Upledger Institute International Response to Article 'Craniosacral Rhythm – Where does it stand?'

Introduction from the Upledger Institute International
We were sent the following article (text in black) and asked for our response to it. We have added our response throughout the original article, starting each section with "UII" and highlighting our response in yellow.

Original Research
Craniosacral Rhythm—where does it stand?
Supp, Georg, PT, Dip. MDT
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Supp G. Kraniosakraler Rhythmus - was ist dran? Gasteditorial. Manuelle Therapie 2007; 11:203-205
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Craniosacral Rhythm—where does it stand?

Introduction
In an article titled "Challenging Myths in Physical Therapy" (Harris 2001), this professor at the University of Vancouver, criticized physical therapists that were using craniosacral therapy in their treatment of musculoskeletal problems, despite the current lack of scientific evidence. Today – about ten years later – the body of evidence has not changed in favor of craniosacral therapy.

Nevertheless, the demand for and offer of training courses in this area continues unabated. The following article represents a critical personal review of this myth.

UII: "If you are irritated by every rub, how will you be polished?" - Rumi

Thank you for translating this article and resurrecting it from 2007 so that we could clear up misinformation that it represents. We are not irritated by this article – we see it as an opportunity to clear up misperceptions, and to make aspects of CranioSacral Therapy much more clear.

We acknowledge that CranioSacral Therapy does need more research and we have practitioners around the world continuing to work on this. There is, however, research published in reputable scientific journals that supports the validity of CST.

Recent research suggests CST has been helpful for individuals with fibromyalgia, dementia, lateral epicondylitis, asthma, and bladder dysfunction in patients with multiple sclerosis. Also an on-going descriptive outcome study shows CST helping in a variety of diagnoses. One of the reasons why we continue to teach CST around the world is that practitioners are facilitating excellent results with their patients in relation to structural alignment, function and pain reduction, among other measurable outcomes.

Here are a few published research studies that show the scientific evidence in support of CranioSacral Therapy.

Castro-Sanchez AM, Mataran-Penarrocha GA, Sanchez-Labraca N, Quesada-Rubio JM, Granero-Molina J, Moreno-Lorenzo C: A randomized controlled trial investigating the effects of craniosacral therapy on pain and heart rate variability in fibromyalgia patients. Clin Rehabil Jan 25(1):25-35, 2011. Epub 2010 Aug 11.

Curtis P, Gaylord SA, Park J, Faurot KR, Coble R, Suchindran C Coeytaux RR, Wilkinson L, Mann JD: Credibility of low-strength static magnet therapy as an attention control intervention for a randomized controlled study of Craniosacral therapy for migraine headaches. J Altern Complement Med Aug; 17(8):711-21. Epub 2011 July 6.

Geldschlager S: Osteopathic versus orthopedic treatments for chronic epicondylopathia humeri radialis: a randomized controlled trial. Forsch Komplementarmed Klass Natuheilkd. Apr; 11(2):93-7, 2004.

Gerdner LA, Hart LK, Zimmerman MB: Craniosacral stillpoint technique: exploring its effects in individuals with dementia. J Gerontol Nurs Mar; 34(3):36-45, 2008.

Harrison RE, Page JS: Multipractitioner Upledger Craniosacral Therapy: descriptive outcome study 2007-2008. J. Altern Complement Med Jan; 17 (1): 13-7, 2011. Epub 2011 Jan 9.

Mataran-Penarrocha GA, Castro-Sanchez AM, Garcia GC, Moreno-Lorenzo C, Carreno, TP, Zafra MD: Influence of Craniosacral Therapy on Anxiety, Depression and Quality of Life in Patients with Fibromyalgia. Evid Based Complement Alternat Med. Sep 3. [Epub ahead of print] 2009.

Mehl-Madrona L, Kligler B, Silverman S, Kynton H, Merrell W: The impact of acupuncture and craniosacral therapy interventions on clinical outcomes in adults with asthma. Explore (NY) Jan-Feb;3(1):28-36,2007.

Nourbakhsh MR, Fearon FJ: The effect of oscillating energy manual therapy on lateral epicondylitis: a randomized, placebo-control, double-blinded study. J Hand Ther Jan-March; 21(1):4-13, 2008.

Raviv G, Shefi S, Nizani D, Achiron A: Effect of craniosacral therapy on lower urinary tract signs and symptoms in multiple sclerosis. Complement Ther Clin Pract May; 15(2):72-5. Epub 2009 Jan 30.

Barke Lora, Gelman Sharon, Lipton James A.: A successful use of cranio-sacral osteopathy in the treatment of post-traumatic headache following subarchnoid hemorrhage. AAO Journal/23: Summer 1997.

This is a modified and translated version of an article published in the German journal “Manuelle Therapie” in December 2007. At that time the article caused overwhelming reactions of German-speaking physiotherapists, but unfortunately only from the opponents of Craniosacral Therapy (CST) who sent their comments. The pilots of magic carpets remained quite silent. Now in 2011: checking the amazing number of CST courses that are still offered in Germany and elsewhere, and comparing that with the ongoing absence of any evidence or at least common sense on the topic, it was considered worth translating the article into English for the

IJMDT. Maybe this won't change anything, but some of the readers will hopefully enjoy. In this context, a quote from Professor Chris Main (having dinner with us in Fellbach 2010) comes to my mind: "Stupidity of the patient is not an evidence base". It might be added: "Stupidity of the therapist is not one either".

UII: As you will continue to see in our response, there is evidence that supports why CST practitioners continue to work with their patients and why new practitioners continue to attend CST seminars. Common sense would also explain that 100,000 CST practitioners in over 106 countries around the world must be facilitating results with their patients otherwise the modality would not continue to grow and thrive.

Please keep in mind the following quote from one of your peers in the physical therapy profession. "One research problem encountered with complementary approaches is that these approaches consistently focus on the patient as a total human being with all the interactions of all bodily systems. This philosophy of the whole does not coincide with the linear, reductionistic physical research accepted by Western medicine. Until research models are developed and instrumentation becomes available that measures multiple systems at multiple levels of consciousness simultaneously, it will be difficult to prove the strengths of many aspects of alternative approaches to patient management.

That does not mean that the efficacy is not there. It means our research skill may not have developed to the level of measuring all the influences that are interacting simultaneously during a complementary approach intervention."

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Historically

More than 100 years ago, so-called 'experts' declared that the craniosacral rhythm exists. It is said that an
American, William Garner Sutherland, had a spontaneous inspiration in the year 1899. He was watching a fragmented skull in a cabinet and concluded that the sutures of the skull must exist to allow the skull
bones movements concerning a "primary respiratory mechanism". His book "The Cranial Bowl" was published in 1939.

UII: Dr. Sutherland utilized his osteopathic medical training when studying a disarticulated skull. He applied this knowledge to the varying shapes of sutures in the skull utilizing the accepted scientific fact that structure and function are interrelated.

John Upledger dominated the craniosacral concept in the last 25 years, after his publication of "Craniosacral Therapy" (Upledger 1983).

Thirty years ago Upledger reported a high intertester reliability for the evaluation of craniosacral movements when he assessed 25 children between three and five years of age (Upledger 1977).

Assumptions
Advocates of the CST concept formulated, among others, the following concepts:
• The cerebrospinal fluid is pulsing in a certain rhythm (6-12 times per minute),
• Which rhythm exists absolutely independently of breathing or the heartbeat,
• Specially trained experts are able to palpate this rhythm,
• It is possible to diagnose illnesses according with the identification of disturbances in this rhythm,

UII: This is an incorrect statement. Advocates of CST are not diagnosing illnesses based on the CranioSacral Rhythm. Advocates of CST look at disturbances in the CranioSacral Rhythm to locate restrictions in the fascia including that of the dura mater or the fascia of the nervous system. These restrictions can alter function of the structures that they encompass and over time, may produce dysfunction that produce symptoms related to a diagnosis.

• The skull bones can be displaced against each other, which can cause pathology,

UII: Restrictions of the fascia and cranial bones MAY result in pathological symptoms. Example: tightness or restriction in the tentorium may reduce movement of the temporal bones, and may over time affect cranial nerve VIII within the canal of the temporal bone and create vertigo.

• Therapists can treat these disturbances, which are diagnosed by palpation of these displacements of the sutures of the skull.

UII: These displacements are not described or evaluated as displacements, but through palpation of symmetry, quality, amplitude and rate of the CranioSacral Rhythm or motion (CSR).

Facts
During aging, not all sutures of the skull calcify and a part of the skull plates can be displaced against each other (Kokich 1976). A minimal mobility at the sutures of the skull is commonly accepted today (Oleski et al 2002). MRI scans show that the brain and the cerebrospinal fluid of healthy individuals are performing some cyclic movements (Maier et al 1994).

UII: Frymann Viola: A study of the rhythmic motions of the living cranium. Journal AOA/vol 70/May 1971, although it may be disputed as antiquated, Dr. Frymann did great initial studies on cranial bone motion. Under the "Fact" section Mr. Supp concedes that some minimal cranial bone motion is shown to exist, and under the "Illusions" section he states that large forces have had to be used to move them. “Large forces’ are not necessary, as shown in Dr. Frymann’s study and others noted below.

If you try to move a large boat in the water by pushing very hard, you will come up against resistance, and the boat will not move. Yet, if you apply gentle pressure you find that slowly and easily the boat will begin to move.

Illusions
Active mobility of the skull bones
According to current scientific evidence, the mobility of the skull is purely a passive one. Whether changes in intracranial pressure cause movements of the skull bones between each other have been studied only once (Heifetz and Weiss 1981). To receive measurable results, the researchers had to apply such high pressures that these experiments could only have been

done on two patients with apallic syndrome in the final stages (Heifetz and Weiss 1981). So, to date, nobody has been able to prove that active movements of the skull bones really exist.

UII: Dr. John E. Upledger spent a total of 11 years as a professional researcher, 3 years in biochemistry and 8 years in biomechanics. He worked very closely with true experts in the field of research. Through that research, as well as his on-going clinical treatments, he and J.D. Vredevoodg put forth the pressure stat model.

