefit individuals suffering from depressive disorders. Kessinger & Boneva, for example, conducted a study reporting significant improvements in neurocognitive function in an upper cervical treated group.[5] Goodman presented a case study of a nine-year-old female with an ADD diagnosis. After treatment of the Occipito-Atlantoaxial Subluxation Complex, symptoms reduced dramatically. She was neither taking prescription medication nor undergoing psychological intervention during the treatment period observed.[6] Similarly, Aguilar, Grostic & Pfleger recently conducted a study that attributed upper cervical adjustment of the atlas to improved functioning in autism.[7] The success of upper cervical care on these disorders suggests that depressive disorders may also benefit from adjustment of the atlas.

One study similar to ours, conducted in 1975 at the Psychoeducational and Guidance Services in College Station, Texas, concluded that chiropractic treatment was effective in reducing symptoms common in a wide range of learning and behavioral dysfunctions, and in fact was 20% to 40% more effective than commonly used medications.[8] Limitations of this study, however, included a small experimental group ($n = 12$), lack of specificity in regards to the chiropractic procedures used, and imprecise descriptions of which part or parts of the spine were adjusted. This study concluded that "chiropractic treat-

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ORIGINAL RESEARCH

# Changes in Physical State and Self-Perceptions in Domains of Health Related Quality of Life Among Public Safety Personnel Undergoing Chiropractic Care

*Wesley McAllister, B.A., D.C.*[1] *and W.R. Boone, Ph.D., D.C.*[2]


## ABSTRACT

**Objective:** A pilot study was conducted at Sherman College of Straight Chiropractic, Spartanburg SC, with volunteers primarily from the North Spartanburg Fire and Emergency Services Department. The study was conducted to evaluate the impact of chiropractic care on the physical and self-perceived health related benefits of public safety personnel. Preliminary data regarding their care has been collected and analyzed. Over an average of 5.5 months volunteers received routine chiropractic care at the College Health Center. Each subject was assessed on a weekly basis and adjusted when necessary.

**Methods:** Physical assessments were conducted on 10 volunteers during the initial visit and at the re-assessment period. As well, a Health Related Quality of Life Survey (HRQL) was completed by each subject at the initial assessment and the following reassessment. Physical assessments included: (a) visual postural analyses (6 tests), (b) cervical range of motion (6 tests), (c) lumbar range of motion (6 tests) (d), spinal balance and leg length (5 tests), (e) orthopedics (19 tests), (f) motor strength (11 tests), (g) deep tendon reflexes (5 tests), (h) superficial reflexes,(3 tests) and (i) sensory testing (14 tests). Positive tests were assigned a numeric of +1 and negative findings a zero. Self-perceptions were also assessed by Cohen's method of determining effect size (ES), or size of the clinical effect.

**Results:** As a group, the ten volunteers decreased from an average of 16.0 positive findings to 9.5 positive findings, a statistically significant reduction ($p = 0.021$). In addition, volunteers' self-evaluations of HRQL domains included: physical well-being, mental/emotional state, stress management, life enjoyment, and overall quality of life, When tallied together over the average 5.5 months of care, these domains represented a significant change ($p = 0.040$). As well, a 6th domain, referred to as a "wellness index," representing the sum of the 5 domains, was also significantly improved ($p = 0.000$). The ES for improvement in all HRQL domains was large, ($0.81 \pm 0.44$), ranging from 0.35 to 1.30.

**Conclusion:** The results of this preliminary study revealed that ten volunteers showed significant improvements in physical assessment findings and self perceptions in health related domains while undergoing an average of 5.5 months of chiropractic care. The changes also appeared to elicit a large clinical effect with regard to self-ratings. Further study, including individuals from various areas of public service, will be required to validate these findings.


**Key Words:** *Chiropractic, public safety personnel, vertebral subluxation*

## Introduction

The protective, and often life saving role that public safety personnel fill in the day to day life of global citizens is historically evident. However, governmental support for the safety and advanced training, especially for firefighters, is sorely lacking.[1,2] Moreover, public safety services, to be successful, must be matched to personality types suited to


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2. Director of Research, Sherman College of Straight Chiropractic, Spartanburg SC.




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J Cancer Surviv (2007) 1:161–166
DOI 10.1007/s11764-007-0018-x

# Short term correlates of the Neuro Emotional Technique for cancer-related traumatic stress symptoms: A pilot case series

**Daniel A. Monti · Marie E. Stoner · Gail Zivin · Martha Schlesinger**

Published online: 9 May 2007
© Springer Science + Business Media, LLC 2007

**Abstract**
*Introduction* As many as one quarter of all cancer survivors report traumatic stress symptoms from cancer-related experiences. While the majority of these patients do not meet the criteria for posttraumatic stress disorder (PTSD), there is growing evidence that subsyndromal symptoms can significantly contribute to functional impairment and negative health outcomes. Treatment options for the hallmark symptoms of traumatic stress—unpleasant, intrusive thoughts and avoidant behaviors—have not been well investigated for the cancer survivorship population.
*Materials and methods* Seven female cancer survivors with traumatic stress symptoms from cancer-related experiences and no other major psychopathology, were enrolled to receive three sessions of Neuro-Emotional Technique (NET), a brief, targeted treatment that combines traditional desensitization principles with complementary modalities.
*Results* Psychological outcome measures (Impact of Event Scale (IES) and Subjective Units of Distress (SUD) and physiological measures (Heart Rate (HR) and Skin Conductance Level (SCL) demonstrated the following changes: 71% on IES, 88% SUD, 74% on HR, and 65% on SCL following the intervention. Statistically significant changes were observed for all four parameters, and effect size *g* for proportion improved were 0.50 each for IES, SUD, and HR, and 0.20 for SCL.
*Conclusions* These cases suggest feasibility of the NET intervention for cancer-related traumatic stress and the potential for change in symptoms and physiological reactivity. Further investigation is needed to determine the specific and long-term effects of such an approach.
*Implications for cancer survivors* Traumatic stress from cancer-related experiences might represent a constellation of symptoms that are amenable to brief, targeted interventions.

**Keywords** Cancer survivors · Neuro Emotional Technique · NET · Traumatic stress · Distressing recollections · Brief psychotherapy

## Introduction

Receiving a cancer diagnosis can be a highly stressful event and the cancer illness experience adds many stressors. It is well documented that stress can contribute to negative health outcomes in cancer survivors; hence, addressing stress has become a priority issue in cancer treatment and research [19].

Traumatic stress refers to a category of conditions where a particular life threatening event or series of events causes ongoing distress beyond a certain time period from the original occurrence of the event or events. Approximately one-fourth of all cancer survivors suffer from traumatic stress symptoms [15]. However, only a minority (3–10%) of these patients meets the criteria for posttraumatic stress disorder [1]. Therefore, the literature has referred to the most common manifestation of traumatic stress in cancer patients as "distressing recollections" of cancer-related expe-

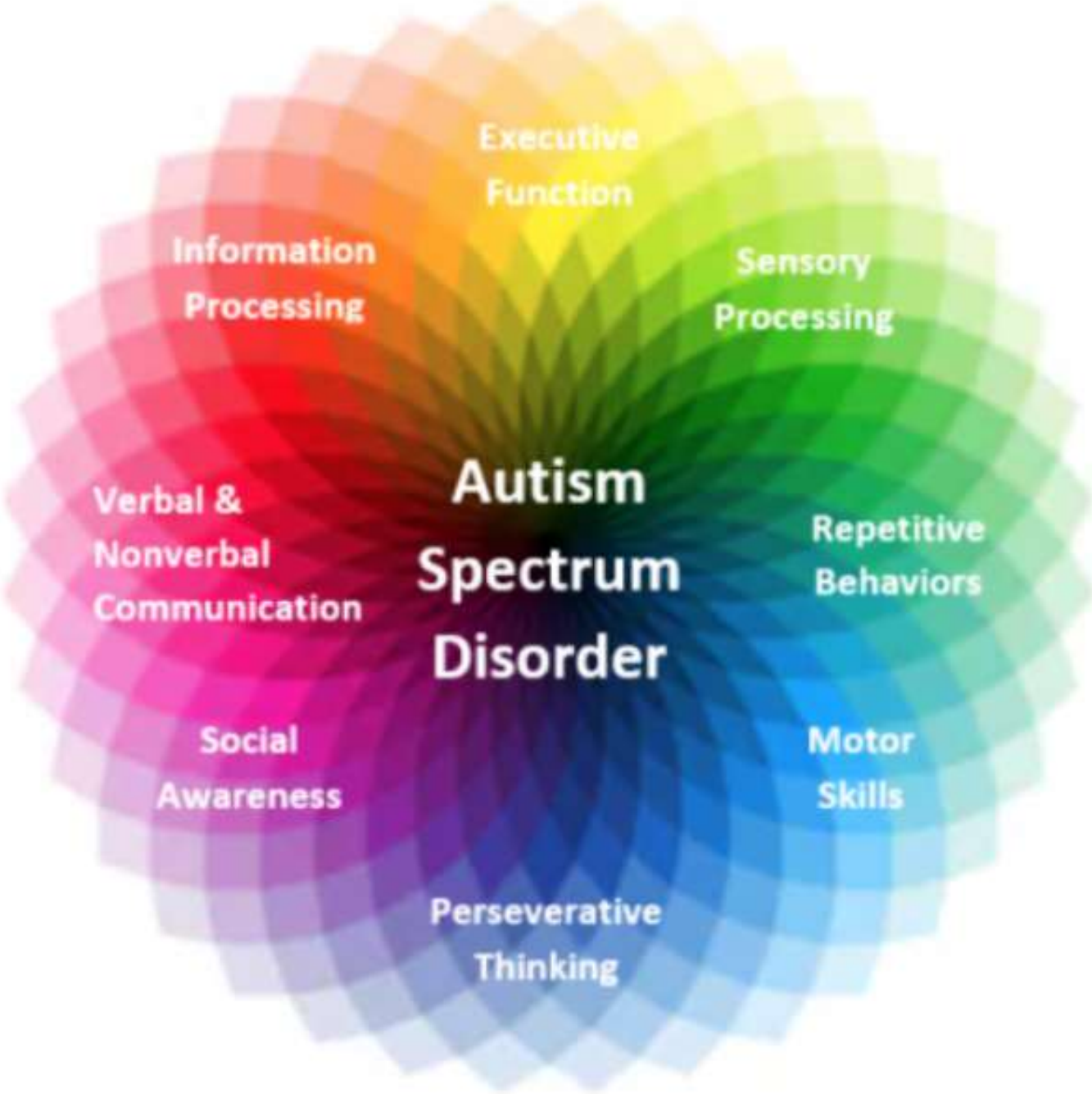
This study was supported by the O.N.E. Research Foundation

D. A. Monti · G. Zivin
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Executive Function
Information Processing
Sensory Processing
Autism Spectrum Disorder
Verbal & Nonverbal Communication
Repetitive Behaviors
Social Awareness
Motor Skills
Perseverative Thinking

# No Benefits

According to the Board of the British Columbia College of Chiropractors, chiropractic doesn't have ***any beneficial effect*** on childhood diseases, disorders or conditions

British Columbia College of Chiropractors
Efficacy Claims Policy

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# No Evidence

According to Katherine Pohlman, a chiropractic researcher at Parker University:

**"We don't have any current evidence to make any sound, safe statements"**

in regards to Autism & Chiropractic.

**Katherine A Pohlman, DC, DICCP, MS, PhD(c)Chiropractic**
**Clinical Research Scientist Parker University Dallas Texas**
**The Atlantic. June 22, 2019**

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# “There’s no credible evidence and it breaks my heart to say it”



https://www.screencast.com/t/GdohqUFE

ORIGINAL RESEARCH

# Improved Brain Development in 37 Children Undergoing Chiropractic Care for Correction of Vertebral Subluxation: A Retrospective Analysis of Health Outcomes

*Sarah Hock, DC, CACCP[1] & Amy Spoelstra, DC[2]*

## Abstract

**Objective**: To describe the care and outcomes of subluxation-based chiropractic care for several children with Neuro-Deflective Disorders™ associated with development.

**Clinical Features**: Chiropractic care of children with Neuro-Deflective Disorders™ via subluxation-based chiropractic care using neurological, developmental, functional, structural, and subjective parental outcome assessments.

**Interventions and Outcomes:** Vertebral subluxations when found at specific spinal segments were adjusted. During care, patient outcomes were measured via both objective and subjective measurements for initial and re-evaluation purposes. At the conclusion of each care plan patients' outcomes showed marked improvement in both objective and subjective measurements demonstrating improvement in the quality of life for these patients.

**Conclusion**: Chiropractic adjustments, which focus on the reduction of vertebral subluxation, appeared to be beneficial for children with Neuro-Deflective Disorders™. When measuring and assessing quality of life for these patients and families there was a positive correlation between chiropractic care and improvement in measured areas.

**Key words:** *Subluxation, adjustment, pediatric, Neuro-Deflective Disorders™, development, neurodevelopmental disorders*

**Introduction**

In this study we address two main questions both initially and as a continuous outcome assessment measure. We want to collect data to determine if there are clinical indicators demonstrating alterations in input, processing, and output as it relates to a communication between the brain and the body. We are also interested in assessing the tools in which a person is primarily skilled in, to process their world and how that relates to their ability to efficiently engage, connect, and learn from their environment in a sophisticated way.

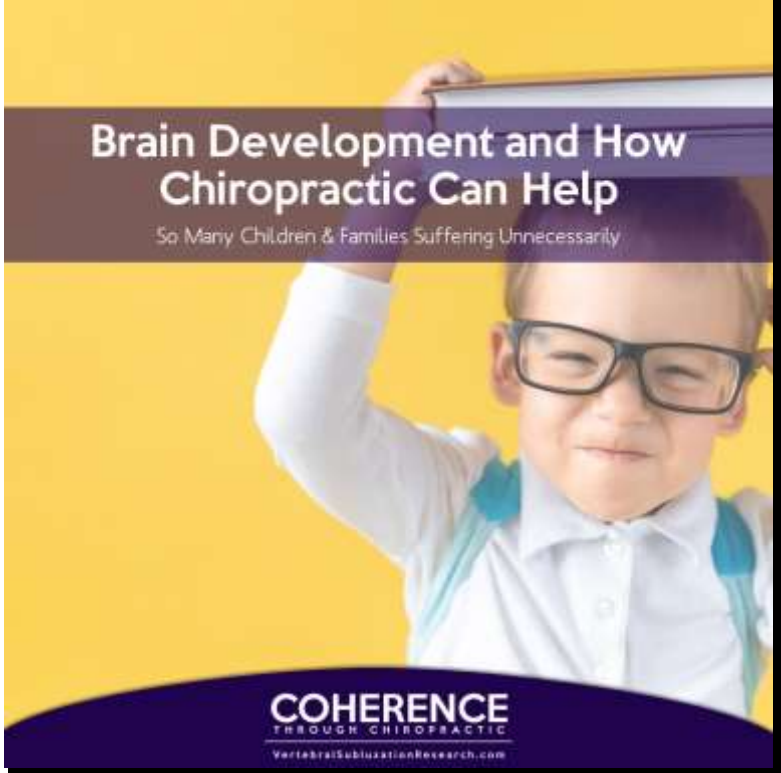
In this study we collected outcomes associated with development and processing in pediatric patients.

We know that subluxation can alter input, increasing afferent input to the nervous system, lowering adaptive thresholds, and creating hypersensitivity to "normal" stimuli. Altering input thus alters output; it is logical to think that this change in output can be measured via the functionality of the nervous system and, in this study, developmental skills and how the body interacts with the external environment.[1]

Chiropractic is founded on the assessment and correction of interference in the communicative neurology between the

1. Private Practice of Chiropractic, Boiling Springs, SC
2. Private Practice of Chiropractic, Coeur d'Alene, ID







# Brain Development and How Chiropractic Can Help

## So Many Children & Families Suffering Unnecessarily

Recent research reported in the ***Journal of Pediatric, Maternal & Family Health – Chiropractic*** on children with a number of challenges that share their origin with delayed brain development show that chiropractic benefits these children.

Research is revealing that there is a relationship between abnormalities in the spine, the nervous system and brain with basic science research showing that the proper development and function of the brain relies on proper structure and movement of the spine from an early age.

Research has shown not only that the brain relies on normal structural integrity and joint movement, but that complex neurological communication and pathways involved in helping humans balance and orient themselves in space as well as develop socially, are tied into spinal biomechanics and their related neurological pathways.

We are now seeing more and more basic science and clinical research showing the relationship between abnormal spinal function and the diagnosis of all types of developmental delays. In older children the situation becomes worse due to a huge increase in sedentary behavior in children.

Researchers believe that the increase in the diagnosis of learning disorders, ADHD, pervasive developmental disorder, Tourette's Syndrome, obsessive compulsive disorder and other neurodevelopmental challenges, have their root in a "perfect storm" of abnormal spinal development coupled with cultural changes.

In a recently published study researchers Sarah Hock, DC, CACCP & Amy Spoelstra, DC report on their research that included 37 children with what they refer to as "Neuro-Deflective Disorders". Such disorders according to the researchers impact how children develop to engage, learn, and connect with their environment and this leads to less efficient responses being used by them.

In the clinical study, the researchers examined these children and found structural shifts along their spines. These findings were confirmed by neurological and functional assessments that measure the health of the nervous system. Research has already shown that these structural shifts can lead to obstruction of the nerves, and it is this obstruction, called *vertebral subluxations*, that chiropractors correct.

Once these subluxations were identified the researchers provided chiropractic care and used the same assessments to monitor progress. They also collected data on the quality of life of these children from the parents. The outcome assessments showed improvement in learning, social skills and interpersonal skills, sensory integration, and overall health. These improvements occurred along with reductions in the vertebral subluxations in their spines.

The study's authors called for additional research to further investigate the clinical implications of chiropractic in this population.

Reference:
Improved Brain Development in 37 Children Undergoing Chiropractic Care for Correction of Vertebral Subluxation: A Retrospective Analysis of Health Outcomes. Sarah Hock, DC, CACCP & Amy Spoelstra, DC. Journal of Pediatric, Maternal & Family Health, Chiropractic – October 3, 2022 – Pages 86-94



### Brain Function & Chiropractic - FACTS

Research is revealing that there is a relationship between abnormalities in the spine, the nervous system, and the brain.

Basic science and clinical research shows that the proper development of the brain relies heavily on proper structure and movement of the spine from an early age.

Research has shown not only that the developing brain relies on normal structural integrity and joint movement, but that complex neurochemical communication and pathways involved in helping humans to "feel good" are tied into spinal biomechanics and their related neurological pathways.

Neurodevelopmental challenges may be related to how the entire body communicates with the brain and the most critical area for this is the spine.

Researchers believe that the increase in the diagnosis of such disorders as autism, ADHD, pervasive developmental disorder, Tourette's Syndrome, obsessive compulsive disorder and other neurodevelopmental disorders, have their root in a "perfect storm" of abnormal spinal development.

People's nervous systems need the constant stimulation of movement in order to develop and function properly – especially from the spine. Abnormal position or movement of the spinal vertebra can develop and result in structural shifts that lead to nerve obstruction. It is this obstruction, called vertebral subluxations that chiropractors correct.

Chronic problems tend to arise when vertebral subluxations are left uncorrected. By reducing the subluxations, chiropractic improves nerve flow and function. The chiropractic adjustment is the means by which the subluxations are reduced and it is a safe, specific force applied to spinal joints.

# Autism/Subluxation Models

- Bipedalism - abnormalities in postural development or activity may disrupt cerebellar and cortical maturation.
- Cognition & motor functions tied. Motor incoordination & disruptions in executive functions are a common thread in developmental disorders. Due to inability to bind motor and cognitive functions, resulting from understimulation of the cerebellum and thalamus
- Dysfunction of hemisphericity whereby there is a failure to achieve equal activity between the left and right hemispheres.

# Autism/Subluxation Models

- ***Brain Reward Cascade***: In vertebrates, the vertebral motor units are intimately related with the *Brain Reward Cascade* by virtue of the nocioceptive reflex from vertebral joints to the limbic system where the cascade takes place.

- ***Kinematic Imbalance due to Suboccipital Strain*** (KISS Syndrome). Biedermann. Upper cervical dysfunctions causing: torticollis, microsomy, scoliosis, motor asymmetries, and slowed motor development.

- ***Blocked Atlantal Nerve Syndrome.*** Gutmann. Central motor impairment and development. Causation lay in the neurophysiological connections between the upper cervical spine and the brainstem

# Autism/Subluxation Models

- **Cerebral Metabolic Changes**
- **Cerebrospinal Fluid Flow Alterations**
- **Blood Flow Alterations**

# Adaptability

Biological pathways to adaptability – interactions between genome, epigenome, nervous system and environment for adaptive behavior.

C. Wolf and D. E. J. Linden

Genes, Brain and Behavior (2012) 11: 3–28

# Estudo dos potenciais evocados auditivos em autismo*****

## Study of auditory evoked potentials in autism

Fernanda Cristina Leite Magliaro*
Claudia Inês Scheuer**
Francisco Baptista Assumpção Júnior***
Carla Gentile Matas****

**Abstract**
Background: electrophysiological assessment of hearing in a
findings obtained in the electrophysiological assessments of
these to the results obtained for individuals of the same age
16 individuals with autism (study group) and 25 normal indiv
eight to 20 years underwent anamnesis, pure tone audiomet
measures, brainstem auditory evoked potential (BAEP), m
potential (P300). Results: the study group presented a
showing statistically significant differences when co
of alterations found in the study group the follow
brainstem alteration in the BAEP, both (electro
and absence of response in the P300. In the
between the groups were found only fo BAEP regard
interpeaks I-III and I-V. Conclusion: autistic individuals pr
impairment in the brainstem auditory pathway and corticals
**Key Words:** Auditory Evoked Potentials; Audiometry; Autistic Disorder; Pervasive Child Development Disorders.

**Resumo**
Tema: avaliação eletrofisiológica da audição em indivíduos com autismo. Objetivo: caracterizar os achados das avaliações eletrofisiológicas da audição em indivíduos com autismo, bem como comparar seus resultados aos obtidos em indivíduos com desenvolvimento típico da mesma faixa etária. Método: foram realizadas anamnese, audiometria tonal, logoaudiometria, medidas de imitância acústica, potenciais evocados auditivos de tronco encefálico (PEATE) e de média latência (PEAML), e potencial cognitivo (P300), em 16 indivíduos com autismo (grupo pesquisa) e 25 normais (grupo controle), com idades entre oito e 20 anos. Resultados: o grupo pesquisa apresentou resultados alterados em todos os potenciais evocados auditivos, havendo diferença estatisticamente significante quando comparado ao grupo controle. Foi observada uma maior ocorrência de alteração do tipo tronco encefálico baixo no PEATE, do tipo Ambas no PEAML, e ausência de resposta no P300, para o grupo pesquisa. Na análise dos dados quantitativos, verificou-se que apenas para o PEATE ocorreu diferença estatisticamente significante entre os grupos, com relação às latências das ondas III e V e interpicos I-III e I-V. Conclusão: indivíduos com autismo apresentam alterações no PEATE e P300, sugerindo comprometimento da via auditiva em tronco encefálico, áreas subcorticais e corticais.
**Palavras-Chave:** Potenciais Evocados Auditivos; Audiometria; Transtorno Autístico; Transtornos Globais do Desenvolvimento Infantil.

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*****Trabalho Realizado no Laboratório de Investigação Fonoaudiológica em Potenciais Evocados Auditivos do Departamento de Fisioterapia, Fonoaudiologia e Terapia Ocupacional da FMUSP.

"Autistic individuals present altered BAEP and P300, suggesting impairment in the brainstem auditory pathway and cortical/subcortical area."

Hindawi
Autism Research and Treatment
Volume 2018, Article ID 5093016, 8 pages
https://doi.org/10.1155/2018/5093016

Hindawi

*Research Article*

# A Study of the Correlation between VEP and Clinical Severity in Children with Autism Spectrum Disorder

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Visual evoked potential (VEP) is a technique used to assess the brain's ele e to visual stimuli. T
were to examine neural transmission within the visual pathway throu sting in preschool children w
disorder (ASD) and compare it to age-matched controls, as well ch for a correlation between the VEP parameters and the
symptoms of ASD. Participants were composed of ASD childr (9 males) and typically developing children (8 males and 4 females),
aged between 3 and 5 years. Checkerboards were chosen as the pattern-reversal VEP. The clinical severity of ASD was assessed using
the Autism Treatment Evaluation Checklist (ATEC) and the Vineland Adaptive Behavior Scales 2nd edition (VABS-II). Our findings
demonstrated that children with ASD had significantly longer N145 latency compared to the controls. A longer N145 latency corre-
lated with a higher score of ATEC within the sensory/cognitive awareness subdomain. In addition, a slower N145 response was also
associated with a lower VABS-II score within the socialization domain. The correlation between longer VEP latency and abnormal
behaviors in children with ASD suggests a delayed neural communication within other neural circuits, apart from the visual path-
way. These lines of evidence support the possibility of using VEP, along with clinical parameters, for the assessment of ASD severity.

"Using VEP as the index of neural processing within the visual system of children with ASD could become a possible tool for the clinical assessment of the disease severity."

## 1. Introduction

Autism is a common neurodevelopmental disorder characterized by impaired communication, deficits in social skills, and abnormal behaviors. The current version of the Diagnostic and Statistical Manual of Mental Disorders (DSM) by the American Psychiatric Association (APA), the DSM-5, collapses various diseases within the group of pervasive developmental disorders (PDD), including autism disorder, into a single disorder, the autism spectrum disorder (ASD) [1]. The diagnosis of ASD is strongly dependent on clinical assessment via a medical interview with the parents or a

The well-accepted pathogenesis of autism is the abnormality in neural communication [2]. Impaired long-distance brain connectivity is also commonly observed in a number of autism researches [3–5]. An evaluation of brain connectivity is usually performed by a magnetic resonance imaging (MRI) based technique called diffusion tensor imaging (DTI). However, this neuroimaging technique requires an experienced neuroradiologist to perform and to interpret the results, demanding much time for data analysis, and is relatively quite expensive. In addition, DTI also requires subjects to limit their movements. It is, therefore, a rather difficult technique to perform on children with autism. Moreover, evidence from

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PLOS ONE

# Investigating the Autonomic Nervous System Response to Anxiety in Children with Autism Spectrum Disorders

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## Abstract

Assessment of anxiety symptoms in autism spectrum disorders (ASD) is a challenging task due to the symptom overlap between the two conditions as well as the difficulties in communication and awareness of emotions in ASD. This motivates the development of a physiological marker of anxiety in ASD that is independent of language and does not require observation of overt behaviour. In this study, we investigated the feasibility of using indicators of autonomic nervous system (ANS) activity for this purpose. Specially, the objectives of the study were to 1) examine whether ... causes significant measurable changes in indicators of ANS in an ASD population, and 2) characterize the pa... changes in ASD. We measured three physiological indicators of the autonomic nervous system respon... electrodermal activity, and skin temperature) during a baseline (movie watching) and anxiety condition (S... a sample of typically developing children (n = 17) and children with ASD (n = 12). The anxiety condition ca... changes in heart rate and electrodermal activity in both gr... between the two groups. In particular, the ASD group showed e... conditions. Elevated and blunted phasic electrodermal activity were found in... conditions, respectively. Finally, the ASD group did not show the typical decrease ... anxiety. These results suggest that 1) signals of the autonomic nervous system may be use... children with ASD, and 2) ASD may be associated with an atypical autonomic response to anxiety tha... with sympathetic over-arousal and parasympathetic under-arousal.

**Citation:** Kushki A, Drumm E, Pla Mobarak M, Tanel N, Dupuis A, et al. (2013) Investigating the Autonomic Nervous System Response to Anxie... Autism Spectrum Disorders. PLoS ONE 8(4): e59730. doi:10.1371/journal.pone.0059730

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**Competing Interests:** The authors AK, ED, MM, NT, AD and TC have declared that no competing interests exist. EA has consulted without f... Neuropharm and NOVARTIS and has received a consultation fee from Seaside Therapeutics. This does not alter the authors' adherence to ... policies on sharing data and materials.

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"These results suggest that 1) signals of the autonomic nervous system may be used as indicators of anxiety in children with ASD, and 2) ASD may be associated with an atypical autonomic response to anxiety that is most consistent with sympathetic over-arousal and parasympathetic under-arousal.'"

## Introduction

Autism spectrum disorders (ASDs) are a group of neuro-developmental disorders that are characterized by a triad of features: impairments in communication, deficits in social interactions, and presence of restrictive repetitive and stereotypical behaviours, interests, or activities. In addition to difficulties in these three core domains, ASDs are also associated with various co-morbidities, including psychiatric disorders. Among these, anxiety is one of the most pressing clinical concerns due to its negative impact on physical and emotional well-being [1,2], high prevalence in this population [3], and its bidirectional relationship with the core deficits of ASD. Anxiety concerns in ASD present across all levels of functioning [4] and persist over the life span [4].

Anxiety symptoms are closely linked to the core deficits of ASD. On the one hand, core-deficits of ASD may contribute to ... anxiety. On the other hand, anxiety may drive and/or exacerbate core-deficits in ASD. For example, social anxiety may lead to further avoidance of social situations, promoting isolation from social groups [3]. In fact, anxiety has been correlated with greater degrees of loneliness and social disability [7], decreased participation in school and community [2], and negative externalizing behaviours such as aggression and self-injury [3,8,9]. Moreover, repetitive behaviors seen in ASD, such as hand flapping, rocking, and echolalia, may be anxiety coping mechanisms [6].

Because of the close relationship between ASD and anxiety, assessment of anxiety symptoms in children with ASD is a challenging task. Such assessment relies on self-reports or observation of overt behaviour. Self-reports are often not reliable in ASD because of deficits in communication as well as difficulties with emotional awareness and introspection [10]. Behavioural symptoms of anxiety are also difficult to recognize in ASD due to

frontiers in Neuroscience

REVIEW
published: 09 November 2017
doi: 10.3389/fnins.2017.00627

# Connectopathy in Autism Spectrum Disorders: A Review of Evidence from Visual Evoked Potentials and Diffusion Magnetic Resonance Imaging

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Individuals with autism spectrum disorder (ASD) show superior ... processing fine details; however, they often exhibit impairments of ge... motion perception, and visual attention as well as core social deficits. Inc... has suggested that social deficits in ASD arise from abnormal function... connectivities between and within distributed cortical networks that a... social information processing. Because the human visual system... a set of parallel, hierarchical, multistage network systems, w... altered connectivity of visual networks contributes to so... ASD. In the present review, we focused on studies of a... attention networks in ASD using visual evoked potenti... (ERPs), and diffusion tensor imaging (DTI). A s... conducted in our laboratory have demonstra... alterations ... enhancement) of visual and attention netw... SD. Recent data have suggested that the atypical visual perception observed... SD is caused by altered connectivity within parallel visual pathways and attenti... networks, thereby contributing to the impaired social communication observed in ASD. Therefore, we conclude that the underlying pathophysiological mechanism of ASD constitutes a "connectopathy."

**Keywords: autism spectrum disorder, connectopathy, visual perception, attention, visual evoked potentials, event-related potentials, diffusion tensor imaging, magnetic resonance imaging**

OPEN ACCESS

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## INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition that is characterized by alterations in social communication and interaction; it co-occurs with restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2013). Recent neuroimaging studies have suggested that ASD is a disconnection syndrome that is associated with connectivity alterations between distributed brain areas recruited during social information processing, rather

"Therefore, we conclude that the altered connectivity of visual processing networks may contribute to impaired social communication exhibited in ASD. The underlying pathophysiological mechanism of ASD can be considered a '**connectopathy**'"

Hindawi Publishing Corporation
Neurology Research International
Volume 2015, Article ID 794829, 20 pages
http://dx.doi.org/10.1155/2015/794829

Hindawi

*Review Article*

# The Role of the Craniocervical Junction in Craniospinal Hydrodynamics and Neurodegenerative Conditions

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The craniocervical junction (CCJ) is a potential choke point for craniospinal hydr
contributory role in the pathogenesis and progression of neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, MS, and ALS, as well as many other neurological conditions including hydrocephalus, idiopathic intracranial hypertension, migraines, seizures, silent-strokes, affective disorders, schizophrenia, and psychosis. The purpose of this paper is to provide an overview of the critical role of the CCJ in craniospinal hydrodynamics and to stimulate further research that may lead to new approaches for the prevention and treatment of the above neurodegenerative and neurological conditions.

"The craniocervical junction is a potential choke point for craniospinal hydrodynamics . . ."

## 1. Introduction

The CCJ comprises the base of the skull, atlas (C1), and axis (C2), as well as muscles and connective tissues that connect the skull to the cervical spine. It further includes the dura mater and dentate ligament attachments of the brain and cord to the foramen magnum and upper cervical spine [1–8]. Moreover, the CCJ links the vascular and cerebrospinal fluid (CSF) systems in the cranial vault to those in the spinal canal. Craniospinal hydrodynamics refer to the relationship

blood into the brain and cord during systole causing a spike in intracranial pressure (ICP). To prevent damage to the brain from excess pulsatility pressure, the increase in volume must be matched by a simultaneous increase in drainage of venous blood and CSF from the cranial vault. In addition to the internal jugular veins humans developed an accessory drainage system comprising emissary veins that link the dural sinuses to the vertebral venous plexus and serve as the primary drainage routes of the brain during upright posture

# Regional Cerebral Blood Flow

"The decrease in rCBF in ASD is a global event, which involves the bilateral frontal, temporal, limbic system and basal ganglias"

Chin Med J (Engl). 2011 May;124(9):1362-6.

Regional cerebral blood flow in children with autism spectrum disorders: a quantitative $^{99}$mTc-ECD brain SPECT study with statistical parametric mapping evaluation.

Yang WH1, Jing J, Xiu LJ, Cheng MH, Wang X, Bao P, Wang QX.

Laura Stiles, Editor

December 17, 2015

# Evidence of Unstable Blood Flow in Autistic Brains

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Researchers found increased levels of the proteins nestin and CD34 in autistic brains, molecular markers of angiogenesis.

A team of scientists has found evidence that people with autism have unstable vessels in the brain which prevents the proper delivery of blood flow, according to research published in the *Journal of Autism and Developmental Disorders*.

"In a typical brain, blood vessels are stable, thereby ensuring a stable distribution of blood," said Patricia Whitaker-Azmitia, PhD, professor in the Department of Psychology and director of the Graduate Program in Integrative Neurosciences at Stony Brook University, N.Y., in a statement. "Whereas in the autism brain, the cellular structure of blood vessels continually fluctuates, which results in circulation that is fluctuating and, ultimately, neurologically limiting."

For their study, the researchers examined human postmortem brain tissue both from normal brains and from brains with a **diagnosis of autism**. During microscopic analysis, the researchers were blind to whether the tissue came from a normal or autistic brain.

In the autistic brain tissue, the researchers found the presence of angiogenesis, the creation of new blood vessels. They did not find this in the normal brain tissue.

# Fluctuating Cellular Structure

“In the autism brain, the cellular structure of blood vessels continually fluctuates, which results in circulation that is fluctuating and, ultimately, neurologically limiting.”

# Theory of Mind

"The perfusion abnormalities seem to be related to the cognitive dysfunction observed in autism, such as deficits in ToM, abnormal responses to sensory stimuli, and the obsessive desire for sameness"

Brain. 2000 Sep;123 ( Pt 9):1838-44.
Abnormal regional cerebral blood flow in childhood autism.
Ohnishi T1, Matsuda H, Hashimoto T, Kunihiro T, Nishikawa M, Uema T, Sasaki M.

# Theory of Mind

**The ability to understand other people's thoughts and emotions**

doi:10.1093/brain/awt166 Brain 2013: 136; 2825–2835 | 2825

BRAIN
A JOURNAL OF NEUROLOGY

# Early brain enlargement and elevated extra-axial fluid in infants who develop autism spectrum disorder

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Prospective studies of infants at risk for autism spectrum disorder have provided important clues about the early behavioural symptoms of autism spectrum disorder. Diagnosis of autism spectrum disorder, however, is not currently made until at least 18 months of age. There is substantially less research on potential brain-based differences in the period between 6 and 12 months of age. Our objective in the current study was to use magnetic resonance imaging to identify any consistently observable brain anomalies in 6–9 month old infants who would later develop autism spectrum disorder. We conducted a prospective infant sibling study with longitudinal magnetic resonance imaging scans at three time points (6–9, 12–15, and 18–24 months of age), in conjunction with intensive behavioural assessments. Fifty-five infants (33 'high-risk' infants having an older sibling with autism spectrum disorder and 22 'low-risk' infants having no relatives with autism spectrum disorder) were imaged at 6–9 months; 43 of these (27 high-risk and 16 low-risk) were imaged at 12–15 months; and 42 (26 high-risk and 16 low-risk) were imaged again at 18–24 months. Infants were classified as meeting criteria for autism spectrum disorder, other developmental delays, or typical development at 24 months or later (mean age at outcome: 32.5 months). Compared with the other two groups, infants who developed autism spectrum disorder ($n = 10$) had significantly greater extra-axial fluid at 6–9 months, which persisted and remained elevated at 12–15 and 18–24 months. Extra-axial fluid is characterized by excessive cerebrospinal fluid in the subarachnoid space, particularly over the frontal lobes. The amount of extra-axial fluid detected as early as 6 months was predictive of more severe autism spectrum disorder symptoms at the time of outcome. Infants who developed autism spectrum disorder also had significantly larger total cerebral volumes at both 12–15 and 18–24 months of age. This is the first magnetic resonance imaging study to prospectively evaluate brain growth trajectories from infancy in children who develop autism spectrum disorder. The presence of excessive extra-axial fluid detected as early as 6 months and the lack of resolution by 24 months is a hitherto unreported brain anomaly in infants who later develop autism spectrum disorder. This is also the first magnetic resonance imaging evidence of brain enlargement in autism before age 2. These findings raise the potential for the use

# CSF

This study confirms and extends previous findings that increased extra-axial CSF is detectable at 6 months in high-risk infants who develop ASD.

Increased Extra-axial Cerebrospinal Fluid in High-Risk Infants Who Later Develop Autism
Shen, Mark D.Piven, J. et al.
Biological Psychiatry , Volume 82 , Issue 3 , 186 - 193



# Autism

Integrative Review of the Literature – January 2019

# Neurodevelopmental Disorders and Chiropractic: A Systematic Review of the Literature

*Jeffrey Holuszko BS, DC[1], Phillip Falardeau BS, DC[2], Cameron Banks, BS, DC[3], Hailey Coonrad BS, DC[4], Jerome Lubbe BA, DC[5], Kenichi Oumi BA, DC[6], Joseph Ritola BA, DC[7], Jill Smith BS, DC[8], Nicole Tukdarian BA, DC[9]*

## Abstract

**Objective:** To provide a comprehensive analysis of the current body of scientific literature regarding the chiropractic management of a wide variety of neurodevelopmental disorders.

**Methods:** A literature search was performed using PubMed, MANTIS, the Index to Chiropractic Literature, McCoy Press, Galileo, and ScienceDirect. Inclusion criteria consisted of full-text peer-reviewed articles written in English as they related to the efficacy of chiropractic management of neurodevelopmental disorders.

**Results:** 51 articles were selected. The results were: Three Randomized Controlled Trials (RCT), 7 Reviews of Literature, three Case Series, 34 Case Studies and three Survey/Commentaries.

**Conclusion:** There is a definite need for RCTs and subsequent systematic reviews of RCTs. Of research obtained in this study, the majority of articles dealt specifically with Autism Spectrum Disorder (ASD) and attention deficit disorder (ADD)/Attention Deficit Hyperactivity Disorder (ADHD) and were predominantly case studies. The chiropractic community should see this as a call to action to provide more substantive research regarding neurodevelopmental disorders.

**Key Terms**: *Chiropractic, subluxation, pervasive developmental disorders (PDD), ADD, ADHD, learning disorders, sensory processing disorders, developmental delays, developmental, Epilepsy, Autism Spectrum Disorders, ASD, Bipolar*

## Introduction

*Definition*

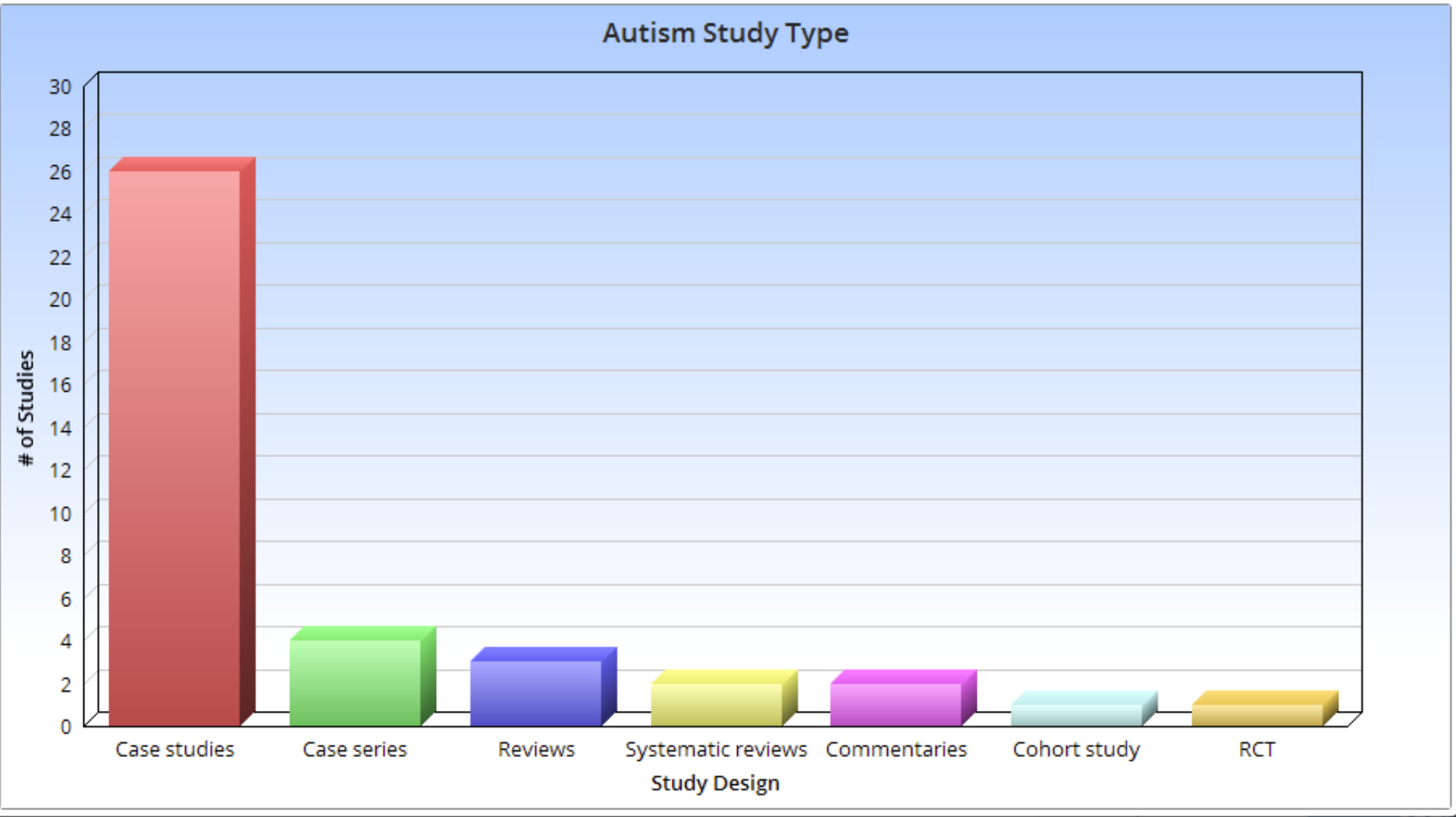
Neurodevelopmental disorders are disabilities associated primarily with the functioning of the neurological system and brain. According to *Pediatric Chiropractic*[1] these include but are not limited to Attention Deficit Disorder (ADD), Attention Deficit Hyperactivity Disorder (ADHD), learning disorders, sensory processing disorders, developmental delays, Cerebral Palsy (CP), mental retardation, epilepsy & seizure, Autism Spectrum Disorders (ASD) and Bipolar Disorder (BD). Possible etiologies for neurodevelopmental disorders involve environmental, biological and/or genetic factors.

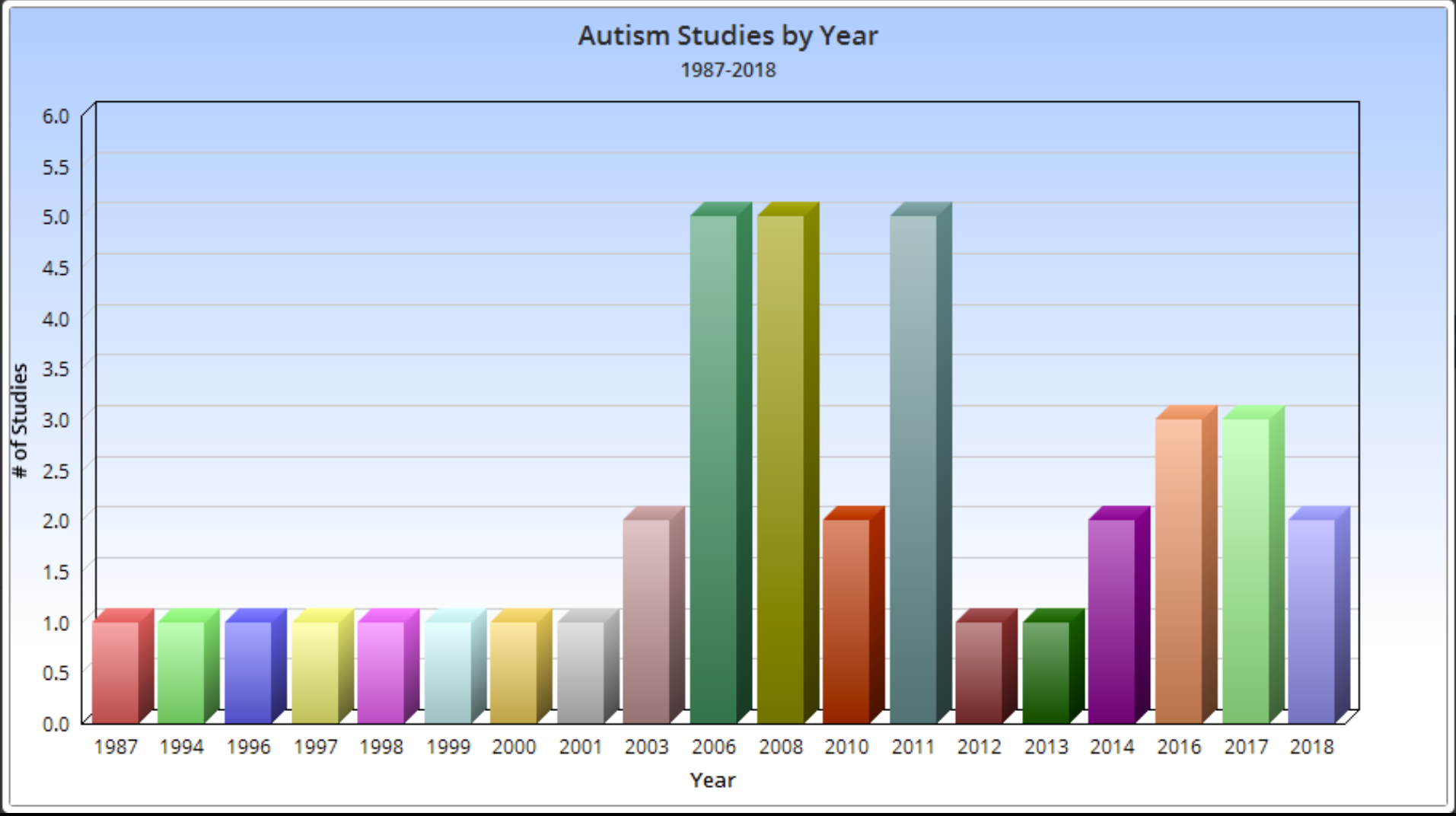
It is important to note the etiology of neurodevelopmental disorders is not the focus of this review. Rather, we focus on the systematic review of literature and efficacy of chiropractic care for the treatment of neurodevelopmental disorders after manifestation and or proper medical diagnosis in children and young adults.

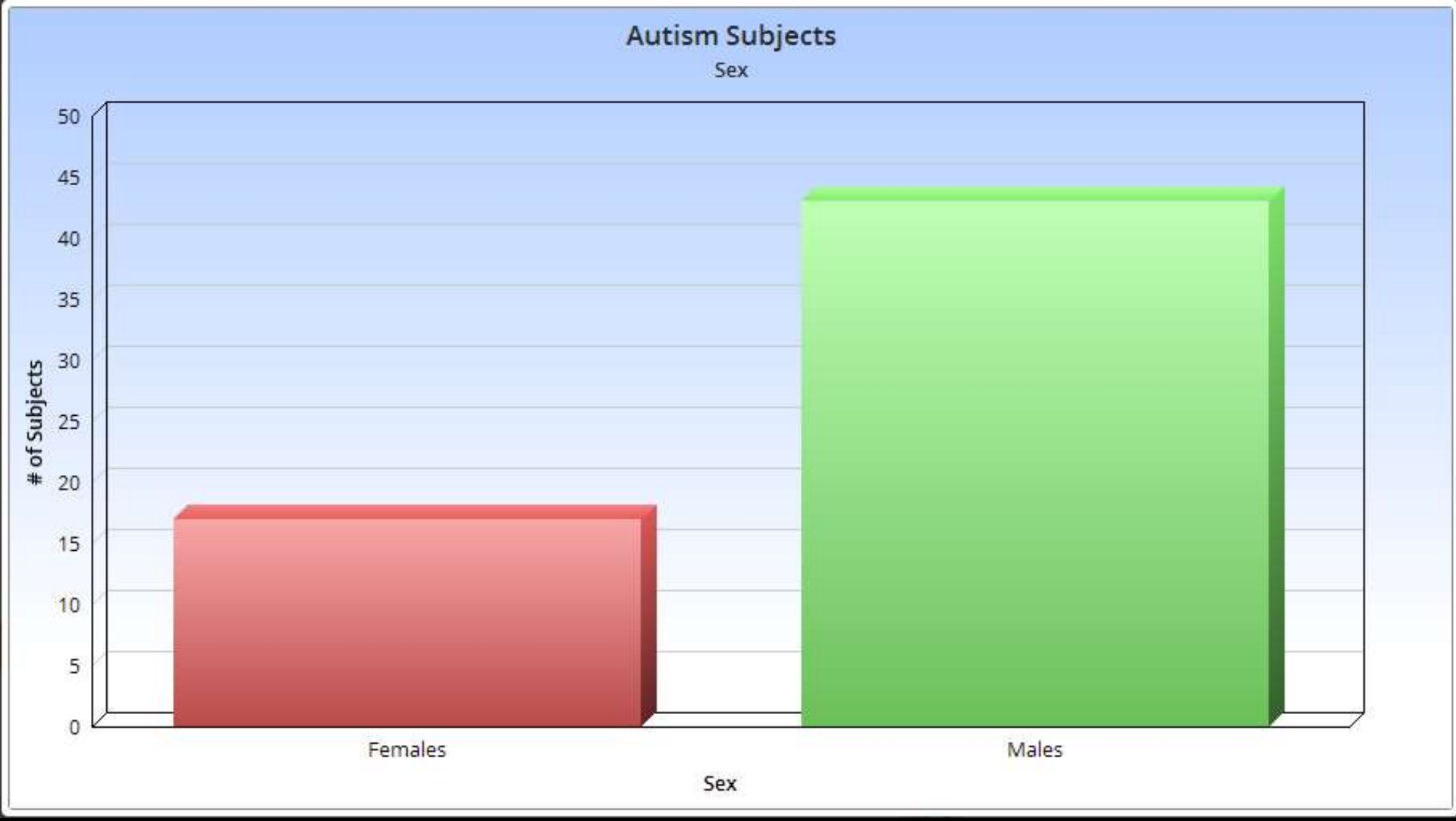
1. Private Practice of Chiropractic, Newport, NH
2. Private Practice of Chiropractic, Nashua, NH
3. Private Practice of Chiropractic, Atlanta, GA
4. Private Practice of Chiropractic, Paramus, NJ
5. Staff Clinician, Carrick Brain Centers, Irving, TX
6. Private Practice of Chiropractic, Arlington, VA
7. Private Practice of Chiropractic, San Cruz, CA
8. Private Practice of Chiropractic, Sarasota, FL
9. Private Practice of Chiropractic, Smyrna, GA

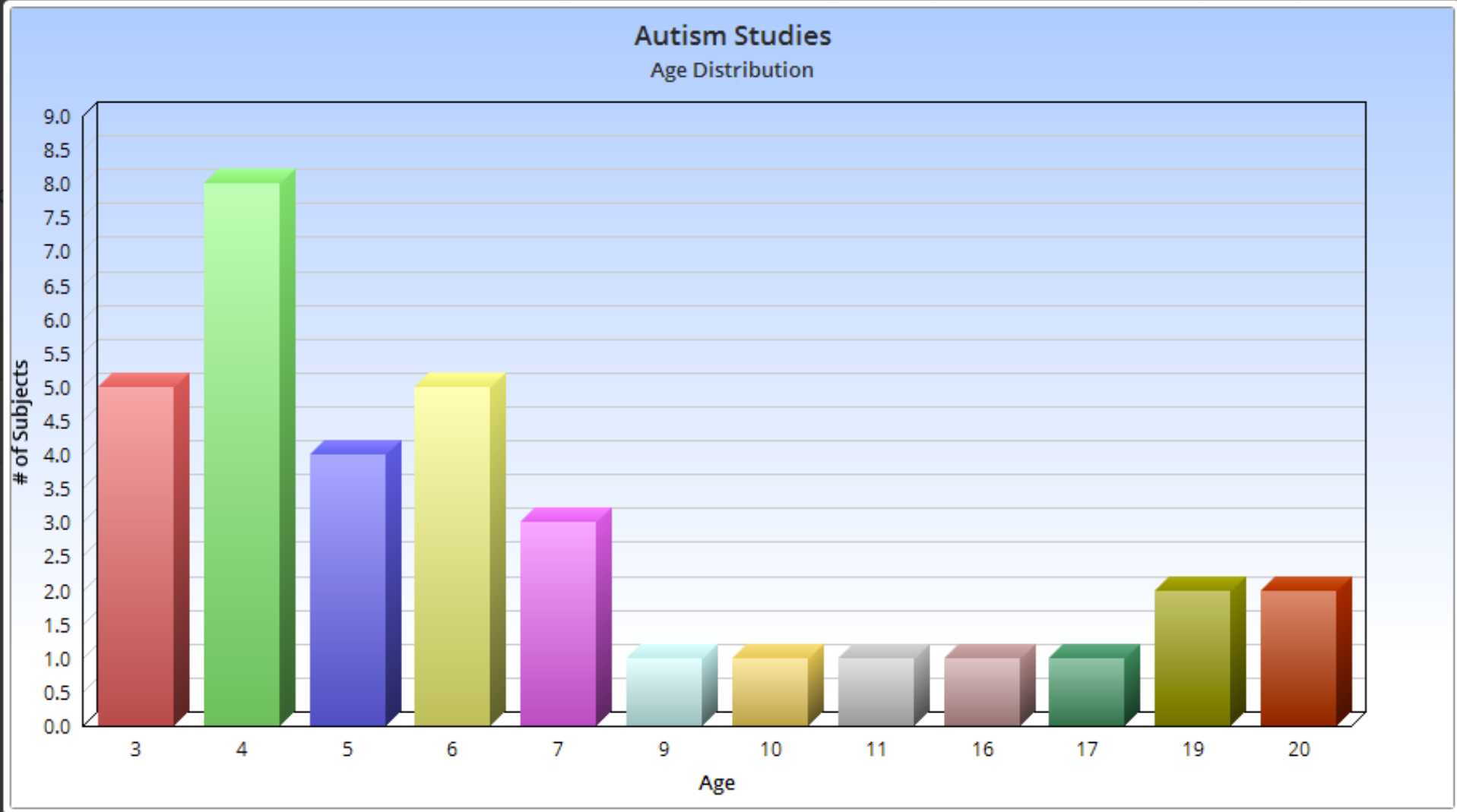
# Summary

| | |
|---|---|
| Total Number of Studies | 39 |
| Total Number of Subjects | 66 |
| Case Studies | 26 |
| Case Series | 4 |
| Reviews | 3 |
| Systematic Reviews | 2 |
| Commentaries | 2 |
| Cohort | 1 |
| RCT | 1 |


Autism Study Type
# of Studies
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
Case studies
Case series
Reviews
Systematic reviews
Commentaries
Cohort study
RCT
Study Design


Autism Studies by Year
1987-2018
# of Studies
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1987
1994
1996
1997
1998
1999
2000
2001
2003
2006
2008
2010
2011
2012
2013
2014
2016
2017
2018
Year


Autism Subjects
Sex
50
45
40
35
30
25
20
15
10
5
0
# of Subjects
Females
Males
Sex


Autism Studies
Age Distribution
# of Subjects
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3
4
5
6
7
9
10
11
16
17
19
20
Age

# Data Analysis

**Age Range:** 3-20 years

**Average Age** = 8 years

**Sex:** 17 females & 43 Males

**# Visits:** Range = 1-56 visits

# Techniques Used

Activator
Cranial
Craniosacral
Diversified
Drop
Functional neurology
Grostic
Knee chest
Logan
NSA
NUCCA
SOT
Thompson
Trigger points
TRT
Upper Cervical
Webster toggle

# Vaccination History

Incomplete

# Medication History

Incomplete

# Chiropractic Care and Behavior in Autistic Children

ANDREW L. AGUILAR, B.S., D.C., M.B.A.,
JOHN D. GROSTIC, D.C.
BRUCE PFLEGER, PH.D., M.S.

