



The Chiropractic Vertebral Subluxation Part 7: Technics and Models From 1962 to 1980

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ABSTRACT

Objective: The purpose of this paper is to review and discuss the history of chiropractic vertebral subluxation (CVS) theories and models between 1962 and 1980.

Discussion: This period was marked by several innovative texts from Weiant, Homewood, and Harper, and Canadian Memorial Chiropractic College's *Segmental Neuropathy*. Technique developers during this period increased the complexity of models from upper cervical to full spine. The textbooks built upon previous theories, the scientific literature, work by Speransky, and instrumentation research. The texts influenced decades of research and theory. Weiant's book surveyed the medical and scientific literature on CVS. Harper integrated modern neurophysiology with D. D. Palmer's theories integrated with other chiropractic models based on research such as Weiant's photoelectric instrumentation. Homewood's book integrated Selye, Speransky, Verner, and several other models, which led to his neurodynamic model of CVS. *Segmental Neuropathy* was a completely new innovation of chiropractic theory with neurophysiology. Collaboration among authors developed into several new models. Chiropractic vertebral subluxation was viewed as a global neurological phenomenon and a neurodystrophic process. Technique models from Goodheart, Nimmo, Toftness, Ward, Gonstead, Grostic, Gregory, and Pierce laid the foundation for modern practices.

Conclusion: The CVS theories during this period were complex and almost unrecognizable from previous theories. The inclusion of every major theory laid the foundation for this period's wide set of models, research, and methods. (J Chiropr Humanit 2018;25:99-113)

Key Indexing Terms: Chiropractic; History

INTRODUCTION

The period from 1962 to 1980 in chiropractic was marked by development in chiropractic vertebral subluxation (CVS) models,¹⁻³ research with instrumentation,⁴⁻⁶ and methods of clinical application for CVS correction.⁷⁻¹⁰ Integration between these 3 areas pushed the profession forward. These developments coincided with new educational standards, the first chiropractic accrediting agency to be recognized by the US Department of Education, and inclusion of "subluxation" as the sole diagnosis for chiropractic in the Medicare program of the US Department of Health and Human Services.¹¹⁻¹⁵ All of these factors influenced shaping of chiropractic theories.

I suggest that theory development in chiropractic during these years can be classified into 3 broad groups: academic CVS models, empirical models based on instrumentation to

detect physiological changes associated with CVS, and CVS technic models. Integration of these areas led to increasingly complex neurological models.

The academic theories in this era were mainly developed in texts by Homewood,¹ Weiant,¹⁶ and Harper,¹⁷ and *Segmental Neuropathy*, written by Canadian Memorial Chiropractic College (CMCC) faculty, who were also technic and instrument innovators.¹⁸⁻²⁰ The models from these texts were integrated into technique development for decades. The instrumentation models spanned the profession and were summarized in several papers by Kimmel between 1961 and 1974. Several chiropractic techniques continued to develop independently during this era, such as upper cervical and full-spine models of Grostic, Gregory, Pettibon, Harrison, Gonstead, Cox, Fuhr, Pierce, Stillwagon, Whitehorne, Goodheart, Nimmo, Toftness, and Ward. Most of them combined ideas from the past and integrated some of the latest theories and neurological models.

Understanding the developments of CVS in this era may help interpret other important events from this time, such as the various consensus statements,²¹⁻²⁴ conferences,^{25,26} and histories that emerged.²⁷⁻²⁹ Ultimately, this history may provide another perspective for modern clinical practice and a richer understanding of the importance of CVS theory during this period (Fig 1).

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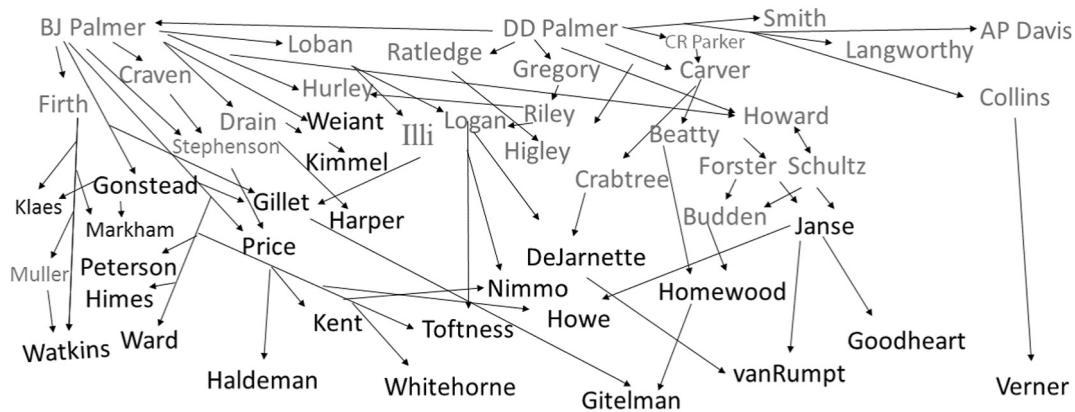


Fig 1. Theorists from 1962 to 1980 with some of their teachers and influencers.

The purpose of this article is to review 3 types of CVS models and to discuss new perspectives that emerged during this era, namely the stress perspective and the neurodystrophic perspective. The discussion section explores commonalities across models, which included the integration of earlier theories and the integration concepts from Speransky, Selye, and Korr, as well as reflex models and the latest technological innovations.³⁰⁻³⁷

DISCUSSION

Academic Models (1962-1980)

The 4 texts that had the greatest impact on CVS theory from this period were Weiant's *Medicine and Chiropractic*,¹⁶ Homewood's *Neurodynamics of the Vertebral Subluxation*,¹ Harper's *Anything Can Cause Anything*,¹⁷ and CMCC's *Segmental Neuropathy*.³⁸ Taken together, these texts represent a significant development in modeling.

Clarence Weiant. Clarence Weiant completed a degree in chemistry at Rensselaer Polytechnic Institute in 1918 and graduated from Palmer School of Chiropractic (PSC) in 1921. He taught at Texas Chiropractic College (TCC) from 1921 to 1924, during which time Drain was the new president. In 1927, he started teaching at the Eastern Chiropractic Institute in New York City as a professor of chemistry and physiology.³⁹ That same year he proposed that infrared light could detect hyperemia associated with CVS.⁴⁰ Weiant graduated from Columbia University with a bachelor's degree in anthropology in 1937 and a PhD in archaeology in 1943. The Eastern Chiropractic Institute became the Chiropractic Institute of New York (CINY) in 1944.