Allow us to briefly explain the pressurestat model. Microscopic study of tissues in the human sagittal suture showed collagen, elastic fibers, as well as vascular and nerve plexuses. It seems entirely possible that the suture contains a stretch reflex. When the suture is gapped open by intracranial fluid pressure to a specific dimension, an intrasutural stretch reflex is activated which telegraphs to the ventricular system of the brain to stop production of cerebrospinal fluid. When the suture is relieved of it stretch and begins to come together and ultimately to compress its contents somewhat (as intracranial volume is reduced), a message is sent to the brain to resume production of cerebrospinal fluid. This resumption of fluid production will therefore raise fluid pressure and reduce intrasutural compression. In this manner, a rhythmic rise and fall of fluid pressure is achieved which, in turn, causes the rhythmic changes in the boundaries of the semi-closed hydraulic system.

With this model in mind, Dr. J.E. Upledger and Dr. E.W. Retzlaff at the Michigan State University Department of Biomechanics began to search for the telegraph system between the suture and the ventricular system of the brain. They successfully traced single nerve axons in monkeys, from the sagittal suture centrally through the meningeal membranes to the wall of the third ventricle of the brain. This histological work provided them with the structures necessary to support the conceptual pressurestat model.

In a description of the straight sinus found in Gray's Anatomy, there is a mention of an arachnoid granulation body which projects into the floor of the straight sinus at its angle of union with the great cerebral vein. This body contains a sinusoidal plexus of blood vessels which become engorged and act as a ball-valve mechanism. This mechanism may then control the outflow from the great cerebral vein which, in turn, by increasing back pressure, affects the secretion of the cerebrospinal fluid by the choroid plexuses of the lateral ventricles. The drainage of these regions of the brain is from the internal cerebral vessels, which empty into the great cerebral vein.

Because CSF is continually being reabsorbed into the venous system during the shutdown, CSF volume is gradually reduced and cranial vault stretch receptors are deactivated. As CSF volume further reduces, intrasutural compression receptors are activated and signal the choroid plexuses to resume CSF production. As the fluid compartment refills, the cycle repeats. In order for Upledger's model to provide us with 10-cycle-per-minute craniosacral system rhythmical activity, he alloted 6 seconds for each complete cycle. Assuming that the rate of CSF production is twice as fast as the rate of reabsorption, he allowed 3 seconds for CSF production and 3 seconds for nonproduction. This assumption gives the rhythmical 3 seconds of system expansion followed by 3 seconds of contraction, which is palpable by the hands of a craniosacral therapy practitioner.

Remember this is just a model used to explain some of the events within the craniosacral system as Upledger perceived them. This model is open to modification and change as new information is brought to light. Thus far, the pressurestat model remains useful.

Independent of the work done by Dr. Upledger and his team, Dr. E.A. Bunt, a South African neurosurgeon, had developed a similar model while researching in the area of idiopathic, normotensive hydrocephalopathy. Dr. Bunt shared his serial tomogram x-rays with Dr. Upledger. They were taken through the lateral and third ventricles of the brain, and showed approximately a 50% area change during dilation and contraction of the lateral ventricles of the brain at a rhythm of 6 cycles per minute in a normal patient. Dr. Bunt believed that the pressurestat concept was viable.

Here are a few research studies that have been published in healthcare journals showing movement of the cranial bones.

Fryman VM. A study of the rhythmic motions of the living cranium.JAm Osteopath Assoc. 1971;70:928 –945. (as mentioned earlier)

Moskalenko YE, Kravchenko TI, Gaidar BV, et al. Periodic mobility of cranial bones in humans. Human Physiology. 1999;25(1):51-58.

Moskalenko YE, Frymann VM, Weinstein GB et al. Slow rhythmic oscillations with the human cranium: phenomenology, origin, and informational significance. Human Physiology:2001;27(2):171-178.

Moskalenko YE, Frymann VM, Kravchenko T. A modern conceptualization of the functioning of the primary respiratory mechanism.

Manual mobilisation of skull bones

A recently published study on anesthetized rabbits that had micro plates affixed at their skull was very revealing (Downey et al 2006). The study showed that the therapeutic pressure recommended by Upledger (Upledger 1977, Upledger 1983) neither caused any movements of the skull bones nor changed the intracranial pressure. Distraction forces of 5 – 20 grams were applied to the rabbits, as recommended by craniosacral osteopaths. In one rabbit, Downey et al applied forces between 100 grams and 10 kilograms. Only when using more than 500 grams, could the researchers achieve movements of 0.30mm between the skull bones. Changes of intracranial pressure were only achieved when they used forces that were more than 100 times greater than those used in therapy (Downey et al 2006).

UII: This particular study was done in response to a review of the literature stating that movement of the cranial bones appears to be real and that a case can be made for it. The authors said that studies should be done to determine if the cranial bone movement is coming from within the bone itself or from the actual separation of the sutures.

This study looked at the separation of the coronal suture. Movement did not occur because of a flawed study design. That is, a machine cannot follow the self-correcting motions, (inherent in osteopathic medical practice) of the frontal bone, burr holes drilled can cause a retraction of the dura mater in animals of prey, and there was no control for the intention of a practitioner with their hands on the rabbit.

Palpatory skills

Von Heymann and Kohrs (2003) published a comprehensive article on craniosacral rhythm in context of biomechanics and neurophysiology. They stated that instrumental measurements nowadays were so exact, that an active mobility of the skull can be tested as low as 0.003 mm

and can be excluded above this measurement. Considering human physiology (muscle spindles, receptors), movements and changes in positions can be perceived only when these are bigger than 0.07 mm. So the threshold of perception is
20 – 30 times greater than the reading at which an active mobility of the skull can be definitely excluded
(Von Heymann and Kohrs 2003).This means concretely: even if the skull bones can move against each other, clinicians would not be able to palpate this movement.

UII: 1997 JOSPT stated that enough evidence for cranial bone movement exists. Studies need to be done to explore the magnitude of movement and its meaning.

Existence of independent movements of cerebrospinal fluid
Movements of cerebrospinal fluid, measured by imaging procedures, are in their rhythm dependent on the current heartbeat. Increasing intraabdominal pressure using the Valsalva manoeuvre or coughing affects this rhythm only temporarily (Maier et al 1994). Von Heymann and Kohrs (2003) pointed out that no system exists which can be responsible for this supposed rhythm. Anatomically neither a pump analogous to the heart muscle exists nor has a reasonable autonomous center analogous to the sinus node or the respiratory center been identified in the neural structures. Proper motions of brain substance,
independent from the vascular system, are anatomically not possible (Heymann 2003). Thus, to date, no scientifically approved study indicates the real existence of an autonomous craniosacral rhythm (Green et al 1999).

UII: Please see these articles. Acta Radiol. 1993 Jul;34(4):321-8. **On the pulsatile nature of intracranial and spinal CSF-circulation demonstrated by MR imaging.** Greitz D, Franck A, Nordell B.

Neuroradiology. 1992;34(5):370-80. **Pulsatile brain movement and associated hydrodynamics studied by magnetic resonance phase imaging. The Monro-Kellie doctrine revisited.** Greitz D, Wirestam R, Franck A, Nordell B, Thomsen C, Ståhlberg F.

Inter-tester reliability
Clinical phenomena do not necessarily depend on proof from technical equipment. The fact that something is not measurable by current capabilities of research does not mean that it does not actually exist at all. On the contrary, it can be the strength of such a clinical phenomenon to replace a mechanical device or be shown potentially to be superior to that equipment. However, it is absolutely essential that a clinical phenomenon can at least be identified by different examiners with reasonable reliability, especially when the entire philosophy of diagnosis and treatment is based on that phenomenon. All past research into the reliability of CST diagnosis has shown lack of agreement. When two therapists palpated the same person, researchers never found a significant consistency concerning the recognized rhythm (Rogers et al 1998, Wirth-Patullo and Hayes
1994, Norton 1996, Hartmann and Norton 2002). Examiners in one study were very experienced therapists; one had used CST for 17 years, and the other reported that she had treated 90% of her patients in the previous three years exclusively with CST (Rogers et al 1998). So they were two real experts! In the conclusion, they wrote "The finding that one examiner could palpate a craniosacral rate of zero while the other examiner could simultaneously palpate a consistent craniosacral rate within the same subjectsuggests that the examiners were measuring different phenomena, and one possibility is that they were attempting to measure something that does not exist" (Rogers et al 1998).

UII: Once again, this represents a flawed study design, as the researchers did not understand that it is the differences in the expression of the CranioSacral Rhythm in various parts of the body that help therapists locate restrictions in fascia/dura mater. Also the body goes into Still Points periodically (or can be induced by a Therapist) during which time the CranioSacral Rhythm would not be felt.

In the study by Wirth-Pattullo and Hayes, they suggest that the reason for the discrepancies of the CranioSacral Rhythm could be because of the relationship between the therapist and patient. Simple palpation will not determine its existence because of the relationship between therapist and patient (becomes subjective) comes into play when they make contact.

Hartmann and Norton (2002) described it even more concisely, "The only alternative we can imagine is that the rhythm is a result of perception of psychological phenomena inside the examiner himself". No one has been able to replicate the results of Upledger's reliability study (Upledger 1977) over the last 30 years. A common point of criticism of his study is that all 25 evaluated children showed a disturbance in the craniosacral rhythm.

UII: This is not true – again see the multiple research citations listed above.

Pathology

Research could not prove a causal relationship between various positions of the skull bones and changes in movements of cerebrospinal fluid yet. The assumption that a disturbance in this area can cause any health problems lacks any supportive evidence and any plausible explanation (Green et al 1999).

Bottom line

No scientific evidence favors the existence of an autonomous craniosacral rhythm in terms of independent movements of brain and cerebrospinal fluid. More than that, the body of evidence seems to eliminate any possibility of this phenomenon.

Each clinician, searching for alternative therapies, must decide by himself, how consequently he will ignore the pure facts. CST does not fulfill the rudimentary minimum requirements for any diagnostic and therapeutic concept. Intertester reliability is zero and to date, serious studies on effectiveness simply don't exist.

UII: We can only speculate that Mr. Supp did not perform a complete literature search or perhaps ignored evidence in favor of CST, as there is much information available, some of which we have included in our response.

If a clinician is to base their research of CranioSacral Therapy solely on the comments made by Mr. Supp or the author of this article, then they would most definitely have a skewed vision of the validity of CranioSacral Therapy. We encourage therapists to examine our responses, read the articles and studies that we have cited, attend a seminar by the Upledger Institute International and experience CST first-hand.

