

Publications Supporting the Use of INSiGHT Scanning Technologies in Chiropractic Care




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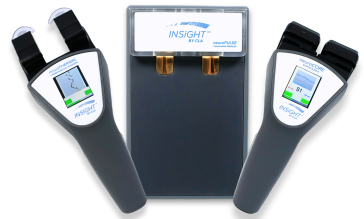
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INTRODUCTION

We are all aware of the statement, “Knowledge is Power.” INSiGHT scanning technologies were designed specifically as a suite of contemporary, validated, reliable and evidence-based technologies for the purpose of analyzing and reporting the impact of vertebral subluxations on the ability of the nervous system to coordinate the body’s innate regulation and expression of potential. The data collected by the INSiGHT neuroTECH, comprised of the neuroPULSE (HRV), the neuroCORE (EMG) and the neuroTHERMAL is used in Chiropractic offices around the world to advance the profession and care for the millions of patients seeking fuller life-expression. The evidence behind the use of data from these types of validated instruments confirms the necessity for Chiropractors to “look deeper” with scanning technologies such as the INSiGHT.

CLA’s INSiGHT scanning technologies analyze spine and nervous system tension patterns so that neural profiles can be created for patients of all ages. The neuroTECH allows Chiropractors to report on the state of overall tone and tension within the functioning nervous system. By analyzing the stress-related patterns in both the spinal motor and regional/global autonomic processing, Chiropractors can determine a patient’s degree of resiliency and establish a watchful and progressive care plan, based on objective data.



INSiGHT technologies provide a comparative normative database, compiled from data collected in its cloud-based application. These Chiropractic normative values provide Chiropractors and their patients a way to track their progress while setting attainable goals.

To date, over 12,000 Chiropractic offices have installed INSiGHT technologies, making functional, neurological scanning a centerpiece of their chiropractic examination and reporting process.

The INSiGHT technologies are registered, Class II medical devices. Each component of the INSiGHT neuroTECH is engineered for precision data collection. The manufacturing facility in the United States is a registered ISO 13485:2016 facility confirming that the validity and reliability of the instruments meets diagnostic and regulatory standards.

INTRODUCTION

This grouping of abstracts from published papers and case studies focuses on the collection and application of data from Heart Rate Variability, surface EMG and Thermal assessments. We have included two key papers at the start of this compilation to orient the reader towards the undeniable importance of the nervous system and the value of utilizing instrumentation when assessing the presence of vertebral subluxations.

We hope these publications inspire you to continue to explore the expansiveness of chiropractic research as it delves deeper into neurofunctional connections, the abilities of human performance and the incredible power of Chiropractic.

Respectfully,

David.

Dr. David Fletcher
DC, FRCCSS(C)

and Team CLA



Publications supporting the use of INSIGHT Scanning: Vertebral Subluxation

Publication 1:

Assessment of Somatic and Autonomic Nervous System Changes Associated with Vertebral Subluxation: A Review and Commentary

RESEARCHERS:

Christopher Kent, DC, JD

ABSTRACT:

Introduction: Vertebral subluxation involves misalignments in the spine that disrupt somatic and autonomic nervous system function. The assessment of these changes is crucial for clinical practice.

Methods: This paper reviews methods for objectively assessing the neurological impacts of vertebral subluxation, focusing on surface electromyography (sEMG), skin temperature differentials, and heart rate variability (HRV).

Results: sEMG measures muscle activity, skin temperature differentials assess autonomic vasomotor control, and HRV evaluates autonomic balance. These tools provide quantitative data for diagnosing and managing vertebral subluxations and offer reliable measures of somatic and autonomic changes associated with subluxation, enhancing the clinical ability to evaluate and manage vertebral subluxation.

Conclusion: Objective assessments of subluxation related neurological dysfunctions, such as sEMG, skin temperature analysis, and HRV, are essential in chiropractic practice and provide significant clinical value.

KEYWORDS: Surface electromyography, skin temperature, HRV, vertebral subluxation, dysafferentation, dyskinesia, dysponesis, dysautonomia, chiropractic

RESEARCH ACCESS:

[Find the full research paper here.](#) Only subscribers can access it. You can subscribe through the website.

