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Thermography in Clinical Practice: The Rebuttal

By David BenEliyahu

Editor's note: We've received a mountain of mail reacting to Dr. Croft's May 7th column in *Dynamic Chiropractic*, "Thermography in Soft Tissue Trauma: Does It Have a Place?" While we can't print all those letters (we did print one in the 6-18 issue), our columnist on thermography Dr. BenEliyahu has chosen to respond to Dr. Croft's article.

Referring out for many studies and not being pleased with the interpretation is something that happens in all fields. I have referred out for hundreds of EMGs and auditory and visual evoked response testing, whose results often do not match the clinical picture or correlate with MRI/CT findings. Many doctors I speak to have made the same observation. With Dr. Croft's rationale, should we now discontinue the use of those tests as well?

In raising the question of lack of specificity, sensitivity, and most of all Dr. Croft's biggest alleged concerns of predictive value, it is clear that his literature review was very limited in scope and that maybe "drip" would be a better descriptive term than "pour" for his literature review. Twenty-one references are hardly an exhaustive effort. Sensitivity and specificity studies have been published throughout the literature showing the unequivocal value of thermography in clinical practice. Simply saying those studies are all inferior is analogous to the medical profession stating the British study and RAND study were all inferior and do not prove anything about chiropractic efficacy.

Brainstem auditory evoked response and bone scan both have low specificity but are established in clinical practice. Thermography which has proven itself over and over for its specificity of dysautonomia and vasomotor dysfunction, has had an unparalleled double standard of research rigor applied to its acceptance. While scientific scrutiny and questions are healthy for the continued growth of a science, scientific prejudice and bias have no place, but all too often permeate to the disadvantage of the patient's welfare. What I also find interesting is the conspicuous absence of Uematsu's work on low back pain and sciatica where he

describes thermography's predictive value of 94.7 percent. Dr. Croft was so interested in predictive value, yet could not find it in his own quoted reference.¹ As a matter of fact, it was on page 556. Uematsu's article also points to thermography's specificity for nerve impingement at a very respectable 87.5 percent. It should be noted that this work was published in the Journal of Neurosurgery and passed through their rigorous peer review process.

In another study published in Orthopedics, by Green et al., 80 patients were studied with thermography and myelography.² Negative thermograms were predictive of negative myelograms in 71 percent. Overall, predictive value was at a very respectable 82 percent. In a study I published in the American Journal of Chiro Medicine, correlating MRI and thermography in cases of cervical disc herniation, we found an 84 percent sensitivity and 78 percent predictive value.³ This was a single blinded study. The paper also described autonomic referred pain zones in the extremities not confluent with dermatomes. Double blinded studies are not possible without the patient knowing the study is being done. Even MRI does not lend itself to double blinded studies.

In an article published in the British Medical Journal by David Eddy of Duke Medical, he stated that in deciding the utility of medical procedures, usually the best evidence is something less than a random controlled trial.⁵ The metanalysis published by Hoffman, et al., in Spine was nothing more than a statisticians literature review.⁴ They select their own criteria for exclusion or inclusion, and bias, like in anything else, can enter into the picture. Furthermore, in an article published in Lancet, the very validity of metanalysis is seriously questioned.⁶ They concluded that "metanalysis is not an exact science and does not provide definitive simple answers to complex clinical problems." In other words, are we to believe the opinions of one paper versus the thousands of articles and studies published in not only the United States literature but the international literature as well? Are we to believe that the peer reviewers of some of the most prestigious journals in the world (i.e., Journal of Neurosurgery, British Journal of Rheumatology, Spine, Physical Medicine, Journal of Orofacial Pain, Journal of Craniomandibular Practice, Physician and Sports Medicine, and JMPT) all overlooked poor quality papers, research and methodology flaws? Hardly! Thermography is utilized without bias or prejudice in many European and Asian countries because of its value in clinical medicine. Are we naive enough to believe that we know more than our international colleagues?