## ABSTRACT

Autism is a severe behavioral and neurological disorder including gross deficits in language development. If speech is present, peculiar speech patterns such as immediate and delayed echolalia, metaphorical language, or pronominal reversal frequently will exist. A child with autism may display bizarre responses to various aspects of the environment including resistance to change, peculiar interest in or attachments to animate or inanimate objects.

A systematic series of chiropractic adjustments were administered to 26 autistic children to see if behavioral or neurological remediations would occur concomitant to the nine month care plan. The children were recruited through three local autism societies from the greater Atlanta area.

Behavioral data for the study were collected by both the classroom teachers and the children's parent(s). Objective data were collected through Brain Stem Evoked Potential (BSEPs) recordings, pre and post x-ray films, a dual probe infrared heat recording graph instrument, and a supine leg check analysis. Student clinicians performed physicals on each child reevaluating at three month intervals. Subjective data were collected through both a Modified Autism Checklist[1] and a Childhood Autism Rating Scale (CARS).[2]

**Key words:** autism, pervasive developmental disorder, developmental delayed, subluxation, upper cervical technique, Grostic technique, orthospinology

## INTRODUCTION

In this multiple case study, adjustments were given in an attempt to remove neurological interference by correcting atlas cervical subluxations in autistic children and observe any behavior/motor skills changes. Orthospinology upper cervical chiropractic technique was used primarily due to Dr. John D. Grostic's *Dentate Ligament—Cord Distortion Hypothesis*, where he states that, "abnormal movement of a cervical vertebra (is) capable of transmitting pathologic forces to the spinal cord and brainstem."[3,4] Removal of this neurological interference was hypothesized to allow for the child to lead a more "normal" lifestyle at home and in his school environment. Several population studies previously completed lend support with this hypothesis.[5,6,7]

***Andrew L. Aguilar, B.S., D.C., M.B.A.*** *Private chiropractic practice, 35 Haywood Street, Suite 209, Asheville, NC 28801.*

***John D. Grostic, D.C., Bruce Pfleger, PH.D, M.S.*** *Sid E. Williams Research Center, Life University School of Chiropractic, Marietta, Georgia.*

### AUTISM[8] CHARACTERISTICS

1. Onset before 30 months of age.
2. Pervasive lack of responsiveness to other people (autism).
3. Gross deficits in language development.
4. If speech is present, peculiar speech patterns such as immediate and delayed echolalia, metaphorical language, pronominal reversal (use of the pronoun "you" when "I" is the intended meaning).
5. Bizarre responses to various aspects of the environment, e.g., resistance to change, peculiar interest in or attachments to animate or inanimate objects.
6. Absence of delusions, hallucinations, loosening of associations, and incoherence as in schizophrenia.

## FEATURES

In early autistic childhood there is invariably failure to develop cooperative play and friendships; but, as the children grow older, greater awareness of and attachment to parents and other familiar adults often develop. Some of the least handicapped may eventually reach a stage where



2000 - Aguilar

ORIGINAL RESEARCH

# Clinical Efficacy of Upper Cervical Versus Full Spine Chiropractic Care on Children with Autism: A Randomized Clinical Trial

*Khaled A. Khorshid, DC, MS, MBBCh*[†], *Roy W. Sweat, DC*[††]
*David A. Zemba, Jr., DC, Brett N. Zemba, DC*[†††]

**ABSTRACT**

**Background:** Children with autism are presented with multiple categories of clinical pictures that affect their social, sensory, speech, and physical development. Parents of autistic children seek all possible therapies available including chiropractic. In this study, the clinical outcome of an upper cervical based chiropractic technique is compared to full spine adjustment in autistic children.

**Methods:** The clinical effects of full spine adjustment for 14 autistic children were evaluated using the Autism Treatment Evaluation Checklist (ATEC). ATEC is a questionnaire about children's development and progress answered by parents. It was developed and is scored, online, by the Autism Research Institute of San Diego, CA. Seven of these children were randomly assigned to be shifted to Atlas Orthogonal upper cervical adjustment. The remaining seven children continued full spine adjustment. Repeated monthly clinical assessments were done for 3-5 months. Pre and post x-ray and leg length analysis was also monitored.

**Results:** The clinical improvement of the autistic children showed in the parent's observations through decrease of ATEC scores. This improvement of ATEC scores was seen in the cases of six of the seven children under upper cervical adjustment and in six of the seven children under full spine adjustment. The total ATEC average improvement in the upper cervical group was 32%, while only 19% in the full spine group. Two autistic children under the upper cervical adjustment protocol no longer met the criteria to be considered autistic following the interventions.

**Conclusion:** In this study, the clinical outcome of chiropractic care showed higher efficacy with upper cervical adjustment when compared to full spine adjustment in autistic children. Further studies are recommended.

**Key words:** *Autism, chiropractic pediatrics, chiropractic adjustment, chiropractic technique, autistic children, atlas orthogonal, vertebral subluxation, full spine.*

**Introduction:**

Since the primary problem in autistic children is neurological, it is prudent to research the efficacy of chiropractic care in these children. Functional MRI in patients with autism showed significant differences from normal people in the activity of cerebellar mesolimbic and temporal lobe cortical regions of the brain when processing facial expressions. [1] These differences are most likely neurodevelopmental in origin. There are several different approaches for treatment of autistic children beyond the scope of this paper [2]; some of these will be mentioned later. Diagnosis of this condition is based upon parent's observations of specific behaviors, and an experienced team of clinicians. This team may include a neurologist, psychologist, pediatrician, speech/language therapist, learning consultant, and other professionals who are knowledgeable about autism.

Autistic children usually show an admixture of bizarre behaviors, developmental delay, and developmental deviance. [3] The disorder used to manifest before thirty months of age and was occasionally referred to as infantile autism. Now, there is an increase of autism with increasing incidence in all children of all ages and throughout the world. The deviance of developmental and social behavior in these children are shown in features such as:

(a) Failure to make eye contact, use facial expressions and body postures and gestures to regulate social interaction
(b) Rarely seeking others for comfort and affection
(c) Rarely initiating interactive play with others
(d) Rarely offering comfort to others or responding to others' distress or happiness
(e) Rarely greeting others

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††† Private practice of chiropractic, Louisville, Kentucky



Khorshid – 2006

RCT

REVIEW ARTICLE

# A Systematic Review of the Literature on the Chiropractic Care of Patients with Autism Spectrum Disorder

Joel Alcantara, DC,[1,2,3,*] Joey D. Alcantara, DC,[4] and Junjoe Alcantara, DC[3]

**Background:** In addition to impacting the affected child and his/her family's quality of life, recent estimates place the lifetime cost for an individual with ASD at $3.2 million and $35 billion for the entire birth cohort. Given the clinical heterogeneity of ASD, treatment approaches are multidisciplinary including alternative therapies, particularly when no pharmaceutical agent is effective for the core symptoms of ASD. Chiropractic is a popular alternative therapy for children. A systematic review of the literature was performed to provide context for future research endeavors in this field.

**Methods:** A systematic review of the literature on the chiropractic care of patients with ASD utilized 8 databases. Eligibility criteria for inclusion included: (1) the study was a primary investigation/report published in an English peer-reviewed journal; (2) the study involved patients ≤18 years; and (3) patients are diagnosed with autism, Asperger's Syndrome, PDD-NOS, or ASD.

**Results:** Our systematic review of the literature revealed a total of five articles consisting of three case reports, one cohort study and one randomized comparison trial. The literature is lacking on documenting the chiropractic care of children with ASD.

**Discussion:** At the heart of the core symptoms of ASD (ie, impaired social interactions, deficits in communication and repetitive or restricted behavioral patterns) is abnormal sensory processing. Preliminary studies indicate that the chiropractic adjustment may attenuate sensorimotor integration based on somatosensory evoked potentials studies.

**Conclusion:** We encourage further research for definitive studies on chiropractic's effectiveness for ASD. However, given the ineffectiveness of pharmaceutical agents, a trial of chiropractic care for sufferers of autism is prudent and warranted.

**Key words:** autism, chiropractic, spinal manipulation

*(Explore 2011; 7:384-390.* *© 2011 Elsevier Inc. All rights reserved.)*

## INTRODUCTION

The *Diagnostic and Statistical Manual of Mental Disorders*, 4th Edition (*DSM-IV*) defines three core features of autism: qualitative deficit in social interaction, impaired communication, and stereotyped patterns of behavior.[1] According to the *DSM-IV*, and the International Classification of Diseases (10th Edition),[1,2] the term Autism Spectrum Disorder (ASD) includes not only Autistic Disorder but also Asperger's syndrome, Pervasive Developmental Disorder–Not Otherwise Specified (PDD-NOS), Rett's syndrome, and childhood disintegrative disorder. For the purpose of this article, we use the term autism and ASD interchangeably unless otherwise specified. ASD diminishes the overall quality of life of the affected individual as well as their family and represents a great burden to society. The disorder impacts a family's finances, employment, and time, and not surprisingly, it places the parents and siblings of children with ASD at risk for great psychological distress.[3-6] In 2006, on average, approximately 1% or one child in every 110 was classified as having ASD based on 11 Autism and Developmental Disabilities Monitoring (ADDM) network sites in the United States.[7] Recent estimates place the lifetime cost to care for an individual with ASD at $3.2 million and approximately $35 billion for the entire birth cohort.[8]

Given the heterogeneity of the disorder, treatments that may be effective are typically multidisciplinary and may include auditory training, discrete trial training, vitamin therapy, antiyeast therapy, facilitated communication, music therapy, occupational therapy, physical therapy, and sensory integration.[9,10] According to the Centers for Disease Control and Prevention (CDC),[10] these different care approaches can generally be categorized as: behavior and communication approaches (ie, applied behavior analysis), dietary approaches (ie, elimination of certain foods and use of vitamins and minerals), medication (ie, to address comorbidities), and complementary and alternative medicine (CAM) therapies.

Of the various practitioner-based CAM therapies used by the American population at large, chiropractic is the most popular and highly utilized by children.[11] Anecdotes and testimonials abound within the chiropractic profession on the benefits of chiropractic care for children with autism. This article seeks to use a systematic review to examine to what degree these claims are supported by the scientific literature.

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4 Private Practice of Chiropractic, Calgary, AB, Canada
* *Corresponding Author. Address: 6327 N Middletown Rd, Media, PA*
e-mail: research@icpa4kids.com

## MATERIALS AND METHODS

A comprehensive search was performed on the chiropractic care of children (age ≤18 years) with ASD. The following electronic databases were searched: MANTIS [1965-2010]; ICL [1984-2010]; Pubmed [1966-2010]; EMBASE [1974-2010], AMED

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doi:10.1016/j.explore.2011.08.001

**Alcantara - 2011**

**5 Total**

3 Case Reports

One Cohort

One RCT

# Clinical effects of spinal manipulation in the management of children and young adults diagnosed with autism spectrum disorder — a systematic review of the literature

By Sabine Kronau DO, MSc Paed Ost*, Bettina Thiel Dipl.-Ing.*, Anne Jäkel DPhil*, Torsten Liem DO, MSc Ost, MSc Paed Ost*

* Osteopathie Schule Deutschland, Mexikoring 19, 22297 Hamburg, Germany
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Email: anne@annejakel.co.uk
No funding was received for this work.
Conflict of interest: The authors of this manuscript declare no conflict of interest.

## ABSTRACT

**Background:** Autism spectrum disorders (ASD) are classified as pervasive developmental disorders that permanently affect essential mental functions. Symptoms include quality-related disorders in areas of social interaction, verbal and non-verbal communication, the variability of behaviours and specific learning disabilities. Abnormalities in development are already apparent in early childhood. **Aim:** To identify evidence for the clinical benefits of manual therapy of the musculoskeletal system in children diagnosed with ASD. **Methods:** The following databases and search interfaces were searched from Database start up until October 2015: Bio Med Central, Chiropractic Library Collaboration, Clinical Trials, Cochrane library, Dimdi, EBSCO host, Pubmed, Pubmed central, Medline Plus, Osteopathic research Digital repository, Osteopathic Research Web, and Physiotherapy Evidence Database. Further searches included journals provided by the University of Wales and the University of Duisburg-Essen. Studies were included if participants were children and young adults aged 0-21 years; studies published in English, German, or French; a diagnosis of autism or ASD, and study designs of randomized clinical trial, case-control studies, case series, case reports, and single subject studies (N of 1), which include manual therapeutic interventions of the musculoskeletal system. Two authors independently screened the studies for inclusion criteria, extracted the data and assessed for risk of bias. Methodological quality of randomized clinical trials was assessed by the Downs and Black tool. Quality of reporting for case series and case reports was assessed with the appropriate checklists provided by the QUAlity and Transparency Of health Research (EQUATOR) network. **Results:** Included in the review were one randomized clinical trial (uncontrolled), one case series, and 11 case reports. The methodological quality of the included randomised clinical trial was rated as being poor. Quality of reporting for the included case series and case reports was also insufficient. All included studies used spinal manipulation, and indicated an improvement in autistic symptoms after the manual therapeutic intervention. **Conclusion:** The results of this systematic review confirm a general lack of good quality, high level of evidence studies on the topic, as well as no existing experimental studies that have been published in the last 10 years. This review indicates that the literature on the effects of chiropractic interventions to the musculoskeletal system of autistic children and young adults appears to be favourable with respect to the severity of their symptoms. However, the results of this review have to be interpreted with great caution, as the majority of identified studies were case reports. Further feasibility and pilot research is needed to lay the foundation for good quality clinical trials of spinal manipulation in the autistic child population.

## Introduction

Autism spectrum disorders (ASD) are defined as a range of conditions classified as neurodevelopmental disorders, including autistic disorder (autism), Asperger syndrome, and pervasive developmental disorder (PDD).[1] Symptoms are quality-related disorders in the areas of social interaction, verbal and non-verbal communication, and a variety of behaviours and learning disorders.[1] Abnormalities in development are apparent already in early childhood and have a high variability.[1,2] ASD is reported to occur in all racial, ethnic and socioeconomic groups, with about 1 in 68 children being identified with ASD in 2012 in the US.[3] Boys seem to be 4.5 times more often affected than girls.[3]

With respect to the causation of autism, no universally accepted explanations are currently present. The possibility of a genetic component, environmental triggers and imbalances in the neurophysiological state are all discussed.[4-6] No specific medication is available to address autism. Medication is generally used to treat accompanying symptoms and modify behaviors of the condition.[7] Current clinical guidelines recommend a combination of behavioral, devel-



**Kronau – 2016**

**Total - 13**

RCT – 1

Case Series – 1

Case reports - 11

Rated studies based on quality

# REVIEW OF LITERATURE

## Autism & Chiropractic: A Selective Review of Literature

*Michael W. Shreeve DC, L.C.P, D.Ph.C.S.[1] & Ariel R. Troxel DC, M.Ed.[2]*

## Abstract

**Objective:** To evaluate current research on chiropractic in the management of children with a diagnosis of autism.

**Methods:** The search included PubMed, Cochrane and Google Scholar with key word search 'Chiropractic' + 'Autism'. Additionally, the references of those published materials were reviewed.

**Results:** Eleven studies related to the treatment and outcomes of children with autism undergoing chiropractic were retrieved.

**Conclusion:** Research has shown that there appears to be a relationship between chiropractic neurological intervention and positive outcomes with improved behavior in individuals with autism. Further research is necessary to explore the role of chiropractic in the management of children with autism.

**Key Words**: *Autism, chiropractic, adjustment, subluxation, upper-cervical, pediatric*

**Introduction**

The literature reviewed, highlights instances of individuals and families who found help in dealing with a diagnosis of autism. In a search for answers to "how can I help my child?", there are instances illustrated here, which can further provide hope for families. In addition to the literature provided, the question is proposed that given the association between craniocervical junction disruptions and sensory-motor difficulties, is it important to further study this area in order to provide greater resources for parents and families as they make health care choices for their children.

Autism Defined: The DSM-V revision produced in May 2013 provided changes to the way autism and similar disorders are defined and diagnosed. Autism Spectrum Disorder (ASD) has now been designed to include Autistic Disorder (classic autism), Asperger's Disorder, Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS), and Childhood Disintegrated Disorder. Rett's Syndrome is no longer considered part of the ASD spectrum.[1]

The new definition includes three social and communication deficits: problems reciprocating social or emotional interaction, severe problems maintaining relationships, and non-verbal communication problems. The new definition considers repetitive and restrictive behaviors. The presence of two of the following four behaviors is a strong indication of a positive diagnosis of autism: 1) extreme attachment to routines and patterns and resistance to changes in routines, 2) repetitive speech or movements, 3) intense and restrictive interests, and/or 4) difficulty integrating sensory information or strong seeking or avoiding behavior or sensory stimuli.[2]

Previously, language delay was a significant factor in diagnosis in classic autism, but under the new definition of ASD, language delays are not included as part of the criteria for diagnosis.[3]

In reviewing the literature, various authors have discussed the definition to be a developmental disorder that shows deviance and delay in social interaction, communication and behavior. Some authors have also delved into the further definition to be a neurological disorder revealing cognitive delay, due to the

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Shreeve 2018

11 Studies

# DEVELOPMENTAL DELAY SYNDROMES: PSYCHOMETRIC TESTING BEFORE AND AFTER CHIROPRACTIC TREATMENT OF 157 CHILDREN

Scott C. Cuthbert, DC, and Michel Barras, DC

ABSTRACT

**Objective:** This study presents a case series of 157 children with developmental delay syndromes, including the conditions such as dyspraxia, dyslexia, attention-deficit hyperactivity disorder, and learning disabilities who received chiropractic care.
**Clinical Features:** A consecutive sample of 157 children aged 6 to 13 years (86 boys and 71 girls) with difficulties in reading, learning, social interaction, and school performance who met these inclusion criteria were included.
**Intervention and Outcomes:** Each patient received a multimodal chiropractic treatment protocol, applied kinesiology chiropractic technique. The outcome measures were a series of 8 standardized psychometric tests given to the children by a certified speech therapist pre- and posttreatment, which evaluate 20 separate areas of cognitive function, including patient- or parent-reported improvements in school performance, social interaction, and sporting activities. Individual and group data showed that at the end of treatment, the 157 children showed improvements in the 8 psychometric tests and 20 areas of cognitive function compared with their values before treatment. Their ability to concentrate, maintain focus and attention, and control impulsivity and their performance at home and school improved.
**Conclusions:** This report suggests that a multimodal chiropractic method that assesses and treats motor dysfunction reduced symptoms and enhanced the cognitive performance in this group of children. (J Manipulative Physiol Ther 2009;32:660-669)
**Key Indexing Terms:** *Chiropractic; Developmental Delay Disorder; Apraxias; Dyslexia; Learning Disorders*

Chiropractic treatment of developmental delay syndromes (DDSs), a term that encompasses conditions such as dyspraxia, dyslexia, learning disabilities, and attention-deficit hyperactivity disorder (ADHD), has shown some interest.[1] The need for more observational and experimental studies in this area has also been pointed out.[2]

It has been shown that motor discoordination, especially affecting the postural and ocular muscles, is a common comorbid condition associated with this spectrum of disorders.[3-7]

At this time, DDSs are thought to have multifactorial etiologies.[3,4,8-11] The epidemiologic prevalence of these disturbances has been estimated to be as high as 5% to 20% (depending on a conservative definition).[10,11]

Over the past decade, there has been an increase in the number of DDS-related visits to health care providers, and the percentage of children with severe behavioral and language problems is increasing.[12] A study by the US Department of Education stated that more than 50% of minority and nonminority children are not reading at their grade level.[13] With the increase of methylphenidate use by 700% since 1990,[14] and because last year, doctors in the United States wrote an estimated 20 million prescriptions for methylphenidate, it is obvious why parents and children with DDS come to chiropractors and other physicians for help.

In a survey of children with DDS (specifically ADHD), 67.6% of families reported current or past use of complementary and alternative medicine to manage this condition, including chiropractic, modified diet, and vitamins, minerals, and dietary supplements.[15] The natural history of DDS is also a challenge. Medications are often used for these children, but these medications do not necessarily normalize these children's function.[16] In children treated pharmacologically, subtle and not-so-subtle neurocognitive impairments often persist into adulthood.[16-19] Problems with DDS are likely to affect employment status, educational achievements, health care consumption, traffic and other accidents, and criminality.

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Paper submitted September 2, 2008; in revised form May 27, 2009; accepted June 8, 2009.
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doi:10.1016/j.jmpt.2009.08.015

# Chiropractic Care and Behavior in Autistic Children

ANDREW L. AGUILAR, B.S., D.C., M.B.A.,
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Behavioral data for the study were collected by both the classroom teachers and the children's parent(s). Objective data were collected through Brain Stem Evoked Potential (BSEPs) recordings, pre and post x-ray films, a dual probe infrared heat recording graph instrument, and a supine leg check analysis. Student clinicians performed physicals on each child reevaluating at three month intervals. Subjective data were collected through both a Modified Autism Checklist[1] and a Childhood Autism Rating Scale (CARS).[2]

**Key words:** autism, pervasive developmental disorder, developmental delayed, subluxation, upper cervical technique, Grostic technique, orthospinology

## INTRODUCTION

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***John D. Grostic, D.C., Bruce Pfleger, PH.D, M.S.*** *Sid E. Williams Research Center, Life University School of Chiropractic, Marietta, Georgia.*

### AUTISM[8] CHARACTERISTICS

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2. Pervasive lack of responsiveness to other people (autism).
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5. Bizarre responses to various aspects of the environment, e.g., resistance to change, peculiar interest in or attachments to animate or inanimate objects.
6. Absence of delusions, hallucinations, loosening of associations, and incoherence as in schizophrenia.

## FEATURES

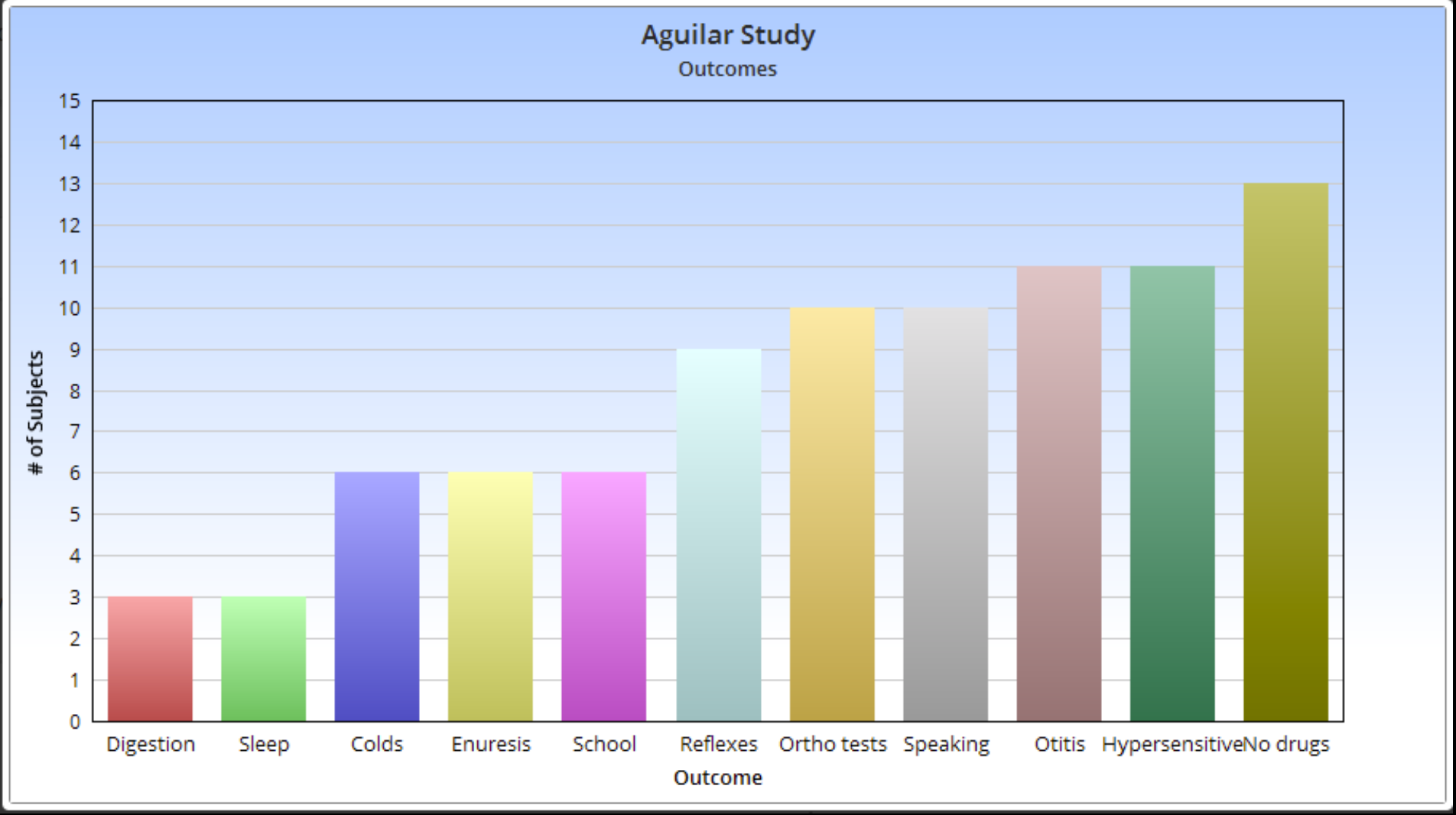
In early autistic childhood there is invariably failure to develop cooperative play and friendships; but, as the children grow older, greater awareness of and attachment to parents and other familiar adults often develop. Some of the least handicapped may eventually reach a stage where

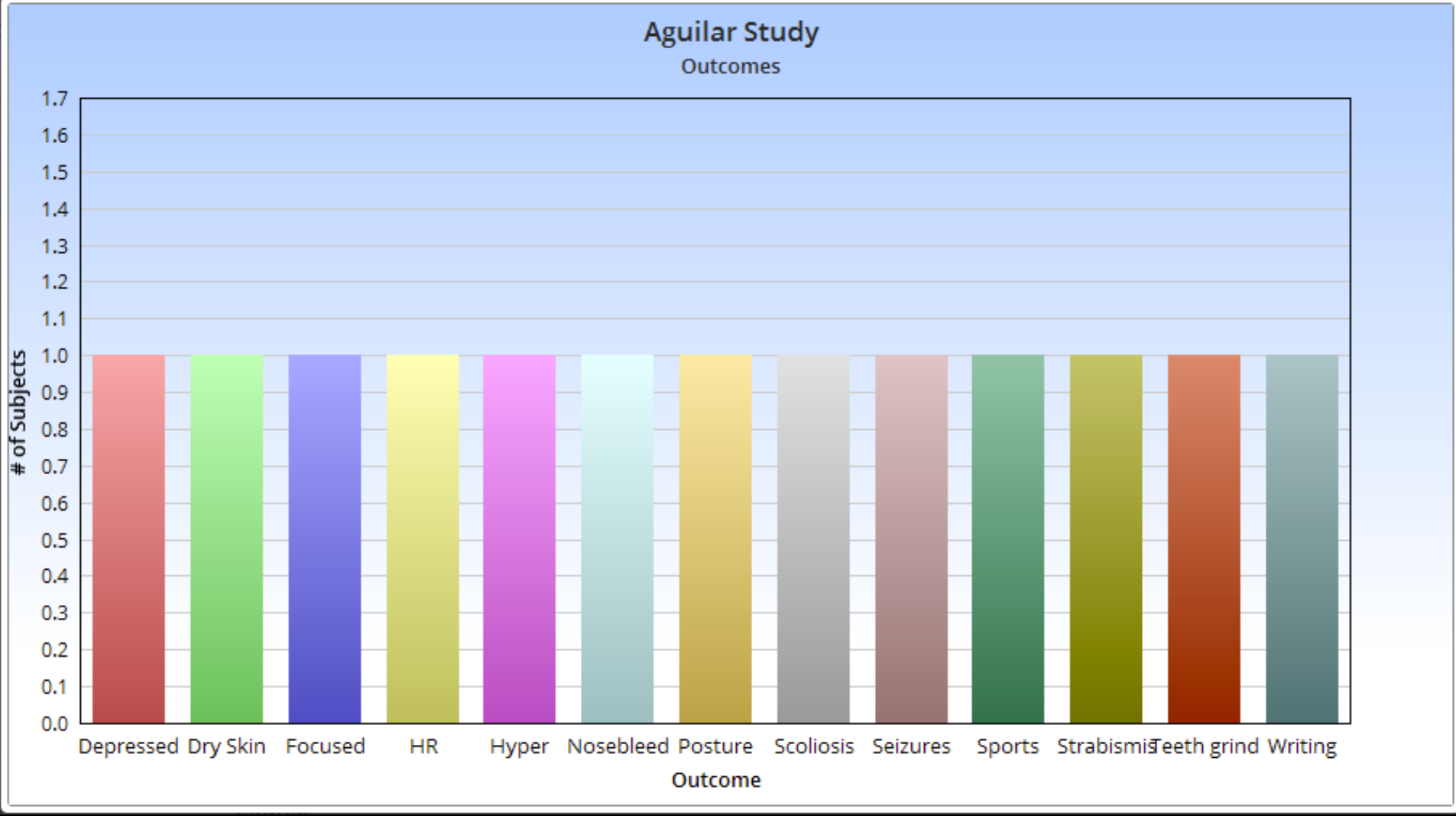


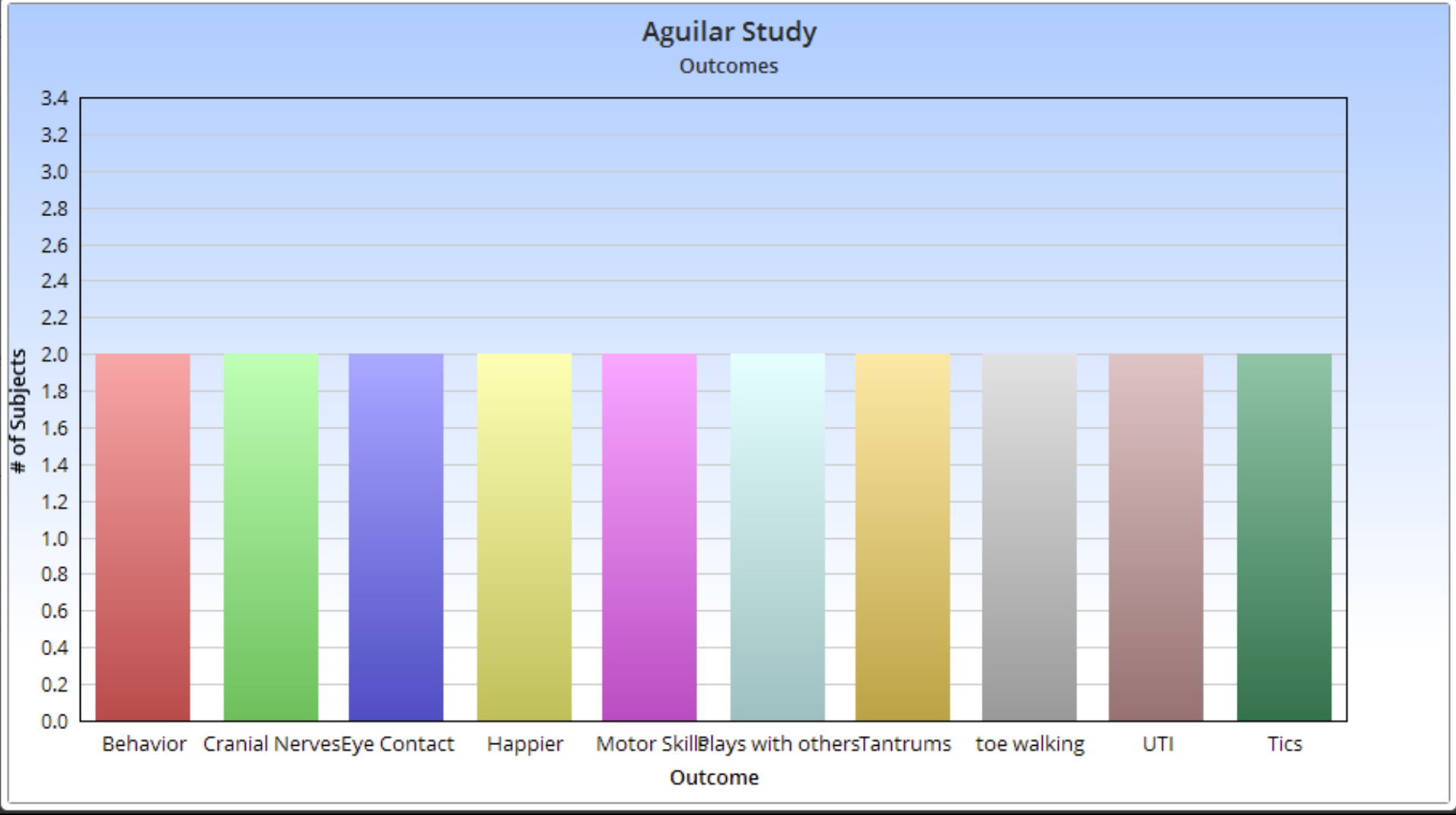
2000 – Aguilar

26 Subjects

21 Males
5 Females


Aguilar Study
Outcomes
# of Subjects
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Digestion
Sleep
Colds
Enuresis
School
Reflexes
Ortho tests
Speaking
Otitis
Hypersensitive
No drugs
Outcome


Aguilar Study
Outcomes
# of Subjects
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Depressed
Dry Skin
Focused
HR
Hyper
Nosebleed
Posture
Scoliosis
Seizures
Sports
Strabismis
Teeth grind
Writing
Outcome


Aguilar Study
Outcomes
# of Subjects
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Behavior
Cranial Nerves
Eye Contact
Happier
Motor Skills
Plays with others
Tantrums
toe walking
UTI
Tics
Outcome

# Future Research



Chiropractic's ability to affect the drive of unconscious proprioception through the central nervous system coupled with its affects on the spinal limbic system, brain function, CSF and vascular flow are fertile areas for future chiropractic research.

# APPENDIX “N”




# Evidence Informed Practice

ChiroFutures
Malpractice Insurance Program
www.chirofutures.org

**College of Chiropractors of British Columbia**

900 – 200 Granville Street
Vancouver, BC V6C 1S4
Phone: 604-742-6470
www.chirobc.com

**College of Chiropractors of British Columbia**

| | |
|---|---|
| **Policy Title – Efficacy Claims**<br><br>**Responsible Office: College of Chiropractors of British Columbia ("CCBC")**<br><br>**Contact:** registrar@chirobc.com | **Reference Information:** *TBD* |
| | **Replaces former policy: NA** |
| | **Date Effective: October 1, 2018** |
| | **Last Update: NA** |
| | **Next Review Date: September 30, 2019** |
| **Keywords** | **E.g. efficacy, marketing, advertising, acceptable evidence** |

1. **Policy Rationale & Purpose:**

   As stated in section 14(1)(f) and Appendix "N" of the CCBC's *Professional Conduct Handbook* ("PCH"), chiropractors must not advertise health benefits of their services when there is no acceptable evidence that those benefits can be achieved. The Board is concerned registrants may be making claims in marketing or directly to patients that chiropractic care has beneficial effects on some diseases, disorders and conditions when there is no acceptable evidence for those claims.

   This policy identifies efficacy claims that are not supported by acceptable evidence, and therefore, must not be made.

2. **Policy Scope**

   This policy applies to all registrants who market or advertise their services.

3. **Policy Statement:**

   Due to the absence of acceptable evidence supporting such claims, **registrants must NOT represent** to patients or the public that chiropractic:

   (a) can be used to treat diseases, disorders or conditions such as: Alzheimer's disease, cancer, diabetes, infections, infertility, or Tourette's syndrome, or

   (b) has any beneficial effect on childhood diseases, disorders or conditions such as: ADHD (or ADD), autism spectrum disorders including Asperger syndrome, cerebral palsy, Down syndrome, fetal alcohol syndrome, or developmental and speech disorders.

   The above list of diseases, disorders or conditions is neither final nor conclusive. Absent acceptable evidence, registrants are not free to make claims about the effectiveness of chiropractic in treating a disorder, disease or condition simply because it is not included in the list.



# British Columbia

# Efficacy Claims Policy

## 1. Policy Rationale & Purpose:

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The above list of diseases, disorders or conditions is neither final nor conclusive. Absent acceptable evidence, registrants are not free to make claims about the effectiveness of chiropractic in treating a disorder, disease or condition simply because it is not includ[redacted] list.

"has ***any beneficial effect*** on childhood diseases, disorders or conditions such as: ADHD (or ADD), autism spectrum disorders including Asperger syndrome, cerebral palsy, Down syndrome, fetal alcohol syndrome, or developmental and speech disorders."

# Acceptable Evidence?

6. **Definitions:**

- "acceptable evidence" means objective, clear evidence based on accepted principles of good research that support the therapeutic claim (see Appendix "N" of PCH)

## APPENDIX "N": Acceptable Evidence

It is the duty of a registrant, when requested by the college or Inquiry Committee to verify statements and claims made in their marketing materials

The College of Chiropractors of British Columbia (CCBC) recognizes that chiropractic care may offer relief for persons experiencing neuro-musculoskeletal symptoms. Chiropractors must not make statements or claims that create an unjustified expectation of the potential benefit of chiropractic treatment and care.

Under section 85 of the College Bylaws, registrants must not engage in marketing that is false, inaccurate, unverifiable, misleading or misrepresentative of the effectiveness or a technique, procedure, instrument or device. Both specific claims and the overall impression of marketing must be considered. Marketing violates section 85 if it is likely to create unjustified expectations for treatment in the mind of patients or the public.

In addition to more traditional advertisements and printed materials, marketing also includes the use of websites, email newsletters, social media, promotional activities and public appearances. Chiropractors are strongly encouraged to regularly review their marketing to ensure compliance with section 85 of the Bylaws and Part 14 of the College's Professional Conduct Handbook.

### What is acceptable evidence?

*Adopted from the Australian Health Practitioner Regulation Agency*

Chiropractors must not advertise health benefits of their services when there is not acceptable evidence that these benefits can be achieved.

When assessing whether there is acceptable evidence for therapeutic claims, the issues to consider include:

- Is the evidence relied on objective and based on accepted principles of good research? Is the evidence from a reputable source? For example a properly peer-reviewed journal.
- Do the studies used provide clear evidence for the therapeutic claims made or are they one of a number of possible explanations for treatment outcomes?
- Have the results of the study been replicated? Results consistent across multiple studies, replicated on independent populations, are more likely to be sound.
- Has the evidence been contradicted by more objective, higher quality studies? (For example, evidence from a single study would not be acceptable evidence if it is contradicted by a systematic review ) Statements and claims in marketing that are contrary to higher-level evidence are not acceptable.

The following types of studies may not be considered sufficient acceptable evidence for advertising claims:

Back to Top



# British Columbia

# "Acceptable" Evidence

**What is acceptable evidence?**

*Adopted from the Australian Health Practitioner Regulation Agency*

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- Do the studies used provide clear evidence for the therapeutic claims made or are they one of a number of possible explanations for treatment outcomes?
- Have the results of the study been replicated? Results consistent across multiple studies, replicated on independent populations, are more likely to be sound.
- Has the evidence been contradicted by more objective, higher quality studies? (For example, evidence from a single study would not be acceptable evidence if it is contradicted by a systematic review ) Statements and claims in marketing that are contrary to higher-level evidence are not acceptable.

- Studies involving no human subjects;
- before and after studies with little or no control or reference group (eg. case studies);
- self-assessment studies;
- anecdotal evidence based on observations in practice; and,
- outcome studies or audits, unless bias or other factors that may influence the results are carefully controlled.

The evidence base for clinical practice is constantly developing so it is important that chiropractors make sure that any scientific information they rely on is current.
Chiropractors must take care to not mislead or create false impressions when using scientific information in marketing. Scientific information in marketing must be presented in a manner that is accurate, balanced and not misleading and using wording that will be readily understood by the intended recipients. The source of the information must be accurately cited.



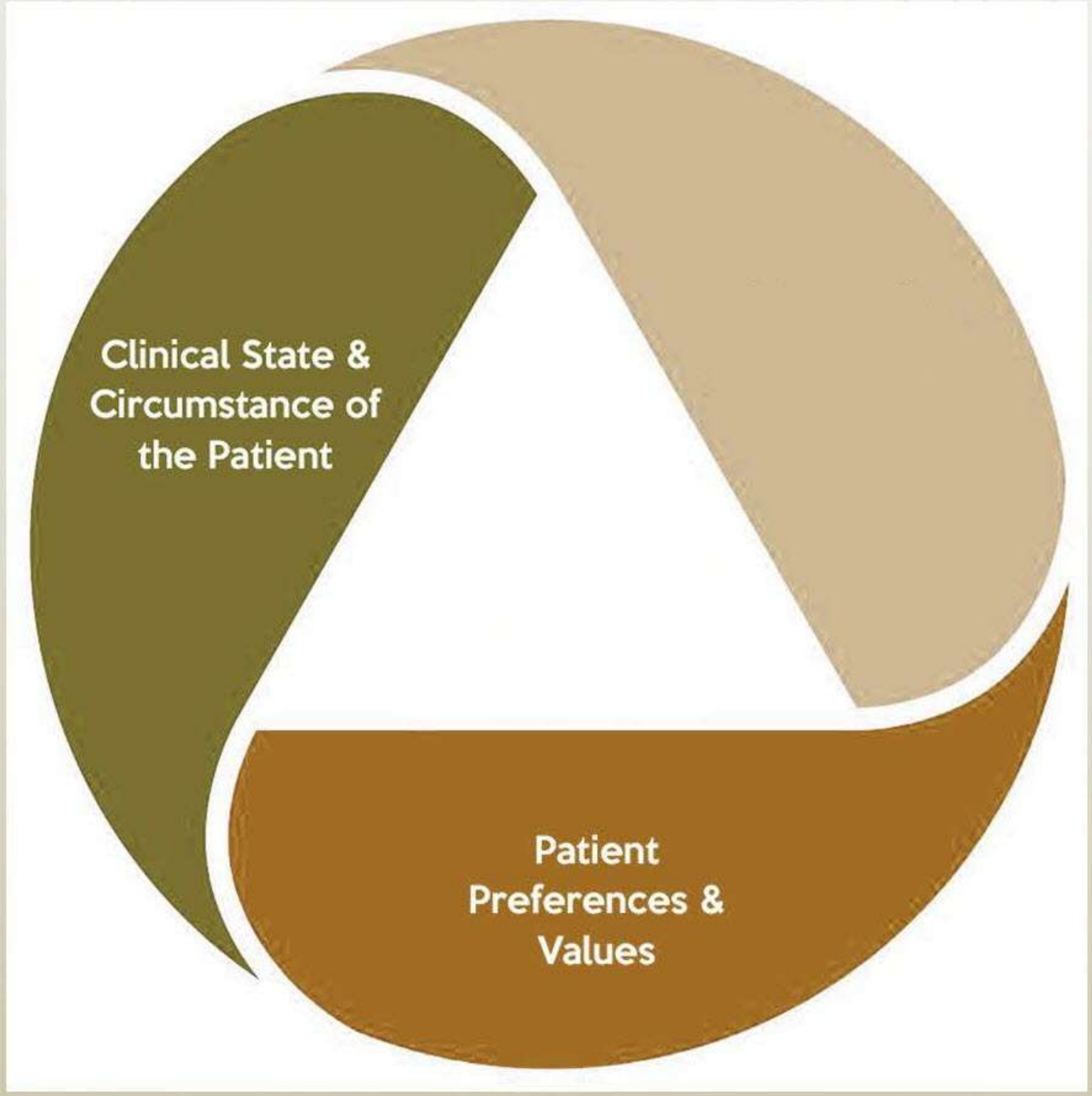

# Evidence Informed Practice

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# Hierarchy of Research Designs & Levels of Scientific Evidence




PARKINSON'S
DISEASE
NERVOUS SYSTEM
ELDERLY
NEUROLOGY
CARE
DISORDER
CEREBRAL
TREMORS
DIET`
SENIOR
BRAIN
DEGENERATIVE
GENETIC
SHAKING
TESTS
AGE
DRUGS
DISEASE
SURGERY
ILLNESS
DEMENTIA
EVIDENCE
SYMPTOMS
ANTIOXIDANTS
CELL
OLD
LIMB
MOOD
PATIENT
DOPAMINE
TREMORS
DIET
SENIOR
BRAIN
TREATMENT
AGE
SENSORY DEFICITS
IDIOPATHIC

# Case Study

## Chiropractic Care of a Patient with Parkinson's Disease Utilizing Chiropractic Biophysics: A Case Study

David A. Shapiro, DC, CFCBP[1]
Nicholas Pickrell, DC[2]

1. *Private Practice, Tucker, GA*
2. *Private Practice, Kennesaw, GA*

**Abstract**

**Objective:** To report on the subjective and objective improvements of a patient with Parkinson's disease, abnormal posture, and vertebral subluxations after undergoing chiropractic care utilizing Chiropractic Biophysics (CBP).

**Clinical Features:** A 67-year-old Caucasian male previously diagnosed with Parkinson's disease with secondary psoriatic arthritis and lumbar radiculopathy presented for chiropractic care. Cervical radiographs confirmed a 43% loss of structural cervical lordosis.

**Intervention and Outcome:** Chiropractic care was provided utilizing Chiropractic Biophysics to reduce vertebral subluxations, improve postural, and spinal alignment. CBP rehabilitative corrective care was conducted over a 12-week period. There was an overall reduction in the patient's vertebral subluxations and symptomatology with improvement in cervical lordosis, in addition to prominent enhancement in the patient's activities of daily living.

**Conclusion:** This retrospective case study reports on the effectiveness of Chiropractic Biophysics in reducing vertebral subluxations and symptomatology by improving postural and spinal alignment of a 67 year-old patient with Parkinson's disease. Further research on chiropractic care correcting abnormal posture and spinal alignment with a reduction of symptomatology in Parkinson's disease is suggested.

**Key Words:** *subluxation, chiropractic, Chiropractic Biophysics, CBP, Parkinson's disease, spinal rehabilitation, spinal corrective care, posture, traction*

### Introduction

Parkinson's disease, second to Alzheimer's disease, is the most common neurodegenerative disease and is the most common movement disorder in the world.[1] A loss in dopaminergic neurons in the substantia nigra cause Parkinson's disease to be a multisystem neurodegenerative disorder of the brain.[2] Approximately 80% of dopaminergic neurons in the substantia nigra are lost when symptoms start to arise.[3]

In the U.S. it is estimated that at least one million people are affected by Parkinson's disease and there are greater than 50,000 new cases diagnosed each year.[1] The etiology of the disease remains unknown although research has hypothesized several leading risk factors such as systemic inflammatory insults, mitochondrial gene mutations, toxins, bacteria, viruses and trauma.[4-8] Resting tremors of the extremities are usually the first classic sign of Parkinson's disease followed by three other classic signs which are cogwheeling, bradykinesia, and postural dysfunction leading to improper gait and falls.[1]

Postural abnormalities in Parkinson's patients increase the probability of falling with the incidence of falling being between 40-70%.[9,10] The risk of falling increases the risk of

## Case Study

# Reduction in Symptoms Associated with Parkinson's Disease Subsequent to Subluxation-Based Chiropractic Care: A Case Study

*Matthew Norton, D.C.*[1]
*Megan Callanan, D.C.*[2]

1. *Private Practice of Chiropractic, Fresno, CA*
2. *Private Practice of Chiropractic, Atlanta, GA*

**Abstract**

**Objective:** The purpose of this case study is to provide a detailed report on the symptomatic improvement of a patient with Parkinson's disease (PD) undergoing Activator Methods chiropractic care.

**Clinical Features:** A 68 year-old female, diagnosed with Parkinson's disease four months prior, presented to a private practice for chiropractic care. She began experiencing symptomatic complaints of essential tremors one-year prior to being diagnosed with Parkinson's disease. Her symptoms, which seemed to be progressively worsening, included resting tremors in her hands, fatigue, lack of motion in the cervical and lumbar spine with associated neck pain/stiffness and lower back pain.

**Interventions and Outcome:** Over a four-month period, the patient was seen twice per week during which she was evaluated and adjusted using the Activator protocol. In addition, postural exercises were performed by the patient for the cervical spine in order to improve range of motion and mobility of the neck. Improvements in ranges of motion, paraspinal thermography and sEMG were noted along with the patient's subjective report of improvements in tremors, fatigue, mobility, rigidity and neck pain/stiffness and lower back pain following Activator adjustment.

**Conclusion:** Spinal subluxation may be a contributing factor in the symptomatic expression of Parkinson's disease. Reduction in subluxation with Activator analysis and adjustment may be an effective approach for managing the symptoms associated with PD; however more research is warranted investigating the effects of Activator Methods Chiropractic Technique (AMCT) and Parkinson's disease.

**Key Words:** *Parkinson's disease. tremors. AMCT. subluxation. chiropractic*

### Introduction

Parkinson's disease (PD) is a progressive neurodegenerative disease due to dopaminergic neuron degeneration within the Substantia Nigra.[1] According to the Parkinson's Disease Foundation, as many as one million Americans live with Parkinson's disease and approximately sixty thousand are diagnosed with PD each year.[2] Although there are a number of treatment options available for the symptoms that accompany PD, there is currently no known cure.

Parkinson's disease is often characterized by both motor and non-motor (cognitive and limbic) deficits. The motor abnormalities associated with PD often include hypokinetic signs such as akinesia/bradykinesia, rigidity and loss of normal postural reflexes, as well as hyperkinetic symptoms such as essential and resting tremors. Dopamine depletion in the striatum is the hallmark of PD, however the exact pathophysiology of Parkinson's symptoms, specifically the tremors associated with PD, is still under debate.[3]

Aside from the hypokinetic signs of Parkinson's disease, the classic Parkinsonian tremor is defined as a resting tremor, a tremor that occurs in a body part that is not voluntarily activated and is completely supported by gravity.[4] For the most part, resting tremors are inhibited during movement and

## Case Study

# Long Term Chiropractic Care and Parkinson's Disease in a 73 Year Old Male: A Case Report

*Melinda Bredin B.A., B.Chiro*[1]
*Amy Morahan*[2]

1. *Lecturer, New Zealand College of Chiropractic*
2. *Senior Intern, New Zealand College of Chiropractic*

**Abstract**

**Objective:** To present the case of a 73 year old patient with Parkinson's disease with concomitant vertebral subluxations.

**Clinical Features:** The patient presented to a chiropractor at age 63 seeking relief for chronic lower back pain. He had been experiencing a resting tremor in his right arm since 2000 and was diagnosed with Parkinson's disease in 2003 at which time he was prescribed Disipal (50 mg, once daily). His main complaints at the time of presentation were loss of balance, trouble initiating gait, and foot drop in the left leg.

**Interventions and Outcomes:** Chiropractic adjustments were delivered using Diversified technique at a frequency of three times per week for four weeks, then decreased to once a week for the next ten years. After 10 years of chiropractic care and medical therapy the patient is now experiencing fewer symptoms than when he was first diagnosed with Parkinson's disease and is still able to have an active lifestyle caring for himself and playing sports several times per week.

**Conclusion:** It is possible that this patient benefited by adding chiropractic care to his existing drug treatment for Parkinsonian symptoms. Further research is needed to investigate the potential role chiropractors may play in providing care to people with Parkinson's disease.

**Key Words:** *Chiropractic, vertebral subluxation, adjustment, spinal manipulation, Parkinson's*

### Introduction

Parkinson's disease (PD) is a progressive movement disorder marked by tremors, rigidity, bradykinesia, and postural instability.[1] It is thought that neurodegeneration is a result of the aggregation of alpha-synuclein proteins, believed to occur at least a decade before the onset of symptoms.[2,3] PD has a major effect on the quality of life of patients, who gradually lose autonomy and cognitive function.[4] The decline in quality of life proceeds at a rate that is five to seven times faster than the average yearly decline caused by normal aging in individuals without the disease.[4] Parkinson's disease mainly affects older people, affecting around one percent of the population over sixty and the disease burden in developed nations is expected to increase as the population ages.[1]

The relationship between chiropractic and PD has been reported in only a few case studies and mainly with the use of upper cervical chiropractic techniques as the intervention.[5,6] For example, in a case study by Chung and Brown, it was found that self-reported measures of weakness, tremors, rigidity and overall mobility improved in a 67 year old female after six months of chiropractic care.[7]

In terms of PD, proprioceptive insult may explain how Parkinsonism is influenced by subluxation. Proprioception facilitates the awareness of relative body position, movement and acceleration. However, in PD there are severe deficits in

CASE STUDY

# Improvement in Parkinson's Disease Symptoms Following Upper Cervical Chiropractic Care: A Case Study & Selective Review of the Literature

*Russell Friedman, D.C.[1] & Sarah Powers, D.C.[2]*

## ABSTRACT

**Objective:** The objective of this case study is to report on the positive health outcomes of a 76-year-old male patient with a diagnosis of Parkinson's disease undergoing chiropractic care for correction of vertebral subluxations and postural distortions.

**Clinical Features:** A 76-year-old male presented with a primary complaint of Parkinson's disease, with symptoms of right-sided tremors, memory loss, balance issues, constant leg pain, occasional poor circulation, and decreased muscular strength. The patient was formally diagnosed with Parkinson's disease by his neurologist.

**Intervention and Outcomes:** A Quantum Spinal Mechanics 3 (QSM3) Method utilizes upper cervical radiographs, a supine leg check, digital posture measuring device and grid. The algorithm was applied in the correction of upper cervical vertebral subluxations and postural distortions. Positive outcomes included a more balanced atlas (C1) vertebrae in orthogonal positioning and an improvement in postural distortions over a course of six months. The patient's signs and symptoms of Parkinson's disease decreased.

**Conclusion:** This case presents evidence of a link between vertebral subluxations, postural distortions and the expression of Parkinson's disease and advocates that more research needs to be conducted for healthcare providers to best serve patients with neurodegenerative disorders.

**Key Words:** *Parkinson's, Quantum Spinal Mechanics, chiropractic, atlas, subluxation, adjustment, spinal manipulation*

### Introduction

Parkinson's disease (PD) is the second most common neurodegenerative disease after Alzheimer's disease.[1] PD occurs when there is degeneration of dopaminergic neurons in the nigrostriatal system of the brain. An affirmative diagnosis of PD is the presence of Lewy bodies in the neurons of the substantia nigra. Lewy bodies are also known as intracytoplasmic inclusions. Patients with PD experience a decreased quality of life, and face an increased risk of dementia, institutionalization and death.[2,3]

Parkinson's disease was first described in 1817 by James Parkinson.[4,5] It is a slow and progressive neurodegenerative disorder. PD is considered a multifactorial disease based on environmental exposure and genetic predisposition. There is no clear evidence to date of the exact mechanism that causes the neurodegeneration. In terms of genetic susceptibility, approximately 10% to 15% of PD cases have a family history amongst first degree relatives.[5] Environmental risk factors for PD include pesticide exposure, heavy metal exposure,

1. Private Practice of Chiropractic, Sandy Springs, GA
2. Private Practice of Chiropractic, Bend, OR

CASE SERIES

# Improved Health Outcomes in Parkinson's Disease Utilizing Specific Upper Cervical Chiropractic Protocol: A Case Series

*Tron Malachowski D.C.[1] & Ruvayn Rubinstein D.C.[2]*

## ABSTRACT

**Objective:** To report reductions in the Unified Parkinson's Disease Rating Scale (UPDRS) in three patients diagnosed with Parkinson's disease (PD) utilizing Kale Upper Cervical Specific Chiropractic protocol over 3 years.

**Clinical Features**: Patient one is a 63-year-old male who presented to the office diagnosed with PD with a UPDRS rating of 25. Using knee chest upper cervical specific protocol, it was established that the patient had a subluxation with a combination listing of ASL-PL. Patient two is a 65-year-old male who presented with PD and a UPDRS rating of 27. Using knee chest upper cervical specific protocol, it was established that the patient had a subluxation with a combination listing of ASRA-PLI. Patient three is a 66-year-old male who presented with PD and a UPDRS rating of 39. Using knee chest upper cervical specific protocol, it was established that the patient had a subluxation with a listing of PL.

**Interventions and Outcome:** Using Upper Cervical Specific Protocol, x-rays, bilateral NeuroCaloGraph (NCG) readings, orthopedic, neurological testing, and UPDRS scoring, the patient's outcomes demonstrated significantly reduced UPDRS scores. Orthopedic findings, neurological findings and NCG readings were also improved significantly.