Weiant was dean of CINY from 1944 until 1966. He became research director of the National Chiropractic Association (NCA) in 1944, which was the predecessor of today's American Chiropractic Association (ACA). From 1945 to 1948, he was head of the Chiropractic Research

Foundation, the research branch of the NCA and precursor to the Foundation for Chiropractic Education and Research, and had his own laboratory facilities.³⁹ In 1953, Weiant and Verner published the second edition of their book *Rational Bacteriology* with R. J. Watkins as coauthor.⁴¹

Weiant developed the Visual Nerve Tracing (VNT) instrument, an infrared photographic instrument, in 1952.⁴² The VNT was based on the Analyte, which he invented with a physicist named Gravelle in 1927.⁴³ The VNT had 2 photoelectric cells, which were placed side by side over the vertebra. Light reflected in the blood vessels of the skin causes the cells to activate. Differences in the degree of vasodilation and vasoconstriction are picked up by the electronic equipment. He proposed that the readings demonstrated that acute CVS could cause inflammatory reactions.³⁷

In 1958, Weiant published *Medicine and Chiropractic* with Goldschmidt, who was a 1922 Carver graduate.^{16,44} In the first chapter, titled "Scope and Purpose of This Book," Weiant explained the improvements in chiropractic theory, research, and education. He wrote of the modern chiropractor, "He is not asked to accept chiropractic on faith. He comes to see it as that science whose field of enquiry is the relation of certain structural defects (particularly of the human vertebral column and pelvis) to functional disturbances and possible pathogenesis."¹⁶ Weiant's conception of chiropractic and CVS were congruent with D. D. Palmer's chiropractic paradigm. Weiant's "functional disturbances" and "possible pathogenesis" were also congruent with the way other chiropractors conceptualized the term "dis-ease" rather than disease. This was a distinction between treating pathology and addressing causes of pathophysiological processes.

The second edition of *Medicine and Chiropractic* was published in 1966, with updated material gathered from New York libraries by Arthur and Joel Goldschmidt. They retrieved over 300 references potentially related to the CVS in the medical and scientific literature.⁴⁵ The text included

some chiropractic references such as books by Forster and Illi^{46,47}; however, many of the references are from Russian and German researchers.¹⁶ One German physician found “the clue to chiropractic theory”⁴⁵ in the work of Pavlov, and another pursued chiropractic because of his interest in Speransky.⁴⁵ The book reviewed literature from Uruguay to the Soviet Union.

In 1964, Weiant summed up the research to that time. He wrote:

The crowning achievement of chiropractic in recent years has been the rigorous reformulation of chiropractic theory. Making use of all relevant modern data from the basic sciences, along with findings of our own major centers of chiropractic research, some of the best minds in our profession have produced a body of theory which no responsible scientist can ignore. It would appear that we are very close to a grand synthesis in this sphere.³

Weiant’s examples of “major centers of chiropractic research” included Illi’s and Janse’s Work, research directed at TCC by Harper, Homewood’s new “formidable” book, and Higley’s research at Los Angeles Chiropractic College on the intervertebral disc.³

A. Earl Homewood. In 1941, Homewood earned a doctor of physical therapy degree from Beatty’s University of Natural Healing Arts. Beatty was Carver’s nephew and Homewood’s mentor. In 1942, Homewood earned his doctor of chiropractic degree from Western States Chiropractic College while Budden (a former dean of National Chiropractic College) was president. In 1945, Homewood was one of the first faculty members of the new CMCC. In 1948, he earned a bachelor of therapeutic arts degree from Western States Chiropractic College. His thesis became the basis for his book. In 1952, he was named dean of CMCC and in 1959, its second president.⁴⁴ Homewood’s book was published in 1962 and went into 3 editions and was reprinted until 1981.¹ In 2015, a new reprint was issued.⁴⁸ Homewood wrote:

A subluxation in the chiropractic sense is not a partial dislocation (less than a luxation), but an alteration of the normal anatomical or physiological relationships, or dynamics, of contiguous structures. Biochemical, biomechanical, pathophysiological, radiological, subjective, and objective symptoms, and other manifestations demand attention, investigation and consideration in depth by every chiropractic physician.¹

Homewood’s definition was congruent with D. D. Palmer’s conception. Homewood made this distinction more explicitly than Palmer could have by using the latest anatomical and physiological literature. Homewood used the term *chiropractic subluxation* to capture that in chiropractic the term *subluxation* is not used by its medical

dictionary meaning but included many factors, such as biochemical, biomechanical, pathophysiological, as Homewood described.¹

Homewood relied on D. D. Palmer’s 1910 text as his base reference and described CVS as vertebrae within their normal range of motion “although not functioning at their optimum.” The term *fixation* captured this disturbance to normal vertebral function.¹ Homewood suggested that D. D. Palmer’s theory of “dis-ease” as too much or not enough functioning was correct. He hypothesized that the CVS excited neural structures, leading to the small intervertebral muscles contracting while the longer and superficial muscles were hypertonic. This allegedly related to an excess of efferent impulses. The tender areas around the CVS were thought to represent increased sensitivity.¹ Homewood acknowledged that the disturbance to neurological function was complicated and difficult to describe and clarify.¹ He wrote:

The writer would emphasize that each phase of the mechanism is but a portion of a complicated, interrelated, interacting, interdependent biological response of the body to a structural disrelation brought about by stresses, either of the external or internal environment or by a combination of many.¹

Homewood attributed the modern chiropractic use of the term *irritation* as the cause of disease to Beatty’s adaptation of D. D. Palmer’s theory.^{1,49} Irritation included any stress or strain from the environment. Mechanical, chemical, or mental stresses were thought to overcome the body’s resistance. This, in turn, was believed to cause CVS or structural distortions that interfered with the transmission of nerve force and irritated the nervous system. Following this line of logic, Homewood stated that the aforementioned processes would lead to disturbances of somatic or visceral function, symptoms, changes in tissues, and ultimately, disease. Homewood’s book contains extensive discussions, which are beyond the scope of this article, about causes and the role of CVS in disease (Fig 2).¹

Homewood integrated Seyle’s stress theory with chiropractic theory.³¹ There was a theoretical connection, which was amplified because Seyle did not write about the role of the nervous system. Homewood wrote, “Selye may be said to have investigated the ‘physiology’ of stress, whereas the chiropractic profession has concerned itself with the ‘anatomy’ of stress.”¹ Homewood also explored the mental and emotional aspects of stress regarding the psychovisceral reflexes in general. He cited Wilhelm Reich in relation to disturbed pelvic posture caused by mental and emotional attitudes toward sex.¹ He also cited Feldenkrais’ insights about decreased respiration, intestinal function, and sexual function in relation to anxiety, muscle tension, and neurotic symptoms.¹ Homewood suggested that these authors were describing elements of psychogenic CVS or those caused by emotional trauma. He also cited D. D. Palmer’s hypothesis that “autosuggestion” was a cause.⁵⁰