Dr. Croft states that very little research has been done in our profession on thermography, while it is true that there is not a ton of research articles, the same can be said about research on the efficacy of chiropractic

care for such notable conditions as whiplash. The same can be said about most medical procedures. It is estimated only 15 percent are supported by solid scientific evidence.⁵ However, research has been done in this profession on thermography, some of which has been published by me, but conspicuously is absent from his literature search and reference list.^{7,8} Research by Green, et al., was published in Pain Digest where 28 patients with low back pain and sciatica had MRI, EMG, NCV, SEP, and thermography. Thermography was found to have the highest sensitivity and specificity.¹⁸

References are provided by Dr. Croft for the statement that several studies show thermography is not reliable for sensory nerve root irritation. Of course, again no balance or reference to the many studies that state thermography is sensitive for these disorders. It is of interest to note that some of the authors (Aminoff) he referenced, also have published that S-SEP is not that sensitive for sensory nerve dysfunction, yet there are studies in the literature that state SEP is sensitive for that diagnosis.^{9,10,11}

In previously published articles in Dynamic Chiropractic, Dr. Croft extols the benefits of S-SEP as the up and coming test, yet it too is surrounded by controversy in the literature. The author's very own arguments against thermography exist for SEP as well.

What really puzzles me in Dr. Croft's attack on thermography is his attempt to gain support from the work of Bennett and Ochoa on rats. Ochoa and Bennett are major proponents of the use of thermography and have labeled thermography the test of choice to test the integrity of the autonomies. It is also important to realize that people are not rats and that patients rarely if ever present to the doctor with sciatic nerve ligatures. The conclusion of Bennett and Ochoa's work states thermography is useful to help understand skin temperature abnormalities and sympathetic activity in human neuropathic pain.

While Dr. Croft brings up research questions that should be studied in the future, it does not negate the benefits of thermographic data in treating patients and its continued use. To stop its use because of research questions is like telling chiropractors to stop practicing or treating conditions like cervical spine pain or whiplash until the academicians prove chiropractic efficacy for these conditions. In Dr. Croft's discussion of the scenario of a patient with low back and leg pain and where thermography fits in, thermography "pundits" have always stated it to be a complementary test. Thermography, a test of physiology and MRI, a test of structure and morphology, are not competitive nor comparable, but are complementary. Surely, the author understands the difference. Clearly, not all patients with MRI evidence of herniated disc are suffering with pain secondary to that herniated disc.

Studies published by Weisel and others showed that CT/MRI have false positive rates of 39-45 percent when studying the normal population. It has a large number of false positives, not to mention some of the false negatives when there are annular tears or internal disc disruption which MRI cannot pick up yet. Yes, MRI is very important in clinical practice but is not a panacea and neither is thermography or electrodiagnostic studies. So clearly CT/MRI cannot stand alone; it must be coupled with clinical findings and neurophysiologic testing. No test should stand alone for that matter.

So do we order an EMG which is invasive, painful, poorly tolerated, and has a sensitivity on the order of 70-80 percent? Do we order a thermography which has equal sensitivity to EMG, is noninvasive, painless, and well tolerated by the patient? Thermography can depict and differentiate articular patterns, neurologic patterns, and myofascial patterns, with the common denominator of autonomic dysfunction. Or do we order both, since EMG can sometimes document motor nerve dysfunction and thermography documents the autonomic component. Let us not forget that there are three components to the spinal nerve: sensory, autonomic, and motor (SAM). It's illogical that only sensory and motor are important to document and the autonomic components are not. Many patients who are failed back surgery cases may not have had the clinician done a thermogram and found that perhaps the patient's pain was of articular (S1, facets) or myofascial origin.

While this has not been published anywhere, and is my opinion, I believe it to be true, based on patients of mine who were told to have surgery due to positive MRI/CT/EMG and myelography, yet had negative thermograms for radiculopathy. These patient's myofascial and articular problems were treated conservatively, medically and chiropractically, and got better. Dr. Croft's concern that the AMA does not approve of thermography is not entirely true. While it is true that the Council on Scientific Affairs of the AMA released a favorable report on thermography in 1987, the AMA's House of Delegates has asked the Council to reconsider its opinion. I do not believe the political flux of the AMA should be our concern. If you recall the AMA was found guilty of conspiracy to limit and eliminate the chiropractic profession.