**Conclusion:** Upper Cervical Specific chiropractic care utilized on three patients with a diagnosis of PD, rated using the UPDRS test at 2 months, 6 months and 36 months. Results associated with PD included better overall health, improved ambulation, a reduced UPDRS score and a reduction in upper cervical subluxations were all obtained.

**Key Words:** *Parkinson's, Specific Chiropractic, vertebral subluxation, upper cervical, Kale Technique, UPDRS*

### Introduction

More than 1.5 million Americans are diagnosed with Parkinson's disease (PD), which is more than are afflicted with multiple sclerosis and muscular dystrophy combined[1]. It is estimated that there are 100,000 new cases of PD reported annually in the United States[2]. Malachowski et al., states that PD which is also known as paralysis agitans is a progressive disorder that affects the central nervous system, characterized by tremor and impaired co-ordination[3]. PD results from obliteration of the substantia nigra, the area of the brain which is responsible for signaling the basal ganglia to secrete

1. Private Practice of Chiropractic, Summerville, SC
2. Private Practice of Chiropractic, Troy, MI

CASE STUDY

# Upper Cervical Chiropractic Management of a Patient Diagnosed with Idiopathic Parkinson's Disease: A Case Report

*Steve Landry TRP, DC*[1]

## ABSTRACT

**Objective:** To demonstrate the effectiveness of upper cervical chiropractic care in managing a single patient with idiopathic Parkinson's disease and to describe the clinical findings.

**Clinical Features:** A 63-year-old man was diagnosed with Idiopathic Parkinson's disease after a twitch developed in his right hand at rest. Other findings included loss of energy, anxiety and localized middle back pain.

**Intervention and Outcomes:** Hole-In-One (HIO) Knee Chest protocol was used over a 4 week period using x-ray procedures, and analysis, skin temperature differential (pattern) analysis and Knee Chest adjusting technique. Contact-specific, low amplitude, high-velocity, moderate-force adjustments were delivered to the Atlas vertebra. The patient experienced significant improvements in his quality of life using SF-36, PDQ-39 and subjective intake during upper cervical care. The patient also showed considerable improvements in overall bodily pain, active and passive cervical range of motion, postural correction and better quality of sleep following the cessation of restless leg syndrome.

**Conclusions:** We conclude that improvement of the Atlas alignment was associated with reduction of most of his Parkinson's symptoms including decrease in frequency and intensity of his middle back pain, improvement in his quality of life and improvement in his motor function.

**Keywords:** *Idiopathic Parkinson's disease, upper cervical care, middle back pain, subluxation, chiropractic, Knee Chest, HIO.*

### Introduction

In the United States, 50,000-60,000 new cases of Parkinson's disease (PD) are diagnosed each year, adding to the one million people who currently have PD.[1] Parkinson's disease is considered a chronic and progressive disorder of the central nervous system and characterized by gradual loss of dopaminergic neurons in the substantia nigra.[2] Because dopamine is considered as an inhibitory neurotransmitter, it is thought that the lack of dopamine allows the basal ganglia to send continuous excitatory signals to the corticospinal motor control system.[3] Therefore over excitation of the motor cortex (caused by lack of inhibition) creates typical Parkinson's symptoms such as bradykinesia, rigidity, resting tremor (initially unilaterally and usually of the hands), postural instability and good response to levodopa.[4] However, the clinical recognition among the various Parkinsonian syndromes cannot always be made with accuracy.

Some characteristic clinical features are useful in the differential diagnosis.[5] Growing evidence suggests that PD and

1. Private Practice of Chiropractic, Marietta, GA

CASE STUDY

# Specific Upper Cervical Chiropractic Management of a Patient with Parkinson's Disease: A Case Report

*Tron Malachowski DC[1], Shannon Goode BSc, DC[2], BJ Kale DC[3]*

## ABSTRACT

**Objective:** The Upper Cervical Specific Chiropractic management of a patient diagnosed with Parkinson's disease.

**Clinical Features:** A 77 year old man diagnosed with Parkinson's disease in 2003 with progressive hand tremors, festinating gait, akinesia, and incoordination.

**Intervention and Outcome:** Using Kale Upper Cervical Specific Protocol, x-ray, bilateral NeuroCaloGraph readings and neurological testing the patient was monitored and evaluated over a three and a half month period. The patient demonstrated significantly reduced trembling of his extremities and improved speed of ambulation with less exertion. Neurological findings and NeuroCaloGraph readings also improved significantly subsequent to adjusting the patient's second cervical vertebra.

**Conclusion:** Upper Cervical Specific chiropractic care of a patient diagnosed with Parkinson's disease over the course of three and a half months is presented. Marked resolution of the patient's neurological signs and symptoms associated with Parkinson's as well as a reduction in the presentation of upper cervical subluxation was obtained.

**Key Words:** *Parkinson's, Chiropractic, vertebral subluxation, upper cervical, Kale Technique, K4 neurocalograph, Knee Chest*

### Introduction

Parkinson's disease (PD), also known, as paralysis agitans is a progressive disorder that affects the central nervous system, characterized by tremor and impaired co-ordination. Parkinson's disease occurs when neurons in the Substantia Nigra die or become impaired, causing a decrease in dopamine production.

Dopamine is an important chemical messenger in the execution of smooth purposeful movements.[1] Estimates of the destruction vary from 60%-80% loss of dopamine producing cells in the brain by the time symptoms appear.[1]

The clinical manifestation of PD varies among individuals in the pre-motor and motor phases.[2,3] Although in the motor phase PD traditionally presents with a slight trembling of an extremity, rigidity in movement, serious difficulty initiating movement, and postural instability or impaired imbalance and coordination.[1]

Parkinson's disease afflicts an estimated 1 million people across the United States with 50,000 newly diagnosed each year.[4] Historically patients go undiagnosed for years until their motor symptoms become apparent although new research suggests a prodromal phase in the progression of PD.[2,3]

Epidemiological data collected on Parkinson's patients demonstrate several pre-motor changes. Olfactory dysfunction, constipation, urinary disturbances, affective and cognitive changes, weight loss, and pain complaints have been found to precede the onset of motor dysfunction.[3] Estimates

1. Private Practice of Chiropractic, Summerville, SC
2. Private Practice of Chiropractic, Atlanta, GA
3. Private Practice of Chiropractic, Summerville, SC

CASE STUDY

# Symptomatic Improvement in a Patient with Parkinson's Disease Subsequent to Upper Cervical Chiropractic Care: A Case Study

*Robert Bello DC*


## ABSTRACT

**Objective:** The purpose of this case study is to report the symptomatic improvement of a patient with Parkinson's undergoing specific upper cervical chiropractic care.

**Clinical Features:** A 66-year-old female that had been diagnosed with Parkinson's disease (PD) one-and-a-half years prior, entered a National Upper Cervical Chiropractic Association (NUCCA) clinic for chiropractic care. She had symptomatic complaints since three years prior, following an unbraced fall in which she landed directly on her face while doing the Cha-Cha during an evening of ballroom dancing. Her symptoms, which had been getting progressively worse, included a resting tremor in her left hand, fatigue, depression and rigidity throughout her extremities, especially in the third toe of both feet.

**Interventions and Outcomes:** The various analytical techniques employed by the NUCCA doctor are discussed in detail, including postural analysis, thermography, static surface electromyography, functional leg length analysis and a series of precision pre and post orthogonal-based cervical x-rays. After receiving a specific, light force NUCCA adjustment, the patient reported immediate symptomatic relief, which has persisted through the time this paper was written.

**Conclusions:** Although this case demonstrates the far-reaching possibilities of specific upper cervical care in a non-musculoskeletal case, there is a serious need for additional research.


**Key Words:** *chiropractic, NUCCA, Parkinson's disease, upper cervical, subluxation, orthogonal*

### Introduction

Currently, there are thought to be over a million cases of Parkinson's disease (PD) in the US and 100,000 new cases estimated annually.[1] A European study comprising participants from France, Italy, the Netherlands, and Spain deduced that an average of 1.6 people per 100 in their respective countries are inflicted with this disease.[2]

In 1997, the annual costs related to PD in the US alone was estimated to be $24 billion.[2] Originally referred to as Shaking Palsy, the disease received its current name in 1817 from the British scientist James Parkinson. He was responsible for recording a list of what are currently delineated as the symptoms of PD, such as resting tremor, stiffness/rigidity, bradykinesia, depression, altered gait and dementia. [1]

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CASE STUDY

# Reduction in Symptoms Related to Parkinson's Disease Concomitant with Subluxation Reduction Following Upper Cervical Chiropractic Care

*Jonathan Chung DC[1] & Justin Brown DC[2]*

## ABSTRACT

**Objective:** To provide a detailed report on one case of a 67 year-old female with Parkinson's disease under upper cervical chiropractic care.

**Clinical Features:** A 67 year-old female patient presenting to a private practice with an atlas subluxation complex as well as signs and symptoms of Parkinson's disease that include weakness, tremors, scoliosis and rigidity.

**Intervention and Outcomes:** Over a period of 6 months, the patient was seen 19 times and was adjusted 12 times following the NUCCA protocol. Improvements in radiographic measurements, paraspinal thermography, and sEMG were recorded. Patient self-reported improvements in weakness, tremors, rigidity, and overall mobility.

**Conclusion:** The upper cervical subluxation may be a contributing factor to the symptomatic expression of Parkinson's disease. Reduction of the subluxation with specific vectored correction may be a plausible, safe, and effective approach for managing PD. More research is warranted investigating the effects of upper cervical care and Parkinson's Disease (PD).

**Key Words:** *Parkinson's Disease, upper cervical, subluxation, orthogonal, NUCCA, atlas*

### Introduction

Parkinson's disease (PD) is a progressive neurodegenerative disease characterized by resting tremor, bradykinesia, rigidity, and postural instability. An estimated one million Americans live with Parkinson's with approximately sixty thousand new cases diagnosed each year.[1] Currently there is no cure for Parkinson's disease.

PD is a result of destruction to the substantia nigra which is responsible for signaling the basal ganglia to secrete dopamine and filter sensory signals to the motor cortex. The inability to inhibit neural impulses to the cortex results in overactivation presenting as the essential tremor and muscular rigidity.[1]

Conventional medical treatments include Levodopa and Carbidopa in order to increase dopamine action on the central nervous system. Though these drugs have displayed effectiveness in managing Parkinson's symptoms, the effect of the drug decreases over time requiring higher dosages. It has been shown recently that Levodopa is associated with severe involuntary dyskinesias.[2] Deep brain stimulation has shown promise in improving motor symptoms and quality of life, but come with a high risk of serious adverse effects.[3]

Research in the chiropractic management of patients with Parkinson's disease is limited. Elster documented improvements in Parkinson's patients undergoing upper cervical chiropractic care in two studies.[4,5] The current paper will describe the reduction of vertebral subluxation findings

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ORIGINAL RESEARCH

# Eighty-One Patients with Multiple Sclerosis and Parkinson's Disease Undergoing Upper Cervical Chiropractic Care to Correct Vertebral Subluxation: A Retrospective Analysis

*Erin L. Elster, D.C.*


## ABSTRACT

**Objective**: The objective of this article is threefold: to examine the role of head and neck trauma as a contributing factor to the onset of Multiple Sclerosis (MS) and Parkinson's disease (PD); to explore the diagnosis and treatment of trauma-induced injury to the upper cervical spine through the use of protocol developed by the International Upper Cervical Chiropractic Association (IUCCA); and to investigate the potential for improving and arresting MS and PD through the correction of trauma-induced upper cervical injury. Data from 81 MS and PD patients who recalled prior trauma, presented with upper cervical injuries, and received care according to the above protocol are reviewed.

**Clinical Features**: Each patient was examined and cared for in the author's private practice in an uncontrolled, non-randomized environment over a five-year period. Of the 81 MS and PD patients, 78 recalled that they had experienced at least one head or neck trauma prior to the onset of the disease. In order of frequency, patients reported that they were involved in auto accidents (39 patients); sporting accidents, such as skiing, horseback riding, cycling, and football (29 patients); or falls on icy sidewalks or down stairs (16 patients). The duration between the traumatic event and disease onset varied from two months to 30 years.

**Intervention and Outcome**: Two diagnostic tests, paraspinal digital infrared imaging and laser-aligned radiography, were performed according to IUCCA protocol. These tests objectively identify trauma-induced upper cervical subluxations (misalignment of the upper cervical spine from the neural canal) and resulting neuropathophysiology. Upper cervical subluxations were found in all 81 cases. After administering treatment to correct their upper cervical injuries, 40 of 44 (91%) MS cases and 34 of 37 (92%) PD cases showed symptomatic improvement and no further disease progression during the care period.

**Conclusion**: A causal link between trauma-induced upper cervical injury and disease onset for both MS and PD appears to exist. Correcting the injury to the upper cervical spine through the use of IUCCA protocol may arrest and reverse the progression of both MS and PD. Further study in a controlled, experimental environment with a larger sample size is recommended.


**Key Indexing Terms:** *upper cervical spine, chiropractic, Parkinson's disease, Multiple Sclerosis, trauma*

## Introduction

While the link between head trauma and the later development of Parkinson's disease (PD) or Multiple Sclerosis (MS) remains controversial, many PD and MS researchers have confirmed the connection.[1-12] Several researchers have reported a strong association between head trauma and the subsequent development of PD in retrospective case-controlled studies and have found this association to be stronger than that of other environmental agents long suspected as risk factors for PD.[1-5] On average, these studies found that head trauma occurred two to three decades prior to PD onset.[1-2,5] One recently published study, performed at the Mayo Clinic and headed by Dr. J.H. Bower, investigated the association between head trauma and PD in more detail.[1] By reviewing the complete medical records of both cases and controls, the study team was able to objectively determine prior occurrence of head trauma without introducing recall bias. Study results suggest that head trauma is associated with the later development of PD, even when study limitations were taken into consideration.

In a discussion regarding the possible role of trauma in the development of MS, Dr. Charles Poser [9-11] notes that "in some patients with MS, certain kinds of trauma (to the brain and/or spinal cord, including whiplash injuries) may act as a trigger at

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# MULTIPLE SCLEROSIS

## Case Study

# Improved Health Outcomes in a Patient with Multiple Sclerosis Undergoing Chiropractic Care: A Case Study

*Kirk Stevens, D.C.*[1]
*Chris Kim, D.C.*[1]
*Paul Jeen, D.C.*[1]

1. *Private Practice of Chiropractic, Auckland, New Zealand*

**Abstract**

**Objective**: To report on a case of a 57-year-old female diagnosed with multiple sclerosis who received chiropractic care.

**Clinical Features**: The patient presented to a chiropractor suffering from bilateral foot numbness, hand numbness, cervical pain, headaches, vision impairment, diplopia, and tinnitus.

**Interventions and Outcomes**: Instrument assisted chiropractic care was provided over 24 sessions during a 2-month period and her progress was assessed. The patient showed improvements in a variety of both subjective and objective health measures.

**Conclusions**: The patient in this case study reported positive health outcomes while receiving chiropractic care. Further research is required to explore the potential role chiropractors may play in caring for patients with multiple sclerosis.

**Keywords**: *Multiple Sclerosis, geriatric, chiropractic, vertebral subluxation, Activator Methods Chiropractic Technique*

### Introduction

Multiple Sclerosis (MS) is a neurological disorder in which focal areas in the central nervous system (brain, spinal cord) undergo demyelination. Its symptoms are characterized by various neurological deficits including visual/oculomotor abnormalities, paraesthesia, weakness, spasticity, urinary dysfunction and mild cognitive impairment.[1] In 2006, the prevalence of MS in New Zealand was estimated to be 71.9 per 100000, with female predominance.[2] The age of onset ranges between 15 & 60, peaking at 20-40. However, there is approximately a 5% chance that a person may develop late-onset MS after the age of 50, implying that MS is still a concern for this demographic.[3]

The cause of MS is currently unknown but there could be a possible link to autoimmune dysfunction. It is regarded as an incurable disease and therefore medical treatment and management focus on controlling exacerbations and relieving symptoms. These involve the administration of various medications, such as corticosteroids and immunomodulators, supportive care including regular exercises, nutritional supplements, reducing workloads and the cessation of smoking.[1] However, the utilization of complementary and alternative medicine (CAM) among some MS patients has been noted in the recent years. A study in the United Kingdom showed that 91% of MS patients has used CAM therapies and 42% of these people used chiropractic care, mostly for the management of symptoms.[4] Although, there are number of reported cases in which chiropractic care showed some benefits,[5,6] there is a lack of controlled clinical trials supporting the efficacy or safety of chiropractic in managing MS.[7]

In this case study we examine a case of a 57-year-old woman with MS under chiropractic care and discuss the outcomes in order to broaden the knowledge of possible implications of chiropractic care in managing MS.

### Case History and Examination

A 57-year-old female patient presented to a chiropractic clinic complaining of sudden onset of bilateral foot numbness. It was especially intense in the lateral aspects of the feet which interfered with her balance. Additionally, she noticed numbness in her right hand affecting 1st, 2nd, and 5th digits with associated aching pain in the right scapular and cervical regions. The cervical pain would occasionally produce associated headache in the occipital region and ill-defined blotchiness in her vision. The pain symptoms were relieved by putting pressure on specific points on the neck and reducing the work in front of computers. Other pertinent information

## Case Report

# Improved Health Outcomes in a Multiple Sclerosis Patient Undergoing Chiropractic Care for Vertebral Subluxation: A Case Report & Review of the Literature

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2. *Private Practice of Chiropractic, Newington, CT*

**Abstract**

**Objective**: To report on positive health outcomes in a 39-year-old female diagnosed with Multiple Sclerosis (MS) undergoing chiropractic care to reduce vertebral subluxation.

**Clinical Features**: A 39-year-old wheelchair bound female presented with a 20-year history of MS. Multiple brain lesions on pre-MRI confirmed the diagnosis. The patient's condition was previously managed medically with increasing disability noted. She had multiple motor and sensory deficits, pain, visual loss and inability to ambulate.

**Intervention and Outcomes**: The patient was examined for vertebral subluxation and adjusted utilizing the toggle-recoil technique based on findings elicited from thermographic scans revealing pattern and X-rays revealing C2, C3 subluxation. The adjustments were given only at the C2 vertebral segment. The patient's care plan was over 18-36 months. Post-MRI results revealed no active plaques in the brain. She experienced diminished MS symptomatology and functional improvement including the ability to ambulate.

**Conclusions**: The patient responded favorably to a course of vertebral subluxation-based chiropractic care. More research on chiropractic and MS is needed.

**Key Words**: *chiropractic, adjustment, vertebral subluxation, Knee-Chest solid head piece toggle-recoil-torque procedure/adjustment, brain stem compression, Multiple Sclerosis, MRI, thermography*

### Introduction

Multiple Sclerosis (MS) is the most common disabling neurological disease of young adults.[1] MS is characterized as an unpredictable disease of the central nervous system (CNS) that can range from mild course of symptoms to steadily worsening or even disabling an individual—in rare instances MS is fatal.[1-2] There is no way to predict the course of each individual suffering with MS, however most people will have short periods of symptoms followed by long periods of relief. MS causes many different symptoms, including numbness or weakness in one or more limbs that typically occur on one side of the body at a time, partial or complete loss of vision often with pain during eye movement, prolonged double vision, tingling or pain in parts of the body, electric-shock sensations that occur with certain neck movements especially bending the neck forward (L'hermitte sign), tremors, lack of coordination or unsteady gait, slurred speech, fatigue, dizziness and problems with bowel and bladder function.[2-3]

The cause of MS is unknown although it is considered a neuroinflammatory disease and falls under the autoimmune disorders.[1] An inflammatory response occurs when the immune system cells attack what appears to be healthy myelin in MS patients. Myelin makes up the myelin sheath that is a fatty substance that coats and protects nerve fibers (axons) in

# CASE STUDY

## Improvement in Multiple Sclerosis and GERD in a Female with Vertebral Subluxations Undergoing Chiropractic Care: A Case Study

*Ben Lerner, D.C.[1] and Sheri Lerner, D.C.[2]*

## Abstract

**Objective:** To report on the improvement of multiple sclerosis and GERD related symptoms in an adult female undergoing chiropractic care to correct vertebral subluxations.

**Clinical Features:** Fifty-one year old female with history of multiple sclerosis and several other conditions including GERD. Objective indicators of vertebral subluxation identified via surface electromyography and radiographs.

**Intervention & Outcome:** Pettibon chiropractic technique along with manual Diversified chiropractic adjusting directed at reducing vertebral subluxations in the cervical, thoracic and pelvic regions were performed. Dietary modifications and a lead detoxification program were also implemented.

**Conclusion:** The case of an adult female with past history of multiple sclerosis and other conditions is presented. Dramatic improvement in symptoms related to multiple sclerosis is noted following the introduction of chiropractic care concomitant with a reduction in vertebral subluxation. Additional research on the benefits of chiropractic in those with multiple sclerosis is warranted.

***Key Words:*** *Multiple Sclerosis, chiropractic, vertebral subluxation, gastroesophageal reflux disease (GERD), Pettibon, Diversified, thermography, surface electromyography*

**Introduction**

Multiple sclerosis (MS) is a debilitating disease characterized by recurrent or chronically progressive neurological dysfunction.[1] This disease is caused by periventricular inflammatory foci in the white matter of the central nervous system. The recurrent inflammatory episodes result in characteristic widespread, demyelinated sclerotic lesions called plaques.[1] The plaques settle randomly throughout the brain, optic nerves, and spinal cords of its victims.[1,2] After the plaques settle, destruction of the myelin takes place, which leads to slowed or blocked nerve transmission, which ends in diminished or lost function.[2]

The prevalence of this disease has been estimated at 100 cases per 100,000 people.[1] The average age of onset is 30, with a male to female ratio of 1:2.[1,2] There is a geographic disparity in terms of prevalence as well, with more cases being found and reported in northern latitudes, more temperate

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CASE REPORT

# Upper Cervical Chiropractic Management of a Multiple Sclerosis Patient: A Case Report

*Erin L. Elster, D.C.*

**Abstract**— This article reviews the upper cervical chiropractic management of a single patient with Multiple Sclerosis (MS). This 47-year-old female first experienced symptoms of MS at age 44, when she noticed cognitive problems and loss of bladder control. After viewing multiple lesions on MRI (MS plaques), her neurologist diagnosed her with MS. Two years later, she noticed additional symptoms of leg weakness and paresthesias in her arms and legs. Her symptoms progressively worsened without remission, so her neurologist categorized her as having chronic progressive MS and recommended drug therapy (Avonex). Upon initial examination of this patient, evidence of an upper cervical subluxation was found using precise upper cervical radiographs and paraspinal digital infrared imaging. The patient's medical history included one possible mechanism (a fall approximately ten years prior), which could have caused her upper cervical subluxation. The patient was placed on a specially designed knee-chest table for adjustment, which was delivered by hand to the first cervical vertebra according to radiographic findings. Monitoring of the patient's progress was through doctor's observation, patient's subjective description of symptoms, thermographic scans, neurologist's evaluation and MRI. The patient was managed with upper cervical chiropractic care for two years. After four months of upper cervical chiropractic care, all MS symptoms were absent. A follow-up MRI showed no new lesions as well as a reduction in intensity of the original lesions. After a year passed in which the patient remained asymptomatic, another follow-up MRI was performed. Once again, the MRI showed no new lesions and a continued reduction in intensity of the original lesions. Two years after upper cervical chiropractic care began, all MS symptoms remained absent. This case report revealed that this specific upper cervical procedure (thermal imaging, cervical radiographs, and knee-chest adjustments) was associated with a successful outcome for a patient with Multiple Sclerosis. Post MRI's, post thermographic scans, and the patient's neurologist's evaluation all suggested the intervention of upper cervical chiropractic care may have stimulated a reversal in the progression of Multiple Sclerosis.

*Key Words: upper cervical spine, chiropractic, Multiple Sclerosis, vertebral subluxation, trauma, thermography, adjustment, manipulation*

## Introduction

Multiple Sclerosis (MS) is the foremost disabling neurological disease among adults between 20 and 50 years of age, afflicting 250,000 people in the United States. It strikes women twice as often as men and Caucasians more frequently than other ethnic groups. The occurrence of MS is greater in northern temperate zones.[1]

The pathological process involved in MS, a demyelinating disease, is the loss of myelin sheaths surrounding axons in the central nervous system (brain and spinal cord). Demyelination is thought to result either from damage to the oligodendrocytes (white matter cells) that produce the myelin or from a direct, immunologic (auto-immune) assault on the myelin itself.[2]

Common early manifestations of MS include paresthesias (numbness / tingling in extremities), optic neuritis (vision loss), mild sensory or motor symptoms in a limb, and cerebellar incoordination (balance loss). Although the most common course of the condition is a relapsing and remitting pattern over many years, the manifestation in each patient varies. In most cases, as the disease progresses, remissions become less complete. Some patients have only a few brief episodes of disability, whereas others have a relentless downhill course over months or weeks.

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## Case Study

# Improvement in Quality of Life of a 36 Year Old Female with Multiple Sclerosis Undergoing Subluxation Centered Chiropractic Care: A Case Report

Michael Gibson, D.C.[1]
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1. *Private Practice of Chiropractic, Kanata, ON*
2. *Private Practice of Chiropractic, East Stroudsburg, PA*

**Abstract**

**Objective:** To report on the effects of the correction of vertebral subluxations in an adult female with multiple sclerosis.

**Clinical Features:** A thirty six year old female with multiple sclerosis showed functional and symptomatic improvement during the course of chiropractic care. Objective indicators of vertebral subluxation in this study included surface electromyography, thermographic scans, and spinal radiographs.

**Interventions and Outcomes:** Patient was given chiropractic adjustments by hand and with the Integrator™ adjusting instrument based on findings elicited with MC² and Thompson technique analysis. These adjustments were given in the cervical, thoracic, and sacral regions and they were directed at reducing vertebral subluxations to improve brain-body communication.

**Conclusions:** The positive response observed during chiropractic care indicates that correction of vertebral subluxations may have an effect on multiple sclerosis. However, since this paper consists of a single case study, it is not possible to generalize the results to the entire population of those with multiple sclerosis. Additional research investigating the effects of vertebral subluxation correction on individuals with multiple sclerosis is warranted.

**Keywords:** *Multiple sclerosis, chiropractic, neck pain, fatigue, numbness, low back pain, headaches, dizziness, vertebral subluxation, MC², tonal*

### Introduction

Multiple sclerosis (MS) is a chronic inflammatory demyelinating disorder that affects the white matter of the brain, spinal cord, and optic nerves.[1] Axonal degeneration and reductions in nerve fiber density in the brain and spinal cord often lead to functional loss and permanent disability.[1] Symptoms in MS are wide ranging in severity and duration with sensory deficits usually presenting first, followed by motor abnormalities.[2] Symptoms may include paresthesias, visual changes, vertigo, pain, dizziness, cognitive impairments, depression, irregular appetite, mood changes, muscle weakness, bowel/bladder dysfunction, gait disturbances, fatigue, speech arrest, seizures, changes in muscle tone, and sexual dysfunction.[1,3,4]

Most people with MS experience the relapsing-remitting form of the disease which is characterized by recurrent symptomatic attacks separated in time by periods of relative stability.[5] Acute attacks in MS are believed to be inflammatory events in the affected nerve tissue.[1] Though some may not experience a marked escalation in severity of the attacks, it is not uncommon for remissions to be accompanied by residual disability.[5] Some experience the Uhthoff phenomenon which is characterized by a symptomatic exacerbation when the individual is exposed to heat, stress, infection, or prolonged periods of exercise.[6,7]

The disease affects 250,000 to 350,000 individuals in the United States and a total of 2.5 million people worldwide.[1] The first symptoms usually occur between the ages of 20 and 40[8] with a peak rate of incidence in the third decade.[9] Females are affected twice as often as males,[3] though at least one source indicates a female predilection 75% of the time.[10] The individuals most commonly affected seem to be white and of European descent. MS is more common in temperate regions such as the United States, Canada, and Europe and rarer in tropical climes.[7,11] Up to 20% of people with MS who dwell in temperate regions report a familial history of the disease.[11,3]

## Case Report

# Improvements in Lung Function, Dysautonomia and Grip Strength in a Patient with Multiple Sclerosis Following Correction of Vertebral Subluxation Using Chiropractic BioPhysics®: A Case Study and Selective Review of Literature

*Curtis Fedorchuk, D.C.*[1]
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*Dustin Vukovic, D.C.*[2]

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**Abstract**

**Objective:** The purpose of this study is to report on the structural and symptomatic improvements made in a patient with a 22-year history of multiple sclerosis using Chiropractic BioPhysics® technique.

**Clinical Features:** A 58-year-old female confined to a wheel chair presented for chiropractic care with a diagnosis of multiple sclerosis. An anterior-posterior lower cervical x-ray displayed 16.2mm left head translation (ideal is 0mm). Paraspinal thermography revealed a significant asymmetry in the cervical region with moderate asymmetry at C1 and C5 and severe asymmetry at C2-C4. Spirometry revealed a peak expiratory lung flow volume of 200 L/min and a forced expiratory lung volume of 1.48 L. Grip strength assessment revealed a maximum left-hand grip strength of 2.8 lbs and a maximum right-hand grip strength of 3.0 lbs.

**Intervention and Outcomes:** The patient received Chiropractic BioPhysics® technique protocols. Follow-up examination revealed that the patient achieved a correction of left head translation of 17.0mm from 16.2mm to -0.8mm; an improvement in peak expiratory flow volume of 27 L/min from 200 L/min to 227 L/min; an improvement in forced expiratory lung volume of 0.18 L from 1.48 L to 1.66 L; an improvement in left-hand grip strength of 9.2 lbs from 2.8 lbs to 12 lbs and in right-hand grip strength of 5 lbs from 3.0 lbs to 8.0 lbs.

**Conclusions:** Reduced vertebral subluxations, improved posture and a concomitant improvement in respiratory function, dysautonomia, and grip strength were achieved.

**Key Words:** *Chiropractic, vertebral subluxation, multiple sclerosis, lung function, pulmonary function, forced expiratory volume, FEV, peak expiratory flow, PEF, spirometry, grip strength, posture, Chiropractic BioPhysics®, Mirror Image®, adjustment, traction*

### Introduction

*Multiple Sclerosis*

Multiple sclerosis (MS) is a chronic, degenerative disease of the nervous system that is demyelinating and inflammatory in nature and is characterized by patchy sclerosis of the central nervous system (CNS).[1-3] MS affects 400,000 people in the United States and over 2 million people worldwide.[1,2,4] The combined annual cost of diagnosis and management of multiple sclerosis in the United States is more than 2.5 billion U.S. dollars.[1,5] Half of multiple sclerosis patients will experience depression during the course of the disease, 43% will experience permanent disability leading to job loss, and

## Case Study

# Improvement in Cervical Curve, Dysautonomia and Quality of Life in a Patient with Multiple Sclerosis using the Pierce Results System™: Case Study & Review of the Literature

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2. *Private Practice of Chiropractic, Evanston, IL*

**Abstract**

**Objective:** This paper presents the chiropractic management and care of a 26-year-old female with multiple sclerosis, numbness, neck pain, and vertebral subluxation complex.

**Clinical Features:** A 26-year-old patient with multiple sclerosis presented to private practice. A complete history and objective examination involving analysis of instrumentation, x-rays, and videoflouroscopy using the Pierce Results System™ (PRS™) was conducted. Several vertebral subluxations and a cervical kyphosis were found in the cervical spine.

**Intervention and Outcome:** Patient was seen twelve times in one month while receiving nine adjustments total utilizing PRS™ for vertebral subluxations and reducing patient's symptoms associated with multiple sclerosis. At reassessment, the patient's cervical curve improved 60% and her musculoskeletal complaints, headaches, and numbness in the neck and arms improved.

**Conclusion:** The PRS™ chiropractic management of multiple sclerosis related symptoms and associated cervical curve improvement was achieved through correction of vertebral subluxation. Manual and instrument assisted spinal adjustments were utilized as intervention and no other modalities or treatments were necessary to achieve such outcomes.

**Key Words:** *Chiropractic, Multiple Sclerosis, Vertebral Subluxation Complex, Thermography, Intrumentation, Videoflouroscopy, Cervical Kyphosis, Technique, Adjustment, Pierce Results System, Adjustment*

### Introduction

Multiple Sclerosis (MS) is a disorder characterized by varied central nervous system (CNS) deficits, which occur unpredictably with remissions and recurring exacerbations.[1] It is distinguished clinically from other diseases when these deficits are separated in time and space and further due to demyelination of the lateral and posterior columns of white matter in neural tissue.[1,2] The lesions present are gray areas within the white matter, which occur around the ventricles in most cases, however they can be located anywhere in the CNS. Tracts in the pons, midbrain, and cerebellum are affected more frequently, and gray matter in the cerebrum can be afflicted but to a much lesser degree.[2]

These sclerotic lesions are marked by myelin degeneration, lipid-laden macrophages, and some axonal preservation.[3] There are lymphocytes and extended mononuclear cells at the edges of the lesions and demyelination of white matter in the CNS results in a multitude of neurological symptoms ranging from numbness, tingling, slurred speech, changes in cognition and vision, and in severe cases paralysis can be present.[3] Most individuals diagnosed with MS have a normal life expectancy, but in some severely progressive cases the disease process can result in death.[3,4]

MS has become more widespread in recent decades as more than 450,000 Americans currently have the disease, and every hour someone is newly diagnosed. MS affects more than 2.3 million people worldwide.[3] Additionally, the Centers for Disease Control and Prevention (CDC) does not require U.S. Physicians to report newly diagnosed cases and because

CASE STUDY

# Improvement in Multiple Sclerosis Symptomatology in a Patient Undergoing Upper Cervical Chiropractic Care

*Nicholas Tedder D.C.[1] & Shana McLaughlin Canfield D.C.[2]*

## ABSTRACT

**Objective:** To describe the upper cervical chiropractic care of a patient with a 13 year diagnosis of Multiple Sclerosis.

**Clinical Features:** A 49-year-old woman with multiple sclerosis presented to an upper cervical chiropractic office. Her chief complaints included neck pain, difficultly writing, fatigue, and head instability in addition to multiple other complaints. Upon examination it was determined that she had an upper cervical subluxation through x-ray and paraspinal thermal analysis.

**Intervention and Outcome:** The patient was adjusted according to Knee Chest Upper Cervical protocol over the course of one year and seven months. The patient had a decrease in all presenting symptoms and an increase in quality of life following care.

**Conclusions:** Although no formal conclusions can be reached from a single case study, this study does show how a patient with MS benefitted from upper cervical chiropractic care. Upper cervical chiropractic care should be researched further on a larger scale, such as randomized clinical trials to further exam its role in benefitting those with multiple sclerosis.

**Keywords:** *Upper cervical chiropractic, multiple sclerosis, paraspinal thermal analysis, subluxation, homeostasis, adjustment*

### Introduction

Multiple sclerosis (MS) is a chronic, inflammatory, demyelinating disease of the central nervous system of unknown etiology.[1-3] It is the most common disabling autoimmune disease in young adults affecting approximately 250,000 people in the U.S. primarily between the ages of 20 and 50.[4] Multiple sclerosis causes a scattered array of neurologic symptoms because it affects the central nervous system, which includes the brain and spinal cord. Some early symptoms can include: cerebellar incoordination, optic neuritis, mild sensory or motor symptoms, paresthesias, handwriting difficulties, headaches, and depression.[4-6]

Multiple sclerosis is characterized by lesions formed from inflammation, demyelination, and axonal damage.[7] Demyelination is the process by which the myelin that surrounds axons in the central nervous system is damaged.

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ORIGINAL RESEARCH

# Upper Cervical Vertebral Subluxation in Multiple Sclerosis Subjects with Chronic Cerebrospinal Venous Insufficiency: A Pilot Study

*Sandro Mandolesi, MD,[1] Giuseppe Marceca, MD,[2] Stephen Conicello, DC,[3] Eriece Harris, DC[4]*

## ABSTRACT

**Objective:** The purpose of this study is to evaluate the relationship between Atlas vertebra misalignments identified via radiographs and patients with multiple sclerosis (MS) and chronic cerebrospinal venous insufficiency (CCSVI).

**Clinical Features:** Four patients with MS and CCVSI, three women and one man were evaluated according to revised McDonald criteria. These four patients were compared to a control group of four patients of similar age but with no neuro-degenerative diseases.

**Intervention and Outcomes:** This is the first report on Atlas (C1) misalignment in MS patients with CCVSI. Four patients were evaluated using the Zamboni's criteria using the following: Echo Color Doppler (ECD) MyLab Vinco System Esaote, Upper cervical x-ray examination, Myofunctional Map, and Tytron thermal scanning instrumentation. In this study we found different alterations of C1 alignment in the MS patients versus the control group. Analysis of the x-ray examination permits us to identify a severe rotation and anterior intrusion of C1 in the MS patients with CCVSI.

**Conclusion:** We found not only endovenous congenital malformations, but also external venous compression that blocks drainage flow. This confirms the validity of our Mechanical Posture Vascular Compressive Block. We hypothesize that extracranial venous compression is linked to severe misalignment of C1. We can also catalogue misalignments into two types of degrees: moderate and severe. This staging permits us to begin to distinguish paraphysiological misalignments from true pathological misalignments.

**Keywords:** *Multiple sclerosis, chronic cerebrospinal venous insufficiency, upper cervical, subluxation*

### Introduction

Multiple sclerosis (MS) is considered a chronic disease of the from early stages.[1] It is estimated that it currently affects 400,000 individuals in the United States, with 12,000 being new cases annually, with more people being diagnosed now than in the past.[2] MS affects twice as many women as it does men, mimicking the unexplained bias found in other

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CASE STUDY

# Upper Cervical Chiropractic Care of a Female Patient with Multiple Sclerosis: A Case Study

*Justin Brown, DC,[1] Jonathon Chung DC,[1] Belinda McCullen DC[2]*

## ABSTRACT

**Objective:** To describe the upper cervical chiropractic management of a female patient with Multiple Sclerosis (MS).

**Clinical Features:** A female patient with Multiple Sclerosis presented to the office with neck pain, numbness, ringing in the ears, fatigue, balance problems, and dizziness. This was the patient's second experience with chiropractic. An atlas subluxation was detected from leg length evaluation, postural analysis, and radiographic measurements. She was adjusted using an upper cervical technique.

**Intervention and Outcomes:** The patient received orthogonal-based, upper cervical low-force (UCLF) chiropractic care based on the National Upper Cervical Chiropractic Association (NUCCA) technique protocol. At the patient's 30th visit she reported having a 90% improvement in her neck pain, 90% improvement in her numbness, 70% improvement in her fatigue, and a 90% improvement in her balance since her initial visit.

**Conclusion:** The positive response observed in the case suggests that atlas subluxation may have a positive effect on the symptoms of patients with Multiple Sclerosis. However, follow up to this case is needed due to the nature of exacerbations and remissions in MS. The need for further investigation of the connection between atlas vertebra subluxations and Multiple Sclerosis is indicated.

**Key Words:** *Upper Cervical, Subluxation, Multiple Sclerosis, NUCCA, orthogonal, neck pain, fatigue, and numbness*

### Introduction

Multiple sclerosis (MS) is considered an inflammatory, demyelinating, and neurodegenerative disorder of the central nervous system (CNS). It is characterized by a recurrent or a chronically progressive neurological dysfunction.[1] MS is caused by periventricular inflammatory foci in the white matter of the central nervous system. These recurrent inflammatory episodes result in its characteristic widespread demyelinated sclerotic lesions called plaques. The plaques settle indiscriminately throughout the brain, optic nerves, and spinal cord.[1,2] After the plaques settle, destruction of the myelin takes place, which leads to sluggish or blocked nerve transmission, which can end in reduced or lost function.[2]

MS can be found at almost any age. Its peak of onset is between 20 and 40 years of age with an average of 30.[3] There were approximately 350,000 people suffering from MS in the United States at the end of the 20th century.[2] Approximately 80% of MS patients suffer from the relapsing-remitting form of the disease. The economic impact of MS is widespread and

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CASE STUDY

# Improvement in a Female with Multiple Sclerosis Undergoing Chiropractic Care Utilizing Toggle Recoil Technique: A Case Report

*John Taylor Thornhill DC*


## ABSTRACT

**Objective**: To report on the reduction of symptoms associated with Multiple Sclerosis and musculoskeletal pain in a female undergoing chiropractic care utilizing Thompson Terminal Point and Toggle Recoil techniques.

**Clinical Features**: A 28 year old female presented with severe neck and back pain following cervical spine trauma. She had a prior diagnosis of Multiple Sclerosis. Objective indicators of vertebral subluxation were identified utilizing Thompson Terminal Point analysis and Grostic leg length analysis.

**Interventions and Outcomes**: Upper cervical specific Toggle Recoil technique was utilized to reduce vertebral subluxations because of the patient's sensitivity to touch. The patient reported improved sleep following the first adjustment. Improvements were noted in musculoskeletal symptoms within five visits. The patient also showed significant improvements in outcome assessment scores utilizing the Neck Disability Index, the Quadruple Visual Analog Scale, and the Headache Disability Index.

**Conclusion**: The improvement of symptoms associated with Multiple Sclerosis and corresponding neck and back pain following short-term upper cervical chiropractic care is presented. Along with previously published work this report intends to establish an association between the correction of upper cervical subluxation and reduction in symptoms associated with Multiple Sclerosis.

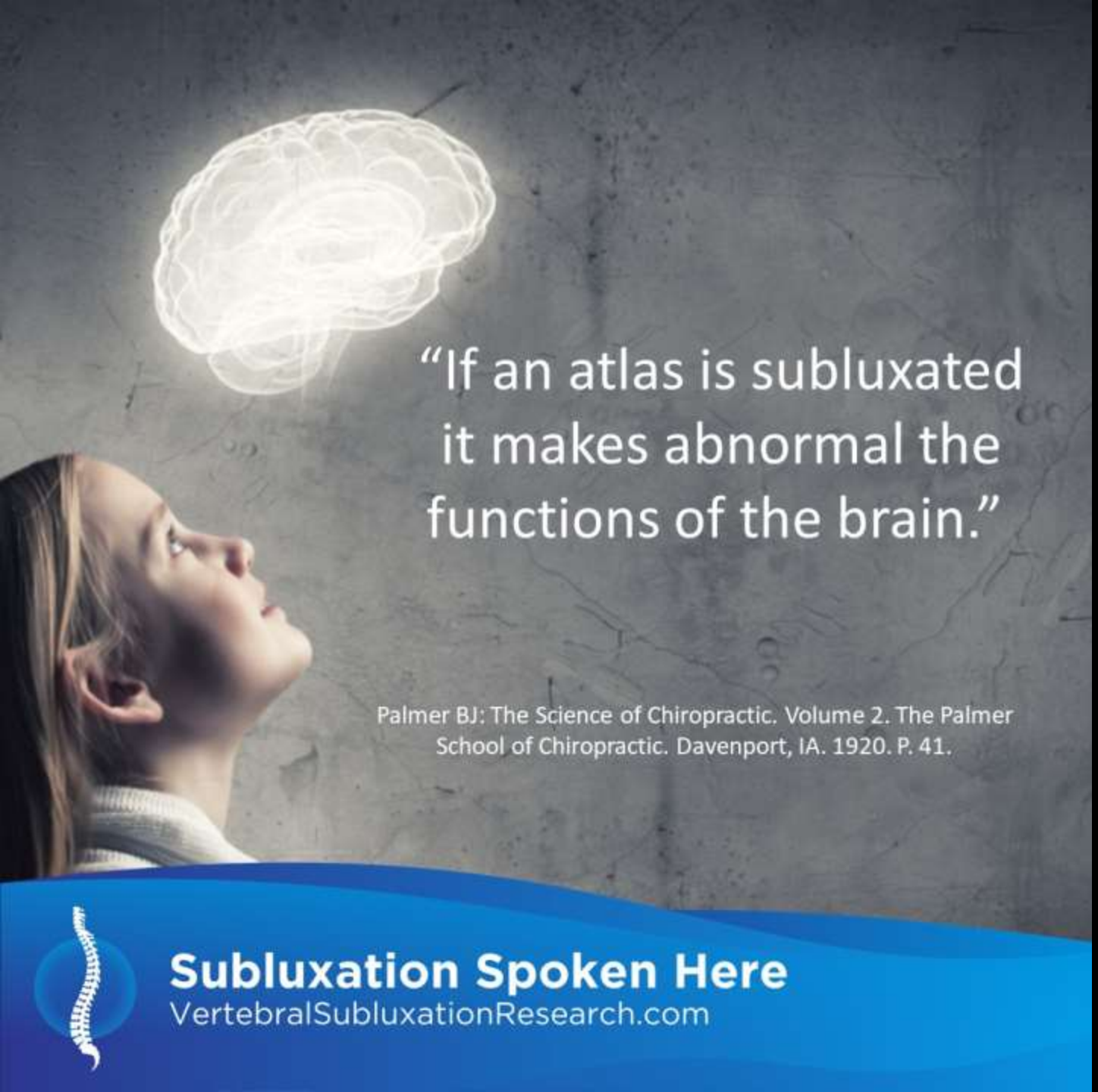

**Key Words**: *Multiple Sclerosis, Upper Cervical, Chiropractic, Musculoskeletal pain, adjustment, Thompson Technique, analysis, neck trauma ,vertebral subluxation*

### Introduction

Multiple Sclerosis is an unpredictable chronic degenerative disease of the central nervous system (the optic nerves, brain and spinal chord).[1] It is defined clinically as distinct episodes of neurological deficit, separated in time and attributable to demyelinating white matter lesions.[1] Lesions (plaques) are sharply defined areas of gray discoloration of white matter occurring especially around the ventricles but potentially located anywhere in the CNS.[1]

Active plaques show myelin breakdown, lipid-laden macrophages, and relative axonal preservation. Lymphocytes and mononuclear cells are prominent at the edges of plaques and around venules in and around plaques.[2] The demyelination of white matter within the central nervous

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# Other Brain "Stuff"

## Case Study

# Feeding Tube Removed Following Chiropractic in a Male Patient with Bickerstaff's Brainstem Encephalitis: A Case Study

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**Abstract**

**Objective:** To describe the positive health outcomes in a 31-year-old male following chiropractic care who was medically diagnosed with Bickerstaff Brainstem Encephalitis.

**Clinical Features:** A 31-year-old male patient presented to the chiropractic office with the medical diagnosis of Bickerstaff Brainstem Encephalitis, exhibiting the classical symptoms of confusion, ataxia and ophthalmoplegia, as well as dysphagia, dizziness, and depression. He had to use a feeding tube to eat.

**Intervention and Outcomes:** The patient was evaluated and adjusted using the Activator protocol. On the eighth adjustment the patient received manual cervical adjustment and after the 17th adjustment was switched to manual thoracic spine manipulations as well. After 12 adjustments, the patient no longer had dysphagia and his feeding tube was removed.

**Conclusion:** This case outlined a 31-year-old male who was diagnosed with Bickerstaff's Brainstem Encephalitis. Further research is encouraged in this population of patients.

**Keywords:** *Bickerstaff brainstem encephalitis, Anti GQ1b antibodies, Guillian-barre syndrome, ophthalmoplegia, Miller-fisher syndrome, Chiropractic, Subluxation, Adjustment*

### Introduction

Bickerstaff brainstem encephalitis (BBE) is a rare, post-infectious disorder that causes confusion, ataxia and ophthalmoplegia.[1] With less than 100 cases reported, BBE is a very rare central and peripheral nervous system disorder similar to that of Guillain-Barre syndrome (GBS) and Miller Fisher syndrome.[2]

A common presentation observed in those that have been diagnosed with BBE can include: ophthalmoplegia, ataxia, drowsiness, brisk reflexes or extensor plantar responses.[3,4] The rarity of this disorder makes it a difficult topic to discover. In 1957, Bickerstaff added five cases to already existing study of patients presenting with similar symptoms.[2] In order to understand BBE we must look into Guillain-Barre Syndrome further because of their overlapping similarities and the rarity of the disease.

Guillain-Barre Syndrome is the most common attained inflammatory neuropathy. Etiology remains unclear but pathophysiology includes demyelination of spinal nerve roots.[5] Guillian-Barre Syndrome affects motor pathways more often than sensory and is usually quite symmetrical. In about two thirds of patients, the syndrome begins five days to three weeks after a trivial infectious disorder, surgery, or vaccination.

Weakness accompanied by paresthesia commonly begins in the distal legs bilaterally and progresses superiorly to the arms, but it can seldom start in the upper body; arms or head. In 90% of patients with Guillain-Barre Syndrome, weakness is

## Original Research

# Effects of Manual Approaches with Osteopathic Modality on Brain Correlates of Interoception: An fMRI Study

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**Abstract**

The present randomised placebo controlled trial explored the extent to which osteopathic manipulative treatment (OMT) affects brain activity, particularly the insula, during both an "interoceptive awareness" and "exteroceptive awareness" task in a sample of 32 right-handed adults with chronic Low Back Pain (CLBP) randomly assigned to either the OMT or sham group. Patients received 4 weekly sessions and fMRI was performed at enrolment (T0), immediately after the first session (T1) and at 1 month (T2). The results revealed that the OMT produced a distinct and specific reduction in BOLD response in specific brain areas related to interoception, i.e., bilateral insula, ACC, left striatum and rMFG. The observed trend across the three time points appears uncharacteristic. At T1, a marginal increase of the BOLD response was observed in all the above-mentioned areas except the rMFG, which showed a decrease in BOLD response. At T2, the response was the opposite: areas related to interoception (bilateral insula and ACC) as well as the rMFG and left striatum demonstrated significant decreased in BOLD response. The findings of this study provide an insight into the effects of manual therapies on brain activity and have implications for future research in the field.

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### Introduction

The interaction between the sense of touch and the body is a well recognised process that takes place at different neural levels, with different effects and mechanisms of action. In the brain, the effect of this interaction produces different mental representations or experiences - also called feelings - of the body[1]. These include inputs from the physiological milieu of the body in terms of metabolic, structural and functional conditions at any given moment, a concept referred to as interoception[2]. Those feelings can be modulated by different stimuli and sources, including touch, ultimately modifying the perception of the internal and external world[3].

Several neurobiological studies posed that the insula (INS) is a critical hub for multimodal interoceptive integration, involved in interoceptive processes, such as awareness of sensations from the body[4], but also exteroceptive elements, such as perception of pain[5,6,] taste[7,8,9,10,] smell[11,] and touch[12]. In fact, external stimuli, i.e. pain, smell or taste, serve as body-mapped signals of the so-called peripersonal space [that is the space immediately surrounding the body][13,14]. Moreover, in the anterior insula exteroceptive and interoceptive information overlap with emotional domains[11], suggesting an underlying commonality[15]. In fact, the insula has been referred as a meeting point between external and internal milieus[16,17,18,19]. Detailed reviews of the interoceptive evidence are available elsewhere[2,3,20].

Methods to measure interoceptive differences comprise the use of questionnaires and behavioural tests that either exploit natural fluctuations in internal physiological signals or manipulate organ physiology experimentally[21,22]. For practical reasons, heartbeat detection tasks are measures largely utilised to assess differences among individuals regarding interoceptive accuracy and ability[23,24,25]. These tests quantify

# CASE STUDY

## Improvement Following Chiropractic Care in an 11-year-old Male with Traumatic Brain Injury: Case Report & Review of Literature

*Megan Karls DC[1], Kory Pugh DC[2], Stephen Wooten DC, ICCSP, CCSP[3], Rod Floyd DC[4] & Joel Alcantara DC[5]*

## Abstract

**Objective:** To describe the chiropractic care of a child with difficulties in upper and lower extremity motor control.

**Clinical Features:** An 11-yr-old male presented for chiropractic care with a history of traumatic brain injury (TBI) as a result of a motor vehicle collision 5 years prior. The patient lacked proper motor control and use of his left hand and lacked balance and co-ordination of the lower extremities. The patient had difficulties with speech and was unable to find balance on a global wobble board and took 5 minutes to find balance on a uniplanar wobble board and held it for 5 seconds.

**Intervention and Outcome:** The patient received chiropractic adjustments characterized as high velocity, low amplitude (HVLA) thrust type known as Diversified and Thompson Technique. In addition to adjustments, neuromuscular re-education was utilized to provide increased coordination for left upper extremities and proprioception for lower extremities. The patient received care over a period of 8 months consisting of 28 visits. As a result of the care he received, the patient demonstrated improved coordination, is able to balance on the global wobble board, is better able to enunciate words and has an improved quality of life.

**Conclusion:** This case report provides supporting evidence on the effectiveness of chiropractic care in children with traumatic brain injury.

**Key words:** *Traumatic brain injury, subluxation, spinal adjustment, chiropractic, balance, speech*

### Introduction

In a study to characterize the prevalence, effectiveness, cost-effectiveness and describe caregiver or patient-related variables associated with the use of CAM, Soo et al.[1] found that the use of CAM was common among pediatric neurology patients with over half of the families reporting benefits with CAM, and few side effects. Galicia-Connolly et al.[2] found similarly with chiropractic as the most common practitioner-based CAM therapy in use along with massage, faith healing, aromatherapy, homeopathy, and relaxation. Furthermore, the investigators found that many patients used CAM products at the same time as conventional medicine.

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CASE STUDY

# The Role of Chiropractic in Traumatic Brain Injury: A Case Study

*Andrea B. Ryan, D.C.*[1]

**ABSTRACT**

**Objective:** To demonstrate the importance of chiropractic care as an integral part of the healing process of a patient with a Traumatic Brain Injury (TBI).

**Clinical Features:** A 55 year old female patient presented to the office with a history of two automobile accidents which had both caused a number of physical symptoms including whiplash, loss of range of motion in her right arm, SI joint pain, shoulder pain, hand pain, parasthesias in the upper and lower extremities, and loss of balance. Complicating the healing process was the onset of depression and suicide attempt after the death of her husband, six years after the second automobile accident.

**Interventions and Outcomes:** Torque Release Technique protocols were used to evaluate and adjust spinal subluxations as it provides a low force adjustment. Adjustments were performed twice weekly over the documented seven months of care. Within one month of care, the patient noted a decrease in symptoms and an improvement in her quality of life. Periodic re-evaluations demonstrated an improvement in physical findings as well as improvement in the function of her autonomic and motor systems as documented by thermal and SEMG scanning.

**Conclusion:** The results of this case study indicate that patients with traumatic brain injury may benefit from including chiropractic care while healing from their physical and emotional stresses.

**Key Words:** *Chiropractic, Subluxation, Torque Release Technique, Traumatic Brain Injury, Surface Electromyography, Thermography,*

## Introduction

Traumatic Brain Injuries (TBI) have the ability to drastically alter a person's lifestyle both temporarily and/or permanently for the rest of their life. There are physical, biochemical, and emotional stresses that are associated with a TBI. As one of the aims of chiropractic care is to reduce those stresses and find a balance in a person's life, it is a vital component to the healing process of any patient inflicted with a TBI. Care must be taken to evaluate the neurological integrity and spinal stability of the patient and tailoring the technique to be utilized to what the patient can tolerate.

The purpose of this case study was to document the healing process of a patient with a TBI and to demonstrate the role that chiropractic played in this process. Prior to beginning care, the chiropractor and patient discussed the goals for the patient with those goals being subluxation reduction, symptom reduction, and increased quality of life. Over a documented seven months of care, the doctor and patient observed success in all three areas as demonstrated by physical exam findings, results of surface electromyography thermal scanning and patient subjective reports.

## Case Report

### *History*

A 55-year-old female patient presented to the author's office with significant neurological and neuromuscular symptoms due to a severe brain injury. The patient had a history of two car accidents within two years. The first was a head on collision, and the second, one year later, involved a half-ton truck accelerating into her parked car.

Immediately after the first car accident, the patient experienced a loss of range of motion in the right arm, severe

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# Hypothesis

# Lymphatic Drainage of the Brain: Implications for Chiropractic

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**Abstract**

Recent neurophysiological research has elucidated the means by which the glymphatic system may deliver interstitial solutes and metabolic waste products from deep brain tissues to the body's lymphatic and venous circulation for clearance. The implications of these new neurophysiological discoveries to the field of chiropractic care are discussed with respect to current knowledge of the impact of upper cervical subluxation on intracranial fluid dynamics.

**Key words:** *chiropractic, glymphatics, lymphatics, subluxation*

## Introduction

"You don't know what you don't know, or what you don't know you don't know." Modern allopathic medicine is based upon the premise that we know enough to "control" or "fix" the human body, while in reality, we truly are in constant exploratory states of understanding the complicated machines in which we live. What happens when a basic premise of "what we know" is overturned?

Recently, researchers at the University of Virginia offered evidence that overturned the long-held assumption that the brain lacks a direct connection to the lymphatic system. In their 2015 Nature publication "Structural and Functional Features of Central Nervous System Lymphatic Vessels", Antoine Louveau and colleagues presented evidence of functional, lymphocyte-containing lymphatic vessels lining the dural sinuses of mice, which drain into the deep cervical lymph nodes.[1]

These lymphatic channels appear to link the also recently characterized glymphatic system,[2] which conducts cerebrospinal fluid through deep brain tissue and removes cellular waste products, to the body's venous circulation. The CNS lymphatic vessel system represents a previously unknown conduit for clearance of waste products from deep within the brain, as well as for immune surveillance.