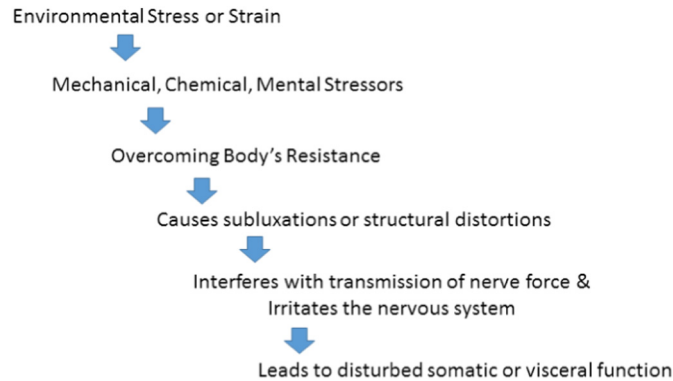


Fig 2. Homewood's model of subluxation etiology.

For patient analysis, Homewood recommended x-ray measurements developed by chiropractic radiologists, palpation, visual inspection, and plumbline analysis, including instruments like the panoramic plumbline posturometer developed at CMCC. He also recommended thermography and dermatomal analysis, especially for chronic CVS, which included the use of the VNT or infrared photographs. Palpation was said to possibly reveal tissue textures from a “slimy” feeling to a “skin-slip” feeling to the cord-like stringiness found with psychogenic CVS. Homewood described muscles associated with a fight-or-flight response as “stringy” with increased hypertonicity upon palpation. He recommended motion palpation and palpation for tender spots, which was related to D. D. Palmer’s method of nerve tracing.⁵⁰

Harper's Irritation Model (1964). William Harper earned a graduate degree in engineering at Massachusetts Institute of Technology in 1933. He graduated from TCC in 1942, during which time Drain was president. Drain recruited Harper to join

the faculty in 1949. Harper started publishing articles about physiology and diagnosis, D. D. Palmer’s model of CVS, irritation of the nervous system, and Speransky’s theory in the 1940s and 1950s.^{51,52} By 1965, when Harper became president of TCC, he had taught every course. In 1980, Janse invited Harper to write an autobiography, which Harper titled *The Man That Chiropractic Developed*.⁵³

Harper published a book in 1964 called *Anything Can Cause Anything*.^{2,52} Harper studied D. D. Palmer’s 1910 text for at least 10 years leading up to the publication of the book. In the book, Harper described D. D. Palmer’s chiropractic models in updated neurophysiological language.¹⁷ The main premise of *Anything Can Cause Anything* was that the environment could irritate the nervous system, which could cause CVS and then lead to impingement. This change was proposed to further irritate the nerves and cause changes in temperature with an increase or decrease of impulses. Normal function would then fall out of time with the needs of the organism. This abnormal function would be expected to lead to pathology (Fig 3).⁵³

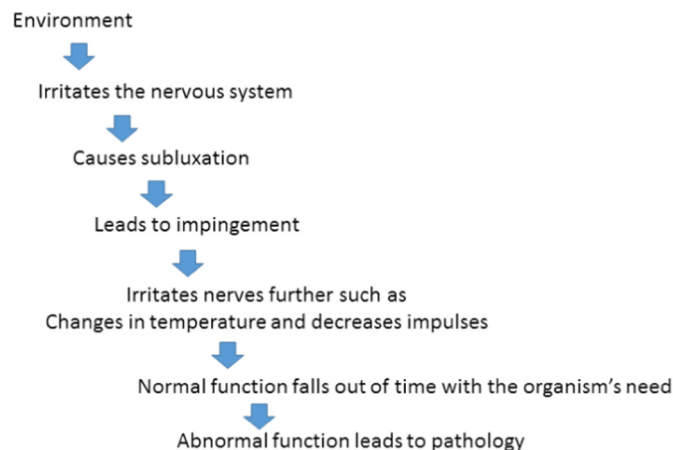


Fig 3. Harper's model of subluxation etiology.

Harper proposed that the irritated nerves could be traced to the vertebral level of the irritating CVS. Other indicators included contracted muscles, pain with movement, and symptoms related to the primary functions. The book contains extensive discussions of diagnosis, chiropractic application, and neurophysiology. Harper wrote:

The subluxation perpetuates disease because it perpetuates the irritation of the somatic afferent fibers in the supporting structures of the articulation, because the subluxation is a change in the environment of the nerves supplying the articulation, and the nerve, because of its property of irritability, gives warning of the change by impulse transmission.²

Harper emphasized that it is not the CVS itself that is of chiropractic concern but the irritation to the nervous system. He wrote, "if the subluxation is not irritating the nervous system, there would be no symptoms."² The irritation was said to cause the symptoms, such as pain, muscle contraction, and a change in visceral function (increased or decreased). If none of these symptoms existed, then there was considered to be no irritation and no reason to adjust the patient.²

Instrumentation Detection of CVS

Between 1962 and 1980, many innovations with x-ray analysis and a proliferation of instrumentation technologies intended to detect CVS occurred. Research into vasomotor activity was prominent.^{4-6,37,42,54} Palpation for heat differentials in relation to CVS patterns extends back to D. D. Palmer.⁵⁵ Instrumentation may have started in chiropractic in 1905, with Oakley Smith's invention of the "locometer," which was used to locate CVS based on marking hypersensitive areas of the spine.⁵⁶ In 1910, B. J. Palmer introduced x-ray analysis. In 1924, he introduced thermographic instrumentation using the neurocalometer invented by his student, engineer Dossa Evins.⁵⁷ In the 1930s, DeJarnette was the first to incorporate the literature on vasomotor activity into the models.⁵⁸ After that period many instruments came and went for the next 40 years.⁴² Some of the instruments were merely commercial ventures, and others were clinically relevant and furthered the CVS theories.⁶

Some instruments had an effect on theory and methodology development.^{42,59-68} Weiant developed his first photoelectric instrument to study vascular changes in 1927.⁴² By 1958, instrumentation had played a large part in his clinical research and CVS modeling.^{16,69} In 1964, Harper cited Weiant's photoelectric research and Gillet's analysis system, which also included instrumentation.^{17,43,70} Thermographic analysis played an important role in Gillet's investigations.⁷⁰ Weiant dedicated his book and his research on pelvic mechanics using x-ray analysis and dissection to