Publication 2:

Vertebral Subluxation and Systems Biology: An Integrative Review Exploring the Salutogenic Influence of Chiropractic Care on the Neuroendocrine

RESEARCHERS:

Amy Haas, PhD, DC; Jonathan Chung, DC; Christopher Kent, DC, JD; Brooke Mills, DC; Matthew McCoy, DC, MPH

ABSTRACT:

In this paper we synthesize an expansive body of literature examining the multifaceted influence of chiropractic care on processes within and modulators of the neuroendocrine immune (NEI) system, for the purpose of generating an inductive hypothesis regarding the potential impacts of chiropractic care on integrated physiology. Taking a broad, interdisciplinary, and integrative view of two decades of research documented outcomes of chiropractic care, inclusive of reports ranging from systematic and meta-analysis and randomized and observational trials to case and cohort studies, this review encapsulates a rigorous analysis of research and suggests the appropriateness of a more integrative perspective on the impact of chiropractic care on systemic physiology. A novel perspective on the salutogenic, health promoting effects of chiropractic adjustment is presented, focused on the improvement of physical indicators of well-being and adaptability such as blood pressure, heart rate variability, and sleep, potential benefits that may be facilitated through multiple neurologically mediated pathways. Our findings support the biological plausibility of complex benefits from chiropractic intervention that is not limited to simple neuromusculoskeletal outcomes and open new avenues for future research, specifically the exploration and mapping of the precise neural pathways and networks influenced by chiropractic adjustment.

KEYWORDS: Evidence informed practice, chiropractic adjustment, adaptability, salutogenesis, integrative physiology, chiropractic care, vertebral subluxation.

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publications supporting the use of INSIGHT Scanning: neuroPULSE (HRV)

Publication 1:

Heart Rate Variability to Assess the Changes in Autonomic Nervous System Function Associated With Vertebral Subluxation

RESEARCHERS:

Christopher Kent, DC, JD.

ABSTRACT:

Analysis of the beat-to-beat intervals of the heart may be used to evaluate the balance between the sympathetic and parasympathetic divisions of the autonomic nervous system. Variability in heart rate reflects the vagal and sympathetic function of the autonomic nervous system and has been used as a monitoring tool in clinical conditions characterized by altered autonomic nervous system activity. Spectral analysis of beat-to-beat variability is a simple, non-invasive technique to evaluate autonomic dysfunction.

Vertebral subluxations are changes in the position or motion of a vertebra which result in the interference with nerve function. Vertebral subluxations may result in altered autonomic nervous system activity. Heart rate variability is a reliable and valid tool that may be used to assess the changes in autonomic activity associated with the reduction and correction of vertebral subluxations. A search of the relevant literature addressing heart rate variability and the reduction or correction of vertebral subluxation from 2000 to 2017 was conducted, and the results summarized

KEYWORDS:

Heart rate variability (HRV), Autonomic nervous system, Chiropractic, Vertebral subluxation, Spinal manipulation, Nerve root compression, Dysafferentation, Dysponesis

RESEARCH ACCESS:

[Find the full research paper here.](#) Only subscribers can access it. You can subscribe through the website.

Publication 2:

Effect of chiropractic care on heart rate variability and pain in a multisite clinical study

RESEARCHERS:

John Zhang, Douglas Dean, Dennis Nosco, Dennis Strathopoulos, Minas Floros

ABSTRACT:

Objective: The purpose of this study is to investigate the effect of chiropractic care in a multiclinic setting on sympathetic and parasympathetic nervous system activities using heart rate variability (HRV) analysis.

Methods: Physicians of chiropractic in private practice were provided with an HRV device to perform analysis before and after chiropractic adjustments on 10 subjects. At each site, 8 subjects were monitored before and after a single chiropractic adjustment, and 2 additional patients were followed for a 4-week period with 2 HRV recordings per week. Patient information forms and a visual analog scale (VAS) questionnaire were completed both before and after each chiropractic adjustment.