This is a groundbreaking finding, because for so many years scientists maintained that the brain was isolated from the lymphatic and/or immune system. Louveau's new discovery may serve to reminds us that even after centuries of studying the body, fresh knowledge continues to come forth that both supports chiropractic ideas and causes us to re-write anatomy textbooks.

The identification of a new lymphatic drainage system changes our understanding of how the brain clears out metabolic waste products, and also opens new doors for our understanding of neurodegenerative diseases. Evidence has demonstrated persistent reduced venous outflow through internal jugular veins after mild traumatic brain injury,[3] suggesting the possibility of a long-term connection between decreased fluid clearance from the brain and the early-onset neurodegenerative diseases often found in athletes such as football players or boxers.

Similarly, Zivadinov and Chung showed that jugular venous reflux (JVR) may also cause cerebral venous drainage impairment which could result in pathology.[4] Compromise of outflow via the internal jugular vein has also been studied by Mandolesi and colleagues[5] and others[6] with respect to potential connection to the pathogenesis of multiple sclerosis.

The types of impedence of internal jugular outflow described above may be important in light of Louveau's new model of lymphatic clearance from deep brain tissue, since flow of CSF within the CNS is dependent on a pressure gradient, the low side of which is venous pressure in the superior sagittal sinus.[7] Decreased outflow from the internal jugular vein may therefore result in incremental increases in intracranial CSF pressure and decreased flow, and thereby by extention result in increased congestion of fluids, metabolites, and lymphocytes as they move through the adjacent dural sinus lymphatic vessels, simply by generation of back pressure. It is of note that lymphatics within the enclosed cranial cavity would by definition be more susceptible to incremental pressure increases within the cavity, and therefore any degree of lymphatic obstruction within the enclosed cranial cavity would result in impaired waste clearance from brain tissues.

CASE STUDY

# Improvement in Alpha Brain Waves, Coordination and Emotional Regulation in a Pediatric Patient with Chiropractic Care Using Network Spinal Analysis

*Matthew Mancuso, DC[1] & Janet Cheng, DC[2]*

## Abstract

**Objective**: The objective of this report is to describe improvements in Alpha Brain Waves, coordination and emotional regulation experienced by a patient undergoing subluxation-based chiropractic care using Network Spinal Analysis.

**Clinical Features**: A 7-year-old female presented with slow physical skill acquisition and difficulty with coordination since birth. She had an aversion to using utensils, preferring to use her fingers to self-feed. She also had emotional outbursts and low self-esteem of two years duration.

**Intervention & Outcomes**: Management of this case is based on Reorganizational Healing (ROH) including chiropractic care through Network Spinal Analysis (NSA) for the reduction of facilitation within the spinal cord. The promotion of structural correction of the misalignment component of the associated vertebral subluxation and Somato Respiratory Integration (SRI) to connect enhanced somatic awareness with respiration were also goals of care. After two months there was improved Alpha Waves, coordination, spontaneous use of silverware for self-feeding and an improvement in emotional regulation.

**Conclusion**: Further research is warranted to examine the effect of chiropractic on brain waves and the development of coordination and emotional regulation in the pediatric population.

**Key Words**: *chiropractic, vertebral subluxation, adjustment, coordination, emotional regulation, Network Spinal Analysis (NSA), Alpha Brain Waves*

**Introduction**

Chiropractic is a health care discipline that serves to optimize health through the principle that the body has an innate intelligence by which it sustains and maintains itself. Chiropractors place particular emphasis on the subluxation, which compromises neural integrity and can cause deleterious effects to health.[1] In recent years, the association between the correction of vertebral subluxation and quality of health has been studied in greater detail with objective measures showing what chiropractors have long been reporting anecdotally.[2-3] Chiropractic care and the correction of vertebral subluxation have been associated with cases relating to improvements in quality of life,[4] structural integrity,[5] attention[6] and development of language,[7] among other aspects of health and wellness.[2-3]

The concept of subluxation is understood through various component models and categorizations of clinical applications as presented by Kent. Tonal approaches tend to view the spine and the nervous system as a functional unit with particular interest on functional outcomes, which are of value in subluxation-centered research.[8] Network Spinal Analysis is

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CASE STUDY

# Complications Following Brain Surgery Improved After Upper Cervical Chiropractic Care: A Case Study

*Justin Brown, DC[1], Jonathan Chung, DC[1], Kyle O'Connell, DC[2]*

## ABSTRACT

**Objective:** To evaluate and discuss the effects of upper cervical chiropractic care on a 17-year-old female patient with a loss of balance, speech difficulties and postural distortion following the removal of an astrocytoma from her cerebellum

**Clinical Features:** The patient is a 17-year-old female that was diagnosed with a cerebellar astrocytoma that was previously removed. The patient presented to the office with significant postural abnormalities, difficulty with balance and difficulty with speech. that began post surgery. The patient presented to the office 4 years after the surgery.

**Intervention & Outcomes:** A case history and chiropractic examination was performed and it was determined that the patient had a subluxation of the C1 (atlas) vertebra. The patient received chiropractic care following the National Upper Cervical Chiropractic Association (NUCCA) protocol. The duration of care was five months and the patient was seen 28 times. At each visit she was checked for vertebral subluxation and was adjusted a total of 26 times. The patient reported an improvement in her balance from a 6/10 to a 9/10 and experienced a 90% improvement in her speech.

**Conclusion:** The findings presented in this case suggest that upper cervical adjustments may benefit patients who suffer from post surgical complications.

**Key Words:** *chiropractic, NUCCA, balance, proprioception, ataxia, cerebellum, subluxation, astrocytoma, cancer*

**Introduction**

The cerebellum is part of the central nervous system (CNS) that is a relatively large mass posterior to the pons and medulla. It consists of two lateral hemispheres that are connected by a narrow middle part called the vermis.[1] The cerebellum has no direct ability to cause muscle contraction but if harmed or removed, body movements become uncoordinated and abnormal.

This happens because the cerebellum helps to sequence motor activity and makes adjustments in the body's motor patterns. The cerebellum makes changes to movement patterns as they are happening so the body will conform to the signals directed by the cerebral cortex and other parts of the brain.[2] The connection between the motor units of the body to the CNS is also seen in muscle spindles as they enable the CNS to modify or control the activity of the receptors.[3]

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CASE STUDY

# Resolution of Essential Tremors in a Female Patient Undergoing Upper Cervical Chiropractic Care: A Case Report & Review of the Literature

*Nathan Berner D.C.*[1]

## ABSTRACT

**Objective:** The objective of this case study is to present the chiropractic case management and improvement of a patient with diagnosed essential tremors and an upper cervical subluxation.

**Clinical Features:** A 58-year-old female presented to a private practice with a 40-year history of diagnosed essential tremors without relief. She additionally suffered from headaches, mid and low back pain, hip pain, sciatic pain, brain fog, difficulty concentrating and challenges with self-motivation.

**Intervention and Outcomes:** The patient was assessed for vertebral subluxation utilizing the Orthospinology analysis including a supine leg length check, hip calipers, cervical scanning palpation, and x-rays. Upon examination, a cervical vertebral subluxation complex was found. The patient was seen 12 times over 4 months of care and received 4 Orthospinology atlas adjustments. On post-adjustment X-rays, the atlas misalignment was reduced by all factors, and the patient's symptoms improved dramatically.

**Conclusions:** This case study demonstrated the upper cervical chiropractic management of a patient diagnosed with essential tremors. The patient found immediate relief of symptomatology and extended improvement in quality of life. This case highlights the need for more research on the link between upper cervical subluxation and essential tremors.

**Key Words:** *Chiropractic, vertebral subluxation, essential tremor, orthospinology, adjustment*

### Introduction

Essential tremor (ET) is one of the most common movement disorders with a worldwide prevalence of 0.4% to 3.9% in the general population.[1] It is estimated to be 20 times more prevalent than Parkinson's. In the United States it is estimated that seven million individuals, and 1 in 25 adults over the age of 40 suffer from ET.[2]

The condition is usually progressive and normally mild but can also be debilitating, preventing many individuals from joining or continuing in the workforce. For such a common condition with potentially debilitating effects, one study found that public knowledge of its existence and characteristics was overall poor.[2]

Tremor is a rhythmic, mechanical oscillation of at least one body region. Essential tremor refers to a condition where there

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## Case Study

# Reduction of Essential Tremors in a 75-Year-Old Male Following Chiropractic Care: A Case Study & Review of the Literature

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*Jeffrey Britt DC*[2]

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**Abstract**

**Objective:** The objective of this case report is to discuss the positive health outcomes following chiropractic in a patient suffering from long standing essential tremors.

**Clinical Features:** A 75-year-old male presents for evaluation with a history of essential tremors that have progressively worsened within the last four years. Examination revealed vertebral subluxations in the cervical, thoracic and lumbar spine.

**Intervention and Outcomes:** The patient was examined for vertebral subluxation using radiographs, range of motion, and neurological and orthopedic testing according to Diversified and Thompson protocols. The patient was then adjusted 3 times per week for 4 weeks and further reassessed on the 12th visit for his response to his chiropractic schedule. At the reassessment the patient reported an improvement in his essential tremors.

**Conclusion:** Chiropractic care resulted in significant decrease of essential tremors for this patient. More research is recommended to explore the benefits of chiropractic in this population.

**Key Words:** *Essential Tremors, vertebral subluxation, Diversified, Thompson, Chiropractic, adjustment*

### Introduction

Tremors are one of the most prevalent involuntary movement disorders and essential tremor is one of the most common. Tremors often affect various activities of daily living, such as eating and writing.[1,2] Approximately 5% of people over the age of 65 suffer from essential tremors.[3] Essential tremors effect the upper limbs in 95% of patients and are evident during action and positioning of the limbs, unlike the resting tremor associated with Parkinson's disease.[2,4]

Essential tremors are estimated to be misdiagnosed approximately 50% of the time.[5] Patients suffering from essential tremors are not considered functionally handicapped and their prognosis does not include a shortened life expectancy.[2] Alcohol is usually found to be a palliative factor although it has been reported that 39% of effected patients do not use alcohol for symptom control.[2,6]

The Movement Disorder Society defines tremors as involuntary, rhythmic, alternating, or oscillatory movements of interrelated muscle groups and are characterized by the frequency of oscillation and amplitude of movement.[4-6] Characteristics of essential tremors include coarse or fine movement that are typically slow and usually symmetric.[6] Essential tremors are postural and kinetic tremors in the absence of other neurological signs.[7]

Movement is controlled by integration of the corticospinal tracts, basal ganglia, and cerebellum and the neural dysfunction responsible for essential tremors is attributed to the inheritance of an autosomal dominant trait with variable pathological expression that are heterogeneous and degenerative.[2,6,8] Cognitive deficits, affecting attention and memory, are associated with regional cerebellar abnormalities.[3] The Essential Tremor Centralized Brain Repository, established in 2003, at Columbia University, is dedicated to the study of essential tremor and their associated impact on brain structure and function.[9]

The common abnormalities found include cerebellar degenerative changes and the presence of Lewy bodies on the brainstem.[9] The pathophysiology of essential tremors is not

CASE STUDY

# Resolution of Intention Tremor Following Chiropractic in an Infant with Vertebral Subluxation: a Case Study and Selective Review of the Literature

*Pamela Stone-McCoy, DC, CACCP[1] & Zoe C. Pogrelis, DC[2]*

## Abstract

**Objective:** To report on the positive health outcomes following the chiropractic management of a child with intention tremor and to review the related literature.

**Clinical Features:** A 20-month-old male child presented to a chiropractic office with intention tremor in his right upper extremity, wide gait, posterior and static posturing of arms, and speech articulation delay with signs of vertebral subluxations.

**Interventions and Outcomes:** Vertebral subluxations were addressed utilizing an Activator adjusting instrument. Indicators of vertebral subluxations were assessed using static and motion palpation findings. Cross-crawl at-home exercises were also advised as part of the care plan. Paraspinal thermal readings indicated a decrease in dysautonomia during reassessment. Frequency of intention tremor significantly decreased and parents reported a marked improvement in the patient's overall quality of life. Verbal communication skills also improved after two months of care.

**Conclusion:** This case reports on positive health outcomes following chiropractic in a child with intention tremor. Clinical research on chiropractic care for children with non-cerebral palsy cerebellar dysfunction is lacking, however, the proprioceptive pathway between the spine and the brain has been explored and mapped. This gap in research should be further investigated.

**Key Words:** *chiropractic, intention tremor, pediatric, cerebellar dysfunction, speech delay, vertebral subluxation, adjustment, gait.*

### Introduction

Tremor is the most common movement disorder in the human population.[1] Kinetic tremor is a type of action tremor which is typically perceived while a limb is actually moving. If the movement is part of a goal-directed behavior, the tremor is termed an intention tremor; otherwise it is called a simple kinetic tremor.[2] Intention tremor is a condition in which the amplitude of tremor is seen to increase as the patient approaches a target with a limb. Intention tremor is due to cerebellar dysfunction and can be either unilateral or bilateral.[1]

Although there have been epidemiological surveys of adults with essential tremor and Parkinson's related tremor, there has yet to be an epidemiological survey targeted solely for children.[3] Intention tremor has not been investigated, independent of other tremor presentations. Intention tremor associated with essential tremor has been explored regarding the prevalence and association with essential tremor disease duration.[4]

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## Original Research

# Resolution of Orthostatic Intention Tremors in a 3-week-old Male Great Dane Following Chiropractic: A Case Report & Review of the Literature

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*Ashley Shiver, DC*[2]

1. *Private Practice of Veterinary Medicine & Animal Chiropractic, Dallas, TX*
2. *Private Practice of Chiropractic, Dunwoody, GA*

**Abstract**

**Objective:** To review the resolution of tremors in a canine following chiropractic care.

**Clinical Features:** A three-week-old male Great Dane canine presented to a private veterinary and animal chiropractic clinic with symptoms of orthostatic intention tremors and signs of vertebral subluxation.

**Intervention and Outcomes:** Vertebral subluxations were managed using an Activator Adjusting Instrument. Analysis of the subluxations were through static and motion palpation, muscle tone and the presence of pain. After chiropractic adjustments and low level laser therapy, the canine immediately fell asleep. Three days after, the canine showed marked improvement and two-weeks later the tremors were resolved.

**Conclusions:** Research related to animal chiropractic management is limited. More research is necessary to explore the role of chiropractic in canines.

**Key words:** *Animal chiropractic, intention tremors, low level light therapy (LLLT), Activator Adjusting Instrument, B Complex Vitamin, L-phenylalanine, subluxation, adjustment, orthostatic tremor, generalized idiopathic tremor syndrome*

### Introduction

Tremors and involuntary movements (IM) have been reported in canines over the last 10 years, although the frequency and etiology is unknown.[1] Due to the limitations of the physical examination when performing neurological tests, it can be difficult to diagnose and classify the type, contributing factors and mechanism of canine tremors. Canines, like humans, can display resting and/or action tremors and there are correlating conditions between the two species.[1]

One of the action-related canine tremor classifications is a high-frequency orthostatic tremor which is mainly observed in the extremities, is only seen when the canine is standing, and typically found in giant dog breeds younger than 2-years-old.[1] Specifically, Great Danes commonly display orthostatic tremor with dyskinesia even though it is generally classified as a resting tremor.[1]

Another action-related canine tremor is idiopathic generalized tremor syndrome and it is mostly seen in less than 2-year-old small white-color breeds but it can be in any color or breed.[1] It is an intention tremor of the head and limbs and is exacerbated with stress, excitement and movement but is absent during sleep.[1] Usually, the neurological examination on these dogs is unremarkable and the signs worsen over 1-3 days but may spontaneously retract in the following months.[1]

Resting tremors such as those seen with Parkinson's disease are more commonly observed in humans. However, there is a similar condition seen in small animals, especially Chinese crested and Kerry blue terrier canines, called multiple system degeneration.[1]

As with the human population, the prevalence of canine tremors in young animals is rare. The frequency, etiology and mechanism is not well understood but trauma may be a contributing factor.[2] The history and physical examination are essential components for evaluating and diagnosing a tremor.[1,3,4] Current treatments include corticosteroids to

## Case Study

# Reduction of Essential Tremors in a 38 Year Old Male Undergoing Chiropractic Care for the Reduction of Vertebral Subluxation: A Case Report

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*Kevin Kustarz, D.C.*[2]

1. *Private Practice, Marietta, GA*
2. *Private Practice, Jupiter, FL*

**Abstract**

**Objective:** The objective of this case report is to detail improvement of a patient with essential tremors while undergoing chiropractic care.

**Clinical Features:** A 38 year old male who was diagnosed with essential tremors presented with complaints of uncontrollable bilateral arm and head tremors that started in 1997.

**Intervention and Outcome:** The patient was assessed for vertebral subluxations using instrumentation, radiographs, and video fluoroscopy following the Pierce Results System ™ of analysis. An adjustment was made using a toggle set, high-velocity, low-amplitude force on the site of subluxation. The patient reported a decrease in the severity of tremors immediately following the adjustment. After 21 visits during a span of over 5 months the patient reported an improvement of 99% for the head tremors, 75% for his arm tremors and 60% increase in quality of life.

**Conclusion:** The chiropractic care for a patient diagnosed with essential tremors is presented. Chiropractic care resulted in a dramatic decrease of symptoms and increase in quality of life for the patient. More research on the benefits of chiropractic care on people with essential tremors is needed.

***Key Terms:*** *Essential Tremors, vertebral subluxation, Pierce Results System, video fluoroscopy*

**Introduction**

Essential tremor (ET) is the most the most common tremor disorder in the world. Previously known as benign tremors, essential tremors are estimated to occur in 3 to 4 people per 1000 with people over the age of 60 being at a higher risk.[1] The disease is as much as 20 times more prevalent than Parkinson's disease.[1] Although there is such a high prevalence, the medical system has limited means of controlling the problem. As of 2009 there was only 1 FDA approved drug for the problem.[2]

ET is characterized by postural and /or kinetic tremors in the frequency range of 4 to 12 Hz. The amplitude of the tremors usually decrease as time goes on while increasing in frequency. ET is considered to be a heterogeneous genetic condition.[2] It is estimated that ET is misdiagnosed up to 50% of the time.[3]

According to the Movement Disorder Society the following criteria are used for diagnosis of the condition. The inclusion criteria is bilateral postural tremor with or without kinetic tremor, involving hands and forearms, that is visible and persistent and a duration lasting over 5 years.

The exclusion criteria include: other abnormal neurological signs (except Froment's sign), presence of known causes of increased physiological tremor, concurrent or recent exposure to tremorogenic drugs or the presence of a drug withdrawal state, direct or indirect trauma to the nervous system within 3 months before the onset of tremor, historical or clinical evidence of psychogenic origins, convincing evidence of sudden onset or evidence of stepwise deterioration.[4]

# Seizures



# Seizures

- Significant Motor Development and Quality of Life Improvement in a Rare Seizure Condition (MMPSI) Following Vertebral Subluxation Reduction: A Case Study. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2022

- Resolution of Psychogenic Non-epileptic Seizures Following Chiropractic Care: A Case Study & Review of the Literature. Journal of Upper Cervical Chiropractic Research, Volume 2019

- Resolution of Chronic Seizures in an Infant Undergoing Chiropractic Care for Vertebral Subluxation: A Case Report and Review of the Literature. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2018
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- Reduction of Seizures & Self Aggression Following Chiropractic Care to Reduce Upper Cervical Subluxation in a 3-Year-Old Male: A Case Study & Review of the Literature. Journal of Upper Cervical Chiropractic Research, Volume 2018

- Reduction of Seizures in a Toddler with Lissencephaly Undergoing Chiropractic Care: A Case Study & Review of the Literature. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2017

- Resolution of Recurrent Pseudoseizures in a 14-Year-Old Female Using Torque Release Technique: A Case Study. Annals of Vertebral Subluxation Research, Volume 2014

- Resolution of Chronic Epileptic Seizures & Improved Cervical Curve Following Chiropractic Care: A Case Report. Annals of Vertebral Subluxation Research, Volume 2016

# Seizures

- Resolution of Seizures in a 20-year-old Male Following Chiropractic Care to Reduce Vertebral Subluxation: A Case Study & Review of the Literature. Annals of Vertebral Subluxation Research
- Resolution of Seizures & Improvement in Quality of Life in a 22-Year-Old Female with Epilepsy Following Upper Cervical Chiropractic Care. Journal of Upper Cervical Chiropractic Research, Volume 2017
- Reduction of Seizures in a Four-Year-Old Male with Intractable Frontal Lobe Epilepsy Following Upper Cervical Chiropractic Care: A Case Study. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2017
- Cessation of Seizures, Behavioral Disturbances and Improvement in Cognitive Developmental Delay Following Upper Cervical Chiropractic Care in a 2 Year Old: A Case Report. Journal of Upper Cervical Chiropractic Research, Volume 2015
- An Epidemiological Approach to the Effects Subluxation-Based Chiropractic Care had in Managing a Three Year Old Girl with Autism, Acid Reflux, Bilateral Head Pain, Seizures, and Vomiting: A Case Study and Review of the Literature. Annals of Vertebral Subluxation Research, Volume 2013

# Seizures

- Seizure, Ataxia, Fatigue, Strabismus and Migraine Resolved by Precise Realignment of the First Cervical Vertebra: A Case Report. Journal of Upper Cervical Chiropractic Research, Volume 2012
- Resolution of Post-Concussion Seizures Following Atlas Orthogonal Technique. Journal of Upper Cervical Chiropractic Research, Volume 2011
- Resolution of Post-traumatic Epilepsy, Headaches & Dizziness Following Upper Cervical Chiropractic Care in a 19-Year-Old Male: Case Study & Review of the Literature. Journal of Upper Cervical Chiropractic Research, Volume 2019
- Sandifer Syndrome: Improved Health Outcomes in an Infant Undergoing Care for Vertebral Subluxation. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2016



CASE STUDY

# Resolution of Vision Loss in a Teenage Girl Following Upper Cervical Chiropractic Care: A Case Study & Review of the Literature

*Brendan Saffron D.C.[1] & Brett Murdock D.C.[2]*

## ABSTRACT

**Objective:** This case study reports the resolution of vision loss in an 18-year-old female undergoing upper cervical chiropractic care.

**Clinical Features**: An 18-year-old female presented to a chiropractic office complaining of mid-back, neck and low back pain, shoulder pain and numbness and tingling in both left and right arms and into her left leg and foot. After suffering a stroke four years prior, the patient underwent surgery to repair the arteriovenous structure of her right temporal lobe. Immediately following surgery she reported blurry vision and a loss of the lateral portion of the visual field of her left eye. The vision in her left eye diminished over the following three years, before becoming completely blind. She suffered from migraines and seizures as well.

**Intervention and Outcomes**: After two upper cervical adjustments utilizing Toggle Recoil Technique, the patient experienced full resolution of the visual loss in her left eye. After 11 weeks her eyesight was still intact. Her migraines and seizures reduced in frequency and severity.

**Conclusions**: The patient in this case experienced a full resolution of vision loss after only two chiropractic adjustments. This outcome demonstrates that more research is necessary to determine the link between chiropractic care and visual loss.

Key Words: *Subluxation, Chiropractic, Adjustment, Toggle Recoil Technique, Vision, Seizures, Arteriovenous Malformation, Stroke, Postoperative Vision Loss*

## Introduction

*Incidence*

Postoperative vision loss (POVL) is a rare complication that is generally associated with spine and cardiac surgeries.[1,2] In one retrospective review of 3,450 surgeries, only seven cases were identified as having postoperative complications of a loss of vision, giving it an incidence of 0.20%.[3] Another retrospective review conducted by Johns Hopkins hospital looked at spinal surgeries over a 20-year period (January 1982-December 2002). Of the 14,102 cases reviewed, only six cases involved a

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## Case Study

# Improvement in Vision in a Patient with Diabetic Retinopathy Following Network Spinal Analysis Care

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*Daniel Knowles, D.C.*[2]
*Richelle Knowles, D.C.*[2]

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2. *Private Practice, Boulder, CO*

**Abstract**

**Objective:** To describe the reorganization and reduction of intraocular pressure (IOP) in a chiropractic patient with diabetic retinopathy and concurrent loss of vision undergoing Network Spinal Analysis (NSA) care.

**Clinical Features:** A 46-year-old male with type I insulin dependent diabetes presented for chiropractic care. His complaints included numbness in both arms and fingers of the left hand, and diabetic retinopathy with total loss of vision for the past five years.

**Intervention and Outcomes:** The patient received NSA care 221 times over three years. After 8 months of care, he reported seeing shapes and colors through his left eye only for the first time in 5 years. He also reported a drop in intraocular pressure from an initial 50 mm Hg down to 18 mm Hg.

**Conclusion:** The patient in this case experienced improved intraocular pressure and vision following Network Spinal Analysis care. More research is warranted to better understand this link between Network Spinal Analysis care, chiropractic and the diabetic patient.

**Key words:** *Network Spinal Analysis Care, Intraocular Eye Pressure, Systemic Blood Pressure, Diabetic Retinopathy, Vision, Chiropractic, Vertebral Subluxation*

### Introduction

Diabetic retinopathy (DR) is the leading cause of preventable blindness in adults worldwide.[1] Kermorvant-Duchemin, et al, described DR as a form of ischemic retinopathy that is characterized by an initial microvascular degeneration, followed by an abnormal hypoxia-induced neovascularization.[2] Advanced DR causes vision loss and blindness via two distinct mechanisms.

The most common mechanism is diabetic macular oedema, which occurs as the blood retinal barrier breaks down with subsequent blood vessel leakage and retinal thickening.[3] The other mechanism is via proliferative diabetic retinopathy (PDR), where neovascularization occurs in response to ischemia, later resulting in bleeding of newly abnormally developed blood vessels.[3] The consequences of diabetic retinopathy are: vitreous haemorrhages, neovascular glaucoma (NVG), tractional retinal detachment, and/or vision loss.[3] Conventional treatment involves retinal photocoagulation with laser or surgery.[4]

Management of NVG consists of controlling the high IOP by medical and/or surgical means to minimize the visual loss.[5] IOP is also directly linked to systemic blood pressure. A population based study of people between the ages of 43-86 with a 5 year follow up of systemic blood pressure and IOP found that change in IOP is directly and significantly associated with changes in systemic blood pressures.[6]

Association between systemic blood pressure and IOC was studied using a linear regression where further investigation was done on identifying the role of antihypertensive medication and its direct effect on IOP and hypertension. However, the inclusion of such medication removed the association between IOP and hypertension.[7] This therefore led the investigators to conclude that there is a common physiologic factor that is responsible for the relationship between blood pressure and IOP such as the effect of generalized sympathetic tone.[7]

As stated by Crawford et al, the role of the chiropractor is to recognize the important interaction of both the sympathetic system and the vascular components and to correct potentially deleterious imbalances in tonic activity, thus affecting the



- Improved Hearing Following Chiropractic in a 10-Year-Old Child with a History of Chronic Otitis Media & Hearing Loss: A Case Study & Review of the Literature. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2021

- Resolution of Vertigo, Restored Hearing & Improved Quality of Life in a Patient with Meniere's Disease & Failed Craniectomy: A Case Report & Review of the Literature. Journal of Upper Cervical Chiropractic Research, Volume 2021

- Resolution of Sensorineural Hearing Loss in a 9-Year-Old Child Following Chiropractic Care to Reduce Vertebral Subluxation: A Case Report & Review of the Literature. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2021

- Resolution of Chronic Otitis Media, Improvements in Hearing and Avoidance of Tympanostomy Tubes in a 9½ Year Old Boy Undergoing Chiropractic Care. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2018

- Resolution of Hearing Loss, Improved Speech & School Performance Following Chiropractic Management of Vertebral Subluxations in a Male Child: A Case Study. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2018

- Improvements in Hearing, Speech, Development, and Behavior Following Chiropractic in a 4 Year Old Male. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2011

- Resolution of Otitis Media, Improvement in Hearing & Avoidance of Myringotomy Tubes Following Chiropractic Care in a Child: A Case Report & Selective Review of the Literature. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2014

- Improved Hearing and Resolution of Otitis Media with Effusion Following Chiropractic Care to Reduce Vertebral Subluxation. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2009

## Original Research

# Improvement in Motor Function Measured by Grip Strength Following Chiropractic Adjustments to Reduce Vertebral Subluxation in 100 Subjects

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**Abstract**

**Objective:** To describe the improvement in motor function measured by grip strength in 100 patients following chiropractic care.

**Methods:** Motor function was measured by grip strength was recorded for 100 patients pre and post adjustment following Koren Specific Technique.

**Results:** Areas of vertebral subluxation were identified and adjusted using Koren Specific Technique. Results were statistically significant and demonstrated an increase in motor function as measured by grip strength post adjustment.

**Conclusion:** Chiropractic care deemed successful in improving motor function measured by grip strength for the patient population described. More research is warranted in this subject area to add to the current body of literature detailing the potential benefits of chiropractic care as it relates to motor function and grip strength.

**Keywords:** *Grip strength, motor function, quality of life, Koren Specific Technique, vertebral subluxation, adjustment*

### Introduction

Most people who visit a chiropractor complain of some form of discomfort, very commonly in the neck and lower back. Chiropractic adjustments have long been known to be a popular choice in helping to alleviate these discomforts. To date, numerous studies have suggested that other than symptomatic relief, chiropractic care can improve muscular strength.

This paper was originally a case study of a 47-year-old female patient who was diagnosed with carpal tunnel syndrome by her specialist hand surgeon and was recommended to undergo a surgery. She had reported numbness and tingling in both thumbs and her second and third digits, and was medically diagnosed with moderately severe carpal tunnel syndrome in both hands via a motor conduction study ("MCS"). The electromyography (EMG) report showed absent median sensory potential from digit II bilaterally, prolonged median distal motor latency bilaterally and reduced compound muscle action potential over thenar muscles bilaterally.

By the fourth session of her chiropractic care, she had reported that the numbness was "almost gone." After undergoing 15 sessions of chiropractic treatment, she reported that her hands were completely free from numbness and she had regained strength in her hands. She was offered by the author to undergo the MCS for a reassessment but declined as she felt that the test was painful and traumatizing. However, she agreed to have her grip strength measured using a hand dynamometer as an alternative. (See Appendix 1)

On the 19th session, her grip strength was measured: Right hand measured 55.6lbs while her left hand measured 51.8lbs (both measured only post adjustment). Based on the "Physical Status According to the Test Result Given by the Dynamometer" (Appendix 2), her grip strength measured was considered normal for her age of 47 years old. (Note: Normal grip strength range for female in the age range of 45-49 years old is between 41.0 to 71.4lbs)

Reportedly, she regained sensory and motor functions of her hands. Experimentally, her grip strength on her 20th visit was remeasured before and after the chiropractic adjustment was rendered. The following results in Table 1 were obtained:

# Neurological Function




- Brain Waves
- P-300
- HRV
- SEMG
- Thermal
- SSEP's

Foundation for Vertebral Subluxation

# Areas of Focus

**Populations:**

- Military Veterans
- Seniors
- Children
- ALS

**Maladaptations:**

- Neurodegenerative Dx
- PTSD
- Concussions
- Depression
- Neurodevelopmental Dx
- Functional Dx

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# Measures

- Orthostatic Hypertension
- Catecholamines
- Norephinephrine
- HRV
- QT Intervals
- Fatigue Scale
- SRQOL

- Cardiac Sympathetic Imaging
- Cardiac Neuronal Architecture
- SPECT
- PET
- fMRI
- Genetic neuroimaging

  (fMRI & Molecular Genetics)

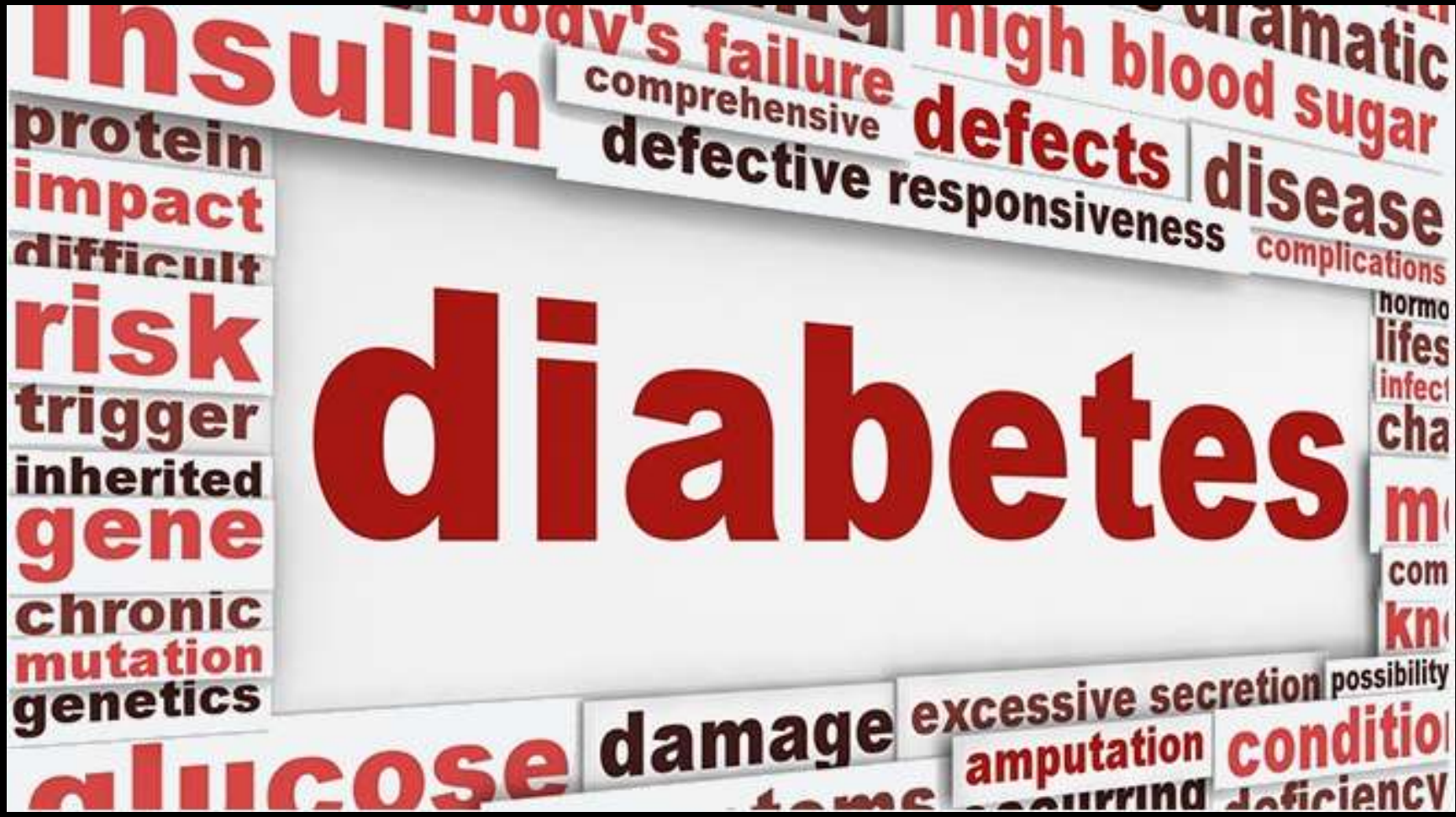
# Measures

- Valid & Reliable Measures of Vertebral Subluxation
- Biomechanical
- Neurological

Example:

Upper Cervical

- X-ray
- Thermal Scanning
- Leg checks


insulin
high blood sugar
dramatic
comprehensive
defects
disease
protein
defective responsiveness
impact
complications
difficult
risk
diabetes
trigger
inherited
gene
chronic
mutation
genetics
damage
excessive secretion
possibility
amputation
glucose

## Original Research

# Improved Glycosylated Hemoglobin, Hyperglycemia, and Quality of Life Following Thoracic Hypokyphosis Vertebral Subluxation Correction Using Chiropractic BioPhysics®: A Prospective Case Report


*Curtis Fedorchuk, DC[1]*
*Douglas F Lightstone, DC[1]*
*Robert D Comer, DC[1]*
*Michael T Weiner, DC[2]*
*Matthew McCoy, DC[3]*

1. *Institute for Spinal Health and Performance, Cumming, GA*
2. *Private Practice of Chiropractic, Tucker, GA*
3. *Foundation for Vertebral Subluxation, Kennesaw, GA*



**Abstract**

**Objective:** Spinal misalignment increases spinal cord tension and is linked to various health conditions. There has never been a study on the impact of spinal alignment on blood glucose metabolism. This prospective case with long-term follow-up explores spinal alignment and its impact on type 1 diabetes mellitus.

**Case and methods:** A 26-year-old male presented with chronic mid-back pain for 9 years and type 1 diabetes mellitus. Radiography and MRI revealed hypokyphosis of the thoracic spine with spinal misalignment from thoracic vertebrae 6 through 9 consistent with vertebral subluxation. Glycosylated hemoglobin and blood-glucose averages were obtained by continuous glucose monitoring. Back pain, paraspinal muscle tension, and quality of life were also measured. The patient received Chiropractic BioPhysics® care including Mirror Image® corrective spinal exercises, adjustments, and traction.

**Results:** After 36 visits, the patient reported improvement in his mid-back pain and quality of life. Thoracic x-rays showed correction of thoracic hypokyphosis. Surface EMG measuring paraspinal muscle tension improved and continuous glucose monitoring showed dramatic drop in blood glucose immediately following the onset of each visit and improvement in blood glucose averages, percentage of time of blood glucose in a healthy target range, and glycosylated hemoglobin. The patient reported he reduced his basal insulin by approximately half during chiropractic care.

**Conclusions:** This case suggests that correction of thoracic hypokyphosis using Chiropractic BioPhysics® care protocols may result in improved glycosylated hemoglobin and blood glucose metabolism for a person with type 1 diabetes mellitus, as well as back pain, paraspinal muscle tension, and quality of life.



**Key Words:** Chiropractic BioPhysics®, adjustments, traction, vertebral subluxation; spine, Type 1 diabetes, thoracic hypokyphosis, continuous glucose meter, HbA1c


### Introduction

Type 1 diabetes mellitus (T1DM) has serious short-term and long- term health implications. The disorder has a strong genetic component, but the factors that trigger onset of clinical disease remain largely unknown.[1] Hyperglycemia predisposes people with diabetes to serious health conditions and complications such as cardiovascular disease, stroke, nephropathy and kidney failure, retinopathy and blindness, neuropathy, depression, infections and amputations, and premature death.[1-11] T1DM is a disease "with substantial risk of long-term morbidity and mortality. For example, a report from the US Centers for Disease Control [CDC] recently estimated that a 10-year- old boy or girl developing [type 1] diabetes in the year 2000 would lose, on average, 18.7 and 19.0 life-years, respectively, compared with their non-diabetic peers".[12]

There is no known way to prevent or cure T1DM. Advancements in newer treatment approaches have facilitated improved outcomes in terms of both glycemic control and reduced risks for development of complications. Nonetheless,

# Diabetes

**Clinical features**: A 26-year-old T1D male presented for care with pain in the neck and upper back regions and a history of diabetes for over 20 years. Spinal and postural abnormalities were found, including anterior head translation, hypokyphosis, and multiple spondylolistheses in the lumbar spine. Further, MRI imaging confirmed a **lordotic segment at T8-T9** and a T8-T9 disc herniation. He was diagnosed with T1D at age 6.

Foundation for Vertebral Subluxation

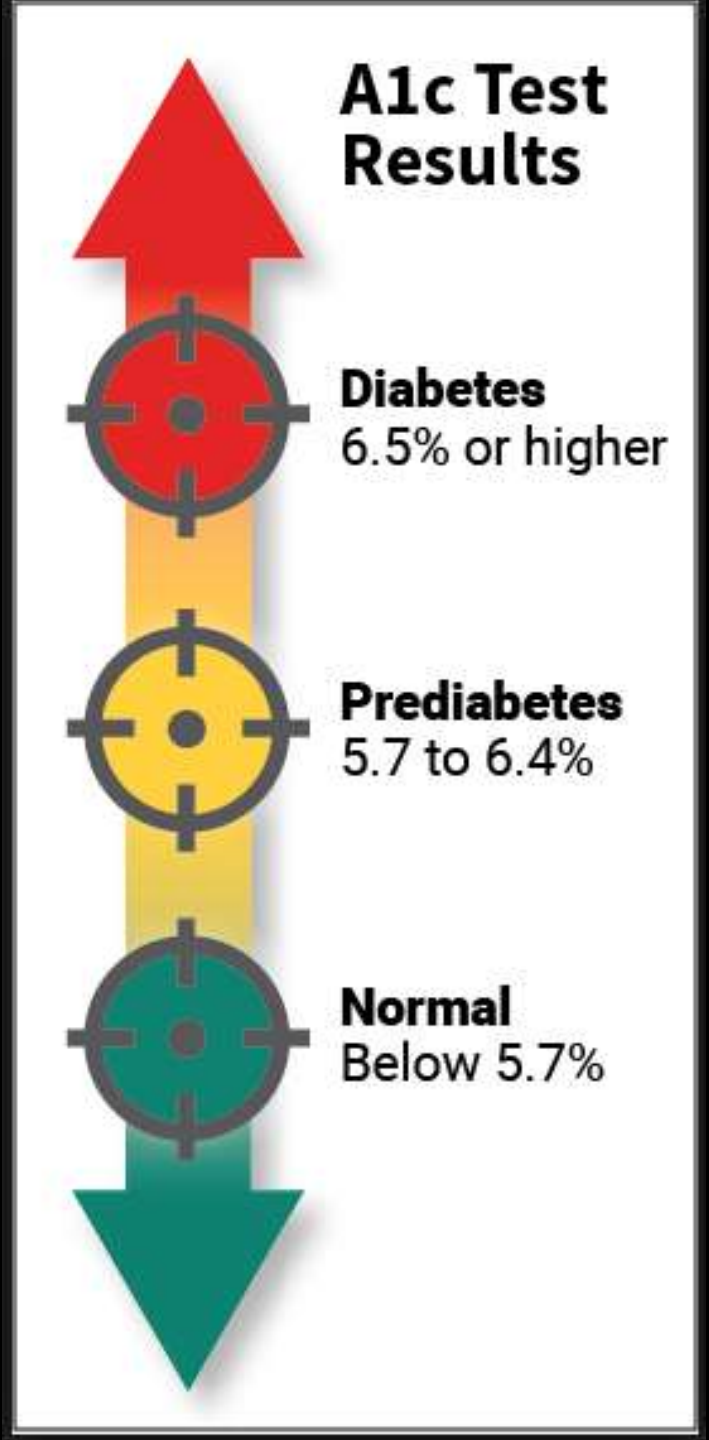
# Diabetes

The patient wore the Dexcom G4 continuous glucose monitor (CGM). No chiropractic care was rendered to the patient in the first 2 weeks of wearing the G4 CGM monitor.

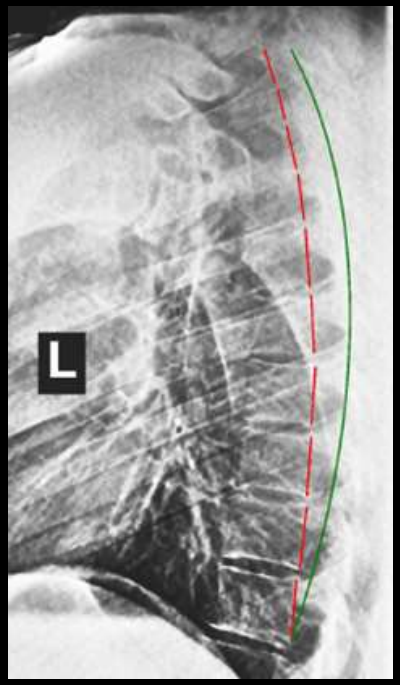
In the first week of wearing the CGM, the average blood glucose was 174 mg/dl, and 178 mg/dl for week 2 and a reported A1C value of 7.8%.

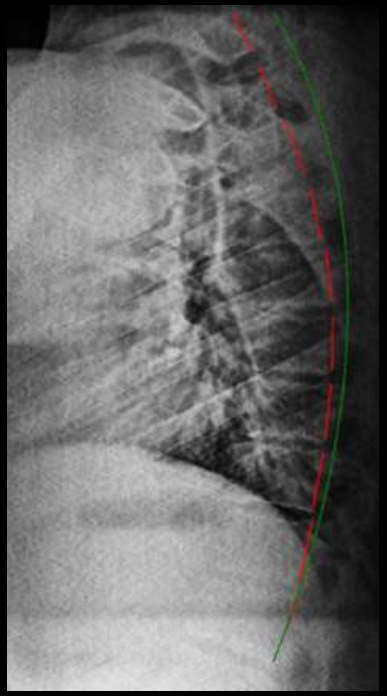
No dietary changes were made or recommended.

Foundation for Vertebral Subluxation


A1c Test Results
Diabetes
6.5% or higher
Prediabetes
5.7 to 6.4%
Normal
Below 5.7%

# Diabetes



Pre

Post

| RRA per Segment | Normal Values | Xray 1 Values | Versus Normal | Xray 2 Values | Versus Normal | % Change: Xray 1 to 2 |
|---|---|---|---|---|---|---|
| T1-T2 | -1° | Not Digitized | n/a | Not Digitized | n/a | n/a |
| T2-T3 | 4° | 3.5° | 12.5% | 3.6° | 10.0% | 2.9% |
| T3-T4 | 5° | 0.3° | 94.0% | 2.4° | 52.0% | 700.0% |
| T4-T5 | 6° | 6.0° | 0.0% | 9.3° | 55.0% | 55.0% |
| T5-T6 | 5° | 2.9° | 42.0% | 3.6° | 28.0% | 24.1% |
| T6-T7 | 6° | 1.3° | 78.3% | 6.4° | 6.7% | 392.3% |
| T7-T8 | 6° | 7.2° | 20.0% | 4.1° | 31.7% | 43.1% |
| T8-T9 | 4° | -0.1° | 102.5% | 4.1° | 2.5% | 4200.0% |
| T9-T10 | 3° | 2.4° | 20.0% | 0.5° | 83.3% | 79.2% |
| T10-T11 | 3° | -1.3° | 143.3% | 9.4° | 213.3% | 823.1% |
| T11-T12 | 3° | Not Digitized | n/a | 6.5° | 116.7% | n/a |

RRA = Relative Rotational Angle of Measurement

| Global Analysis | Normal Values | Xray 1 Values | Versus Normal | Xray 2 Values | Versus Normal | % Change: Xray 1 to 2 |
|---|---|---|---|---|---|---|
| ARA T2-T11 | 42° | 22.2° | 47.1% | 43.6° | 3.8% | 96.4% |
| Translation T2-T11 | 0 mm | 7.0 mm | 7.0 mm | 9.6 mm | 9.6 mm | 37.1% |

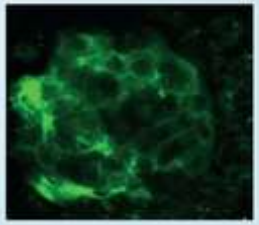
Foundation for Vertebral Subluxation

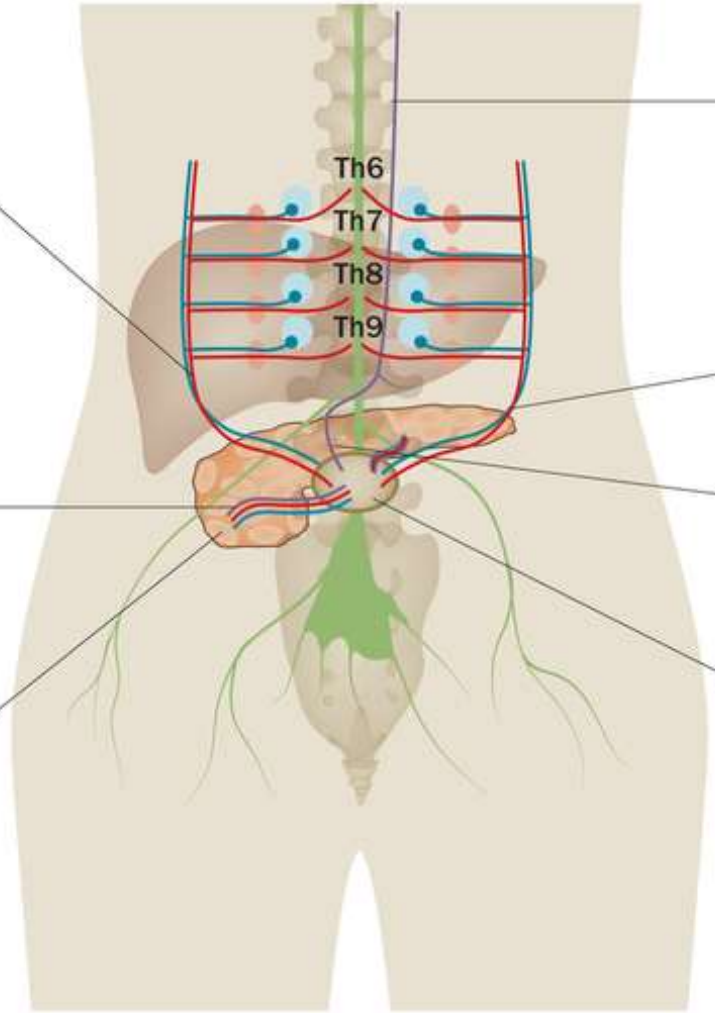
**Right splanchnic nerve**
Contains afferent sensory and efferent sympathetic fibres. Surgical transection has been proposed as a measure to limit pancreatitis-associated pain.

**Extrinsic pancreatic innervation**
These nerves run along pancreatic blood vessels and enter the pancreatic parenchyma. They are frequently invaded by cancer cells during neural invasion.

**Intrapancreatic ganglia**
Constitutes the intrinsic innervation and recieves direct input from duodenal enteric ganglia.








**Vagus nerve**
A suppressor of inflammation in both acute and chronic pancreatitis. The cell bodies of the the afferent fibres are within the nodose ganglia.

**Left splanchnic nerve**
Contains afferent sensory and efferent sympathetic fibres toward the coeliac ganglion.

**Right vagal trunk**
Contains parasymathetic fibres that synapse on the intrinsic parasympathetic ganglia.

**Coeliac ganglion**
The convergence point of the fibres of the extrinsic innervation and contains sympathetic neuronal cell bodies. From here, pancreatic nerves extend along the pancreatic blood vessels toward the interior of the organ. Neurolysis is an interventional method of analgesis for patients with pancreatic diseases.

Nature Reviews | Gastroenterology & Hepatology

Foundation for Vertebral Subluxation

# Diabetes

**Intervention and outcomes**: With an unaltered diet, the patient was seen 36 times over 8 weeks in which Chiropractic BioPhysics (CBP) technique was applied.

The patient achieved a reduction of their subluxations; changes in cervical hyperlordosis, thoracic hypokyphosis, and lumbar spondylolistheses.

During care, the patient's blood glucose and A1C values improved each week.

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# Diabetes

**NOTE:** Clinical studies conducted by Dexcom showed an average improvement in A1C values of .5% over 6 months, and a maximum reduction of 1% in one patient in a 12 month period.

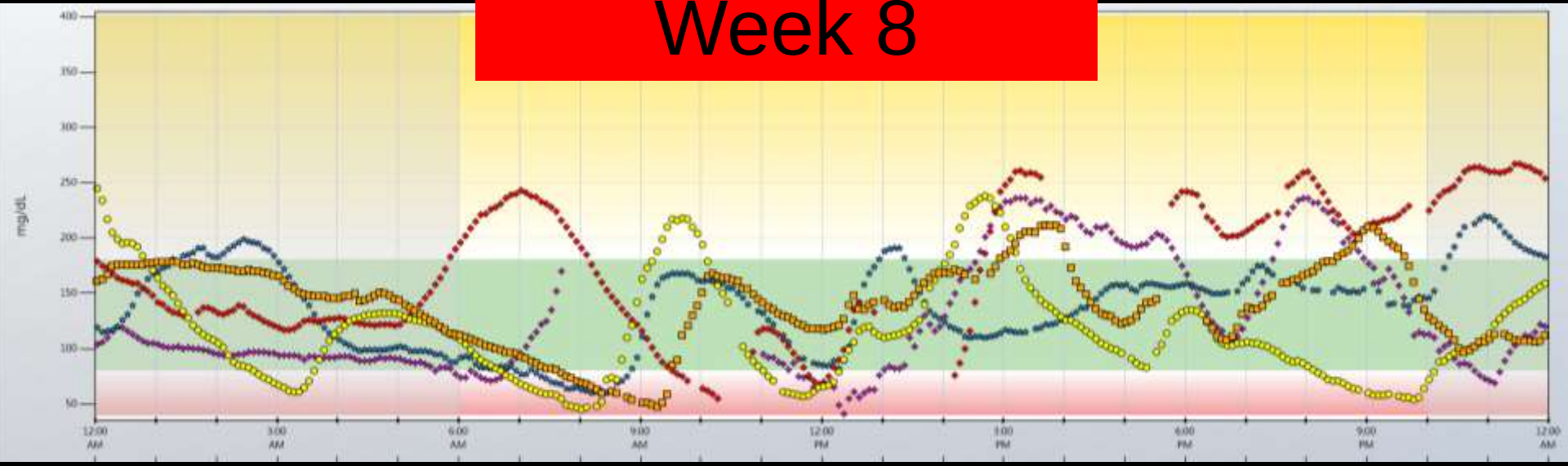
<u>This case exceeds the results of every patient in the company's clinical trials in 8 weeks.</u>

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# Week 1


mg/dL
400
350
300
250
200
150
100
50
12:00 AM
3:00 AM
6:00 AM
9:00 AM
12:00 PM
3:00 PM
6:00 PM
9:00 PM

# Week 8


mg/dL
400
350
300
250
200
150
100
50
12:00 AM
3:00 AM
6:00 AM
9:00 AM
12:00 PM
3:00 PM
6:00 PM
9:00 PM

# Diabetes

At the end of week 8, the final average blood glucose was 138 mg/dl and the A1C level was 6.7 %. Further the patient was able to lower their insulin usage via adjusting the internal pump settings.

NOTE: this was done without any diet modifications.

Foundation for Vertebral Subluxation

# Diabetes

**Conclusion:** CGM allows for diabetics to monitor their blood glucose in real time, so that they may alter dietary and lifestyle habits to improve upon their blood glucose levels. Clinical studies conducted by Dexcom showed an average improvement in A1C values of .5% over 6 months, and a maximum reduction of 1% in a 12 month period. This case study demonstrates the successful reduction of global and segmental subluxations, insulin usage with concomitant reduction in average blood glucose by >30 mg/dl and A1C values by 1.1% in 8 weeks. Further research is suggested for a case series and clinical trials to determine any link between spinal posture, subluxation and sugar metabolism and A1C levels.

Foundation for Vertebral Subluxation

# 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.

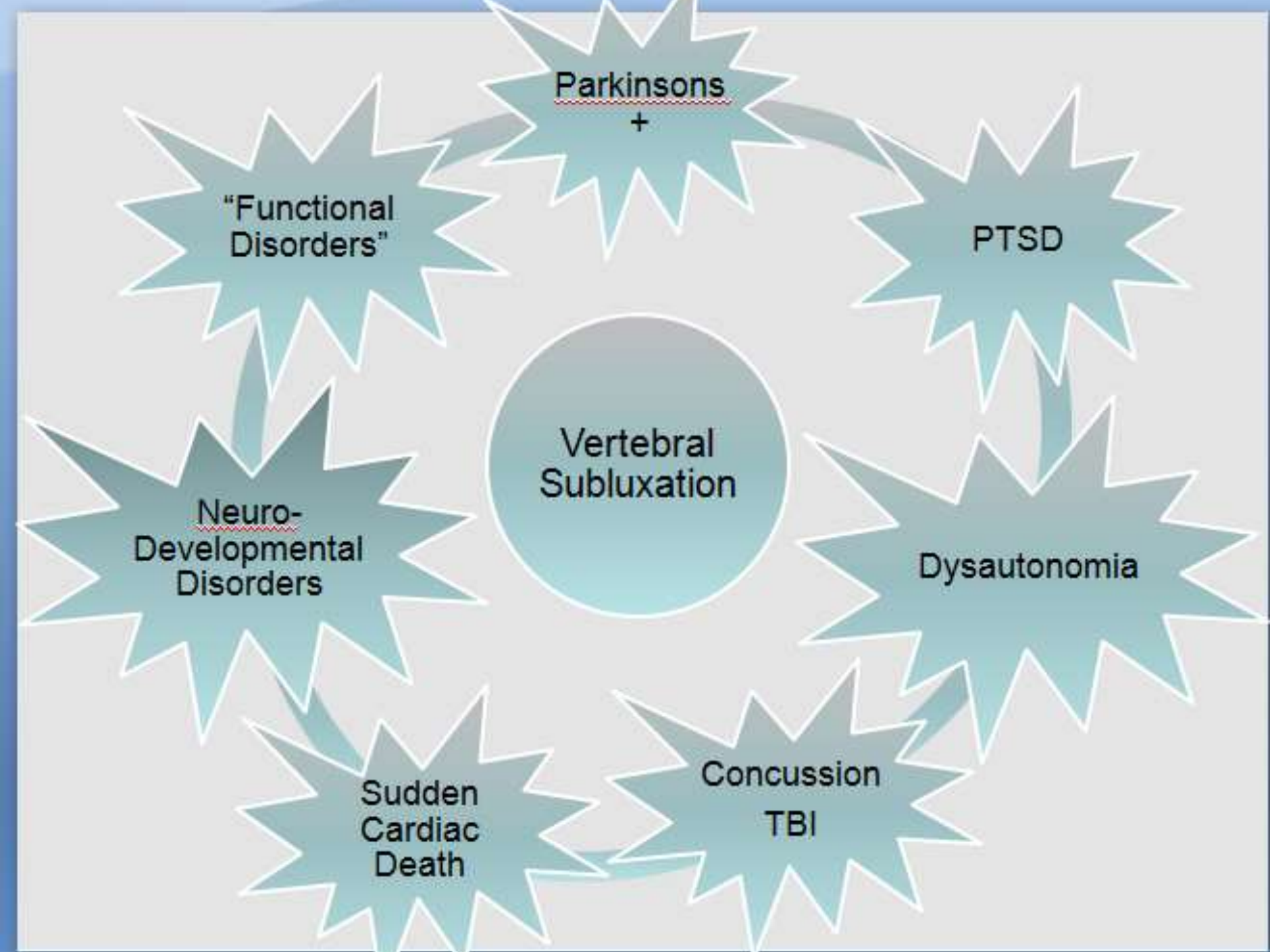
27 of 31 volunteers (87%) demonstrated increased circulation.