Illi.⁴⁵ Ward also cited Illi's research and expanded on it by including seated full-spine x-ray analysis.¹⁰ Kimmel,⁶ Pierce,⁴² and Peterson⁷¹ each found that thermographic instrumentation demonstrated a cold area that they hypothesized may be indicative of the CVS. The synchro-therme was an instrument developed by Peterson and studied at CMCC by Haldeman.⁵⁴ The text developed by CMCC in 1965 was used as the manual for synchro-therme trainings.¹⁸ Other technique developers relied on instrumentation and x-ray analysis, such as Nimmo,⁸ Toftness,⁹ Grostic,⁷² Gonstead,⁷³ Pierce,⁷⁴ and Ward.¹⁰

The scientific accuracy of instrumentation was reviewed by Kimmel starting in 1961.⁴⁻⁶ Edwin Kimmel attended CINY in 1949 at the height of Weiant's leadership in chiropractic research.⁷⁵ Kimmel was the research director for the NCA's Council on Psychotherapy from 1952 to 1964 and chairman of the Education Committee of the Chiropractic Association of New York. He was also a member of the New York Academy of Sciences and published articles for 45 years on chiropractic.⁷⁵ According to Weiant, Kimmel was "one of the driving forces in the political maneuvering that would force a re-write of the constitution and bylaws of the new ACA at its tumultuous convention in Denver in 1964."⁷⁵ He became a state delegate from New York of the new ACA in 1965.⁷⁵ Kimmel was on the faculty of CINY until its demise in the 1960s. He was an adjunct faculty at the Columbia Institute of Chiropractic (precursor to New York Chiropractic College) in the 1970s.⁷⁵ Between 1961 and 1974, Kimmel wrote several articles on instrumentation designed to detect CVS.⁴⁻⁶

In 1961, Kimmel critiqued 3 classes of chiropractic instrumentation.⁴ The first group included the thermoelectric instruments, the second group included bioelectric instruments, and the third group included photoelectric instruments (Fig 4). In the article, Kimmel suggested that there were several indications of the irritation caused by CVS, including redness, swelling, heat, pain, and local or distal functional impairments. He cautioned practitioners to use the best scientific evidence when interpreting data.⁴

In 1966, Kimmel updated his insights on the latest instrumentation in hopes of assisting practitioners in avoiding instruments that were not scientifically validated and embracing the best technological advancements in the field of bioelectronics.⁵ One of the main criticisms was not at what the instruments measured but on claims made based on interpretations. After almost 15 years of researching and writing on the topic, Kimmel wrote:

For a good many years we have been trying to justify, substantiate and validate chiropractic as a scientific discipline. Many of us realize that the need for valid instrumentation in modern chiropractic practice becomes more obvious as time progresses. It is well known that precise measurements are a necessary and basic part of the scientific doctrine. In

Thermo-electric instruments	Bio- electric instruments	Photo-electric instruments
NCM, neurocalograph, chirometer, analagraph, Thermo-scribe, Dermo-scope, Thermo-o-meter, Calor-o-meter, Super thermos- meter, Pyrometer, Neuro-pyro-meter, Unversil skin thermometer, Magnetic skin thermometer.	Micro-dynameter, Rx-Microtabulometer, Psychgalvanometer, Clinical Dermohmeter, Polygraph, Micro-neurometer, Psychroneurometer, Electro-psychometer, Index-o-meter, Neuro-micrometer, Bio-neurometer, Neuro-psychometer, Bio-electrometer, Analytic pocket PH meter, Galvano-psychometer, Nervoscope.	Spectro-photometer, the Colorscope, the Analyte, the Colorimeter, the Mercury-quartz light, the Ultraviolet light source, the Visual Nerve Tracing Instrument, the Photronic Dermatone Analyzer.

Fig 4. Kimmel's 3 classes of chiropractic instrumentation.

the past we have been somewhat naive in our quest for qualitative analytical information. We have allowed ourselves to be misdirected and misinformed by the dubious claims made by opportunistic manufacturers. Despite the fact that the most recent advances in scientific electronic technology may have been utilized in the manufacture of these instruments, up to now the validity of the findings has never been proven by dedicated, qualified, unbiased research. The chiropractors who have purchased these instruments have placed a great deal of value upon the findings, and as a result the entire profession is subject to criticism.³⁷

In the series, Kimmel presented his own thermoelectric research, which pointed to cold spots rather than hot spots as the point of vasomotor constriction that he thought were associated with CVS. He suggested that subclinical irritation can cause slight inflammation. For thermography and the sympathetic response to the irritation caused by the CVS, Kimmel suggested the inflammation may be a hot or cold subclinical tissue response.^{5,6,37}

In summing up his findings, he acknowledged that there was much more research to do to adequately demonstrate instrumentation's role in chiropractic. Nevertheless, he concluded that although more research was warranted, "There seems to be an increasing amount of evidence which supports the value of chiropractic instrumentation."⁶ He concluded that thermographic changes and unipolar thermoelectric instruments needed more investigation. He also suggested that the profession was being "hypercritical" about bioelectric instruments by dismissing them without

conducting proper scientific research. To the skeptics in the profession, he recommended that clinical information could be gathered with these instruments within limitations although chiropractors should continue to pursue scientific evidence, including the reporting of positive and negative results of research findings.³⁷ Kimmel was the first in the profession to reference R. O. Becker's early work on the bioelectric field around the body generated by the brain and cord.⁷⁶ Kimmel increased the level of academic standards in the field of chiropractic instrumentation.

Segmental Neuropathy (1965). *Segmental Neuropathy* was a book published by CMCC in 1965, with Peterson, Watkins, and Himes as the primary authors (Fig 5).³⁸ In 1962, Watkins had returned to CMCC after becoming one of the first diplomates in roentgenology.²⁶ He soon became chairman of the departments of technique, x-ray, diagnosis, and clinics, as well as assistant dean. Watkins oversaw the neurological aspects of the book.³⁸ Himes was a 1931 Palmer graduate and was named the head of the technique department at PSC in 1953, director of student clinics in 1958, and director of all Palmer clinics from 1959 to 1961. He became dean of CMCC in 1962.⁴⁴ Himes brought the Palmer philosophical perspective to the text. Himes invited an old Palmer associate, A. R. Peterson (a 1947 graduate of PSC), to join CMCC.⁷⁷ Peterson was the first author on the book.³⁸

Peterson developed a model of vasomotor regulation in 1964.⁷⁸ He hypothesized that the regulation was mediated through the sympathetic system spanning across specific zones corresponding to vertebral segments. Watkins wrote that this thermal regulation could be monitored as a "window into the inner workings of the nervous system,"²⁶ an extremely