We do not know if CST will ever be fully proven by today's scientific methodology. There are too many intangible and unmeasurable variables. Dr. John E. Upledger has often said, "It will be the large body of patients that we treat that will continue to validate CST as a viable treatment modality".

Conclusions
Alternative methods of diagnosis and therapy usually claim that they cannot be assessed by the standard measuring tools of evidence based medicine. No doubt, some things are happening between heaven and earth that cannot be assessed by the wooden yardstick of our mind. But therapists should remain sceptical. The ones who believe the tenets of the craniosacral community in their daily work are at risk of moving away from serious health profession behaviour to the magic kingdom of assumptions and wishful thinking. It's not damnable that patients might feel better after craniosacral intervention, due to placebo response from a convincing therapist. But some doubts may be allowed, when the "feel better" never evolves to a "get better". If active treatment strategies remain kept back due to doubtful diagnostic models, the patient loses the possibility to work actively and self-reliantly on his wellbeing. At this point the "diplomatic immunity" of every alternative method expires.

UII: Again we refer the reader to studies noted earlier. Studies showed effectiveness of CST 6 months to a year after the treatment (e.g. fibromyalgia study) – that is not "wishful thinking" as the author suggests, rather it is a "get better" especially for the patients who served as subjects in the study. When individuals with lateral epicondylitis received treatment utilizing CST, they were able to "*actively and self-reliantly"* avoid the use of medication. Although drug therapy is a common method of intervention, it is not without side effects and of course the high costs often associated with pharmaceutical use. In contrast, CST offers patients a safe and effective treatment devoid of these side effects and associated costs.

We support and are active in producing additional research demonstrating the effectiveness of CranioSacral Therapy. There is, however at this moment, research published in reputable scientific journals that supports the validity of CST. Should opponents of CST continue to ignore developing evidence supporting the use of CST as a viable form of treatment, their patients are actually being prevented from *working actively and self-reliantly* on their well-being through the use of a gentle therapy directed at the source of the problem rather than the symptoms. It is our hope that this response clarifies misconceptions based on an incomplete literature review. We trust in the intention of every therapist to help their patients. We also trust that your reader's awareness of what CST really is, and what it has been shown to accomplish, is raised to a new level of openness to its possibilities.

In addition to the above responses, we have included, in its entirety, a paper written by Dr. John E. Upledger in 1995 that will share additional information in support of CranioSacral Therapy. One small thing to note that at the time that this paper was written, there were approximately 20,000 practitioners trained in Upledger CranioSacral Therapy. To date in July 2012, there are over 100,000 practitioners trained in Upledger CranioSacral Therapy. For a listing of these practitioners please refer to www.upledger.com.

RESEARCH AND OBSERVATIONS THAT SUPPORT THE EXISTENCE OF A CRANIOSACRAL SYSTEM

By John E. Upledger, DO, OMM

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Abstract

CranioSacral Therapy is a gentle, non-invasive, hands-on treatment modality that is said to enhance self-healing abilities as well as provide symptomatic relief from a wide variety of dysfunctions and disabilities. The treatment system is dependent upon the existence of a newly discovered physiological system that has become known as the craniosacral system.

In the present article, the author has reviewed much of the theoretical background and research that support the existence of the craniosacral system. The research summarized here represents work that the author has either personal knowledge or involvement.

The author concludes that positive patient outcomes as a result of CranioSacral Therapy should weigh greater than data from designed research protocols involving human subjects, as it is not possible to control all of the variables of such studies.

Key words: CranioSacral Therapy, craniosacral system, Pressurestat model.

CranioSacral Therapy is a gentle, hands-on system of treatment that rapidly is gaining wider usage and acceptance. The basis of CranioSacral Therapy lies in the existence of a craniosacral system. This physiological system is newly discovered and, as such, its existence is frequently called into question.

As one who is considered a leading proponent of the use of CranioSacral Therapy and who has been deeply involved in researching the craniosacral system, I feel qualified to present the following summary of the research that has been done to provide a better understanding of the craniosacral system and its implications in human health and dysfunction. Research aside, countless numbers of patients who have achieved improved health through CranioSacral Therapy will attest to the validity of the modality.

First, I will list some of the work in which I was not directly involved, but has been brought to my attention either by the researchers themselves or by other colleagues with whom I am acquainted. Then I will recount some of the work in which I have been personally involved.

Research In Which I Have No Direct Involvement

1. Recording of Cranial Rhythmic Impulse

Milicien Tettambel, D.O., et al.

Journal of the American Osteopathic Association

Volume 78, October 1978, Page 149

Dr. Tettambel used force transducers taped one across the frontal bone and one across each of the two mastoid processes of the temporal bones on 30 subjects ranging in age from 16 to 71 years.

She successfully recorded three separate rhythms on all of these subjects. The cardiac pulses and the respiratory rhythms were clearly recorded. A third pulse was also recorded at an average of 8 cycles per minute. She presumed that the third rhythm represented the cranial rhythmic impulse.

2. Louis Rommeveaux, D.O.

Personal Communication

He informed me by personal letter that he employed an electronic engineer to build a device that he mounted on 48 different subjects. The device was attached longitudinally with one end taped to the skin over the glabella and the other end to the skin over the nasal bones. His device measured and recorded movement between its two attachments.

Rommeveaux stated that significant rhythmical movement was recorded on all 48 subjects at rates between 5 and 10 cycles per minute.

He also stated that he monitored craniosacral activity on 36 patients in the hospital at the time they were given peridural anesthesia. He stated that his perception was that the craniosacral rhythm underwent a complete stop at exactly the time the anesthetic injection commenced. The halt in rhythm persisted for about five minutes before it began again.

This latter work is subjective and will be disregarded by some. However, those of us who do CranioSacral Therapy have learned to trust our hands and so may give his impressions credence. For me, this trust of my senses began while I was a research fellow in biochemistry. My mentor, Stacy F. Howell, Ph.D., convinced me that when the laboratory findings did not confirm my physical findings with a given patient, I should suspect laboratory error and trust what I hear, see and/or feel.

3. A Study of Rhythmic Motions of the Living Cranium

Viola M. Frymann, D.O.

Journal of the American Osteopathic Association

Volume 70, No. 9, May 1971

Dr. Frymann and a mechanic devised equipment that was intended to measure and record circumferential changes of the head as well as cardiac and respiratory rhythms. She successfully demonstrated a third rhythm that appeared to be independent of heart rate and breathing activity. She interpreted this third rhythm, which ranged between 6 and 12 cycles per minute, to be the activity of the craniosacral system.

4. Studies of the Structures and Mechanical Properties of the Cranium

Jean-Claude Herniou, D.O., Ph.D.

This work was Herniou's doctoral thesis at the Universite de Technologie de Compiegne in Paris, France. Herniou practices in Paris. He visited me while I was still in the Biomechanics Department at Michigan State University, College of Osteopathic Medicine. He also attended several of the seminars I presented in France. I have a copy of his thesis in French.

In brief, Dr. Herniou was able to apply equipment that measured the piezo-electric changes across the sagittal sutures in live sheep. His work showed a rhythmical opening and closing of these sutures at an average rate of 12 cycles per minute. The range of motion never exceeded 1 millimeter. This work was carefully scrutinized for its scientific merit by Herniou's doctoral committee.

5. Ultrasonic Measurement of Intra-Cranial Pulsations at 9 Cycles Per Minute

Wallace, Avant, McKinney and Thurstone at Winston-Salem, North Carolina

Journal of Neurology, 1975

The investigators reported an apparently independent 9-cycle-per-minute intracranial pulsation observed by ultrasound in the brain and membrane tissues of a human subject.

6. Modulation Resembling Traube-Hering Waves Recorded in Human Brain

Jenkins, Campbell and White

European Neurology, 5:1-6, 1971

Ultrasound echo pulsations were observed at 7 cycles per minute in a healthy human subject. These pulsations continued without change when the subject held his breath.

Traube-Hering pulsations are usually measured on the ear. When the investigators observed the Traube-Hering pulsations on the ear they differed significantly from the 7-per-minute pulsations of the brain. The authors conclude that the 7-per-minute brain pulsations are autonomous and not related to cardiac, respiratory and/or Traube-Hering pulsations.

7. Dysfunctioning of the Fluid Mechanical Cranio Spinal Systems as Revealed by Stress/Strain Diagrams

K. Lewer Allen, M.D., Neurosurgeon

E.A. Bunt, M.D., Neurosurgeon

Drs. Allen and Bunt both practice neurosurgery in Johannesburg, South Africa. The above paper was presented by Dr. Bunt at the 1979 International Conference on Bioengineering and Biophysics in Jerusalem. I presented the Pressurestat Model as the driving force for craniosacral motion at this same conference. After my lecture, Dr. Bunt personally invited me to attend his presentation and have a conversation afterward. At his presentation and in our subsequent discussion, Dr. Bunt informed me that during his search for the etiology of idiopathic hydrocephalus, he did several tomographic studies of the skull, the brain, and the brain's ventricular system.

In his tomographic studies of the ventricular system, the image cut was such that it gave a two-dimensional display of the lateral and third ventricles. He noted that there was a rhythmical dilation and contraction activity with a range of about 40% in the area seen on the tomograms. In a normal adult woman, the rate of the rhythmical ventricular change was 8 cycles per minute. In a child with idiopathic hydrocephalus, the rate of ventricular cyclic changes was 4 cycles per minute and irregular. During our private conversation, Dr. Bunt ventured to say that he intuited that the cause for idiopathic hydrocephalus might be found in the sagittal suture or the sagittal venous sinus. He further stated that the Pressurestat Model that I had presented made perfect sense to him and fit in with his observations as a neurosurgeon. This last part is conjecture but I choose not to discount Dr. Bunt's 20-plus years of experience as a neurosurgeon just because he has not done a controlled study. This is my own bias: I respect human intelligence more than I respect experimental design and instrumental measurements. I subscribe to the Heisenberg uncertainty principle. In fact, Jon E. Vredevoogd and I have witnessed it in action. This caused us to discard a rather large quantity of data from electrical measurements that we had made on autistic children.

8. Roentgen Findings in the CranioSacral Mechanism

Philip E. Greenman, D.O.