Results: Data from 96 physicians were divided into single-visit and 4-week groups. After 1 chiropractic adjustment, pain as analyzed by VAS was reduced significantly from 3.7 +/- 2.2 to 2.1 +/- 2.0 ($P < .001$). The mean heart rate reduced from 76.7 +/- 12.7 to 74.3 +/- 12.4 ($P < .01$), the SD of normal-to-normal QRS increased from a range of 55.8 to 44.6 to a range of 60.6 to 47.2 ($P < .001$), the high-frequency component increased from 359 +/- 968 to 444 +/- 1069 ($P < .01$), the low-frequency component increased from 403 +/- 753 to 465 +/- 755 ($P < .05$), and the total power increased from 1063 +/- 1886 to 1265 +/- 2048 ($P < .01$). After 4 weeks of chiropractic adjustments, pain measured by the VAS was reduced significantly before and after each visit as analyzed by t tests, but the significant changes were not found using analysis of variance analysis. The reduction of pain from each treatment was not maintained over the 4 weeks of study period. The analysis of variance on the HRV 4-week data found that changes in the SD of normal-to-normal QRS, total power, and low-frequency components reached statistically significant levels ($P < .05$). The heart rate and the high-frequency component did not change significantly ($P > .05$).

Conclusion: In this study, HRV and VAS changed in patients as a result of chiropractic care.

KEYWORDS:

Heart rate variability (HRV), Autonomic nervous system, Chiropractic, Vertebral subluxation, Spinal manipulation, Nerve root compression, Dysafferentation, Dysponesis

RESEARCH ACCESS:

[Find the full research paper here.](#) Only subscribers can access it. You can subscribe through the website.

Publication 3:

Heart Rate Variability as an Objective Outcome Measure for Subluxation Based Chiropractic Care for Athletes

RESEARCHERS:

Matthew Hartenburg, D.C.

ABSTRACT:

Background: The chiropractic profession has a long history of providing care for athletes. Despite anecdotal claims regarding improved performance made in chiropractic marketing, little evidence exists showing a relationship between chiropractic care and improved sports performance. Strength and conditioning research have recently begun to investigate the role of the autonomic nervous system in periodized training and recovery. The function of the autonomic nervous system is responsible in large part for the physiological adaptations that occur as a result of training; and heart rate variability is being utilized to assess athletes' physiologic recovery.

This paper will explore the principle of specific adaptation to imposed demand, periodization of overload training and recovery, the role of the autonomic nervous system in physiologic adaptation to training, utilizing heart rate variability to assess response to training load and state of recovery, and a potential research agenda for subluxation based chiropractic in a population of athletes.

Discussion: The topic of periodization, recovery, and overtraining syndrome is broad and complex, but the role of the autonomic nervous system in sports performance is garnering a lot of attention. Function of the autonomic nervous system appears to have a central role in adaptation versus maladaptation during training cycles. Due to the increased popularity, and evidence, in monitoring training and recovery status through the use of heart rate variability in conjunction with subjective measures, future chiropractic research endeavors involving athletes should be geared towards identification of vertebral subluxations, their epidemiology in a population of athletes, and the effects of correction of vertebral subluxation on objective measures such as HRV and questionnaires such as the REST-Q.

Conclusion: Sufficient evidence exists to establish a research agenda geared towards subluxation-based chiropractic in a population of athletes utilizing heart rate variability as an outcome measure.

KEYWORDS:

Sports performance, heart rate variability, HRV, chiropractic, overtraining syndrome, autonomic nervous system, subluxation, adaptability, salutogenesis

RESEARCH ACCESS:

[Find the full research paper here.](#) Only subscribers can access it. You can subscribe through the website.

Publication 4:

Coherence: Bridging Personal, Social, and Global Health

RESEARCHERS:

Rollin McCraty, Ph.D.; Doc Childre

ABSTRACT:

Of the many new scientific perspectives that emerged from the 20th century, one of the most profound is that the universe is wholly and enduringly interconnected and coherent.¹⁻³ Complex living systems, including human beings, are composed of numerous dynamic, interconnected networks of biological structures and processes. Coherence implies order, structure, harmony, and alignment within and amongst systems—whether in atoms, organisms, social groups, planets, or galaxies. Thus, every whole has a relationship with and is a part of a greater whole, which is again part of something greater. In this context, nothing can be considered as separate, alone, or lacking relationships. One of the more surprising findings that has emerged from physics is quantum coherence, which has given rise to the prediction of nonlocality and instantaneous communication between subatomic particles separated by vast distances.