Fig 5. *The first synchro-therme seminar Canadian Memorial Chiropractic College faculty: Shrubbs, Watkins, Peterson, and Himes. Image from the May/June 1965 issue of Digest of Chiropractic Economics and used with permission.*

sensitive indicator of early neural dysregulation. Hence the subtitle of the book: “The First Evidence of Developing Pathology.”³⁸ The vasomotor model included the hypothesis that CVS created a cold spot rather than a hot spot, as had been postulated in earlier works by other authors. This was also what Kimmel found, and it was the exact opposite of the Palmer “nerve-heat” concept associated with the neurocalometer.^{26,37,50,79}

Peterson, Watkins, and Himes taught a seminar series called “Vasomotor Monitoring,” which was based on learning to use the synchro-therme.⁷¹ The synchro-therme was developed by Peterson to independently measure bilateral thermographic radiations along the spine.²⁶ *Segmental Neuropathy* was developed for the course (Fig 6). The book integrated concepts from Speransky and Seyle with the principles of chiropractic without directly referencing either source. The text emphasized the integrated balance of health. The delicate balancing act of adaptation to the environment required an “intelligent” pattern.³⁸ Adaptation was viewed as adequate neural control. The inability to adapt, which could relate to any and every pathophysiology, ultimately represented less neurological control. The CVS was viewed as a “symptom of neural dysfunction” and a “cause of neural dysfunction.”³⁸ This reflex pattern was proposed to perpetuate itself in the nervous system in abnormal ways as a segmental neuropathy. According to this theory, the segmental integrity of the nervous system was the key to CVS, the quality of the nerve impulse, and the interaction of many reflex systems. Further, the authors wrote that the chiropractic adjustment disrupts the neuropathic process. They wrote:

Unless advances are made beyond old mechanical concepts, into concepts embracing the neurological factors associated in the disease process, one finds it difficult, if not impossible to explain the great paradox of chiropractic – that different adjusting techniques, based on conflicting premises, often produce the same impressive clinical results.

The vertebral subluxation becomes more subtly understandable when viewed as a symptom of an aberrant postural reflex, which is normally inter-segmentally associated through nerve networks located on each spinal cord level. Such sensory-motor neural control must be totally integrated to produce coordinated motion in the spinal column as a whole unit. The etiology of the vertebral subluxation may well be physiological or mechanical trauma to the proprioceptive fibers, a neurological insult to the nervous control mechanisms servicing the articulation. This action would result in a deranged appreciation by the appropriate spinal and cerebral centers of the position in space of the respective vertebrae.²⁶

They suggest that by understanding the complexity of the neurology associated with CVS, one can then understand the positive results often associated with so many different chiropractic methodologies.²⁶



Segmental Neuropathy

Fig 6. The cover of *Segmental Neuropathy* online edition.³⁸

Technic Models

Clinical innovation became both a strength and a fault for chiropractic. The strength came from tested methodologies that were reproduced by practitioners.⁷⁴ One of the faults was the economic incentive for technic instructors to sell their method, and another was the lack of research and research culture related to funding.⁸⁰ And yet, many technics that emerged during this period continue to be used in current clinical practice. A few examples demonstrate how these methodologies further increased the complexity of the definition of the CVS.

Groscopic's Model. By the 1960s, there were new research organizations exploring work originally developed by J. F. Grostic, a 1933 PSC graduate. After a neck injury in 1935 to which Grostic ascribed a relapse of Hodgkin's lymphoma, Grostic became a patient of B. J. Palmer's at the B. J. Palmer Research Clinic. His recovery under B. J. Palmer's care inspired him to investigate upper cervical analysis and chiropractic care. He was a founding member of the Palmer

Standardized Chiropractors Council in 1937. Palmer Standardized Chiropractors Council members shared their clinical research and notes in hopes of standardizing methodology.⁸¹

By 1939, Grostic taught his own procedure as a way to systematize the types of analysis that were implicit in B. J. Palmer's model but up until that point were difficult to teach. Grostic's procedure was based in part on pre and post x-ray analysis, which were taken during an initial exam and then again after the care plan was complete. For example, after examining the results of 80 pre and post x-rays, he modified his procedure to emphasize precision based on mechanics, mathematics, and physics. He developed x-ray procedures to reduce patient exposure and maximize clinical results, and procedures of patient setup and x-ray measurement techniques led to new methods for determining atlas laterality as well as axis and occipital condyle angles and occipitoatlantal rotation. He developed a supine leg check to help determine neurological interference. By 1957, Grostic developed an adjustment procedure that included a light thrust.⁸¹

Upper Cervical Models. The branches of upper CVS correction methods, which started with B. J. Palmer in the 1930s, developed into 3 streams during this period.⁷⁴ Most of the upper cervical analysis and correction models were developed from students of Grostic and B. J. Palmer. Orthospinality technique adhered mainly to Grostic's original models, although it used an instrument to adjust, whereas Grostic used his hands. Orthospinality was taught at several chiropractic colleges.^{74,81} The National Upper Cervical Chiropractic Association was started by Ralph Gregory. Gregory was a 1939 PSC graduate and a student of Grostic. By 1969, Gregory concluded that his 25 years of clinical observations demonstrated every distortion of the full spine and pelvis originated from an upper cervical subluxation.⁸² The National Upper Cervical Chiropractic Association had been publishing a monograph with research findings since 1973. Atlas Orthogonal technique was started by Roy Sweat in 1981 and was taught at several chiropractic colleges.

Full-Spine Models. Several full-spine technic developers, such as Pettibon and Harrison,⁷⁴ were descendants of the hole-in-one technic.⁷⁴ Pettibon viewed the entire spine as a functional unit and that the goal of chiropractic should be to relate "the subluxated spine optimally to its environment."⁷⁴ He developed a full-spine x-ray analysis system based on the biomechanical view of spinal posture. Harrison developed chiropractic biophysics after he stopped working with Pettibon in 1980.⁷⁴ Pettibon and Harrison followed the postural school of thought initiated by Carver.⁸³ Harrison and his students developed a mathematical modeling of what he considered the "ideal" spine.⁷⁴

Gonstead's Model. The Gonstead seminars were launched in 1954 by Ted Markham and Marv Klaes, who were the first instructors of Clarence Gonstead's methods.⁸⁴ Both studied under Firth and were Lincoln Chiropractic College

graduates. It is likely they applied Firth's disc theories to explain Gonstead's methods.⁸⁵ Gonstead learned the Palmer Technic system from Firth and others during the 1920s.⁸⁶ Gonstead used instrumentation and x-ray analysis coupled with extensive clinical practice to develop his own methods and analysis.⁸⁴ Gonstead expanded on his discopathy model of CVS theory after conducting cadaver studies at Lincoln Chiropractic College. His model was based on stages starting with fixation, then misalignment, which he proposed would lead to disc damage and then nerve interference.⁷⁴