It should also be noted that both ACA and ICA Councils on diagnostic imaging have colleges of thermography and have very favorable position statements for the use of thermography in clinical chiropractic practice. Patients complaining of chronic low back and leg pain may have radiculopathy, reflex sympathetic dysfunction (RSD) or articular dysfunction. Some of the above mentioned conditions can co-exist and thermography in my significant experience has been helpful in revealing these patterns.¹⁶

Often the primary diagnosis is so predominant symptomatic that secondary diagnoses are overlooked or missed, and may be responsible for chronic pain syndromes. Thermal imaging often helps identify these secondary etiologies of pain. In the case of RSD, it is unfortunate and apparent, Dr. Croft does not fully comprehend the severity of the condition. It is when RSD is in its earliest stage that confirmative diagnosis is mandatory for successful management and prevention of a lifelong disability. In my years of clinical practice, I have seen so many cases that not only did MDs miss the RSD diagnosis, but so did DCs, and what was left was a crippled patient with Stage III RSD. Bone complication occurs late in the second stage to third stage, and it is just that, a complication worth trying to prevent. Serial x-rays and scintigraphy are not the method of choice. Bone scans are nonspecific and often reveal abnormalities on the normal side.

In an article published in the British Journal of Rheumatology, thermography was found to be definitively helpful, especially with dynamic cold stressor testing.¹⁷ Why would any caring doctor subject a patient to multiple ionizing radiation x-rays or bone scans when a noninvasive, pain free, very tolerable test like thermography can be done and is much more sensitive? Why would any caring doctor allow the conditions to progress and watch and wait for the bone osteoporotic changes to occur by doing serial x-rays, which is an irreversible and a preventable event I might add.

I find it interesting that Dr. Croft would advocate the use of bone scans for RSD in one sentence and then just "clinical grounds" in another. The usefulness of thermography is not questionable to those who understand RSD and have seen and diagnosed RSD. It is not questionable to the pain clinics in the nation such as the Mayo Clinic, Mass General Hospital, Johns Hopkins, Cleveland Clinic, Mt. Sinai School of Medicine, NYU School of Medicine, among many others that use thermography in the diagnosis and management of RSD. The magnitude of the problem was recently discussed in a new book authored by Dr. Hooshmand, a neurologist, who treats RSD.¹⁹ His research found that thermography increased the diagnosis of RSD by four times; in other words, without thermography, it has been often misdiagnosed. Many patients could have been saved from lifelong disabilities if RSD had been diagnosed early with the help of thermography.

Thermography measures surface temperature which is reflective of the autonomic, specifically the sympathetic. It is an absolute truth like a thermometer measuring core body temperature. If thermography is unscientific so is the thermometer. No one disputes the validity of fever in disease, we all search for the etiology of the fever and do not say it is a false positive if we cannot readily identify its etiology. "Scientific, unsubstantiated," sounds like the AMA and its Health Fraud Chairman Barrett discussing the merits and

benefits of chiropractic care; we all know how unbiased and objective he is.

Thermography, like chiropractic, is a true science, both need ongoing research, both need to be understood better by others who do not understand it or use it, and both will survive and continue to be utilized no matter how hard its political detractors attempt to discredit it.

In conclusion, I will quote Themas Laborcle, MD, who published an article in Pain:

"Despite scientific validation and proven use in a clinical setting, neuromuscular thermography has met with much criticism and skepticism. The emotional and political controversy surrounding thermography has distracted the medical community to such an extent that the real issue of utmost importance to the practicing physician is often ignored. The basic scientific foundation of medicine should preclude the prejudicial influence of emotion, politics, and anecdotes. Scientific investigation for more than two decades now have demonstrated that neuromuscular thermography is of proven value in the clinical evaluation of various pain disorders and neuromuscular conditions including radicular pathology."²⁰

Thermography has a vital role to play in clinical medicine and clinical chiropractic. It should continue to be employed as a diagnostic tool and should continue to be researched as should all medical/chiropractic procedures.

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