Journal of the American Osteopathic Association, 70:1, September 1970

X-ray studies of the relationships between the sphenoid body and the basiocciput were done on 25 patients by Dr. Greenman. He was able to show abnormal relationships between these bones that demonstrated the lesions defined by Sutherland as flexion, extension, torsion, sidebending, vertical strain and lateral strain. No correlation was attempted with clinical symptoms. Therefore, the x-ray findings could represent anatomical variants as well as abnormal findings.

9. Changes in Magnitude of Relative Elongation of the Falx Cerebri During the

Application of External Forces on the Frontal Bone of an Embalmed Cadaver

Dimetrios Kostopoulos, M.A., P.T

George Keramidas

Journal of Craniomandibular Practice, January 1992

This work was carried out by the investigators at the New York University Anatomy Laboratory. The investigators made use of instrumentation that measured piezo-electric changes related to distance changes in the falx cerebri in response to measured anteriorly directed traction on the frontal bone. Results showed that an elastic response began at 140 grams frontal bone traction. At 642 grams the elastic response ended and viscous changes began. At 642 grams of frontal bone traction the falx cerebri elongated 1.097 mm within the 5 cm distance spanned by the measuring device.

10. Characterization of the Cranial Rhythmic Impulse in Healthy Human Adults

James M. Norton, Ph.D., et al

Journal of the American Osteopathic Association, Fall 1992

Dr. Norton's study included 24 subjects and 12 examiners, all drawn from the faculty and student body at the College of Osteopathic Medicine at the University of New England.

The craniosacral system's rhythmical activity was monitored by having the examiner press a switch mounted on the examining table leg with his/her knee at the beginning of the flexion phase of each cycle of the craniosacral system. All examiners were required to use the same standard hand placement on the subjects' heads. All subjects and examiners were required to rest quietly in each others' presence for three minutes before the examination began.

A total of 274 cycles was reported by the 12 examiners on the 24 subjects. The average rate of craniosacral activity was calculated to be 3.7 cycles per minute. It is important to note that several spontaneous "still points" occurred during the examination processes. The time for still points was included in the calculation of cycles per minute, which lowered the average rate significantly. It is also significant that the cycles per minute were consistently slower after the still point had occurred than it was before such occurrence.

In my experience, it seldom happens that a therapist practicing CranioSacral Therapy can touch a patient for more than a minute or two without having some therapeutic effect on this very sensitive craniosacral system. It can be accomplished but the examiner must not blend with the subject. The examiner must work quite hard to maintain a distance between himself/herself and the subject. This is a very difficult task for most therapists practicing CranioSacral Therapy.

As an added thought, consider that Rollin E. Becker, D.O., a well-known CranioSacral Osteopath with about 50 of years experience, describes a 3- to 4-cycle-per-minute rhythm that is "beneath" or more subtle than the craniosacral rhythm.

Further, in private conversation with physicist Neil Mohon, he told me that he has measured in excess of 50 different energy fields around living human beings. Each of these energies has its own pulsatile characteristics. Mohon was doing research for the United States government, developing instruments that would detect, for example, the presence of humans hiding in jungles when he made these discoveries. How little we know.

11. Failure of Tissue Pressure Model to Predict Cranial Rhythmic Impulse Frequency

J.M. Norton, Ph.D.

Journal of the American Osteopathic Association, Volume 92, No. 10, October 1992

In this work, Dr. Norton investigated the possibility that the cranial rhythmic impulse (craniosacral rhythm) might be the result of some complex interaction between the cardiovascular and respiratory activities. The latter two activities were recorded by skin surface electrodes and pneumograph, respectively.

While the cardiovascular and respiratory activities were being recorded, a therapist practicing CranioSacral Therapy used the knee-switch method described in Norton's previous work (above) to record the beginning of each flexion phase of the craniosacral system on 20 different subjects. The rate of craniosacral system activity on all subjects was between 6 and 10 cycles per minute.

Norton could find no combination or interaction between the cardiovascular and the respiratory activities that could explain the findings of the craniosacral system examiner. Further, it was observed that when subjects voluntarily held their breath, the craniosacral system activity continued, apparently unaffected.

Dr. Norton concludes that the craniosacral examiner must have indeed perceived and recorded another rhythmical activity besides the cardiovascular and respiratory rhythms.

12. The Effects of Cranial Manipulation Upon Ryodoraku Acupuncture Meridians

Robert Chadwick, D.O.

This is a piece of unpublished work that was turned in to me as part of the required research experience by a graduate student at Michigan State University.

Dr. Chadwick used the classical Japanese Ryodoraku electrical measurement methods to evaluate acupuncture meridian millivoltages before and after the application of CranioSacral Therapy. Dr. Chadwick found that on 10 patients, without exception, CranioSacral Therapy moved all meridian imbalances toward the desired balance.

13. Measurement of Accuracy in the Bimanual Perception of Motion

Richard M. Roppel, Ph.D., Normal St. Pierre, B.S., Fred L. Mitchell, Jr., D.O.

Journal of the American Osteopathic Association, Volume 77, February 1978

Dr. Roppel, et al., designed and built an artificial device similar to an open clam shell in which the two halves were moved by controlled plungers in order to roughly mimic parietal bone motion as it is hypothesized in CranioSacral Therapy in the human skull.

Dr. Roppel created 10 different computer programs that were applied to the plungers, thus moving the artificial parietal bones according to variations in motion pattern, motion amplitude, symmetry and asymmetry of motion, rate per minute, and speed of motion programs. The mock-up was then covered with quarter-inch-thick foam rubber in order to simulate the scalp tissues that cover human skull bones.

With their hands in place on the mockup, the examiners made voice recordings of their motion perceptions into a recorder that was synchronized with the computer-governed motion programs. The purpose was to discover the thresholds of manually perceptible motion of the simulated parietal bones through the foam cover.

Dr. Roppel's reported conclusions were:

(1) Accuracy of perception was inversely related to time delay in reporting. This suggested that the longer the examiner thought about a perception, the less likely he would render a correct report.

(2) The more rapidly the simulated parietal bones moved, the more accurate the reports of the perceived motion would be.

(3) Examiners could detect movement of between 0.25 and 0.50 millimeters with 85% accuracy.

(4) Some lay persons (secretaries in the Biomechanics Department) gave more correct responses about motion than did M.D. and D.O. students and faculty.

14. Parietal Bone Mobility in the Anesthetized Cat

Thomas Adams, Ph.D., et al.

Journal of the American Osteopathic Association, Volume 92, Number 5, May 1992

Dr. Thomas applied strain gauges across the surgically exposed sagittal sutures in living cats. He recorded rhythmic motion across the sutures with the cats at rest that differed from cardiovascular and respiratory activity. Externally applied stimuli did not significantly change the sutural activity. The rates of sutural movement averaged 11 cycles per minute.

15. Right Brain, Left Brain Asymmetry

Norma J. Gilmore, Ed.D.

ACLD Newsbriefs, July-August 1982

Dr. Gilmore performed the Upledger-designed 10-Step CranioSacral Therapy Protocol on 20 learning disabled children once weekly for six weeks. She reports that all 20 learning-disabled children improved from below average to either average or good in their reading skills over the six-week period.

Dr. Gilmore has had no medical or pre-medical training. She learned to apply the 10-Step Protocol by rote. She is living proof that, when properly taught, CranioSacral Therapy can be applied effectively to needy children by a person who lacks any type of healthcare background. Dr. Gilmore performed the CranioSacral Therapy as "Upledger Relaxation Technique."

16. Relation of Disturbances of CranioSacral Mechanisms to Symptomatology of

Newborns: Study of 1250 Infants
Viola M. Frymann, D.O.

Journal of the American Osteopathic Association, Volume 65, June 1966

Dr. Frymann evaluated 1,250 newborn infants, focusing on craniosacral system function. She found that both respiratory and circulatory symptoms correlated to abnormal sphenobasilar synchondrosis torsion accompanied by temporal bone dysfunction and immobility. Frymann states that symptoms abated when CranioSacral Therapy was used to correct the sphenobasilar torsion, and mobilize and balance the temporal bones.

17. Physical Findings Related to Psychiatric Disorders

John M. Woods, D.O., Rachel M. Woods, D.O.

Journal of the American Osteopathic Association, Volume 60, August 1961

Drs. Woods used manual palpation techniques to evaluate 102 psychiatric patients and 62 normal persons. The average rate of craniosacral rhythm in the 62 normal persons was 12.47 cycles per minute. In the 102 psychiatric patients the average rate was 6.7 cycles per minute. Two patients who had received frontal lobotomies were also evaluated. These frontal lobotomy patients presented with craniosacral system rates of 4 cycles per minute.

Investigations by Dentists

Dentists have also contributed to the body of work done to investigate the existence of a craniosacral system and rhythm. Two dentists who have reported their results to me have been participants in seminars that I have conducted. They are Barry Libin, D.D.S., M.S.D., and Karsten Gunnergaard, D.D.S. Ernest G. Baker, D.D.S., has also published a research project, but I do not know him personally. I know of his work through Fred Mitchell, D.O., and Ernest W. Retzlaff, Ph.D.

1. Occlusal Changes Related to Cranial Bone Mobility

Barry Libin, D.D.S., M.S.D.

International Journal of Orthodontics, Volume 20, Number 1, March 1982

Dr. Libin reports that he has changed the transverse dimension across the maxillae as measured at the second molars by 2 and sometimes 3 millimeters using CranioSacral Therapy.

2. Karsten Bunnergaard, D.D.S.

Personal Communication

Karsten Gunnergaard, D.D.S., practicing in Hamburg, Germany, described to me his use of a device that made use of the "Hall (Gold Leaf) Effect" to measure craniosacral rhythmical activity across the maxillary arch. He recorded an average rate of 12 cycles per minute on four different patients. He estimated the amplitude of the range of motion across the maxillary arch at 1.5 millimeters with the patient at rest in the dental chair.

The "Hall Effect" is described in most introductory physics textbooks and in science dictionaries and encyclopedias.

3. Alteration in the Width of the Maxillary Arch and its Relation to Sutural Movement of Cranial Bones

E.G. Baker, D.D.S.

Journal of the American Osteopathic Association, Volume 70, February, 1970

Dr. Baker built a device that measured width of the maxillary arch by attaching to the second upper molars. His work demonstrated a 9-cycle-per-minute average of a rhythmical 1.5 millimeter average variance in maxillary arch width on one patient.