James Cox's Flexion-Distraction Approach. James Cox, a 1963 graduate of National Chiropractic College, developed a model of spinal dysfunction that is based on vertebral movement and intervertebral disc function. It is not clear whether Cox uses the term *subluxation* in his model. He has incorporated concepts from a traction table originally developed by McManis in 1918 for the osteopathic profession. Cooperstein and Gleberzon wrote that the flexion-distraction approach was designed to "improve vertebral motion and positional relationships, free up longitudinal adhesions, relieve nerve root pressure, separate the facet joints, improve circulation in and around the intervertebral foramina, improve metabolite transport into the disks, and reduce hydrostatic pressure in the disks."⁷⁴ Many of these elements were congruent with elements from other models.⁷⁴

Fuhr's Model. Arlan Fuhr graduated from Logan College of Chiropractic in 1961. His model includes theories of Logan, Derifield, Thompson, and Van Rumpt.⁷⁴ Fuhr's model is that the segment is hyperirritated, especially the anterior and inferior sacrum, which leads to contracture of paraspinal muscles, which leads to a short leg. Biomechanical torsion of the pelvis is thought to causes a facilitation of the muscles as a result of CVS.^{74,87} Fuhr developed an instrument called the Activator to deliver the thrust of an adjustment.

Pierce, Stillwagon, and Whitehorne's Model. Pierce, Stillwagon, and Whitehorne developed a model in the 1960s that had roots in the thermographic pattern analysis developed at the Palmer School of Chiropractic and J. Clay Thompson's full-spine approach.⁷⁴ Whitehorne was dean at Columbia Institute of New York. Pierce and Stillwagon each had private clinics and taught postgraduate seminars with Whitehorne.⁸⁸ The model is usually attributed to Pierce and Stillwagon. However, it was Whitehorne, a 1947 PSC graduate, who brought the upper-cervical perspective to the model. For this reason, Epstein, who was a student of the 3, suggests that it should truly be referred to as Pierce-Stillwagon-Whitehorne technic.⁸⁹

Their methods of CVS detection included leg checks, x-rays, palpation, and instrumentation. Thermography was used to measure physiological changes, and the other methods were used to detect anatomical changes.⁷⁴ In their full-spine approach, CVS of the cervical and pelvic spine

were viewed as causes of compensations in the lumbar and thoracic spine. They emphasized CVS of C1, C2, C5, and the pelvis including the sacrum. They hypothesized that correction of CVS was to restore normal function to the autonomic system and normalize blood flow in the tissues, which was determined by changes in the thermographic patterns.⁷⁴ In 1963, Pierce developed the dermathermograph, which was a single-probe infrared device. By 1983, it was modified to the DT-25, and Stillwagon developed the Visi-Therm.^{42,74}

Goodheart's Applied Kinesiology (1964). In 1964, George Goodheart, Jr. presented his first seminar on applied kinesiology (AK).⁷ The seminar notes were brief, with only 7 pages of text supplemented by instructions on testing specific muscles from Kendall and Kendall's text, *Muscles: Testing and Function*.⁷⁸ Goodheart recounted his innovative discovery that in musculoskeletal imbalances the primary fault is not the hypertonic muscle spasm, but instead lies in the hypotonic weak antagonist. He also described his discovery of nodules at the origin or insertion of these weak muscles and how he found that applying heavy pressure on these nodules almost immediately strengthens the weak muscle. This was the original origin-insertion technique and was the entirety of AK in 1964.⁷

The remainder of the original seminar notes described the use of manual muscle testing to locate the weak muscle and identify the origin and insertion for the site of technique application. Goodheart emphasized observation of postural patterns. The foreword states: "A chiropractic analysis consists of many things, but it consists first and foremost of what we see. Second, what we feel, and third, what the x-ray, tells us. What you feel is of great importance, but what you see is of even greater importance."⁷

He added the use of muscle testing as an indicator of physiologic response to not only locating the site of CVS through a vertebral challenge of the intrinsic muscles, but to identifying the ideal line of drive and, after the adjustment, to test whether or not it was effective.⁷ Under different names, the use of manual muscle testing to evaluate functional response has since spread beyond the profession to a variety of disciplines.⁹⁰

Nimmo's Theory (1973). Raymond Nimmo was a 1926 PSC graduate. He studied Logan Basic technique in 1935. In the 1940s and 1950s he developed his own methods, which integrated his study of fascia release and Travell's trigger-point work. In 1973, Vannerson and Nimmo proposed that CVS was a neuropathic process involving at least 1 segment of the spine. They suggested that CVS were not fixations but "sensitive areas"⁸ with a lowered threshold of facilitation. The misalignment was thought to be secondary to the vicious and chronic neural process activating the hypertonic muscles. Vannerson and Nimmo preferred the term *noxious generative points* to the term *subluxation*.^{8,74} This is another proposed change to

terminology, although Cooperstein and Gleberzon considered their term synonymous with subluxation.⁷⁴

Toftness' Model. Irving N. Toftness was a 1928 graduate of PSC. He started as a hole-in-one practitioner as proposed by B. J. Palmer and then embraced Logan Basic technique. Toftness eventually integrated the 2 with a focus on C1, C2, C3, C4, and the sacrum. Toftness included several of D. D. Palmer's concepts in his rationale, such as that the neuroskeleton was a regulator of tension, which was integrated into his stress theory.⁹ According to Toftness, the excitation caused by the CVS was transmitted to the brain as nerve stress or nerve energy, which led to disease. Toftness believed that CVS moved around the tension frame as a type of adaptation to stressors. Until the stress was gone, the body would shift the stress from one articulation to another. He posited that CVS gave off detectable energetic radiations and developed the Toftness Radiation Detector as the central part of his analysis.⁹

Ward's Spinal Stress Model (1980). Lowell Ward graduated from the PSC in 1959 when B. J. Palmer was president. Ward's spinal stress model was an integration of chiropractic theory including Illi's work, Selye's stress model, and Breig's biomechanics of the central nervous system.¹⁰ Ward was among the first within chiropractic to take up Selye's call to develop ways to measure stress and also one of the first to integrate Breig's paradigm of spinal cord biomechanics into practice.⁹¹ Ward used thousands of pre and post x-rays to develop a postural assessment analysis that led to the creation of his spinal stressology technique.¹⁰ Pre x-rays were taken on initial exam and post x-rays were taken after the care plan was complete.