No measurable changes were observed in 3 volunteers. Dramatic subjective improvement was also noted in nearly all volunteers.

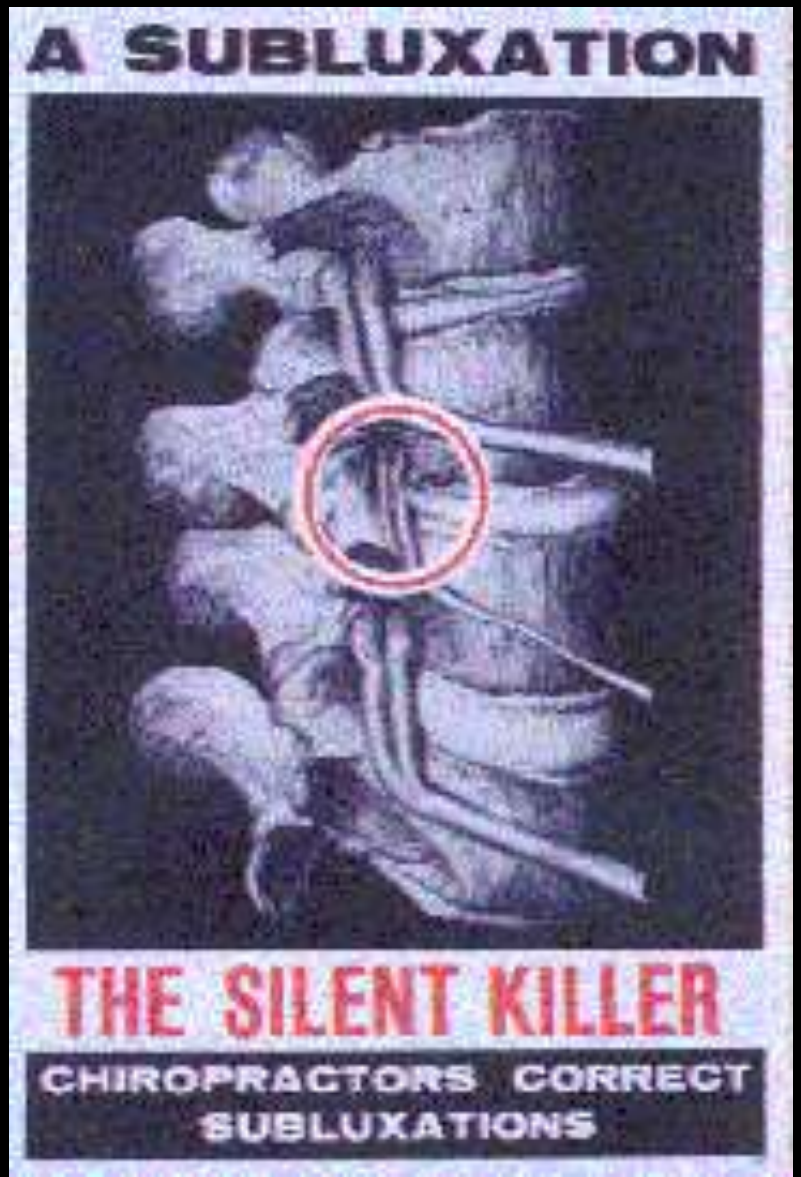
Dickinson RL “Effects of Chiropractic Spinal Adjustments and Interferential Therapy in the Restoration of Peripheral Circulatory Impairment in the Lower Extremities of Diabetics” Chiropractic 1988;1(1): 18-24.

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Parkinsons
+
"Functional Disorders"
PTSD
Vertebral Subluxation
Neuro-Developmental Disorders
Dysautonomia
Sudden Cardiac Death
Concussion
TBI

# Vertebral Subluxation




Foundation for Vertebral Subluxation

# US “Health Care” Expenditures

- 70% is spent on Chronic illness
- Cardio and Stroke--$210 billion
- Cancer--$192 billion
- Diabetes--$92 billion
- Obesity-Related--$75 billion
- Arthritis--$22 billion

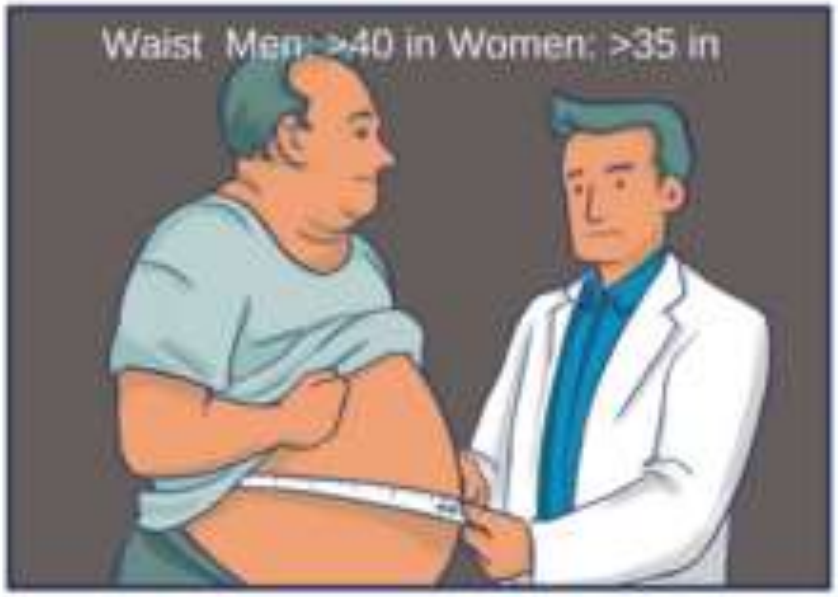
Kessler A: ***The End of Medicine***, 2006.

# Major Stroke Risk Factors

- High blood pressure
- High cholesterol
- Smoking
- About half of Americans (49%) have at least one of these three risk factors
- Several other medical conditions and unhealthy lifestyle choices can increase risk for stroke.

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# Do you have Metabolic Syndrome?













BISCUITS
N'
PORN



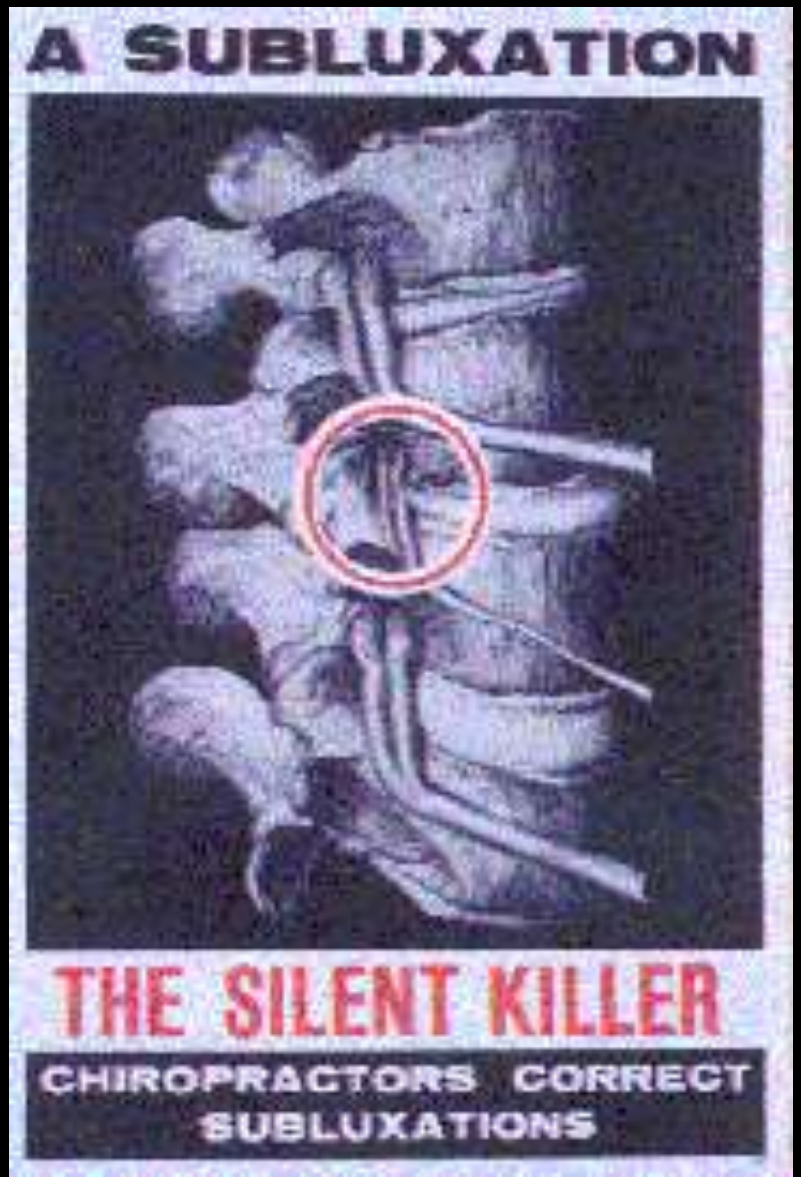

Over the past few years we have came across astonishing evidence relating inflammation to chronic dysfunctions to the endocrine (hormone) system, immune system, and nervous system.

Systems are being altered by inflammation causing abnormal blood chemistry.

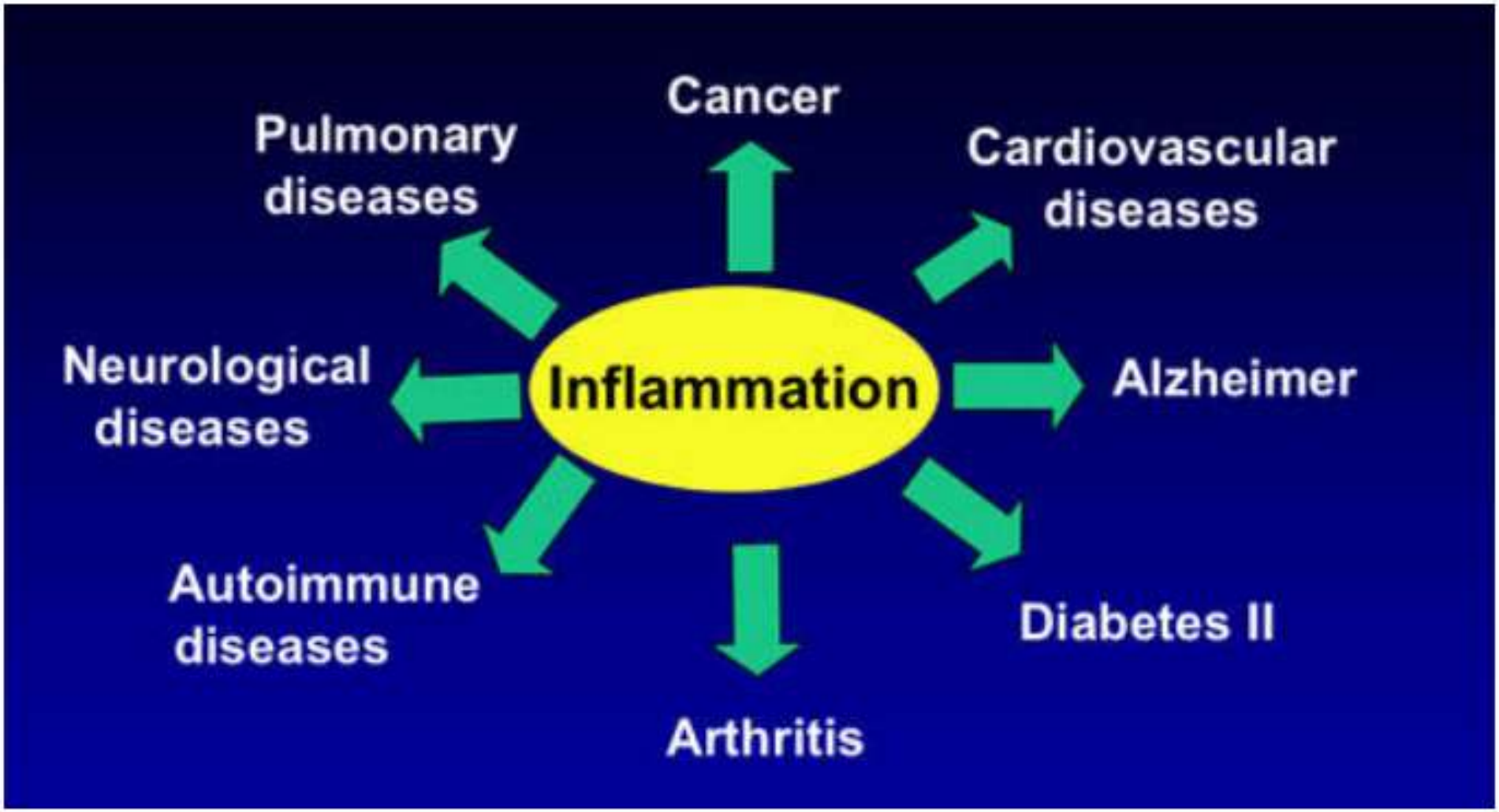
Over the past few years inflammation has been linked to cancer, heart attacks, Alzheimer's Disease, arthritis, inflammatory bowel disease, celiac disease, autoimmune disease, asthma, migraines and many more.

When inflammation becomes chronic the body begins to deteriorate losing the ability to function normally.

# Vertebral Subluxation

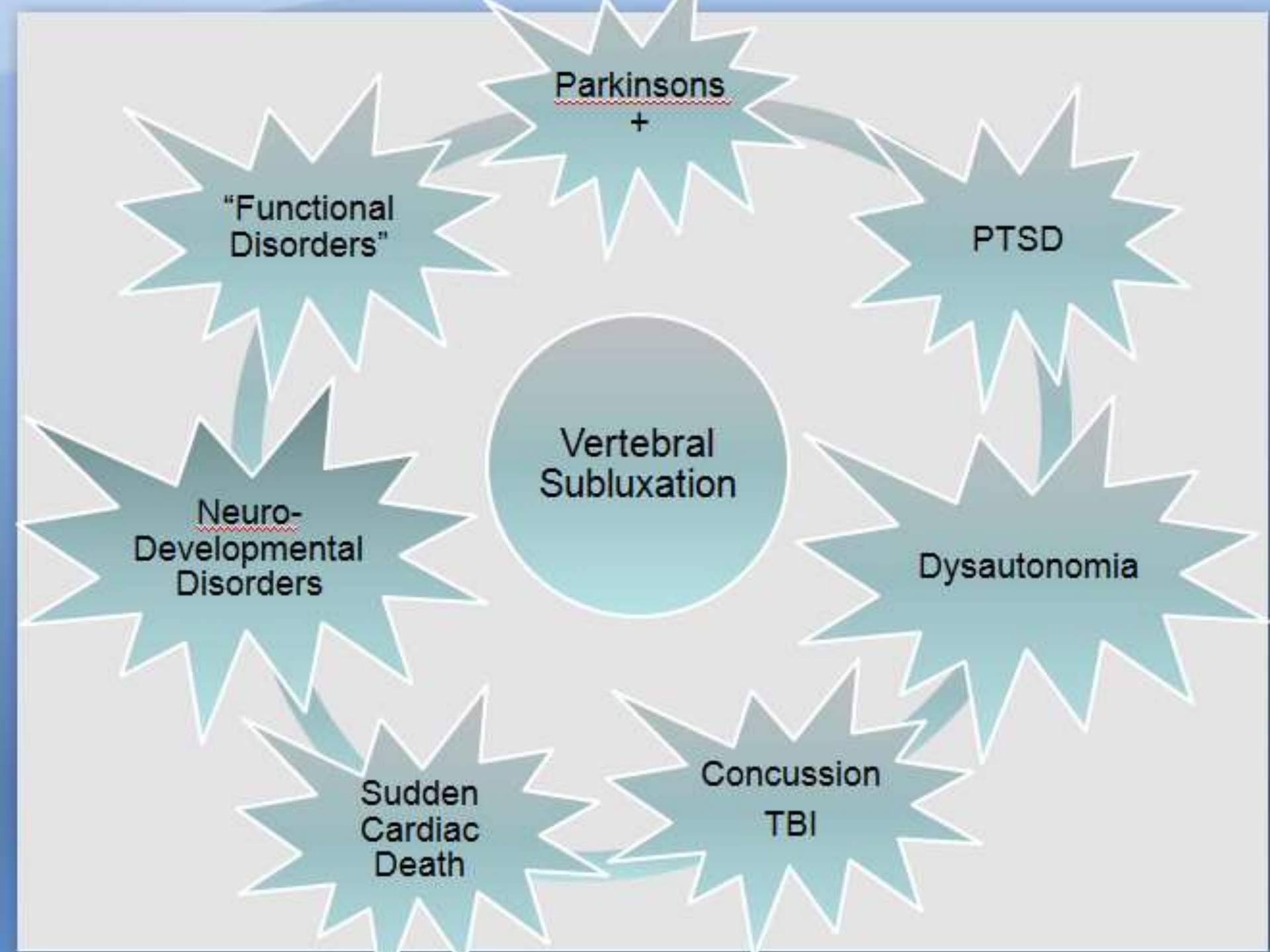



Foundation for Vertebral Subluxation




- Time Magazine: The Secret Killer, February 2004

Foundation for Vertebral Subluxation


Parkinsons
+
"Functional Disorders"
PTSD
Vertebral Subluxation
Neuro-Developmental Disorders
Dysautonomia
Sudden Cardiac Death
Concussion
TBI

Medical Hypotheses (2007) 69, 1169–1178



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# The biochemical origin of pain: The origin of all pain is inflammation and the inflammatory response. Part 2 of 3 — Inflammatory profile of pain syndromes

**Sota Omoigui** *

*Division of Inflammation and Pain Research, L.A Pain Clinic, 4019 W. Rosecrans Avenue, Los Angeles, CA 90250, United States*

Received 27 June 2007; accepted 27 June 2007

**Summary** Every pain syndrome has an inflammatory profile consisting of the inflammatory mediators that are present in the pain syndrome. The inflammatory profile may have variations from one person to another and may have variations in the same person at different times. The key to treatment of Pain Syndromes is an understanding of their inflammatory profile. Pain syndromes may be treated medically or surgically. The goal should be inhibition or

Clinical Chemistry 54:1
24–38 (2008)

Review

# Inflammation in Atherosclerosis: From Vascular Biology to Biomarker Discovery and Risk Prediction

René R. S. Packard and Peter Libby*

Recent investigations of atherosclerosis have focused on inflammation, providing new insight into mechanisms of disease. Inflammatory cytokines involved in vascular inflammation stimulate the generation of endothelial adhesion molecules, proteases, and other mediators, which may enter the circulation in soluble form. These primary cytokines also induce production of the messenger cytokine interleukin-6, which stimulates the liver to increase production of acute-phase reactants such as C-reactive protein. In addition, platelets and adipose tissue can generate inflammatory mediators relevant to atherothrombosis. Despite the irreplaceable utility of plasma lipid profiles in assessment of atherosclerotic risk, these profiles provide an incomplete picture. Indeed, many cardiovascular events occur in individuals with plasma cholesterol concentrations below the National Cholesterol Education Program thresholds of 200 mg/dL for total cholesterol and 130 mg/dL for low-density lipoprotein (LDL) cholesterol. The concept of the involvement of inflam-

In the past several decades, our understanding of the pathogenesis of atherosclerosis has undergone a revolution *(1)*. Previously, physicians thought of atherosclerosis as primarily a plumbing problem. The degree of stenosis on an angiogram and symptoms and signs of ischemia indicating impaired perfusion of target tissues provided the main tools to assess atherosclerosis. The understanding of the pathophysiology of this disease has now entered a new era based on understanding of the biology and a critical reappraisal of the pathobiology of atherothrombosis *(2)*. The modern biological perspective has revealed that thrombotic complications, culminating, for example, in myocardial infarction, do not necessarily result from critical stenoses. We have also come to appreciate that many myocardial infarctions occur in individuals without previous ischemic symptoms or diagnosis. In up to one-half of individuals, the first manifestation of coronary atherosclerosis is sudden death or myocardial infarction unheralded by premonitory symptoms. This shift in our understanding of the disease underscores

# Inflammation

“Most modern people are boiling pots of inflammation: hot steaming, churning cauldrons of disordered, chaotic inflammatory responses.”

William Davis MD

# Cytokines

Cytokines are small proteins that function as singling molecules for intercellular communication.

Virtually all nucleated cells can produce cytokines, but they are primarily produced by endothelial cells (vascular system cells) and macrophages (innate immune cells).

Cytokines can be either inflammatory or anti-inflammatory. The primary inflammatory cytokines are Interleukin-1 (IL-1), Interleukin-6 (IL-6), and Tumor Necrosis Factor-alpha (TNF-a).

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# Inflammatory Components of Atherosclerosis Related to Chiropractic

- According to the literature, subluxation-based chiropractic care is directly related to correcting the main causes of atherosclerosis and CVD as discussed above.
  - Namely:
    - ***Inflammatory markers***
    - ***Increased sympathetic tone***.

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# Inflammation, CVD & Chiropractic

Clinical Reduction of Primary CVD Risk Factors:

- Inflammatory mediators IL-6, C-reactive protein and cytokines [1-2]
- Emotional and mental stress [3-6]
- Salivary cortisol levels [7-9]

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# Inflammation, CVD & Chiropractic

Clinical Normalization of Various Stressors Affecting CVD:

- Blood pressure/anxiety [10]
- Enhanced immune response(s) [11-19]
- Heart Rate Variability [20]
- Dysrhymthmic abnormalities [21-22]
- Duodenal Ulcers [23]
- Muscle tension [24]
- Overall increased bodily function [25]
- Neurocognitive function [26]
- Dysmenorrhea [27]
- Pulmonary function [28]
- Decreased labor times for primigravidae and multiparous pregnancies [29]


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REVIEW

# Somatovisceral Responses to Chiropractic Adjustments

*Shane Lynch D.C.*[1]
*William R. Boone Ph.D, D.C.*[2]

**ABSTRACT**

**Objective:** To examine the literature for probable mechanisms supporting a somatovisceral response.

**Review:** Chiropractors maintain that vertebral subluxations may influence visceral physiology. In support of this viewpoint, case studies report improvement of visceral problems following chiropractic spinal adjustments. As well, a smaller number of controlled studies have demonstrated measurable changes in somatovisceral parameters such as heart rate, heart rate variability, bladder pressure, gastric motility and blood pressure.

**Discussion:** The somatovisceral responses produced in these controlled studies have been, in general, of short duration. Consequently, it is not known if this response time is sufficient to influence long term visceral physiology. While the body of evidence supporting long term somatovisceral change following chiropractic adjustments is growing, it remains a topic for continued investigation.

**Conclusion:** It is concluded that research into this concept is essential to underpin the rationale behind adjusting the spine for the correction of vertebral subluxation.

**Key Words:** *Autonomic nervous system, chiropractic adjustment, somatovisceral , spinovisceral, subluxation.*

## CHIROPRACTIC- RELATED RESEARCH PAPERS
## ASPECTS OF BIOCHEMISTRY AND PHYSIOLOGY

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ACTH [201]
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Biophotons [205]
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Calcetonin [202]
Catecholamine [209]
CD 4 cells [210]
Chemiluminescence [211]
Conjunctival nevi [212]
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Interleukin-2 [219]
Lectins [220]
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    Phaseolus vulgaris leucoagglutin (PHA-L)
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Macrophages [224]
Melanomas [212]
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Neutrophils [211,227-229]
Oxygen radicals [224]
Phagocytosis [227,230]
Prostaglandin [231,232]
Respiratory burst [228-230,233]
Serum aldosterone [234]
Substance P [227,228]
Tumor necrosis factor [226]

This table demonstrate s the wider aspects of chiropractic research. (Note: Many of these studies concern an immunological response. More than one term may appear in a single paper. Papers are not necessarily related to spinal manipulation but more the broad nature of chiropractic research.)

- From Rome . . .

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PHARM REV

# The Sympathetic Nerve—An Integrative Interface between Two Supersystems: The Brain and the Immune System

ILIA J. ELENKOV, RONALD L. WILDER, GEORGE P. CHROUSOS, AND E. SYLVESTER VIZI[1]

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PHARMACOLOGICAL REVIEWS

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# New Paradigm: Stress NOT Diet

**52 country INTERHEART study**
***Lancet* 2004**

- *NOTE*: *"Persistent severe* stress makes it *two and a half times* more likely that an individual will have a heart attack compared to someone who is not stressed." Stress and depression combined increase the risk *"threefold*!"

Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al. Effects of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet 2004; 11-17;364(9438):937-52.

Foundation for Vertebral Subluxation

# Proposed Mechanisms

- **Degeneration Model of Vertebral Subluxation**: Intervertebral disc degeneration → vertebral compensation → soft tissue changes → cord compression; nerve root compression → local irritation; vertebral artery compromise → autonomic dysfunction.

- **Dysafferentation Model of Vertebral Subluxation**: Biomechanical dysfunction → altered nociception/mechanoreception → abnormal afferent input to CNS → efferent dysfunction ("garbage in, garbage out").

- **Neurodystrophic Model of Vertebral Subluxation**: Neural dysfunction→ stress on tissues → lowered tissue resistance → immune responses → increased sympathetic stimulation.

- **More specific mechanisms to be discussed below.**

Kent C. Models of vertebral subluxation: a review. J Vert Sublux Res 1996; (1:1): 11-17.

# Conclusions

- There is a remarkable amount of evidence supporting that p*sychogenic and physical stress-induced* inflammation, hormone, and immune responses are responsible for atherosclerotic plaque, thrombi, and clotting that cause various CVD's.

- The literature suggests that it is highly probable that subluxation-based chiropractic care may effectively manage various CVD risk factors.

- Clinical trials are recommended to substantiate these claims.

# Maladaptive Responses to Vertebral Subluxation

Decreased Vitality

Impaired Immune Response

Altered Metabolism/Physiology/Anatomy

Clarity of Thought

Altered Behaviors (Reward Cascade)

Genetic Expression

Foundation for Vertebral Subluxation

# Serum Thiol

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

[†]Camgen, Inc., 101-4430 Chatterton Way, Victoria, B.C. V8X 5J2

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# 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

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# Serum Thiol

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

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# 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.

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# 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.

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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



Foundation for Vertebral Subluxation

# 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."**

Foundation for Vertebral Subluxation

“All life forms strive to the max of their potential - *except for humans beings*”

Jim Rohn

# How tall does a tree grow?

# 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.**

Foundation for Vertebral Subluxation



# 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

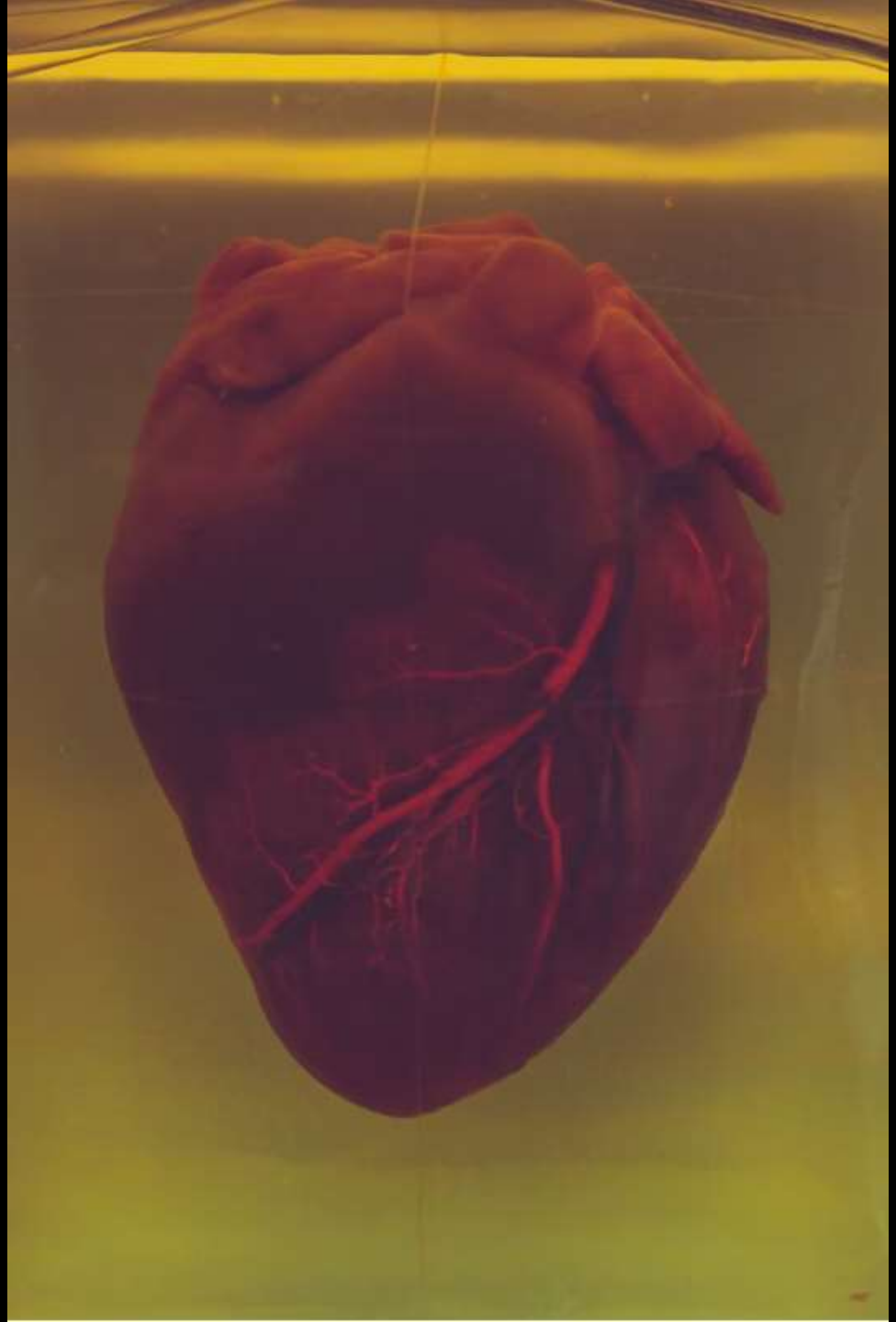
The annual health care cost for US senior citizens in 1994 was conservatively estimated at $10,041.00 per person.

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.




HEART
ATRIAL
HYPERTENSION
RHYTHM
DISEASE
ATTACK
VESSEL
HYPERTENSION
CORONARY
IRREGULARITIES
VENTRICULAR
ATRIAL
BLOOD
ATTACK
FIBRILLATION
ILLNESS
HEART
ISCHEMIA
HEART
VENTRICULAR
CORONARY
ISCHEMIA
PRESSURE
FIBRILLATION
ATRIAL
IRREGULARITIES
CHOLESTEROL
CHOLESTEROL
HEARTBEAT
BLOOD
VESSEL
DISEASE
PRESSURE
VENTRICULAR
HYPERTENSION
DISEASE
ILLNESS
PRESSURE
HEARTBEAT
HYPERTENSION
ATTACK
FIBRILLATION
VENTRICULAR
ATRIAL
RHYTHM
IRREGULARITIES
VESSEL


Stroke

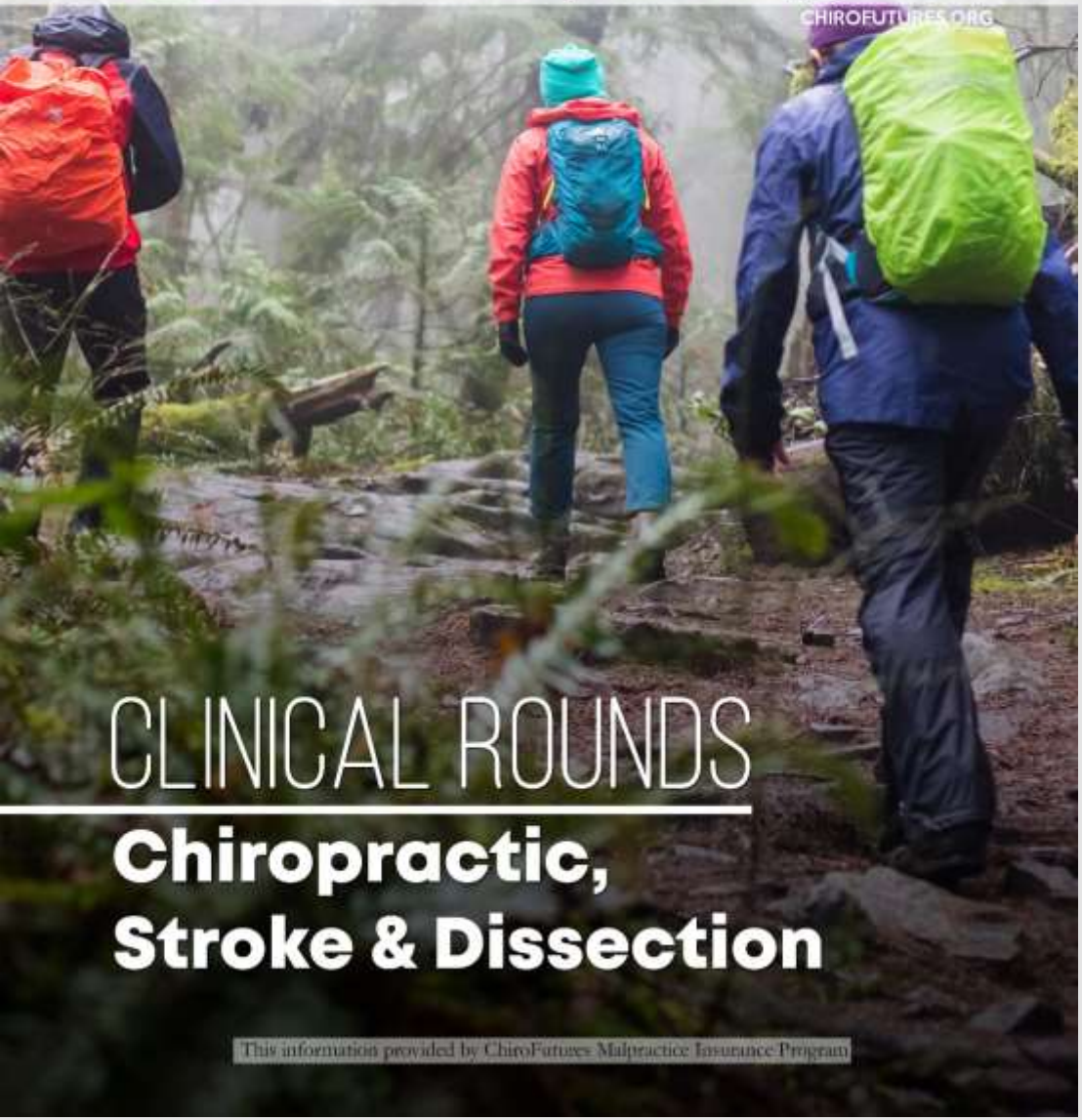
ChiroFutures

# Vascular Endothelial Damage via SARS-COV-2 “Spike” Protein and its Relationship to Promoting Thrombosis (Clot Formation)

Amy Haas DC, Ph.D

ChiroFutures

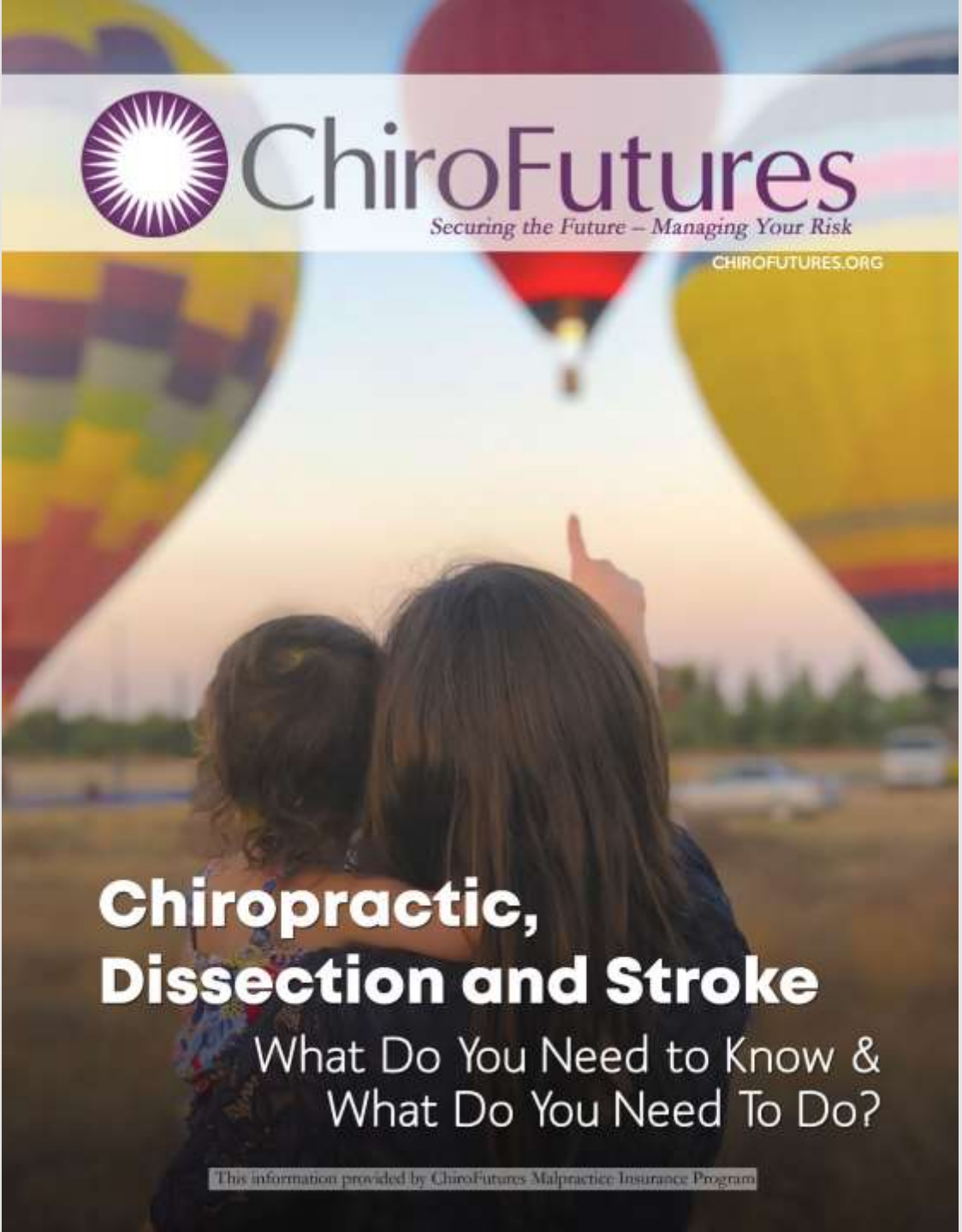
*Securing the Future – Managing Your Risk*




# CLINICAL ROUNDS

## Chiropractic, Stroke & Dissection

This information provided by ChiroFutures Malpractice Insurance Program


ChiroFutures
Securing the Future – Managing Your Risk
CHIROFUTURES.ORG
Chiropractic,
Dissection and Stroke
What Do You Need to Know &
What Do You Need To Do?
This information provided by ChiroFutures Malpractice Insurance Program

# $75M Verdict in Med Mal Trial Over Stroke That Profoundly Paralyzed Patient

Posted by *Arlin Crisco* on Oct 24, 2022 4:06:34 PM

Tweet Like 56 Share



ChiroFutures *Securing the Future - Managing Your Risk*
*Risk Purchasing Group*

To: Berkley Select
Attn: Claim Department
Email:
Fax:

From: Marcia
Email:
Phone: 800-219-9090
Fax: 800-219-9619

Re: DC

DOL:
Policy:
Writing Company: Great Divide Insurance
Retroactive Date: OCC
With CFS Since: 07/29/2017

Description of Loss: IO: Patient was diagnosed with dissection of vertebral artery day after adjustment.

Additional Notes:

Please confirm receipt, advise assignment of claim number and adjuster with contact information for our records. If you need additional information or assistance please let us know.

Best Regards,

ChiroFutures *Securing the Future - Managing Your Risk*
*Risk Purchasing Group*

To: Berkley Select
Attn: Claim Department
Email:
Fax:

From:
Email:
Phone: 800-219-9090
Fax: 800-219-9619

Re: DC

DOL:
Policy:
Writing Company: Great Divide Insurance
Retroactive Date: 06/17/2019
With CFS Since: 06/17/2019 (& prior: 03/12/2018 to 04/10/2019)

Description of Loss: IO: DC is concerned the delay in MRI being done may have caused patient harm.

Additional Notes: As DC's concerns appear to be procedural, I have sent the packet to Drs. McCoy and Carrino for their Risk Management counsel.

Please confirm receipt, advise assignment of claim number and adjuster with contact information for our records. If you need additional information or assistance please let us know.

Best Regards.

ChiroFutures *Securing the Future - Managing Your Risk*
*Risk Purchasing Group*

To:
Attn: Claim Department
Email: newclaim
Fax:

From:
Email:
Phone: 800-219-9090
Fax: 800-219-9619

Re: D.C.

DOL:
Policy:
Writing Company: Great Divide Insurance
Retroactive Date: 02/15/2016
With CFS Since: 12/23/2018

Description of Loss: IO: Patient was diagnosed with 'stroke' after adjustment. DC has received a Records Request, which, I understand, has been fulfilled by the practice.

Additional Notes: Please call DC to discuss how to move forward.

Please confirm receipt, advise assignment of claim number and adjuster with contact information for our records. If you need additional information or assistance please let us know.

Best Regards.

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*Risk Purchasing Group*

To:
Attn: Claim Department
Email: newclaim
Fax: 312-207-

From: Marcia
Email: sonorannational.com
Phone: 800-219-9090
Fax: 800-219-9619

Re: David Hopper D.C.

DOL: 2
Policy:
Writing Company: Great Divide Insurance
Retroactive Date: 01/01/2017
With CFS Since: 12/17/2018

Description of Loss: IO: DC adjusted friend after meeting, friend was diagnosed with VAD later that evening.

Additional Notes: Please call DC to discuss process and how to go forward.

Please confirm receipt, advise assignment of claim number and adjuster with contact information for our records. If you need additional information or assistance please let us know.

Best Regards.

ChiroFutures *Securing the Future - Managing Your Risk*
*Risk Purchasing Group*

To:
Attn: Claim Department
Email: @berkleyselect.com
Fax:

From: Marcia
Email: marcia.
Phone: 800-219-9090
Fax: 800-219-9619

Re: DC

DOL:
Policy:
Writing Company: Great Divide Insurance
Retroactive Date: 05/08/2019
With CFS Since: 05/08/2019

Description of Loss: IO: on 2nd visit to DC, DC did not adjust & instead sent patient to ER. Patient was originally diagnosed with VAD, with ER attendant mentioning "DC's fault".

Additional Notes: Per DC's included email, patient appears to only be grateful for DC's help, not accusatory.

Please confirm receipt, advise assignment of claim number and adjuster with contact information for our records. If you need additional information or assistance please let us know.

Best Regards,

ChiroFutures *Securing the Future - Managing Your Risk*
*Risk Purchasing Group*

To:
Attn: Claim Department
Email: @berkleyselect.com
Fax:

From: Marcia
Email: @sonorannational.com
Phone: 800-219-9090
Fax: 800-219-9619

Re: DC

DOL:
Policy:
Writing Company: Great Divide Insurance
Retroactive Date: OCC
With CFS Since: 11/02/2020

Description of Loss: IO: Neurologist ordered MRI & MRA for DC's patient to check for VAD

Additional Notes: Please call DC for current status and assistance on how to move forward to avoid claim.

Please confirm receipt, advise assignment of claim number and adjuster with contact information for our records. If you need additional information or assistance please let us know.

Best Regards,

ChiroFutures *Securing the Future - Managing Your Risk*
*Risk Purchasing Group*

To:
Attn: Claim Department
Email: )berkleyselect.com
Fax: 312-207-1933

From: Marcia
Email: )sonorannational.com
Phone: 800-219-9090
Fax: 800-219-9619

Re: Carlie Broadbent DC

DOL:
Policy:
Writing Company: Great Divide Insurance
Retroactive Date: OCC
With CFS Since: 04/19/2021

Description of Loss: IO: DC has received records request from patient diagnosed with ruptured artery

Additional Notes: Please call DC & see related IO Pkt sent in from DC's co-worker, DC

Please confirm receipt, advise assignment of claim number and adjuster with contact information for our records. If you need additional information or assistance please let us know.

Best Regards.

ChiroFutures *Securing the Future - Managing Your Risk*
*Risk Purchasing Group*

To:
Attn: Claim Department
Email: berkleyselect.com
Fax:

From: Marcia
Email: sonorannational.com
Phone: 800-219-9090
Fax: 800-219-9619

Re: & n DCs w/ GROUP: Venture LLC

DOL:
Policy:
Writing Company: Admiral Insurance
Retroactive Date: OCC
With CFS Since: 10/01/2021

Description of Loss: IO: Practice received a records request by a patient diagnosed with stroke after adjustment.

Additional Notes:

Please confirm receipt, advise assignment of claim number and adjuster with contact information for our records. If you need additional information or assistance please let us know.

Best Regards.

SPINE Volume 33, Number 4S, pp S176–S183
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# Risk of Vertebrobasilar Stroke and Chiropractic Care

## Results of a Population-Based Case-Control and Case-Crossover Study

J. David Cassidy, DC, PhD, DrMedSc,*†‡ Eleanor Boyle, PhD,* Pierre Côté, DC, PhD,*†‡§ Yaohua He, MD, PhD,* Sheilah Hogg-Johnson, PhD,†§ Frank L. Silver, MD, FRCPC,¶|| and Susan J. Bondy, PhD†

**Study Design.** Population-based, case-control and case-crossover study.

**Objective.** To investigate associations between chiropractic visits and vertebrobasilar artery (VBA) stroke and to contrast this with primary care physician (PCP) visits and VBA stroke.

**Summary of Background Data.** Chiropractic care is popular for neck pain and headache, but may increase the risk for VBA dissection and stroke. Neck pain and headache are common symptoms of VBA dissection, which commonly precedes VBA stroke.

**Methods.** Cases included eligible incident VBA strokes admitted to Ontario hospitals from April 1, 1993 to March 31, 2002. Four controls were age and gender matched to each case. Case and control exposures to chiropractors and PCPs were determined from health billing records in the year before the stroke date. In the case-crossover analysis, cases acted as their own controls.

**Results.** There were 818 VBA strokes hospitalized in a population of more than 100 million person-years. In those aged <45 years, cases were about three times more likely to see a chiropractor or a PCP before their stroke than controls. Results were similar in the case control and case crossover analyses. There was no increased association between chiropractic visits and VBA stroke in those older than 45 years. Positive associations were found between PCP visits and VBA stroke in all age groups. Practitioner visits billed for headache and neck complaints were highly associated with subsequent VBA stroke.

**Conclusion.** VBA stroke is a very rare event in the population. The increased risks of VBA stroke associated with chiropractic and PCP visits is likely due to patients with headache and neck pain from VBA dissection seeking care before their stroke. We found no evidence of excess risk of VBA stroke associated chiropractic care compared to primary care.

**Key words:** vertebrobasilar stroke, case control studies, case crossover studies, chiropractic, primary care, complications, neck pain. **Spine 2008;33:S176–S183**

Neck pain is a common problem associated with considerable comorbidity, disability, and cost to society.[1–5] In North America, the clinical management of back pain is provided mainly by medical physicians, physical therapists and chiropractors.[6] Approximately 12% of American and Canadian adults seek chiropractic care annually and 80% of these visits result in spinal manipulation.[7,8] When compared to those seeking medical care for back pain, Canadian chiropractic patients tend to be younger and have higher socioeconomic status and fewer health problems.[6,8] In Ontario, the average number of chiropractic visits per episode of care was 10 (median 6) in 1985 through

ORIGINAL RESEARCH

# RISK OF STROKE AFTER CHIROPRACTIC SPINAL MANIPULATION IN MEDICARE B BENEFICIARIES AGED 66 TO 99 YEARS WITH NECK PAIN

James M. Whedon, DC, MS,[a] Yunjie Song, PhD,[b] Todd A. Mackenzie, PhD,[c] Reed B. Phillips, DC, PhD,[d] Timothy G. Lukovits, MD,[e] and Jon D. Lurie, MD, MS[f]

ABSTRACT

**Objective:** The purpose of this study was to quantify risk of stroke after chiropractic spinal manipulation, as compared to evaluation by a primary care physician, for Medicare beneficiaries aged 66 to 99 years with neck pain.
**Methods:** This is a retrospective cohort analysis of a 100% sample of annualized Medicare claims data on 1 157 475 beneficiaries aged 66 to 99 years with an office visit to either a chiropractor or primary care physician for neck pain. We compared hazard of vertebrobasilar stroke and any stroke at 7 and 30 days after office visit using a Cox proportional hazards model. We used direct adjusted survival curves to estimate cumulative probability of stroke up to 30 days for the 2 cohorts.
**Results:** The proportion of subjects with stroke of any type in the chiropractic cohort was 1.2 per 1000 at 7 days and 5.1 per 1000 at 30 days. In the primary care cohort, the proportion of subjects with stroke of any type was 1.4 per 1000 at 7 days and 2.8 per 1000 at 30 days. In the chiropractic cohort, the adjusted risk of stroke was significantly lower at 7 days as compared to the primary care cohort (hazard ratio, 0.39; 95% confidence interval, 0.33-0.45), but at 30 days, a slight elevation in risk was observed for the chiropractic cohort (hazard ratio, 1.10; 95% confidence interval, 1.01-1.19).

Journal of Human Hypertension (2007) 21, 347–352
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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* (2007) **21**, 347–352.
doi:10.1038/sj.jhh.1002133; published online 2 March 2007

ORIGINAL RESEARCH

# Reduction in Arterial Blood Pressure Following Adjustment of Atlas to Correct Vertebral Subluxation: A Prospective Longitudinal Cohort Study

*Scott R. Torns D.C.*[1]

## ABSTRACT

**Objective:** This investigation was a placebo-control, randomized, prospective longitudinal cohort study to examine the long term effect Atlas Orthogonal (AO) upper cervical chiropractic care has on arterial blood pressure (ABP).

**Methods:** Twenty participants were computer randomized into a placebo-control group and a therapeutic group. All participants were examined radiographically, and coordinate values were calculated for Atlas dysfunction per AO Technique. The therapeutic group received an AO adjustment while controls received a sham adjustment. Pre and post therapeutic intervention ABP values were recorded for each participant. Subsequent measures for ABP were again recorded at one week, two weeks, four weeks, and lastly, six weeks after intervention. The Atlas was adjusted utilizing an AO Adjusting Instrument. No adverse reactions were recorded in either group.

# ABSTRACT

**Objective:** This investigation was a placebo-control, randomized, prospective longitudinal cohort study to examine the long term effect Atlas Orthogonal (AO) upper cervical chiropractic care has on arterial blood pressure (ABP).

**Methods:** Twenty participants were computer randomized into a placebo-control group and a therapeutic group. All participants were examined radiographically, and coordinate values were calculated for Atlas dysfunction per AO Technique. The therapeutic group received an AO adjustment while controls received a sham adjustment. Pre and post therapeutic intervention ABP values were recorded for each participant. Subsequent measures for ABP were again recorded at one week, two weeks, four weeks, and lastly, six weeks after intervention. The Atlas was adjusted utilizing an AO Adjusting Instrument. No adverse reactions were recorded in either group.

**Results:** The therapeutic group demonstrated significant lowering of both their systolic and diastolic values. Improvements in systolic values continued to be statistically significant at six weeks. The effect on the diastolic values failed to reach significance after four weeks. There were no statistically significant differences detected in the systolic or diastolic values of the control group.

**Conclusions:** This investigation provides further evidence connecting upper cervical chiropractic care and ABP regulation. While the exact mechanism remains in question, data suggests an appropriate dose may be one upper cervical chiropractic visit per month for patients that suffer from high ABP.



**Keywords:** *Atlas, high blood pressure, hypertension, Atlas Orthogonal, upper cervical chiropractic, nonsurgical antihypertensive therapy*



Foundation for Vertebral Subluxation

ORIGINAL RESEARCH

# Atlas Vertebra Realignment and Arterial Blood Pressure Regulation in 42 Subjects

*Scott Torns, DC*[1]

## ABSTRACT

**Objective:** To investigate the effect of the Atlas Orthogonal (AO) upper cervical adjustment on arterial blood pressure (ABP).

**Methods:** Forty-two patients in a private chiropractic practice met and participated in the study. Upon radiological examination, coordinate values were recorded per AO Technique. Pre and post adjustment ABP measurements were recorded for the following groups: Hypotensive, Normotensive, Pre-Hypertensive, Stage One Hypertensive, and Stage Two Hypertensive. Atlas was adjusted utilizing the AO technique. No adverse events were recorded.

**Results:** Pre-Hypertensive, Stage One Hypertensive, and Stage Two Hypertensive groups had a statistically significant decrease in ABP. There was an increase in ABP in the Hypotensive group.

# ABSTRACT

**Objective:** To investigate the effect of the Atlas Orthogonal (AO) upper cervical adjustment on arterial blood pressure (ABP).

**Methods:** Forty-two patients in a private chiropractic practice met and participated in the study. Upon radiological examination, coordinate values were recorded per AO Technique. Pre and post adjustment ABP measurements were recorded for the following groups: Hypotensive, Normotensive, Pre-Hypertensive, Stage One Hypertensive, and Stage Two Hypertensive. Atlas was adjusted utilizing the AO technique. No adverse events were recorded.

**Results:** Pre-Hypertensive, Stage One Hypertensive, and Stage Two Hypertensive groups had a statistically significant decrease in ABP. There was an increase in ABP in the Hypotensive group.

**Conclusion:** These findings suggest realignment of the atlas does not simply lower ABP but may also be part of a systemic homeostatic mechanism not yet completely understood. The same adjustment that decreased hypertensive ABP measurements also increased hypotensive ABP measurements to more normal levels. Exploration into the potential cause of these observed effects is also discussed.

**Keywords:** *Atlas, upper cervical, hypertension, blood pressure, chiropractic, antihypertensive therapy*

Foundation for Vertebral Subluxation

ORIGINAL RESEARCH

# The Impact of Chiropractic Adjustments on Intracranial Blood Flow: A Pilot Study

*Robert M. Scott, D.C., Ph.D,* [1] *Christopher L. Kaufman Ph.D.,* [2] *Donald R. Dengel, Ph.D.* [3,4]

**ABSTRACT**

**Background:** A limited number of studies have addressed the impact of extracranial vascular blood flow and positional changes of the cervical spine. Fewer have addressed the specific effects of chiropractic adjustments and vertebral artery blood flow via Doppler Ultrasound techniques. Identifying the effects on blood flow may prove helpful in identifying the relationship of flow to mechanism of action and subsequent application of chiropractic care to vascular health and the onset of disease.

**Objective:** To investigate the effect of a single chiropractic adjustment on middle cerebral artery blood flow and radial artery blood pressure response.

**Design and Setting:** A randomized controlled study involving 20 healthy chiropractic students. Data were analyzed utilizing a two-group repeated measures ANOVA with 6 levels followed by a post hoc multiple comparison analysis.

**Results**: A transient but significant change in middle cerebral artery blood flow occurred in subjects receiving a chiropractic adjustment. Peak flow was reached within one minute of receiving the adjustment and returned to baseline values by minute five. A single cervical adjustment had no effect on systolic or diastolic blood pressure.

**Conclusion:** This Doppler study looked at the effect of a chiropractic adjustment on intracranial blood flow. The results indicate that asymptomatic subjects experience small, transient increase in blood flow immediately following an adjustment.