Most people know what it feels like to be in a harmonious state, the place where our hearts, minds and bodies are united in a feeling of wholeness. This state is often referred to as "the zone," "flow," "oneness," etc. When we are in such states, we typically feel connected not only to our deepest selves but to others, even to the earth itself. We call this state of internal and external connectedness "coherence." This overview discusses how increased personal coherence can be achieved as people learn to more consistently self-regulate their emotions from a more intuitive, intelligent, and balanced inner reference and how this state is directly associated with increased intuition and improved health and cognitive functioning. It also describes how coherence is reflected in physiology and objectively measured. The discussion then expands to coherence in the context of families, workplaces, and communities. The article concludes with the perspective that being responsible for and increasing our personal coherence is not only reflected in improved personal health and happiness but also feed into and are reflected in a global field environment. It is postulated that as increasing numbers of people add coherent energy to the global field, it helps strengthen and stabilize mutually beneficial feedback loops among human beings and with the earth itself.

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publication 5:

Improvement in Heart Rate Variability in 46 Patients Undergoing Chiropractic with Network Spinal Analysis: A Retrospective Analysis of Outcomes

RESEARCHERS:

Daniel Knowles, D.C., Richelle Knowles, D.C. & Dejan Kotur, D.C.

ABSTRACT:

Objective: The objective of this retrospective analysis is to examine if chiropractic care utilizing Network Spinal Analysis (NSA) has a positive effect on heart rate variability (HRV) as an objective measure for autonomic nervous system function.

Clinical Features: 46 patients presented to a private practice for chiropractic care. The age of the patients ranged from 18 to 87 years. 29 subjects were female and 17 were male. Chief complaints ranged from musculoskeletal to visceral, while others were asymptomatic.

Intervention and Outcomes: This study was reviewed for human subjects' protection by the Institutional Review Board of the Foundation for Vertebral Subluxation in Kennesaw, GA USA. Each patient received an initial HRV score, as well as a 90-day HRV score. Throughout that duration, all subjects received spinal adjustments as per NSA care protocol. Of the four analyses comparing initial HRV to 90-day HRV scores, two groups were found to be highly significant ($p < 0.05$) —subjects with below average initial scores ($p = 0.0015$) and male subjects ($p = 0.0012$).

Conclusion: This study demonstrates that NSA care may be an effective method for people to improve their autonomic nervous system function through adjustment of vertebral subluxation, reorganizing spinal tension patterns and decreasing physiological stress.

KEYWORDS:

Vertebral subluxation, Network Spinal Analysis, cardiovascular disease, chiropractic, tone, heart rate variability, stress, autonomic nervous system, spinal entrainment, adjustment, coherence, reorganizational healing, dysautonomia

RESEARCH ACCESS:

[Find the full research paper here.](#) Only subscribers can access it. You can subscribe through the website.

Publication 6:

Sustained improvement of heart rate variability in patients undergoing a program of chiropractic care: A retrospective case series

RESEARCHERS:

Amy Haas, PhD, D.C.; David Russell, D.C.

ABSTRACT:

The purpose of this study was to report the sustained changes in heart rate variability (HRV) observed in 6 patients undergoing continuous chiropractic care for the correction of vertebral subluxations. **Clinical Features:** Six patients between 25 to 55 years of age all presented with primarily musculoskeletal complaints for chiropractic care in a private practice setting. All patients were nonsmokers with no reported cardiac pathology. All patients were initially assessed for indicators of vertebral subluxation before being accepted for chiropractic care and were monitored for changes in HRV scores over time. **Intervention and Outcomes:** Chiropractic care, using Diversified and Thompson techniques to correct vertebral subluxations, was provided for an initial period of 10 to 52 weeks (about 12 months) at a frequency of 2 to 3 visits per week. HRV, measured by SSDN, increased over the early part of their course of chiropractic care, and these increases were sustained whilst the patient remained under long term continuous care in all 6 patients. Improvements in SDNN ranged from 50% to greater than 300% as compared to pre-care values. **Conclusion:** Patients receiving continuous chiropractic care to correct vertebral subluxation demonstrated a sustained improvement in HRV. This novel finding objectively demonstrates long-term change consistent with improved neurophysiological regulation, adaptability and resilience in patients undergoing chiropractic care, and suggests the utility of chiropractic care for outcomes greater than only musculoskeletal improvements.