Ward worked with an aerospace engineer named Fulkerson starting in 1966⁹² to develop a measurement system designed to detect Selye's stages of stress in the spinal system. The 4 levels of spinal stress were alarm, resistance, exhaustion, and irreversible exhaustion. He viewed the spine's reaction to stress as 1 functional unit and developed several postural typologies that he suggested were related to personality typologies.¹⁰

Ward proposed a change to CVS terminology. Instead of using the term *subluxation*, he felt that the profession should use *biomechanical dysfunction*. Subluxation, according to Ward, occurred in the spinal column-pelvic-meningeal system. He considered CVS as an "intra-spinal vertebral stress fixation."¹⁰ He also considered it "any vertebra within the spinal column that is fixed in a position that turns the spine away from its vertical center line as seen on the anterior-posterior x-ray view."¹⁰

Ward considered a lack of spinal integrity to be a loss of wholeness for the spine. When spinal column integrity was lost, the spine, nerves, and body must adapt and continue to function, often to deal with stressors. Ward felt that over time stress accelerators lead to destructive breakdown.¹⁰ Ward postulated that spinal column primary stressors included trauma, neurological overloading, and structural

malformations. Secondary stressors included atlas position being compromised and coccygeal dysfunction. He proposed that these 2 distal ends of the spine were the first to respond to primary stressors and then act to initiate new stressors. Other secondary stressors were thought to be imbalance of muscles and ligaments, functional short leg, and "spine-spinal cord behavioral stress patterns."¹⁰ He considered the functional short leg to be an indication of spinal cord meningeal stress fixations and integrated with Breig's paradigm of dynamic cord length.¹⁰

Goodheart endorsed Ward's stressology. He wrote:

To me, Dr. Ward's system of x-ray analysis in his suggestion that the total spinal column pelvic unit should be observed and measured is the "sine quanon" of the profession.

In fact, I think Dr. Ward's spinal column stressology is possibly the most unique concept variation that has been developed within all our profession. The concept that the total spine has the potential of increasing and decreasing in spinal length as well as the relative fixed positioning that can be both observed and quantified will fit very closely into and correlate with the Applied Kinesiology Approaches.¹⁰

Ward may have been the first in the chiropractic profession to study the adaptive change from standing to seated spinal posture using x-ray analysis. Ward hypothesized that the spine should adapt synchronously in both positions and that not doing so was indicative of dysfunction and meningeal tension.¹⁰

New Perspectives

At least 2 new CVS perspectives emerged during this era: the stress perspective and the neuropathic perspective. Like other new perspectives, including the instrumentation perspective, once they became adopted by the profession, CVS theory and CVS models were changed. Any discussion after this period that does not include these new perspectives would be incomplete because it would neglect the increasingly complex ways the CVS was accepted and integrated into the profession.

The Stress Perspective. The first mentions of Selye's works in the chiropractic literature were written in the 1950s by Muller, Verner, and Del Pino.⁹³⁻⁹⁵ All 3 acknowledged that chiropractic theory contributed to the stress literature by including the role of the nervous system. Homewood noted that Selye discovered the physiology and chiropractic the anatomy of stress.¹ Toftness also used stress models to understand how CVS moved from place to place on the neuroskeleton tension framework.⁹ This was an integration of D. D. Palmer's models with Selye in a novel way.

Ward included a measurement system to observe the stages of stress on the spine.¹⁰ He also modeled the stress response for the spine as a psychophysical functional whole. Ward's concept of the spinal system as a circuit responding to overload cited B. J. Palmer's original use of that metaphor in 1907 and republished in 1920.^{10,96} Ward integrated stress models of the spine with Breig's biomechanics of the spinal cord and a dynamic x-ray analysis.^{10,91}

Ward also foreshadowed the theory of allostasis, which updated homeostasis models and coupled them to stress loading and the nervous system.^{10,97,98} Ward's concept of neurological overloading, which was multifactorial, is consistent with the way overloading is used in allostatic theory.^{10,99} Allostasis is an important research paradigm for the chiropractic profession to explore.

The Neuropathic Perspective. Peterson, Himes, and Watkins integrated their findings with the models of Speransky and Selye.³⁸ They thought that the cold areas of the spine indicated neuropathic lesions that were self-perpetuating and initially protective. This model of the protective nature of the CVS (because of dysfunctional neurological reflex systems and stress) extends back to D. D. Palmer. Their approach was integrated with the models that developed in the PSC under B. J. Palmer.^{79,100}

Common in the works of Verner, Weiant, Homewood, and Harper, and in their *Segmental Neuropathy*, was a view that CVS was both a symptom of neural dysfunction and a cause of neural dysfunction.^{1,2,38,45,93} Homewood took D. D.'s theory of the excitation of neural structures and linked it to the reflex and proprioceptive models already suggested by Verner, Heintze, Watkins, and Janse.^{1,34,93,101,102} Homewood wrote that "The tender areas around the subluxation represent increased sensitivity."¹ According to many of the theorists, this led to contracted musculature, which was often unilateral, leading to a short leg reaction. Phillips wrote about this as a flexor reflex or "an irritable reflex mechanism."³³ Harper pioneered the integration of D. D. Palmer's use of irritation and also described a neuropathic perspective of CVS.⁵⁰ The inclusion of Korr's facilitation perspective was soon integrated with the neuropathic perspective, which led to the most advanced models to date. As Watkins noted in 1966, the neuropathy precedes the neurodystrophic process.

Analysis

The period from 1962 to 1980 demonstrated a new level of maturity in models of CVS theory. Perspectives from the past were integrated with the latest perspectives on Selye's stress syndrome, Korr's facilitation hypothesis, and research from other fields, which included neurophysiological and pathophysiological concepts. Reflex models and Korr's facilitation hypothesis influenced several technique and CVS models from academics. Biomechanical perspectives were highlighted in technique developments of this

era. Instrumentation shaped the theories as well. The neurodystrophic perspective was included in most of the major texts. Other commonalities that should be highlighted were the influence of Speransky, Selye, and Korr; the impact of Verner and the Palmers; the thought-leadership of CMCC; and a new focus on CVS terminology.