**Key Words:** *Chiropractic Adjustment, Blood Flow, Transcranial Doppler Ultrasound, Blood Pressure, Subluxation*

# Case Study

## Reduction in Cardiovascular Disease Risk Factors Following Chiropractic Care: A Case Study & Selective Review of the Literature

Anthony Slinger D.C.[1]
Shayla Lesho D.C.[2]

1. *Private Practice of Chiropractic, Charles City, IA*
2. *Private Practice of Chiropractic, Mount Pleasant, SC*

**ABSTRACT**

**Objective:** This case reports on the subjective and objective improvements of a male patient with vertebral subluxation, hypercholesterolemia, hypertriglyceridemia, and gout after undergoing chiropractic care and lifestyle interventions.

**Clinical Features:** A 30 year-old patient with previous diagnoses of hypercholesterolemia, hypertriglyceridemia, and gout in the left ankle as well as secondary low back pain presented for chiropractic care. Hematological panels confirmed hypercholesterolemia, hypertriglyceridemia, and hyperuricemia.

**Intervention and Outcome:** Chiropractic care was administered using high velocity, low amplitude adjustments (i.e., Diversified technique) to reduce vertebral and lower extremity subluxations. Objective clinical findings included: motion palpation, static palpation, paraspinal thermography, postural evaluation, orthopedic tests, and neurological tests. Under discretion of the chiropractor, lifestyle interventions were carried out, such as dietary changes, nutritional supplementation, and an exercise regimen. Diversified chiropractic adjustments were conducted over a 10 week period of care. There was an overall reduction in the patient's subluxations, in addition to marked improvement in serum cholesterol and lipid panels.

**Conclusion:** This retrospective case study reports on the effectiveness of chiropractic care in reducing vertebral and lower extremity subluxation findings as well as lowering the risk factors of cardiovascular disease in a 30 year-old patient. Further research in chiropractic care and cardiovascular disease is advocated.

**Key Words:** *subluxation, chiropractic, diversified technique, hypercholesterolemia, gout, cardiovascular disease*

## Case Study & Review

# An Epidemiological Approach to Subluxation-Based Chiropractic Care and CVD Risk Factors: A Case Study and Review of the Literature

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Nate A. Blume, D.C.[2]

1. *Life University, College of Chiropractic & Emory University School of Public Health, Atlanta, GA*
2. *Private Practice of Chiropractic, Indianapolis, IN*

**Abstract**

**Objective:** We present the findings in which a 54 year old male experienced lipid panel normalization as following subluxation-based chiropractic care.

**Clinical Features:** 54 year old male first presented into the office with a chief complaint of dyslipidemia. He had a past history of myocardial infarction and angioplasty. One month prior to care the patient had a lipid panel drawn indicating that his total cholesterol levels were 124, LDL levels were 63, HDL levels were 38, and triglyceride levels were 116. Other complaints included anxiety, constipation, fatigue, irritability, mood swings, neck pain, and stiff neck. He also reported occupational and personal stress as well as depression.

**Intervention and Outcome:** Paraspinal surface electromyography, range of motion, and thermography readings were taken on the initial visit, on the twelfth visit one month later, and fifteen days after his second blood draw (4 ½ months into care). In conjunction with the above findings, vertebral subluxations were confirmed at the levels of C1, C5, pelvis, and sacrum. Care plan included thirty one patient visits over a five month period before blood draw confirmed that his cholesterol levels decreased. No reported lifestyle changes occurred beside chiropractic care. In response to the positive blood work results, the patients' cardiologist reduced his medications.

**Conclusion:** We offer a brief historical account of the role cholesterol has played in CVD and provide the most recent global data. Our review reveals that the "cholesterol is harmful" hypothesis is not ubiquitously supported by the literature and there appears to be a growing paradigm shift that subscribes to the theory that stress-related inflammatory and hormonal responses are key components to atherosclerotic plaque build-up and subsequent CVD. A review of literature indicates that subluxation-based chiropractic care may be effective in managing atherosclerosis and other risk factors associated with CVD due to its potential effect on inflammatory markers; namely, C-reactive protein (CRP), immune system response(s), psychological and physiological stress. The results of this case study warrant further research to explore these relationships.

**Key Words:** *Chiropractic, subluxation, cholesterol, hypercholesteremia, dyslipidemia, statins, stress, inflammation, cardiovascular disease, atherosclerosis*

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ORIGINAL RESEARCH

# Improvement in Pattern Analysis, Heart Rate Variability & Symptoms Following Upper Cervical Chiropractic Care

*Robert C Kessinger DC[1], Michael F. Anderson, DC,[2] Jarod W Adlington, DC[3]*

## ABSTRACT

**Objective:** This paper reports thermal pattern analysis and heart rate variability outcome on three cases undergoing an upper cervical chiropractic technique.

**Clinical Features:** Three patients who had never received upper cervical chiropractic care were examined both pre and post adjustment using the Tytron C-4000 paraspinal digital infrared instrument and the BioSuite HRV to assess autonomic nervous system function via heart rate variability.

**Interventions and Outcomes:** Cervical radiographs, paraspinal digital infrared imaging, and pelvic balance leg length inequality were used to confirm upper cervical subluxation. Analysis was applied to determine pre-adjustment cervical thermographic pattern. A heart rate variability test was also preformed pre-adjustment. A Knee Chest Upper Cervical Specific adjustment was administered to the C1 region of the spine in all three cases. The three patients were then instructed to lie in a supine position for 45 minutes. The patients were then re-tested for pelvic balance leg length, re-scanned with the Tytron C-4000 instrument, and post tested with the HRV unit. Subjective findings improved following care as well as a concomitant reduction in pattern and improvement in heart rate variability findings.

**Conclusion:** In these three cases there appears to be a relationship between the improvements in bilateral skin temperature pattern analysis and heart rate variability following an upper cervical chiropractic technique. It is feasible that upper cervical chiropractic care can have a positive effect on the autonomic nerve system and there may be a connection between pattern reduction and improved heart rate variability. Further study is recommended.

**Key Terms:** *chiropractic, pattern analysis, heart rate variability, upper cervical, vertebral subluxation, thermography, knee chest adjustment.*

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CASE STUDY

# Resolution of Atrial Fibrillation & Hypertension in a Patient Undergoing Upper-Cervical Chiropractic Care

*Trevor Qualls, BS DC[1] & Crystal Lester, BA[2]*

## ABSTRACT

**Objective:** To describe the correction of an upper cervical subluxation in a patient with atrial fibrillation and hypertension.

**Clinical Features:** A 68-year-old female presented with fatigue, weakness, dyspnea, tachycardia and hypertension. Her cardiologist previously diagnosed her with atrial fibrillation.

**Intervention & Outcomes:** High velocity, low amplitude adjustments were delivered in the knee-chest position to the atlanto-occipital area on 4 separate visits. Upon receiving a second adjustment, the patient's heart rate variability readings showed signs of improvement suggesting autonomic balance. Her blood pressure returned to normal and was able to discontinue her medication.

**Conclusion:** This case reviews the use of upper cervical in the resolution of signs and symptoms in a patient with atrial fibrillation.

**Keywords:** *Chiropractic, Upper Cervical, Knee-Chest, Atrial Fibrillation, Subluxation, HRV, Arrhythmia*

## Case Study

# Reduction in Cholesterol and Improved Quality of Life in a Patient with Dyslipidemia Undergoing Chiropractic Care: A Case Study

Curtis Fedorchuk D.C.[1]
Jill Leeder Burk D.C.[2]
Sean L. Phillips D.C.[3]

1. Private Practice of Chiropractic, Cumming, GA USA
2. Private Practice of Chiropractic, Colorado Springs, CO, USA
3. Private Practice of Chiropractic, Dunn, NC, USA

**Abstract**

**Objective:** To report on changes in cholesterol levels and quality of life in a patient following chiropractic care.

**Clinical Features:** A 49 year old female presents with neck pain, carpal tunnel syndrome, low back pain, dyslipidemia and vertebral subluxations. Lipid lowering statins were prescribed by her medical physician but using her own judgment, she elected not to take them.

**Intervention and Outcome:** The patient was treated with Diversified and Chiropractic Biomechanics of Posture® (CBP) techniques over a six-month time span. During initial care, her total cholesterol improved from 221 to 170 mg/dL. LDL went from 153 to 109 mg/dL and HDL went from 33 to 38 mg/dL. Triglycerides improved from 241 to 199 mg/dL. Quality of life scores were increased in eight categories. No other interventions were used.

**Conclusion:** The clinical process documented in this report suggests that the combination of Diversified and CBP® chiropractic care reduces subluxations and stress on the spinal column and nervous system. As a result of this reduced stress, there is a reduction of dysponesis, which is evidenced by the improved quality of life and blood serum cholesterol levels.

**Keywords:** *Cholesterol, SF-36, Quality of Life, Chiropractic Biomechanics of Posture® (CBP), triglycerides, vertebral subluxation*

# 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.

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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.

# Framingham

- To identify the common factors that contribute to CVD, the United States Federal Government sponsored a research initiative entitled *The Framingham Heart Study*, under the direction of the National Heart.

- The **Gold Standard in CVD research**
  - 1948: 5,209 people originally recruited
    - 1971: 5,124 of their children joined the study
      - 2002: their grandchildren recruited
- Paradoxical results:
  - Cholesterol levels no different in MI victims vs. non-MI victims

- Resent Data suggests that:
  - People with *very* high cholesterol levels experienced a lower incidence of MI
  - People with *very* low readings experienced a higher incidence of MI


- Framingham Heart Study [Internet]. Framingham; c2011 [cited 2012 January]. Available from: http://www.framinghamheartstudy.org/about/history.html.
- Oner M. The great American heart hoax. Dallas: Benbella, 2008.

# 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.

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# 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.

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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.

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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.

# 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.

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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.

# 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).

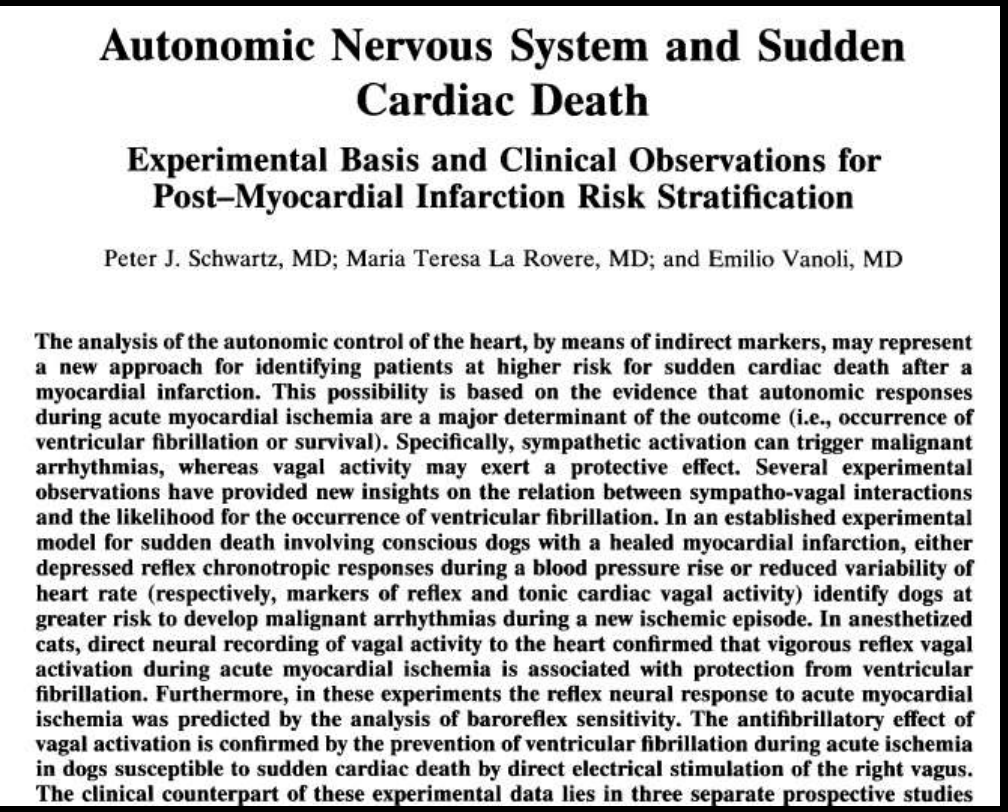
# Autonomic Nervous System and Sudden Cardiac Death

## Experimental Basis and Clinical Observations for Post–Myocardial Infarction Risk Stratification

Peter J. Schwartz, MD; Maria Teresa La Rovere, MD; and Emilio Vanoli, MD

**The analysis of the autonomic control of the heart, by means of indirect markers, may represent a new approach for identifying patients at higher risk for sudden cardiac death after a myocardial infarction. This possibility is based on the evidence that autonomic responses during acute myocardial ischemia are a major determinant of the outcome (i.e., occurrence of ventricular fibrillation or survival). Specifically, sympathetic activation can trigger malignant arrhythmias, whereas vagal activity may exert a protective effect. Several experimental observations have provided new insights on the relation between sympatho-vagal interactions and the likelihood for the occurrence of ventricular fibrillation. In an established experimental model for sudden death involving conscious dogs with a healed myocardial infarction, either depressed reflex chronotropic responses during a blood pressure rise or reduced variability of heart rate (respectively, markers of reflex and tonic cardiac vagal activity) identify dogs at greater risk to develop malignant arrhythmias during a new ischemic episode. In anesthetized cats, direct neural recording of vagal activity to the heart confirmed that vigorous reflex vagal activation during acute myocardial ischemia is associated with protection from ventricular fibrillation. Furthermore, in these experiments the reflex neural response to acute myocardial ischemia was predicted by the analysis of baroreflex sensitivity. The antifibrillatory effect of vagal activation is confirmed by the prevention of ventricular fibrillation during acute ischemia in dogs susceptible to sudden cardiac death by direct electrical stimulation of the right vagus. The clinical counterpart of these experimental data lies in three separate prospective studies**

# Compelling Evidence



## Autonomic Nervous System and Sudden Cardiac Death

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- Sympathetics trigger malignant arrythmias
- Vagal activity gives protective effect
- Depressed baroreflex sensitivity
- Decreased HRV

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# 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 nerve firings that affect the heart.

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.

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*Review Article*

# Modeling and imaging cardiac sympathetic neurodegeneration in Parkinson's disease

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**Abstract:** Parkinson's disease (PD) is currently recognized as a multisystem disorder affecting several components of the central and peripheral nervous system. This new understanding of PD helps explain the complexity of the patients' symptoms while challenges researchers to identify new diagnostic and therapeutic strategies. Cardiac neurodegeneration and dysautonomia affect PD patients and are associated with orthostatic hypotension, fatigue, and abnormal control of electrical heart activity. They can seriously impact daily life of PD patients, as these symptoms do not respond to classical anti-parkinsonian medications and can be worsened by them. New diagnostic tools and therapies aiming to prevent cardiac neurodegeneration and dysautonomia are needed. In this manuscript we critically review the relationship between the cardiovascular and nervous system in normal and PD conditions, current animal models of cardiac dysautonomia and the application of molecular imaging methods to visualize cardiac neurodegeneration. Our goal is to highlight current progress in the development of tools to understand cardiac neurodegeneration and dysautonomia and monitor the effects of novel therapies aiming for global neuroprotection.

**Keywords:** Positron emission tomography, SPECT, $^{18}$F-FDA, $^{11}$C-MHED, cardiac dysautonomia, sympathetic nervous system, Parkinson's disease

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# Cardiovascular dysautonomia in Parkinson Disease: From pathophysiology to pathogenesis

**Samay Jain, MD, MS**[1] and **David S. Goldstein, MD, PhD**[2]

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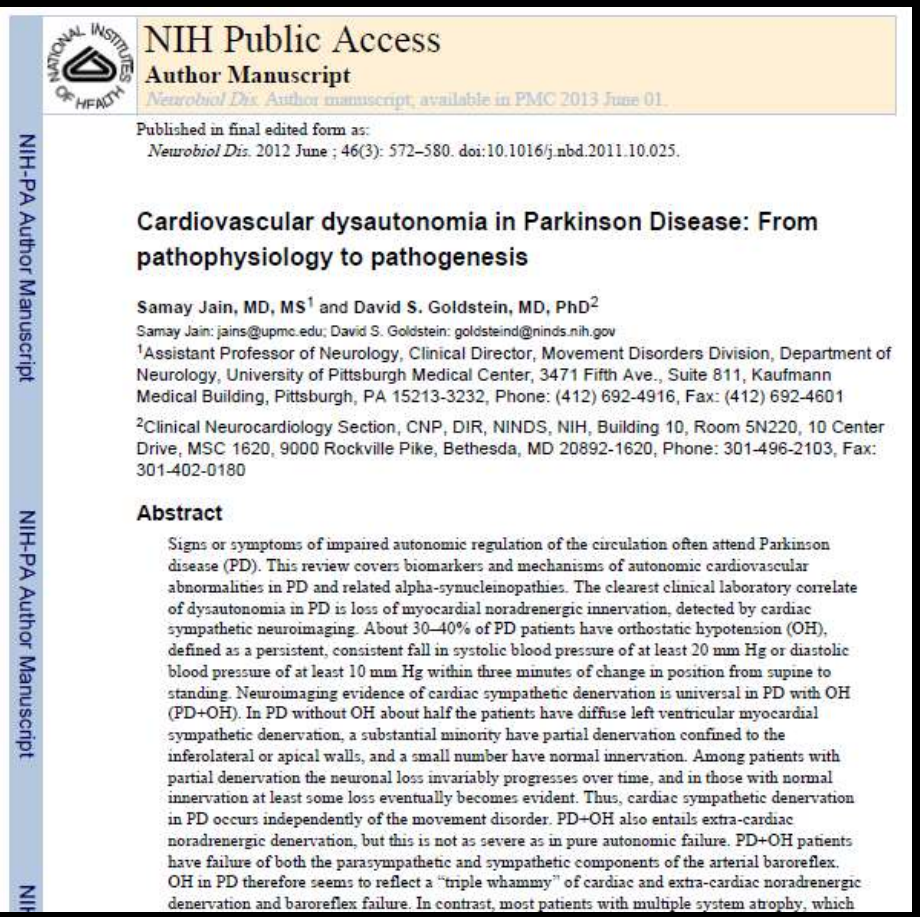
## Abstract

Signs or symptoms of impaired autonomic regulation of the circulation often attend Parkinson disease (PD). This review covers biomarkers and mechanisms of autonomic cardiovascular abnormalities in PD and related alpha-synucleinopathies. The clearest clinical laboratory correlate of dysautonomia in PD is loss of myocardial noradrenergic innervation, detected by cardiac sympathetic neuroimaging. About 30–40% of PD patients have orthostatic hypotension (OH), defined as a persistent, consistent fall in systolic blood pressure of at least 20 mm Hg or diastolic blood pressure of at least 10 mm Hg within three minutes of change in position from supine to standing. Neuroimaging evidence of cardiac sympathetic denervation is universal in PD with OH (PD+OH). In PD without OH about half the patients have diffuse left ventricular myocardial sympathetic denervation, a substantial minority have partial denervation confined to the inferolateral or apical walls, and a small number have normal innervation. Among patients with partial denervation the neuronal loss invariably progresses over time, and in those with normal innervation at least some loss eventually becomes evident. Thus, cardiac sympathetic denervation in PD occurs independently of the movement disorder. PD+OH also entails extra-cardiac noradrenergic denervation, but this is not as severe as in pure autonomic failure. PD+OH patients have failure of both the parasympathetic and sympathetic components of the arterial baroreflex. OH in PD therefore seems to reflect a "triple whammy" of cardiac and extra-cardiac noradrenergic denervation and baroreflex failure. In contrast, most patients with multiple system atrophy, which

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# “Triple Whammy”



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**Cardiovascular dysautonomia in Parkinson Disease: From pathophysiology to pathogenesis**

**Samay Jain, MD, MS**[1] and **David S. Goldstein, MD, PhD**[2]

Samay Jain: jains@upmc.edu; David S. Goldstein: goldsteind@ninds.nih.gov

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**Abstract**

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- “Triple  Whammy”
- Loss of cardiac noradrenergic innervation
- Orthostatic hypertension
- Baroreflex failure
- Cardiac sympathetic denervation is UNIVERSAL in PD with Orthostatic hypertns.
- Occurs independent of the movement disorder

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# Cardiac and Extracardiac Sympathetic Denervation in Parkinson's Disease with Orthostatic Hypotension and in Pure Autonomic Failure

Dnyanesh N. Tipre, MPharm, PhD; and David S. Goldstein, MD, PhD

*Clinical Neurocardiology Section, National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, Maryland*

The uptake of 6-$^{18}$F-fluorodopamine by cardiac noradrenergic nerves enables visualization of the sympathetic innervation of the left ventricular myocardium by PET. Patients with Parkinson's disease (PD) and orthostatic hypotension (OH) (PD+OH) or with pure autonomic failure (PAF) have markedly decreased myocardial 6-$^{18}$F-fluorodopamine–derived radioactivity, consistent with cardiac sympathetic denervation, a phenomenon that neurochemical, neuropharmacologic, and, most recently, postmortem neuropathologic studies have confirmed. In this study, we examined whether 6-$^{18}$F-fluorodopamine can visualize sympathetic innervation in extracardiac organs and, if so, whether patients with PD+OH or PAF have neuroimaging evidence of extracardiac noradrenergic denervation. **Methods:** To validate the method, healthy volunteers underwent 6-$^{18}$F-fluorodopamine scanning of the head, thorax, and abdomen, with or without treatment with desipramine to block sympathoneural uptake of catecholamines. $^{13}$N-Ammonia scanning was used to address possible group differences in 6-$^{18}$F-fluorodopamine delivery by blood perfusion. **Results:** Desipramine treatment was associated with decreased 6-$^{18}$F-fluorodopamine–derived radioactivity in the heart, renal cortex, and thyroid gland but not in the liver, spleen, renal pelvis, or salivary glands. Both the PD+OH group and the PAF group had decreased 6-$^{18}$F-fluorodopamine–derived radioactivity in the heart ($P < 0.0001$) and renal cortex ($P = 0.02$ and $P = 0.005$, respectively). The PD+OH group also had decreased radioactivity in the thyroid gland ($P = 0.01$). Neither group had decreased radioactivity in the other organs, after correction for $^{13}$N-ammonia–derived radioactivity. **Conclusion:** 6-$^{18}$F-Fluorodopamine scanning visualizes sympathetic innervation in the heart, renal cortex, and thyroid gland. Both PD+OH and PAF involve decreased noradrenergic innervation that is most prominent in the heart but is also detectable in extracardiac organs.

**Key Words:** fluorodopamine; ammonia; pure autonomic failure; Parkinson's disease; PET

PET after intravenous injection of 6-$^{18}$F-fluorodopamine enables visualization of cardiac sympathetic innervation (*1*). It was previously reported that patients with Parkinson's disease (PD) and orthostatic hypotension (OH) (PD+OH) have remarkably decreased left ventricular myocardial concentrations of 6-$^{18}$F-fluorodopamine–derived radioactivity (*2,3*), with values similar to those in patients with pure autonomic failure (PAF). Whether patients with PD+OH have neuroimaging evidence for decreased sympathetic innervation in extracardiac organs has been much less clear. Studies with $^{123}$I-metaiodobenzylguanidine have indicated that in patients with PD, sympathetic denervation is confined to the heart (*4,5*). On the other hand, Li et al. obtained preliminary evidence for decreased 6-$^{18}$F-fluorodopamine–derived radioactivity in the thyroid gland and renal cortex of patients with PD (*6*).

This study had 2 purposes. The first was to assess the validity of 6-$^{18}$F-fluorodopamine scanning for visualization of sympathetic innervation in organs such as the liver, spleen, salivary glands, thyroid gland, and kidneys. The second was to examine whether patients with PD+OH or PAF have evidence of decreased sympathetic innervation in organs in which 6-$^{18}$F-fluorodopamine scanning was validated as a means of assessing sympathetic innervation.

To validate sympathetic neuroimaging by 6-$^{18}$F-fluorodopamine scanning, we tested the effects of oral desipramine treatment on the uptake and subsequent loss of 6-$^{18}$F-fluorodopamine–derived radioactivity in organs of healthy volunteers. Desipramine, a tricyclic antidepressant, is a classical inhibitor of neuronal uptake of catecholamines via the

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# “Confirmed”



Cardiac and Extracardiac Sympathetic Denervation in Parkinson's Disease with Orthostatic Hypotension and in Pure Autonomic Failure

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The uptake of 6-$^{18}$F-fluorodopamine by cardiac noradrenergic nerves enables visualization of the sympathetic innervation of the left ventricular myocardium by PET. Patients with Parkinson's disease (PD) and orthostatic hypotension (OH) (PD+OH) or with pure autonomic failure (PAF) have markedly decreased myocardial 6-$^{18}$F-fluorodopamine–derived radioactivity, consistent with cardiac sympathetic denervation, a phenomenon that neurochemical, neuropharmacologic, and, most recently, postmortem neuropathologic studies have confirmed. In this study, we examined whether 6-$^{18}$F-fluorodopamine can visualize sympathetic innervation in extracardiac organs and, if so, whether patients with PD+OH or PAF have neuroimaging evidence of extracardiac noradrenergic denervation. **Methods:** To validate the method, healthy volunteers underwent 6-$^{18}$F-fluorodopamine scanning of the head, thorax, and abdomen, with or without treatment with desipramine to block sympathoneural uptake of catecholamines. $^{13}$N-Ammonia scanning was used to address possible group differences in 6-$^{18}$F-fluorodopamine delivery by blood perfusion. **Results:** Desipramine treatment was associated with decreased 6-$^{18}$F-fluorodopamine–derived radioactivity in the heart, renal cortex, and thyroid gland but not in the liver, spleen, renal pelvis, or salivary glands. Both the PD+OH group and the PAF group had decreased 6-$^{18}$F-fluorodopamine–derived radioactivity in the heart ($P < 0.0001$) and renal cortex ($P = 0.02$ and $P = 0.005$, respectively). The PD+OH group also had decreased radioactivity in the thyroid gland ($P = 0.01$). Neither group had decreased radioactivity in the other organs, after correction for $^{13}$N-ammonia–derived radioactivity. **Conclusion:** 6-$^{18}$F-Fluorodopamine scanning visualizes sympathetic innervation in the heart, renal cortex, and thyroid gland. Both PD+OH and PAF involve decreased noradrenergic innervation that is most prominent in the heart but is also detectable in extracardiac organs.

**Key Words:** fluorodopamine; ammonia; pure autonomic failure; Parkinson's disease; PET

PET after intravenous injection of 6-$^{18}$F-fluorodopamine enables visualization of cardiac sympathetic innervation (*1*). It was previously reported that patients with Parkinson's disease (PD) and orthostatic hypotension (OH) (PD+OH) have remarkably decreased left ventricular myocardial concentrations of 6-$^{18}$F-fluorodopamine–derived radioactivity (*2,3*), with values similar to those in patients with pure autonomic failure (PAF). Whether patients with PD+OH have neuroimaging evidence for decreased sympathetic innervation in extracardiac organs has been much less clear. Studies with $^{123}$I-metaiodobenzylguanidine have indicated that in patients with PD, sympathetic denervation is confined to the heart (*4,5*). On the other hand, Li et al. obtained preliminary evidence for decreased 6-$^{18}$F-fluorodopamine–derived radioactivity in the thyroid gland and renal cortex of patients with PD (*6*).

This study had 2 purposes. The first was to assess the validity of 6-$^{18}$F-fluorodopamine scanning for visualization of sympathetic innervation in organs such as the liver, spleen, salivary glands, thyroid gland, and kidneys. The second was to examine whether patients with PD+OH or PAF have evidence of decreased sympathetic innervation in organs in which 6-$^{18}$F-fluorodopamine scanning was validated as a means of assessing sympathetic innervation.

To validate sympathetic neuroimaging by 6-$^{18}$F-fluorodopamine scanning, we tested the effects of oral desipramine treatment on the uptake and subsequent loss of 6-$^{18}$F-fluorodopamine–derived radioactivity in organs of healthy volunteers. Desipramine, a tricyclic antidepressant, is a classical inhibitor of neuronal uptake of catecholamines via the

- PD
- Orthostatic hypertension
- Autonomic failure
- Markedly decreased 6-F-fluorodopamine radioactivity
- EQUALS Cardiac sympathetic denervation

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BRIEF REPORT

# CARDIAC COHERENCE AND POSTTRAUMATIC STRESS DISORDER IN COMBAT VETERANS

Jay P. Ginsberg, PhD; Melanie E. Berry, MS; Donald A. Powell, PhD

**Background** • The need for treatment of posttraumatic stress disorder (PTSD) among combat veterans returning from Afghanistan and Iraq is a growing concern. PTSD has been associated with reduced cardiac coherence (an indicator of heart rate variability [HRV]) and deficits in early stage information processing (attention and immediate memory) in different studies. However, the co-occurrence of reduced coherence and cognition in combat veterans with PTSD has not been studied before.

**Primary Study Objective** • A pilot study was undertaken to assess the covariance of coherence and information processing in combat veterans. An additional study goal was assessment of effects of HRV biofeedback (HRVB) on coherence and information processing in these veterans.

**Methods/Design** • A two-group (combat veterans with and without PTSD), pre-post study of coherence and information processing was employed with baseline psychometric covariates.

**Setting** • The study was conducted at a VA Medical Center outpatient mental health clinic.

**Participants** • Five combat veterans from Iraq or Afghanistan with PTSD and five active-duty soldiers with comparable combat exposure who were without PTSD.

**Intervention** • Participants met with an HRVB professional once weekly for 4 weeks and received visual feedback in HRV patterns while receiving training in resonance frequency breathing and positive emotion induction.

**Primary Outcome Measures** • Cardiac coherence, word list learning, commissions (false alarms) in go–no go reaction time, digits backward.

**Results** • Cardiac coherence was achieved in all participants, and the increase in coherence ratio was significant post-HRVB training. Significant improvements in the information processing indicators were achieved. Degree of increase in coherence was the likely mediator of cognitive improvement.

**Conclusion** • Cardiac coherence is an index of strength of control of parasympathetic cardiac deceleration in an individual that has cardinal importance for the individual's attention and affect regulation.

**Invited Reviews for the 2008 Hirosi Kuriyama Award**

# Pathophysiology underlying irritable bowel syndrome —From the viewpoint of dysfunction of autonomic nervous system activity—

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**Abstract**

Although irritable bowel syndrome (IBS) is the most common gastrointestinal disease and is found in up to 50% of patients referred to gastroenterologists, its pathogenesis remains unexplained. Lately most attention has been focused on visceral hypersensitivity related to dysfunction of the autonomic nervous system. Although there have been many reports regarding the autonomic nervous system in IBS patients, the results have not always been consistent. In many studies, increased sympathetic nervous system activity and decreased parasympathetic nervous system activity have been the most frequently noted differences when IBS patients are compared with healthy controls. There are also some differences among IBS symptom subgroups and some differences between men and women. Data from previous studies have been inconsistent, with complicating factors resulting in difficulties in classification and the possibility of multiple physiological pathways for a similar symptom picture. Further studies based on the Rome III criteria are required to evaluate whether or not autonomic functions significantly differ from each other. However, although there are many methods of measurement for evaluation of the autonomic nervous system, there are few of these methods that are not only accurate but also cost-effective, non-invasive, and easy to

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# 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.

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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.

# 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.

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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.

Available online at www.sciencedirect.com

Integrative Medicine Research

journal homepage: www.imr-journal.com

Review Article

# The Kaleidoscope Model of Integrative Healthcare as a collaborative paradigm for cardiology and chiropractic: a call to action

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ABSTRACT

This review article proposes a model of integrative care for cardiovascular patients in institutional settings. We review relevant historic and contemporary examples of medical–chiropractic cooperation and a brief review of the literature illustrating the clinical benefits of chiropractic care for patients with cardiovascular disease. The groundwork proposes a distinct research and clinical practice model incorporating the doctor of chiropractic (D.C.) as a synergistic partner with the medical cardiologist coined the Kaleidoscope Model of Integrative Care (KM). While a traditional kaleidoscope does not alter the nature of light itself, the observer does see the 'raw data' of colors and shapes, wavelengths, etc. contained within the "potential" of the light itself; left unrecognized, even subtle re-orientations of the instrument changes the perspective. Similarly, the KM is intended as a conduit for slight reorientations to traditional medical–chiropractic–patient hierarchies, thus creating new treatment options and generating robust changes in inter-professional perception of the patient's condition(s) and treatment options. It is hoped that this model will not only serve future patients within hospitals, but that institutions will serve as incubators for better collaboration and research among the majority of free-standing medical and chiropractic practices ultimately benefitting the patient with cardiovascular disease.

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## 5. The basis of chiropractic to cardiovascular physiology

Several biologically plausible mechanisms exist by which the chiropractic adjustment may ameliorate arterial hypertension and connections between chiropractic and heart function. The vagus nerve exits the skull at the jugular foramen in close proximity to the atlanto-occipital joint; therefore, correction of atlanto-occipital subluxation (as defined in this context by chiropractic[51]) and/or cranial dysfunction may assist the body in regulating the heart's parasympathetic tone and may disturb vagus innervation to the aortic and carotid baroreceptors. These preganglionic fibers synapse at the superior cervical, middle cervical, and stellate ganglia; therefore, correction of cervical and/or thoracic subluxation can help regulate the sympathetic tone of the heart and great vessels. Additionally, virtually all vessels (other than capillaries) receive sympathetic innervations to the smooth muscle within the tunica media. Sympathetic outflow is from the thoracolumbar region and synapses anywhere within the paravertebral chain (from the upper cervical spine to the coccyx). The regulation of vasomotor tone, in essence, can plausibly be threatened by chiropractic subluxation anywhere in the vertebral column.

A number of well-documented risk factors for myocardial infarction and stroke could plausibly be disrupted by disturbed tone related to chiropractic subluxation. Sacco et al concluded arterial hypertension is the single most important modifiable risk factor for stroke.[52] The Framingham Study's establishment of a definitive relationship between hypertension and stroke is now well-known.[53] The risk of stroke is increased 3–5 times with hypertension and could be as high as 8 times higher, depending on the severity of the hypertension.[54] Studies also show that treating hypertension lowers stroke risk. A meta-analysis by Lewington et al links arterial hypertension to death from myocardial infarction as well as stroke in middle and old age.[55] Chen et al found arterial hypertension to be an independent risk factor for death from myocardial

infarction, hypertension and prior stroke in survivors of previous myocardial infarction,[56] and Thune et al found that antecedent hypertension independently increased the risk of heart failure.[57]

## 6. Clinical research in chiropractic and cardiovascular physiology

A number of clinical studies indicate that chiropractic adjustments can reduce systolic and diastolic blood pressure in patients with hypertension. Plaugher and Bachman published an instructive case study involving a 38-year-old man with a 14-year history of hypertension and visceral side-effects from the medication.[58] Chiropractic care centered on adjustments of mid-cervical, upper thoracic, and mid-thoracic vertebral subluxations. Medications were stepped down; at publication, the patient's blood pressure had stabilized at normal levels without medication and with abatement of all presenting symptoms. Connelly and Rasmussen presented a case series of hypertensive patients under chiropractic care,[59] exhibiting a substantial reduction in systolic and diastolic blood pressure along with reduced need for medication.

Beyond these case reports and case series, a number of clinical studies have been published. Six chiropractic students with blood pressures of at least 140/90 mm/Hg received chiropractic adjustments for correction of dysfunctional occipito-mastoid suture mechanics.[60] Four other hypertensive students were not adjusted. Post-adjustment, there was a mean decrease of 10 mm/Hg in the experimental subjects' systolic pressure, with no change in control and with statistical significance. In another pilot, 21 patients with hypertension were randomly assigned to active treatment, placebo treatment, and control groups.[61] The active treatment subjects were adjusted to correct subluxated levels between T1 and T5. Both systolic and diastolic blood pressures were reduced after intervention to a statistically significant degree with no statistically significant change in the placebo or control groups. Win et al have also suggested that heart rate variability and blood pressure in patients with cervicalgia has different sympathetic/parasympathetic dominances depending on the spinal level being treated.[62]

Recently, Bakris et al undertook an eight-week interdisciplinary study with the cooperation of the Pritzker School of Medicine, University of Chicago.[63] Both the setting and the fastidious protocol make this the most promising study of its type to date. This study included 50 patients with hypertension who were either taking no antihypertensive drugs or underwent a 2-week drug-free "washout" period. The subjects were randomly assigned to a treatment group or a control group. Subjects in the treatment group received atlas adjustments as indicated, while control subjects received a sham procedure. Investigators performing blood pressure measurements were blinded as to whether the patient belonged to the control or treatment group. At 8 weeks, the treatment group demonstrated a mean decrease in systolic blood pressure of 17 mmHg, compared to 3 mmHg for the control group. Diastolic blood pressure decreased a mean of 10 mmHg in the treatment group, compared to 2 mmHg for the controls. The difference between groups was statistically significant for both systolic and diastolic blood pressure. Furthermore, the magnitude of the blood pressure improvement in the treatment group was similar to the results generally seen when two antihypertensive drugs are used simultaneously. None of the patients in the study were complaining of musculoskeletal pain at the time.

Hyperaldosteronism is a risk factor for arterial hypertension and heart failure,[64] and there is also robust interaction between respiratory and cardiovascular function. A study of 1270 men at the Veterans Administration Outpatient Clinic in Boston, Massachusetts found a statistically significant inverse correlation between forced vital capacity (FVC) at the initiation of the study and arterial hypertension at 10 years of follow-up.[65]

Most importantly, chiropractic adjustments can positively impact on volumes and further reduce risk factors for future cardiovascular events. Several studies show that FVC and/or FEV-1 improve under chiropractic care,[66–70] and there has been a correlation between both FVC and forced expiratory volume in one second (FEV-1) on the one hand and the risk of stroke on the other as well as impaired ventilatory function and stroke possibly sharing a common causes.[71] Additionally, Waks et al found an association between abnormal heart rate variability (HRV) and sudden cardiac death in patients with end stage renal disease.[72] HRV is often used to monitor the state of autonomic innervation to the heart. Apropos of the current discussion, there are several studies in which HRV improved under chiropractic care.[73–77] These data suggest that chiropractic care can potentially improve the autonomic dysfunction resulting in heart failure, hypertension, and sudden cardiac death and that chiropractic care would be beneficial for patients with cardiovascular disease.

## 7. Proposal of implementation

To address these issues with the KM so that robust changes in inter-professional perception of the patient's condition and options for treatment are successful, the features expected to evolve in time will initially include several tenets:

1. *To the maximum degree possible, hospital rounds and patient consultations will involve both medical and chiropractic practitioners.* It is critically important that chiropractic not be seen strictly through the medical lens and equally important that conventional medicine not be seen strictly through the 'alternative' lens of chiropractic. In effect, the kaleidoscopic lens of the KM can be subtly rotated to compliment medical and/or chiropractic insights, thus embracing both disciplines simultaneously in rounds and consultations and helping synergistic partners for the patient's benefit.
2. *Medical and chiropractic practitioners will have frequent opportunities to observe each other's procedures.* This is essential to enhance synergy between the professions. Medical cardiologists are not expected to conduct a chiropractic examination and adjustment, but they should have an understanding of how this appears when performed by an expert practitioner. Likewise, chiropractic practitioners will never perform surgical or medical procedures, but their

# Pulmonary Effects

Miller

Menon

Masarsky & Weber

Kessinger

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# 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.

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# 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% in-crease 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.

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

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*Article*

# Translational and Rotational Postural Aberrations Are Related to Pulmonary Functions and Skill-Related Physical Fitness Components in Collegiate Athletes

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**Abstract:** This study assessed the relationship between body posture displacements, cardiopulmonary exercise testing (CPET), and skill-related physical fitness tests. One hundred male (60%) and female collegiate athletes (22.2 ± 4 yrs) with normal body mass indexes (BMI up to 24.9) were assessed via the PostureScreen Mobile® app to quantify postural displacements such as head, thorax, and pelvis rotations and translations. CPET and physical performance tests, including the agility *t*-test, vertical jump test, stork static balance test (SSBT), and dynamic Y-balance test (YBT), were performed. Spearman correlation (r) and *p*-values are reported. The postural parameters were found to have moderate-to-high associations with the CPET and agility test, moderate correlations with the vertical jump test and SSBT (head and pelvic postures only), and weak correlations with the YBT. As the postural parameters were more asymmetric, both the CPET and performance skills scores were worse. For example: (1) a medium positive correlation was found between cranio-vertebral angle (CVA) and the vertical jump test ($r = 0.54$; $p$-value $< 0.001$) and SSBT ($r = 0.57$; $p$-value $< 0.001$), while a strong negative correlation was found between CVA and the agility test ($r = -0.86$; $p$-value $< 0.001$). (2) A strong positive correlation was found between CVA and oxygen uptake efficiency slope, load watts VO2 at VT, VO2/kg, and load watts at the respiratory compensation point (RCP) ($r = 0.65$ and $r = 0.71$; $p < 0.001$). Conversely, a significant negative correlation was found between CVA and VE/VO2 at VT ($r = -0.61$; $p < 0.001$). Postural rotations and translations of the head, thorax, and pelvis were statistically correlated with the physical performance skills and CPET in the young collegiate athletes. There were moderate-to-high associations with cardiopulmonary functions and the agility tests, moderate correlations with the vertical jump test, and weak correlations with the YBT. Postural alignment may be important for optimal physical performance and optimal cardiopulmonary function. Further research is necessary to elucidate the reasons for these correlations found in our sample of young and healthy athletes.

**Keywords:** posture; athletic performance; athletes; cardiopulmonary performance

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## 1. Introduction

Athletic performance is influenced by various factors such as strength, endurance, and skill [1–3]. However, postural alignment is often overlooked, despite being a critical component in optimal performance [4,5]. Proper posture is essential for athletes to perform



This study assessed the relationship between body posture displacements, cardiopulmonary exercise testing (CPET), and skill-related physical fitness tests.

One hundred male (60%) and female collegiate athletes.

Quantified postural displacements such as head, thorax, and pelvis rotations and translations.

CPET and physical performance tests, including the agility t-test, vertical jump test, stork static balance test (SSBT), and dynamic Y-balance test (YBT), were performed.

Postural rotations and translations of the head, thorax, and pelvis were statistically correlated with the physical performance skills and CPET in the young collegiate athletes.

Postural alignment may be important for optimal physical performance and optimal cardiopulmonary
function.


Asthma
Genetic
Bronchial
Attack
Chronic
Lungs
Disease
Problems
Treatment
Inflammatory
Symptoms
Triggers
Environmental Factors
Corticosteroids
Air Pollution
Diagnosis
Breathing

- Resolution of Asthma and other Functional Disorders Following Chiropractic Care to Reduce Vertebral Subluxations in a Nine Year Old Male: A Case Report. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2018

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- Improvement in a Pediatric Patient with Neurofibromatosis Type 1 and Asthma: A Case Report. Journal of Pediatric, Maternal & Family Health Chiropractic, Volume 2011

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# Adaptability

- Vertebral Subluxation Epidemiology
- Maladaptive Responses to Vertebral Subluxation
- Dysautonomia, VS & Adaptability

Foundation for Vertebral Subluxation

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Review

# Biological pathways to adaptability – interactions between genome, epigenome, nervous system and environment for adaptive behavior

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**Because living systems depend on their environment, the evolution of environmental adaptability is inseparable from the evolution of life itself (Pross 2003). In animals and humans, environmental adaptability extends further to adaptive behavior. It has recently emerged that individual adaptability depends on the interaction of adaptation mechanisms at diverse functional levels. This interaction enables the integration of genetic, epigenetic and environmental factors for coordinated regulation of adaptations. In this review, we first present the basis for the regulation of adaptation mechanisms across functional levels. We then focus on neuronal activity-regulated adaptation mechanisms that involve the regulation of genes, noncoding DNA (ncDNA), ncRNAs and proteins to change the structural and functional properties of neurons. Finally, we discuss a selection of these important neuronal activity-regulated molecules and their effects on brain structure and function and on behavior. Most of the evidence so far is based on sampling of animal tissue or post-mortem studies**

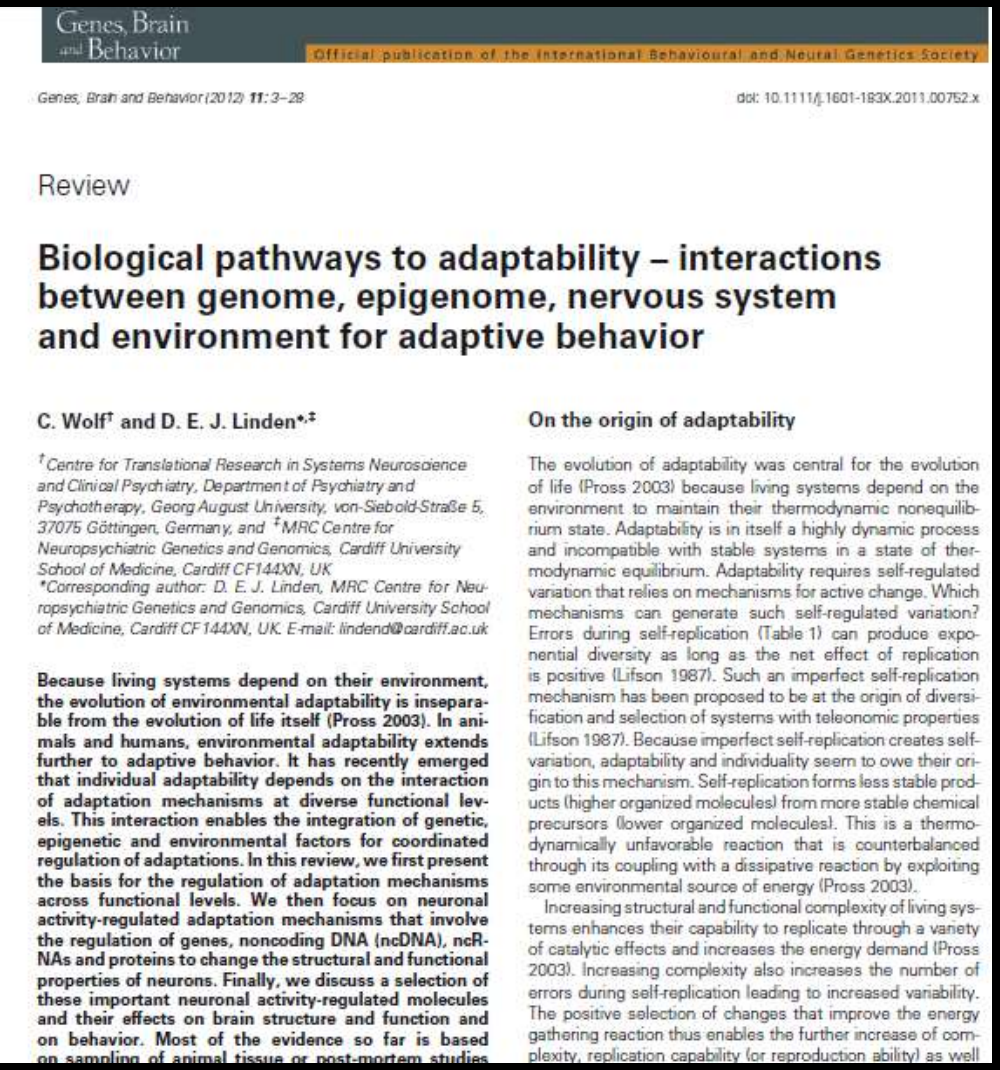
## On the origin of adaptability

The evolution of adaptability was central for the evolution of life (Pross 2003) because living systems depend on the environment to maintain their thermodynamic nonequilibrium state. Adaptability is in itself a highly dynamic process and incompatible with stable systems in a state of thermodynamic equilibrium. Adaptability requires self-regulated variation that relies on mechanisms for active change. Which mechanisms can generate such self-regulated variation? Errors during self-replication (Table 1) can produce exponential diversity as long as the net effect of replication is positive (Lifson 1987). Such an imperfect self-replication mechanism has been proposed to be at the origin of diversification and selection of systems with teleonomic properties (Lifson 1987). Because imperfect self-replication creates self-variation, adaptability and individuality seem to owe their origin to this mechanism. Self-replication forms less stable products (higher organized molecules) from more stable chemical precursors (lower organized molecules). This is a thermodynamically unfavorable reaction that is counterbalanced through its coupling with a dissipative reaction by exploiting some environmental source of energy (Pross 2003).

Increasing structural and functional complexity of living systems enhances their capability to replicate through a variety of catalytic effects and increases the energy demand (Pross 2003). Increasing complexity also increases the number of errors during self-replication leading to increased variability. The positive selection of changes that improve the energy gathering reaction thus enables the further increase of complexity, replication capability (or reproduction ability) as well

Foundation for Vertebral Subluxation

# Adaptation Mechanisms



Genes, Brain and Behavior

Official publication of the International Behavioural and Neural Genetics Society

Genes, Brain and Behavior (2012) 11: 3–28

doi: 10.1111/j.1601-183X.2011.00752.x

Review

## Biological pathways to adaptability – interactions between genome, epigenome, nervous system and environment for adaptive behavior

C. Wolf† and D. E. J. Linden*,‡

†Centre for Translational Research in Systems Neuroscience and Clinical Psychiatry, Department of Psychiatry and Psychotherapy, Georg August University, von-Siebold-Straße 5, 37075 Göttingen, Germany, and ‡MRC Centre for Neuropsychiatric Genetics and Genomics, Cardiff University School of Medicine, Cardiff CF144XN, UK

*Corresponding author: D. E. J. Linden, MRC Centre for Neuropsychiatric Genetics and Genomics, Cardiff University School of Medicine, Cardiff CF144XN, UK. E-mail: lindend@cardiff.ac.uk

**Because living systems depend on their environment, the evolution of environmental adaptability is inseparable from the evolution of life itself (Pross 2003). In animals and humans, environmental adaptability extends further to adaptive behavior. It has recently emerged that individual adaptability depends on the interaction of adaptation mechanisms at diverse functional levels. This interaction enables the integration of genetic, epigenetic and environmental factors for coordinated regulation of adaptations. In this review, we first present the basis for the regulation of adaptation mechanisms across functional levels. We then focus on neuronal activity-regulated adaptation mechanisms that involve the regulation of genes, noncoding DNA (ncDNA), ncRNAs and proteins to change the structural and functional properties of neurons. Finally, we discuss a selection of these important neuronal activity-regulated molecules and their effects on brain structure and function and on behavior. Most of the evidence so far is based on sampling of animal tissue or post-mortem studies**

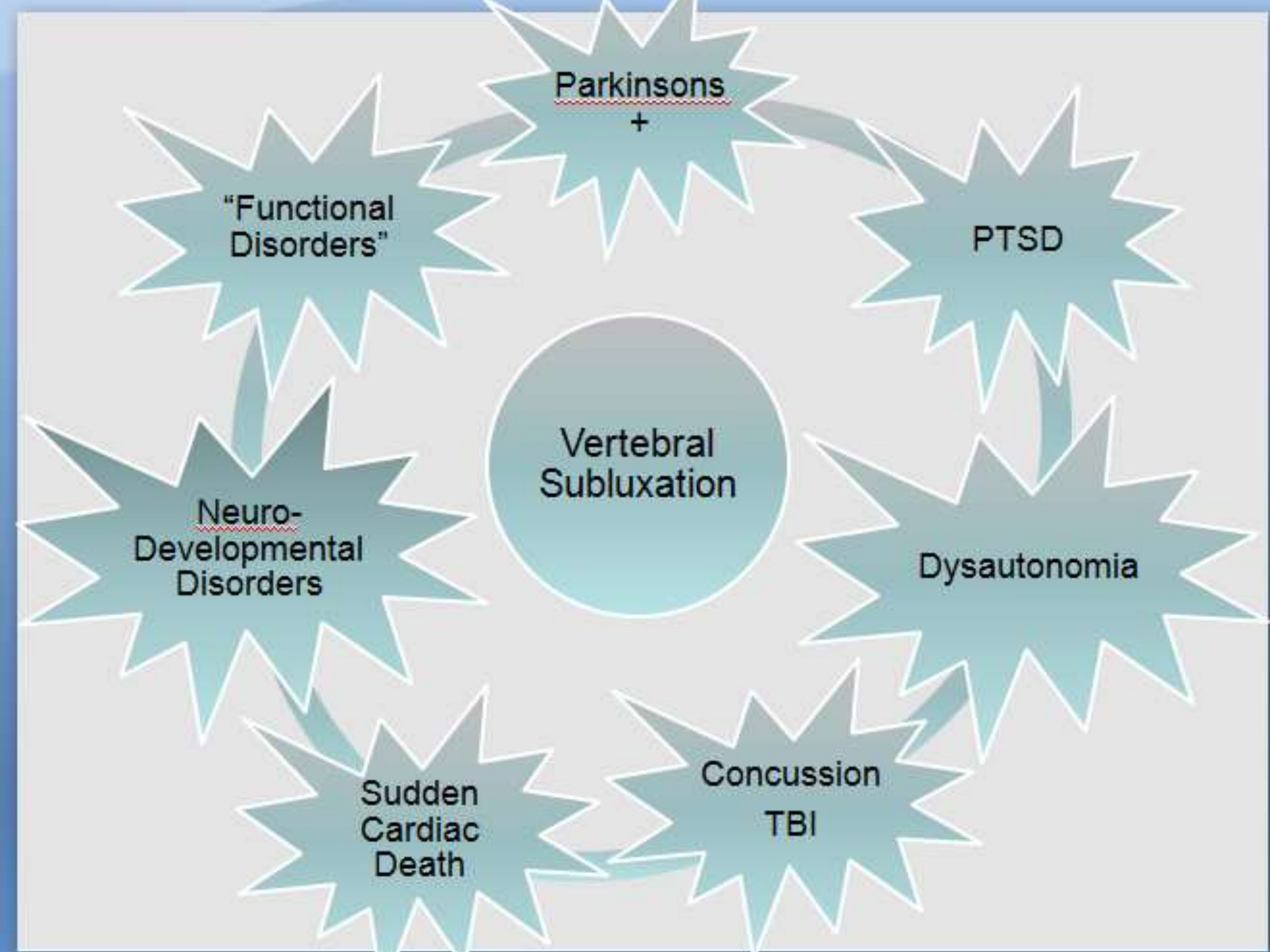
### On the origin of adaptability

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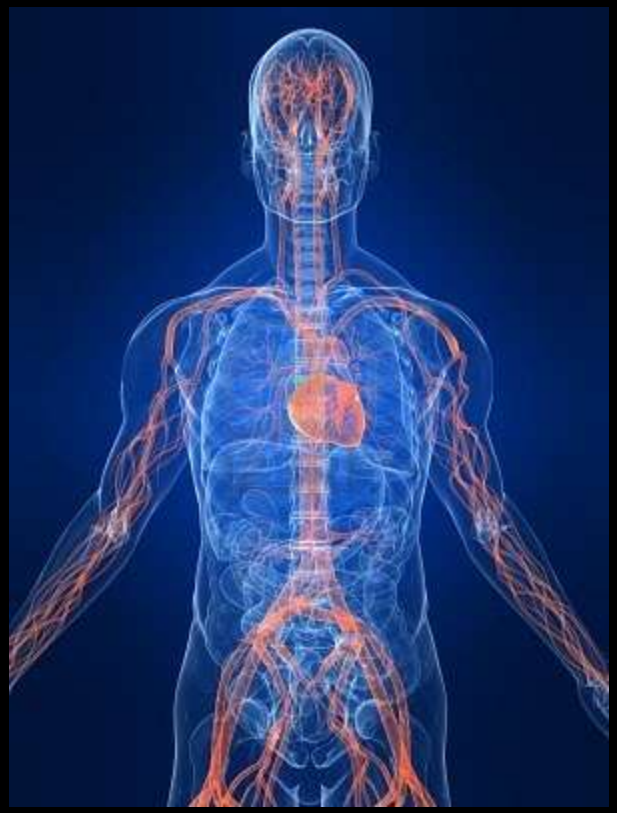
Increasing structural and functional complexity of living systems enhances their capability to replicate through a variety of catalytic effects and increases the energy demand (Pross 2003). Increasing complexity also increases the number of errors during self-replication leading to increased variability. The positive selection of changes that improve the energy gathering reaction thus enables the further increase of complexity, replication capability (or reproduction ability) as well

Neuronal activity-dependent adaptation mechanisms integrate genetic, epigenetic and experience-dependent signals.