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publication 7:

Improvement in Physical Resilience and Management of ADHD in a 12-year-old Male under Chiropractic Care: A Case Report

RESEARCHERS:

Steinberg B, Postlethwaite R, McIvor C.

ABSTRACT:

Objective/Clinical Features: A 12-year-old male presented for chiropractic care with the primary concerns of ADHD, a mood disorder, and growing pains in his legs that had started a month prior. The patient had stopped taking Methylphenidate ER 30mg two weeks prior to presenting. Nerve function tests were performed (including paraspinal thermography, surface EMG and heart rate variability analysis). A prone leg check revealed a short right leg of one half an inch.

The right C1 was taut and tender, and the patient was positive for right cervical syndrome. Cervical spine x-rays were performed (including AP, lateral and AP open mouth). Relevant EMG and thermography findings included significant mid spine hypotonicity and significant imbalance in neural regulation confirming dysautonomia.

Intervention/Outcomes: The patient was seen twice a week for twelve weeks. During this time, Torque Release Technique (TRT) and analysis was used. After the 12 weeks, the patient was reassessed. The parents reported a decrease in leg pain, and a complete resolution of allergies and strep infection. The patient was less confrontational and generally had a more positive demeanor. The mid spine hypotonicity was returning to normal and there was a significant change seen in the thoraco-lumbar junction.

Conclusion: Chiropractic care for the reduction of vertebral subluxations may result in an improvement in physical resilience and the severity of ADHD related symptomatology. Further research is required.

KEYWORDS:

Chiropractic; Subluxation; Torque Release Technique; ADHD; resilience.

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publication 8:

The sympathetic nervous response in inflammation

RESEARCHERS:

Georg Pongratz and Rainer H Straub

ABSTRACT:

Over the past decades evidence has accumulated clearly demonstrating a pivotal role for the sympathetic nervous system (SNS) and its neurotransmitters in regulating inflammation. The first part of this review provides the reader with an overview showing that the interaction of the SNS with the immune system to control inflammation is strongly context-dependent (for example, depending on the activation state of the immune cell or neuro-transmitter concentration). In the second part we focus on autoimmune arthritis as a well investigated example for sympathetically controlled inflammation to show that the SNS and catecholamines play a differential role depending on the time point of ongoing disease. A model will be developed to explain the proinflammatory effects of the SNS in the early phase and the anti-inflammatory effects of catecholamines in the later phase of autoimmune arthritis. In the final part, a conceptual framework is discussed that shows that a major purpose of increased SNS activity is nourishment of a continuously activated immune system at a systemic level using energy-rich fuels (glucose, amino acids, lipids), while uncoupling from central nervous regulation occurs at sites of inflammation by repulsion of sympathetic fibers and local adrenoceptor regulation. This creates zones of 'permitted local inflammation.' However, if this 'inflammatory configuration' persists and is strong, as in autoimmunity, the effects are detrimental because of the resultant chronic catabolic state, leading to cachexia, high blood pressure, insulin resistance, and increased cardiovascular mortality, and so on. Today, the challenge is to translate this conceptual knowledge into clinical benefit.

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publication 9:

The vagal innervation of the gut and immune homeostasis

RESEARCHERS:

Gianluca Matteoli, Guy E Boeckxstaens

ABSTRACT:

The central nervous system interacts dynamically with the immune system to modulate inflammation through humoral and neural pathways. Recently, in animal models of sepsis, the vagus nerve (VN) has been proposed to play a crucial role in the regulation of the immune response, also referred to as the cholinergic anti-inflammatory pathway. The VN, through release of acetylcholine, dampens immune cell activation by interacting with α -7 nicotinic acetylcholine receptors.

Recent evidence suggests that the vagal innervation of the gastrointestinal tract also plays a major role in controlling intestinal immune activation. Indeed, VN electrical stimulation potently reduces intestinal inflammation restoring intestinal homeostasis, whereas vagotomy has the reverse effect. In this review, we will discuss the current understanding concerning the mechanisms and effects involved in the cholinergic anti-inflammatory pathway in the gastrointestinal tract.

Deeper investigation on this counter-regulatory neuroimmune mechanism will provide new insights in the crosstalk between the nervous and immune system leading to the identification of new therapeutic targets to treat intestinal immune disease

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publications supporting the use of INSIGHT Scanning: neuroCORE (EMG)

Publication 1:

Surface Electromyography in the Assessment of Changes in Paraspinal Muscle Activity Associated with Vertebral Subluxation: A Review

RESEARCHERS:

Christopher Kent, D.C.