4. The Colorado Board of Medical Examiners vs. W. M. Raemer, D.D.S.

Court of Appeals, State of Colorado, Case No. 87CA1589

March 22, 1990

The unanimous ruling of the Appellate Court in favor of W. M. Raemer, D.D.S., states that CranioSacral Therapy is an effective form of treatment for TMJ dysfunction. As such, it was ruled that dentists in Colorado are allowed to use CranioSacral Therapy for treatment in the scope of their practice.

Research In Which I Am Personally Involved

My involvement in the development of CranioSacral Therapy began in 1970. Since that time I have worked at one time or another rather closely and intensely with Ernest W. Retzlaff, Ph.D. (physiology), Richard W. Roppel, Ph.D. (biophysics) and Zvi Karni, Ph.D. (biophysics) and D.Sc. (bioengineering). Jon Vredevoogd, M.F.A., with whom I co-authored the first textbook on CranioSacral Therapy, is a problem-solving designer who works as a professor in the Architectural Design Department at Michigan State University. The other three researchers were all members of the Department of Biomechanics.

I shall describe my work in the field of CranioSacral Therapy and its development in a chronological manner so you can see how one step builds upon the next.

1970—I saw the craniosacral system in action first-hand while serving as first assistant on a neurosurgical procedure. I saw the intact dura mater at the mid-cervical level bulge and retract rhythmically at the operative site as the volume of cerebrospinal fluid that it contained increased and decreased 8 times per minute. No one in the operating room could answer the questions that this observed activity posed. The 8-cycle-per-minute rhythm was different from the breathing of the patient as observed in the breathing apparatus he was connected to, and it was far different from the heart rate as seen on the monitor.

1972—I attended a five-day course on cranial osteopathy sponsored by the Cranial Academy. I felt the rhythm I had seen in 1970 with my own hands on both the skull and the sacrum of at least 10 different classmates. I could also feel this rhythm in my own head and pelvis while they were being palpated by other students and faculty.

I had the advantage of having actually seen the system in action about which the teachers were offering hypotheses and conjecture. Now my problem was whether I should believe my eyes, my memory of what my eyes had seen, my senses of touch and proprioception in my hands and my sense of motion in my own head and pelvis or whether I should believe Gray's Anatomy, the "Bible" from which I had been taught. Gray's said that what I was feeling was impossible. My own sensory systems said that Gray's was in error. I chose to trust myself.

1972-1975—I developed my palpation skills and confidence by trying various methods of manipulating and connecting with what we would one day call the craniosacral system. A neurosurgeon friend, Dr. James Tyler, allowed me to scrub with him several times as first assistant and to practice my hands-on techniques on his first-day, post-operative brain surgery patients. Dr. Tyler felt that the work I was doing with his patients decreased both their morbidity and their recovery time. I also did a lot of work combining the cranial manipulation techniques with acupuncture for Dr. Tyler's intractable pain patients. I found that what we would come to name CranioSacral Therapy was very effective in trigeminal neuralgia, a wide variety of headaches, visual disturbances and strabismus, transient cerebral ischemia, vertigo and dysequilibria problems and in some cases of "mental retardation."

July 1975—I joined the faculty at Michigan State University, College of Osteopathic Medicine as a clinician-researcher in the Department of Biomechanics.

1975-1980—I worked with Dr. Retzlaff on the histology of cranial sutures. Using tissues from living patients ages 7 through 57, we found that the capability for motion was present within the suture. The suture contains an abundance of collagen and elastic fiber, vascular networks that communicate with the Haversian Canals of the bone and non-myelinated nerve fiber networks and receptors. Sutures from living patients were not calcified as was the belief of anatomists. The appearance of calcification came post-mortem and with the use of preservative chemicals.

The publications that resulted from this work are:

1. Possible Functional Significance of Cranial Bone Sutures. Retzlaff, Upledger, Mitchell, Biggert. Presented to 88th Session, American Association of Anatomists; 1975.

2. Structure of Cranial Bone Sutures. Retzlaff, Upledger, Mitchell, Biggert.

Journal of the American Osteopathic Association. Vol. 75, February 1976.

3. CranioSacral Mechanism. Retzlaff, Roppell, Becker, Upledger.

Journal of the American Osteopathic Association. Vol. 6, December 1976.

4. Sutural Collagenous Bundles and Their Innervation in Saimic Scureus. Retzlaff, Upledger, Mitchell, Biggert. Anatomical Record. 187, April 1977.

5. Nerve Fibers and Endings in Cranial Sutures. Retzlaff, Upledger, Mitchell, Biggert. Journal of the American Osteopathic Association. Vol. 77, February 1978.

6. Aging of Sutures in Humans. Retzlaff, Upledger, Walsh and Mitchell. Anatomical Record. Vol. 193, No. 3, March 1979.

7. Light and Scanning Microscopy of Neuroaxis in Human Cranial Sutures and Associated Structures. Retzlaff, Mitchell, Upledger, Vredevoogd and Walsh. Anatomical Record. Vol. 196, No. 3, March 1980.

8. Sutures of Primates Including Man. Retzlaff and Upledger. Presented to AOA Research Conference; 1981.

9. The Cranium and Its Sutures. Retzlaff, Ernest W., Ph.D. (Ed.) and Mitchell, Fred L., Jr., D.O. (Ed.). Springer Verlag, 1987.

1975—Unpublished work with Roppel and Retzlaff involved the use of live monkeys. I made two small incisions through the scalp of an anesthetized monkey over each parietal bone equidistant from the

sagittal midline. One antenna was mounted in an analogous position on the external periosteal surface of each parietal bone. Dr. Roppel then broadcast a radio signal across the two antennae, the frequency of which varied with the distance between the two antennae. Using this setup, we were able to record a separate craniosacral motion in the anesthetized monkey that was different in cyclic rate than either the recorded breathing or the heart rate.

I was able to interrupt the craniosacral rhythmical activity by applying slight pressure with one finger to the monkey's coccyx. We repeated this experiment on three different monkeys. The craniosacral rhythm of the monkeys fluctuated between 8 and 10 cycles per minute. All craniosacral activity on all three monkeys was interruputible by the above mentioned coccygeally placed finger tip pressure.

Clinically, I began to apply this concept to headache patients. A significant number of headaches could be commenced by coccygeal pressure in an anterior direction and relieved by moving the coccyx posteriorly.

1976—As we continued the basic science work with sutures and membranes, I decided that I should begin the pursuit of the clinical application of CranioSacral Therapy. I had done significant work with children prior to moving to Michigan State University, so I decided to begin with an interrater reliability study with nursery school children. I designed a 19-parameter hands-on standardized evaluation tool that would be used to evaluate these children by three other examiners and myself.

Twenty-five nursery school children were examined on each of the 19 parameters. The parameters did not include the rate or the amplitude of the craniosacral rhythm because we knew then, as we know now, that rate and amplitude are variable with examiner touch, intention, sharing of energy and spontaneous still points. We were looking for agreement or disagreement on significant restricted areas of the craniosacral system and its sutures. Our parameters were as follows:

Occiput

1. Right restriction of motion

2. Left restriction of motion

Temporal Bones

3. Right restriction of motion

4. Left restriction of motion

Sphenobasilar Joint

5. Restriction toward flexion

6. Restriction toward extension

7. Side bending rotation restriction toward right

8. Side bending rotation restriction toward left

9. Torsion restriction toward right

10. Torsion restriction toward left

11. Compression/decompression restriction

12. Lateral strain restriction toward right

13- Lateral strain restriction toward left

14. Vertical strain restriction toward right

15. Vertical strain restriction toward left

Sacrum

16. Restriction toward flexion

17. Restriction toward extension

18. Restriction toward right torsion

19. Restriction toward left torsion

The rating system employed is as follows:

1. Easy or "normal" response to induced passive motion

2. Moderate or transient restriction to induced passive motion

3. Severe or complete restriction to induced passive motion

Increments of 0.5 were allowed on the rating scale.

The other three examiners were Dr. Gastman, to whom I taught CranioSacral Therapy; Dr. Ward, who began learning cranial osteopathy in 1972 at the same workshop I did; and Dr. Mitchell, who began learning cranial osteopathy in the early 1960s. His techniques for evaluation and treatment were different than my own.

Dr. Gastman evaluated 11 of the children I evaluated. With 0 rating variance allowed, Gastman and I agreed 72% of the time. With 0.5 rating variance allowed, we agreed 92% of the time. In total, we both examined 209 parameters blinded to each others' results, and we agreed on 192 of these parameters, given a 0.5 rating allowance variance. Given no rating allowance variance, we agreed on 149 of 209 ratings. This is remarkably good agreement for a subjective test with small, wiggling children.

Dr. Ward evaluated eight of the children I evaluated. We agreed 77% of the time with no rating variance allowed, and 88% of the time with 0.5 rating variance allowed. Simple arithmetic says that with 77% agreement when exact agreement was required, Dr. Ward and I agreed exactly 117 times out of a possible 152. If we allow a 0.5 rating variance, Dr. Ward and I agreed on 133 out of 152 parameters.

Dr. Mitchell examined six of the children I examined. This means that we mutually evaluated 114 parameters of motion. At no allowance for variance, we agreed on exactly 74 out of 114 parameters, and on 84 out of 114 parameters at 0.5 rating variance allowed.

In the aggregate at zero allowance for rating variance, we agreed 71% of the time, and 85% of the time if we allow a 0.5 rating variance. One of the parameters that reduced our percent of agreement significantly was left sacral torsion. Mitchell and I agreed here only 17% of the time.

The purpose of this work was to evaluate agreement/disagreement on clinically significant restrictions. We had seen and felt the craniosacral system's activity; we knew of its existence. In my judgment the research showed that skilled craniosacral clinicians could find significant restrictions in the craniosacral system and that these restrictions are real. We did count cranial rhythmic impulses as well as heart and respiratory rate, but we only counted each for 15 seconds and multiplied by 4 to get the rates per minute. We counted and recorded these rates on each therapist and child before the evaluation began.

In the interest of science or experimental design, all of the evaluators were blind to the others' findings. All rating data were reported directly to a technician who recorded these reported findings on standard forms. The technician asked for each parameter rating as it appeared on the form. In this way all examiners followed the same examination sequence.