Foundation for Vertebral Subluxation


Parkinsons
+
"Functional Disorders"
PTSD
Vertebral Subluxation
Neuro-Developmental Disorders
Dysautonomia
Sudden Cardiac Death
Concussion
TBI

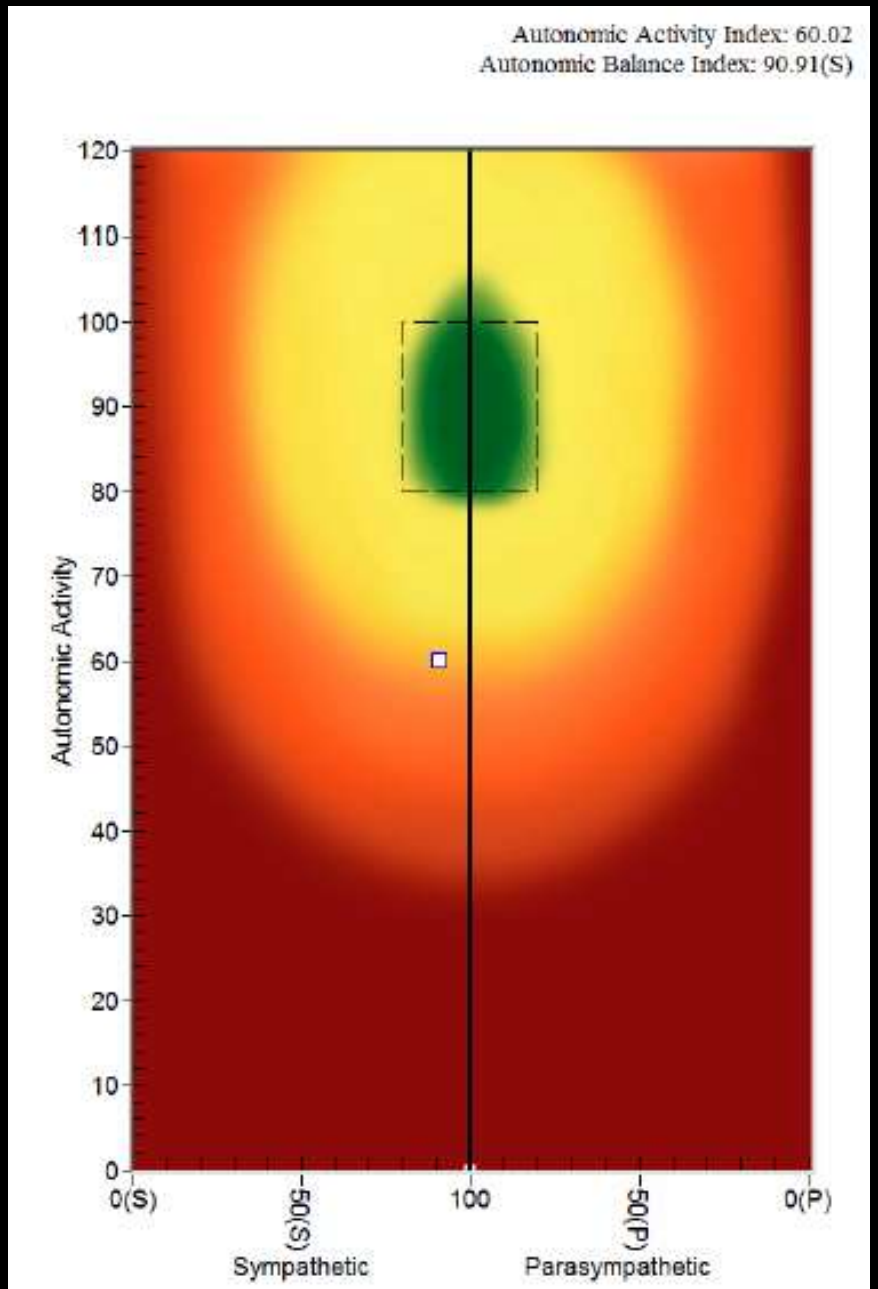
# DYSAUTONOMIA



- Thermography
- Heart Rate Variability

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# Neuropathophysiology – Abnormal - HRV

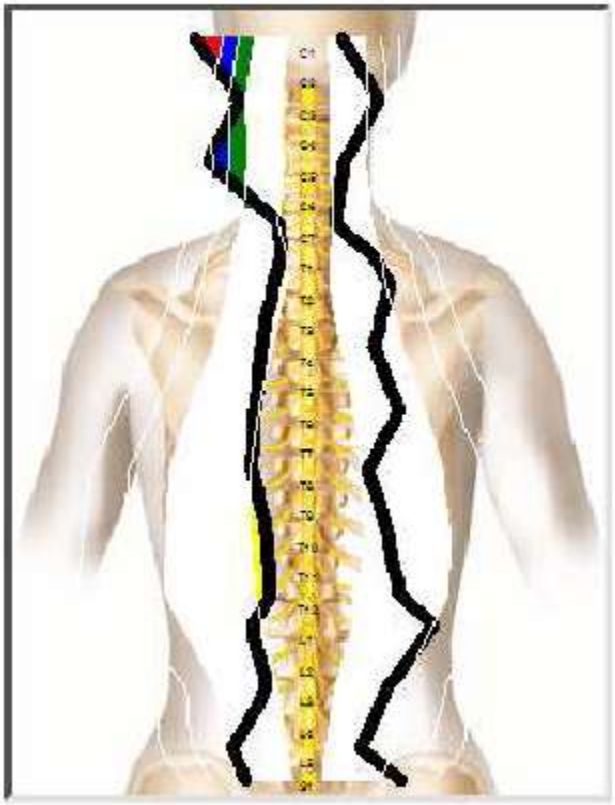



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# Metrics

Static EMG Scan Pattern Graph on (04/20/2009 05:07 PM)

Position: Seated  Action: Neutral



**Pattern:**
**68.63**

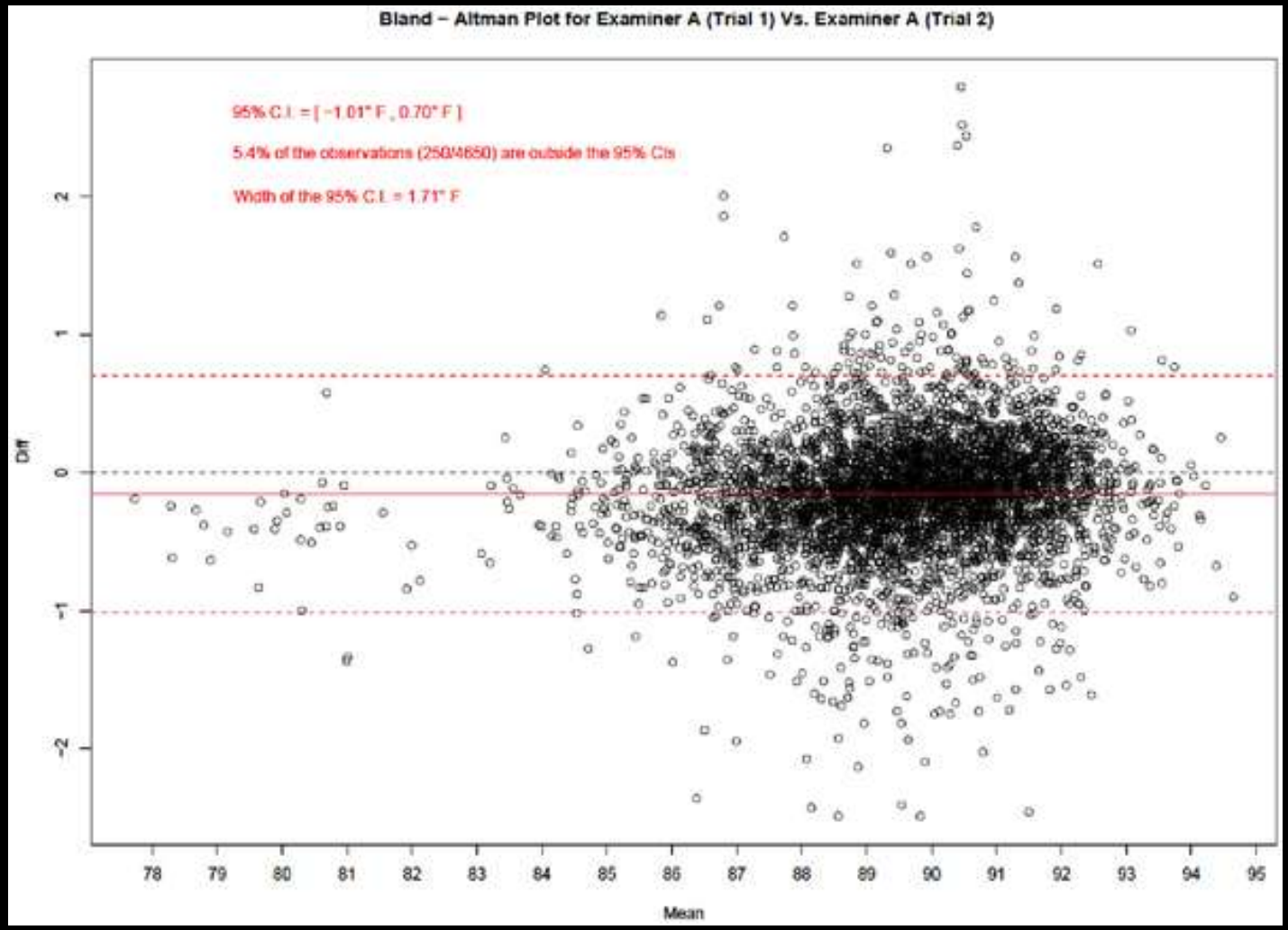
**Symmetry:**
**51.21**

**Total Energy:**
**35.47**

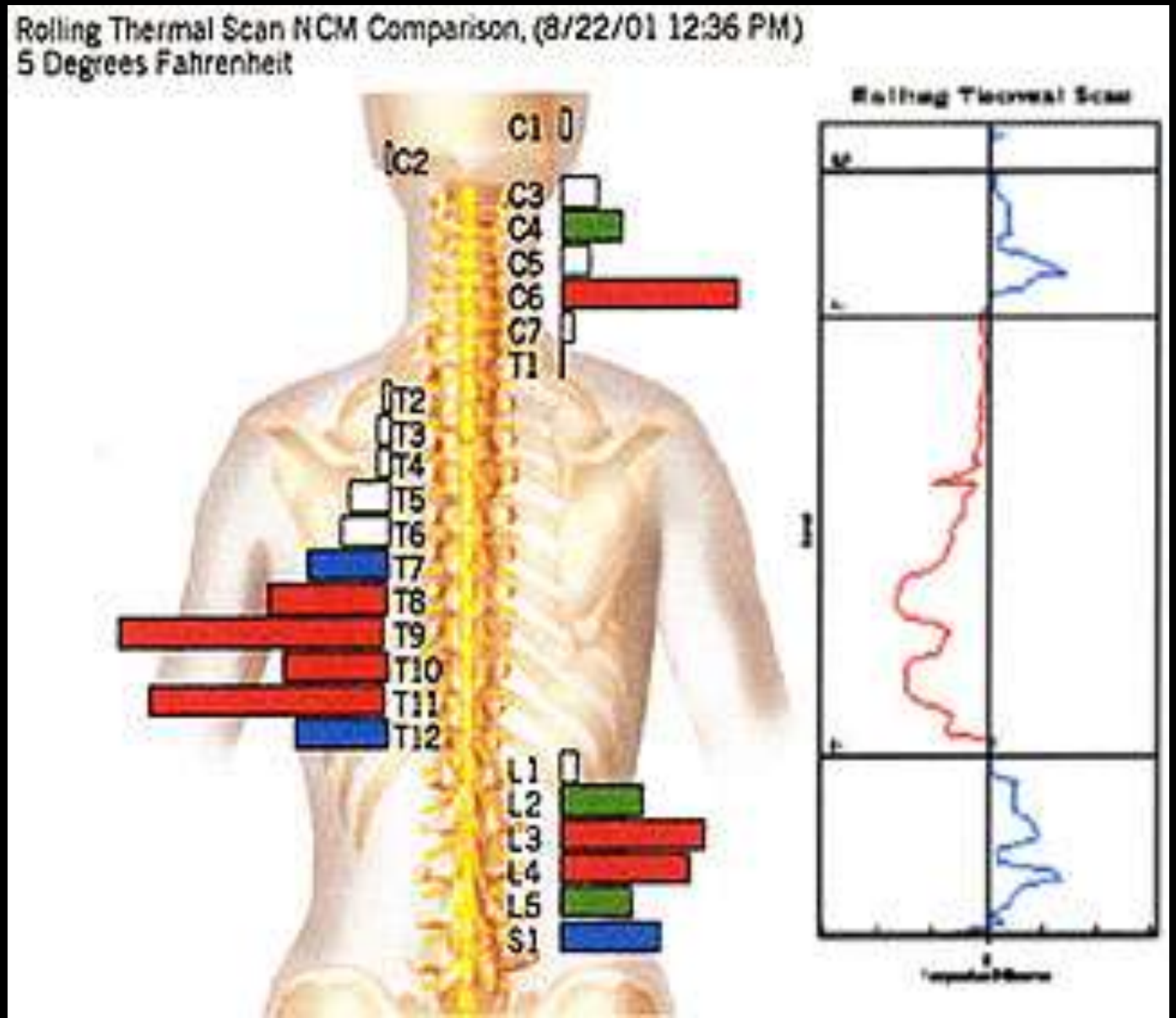
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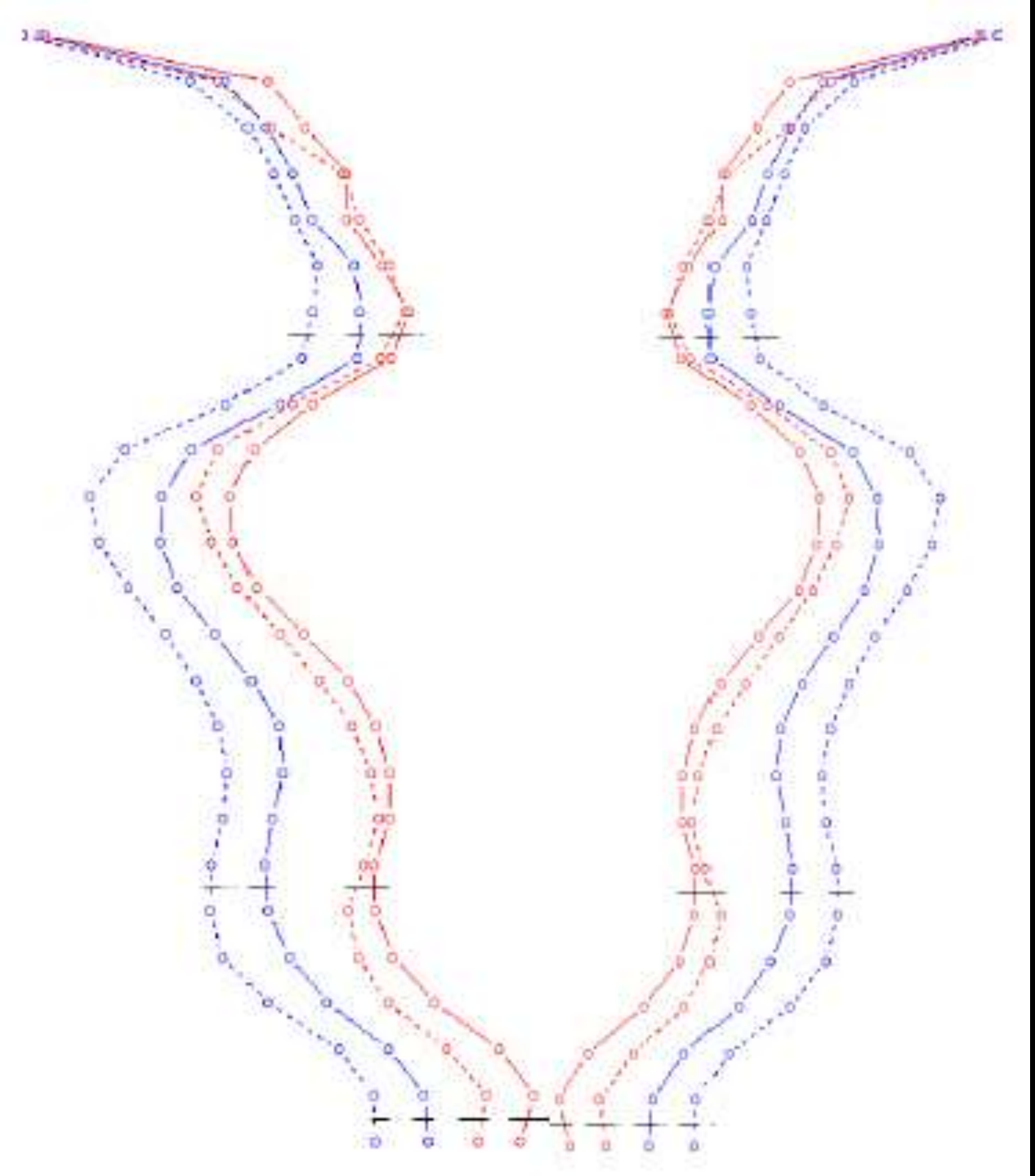
# Thermal Scanning

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# Neuropathophysiology - Abnormal



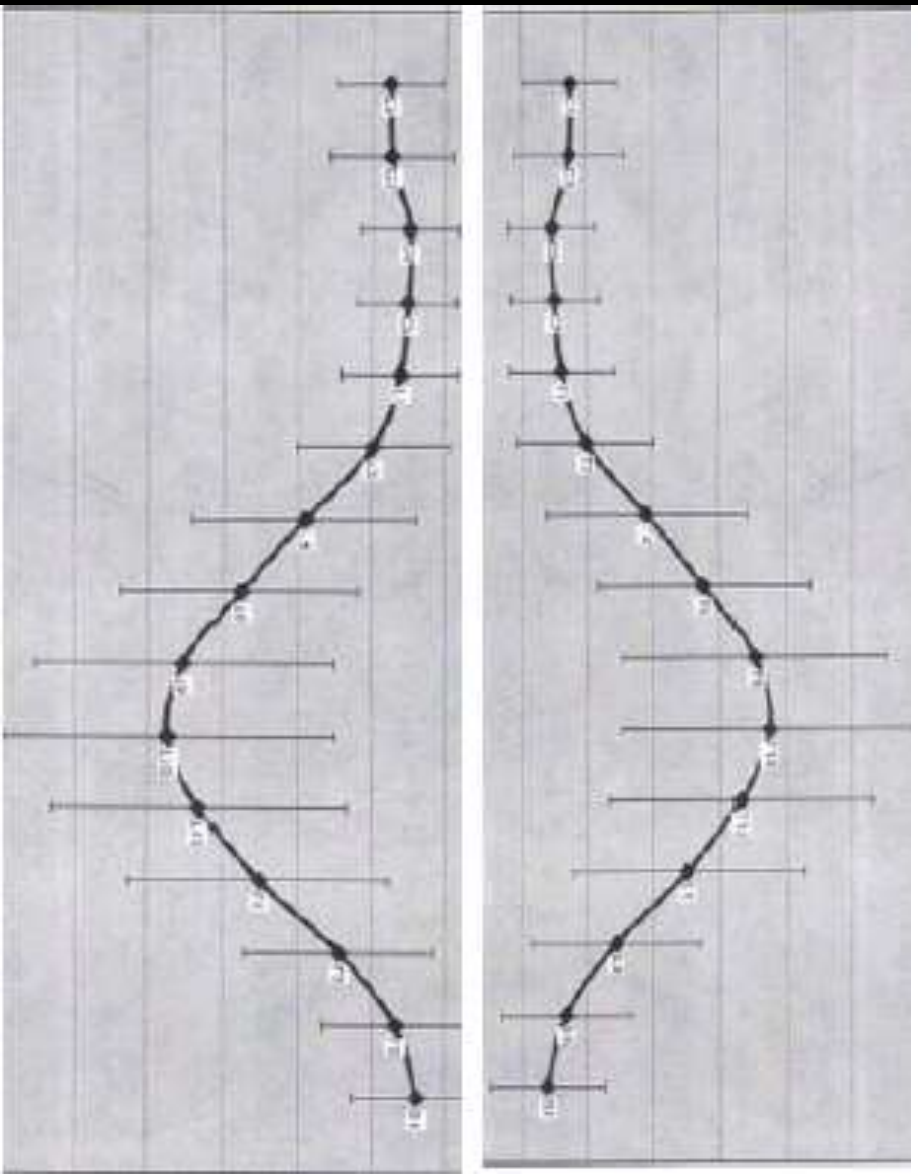


# Normal Pattern - Therms

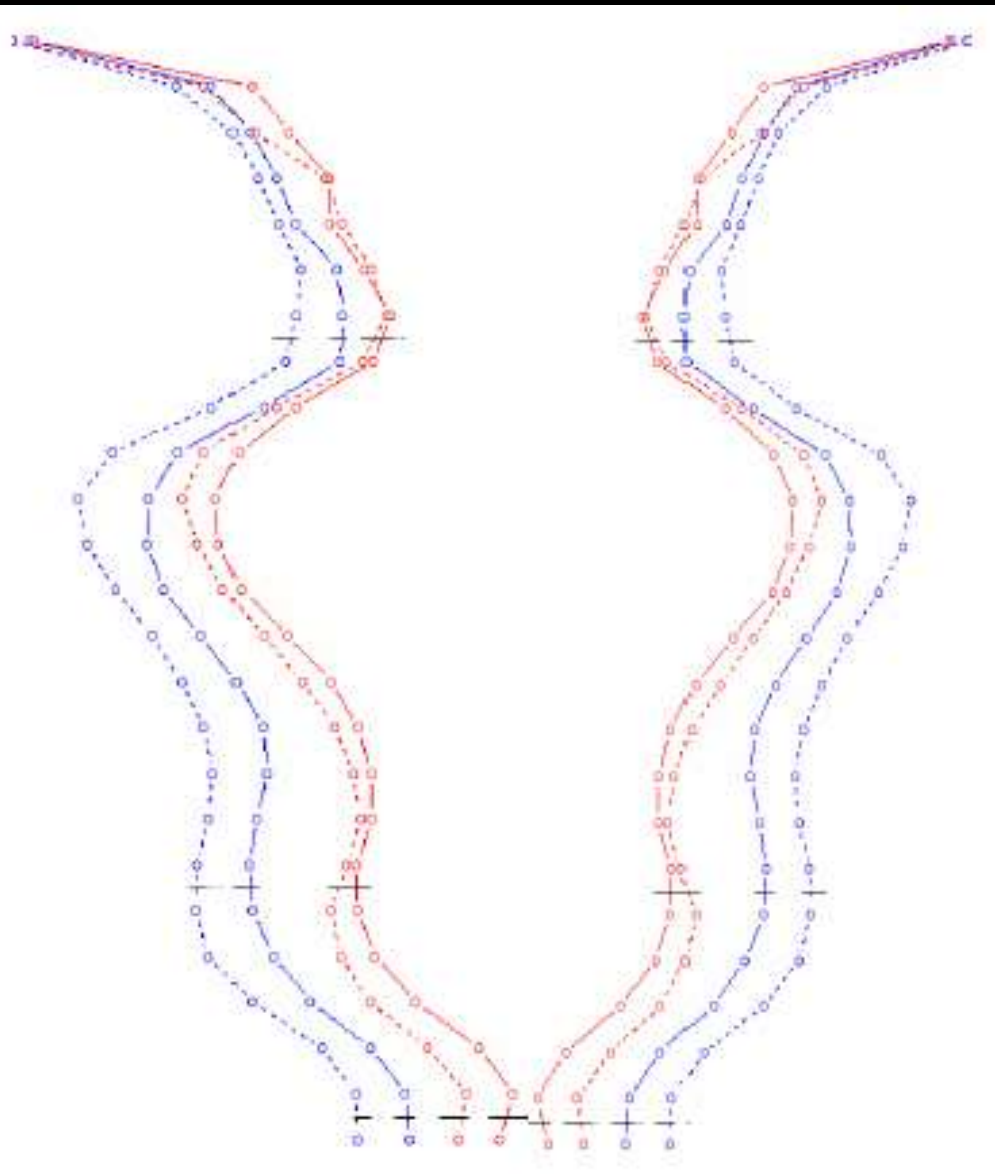
Foundation for Vertebral Subluxation

# Where is this Taking Us?

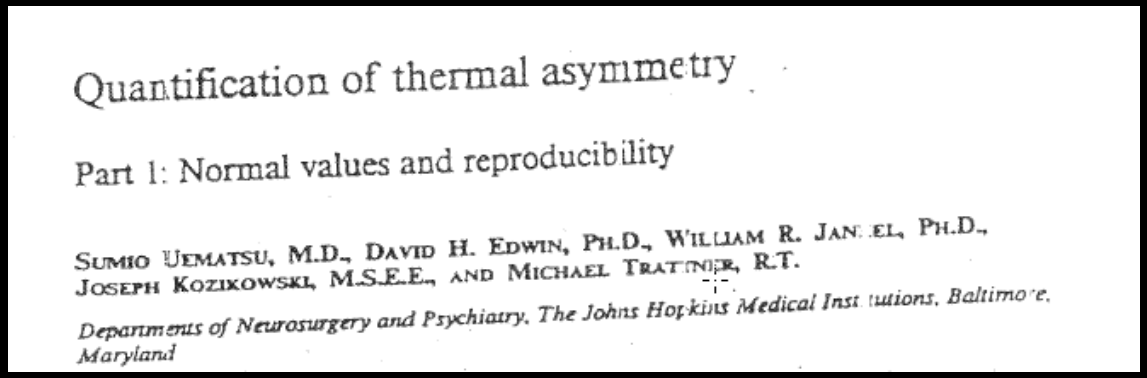
SEMG Normal



Thermal Normal



# UEMATSU, et al.



Quantification of thermal asymmetry

Part 1: Normal values and reproducibility

SUMIO UEMATSU, M.D., DAVID H. EDWIN, PH.D., WILLIAM R. JANNETTA, PH.D., JOSEPH KOZIKOWSKI, M.S.E.E., AND MICHAEL TRATTNER, R.T.

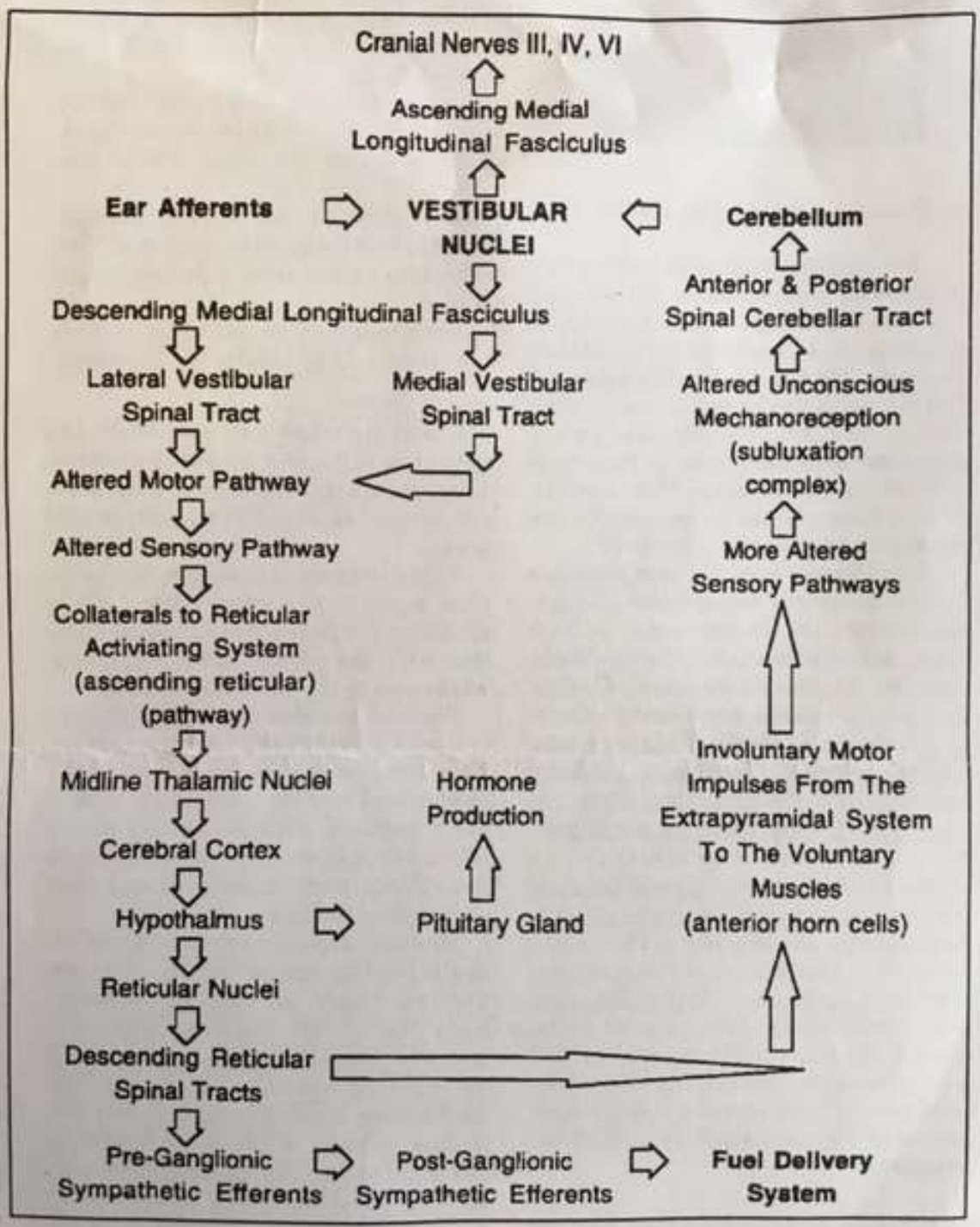
*Departments of Neurosurgery and Psychiatry, The Johns Hopkins Medical Institutions, Baltimore, Maryland*

Measured temperature differences in 40 matched regions in 90 healthy subjects.

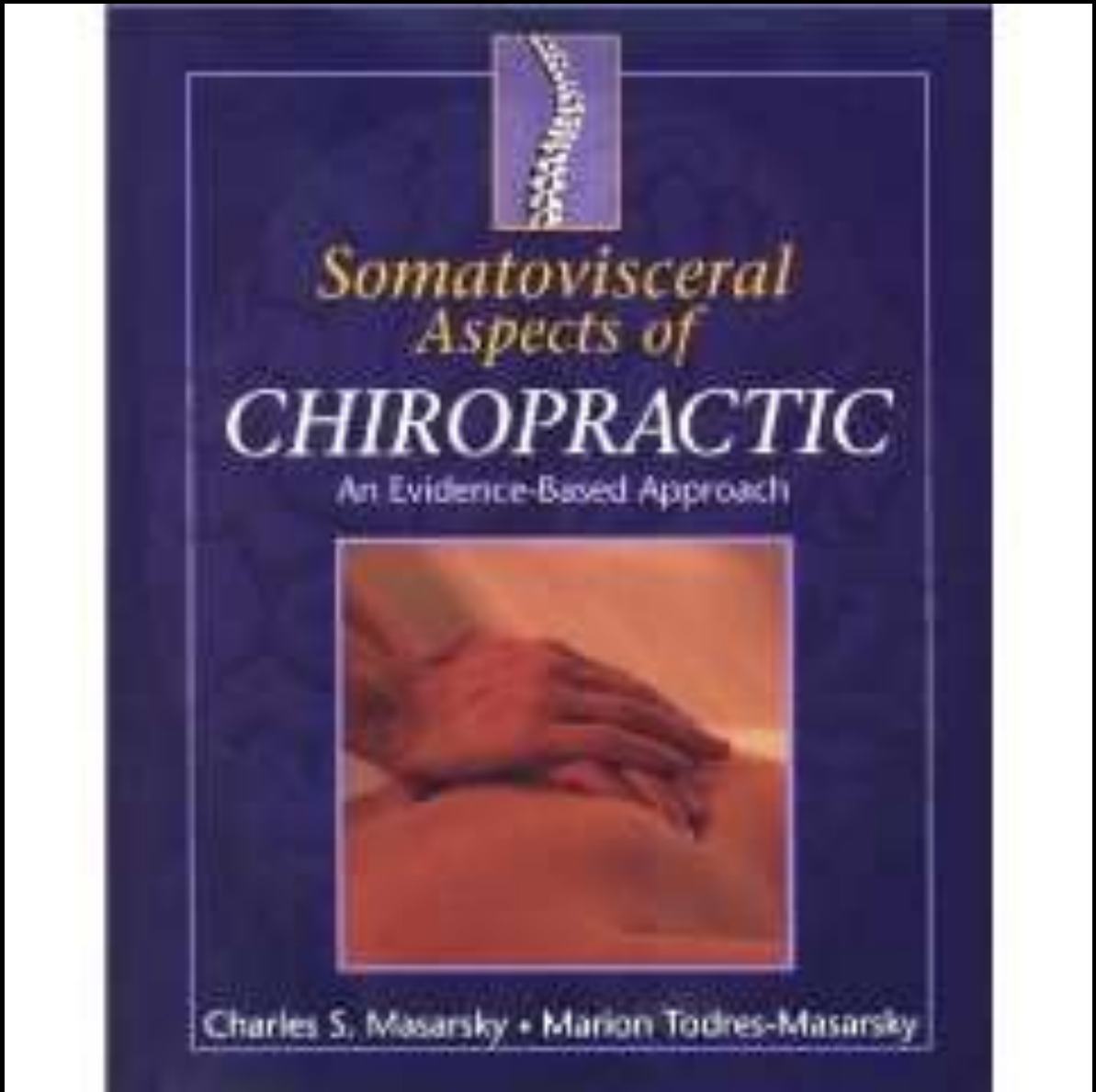
CONCLUSION:

"These values can be used as a standard in assessment of sympathetic nerve function, and the degree of asymmetry is a quantifiable indicator of dysfunction."

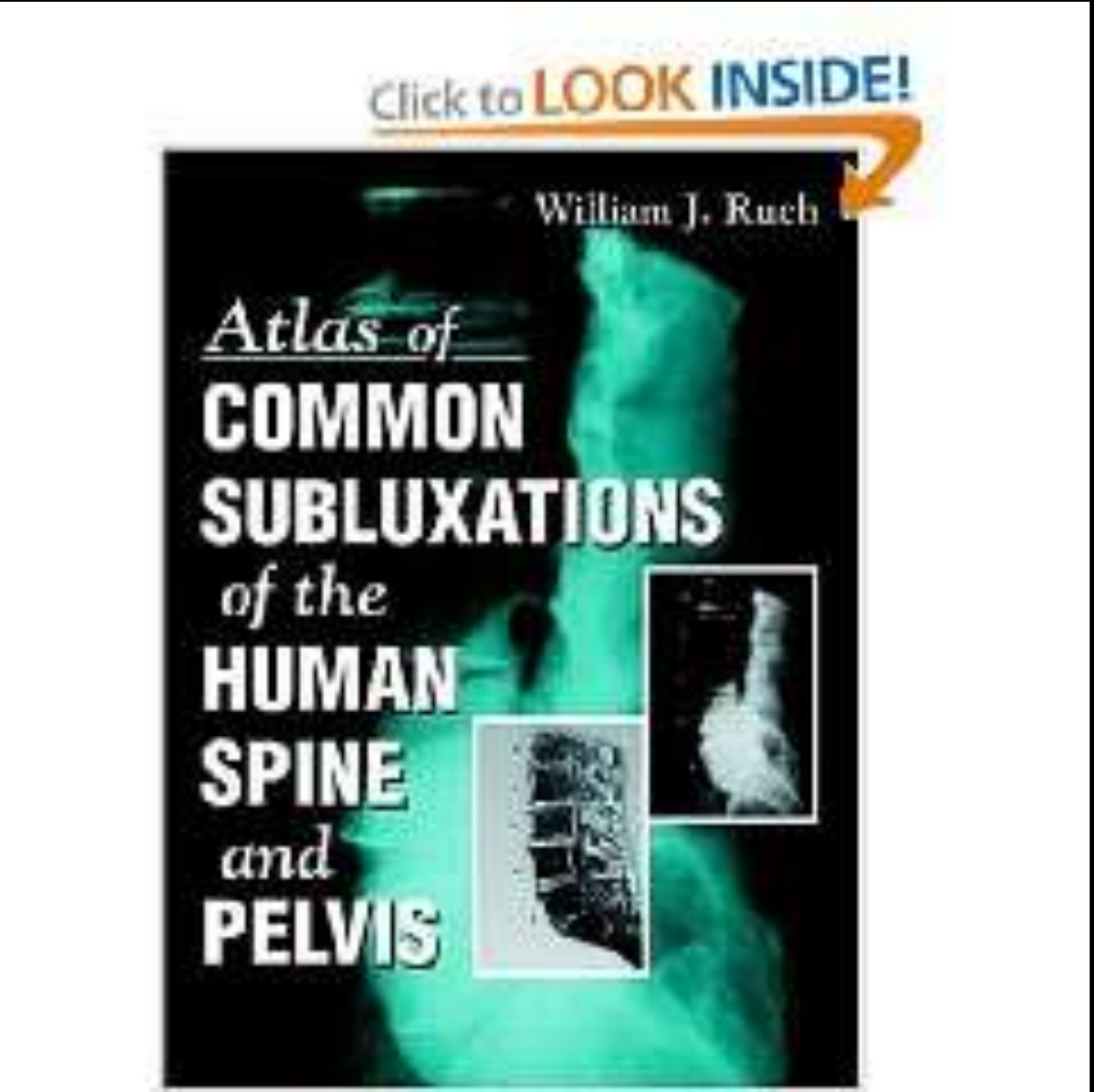
*Uematsu, et al.: Quantification of Thermal Asymmetry. J. Neurosurg. Oct. 1988.*


Cranial Nerves III, IV, VI
Ascending Medial Longitudinal Fasciculus
Ear Afferents
VESTIBULAR NUCLEI
Cerebellum
Descending Medial Longitudinal Fasciculus
Anterior & Posterior Spinal Cerebellar Tract
Lateral Vestibular Spinal Tract
Medial Vestibular Spinal Tract
Altered Unconscious Mechanoreception (subluxation complex)
Altered Motor Pathway
Altered Sensory Pathway
More Altered Sensory Pathways
Collaterals to Reticular Activiating System (ascending reticular) (pathway)
Midline Thalamic Nuclei
Hormone Production
Involuntary Motor Impulses From The Extrapyramidal System To The Voluntary Muscles (anterior horn cells)
Cerebral Cortex
Hypothalmus
Pituitary Gland
Reticular Nuclei
Descending Reticular Spinal Tracts
Pre-Ganglionic Sympathetic Efferents
Post-Ganglionic Sympathetic Efferents
Fuel Delivery System

# Need Evidence?

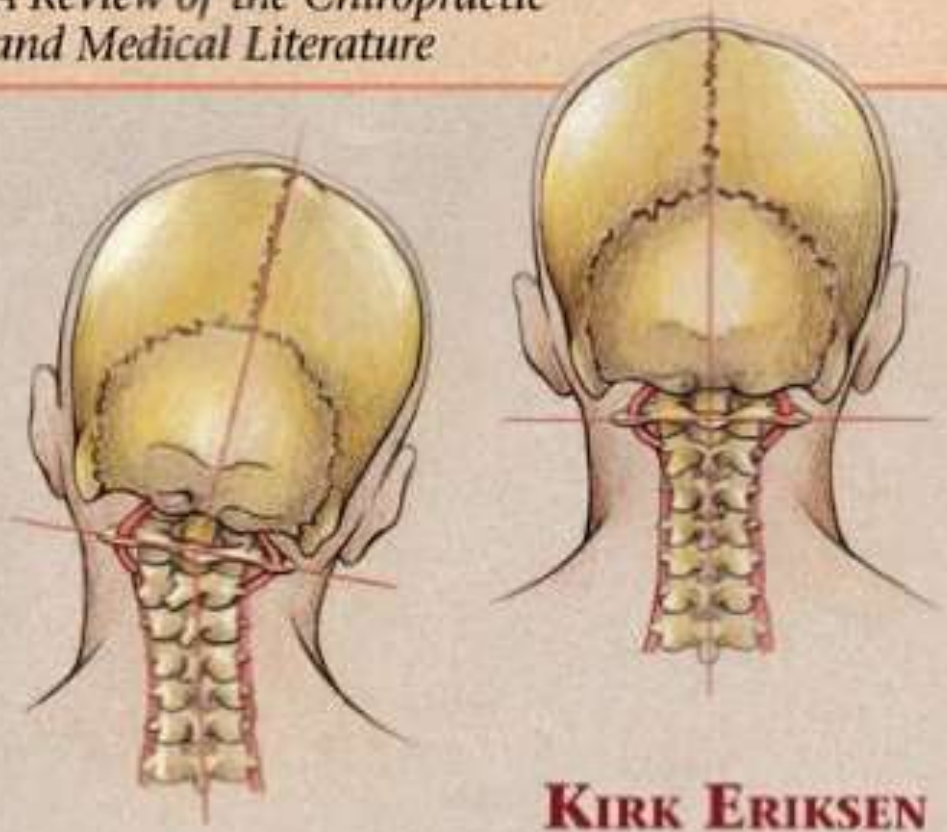


# Need Evidence?



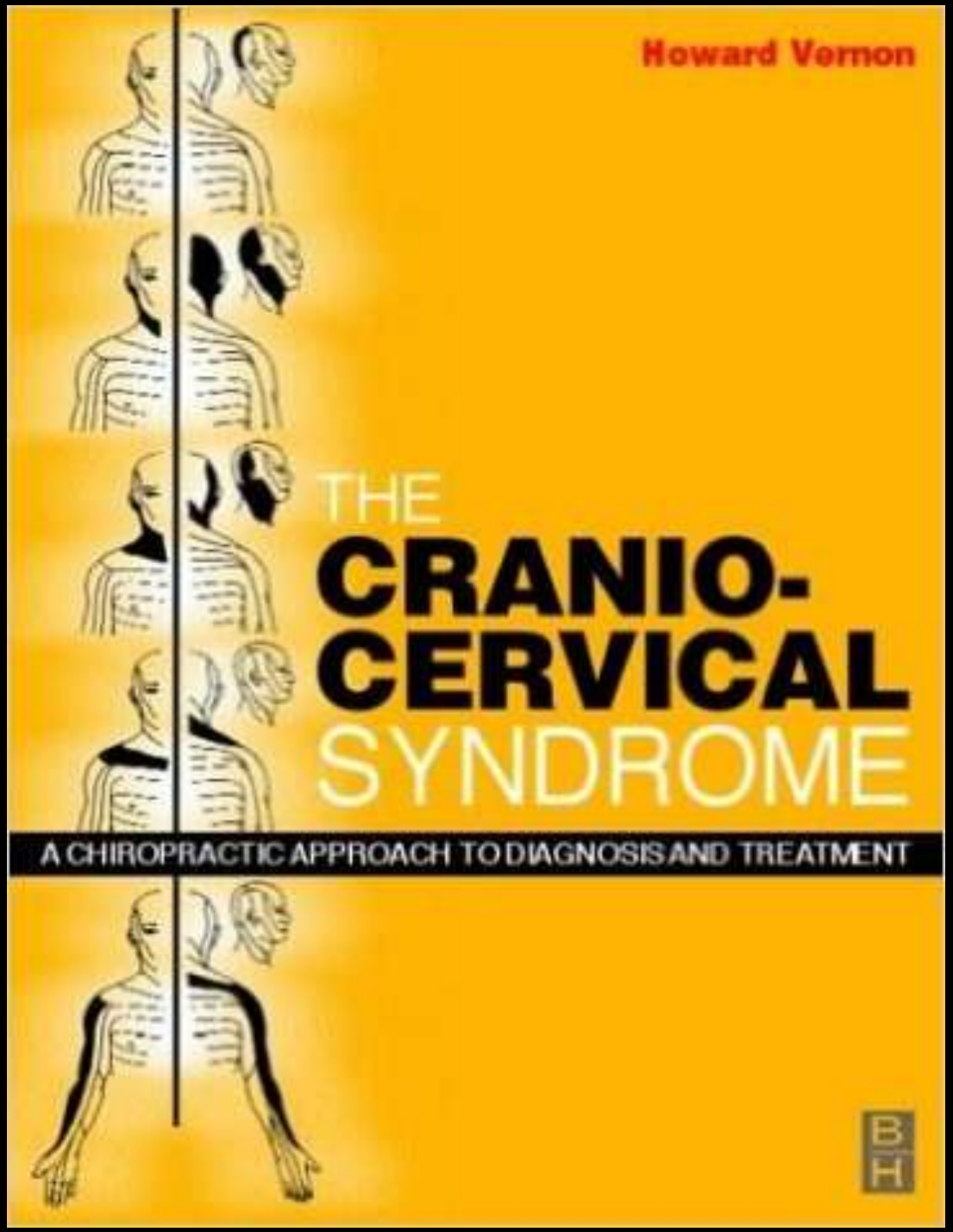
# Upper Cervical Subluxation Complex

*A Review of the Chiropractic and Medical Literature*



Kirk Eriksen

Wolters Kluwer Health | Lippincott Williams & Wilkins


Howard Vernon
THE
CRANIO-
CERVICAL
SYNDROME
A CHIROPRACTIC APPROACH TO DIAGNOSIS AND TREATMENT
BH

# The Craniocervical Syndrome and MRI

Editors
Francis W. Smith
Jay S. Dworkin



KARGER

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Meridel I. Gatterman

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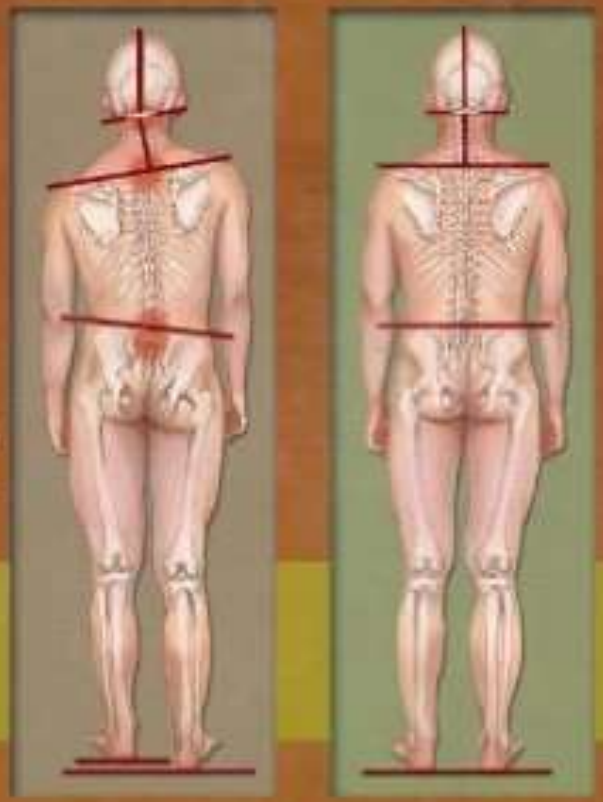
ROBERT A. LEACH



Wolters Kluwer | Lippincott Williams & Wilkins

# ORTHOSPINOLOGY PROCEDURES

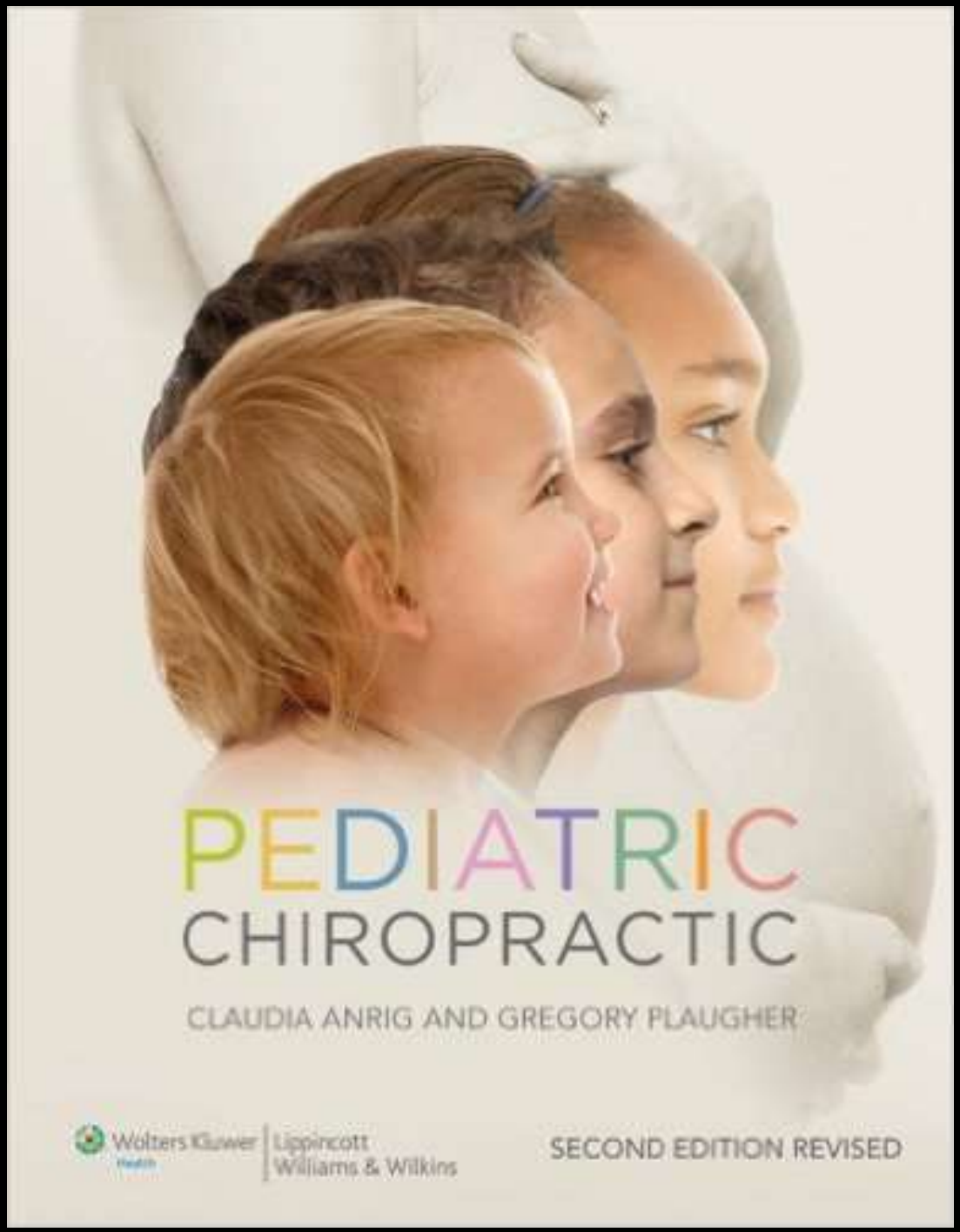
*An Evidence-Based Approach to Spinal Care*

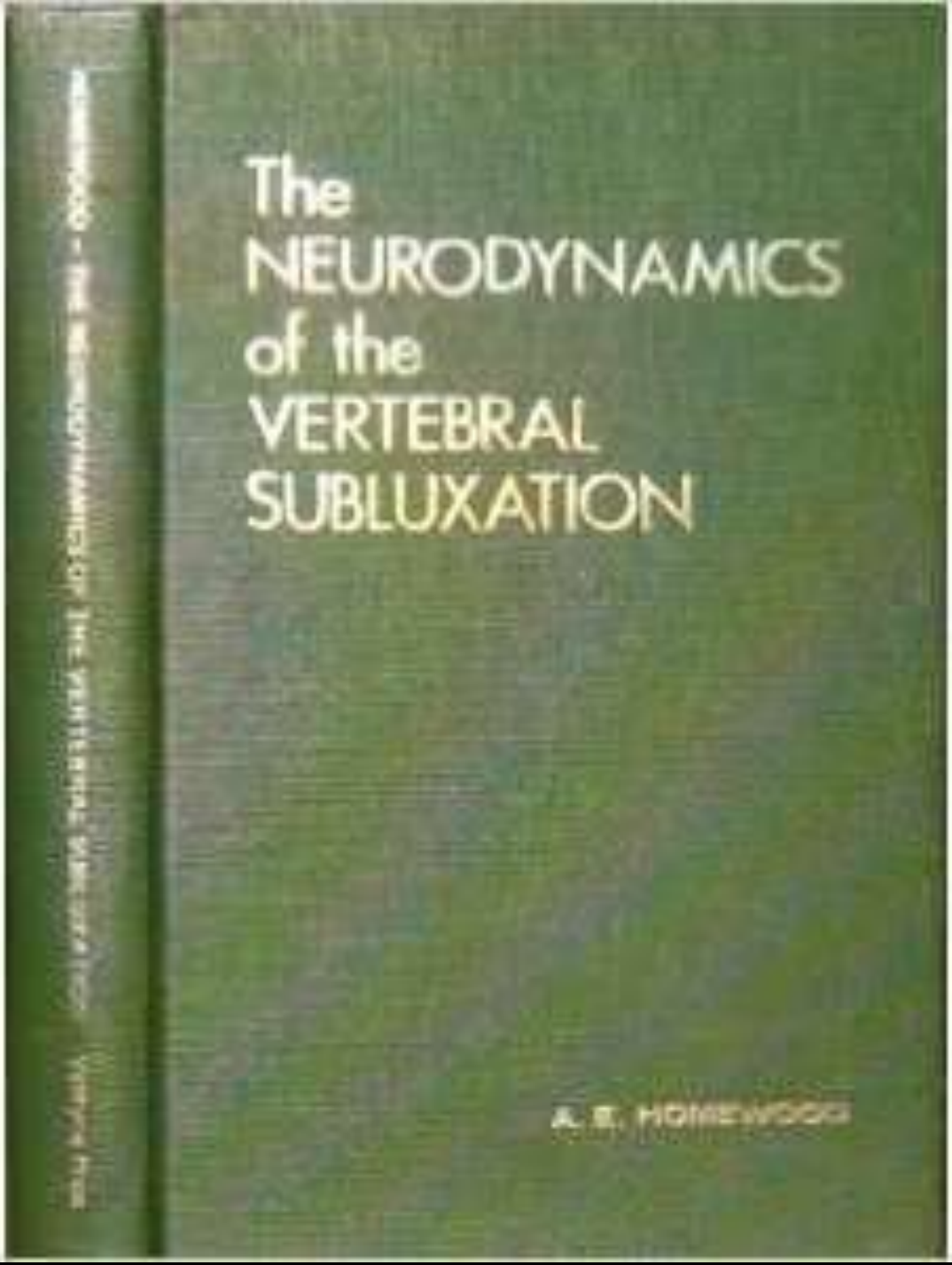


Kirk Eriksen
Roderic P. Rochester

Based on the John F. Grostic Model and Procedure

Wolters Kluwer | Lippincott Williams & Wilkins


PEDIATRIC
CHIROPRACTIC
CLAUDIA ANRIG AND GREGORY PLAUGHER
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SECOND EDITION REVISED


The
NEURODYNAMICS
of the
VERTEBRAL
SUBLUXATION
A. E. HOMEWOOD

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ROBERT COOPERSTEIN • BRIAN J. GLEBERZON

Foreword by
Dr Robert D. Mootz

Receptor-Tonus Technique201
Sacro-Occipital Technique
Soft-Tissue Technique
Spinal Biomechanics Pettibon Technique
Stressology
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Toftness Technique
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Upper Cervical Technique
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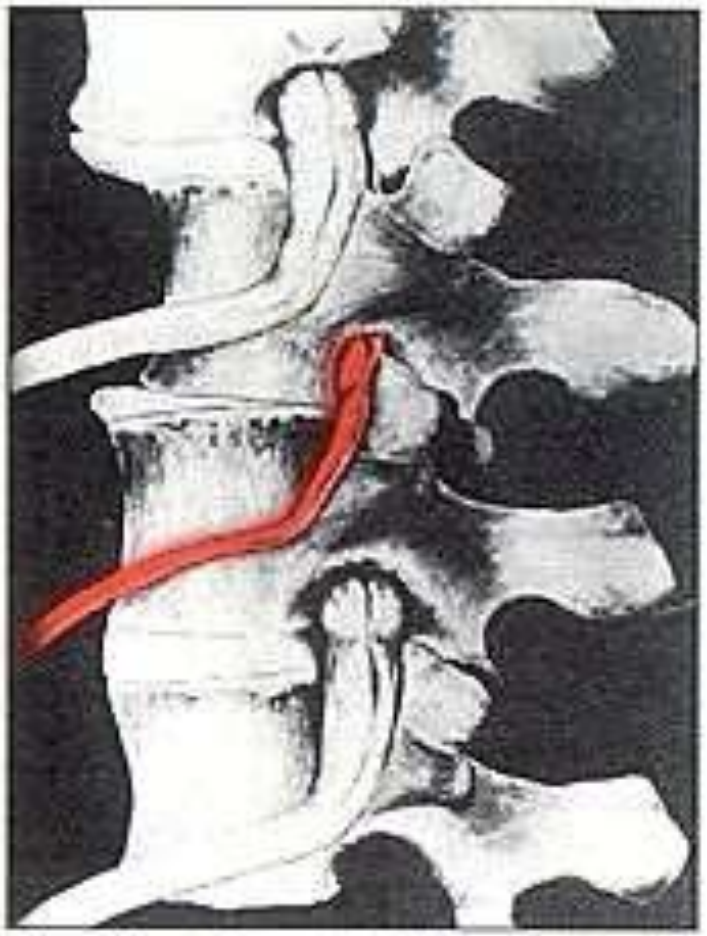
# Normal Biomechanical Stresses on Spinal Function



English Language Edition
Edited by
Hans J. Hager

An Aspen Publication

# So What About the Silent Killer?



*This is one type of vertebral subluxation (nerve interference) – the "silent killer."*