ABSTRACT:

Electromyography is the technique of recording electrical potentials associated with muscular activity. Needle electrodes may be inserted in the muscle being monitored, or surface electrodes may be placed on the skin overlying the muscles being studied. Both techniques have been used for the examination of paraspinal and peripheral muscle function. However, surface EMG and needle EMG are not interchangeable procedures. This paper reviews the principles of static and dynamic surface electromyographic techniques. Issues of reliability and validity are addressed. The clinical application of SEMG procedures for the assessment of changes in paraspinal myoelectric activity associated with vertebral subluxation are described.

KEYWORDS:

Surface electromyography, needle electromyography, vertebral subluxation, paraspinal muscle activity

RESEARCH ACCESS:

[Find the full research paper here](#). Only subscribers can access it. You can subscribe through the website.

Publication 2:

Normative Data for Paraspinal Surface Electromyographic Scanning Using a 25–500 Hz Bandpass

RESEARCHERS:

Patrick Gentempo, Jr. D.C., Christopher Kent, D.C., Brett Hightower, D.C., Salvatore J. Minicozzi, D.C

ABSTRACT:

A protocol has been previously described for recording surface paraspinal electromyographic (SEMG) potentials at fifteen paired sites (4 cervical, 7 thoracic, 3 lumbar, 1 sacral) using a bandpass (range of sampled frequencies) of 100 - 200 Hz. In this paper, normative data from eighty human subjects are presented using this protocol and a 25 - 500 Hz bandpass. The advantages of a 25 - 500 Hz band-pass are discussed

KEYWORDS:

Surface Electromyography, Electromyographic Scanning, Chiropractic, Chiropractic Analysis

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publication 3:

The Clinical Application of Surface Electromyography as an Objective Measure of Change in the Chiropractic Assessment of Patient Progress: A Pilot Study

RESEARCHERS:

Simon Kelly, W. R. Boone, Ph.D., D.C.

ABSTRACT:

A pilot study was conducted to evaluate the application of sEMG, as recorded with the Insight 7000 TM Subluxation Station, to the chiropractic clinical setting as an objective measure of change in assessing patient progress.

The study revealed that intra-examiner reliability could be demonstrated through a paired two-tailed t-test which takes variation into consideration, rather than using correlation coefficients which could mask examiner error. Thirty patients under the care of 19 different supervised interns in a clinical teaching setting, were, over a four week period, administered a wide range of adjustments in accordance with a planned regimen of care. Findings revealed that all patients experienced a gradual to significant decline in sEMG activity in either the right and/or left side, in 14 of the 15 paraspinal muscular segments evaluated. This suggested a long term effect in sEMG activity changes, as opposed to a short term physiological response. Additional study is underway to evaluate inter-examiner reliability of the Insight 7000 Subluxation Station in the clinical teaching setting. Investigation is also planned to couple sEMG changes to other physical findings. This level of study is expected to contribute to an understanding of the clinical significance of the effects of the chiropractic adjustment on paraspinal muscular activity.

KEYWORDS:

Surface electromyography, EMG, sEMG, Insight 7000 Subluxation Station, muscle activity, vertebral subluxation, chiropractic clinical practice

RESEARCH ACCESS:

[Find the full research paper here.](#) Only subscribers can access it. You can subscribe through the website.

Publication 4:

sEMG Analysis of Lumbar Paraspinal Muscle Recruitment During Chiropractic Cervical Syndrome Evaluation: A Pilot Study

RESEARCHERS:

Alan Brewster, BS, DC & Claudia Seay, BS, DC

ABSTRACT:

Background: The cervical syndrome (CS) check has been used extensively in the practice of chiropractic, and there exist many robust theories concerning its neurological mechanism – from Thompson’s “innervational overload of the extensor muscles,” to Grostic’s “Dentate Ligament / Cord Distortion Hypothesis.” However, research on the effect of the cervical syndrome check on paraspinal muscles and the relationship to vertebral subluxation throughout the spine appears incomplete.