Once all the children were evaluated, the raw data were given directly to Eric Gordon, Ph.D., an independent statistician. None of the examiners were privileged to see the data before Dr. Gordon performed his treatment, analysis and organization of the raw numbers.

This piece of research, entitled "The Reproducibility of CranioSacral Examination Findings: A Statistical Analysis" by John E. Upledger, D.O., F.A.A.O., was first published in The Journal of the American Osteopatic Association in August 1977, 76:890-899. This is a refereed journal. It was selected for republication in the 1977 yearbook of the American Academy of Osteopathy. It was then republished in another osteopathic publication, Clinical Cranial Osteopathy: Selected Readings, edited by Richard A. Feely, D.O., 1988.

Dr. Feely was Clinical Associate Professor of Family Medicine at the Chicago College of Osteopathic Medicine at the time. He also chose to publish another of our research articles in that volume. The article, summarized below, is "Mechano-electric Patterns During CranioSacral Diagnosis and Treatment" by John E. Upledger, D.O., and Zvi Karni, Ph.D., D.Sc. This work was published originally in the Journal of the American Osteopathic Association, Volume 78, in July 1979.

I used the above-reported reproducibility work as a stepping stone toward the next research that I conducted as the solo examiner of 203 public school children. The 19-parameter standardized evaluation protocol had, in my opinion, proven its worth. The next step was to get into the public school system in order to examine a sample of the students. I obtained the cooperation of the principals of three grade schools in Lansing, Michigan. Information and consent forms were sent home to parents with these grade school children on a Monday. By the following Friday, 203 signed consent forms were returned that allowed participation in the research. During the following week, I went into each of the schools for one day each and, using an assigned room, had a portable treatment table set up for the purpose of performing the examination. The same technician who had participated in the previous work was employed to record my orally reported data. A school employee was assigned to have a child lying on the table when I entered the room to do the examination. I did not want to see the children walking, or receive any suggestions from observations of them climbing onto the table, for example. I did not speak to any child before or during the examination. I only thanked each one at the end of the examination.

As in the previously reviewed protocol, the technician guided me through the 19-parameter protocol. Heart rate, respiratory rate and cranial pulse rate were first recorded by counting each for 15 seconds and multiplying by four to obtain the rates per minute. Then the 19-step standardized examination was completed.

All the raw data was given to Dr. Gordon, the same statistician employed in the previous study. Dr. Gordon was then privileged to go into the school files and obtain information on each child participant

relative to his/her school performance such as teachers' opinions. From this exploration he developed the categories that were used to correlate with craniosacral system examination findings. The categories derived from the school files by Dr. Gordon were "normal or not normal," behavioral problems, motor coordination and speech problems, and learning disabilities. The motor coordination and speech problem category children were all confirmed by the Motor Coordination Clinic located on the Michigan State campus. Fortunately, all children with these problems were seen and treated by this clinic as a part of the University's community service.

Historical data were collected by personal interviews with the parents after the craniosacral examination had been completed. These interviews were conducted by the research technician. From this historical data we developed the following categories for possible correlation with patterns of dysfunction within the craniosacral system. The historical categories decided upon were seizure history, head injury, obstetrical complications and ear problems. Dr. Gordon then performed all data organization and statistical analyses.

The conclusions that emerged after all this combined effort and sincere attempt at rigorous control were:

1. The standardized quantifiable craniosacral motion examination represents a practical approach to the study of relationships between craniosacral system dysfunctions and a variety of health, behavior and performance problems.

2. Our data in general supported school officials' and teachers' classifications of children as "normal" or "not normal."

3. Craniosacral dysfunction scores correlated very positively with classifications of "not normal," behavioral problems, learning disabilities, motor coordination problems and obstetrical complications as given by the parent or parents in the patient's history.

4. The highest craniosacral restriction scores correlated most positively with those children suffering from multiple problems as categorized in this study.

The results of this research were published in the Journal of the American Osteopathic Association, Volume 77, June 1978, after rigorous review by three referees. The article is entitled "The Relationship of CranioSacral Examination Findings in Grade School Children with Developmental Problems" by John E. Upledger, D.O., F.A.A.O. Both of these studies on school children have been included in the appendix of our textbook, CranioSacral Therapy by John E. Upledger and Jon D. Vredevoogd, 1982, available through The Upledger Institute.

My intention was to follow these two research projects with a controlled study of dyslexic children in East Lansing. We planned to have three groups of 25 children each. The groups would be matched as best we could for age, gender, and severity of disabilities. One group would receive CranioSacral Therapy once a week for one school semester. A second group would receive placebo CranioSacral Therapy in the form of head touching for 15 minutes once a week with no therapist-facilitated correction intended. However, I was well aware of the therapeutic effect of touch, and we would deal with this problem as best we could by reporting spontaneous corrections sequentially on the standardized examination forms that would be completed on every child each week. The third group of children would receive no treatment, no touch, and no special attention from us. All of the children were to be evaluated at the beginning and the end of the semester for their reading skills.

The project was organized, funded and ready to go when it was sabotaged by a young reporter who heard about it. That reporter attended the School Board meeting where I was to get the official stamp of approval by the board. He opened discussion about the project and published an article in the morning newspaper headlined "MSU Professor to Use Lansing School Children as Guinea Pigs." That was the end of that project.

Fortunately, we were reassigned by the funding agency to begin research with autistic children at the Genessee County Center for Autism. I will discuss the autistic work a little later. Right now it seems appropriate to bring you up to date with my work as it was carried out with Dr. Karni. At the same time, we opened a University-sponsored clinic for brain-dysfunctioning children that continued from 1977 through my departure from M.S.U. in 1983.

1976-1979—During one of our regular Biomechanics Department meetings in the summer of 1976, I put forth the request for help from our basic science faculty. I wanted to investigate the possibility that there exists an exchange of energy of some kind between a therapist and a patient during a hands-on CranioSacral Therapy treatment session. Dr. Karni, the biophysicist/ bioengineer on loan to us from the Technion Institute in Haifa, Israel, took me up on my request. At first he was very skeptical but as things progressed, Dr. Karni became very enthusiastic about what he was seeing.

The result of our initial work was published as "Mechano-electric Patterns During CranioSacral Osteopathic Diagnosis and Treatment" by John E. Upledger, D.O., F.A.A.O., and Zvi Karni, Ph.D., D.Sc., in The Journal of the American Osteopathic Association I, Volume 78, July 1979. As a service to those of you who may be interested, we also included this article in the Appendix of CranioSacral Therapy by Upledger and Vredevoogd.

This work used instrumentation that Dr. Karni custom-designed and built. He called it a Modified Wheatstone Bridge. This equipment enabled us to record electrical potential on a polygraph along with ECG and respiratory activity. The latter was recorded by a strain gauge mounted over the anterior diaphragm.

Our concept was that the human body could/should be considered as a bag of electrolyte solution with insulating skin as its boundaries. With this in mind, we placed exploring electrodes on both anterior thighs of subjects, three inches above the superior borders of the patellae with grounding electrodes ipsilaterally placed on the dorsum of each foot. We left the electrical noise in the recordings. Karni used his creative expertise in physics and engineering to get his Modified Wheatstone Bridge to algebraically add the noise deflections. We then began to see patterns of electrical potential change within patients that correlated to specific craniosacral techniques that I was using at the time. We placed a screen between Karni and his polygraph, on which all of the data was being recorded, and myself with the patient. Soon, from his polygraph tracings, Karni was able to tell me what I was doing with the patient.

We recorded what seemed like miles of polygraph tracings. We saw that breathing was not consistently related to craniosacral system activity. We saw that at the onset of a still point the heart quite often gave a premature ventricular contraction. We definitely saw that electrical phenomena were related somehow to craniosacral system phenomena in the same body. The most exciting thing for me was the observation that, when I found a point of release in the craniosacral system, the craniosacral rhythmical activity stopped simultaneously with a cessation of patient in-body electrical potential fluctuation. The electrical potential baseline also dropped during this period of "release" within the craniosacral system. I still believe this is probably our most important finding, although we still do not understand the mechanics of this relationship.

Dr. Karni and I continued through 1978, when he was forced to return to the Technion Institute in Israel. We did strain plethysmography studies on patients. We placed sensitive strain gauges at the mid-forearms and the wrists of patients, which would measure and record on the polygraph circumferential changes in the arm and wrist. The gauges were Peckel's electrical resistance high extension rubber strain gauges type 20S. They were battery powered so that there would be no fluctuations in power source. Recordings were done for 20 minutes on each patient.

The gauges reflected the arterial pulse quite clearly. They also showed a cycled pulse of 9 to 10 per minute. This pulse moved from mid-forearms to wrists, usually over a period of about four-tenths of a second. We presumed this to be what we called the craniosacral system's rhythmical activity. We also

saw a 3-cycle-per-minute pulse. All three pulses were superimposed upon each other. Rollin E. Becker, D.O., talked about a 3- to 4-cycle-per-minute pulse, mentioned earlier. We wondered if this was it. Dr. Karni and I also did a lot of other exploration related to Kirlian photography, acupuncture points and meridians, and so on.

In Kirlian photographs, we saw definite increases of corona output from patients' fingers resultant of CranioSacral Therapy. This was reported in 1978 to the International Kirlian Society Convention in New York City. We also saw changes in electrical activity in acupuncture meridians resultant to CranioSacral Therapy. Since then, I have often had acupuncturists evaluate the pulses and monitor the changes that occur as I do CranioSacral Therapy. Clearly, the system of acupuncture meridians and energies are often favorably influenced by CranioSacral Therapy.

In late 1978, Dr. Karni returned to Israel for political reasons. He then arranged a visiting professorship for me in the summer of 1979 at the Technion Institute in Haifa. It was also agreed that I would do work at the Loewenstein Hospital, a neurological institute, in Ra'anana under the direction of Professor T. Najenson.

At Technion, we did more strain plethysmography work along with Joseph Mizrahi, Ph.D. We confirmed the preliminary work that Dr. Karni and I had begun in Michigan. This work was published in a journal produced by the Julius Silver Institute of Biomedical Engineering Sciences at the Technion Institute in Haifa, Israel, in April 1980.