The concepts from Speransky and Selye had been integrated into the chiropractic literature since the 1930s.^{26,95,103-106} In these theories, chiropractors found congruence of Selye's work with the chiropractic paradigm. Early chiropractic was criticized for, among other things, holding a unitary concept of disease: interference with the nervous system. Speransky and Selye put forth just such concepts.^{30,31} Selye was an endocrinologist and originally thought the stress response was solely hormonal.³¹ He eventually conceded the nervous system or endogenous mentally generated stress was the main driver.¹⁰⁷ Selye and Speransky had become commonplace in the chiropractic literature by the 1950s,^{94,95} and both were integrated into technique models during the 1970s.^{9,10}

Even though reflex models of adjusting had been used in chiropractic since the 1930s,^{108,109} these models reached new levels of complexity between 1962 and 1980 based on the integration of the latest neurophysiology.^{33,35,110,111} Reflex models had an effect on theories and technique development by chiropractors such as Watkins²⁶ and Goodheart.⁷

Korr was an osteopathic researcher whose research focus was congruent with chiropractic theory, namely the reflex mechanisms associated with CVS. Korr integrated reflex models and was inspired by Speransky, when he developed the concept of the "facilitated segment" to account for neural consequences of spinal "lesions" based on experimental observations that he made with Denslow.^{32,112} Korr's facilitated segment was adopted by chiropractors and integrated with other theories and clinical applications.^{8,25}

The impact that B. J. Palmer had on theories from this period is not obvious by studying references in textbooks. Some theorists appear to have used B. J. Palmer's ideas but did not include references to him. Ideas that seem to have been B. J. Palmer's were attributed to other sources. Direct influence from B. J. included his influence on the models of his students, including Grostic, Whitehorne, Himes, Nimmo, Toftness, Ward, Gregory, Peterson, and Weiant. Most of these PSC graduates broke from B. J. Palmer's theories in some way. Several indirect influences could be inferred through second-generation students, such as Watkins and Muller, who studied under Firth, and Harper, who studied under Drain.

Indirectly, B. J. Palmer had an effect on other theorists. For example, Harper's text contains a notable lack of reference to B. J. Palmer even though he cited other chiropractic authors including D. D. Palmer, Drain, Janse, Firth, Weiant, Verner, Gillet, Kimmel, and Muller.¹⁷ Harper

equated D. D.'s concept of tone to irritability. However, he mistakenly attributed the simple cell cycle to D. D. Palmer rather than B. J. Palmer. Harper described the process of sensory input, impulse transmission to the brain, interpretation, and function. This describes B. J. Palmer's cycle of life and parts of his normal complete cycle.^{96,113} Perhaps Harper learned of the cycle from Drain, his mentor. Drain studied with both Palmers and quoted from their books.¹¹⁴ According to Jim Russell, a 1949 TCC graduate, B. J. Palmer's books could not be found on campus in the 1940s.¹¹⁵ Harper's book was a standard reference in the literature during the 1960s to 1980s.¹¹⁶ Harper's line of thinking is a development of D. D. Palmer's thinking, but it also integrates Drain's perspective, which was mostly developed from B. J. Palmer, who emphasized the interference rather than the irritation.

In some instances, the only way to truly know of B. J. Palmer's impact is to understand the history of ideas in chiropractic. For example, like Harper, Homewood did not reference B. J. Palmer.¹ However, he described the interference model of CVS and the cord pressure model. Both were originated by B. J. Palmer.^{96,113,117} It is possible that he was unaware of B. J. Palmer's early writings on these topic because his teachers were Beatty and Budden, both of whom came from schools that were rivals of B. J. Palmer's school.

One technique manual and 3 major texts were authored by CMCC faculty members between 1948 and 1965. First was the CMCC technique manual that was a collaboration of Watkins, Homewood, and other faculty.¹⁹ The 3 books included Muller's *Chiropractic and Autonomics*,⁹⁵ Homewood's *Neurodynamics of Vertebral Subluxation*,¹ and Peterson and colleagues' *Segmental Neuropathy*.³⁸ CMCC was the first professionally owned school, which meant that it was a not-for-profit and governed by a board. The initial goal was to hire the best faculty. Muller, Watkins, Himes, Homewood, Peterson, Gitelman, Faye, and Haldeman all contributed to the thought leadership of the profession. Haldeman noted in 1973 that this school more than any other was influenced by Verner.²⁸ Collaborations and papers from CMCC spread to other institutions and the entire profession well into the 1990s.

In 1965, DeJarnette, the developer of sacro-occipital technique and author of several chiropractic texts,^{58,109,118} recommended that the profession stop philosophizing about the existence of CVS and continue to determine what constitutes it, because it "has become the Rock of Gibraltar of this profession."¹¹⁹ This attitude was common from 1962 to 1980 and was born of new levels of sophistication of theories and maturation of techniques.^{1-3,7-10,24,26,27,74}

One of the first calls in the literature to remove the term *subluxation* was first published during this time. It came in a letter to the editor from P. E. Brown in a 1966 issue of the *ACA Journal Chiropractic*.¹²⁰ He wrote, "The term as used is an incorrect one! ...Why not discard the term once and for all and use acceptable, understandable language that is used in the healing arts field?"¹²⁰ Not much biographical data exist in the literature about Brown except that he

received the ACA Meritorious Service Award in 1975.¹²¹ According to his argument, chiropractors were using the word incorrectly by defining it neurologically because the medical dictionary definition of *subluxation* means "partial dislocation." His critique may have been a response to DeJarnette.¹¹⁹ Nevertheless, his suggestion that aimed to bring the profession's lexicon more in alignment with orthodox medicine and the accepted scientific literature seemed to be influential. Although Brown is not known to be the originator of the movement to stop using the term, by the 1970s some academics, researchers, and theorists were developing alternative terminology to describe the CVS.^{27,122-125}

Limitations

This work is limited by the interpretations of the author. Others may analyze this material differently and derive alternative conclusions. The paper is also restricted by the availability of literature from the period. Systematic methods of literature searching using a standard set of terms and Boolean operators would have been more reproducible methods and may have yielded more literature.

CONCLUSION

This period was prolific for new CVS models, driven by integration of scientific theory and commercial investments in instrumentation to detect CVS. The theories between 1962 and 1980 laid the foundation for many major theories of the modern era. Texts from Weiant, Homewood, Harper, Peterson, Watkins, and Himes formed a new theoretical framework for modern chiropractic based on previous theory leading back to D. D. Palmer. Technique developments during this time innovated on traditional models such as upper cervical and full-spine adjusting and also integrated new theories, such as Selye's stress theory and Breig's biomechanics of the central nervous system. By understanding the models from this era, a foundation for modern chiropractic theory and practice may be established. Research into the hypotheses, instrumentation protocols, and assessment methods may still prove fruitful in the profession because new research designs could be applied to CVS models from the past.

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Practical Applications

- This series of articles provides an interpretation of the history and development of chiropractic vertebral subluxation theories.
- This series aims to assist modern chiropractors to interpret the literature and develop new research plans.

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