

# Advances in Paraspinal Thermographic Analysis

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## Abstract

Basic theory and common practice in temperature-based chiropractic assessment procedures and instrumentation are reviewed. Segmental spinal thermoregulatory function is presented as a refining mechanism for hypothalamic core-temperature control. Spinal nerve-cell-body function is suggested as the primary mechanism responsible for the asymmetries and anomalies commonly observed in paraspinal and other thermograms. Paraspinal cutaneous thermal asymmetries and anomalies are shown to be suggestive of various pathophysiological alterations, and in particular, the vertebral subluxation complex (VSC). Scientific hypotheses and experimental data relevant to historical and present diagnostic paraspinal thermography are presented, along with a review of representative instrumentation. The potential impact on chiropractic of these postulations, and of newly available, high-precision, computerized spot-radiometry (spot infrared thermography) is examined.

KeyWords: Chiropractic, Thermography and Thermo-regulation.

## BACKGROUND

Paraspinal cutaneous thermal anomalies have long been held to be suggestive of vertebral subluxation. A review of analytical theories relating to thermography and its use in chiropractic indicated a need for a more complete understanding of the relationship between thermographic data and spinal health. In this study we completed an in-depth review of literature relating to cutaneous thermography, analyzed the basic theory of commonly used instrumentation and postulated new concepts relating to paraspinal thermoceptive neuronal sympathetic function.

### Chiropractic - The Early Leader

Historically, temperature measurement has been the most common objective diagnostic modality in health practice. Thermal measurement devices range from simple mercury-in-glass thermometers for core temperature measurement to highly sophisticated thermographic imagers that provide a "picture" of variations in the heat radiated from the skin. In the 1920s, Chiropractors launched into thermography with the Neurocalometer developed by B. J. Palmer and Dossa Evans. This instrument incorporates dual thermocouple thermometers that are mounted two inches apart. Electrically, the thermocouples are differentially connected and their output drives a strip-chart recorder. When the dual thermocouple is moved along the paraspinal skin, the recorder trace represents a scan of differential temperatures.<sup>1,2</sup> The early chiropractic investigators lacked the advantages of modern computerized equipment and rigorous analytical techniques. They did, however, pioneer in the development of these three physiological postulations upon which most clinical cutaneous thermography is based:

1. The human body is segmented into "dermatomes"; 2. Side-to-side skin temperatures are generally symmetrical unless dysfunction exists; 3. Any anomalous deviation from a gradually increasing paraspinal skin temperature from S2 to C1 may suggest the vertebral subluxation complex (VSC) or remote dysfunction.<sup>1-3</sup>

There are far reaching health implications in these postulations because they suggest that paraspinal thermography should provide a "window" into the entire sympathetic nervous system.<sup>4</sup>

### Theory and Practice in Thermo Graphic Assessment

Modern medical theories and clinical findings parallel many of the early thermographic concepts related to chiropractic assessment procedures. As thermal detectors are moved upward from S2 to C1, the NCM and several other chiropractic instruments produce strip chart recorder traces that represent variations in the temperature difference across the spine. Significant temperature anomalies, or "breaks," are said to be suggestive of a VSC.<sup>1-3,5,6</sup> Many investigators have also theorized that any consistent "pattern" in spinal temperature differentials also suggests a VSC. This is the "pattern of interference" theory which proposes that interference with neuronal function at the spinal level creates side-to-side paraspinal thermal anomalies that may persist until the eliciting VSC is corrected.<sup>7</sup> Some practitioners employ analogous single-trace thermography that provides a strip-chart record of the actual temperature along one side of the spine, usually from S2 to C1. Thermal anomalies in these single-measurement traces are also said to suggest the location of a VSC.<sup>6</sup> Recent thermographic developments also include low-resolution and high-resolution imaging systems and liquid crystal contact sheets. Such "imagers" display grey-scale or color "pictures" representing the thermal pattern of a large skin territory on a video monitor or a flexible sheet. Thermal anomalies