At the Neurological Institute in Ra'anana, I was asked to evaluate several comatose and/or paralyzed patients from a craniosacral point of view. All my findings on extremities were positively confirmed by Dr. Mizrahi with his plethysmograph. The results were as follows:

1. Four cases of long-standing coma secondary to anoxia displayed craniosacral rhythms of 3-4 cycles per minute all over the body.

2. Two cases of long-standing coma due to drug overdose displayed rhythms of 10-25 cycles per minute all over the body.

3. One case of poliomyelitis with secondary residual paraplegia displayed palpable craniosacral rhythms of 24 cycles per minute in the paralyzed limbs and 10 cycles per minute in the rest of the body.

4. One case of Guillian Barre Disease displayed craniosacral rhythms of low amplitude 24 cycles per minute in paralyzed lower extremities, and low amplitude 6 cycles per minute above the paralysis.

5. Seven cases of spinal-cord injury displayed craniosacral rhythm of 7-10 cycles per minute on the head and body above the cord injury, and 18-26 cycles per minute below the cord injury. These determinations were made by palpation of the paravertebral muscles. I was able to accurately localize the level of the spinal-cord injury in this way with no knowledge of this level of injury from other sources. The patients were prone in bed when I examined them.

6. One case of long-standing coma due to cerebral hemorrhage with secondary left sided hemiplegia displayed a craniosacral rhythm on the hemiplegic side of 25 cycles per minute. On the normal side it was 8 cycles per minute. The craniosacral activity on/in this patient's head was disorganized and confused. It was not countable because it made several erratic changes each minute as we attempted to count.

As an interesting sidelight, while I was lecturing to the hospital staff in Haifa, it was brought to my attention that by proving cranial sutures are not calcified, we had "reinvented the wheel." I was shown pages 202 and 203, Volume 1, in Anatomica Humana, 1931, written by Professor Guiseppi Sperino. He

stated that cranial sutures only calcify before death under pathological circumstances. Apparently, Italian and British anatomists have a long-standing disagreement over this issue.

Shortly after my visit to Israel, Dr. Karni suffered a heart attack. I did not hear from him again until March 1985. At that time he was holding a visiting professor chair at the University of Southern California in Los Angeles. He informed me that he was ready to deliver lectures that would clearly define strains, pressures and rhythms inside the living skull. He stated that he had been working with the Neurosurgical Department at the University to accomplish this work. He wished to re-establish our collaborative effort because he was in a position to confirm my palpatory perceptions with his work.

I arranged a presentation for him at a Florida medical school to be given one month later. Two weeks from the time of our conversation, I received a call from Yoram Lanier, Ph.D., at the Technion Institute in Israel. Dr. Karni had died from a second heart attack a few days earlier. I still have the letter that Dr. Karni sent me explaining his findings and work.

During the time I was at Michigan State University, I also was privileged to be able to do dissections on unembalmed human and baboon heads. Our department was studying spinal ligament characteristics for the Air Force, and so we received one or two bodies each week. I was given the heads. I developed special dissection techniques that preserved the intracranial membrane system. With Yoram Lanier, Ph.D., a tissue expert in biomedical engineering on loan to us from the Technion Institute, we studied biochemical changes that resided in the intracranial dura mater membranes resultant of the fracturing of molecular bridges between collagen fibers in these membranes. We correlated these membranous strain patterns with skull shapes and deformities. The correlation enabled us to study membranes and predict sutural jamming, among other scenerios. This is a life's work for someone who is so inclined, but as a preliminary look, it proved to be fascinating. I'm not sure how you could set up a double-blind study or have a control group on this subject to satisfy the experimentalists.

It was in 1977 that I became aware of fascia hanging from the free border of the falx cerebri on many of my dissections. When I hit a tough attachment/area while removing the brain tissue, it finally occurred to me that I could not be damaging the falx cerebri with only the water irrigation and my gloved finger. I showed this tissue to Dr. Retzlaff who put it under his microscope. He informed me that this was a nerve tract running out of the falx cerebri with brain tissue attached to its free end. The brain tissue appeared to have elements of ventricular lining (ependymal cells) as a partial constituent. This was great. Perhaps we had a nerve tract from the sagittal suture to the ventricular system of the brain.

To study this, we injected horseradish peroxidase into the sagittal sutures of two live monkeys that pharmacology was about to sacrifice. Horseradish peroxidase is a dye that follows nerve tracts and stains them. Two days later the monkeys were sacrificed, and Dr. Retzlaff was able to trace the nerves from the monkeys' sagittal sutures into the ventricular system of the monkeys' brains. This was the piece we needed to put together our Pressurestat Model for the mechanism of the craniosacral system's rhythmical activity.

Earlier, I mentioned the research at the Center for Autism. It went on for the first six months of 1978, 1979 and 1980. We did not publish our results simply because we were too busy doing the work to summarize it. We did find out that 10% CO2 - 90% O2 inhalation therapy 2x/day for 15 minutes quiets the autistic child. We did this because the autistic children all seemed to be shallow breathers. I wanted to activate the respiratory reflex and oxygenate their brains. We did nutritional counseling subsequent to the results of hair analysis and physical findings. Most of the children were in foster homes. It was clear that our counseling was not high priority to most of the foster parents. We did general bodywork and CranioSacral Therapy on the autistic children. We saw some remarkable behavioral improvements but they seemed temporary. Regressions occurred during our six months of down time each year. It was difficult to document change because we could find no independent specialist who seemed able to rate the behavior of autistic children in any way that resembled an objective quantitative manner that would lend itself to statistical analysis. We also used time-lapse photography at 0.1 sec. to record child movement in the classroom. This was done for two weeks. We found that when the barometer was in motion the children

were more restless. We also saw that when the room temperature was about 72° F and the humidity was about 60%, the children were the most calm and cooperative. We also found with thermographic studies that we could warm their hands 2° or 3° C by doing the still point induction technique used in CranioSacral Therapy. This latter observation suggests a relaxation response in the vasculature probably via induced sympathetic nervous system tone reduction.

All of the autistic children seemed to have very tight intracranial membrane systems, and none of them had more than two of the 19 parameters on my standardized examination form rated as normal motion. My impression was that there is great energy within the craniosacral system. This energy was trying to work against a membrane system that was too tight for the skull and brain, which were trying to expand with normal growth.

It seemed to me that something was preventing the meninges from accommodating the growth process that was being dictated genetically. Many things could do this. Perhaps that was why the children that improved regressed when our treatment was interrupted. Perhaps the membranes needed our help in order to accommodate brain and skull growth.

The autistic children did educate me significantly about the process that we now call SomatoEmotional Releasesm. This topic is covered in the book SomatoEmotional Release and Beyond by John E. Upledger, D.O.

During the last year of our work at the Center for Autism, I wanted to test my feeling about tight membranes and their relationship to autism. Bernard Rimland, Ph.D., was at that time in the forefront of autism research. He had developed a scale for autism based on the appearance or lack of appearance of development landmarks. Dr. Rimland's scale was considered valid and reliable by the Department of Psychology at M.S.U. I contacted Dr. Rimland and requested that he allow me to blindly examine some of the children that he had rated. He agreed and contacted parents, and I evaluated 63 of his rated children. I had to go to Detroit, Chicago and Columbus, Ohio to do it, but we did it. Using my criteria of high energy and membranous restriction for autism, I came up with 85% agreement with the Rimland Scale for Autism. This confirmed my suspicions. I was also able to determine which children were schizophrenic rather then autistic. The schizophrenic child has low intrinsic energy and plenty of suppleness in the intracranial membrane system. This impression was supported by the Rimland Scale that also predicts schizophrenia. I did no further research with this approach; I simply did not have the time.

There is just one other piece of work I did that supports the existence of the craniosacral system. This was done on two, fresh, unembalmed bodies at the Harvard Medical School Morgue. It was done with Cindy Rowe, P.T., who was instrumental in gaining us entry into the Morgue, and Neil Mohon, a physicist who came along to measure.

The brains of these fresh bodies were carefully removed through 2-inch square holes in each parietal bone. The intracranial membranes were kept intact. Our purpose was to see how much force on the skull and sacrum is required to move the intracranial membrane system. Mohon was in charge of membrane markers and force application. The heads of the bodies were stabilized and a fixed camera photographed the skull and the marked membranes through the parietal windows. On the unembalmed fresh body with no hydraulic force to assist, it required 48.2 grams of traction on the frontal bone to achieve perceptible falx cerebri marker movements. Although we did not measure the force, we could also move the falx cerebri by the application of light flexion force on the sacrum with the hand. Further, we found that we could palpate membrane tightening with a finger before the markers could be seen to move. We were able to move the tentorium cerebelli by the application of lateral traction on the ears. The traction was on the order of 60 grams.

This covers my involvement in research activities as they relate to the craniosacral system. On the other hand, one might say that since I have been perceiving craniosacral system activity for almost 25 years, this could be construed as ongoing research. Research may be defined as a careful systematic study

usually undertaken in order to discover and/or establish facts and principles. I have gotten exceptionally good results with patients using CranioSacral Therapy, and I know that our Institute alone has trained almost 20,000 therapists in its use since its beginning in 1986, and I have files full of letters about its successful application to patient problems. I was teaching CranioSacral Therapy for over 10 years prior to founding The Upledger Institute, so I suspect that there are well over 20,000 persons perceiving craniosacral system activities on an almost daily basis. Personally, I think these experiences count for a lot. Perhaps more than you can ever achieve in a controlled laboratory setting.

From what I have said previously, it is apparent that the craniosacral rhythm frequently does spontaneous stops, or still points. At these times, I suspect, it is readjusting itself. When we add our energy to that of the patient, the craniosacral system frequently takes advantage of this "energetic boost" in order to do self-correction that may often involve changes in rhythmical activity. All of us who do advanced CranioSacral Therapy know that emotion, significant body position, significant words and thoughts can all alter and/or stop the craniosacral rhythm temporarily.

One area of wonderment to observers of those practicing CranioSacral Therapy in action is how these therapists are able to locate problems in the peripheral body by the use of the craniosacral system's activity. Personally, I believe that the most likely answer to the whole-body response to the craniosacral system is via the effect of the rise and fall of cerebrospinal fluid (CSF) pressure within the meningeal compartment of the brain. The brain, in turn, rhythmically tones and relaxes the myofascial system via the motor nervous system. This effect is delicate and easily inhibited by connective tissue that is restricted and not able to respond to this gentle urging of the craniosacral system via the motor system. These restrictions are easily found by the skilled therapist practicing CranioSacral Therapy.