# **YOU** Are the Authority

- Be certain
- Know what normal and abnormal is
- Know how to communicate them
- Meet your patient’s where they are
- Help take them where they need to go
- Have a big mission

# Normal



# Abnormal – Kinesiopathology - Phase 1



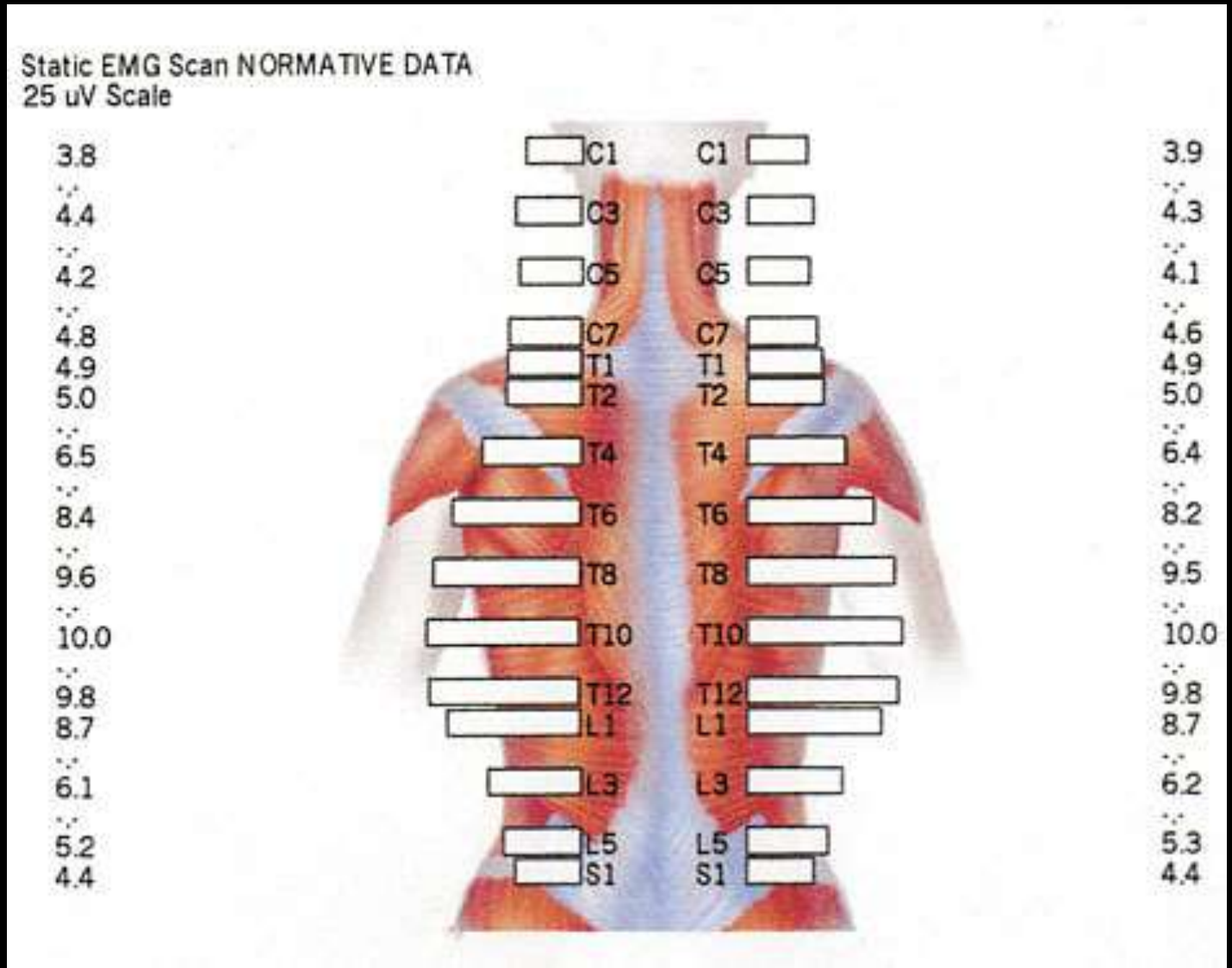
# Abnormal – Kinesiopathology - Phase 2



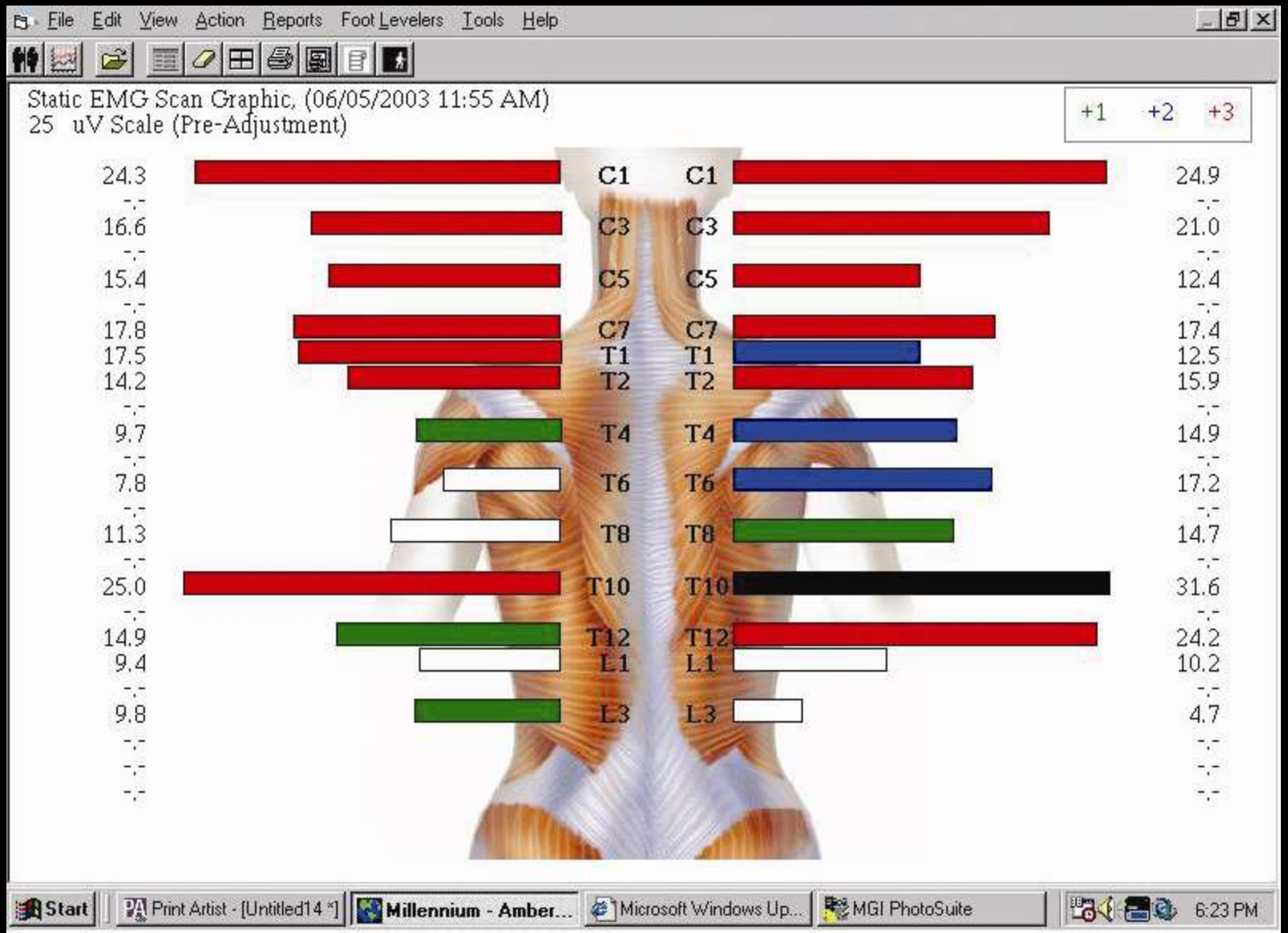
# Abnormal – Kinesiopathology - Phase 3



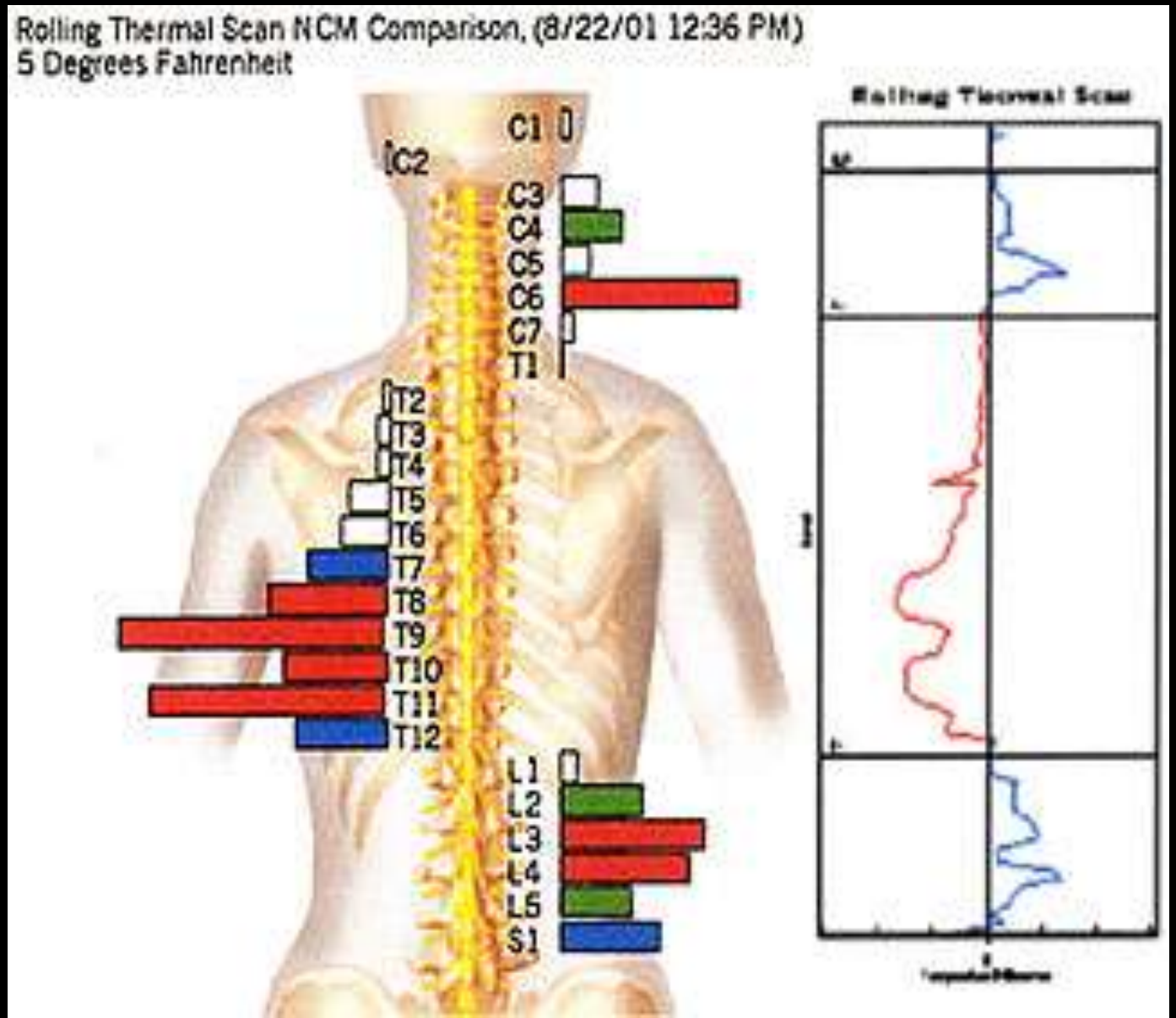
# Muscle Function - Normal



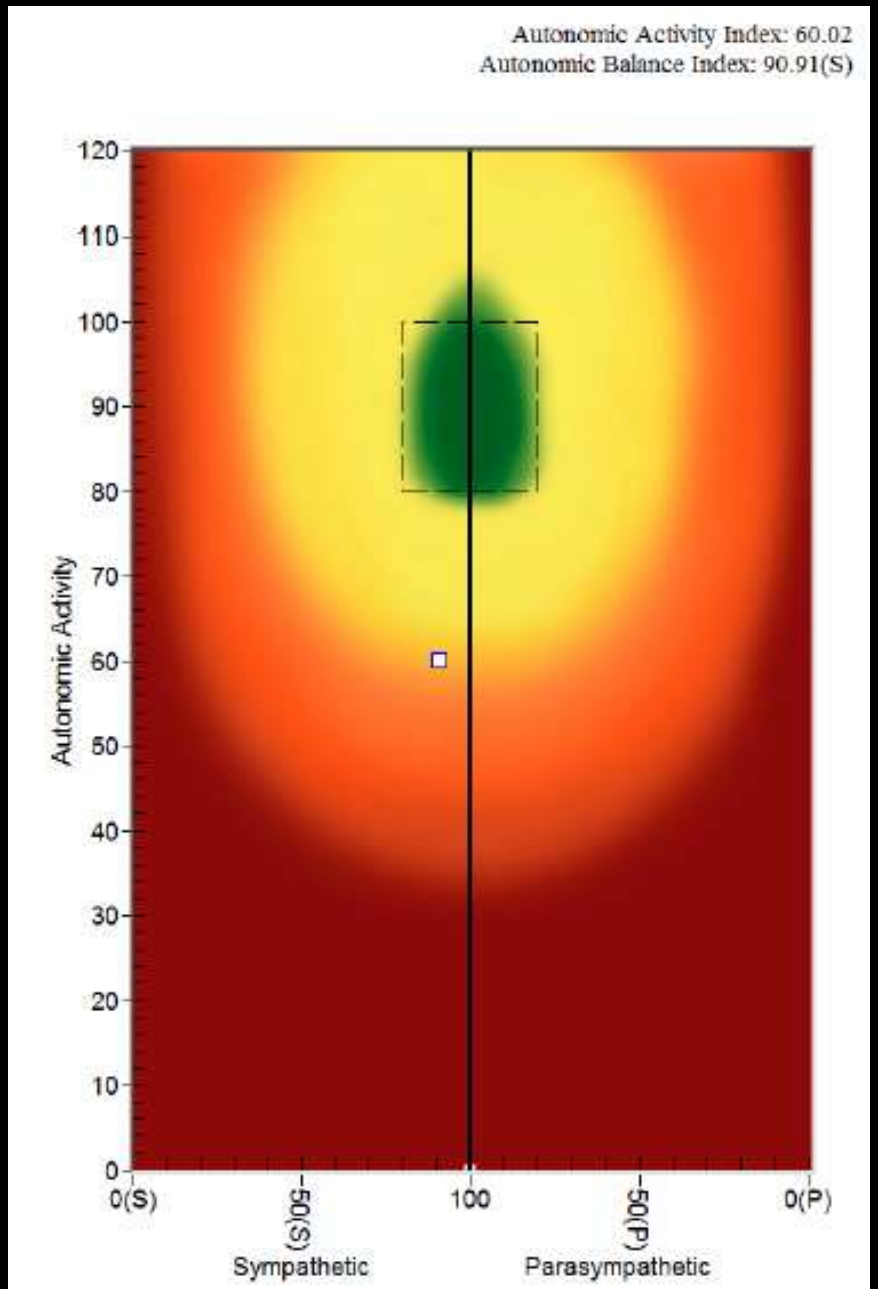
# Abnormal - Myopathology



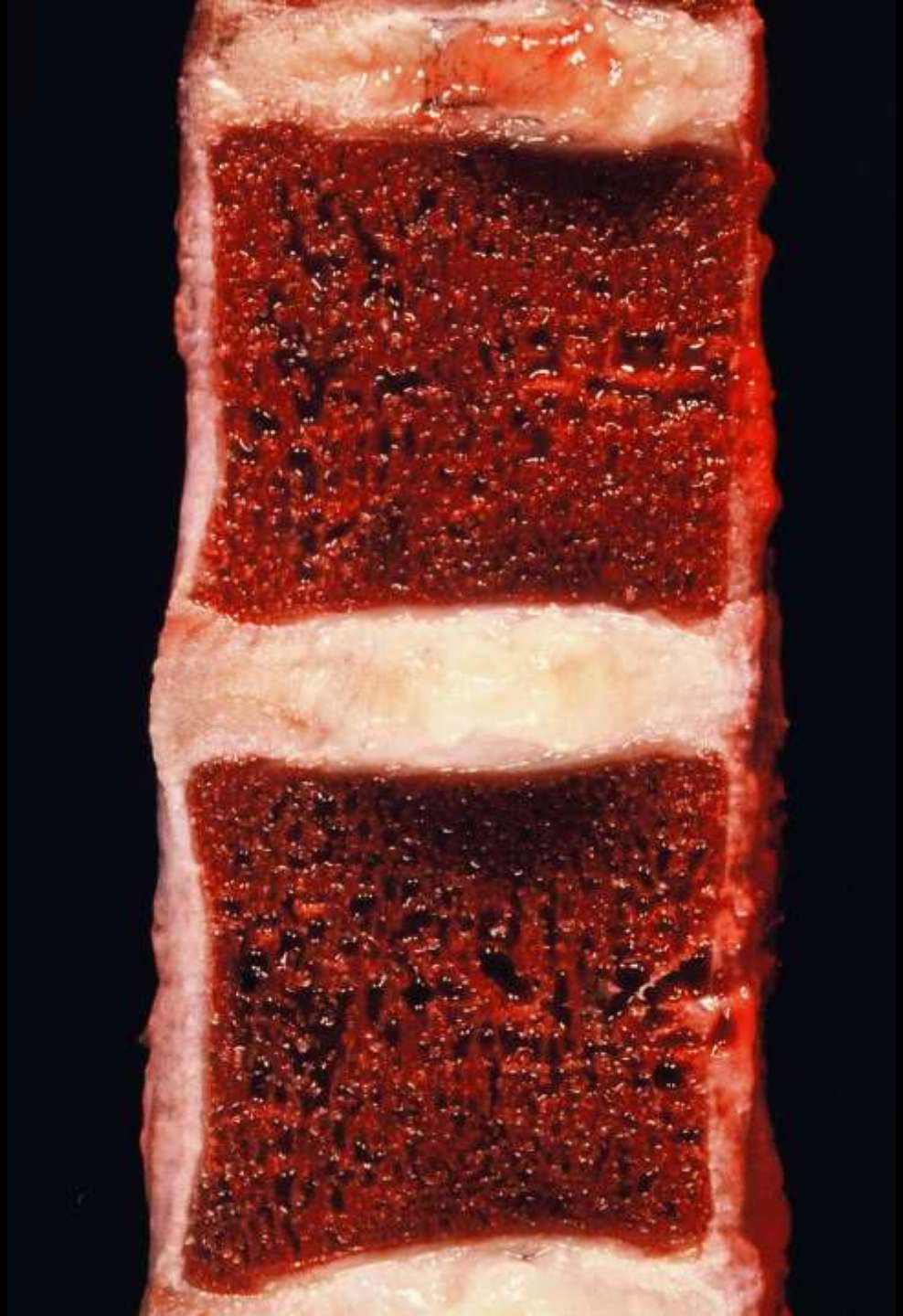
# Neuropathophysiology - Abnormal

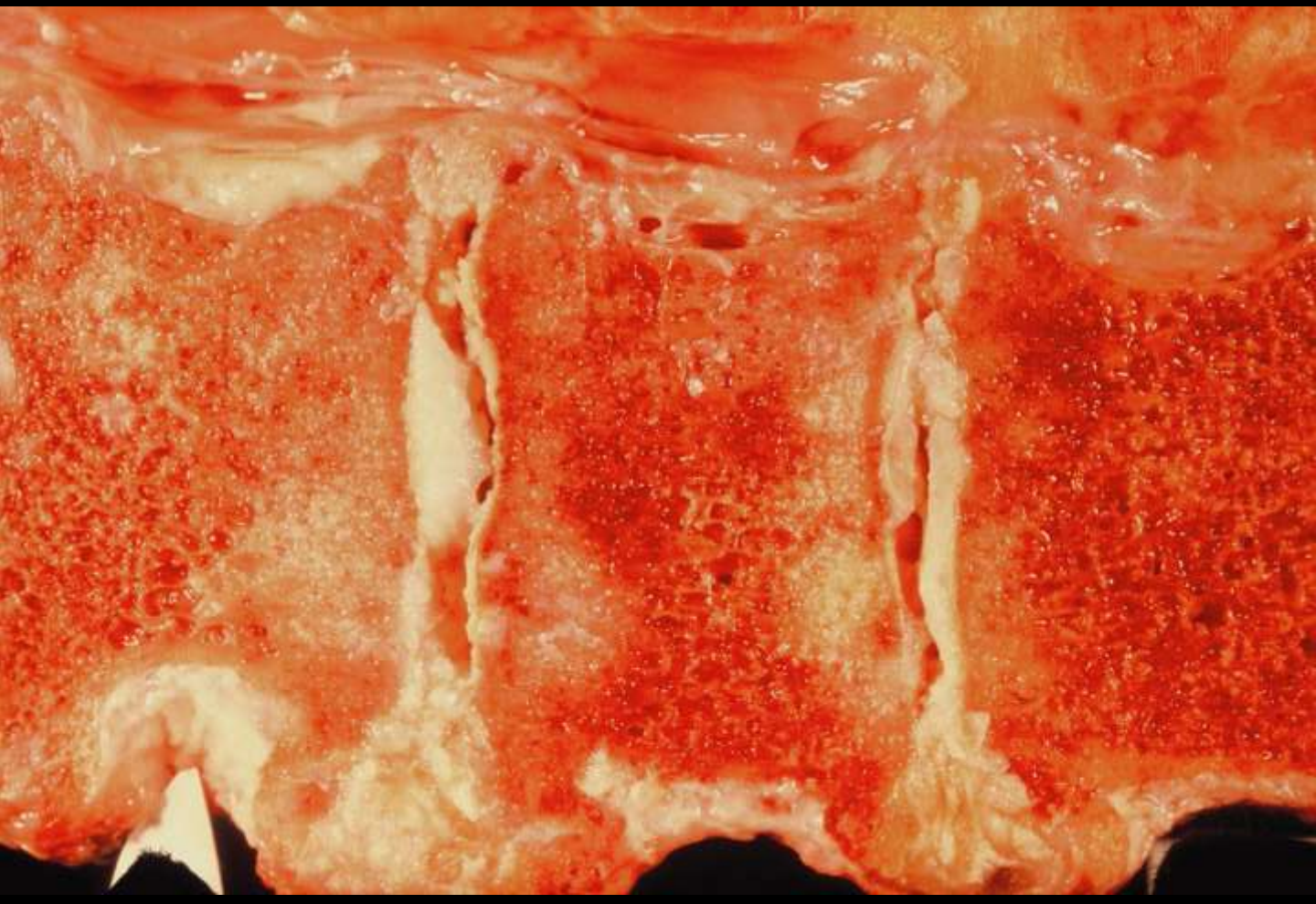


# Neuropathophysiology – Abnormal - HRV

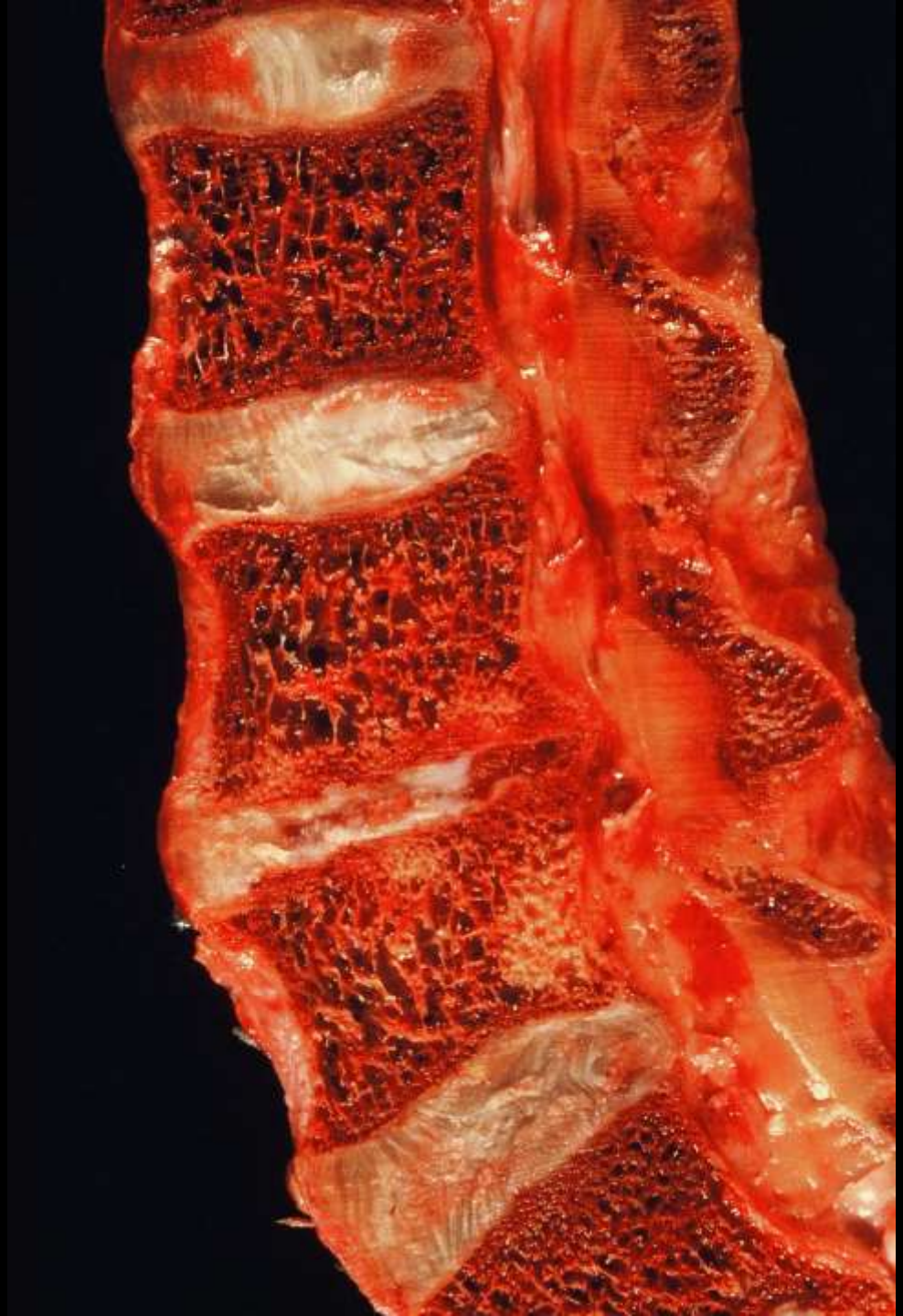






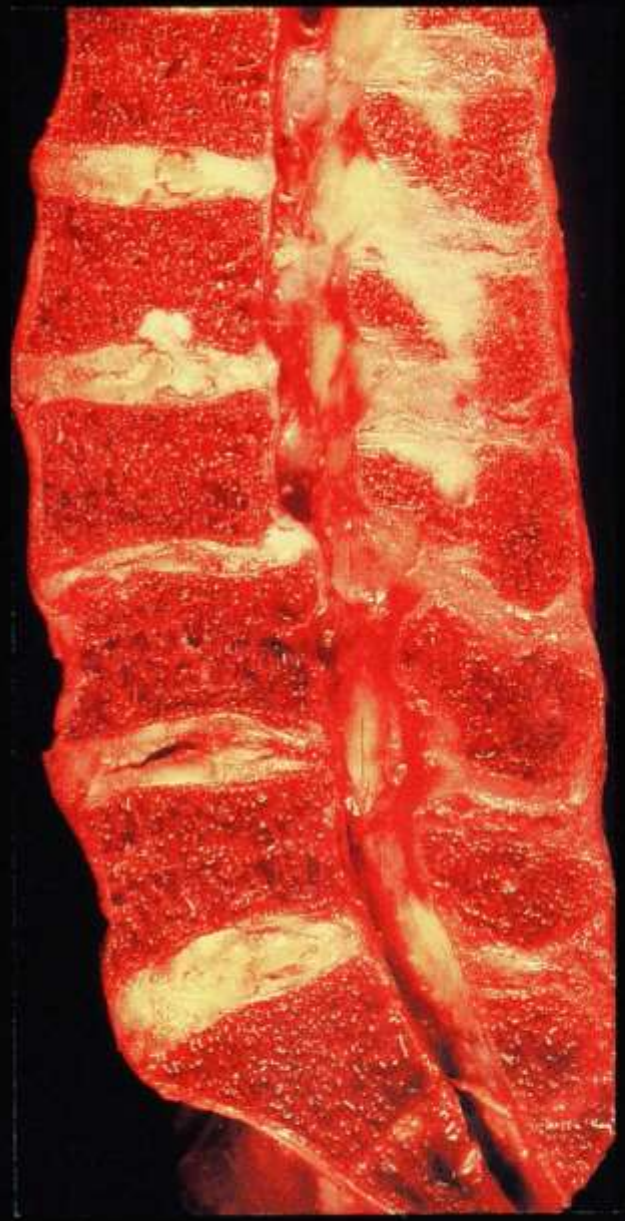




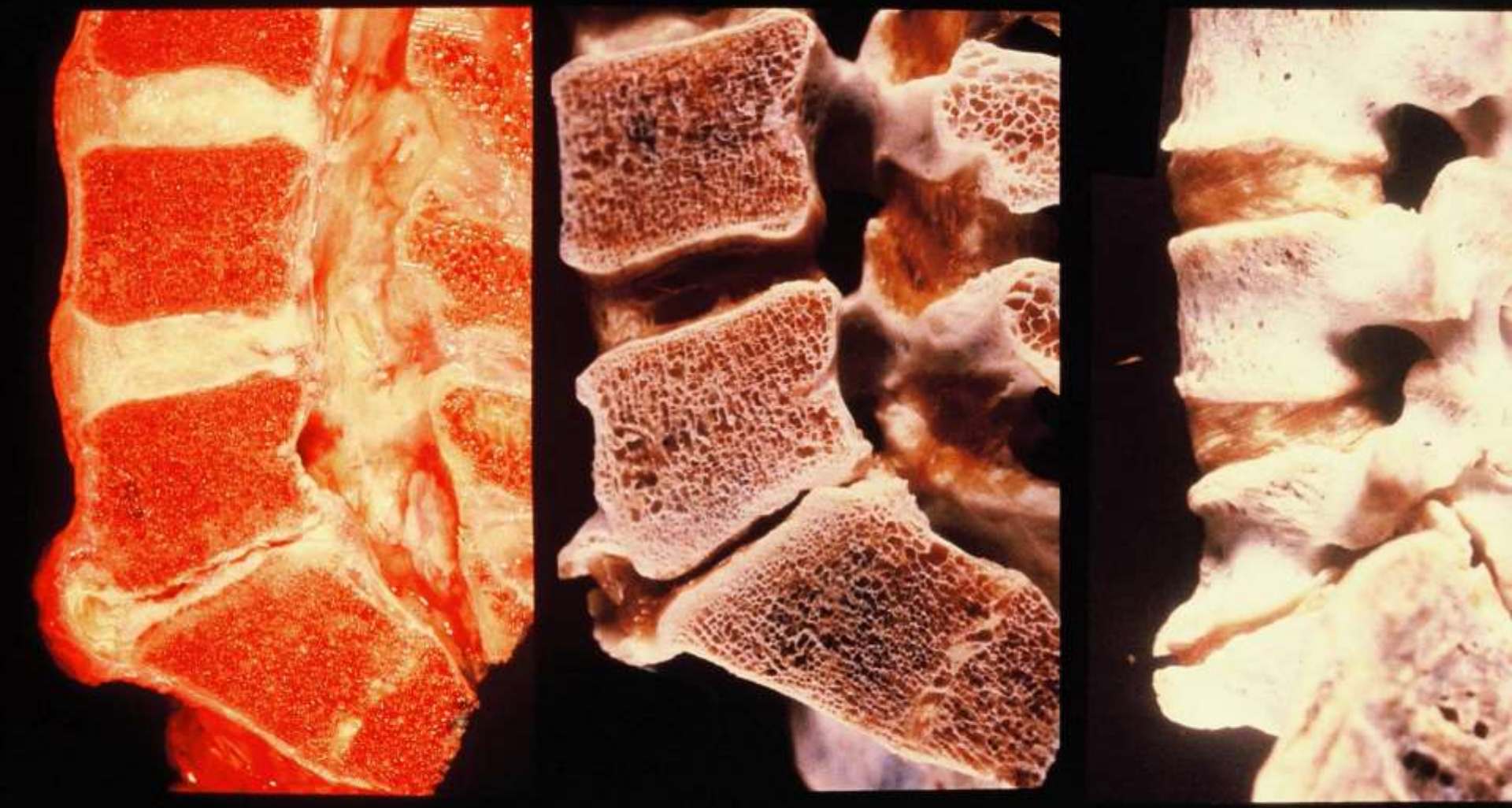


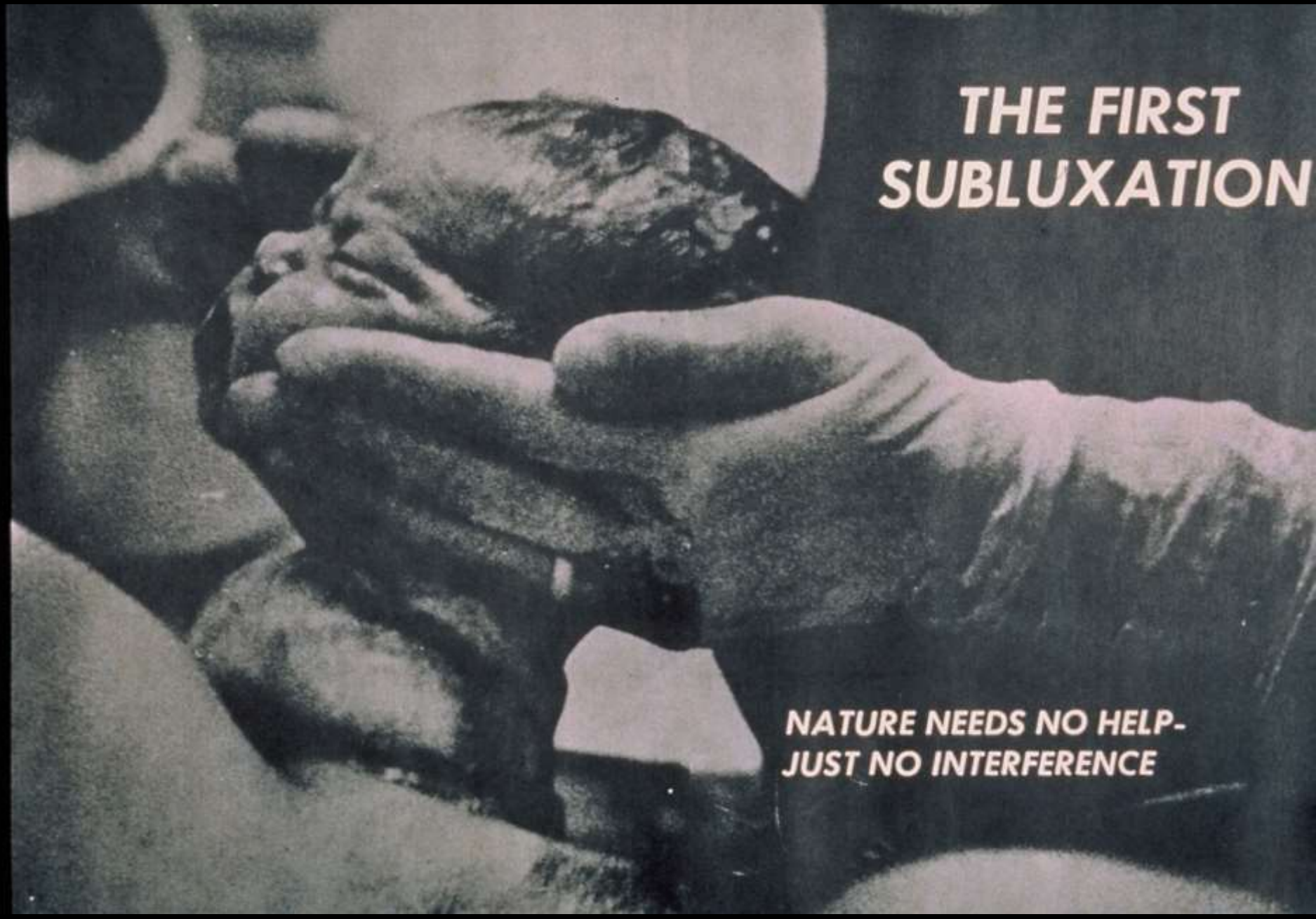




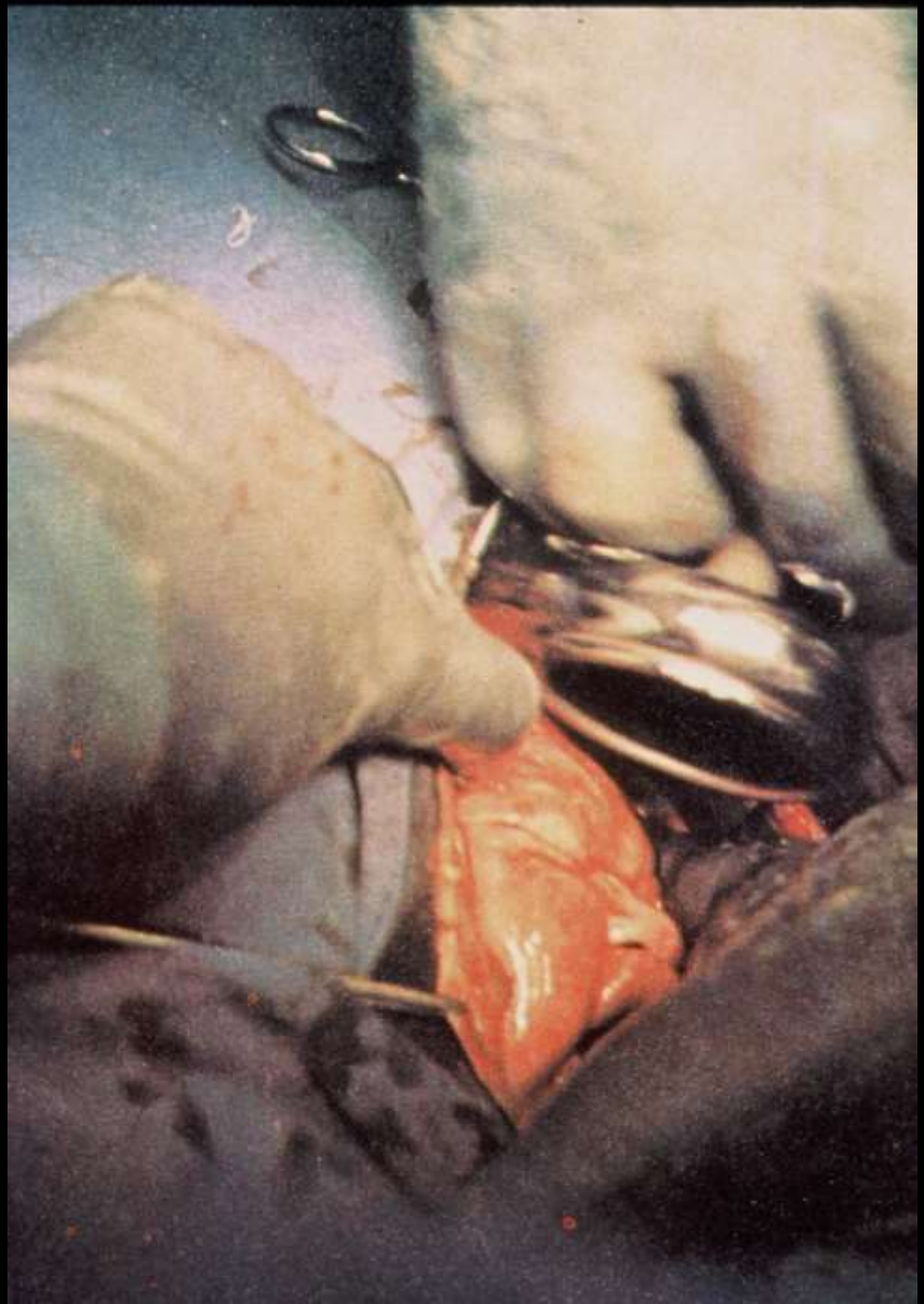


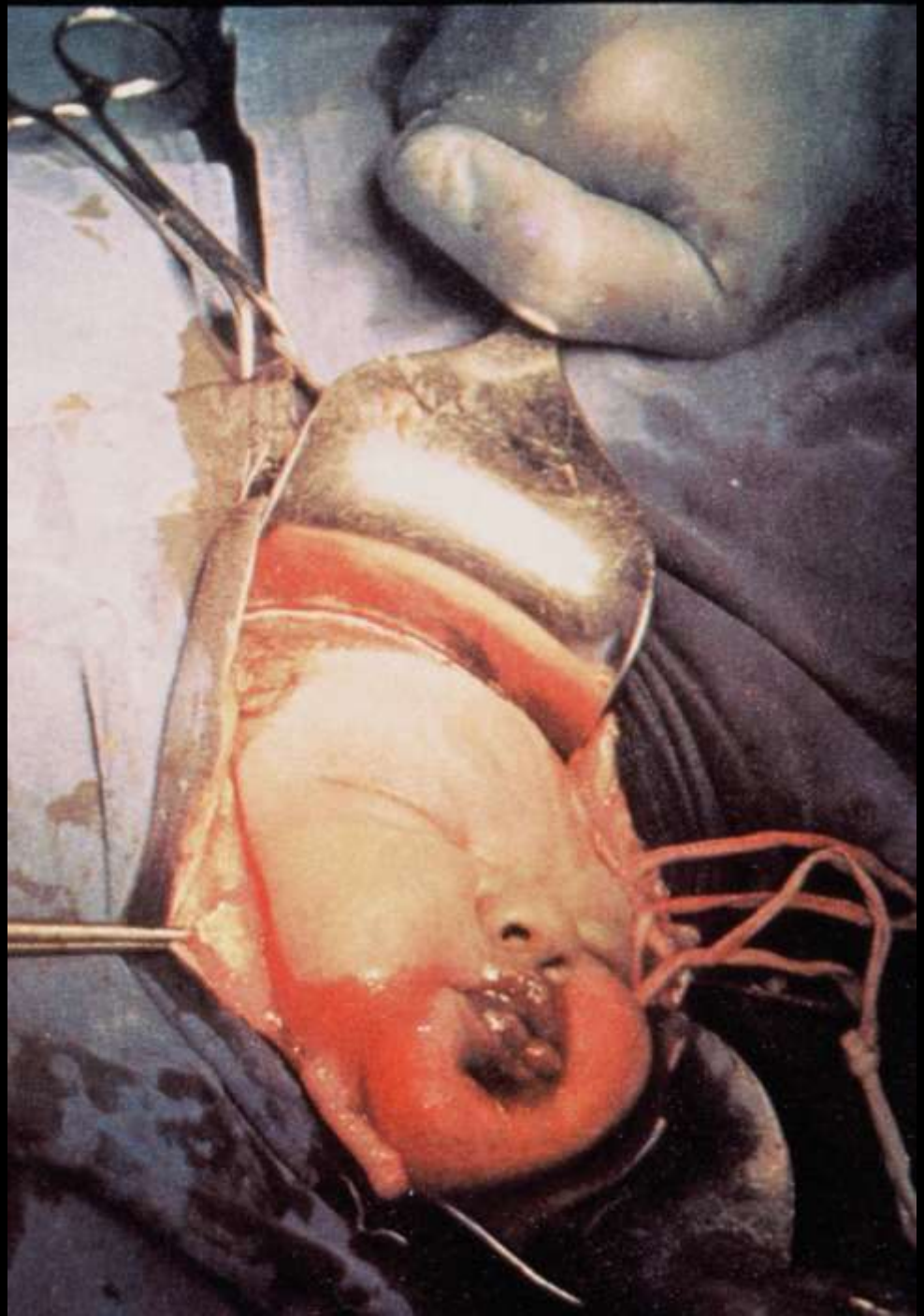


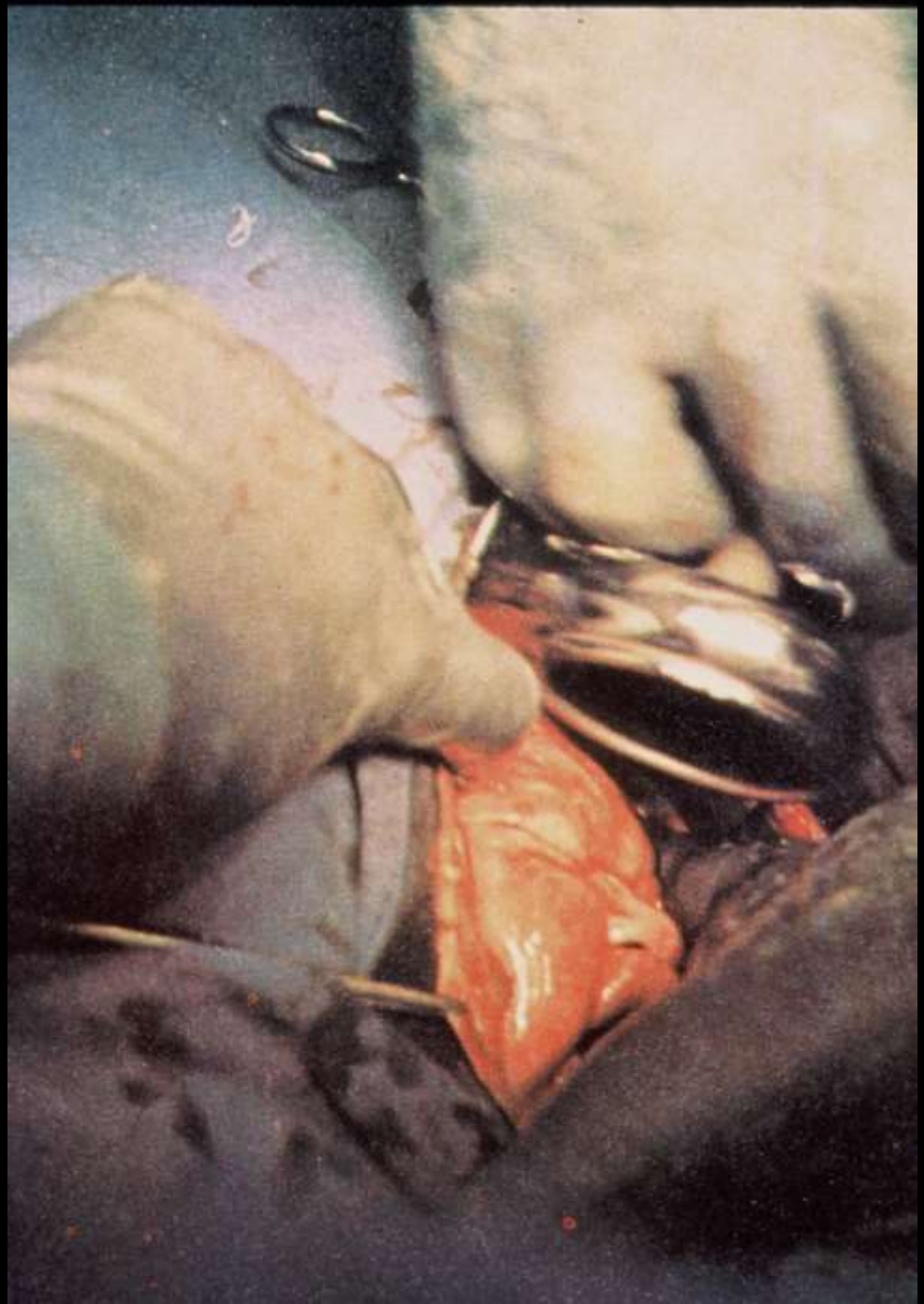


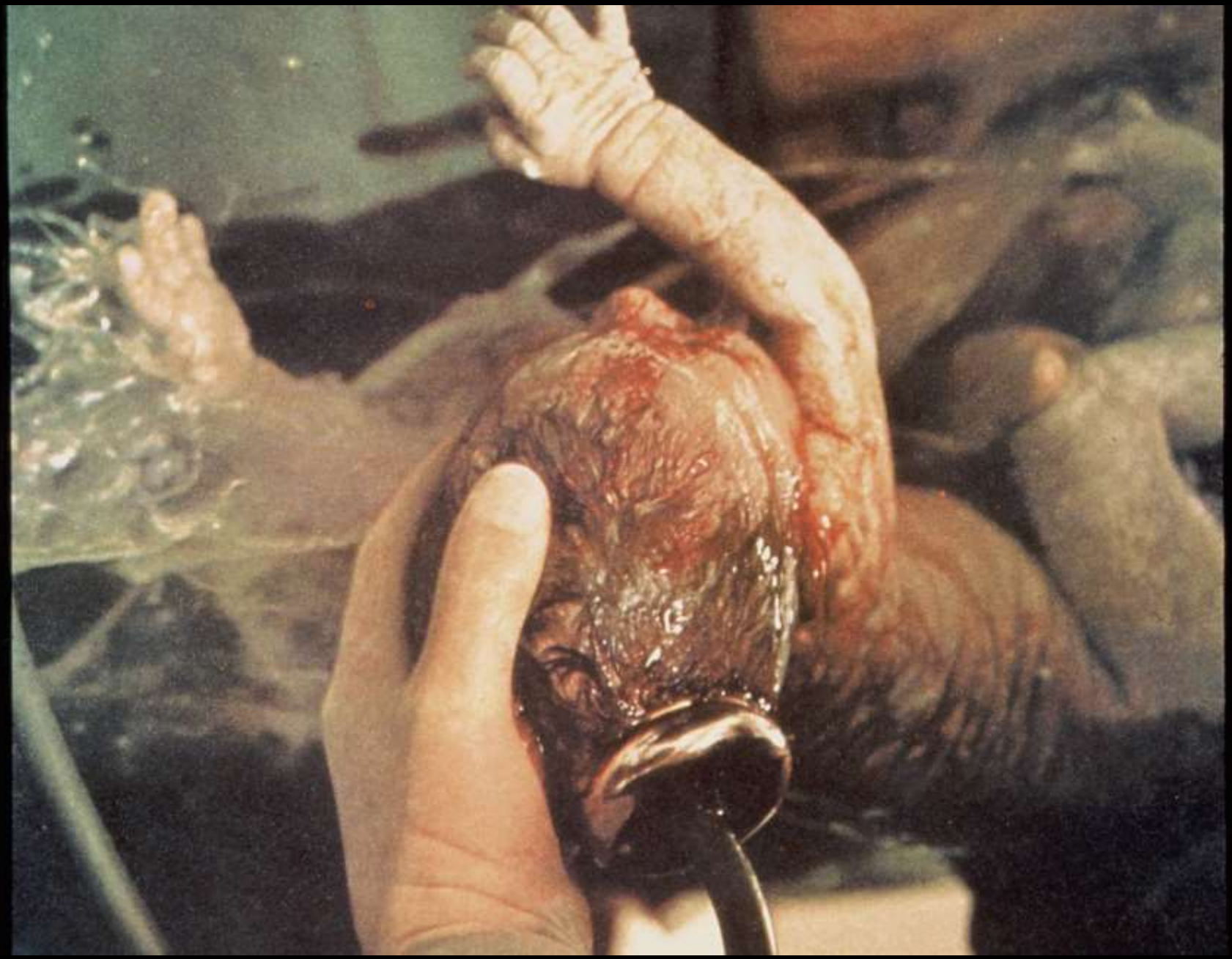

THE FIRST
SUBLUXATION
NATURE NEEDS NO HELP-
JUST NO INTERFERENCE

















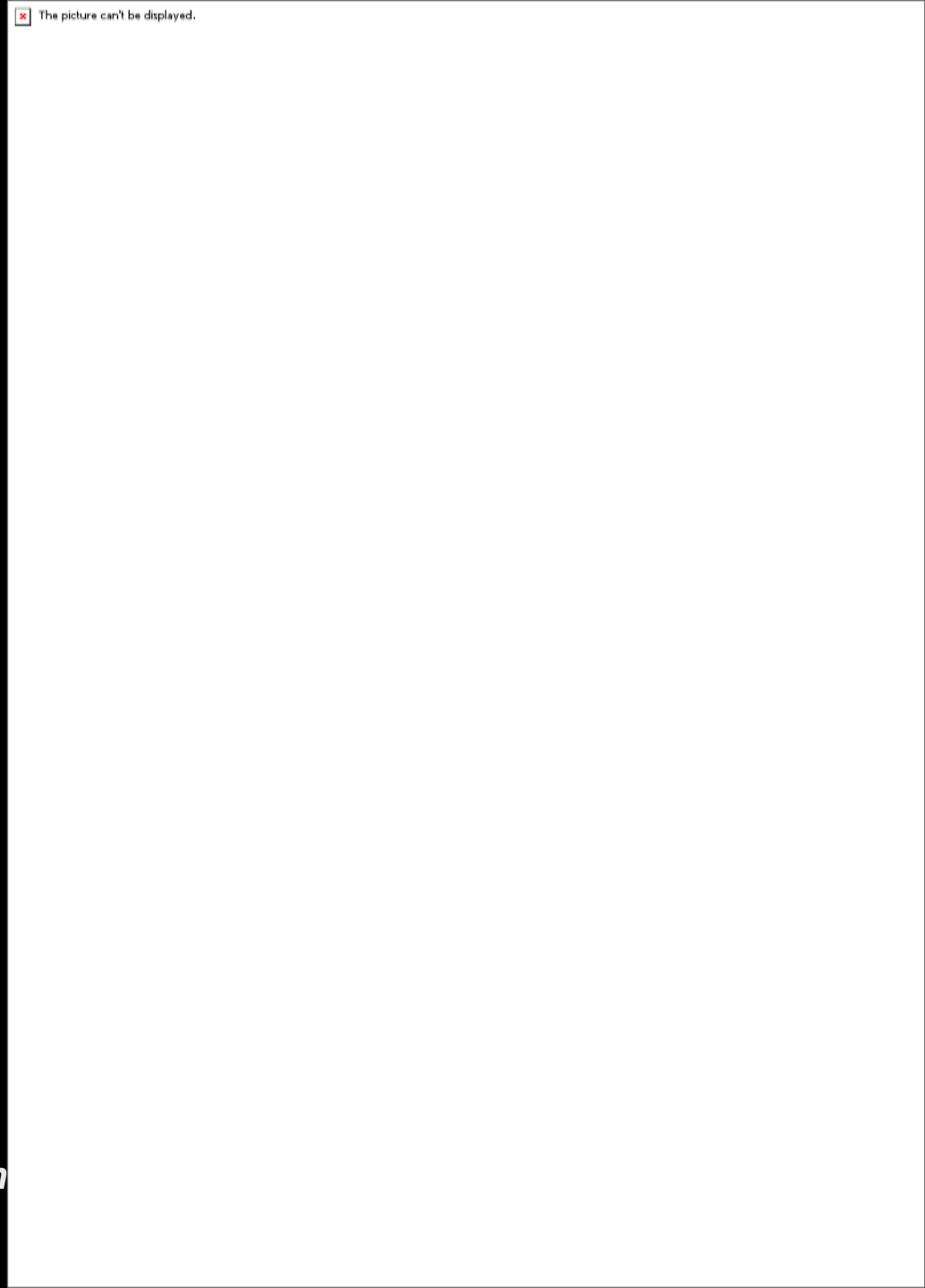


# Palmer, B.J.: The Science of Chiropractic. 1920

**"The mind, soul, spirit, nature, intuition, subconscious mind, or as I prefer to name it, the Innate Intelligence, which Dr. Carver refers to, runs the human machine, performs all functions in a natural manner, providing it is in proper order."**

# Pert, C. The Neuropeptide Network. New York Academy of Sciences. 1988

"The amygdala and hypothalamus are two such nodal points, of course. Moreover, they are particularly rich areas, because they contain receptors for essentially every neuropeptide we so far have identified. If our reasoning is correct - that the presence of a heavy density of neuropeptide receptors identifies a part of the limbic system - our research suggests that the ***usual picture of the limbic system should be extended to include the spinal cord, for a third area enriched with neuropeptide receptors is th dorsal horn of the spinal cord."***



# Pert, C. The Neuropeptide Network. New York Academy of Sciences. 1988

"It was Freud, of course, who drew our attention to the possibility that the brain has a conscious part and an unconscious or subconscious part. Normally, one thinks of the conscious part on the top and the unconscious part toward the back. But we would go further 'back' (or down) and say that the subconscious is in the spinal cord and even 'lower.' Psychologists talk about deep subconscious processes. Clearly, the network of chemicals that I have attempted to describe suggests that the subconscious extends to one's T-cells, to one's monocytes, and in a kind of flowing wave, back to one's brain cells."



“Chiropractors are not responsible for the epidemiology of vertebral subluxation”

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Christopher Kent DC, JD




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# Questions?



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# How Committed Are You?



# Mohammed Bouazizi