Methods: In this pilot study, sEMG was used to evaluate paraspinal muscle recruitment bilaterally at L1 during both actual and sham cervical syndrome checks. The investigator acquiring and analyzing the sEMG was blinded as to whether the subject performed an actual or sham CS maneuver, and whether a leg length inequality (LLI) change was elicited. For the purposes of this study, the only criterion was whether a leg length change occurred, without regard for the CS category of that change if one occurred.

Results: In the presence of an asymmetrical LLI change (an asymmetrical spinal/pelvic response), the proportional change of paraspinal recruitment was also asymmetrical. In the presence of a symmetrical LLI change (indicating a symmetrical spinal/pelvic response), the symmetry of paraspinal recruitment was high. No correlation of LLI to amplitude of paraspinal potentials was found.

Conclusion: There is a direct correlation between symmetry of prone LLI changes during bilateral cervical rotation and symmetry of bilateral changes in paraspinal muscle activity at L1. However, the sEMG potential during neutral head position is often asymmetrical, and amplitude of sEMG potentials is not correlated to laterality of LLI change. Because muscle palpation has often exhibited poor inter-examiner reliability, sEMG may provide a greater level of reliability for precise analysis of cervical syndrome and ultimately vertebral subluxation.

KEYWORDS:

sEMG, surface electromyography, cervical syndrome, chiropractic

RESEARCH ACCESS:

[Find the full research paper here.](#) Only subscribers can access it. You can subscribe through the website.

Publications supporting the use of INSIGHT Scanning: neuroTHERMAL

Publication 1:

Paraspinal Thermography in the Analysis and Management of Vertebral Subluxation: A Review of the Literature

RESEARCHERS:

Matthew McCoy DC, MPH

ABSTRACT:

Objective: Paraspinal thermal scanning has been utilized by chiropractors to characterize vertebral subluxation and monitor the outcome of chiropractic intervention since the profession's inception. Thermal scanning has been shown to be a valid and reliable procedure for measuring paraspinal temperatures and clinical studies to explore the clinical meaningfulness of these measures have been conducted. The objective of this paper was to review the literature on paraspinal thermal scanning in chiropractic practice related to subluxation.

Methods: A search of the chiropractic literature was performed via the Index to Chiropractic Literature and PubMed along with hand and stack searches of relevant papers found through reference sections of already gathered papers. Only papers dealing with the utilization of thermography in relation to chiropractic and vertebral subluxation or related concepts were included.

Results: 72 papers were found to meet these guidelines and were made the subject of this review. The existing literature on reliability of paraspinal thermal scanning shows good to excellent reliability for the technique and issues related to interpreter reliability and computerized analysis are being addressed. While some authors have inappropriately interpreted the thermal literature, basic and advanced concepts related to its clinical meaningfulness such as pattern analysis, health perception and the use of thermal scanning as an outcome assessment tool in the management of vertebral subluxation, have a formidable evidence base on which to draw.

Conclusion: For those interested in the use of paraspinal thermal scanning as an outcome assessment tool for addressing vertebral subluxation, the focus of research now needs to shift. There are several areas that need to be further explored including the issues related to reliability of interpretation, the clinical utility of pattern analysis, and the relationship between thermal readings and health outcomes.

KEYWORDS:

Thermography, thermal scanning, chiropractic, skin temperature, vertebral subluxation, outcome assessment

RESEARCH ACCESS:

[Find the full research paper here](#). Only subscribers can access it. You can subscribe through the website.

Publication 2:

Intra-Examiner and Inter-Examiner Reproducibility of Paraspinal Thermography

RESEARCHERS:

Matthew McCoy, Ismay Campbell, Pamela Stone, Curtis Fedorchuk, Sameera Wijayawardana, Kirk Easley

ABSTRACT:

Objective: The objective of this study was to evaluate the intra-examiner and inter-examiner reproducibility of paraspinal thermography using an infrared scanner.

Materials and Methods: The thermal functions of a commercially available infrared scanner (Insight Subluxation Station) were evaluated for clinical reliability. Two practicing clinicians conducted the measures on 100 subjects. Intra class correlation coefficients (ICCs) and concordance correlation coefficients (CCCs) were calculated from the collected data.

Results: Mean bilateral paraspinal skin temperature was 89.78F and ranged from 88.77F to 91.43F. Intra class correlation coefficients (ICCs) for agreement and consistency ranged from 0.959 to 0.976. Concordance correlation coefficients (CCCs) ranged from 0.783 to 0.859 with tight confidence intervals indicating robust estimates of these quantities.

Conclusion: This study revealed excellent intra-examiner and inter-examiner reproducibility of paraspinal thermography using a commercially available unit.

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publication 3:

Quantification of Thermal Asymmetry Part 1: Normal Values and Reproducibility

RESEARCHERS:

SUMIO UEMATSU, M.D.; DAVID H. EDWIN, PH.D.; WILLIAM R. JANKEL, PH.D.; JOSEPH KOZIKOWSKI, M.S.E.E.; and, MICHAEL TRATTNER, R.T.

ABSTRACT:

The use of thermography in evaluating nerve injury is based on the presence of temperature asymmetries between the involved area of innervation and the corresponding area on the opposite side of the body. However, interpretation of the thermographic image has been troubled by subjectivity. This paper describes a computer-calculated method of collecting data that eliminates subjective biases. Comprehensive normative data are presented on the degree of thermal asymmetry in the human body. The degree of thermal asymmetry between opposite sides of the body (ΔT) is very small. For example, the value of ΔT for the forehead (mean \pm standard deviation) was 0.18 degree \pm 0.18 degree C, for the leg it was 0.27 degree \pm 0.2 degree C, and for the foot it was 0.38 degree \pm 0.31 degree C. These values were reproducible in both short- and long-term follow-up measurements over a period of 5 years. The ΔT 's reported here were obtained from 40 matched regions of the body surface of 90 asymptomatic normal individuals. 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.

RESEARCH ACCESS:

[Find the full research paper here.](#)

Publication 4:

Mastoid Fossa Temperature Imbalances in the Presence of Interference Patterns: A Retrospective Analysis of 253 Cases

RESEARCHERS:

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ABSTRACT:

Objective: To determine how bilateral mastoid fossa asymmetry relates with other patterns of interference associated with vertebral subluxation analysis, employing state of the art thermography detection instrumentation.

Design: Bilateral thermographic mastoid fossa data for this study was compiled retrospectively by paraprofessionals from randomly selected “active patient files.” A paraprofessional trained in paraspinal thermographic scanning randomly selected patient files making note of case numbers to preclude the possibility of duplication of patients. “Active patient files” are case records of patients receiving care on a scheduled basis in accordance with the established plan of care. The active patient files consisted of 552 case files. Mastoid fossa data were extracted from 139 randomly selected patient visits from among those wherein the doctor had identified the presence of patterns of interference and receiving atlas adjustments; and 114 randomly selected patient visits without patterns of interference.

Methods: On all prior visits the following four criteria were used to determine the presence of a pattern of interference: cervical paraspinal thermographic scan; mastoid fossa temperature differential; spinal balance (Thompson-Derifield) leg length and cervical syndrome leg length tests. The Titron scanner, model C-3000 was used to compile all paraspinal thermographic data. The data was randomly collected from a population of 552 active patient files. 139 patient visits were selected that displayed patterns of interference and received atlas adjustments; and 114 patient visits without patterns of interference.

Results: In the absence of patterns of interference a tendency toward bilateral mastoid fossa temperature symmetry (55.26% of cases) was observed. In the presence of patterns of interference there was less of a tendency for bilateral mastoid fossa Temperature symmetry (32.0% of cases). When asymmetry was found the average difference in fossa temperatures exceeded those observed using conventional tools. In patients displaying the presence of patterns of interference the fossa temperature tended to be cooler on the side of atlas vertebra laterality (SOL). It was also observed that the pre-adjustment balanced temperatures were fewer than the number of post-adjustment balanced temperatures.

Conclusions: The data suggests that there is a tendency toward bilateral mastoid fossa thermographic symmetry, especially in the absence of patterns of interference. However, bilateral symmetry is less likely in the presence of interference patterns. Additionally, the magnitude of the temperature differential was found to be greater than experienced with earlier instrumentation. It was also noted that in the presence of interference patterns associated with atlas listings the mastoid fossa tends to be more frequently cooler on the side of atlas laterality.

KEYWORDS:

Thermography, paraspinal, pattern of interference, mastoid fossa, Chirometerâ, Titron, Neurocalometerâ, Neurocalographâ, vertebral subluxation

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