Now please allow me to briefly explain the Pressurestat Model that was developed at Michigan State University in order to illustrate the rhythmical activity of the craniosacral system. First, Dr. Retzlaff and I found the nerve plexuses in the human sagittal suture along with a variety of receptors that we believed would sense both compression and stretch of the intrasutural material. There were also many autonomic nerve networks that followed the intrasutural vasculature. The suture design would certainly allow small amounts of movement between bone surfaces. Then, in the monkeys, we found the nerve tract connections between the sagittal suture and the ventricular system of the brain. This ventricular system incorporates the choroid plexuses that manufacture or secrete cerebrospinal fluid. So at this point, we have a potential signaling system between the suture and the choroid plexuses. It seems reasonable that the intrasutural sensory receptors might signal a cessation of the production of cerebrospinal fluid, or CSF, to the choroid plexuses when the suture is expanded to the extent that the stretch receptors are activated. The sutural expansion or intrasutural stretch would result from an increased volume/pressure of CSF within the meningeal boundaries of the cranial vault. After the CSF production has been stopped for some time, if the CSF is continually being re-absorbed into the venous system during the stoppage, the volume/pressure of CSF within the cranial vault would be reduced so that initially the sutural expansion or intrasutural stretch would be alleviated. This event would be closely followed by sutural closing that would then compress the intrasutural contents. When this compression becomes sufficient to stimulate the intrasutural compression receptors, the signal would be sent down the nerve tracts to the ventricular system of the brain and cause the choroid plexuses to reinstitute CSF production. This resumption of CSF production first results in a decompression suture and then a re-expansion to the point of re-stimulating the stretch receptors that in turn signal the choroid plexuses to shut off CF production. The cycle repeats.

In order to mock up a "normal" 10-cycle-per-minute craniosacral system rhythmical activity, we must allot six seconds for each complete cycle of filling and partial emptying. If the rate of CF production by the choroid plexuses is twice as fast as the rate of re-absorption of CF back into the venous circulation, we would have three seconds for the production of CF and three seconds for non production of CF. Assuming the rate of absorption by the arachnoid granulation bodies to be relatively constant, this would give us the reasonably symmetrical three seconds of expansion of the system followed by three seconds of contraction that we seem to feel with our hands under average circumstances.

Remember, this is just a model that could explain some of the events that occur within the craniosacral system as we have thus far perceived them. A model is open to modification and change as new information is brought to light. Thus far, the Pressurestat Model remains useful.

In closing, I would state that I have spent a total of 11 years as a professional researcher, three years in biochemistry and eight years in biomechanics. I have worked very closely with some true experts in the field of research. I am convinced by experience that we should not allow experimental design to fetter human intelligence, nor should we allow it to stifle creativity. I have also served for five years on The American Osteopathic Association's Bureau of Research and am presently acting co-chairman of the Research Committee of the Advisory Panel for The Office of Alternative Medicine at The National Institutes of Health. I can clearly see a shift away from strict experimental design towards the acceptance of outcome studies. I have yet to see a perfectly designed research protocol involving human subjects. Over the years, I have come to realize that controlling all of the variables in a study that involves human beings is not possible. If you think you can do it I believe that you are either eluding or deluding yourself. It is true that the evidence which supports the craniosacral system has some holes in it. However, to follow the suggestion that CranioSacral Therapy not be used because of these vacancies in its scientific support would be to deprive thousands of patients of their chance to heal. CranioSacral Therapy, when practiced with a mild degree of prudence, is virtually risk-free, and it possesses the potential for great help. The outcomes demonstrate these facts. Why not use it? We still use gravity and electricity even though we have gaps in our understanding of how they work.

In the words of Rudolph Virchow, the highly honored German pathologist, "Absence of proof does not necessarily demonstrate proof of absence."

A Summary of the Research that Supports the Existence

of a CranioSacral System

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Craniosacral Rhythm—where does it stand?

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Introduction

In an article titled "Challenging Myths in Physical Therapy" (Harris 2001), this professor at the University of Vancouver, criticized physical therapists that were using craniosacral therapy in their treatment of musculoskeletal problems, despite the current lack of scientific evidence. Today – about ten years later – the body of evidence has not changed in favor of craniosacral therapy. Nevertheless, the demand for and offer of training courses in this area continues unabated. The following article represents a critical personal review of this myth.

This is a modified and translated version of an article published in the German journal “Manuelle Therapie” in December 2007. At that time the article caused overwhelming reactions of German-speaking physiotherapists, but unfortunately only from the opponents of Craniosacral Therapy (CST) who sent their comments. The pilots of magic carpets remained quite silent. Now in 2011: checking the amazing number of CST courses that are still offered in Germany and elsewhere, and comparing that with the ongoing absence of any evidence or at least common sense on the topic, it was considered worth translating the article into English for the IJMDT. Maybe this won’t change anything, but some of the readers will hopefully enjoy. In this context, a quote from Professor Chris Main (having dinner with us in Fellbach 2010) comes to my mind: “Stupidity of the patient is not an evidence base”. It might be added: “Stupidity of the therapist is not one either”.

Historically

More than 100 years ago, so-called 'experts' declared that the craniosacral rhythm exists. It is said that an American, William Garner Sutherland, had a spontaneous inspiration in the year 1899. He was watching a fragmented skull in a cabinet and concluded that the sutures of the skull must exist to allow the skull bones movements concerning a “primary respiratory mechanism”. His book "The Cranial Bowl" was published in 1939. John Upledger dominated the craniosacral concept in the last 25 years, after his publication of "Craniosacral Therapy" (Upledger 1983). Thirty years ago Upledger reported a high intertester reliability for the evaluation of craniosacral movements when he assessed 25 children between three and five years of age (Upledger 1977).

Assumptions

Advocates of the CST concept formulated, among others, the following concepts:

- The cerebrospinal fluid is pulsing in a certain rhythm (6-12 times per minute),
- Which rhythm exists absolutely independently of breathing or the heartbeat,
- Specially trained experts are able to palpate this rhythm,
- It is possible to diagnose illnesses according with the identification of disturbances in this rhythm,
- The skull bones can be displaced against each other, which can cause pathology,
- Therapists can treat these disturbances, which are diagnosed by palpation of these displacements of the sutures of the skull.

Facts

During aging, not all sutures of the skull calcify and a part of the skull plates can be displaced against each other (Kokich 1976). A minimal mobility at the sutures of the skull is commonly accepted today (Oleski et al 2002). MRI scans show that the brain and the cerebrospinal fluid of healthy individuals are performing some cyclic movements (Maier et al 1994).

Illusions

Active mobility of the skull bones

According to current scientific evidence, the mobility of the skull is purely a passive one. Whether changes in intracranial pressure cause movements of the skull bones between each other have been studied only once (Heifetz and Weiss 1981). To receive measurable results, the researchers had to apply such high pressures that these experiments could only have been done on two patients with apallic syndrome in the final stages (Heifetz and Weiss 1981). So, to date, nobody has been able to prove that active movements of the skull bones really exist.

Manual mobilisation of skull bones

A recently published study on anesthetized rabbits that had micro plates affixed at their skull was very revealing (Downey et al 2006). The study showed that the therapeutic pressure recommended by Upledger (Upledger 1977, Upledger 1983) neither caused any movements of the skull bones nor changed the intracranial pressure. Distraction forces of 5 – 20 grams were applied to the rabbits, as recommended by craniosacral osteopaths. In one rabbit, Downey et al applied forces between 100 grams and 10 kilograms. Only when using more than 500 grams, could the researchers achieve movements of 0.30mm between the skull bones. Changes of intracranial pressure were only achieved when they used forces that were more than 100 times greater than those used in therapy (Downey et al 2006).

Palpatory skills

Von Heymann and Kohrs (2003) published a comprehensive article on craniosacral rhythm in context of biomechanics and neurophysiology. They stated that instrumental measurements nowadays were so exact, that an active mobility of the skull can be tested as low as 0.003 mm and can be excluded above this measurement. Considering human physiology (muscle spindles, receptors), movements and changes in positions can be perceived only when these are bigger than 0.07 mm. So the threshold of perception is 20 – 30 times greater than the reading at which an

active mobility of the skull can be definitely excluded (Von Heymann and Kohrs 2003).This means concretely: even if the skull bones can move against each other, clinicians would not be able to palpate this movement.

Existence of independent movements of cerebrospinal fluid

Movements of cerebrospinal fluid, measured by imaging procedures, are in their rhythm dependent on the current heartbeat. Increasing intraabdominal pressure using the Valsalva manoeuvre or coughing affects this rhythm only temporarily (Maier et al 1994). Von Heymann and Kohrs (2003) pointed out that no system exists which can be responsible for this supposed rhythm. Anatomically neither a pump analogous to the heart muscle exists nor has a reasonable autonomous center analogous to the sinus node or the respiratory center been identified in the neural structures. Proper motions of brain substance, independent from the vascular system, are anatomically not possible (Heymann 2003). Thus, to date, no scientifically approved study indicates the real existence of an autonomous craniosacral rhythm (Green et al 1999).

Inter-tester reliability

Clinical phenomena do not necessarily depend on proof from technical equipment. The fact that something is not measurable by current capabilities of research does not mean that it does not actually exist at all. On the contrary, it can be the strength of such a clinical phenomenon to replace a mechanical device or be shown potentially to be superior to that equipment. However, it is absolutely essential that a clinical phenomenon can at least be identified by different examiners with reasonable reliability, especially when the entire philosophy of diagnosis and treatment is based on that phenomenon.

All past research into the reliability of CST diagnosis has shown lack of agreement. When two therapists palpated the same person, researchers never found a significant consistency concerning the recognized rhythm (Rogers et al 1998, Wirth-Patullo and Hayes 1994, Norton 1996, Hartmann and Norton 2002). Examiners in one study were very experienced therapists; one had used CST for 17 years, and the other reported that she had treated 90% of her patients in the previous three years exclusively with CST (Rogers et al 1998). So they were two real experts! In the conclusion, they wrote "The finding that one examiner could palpate a craniosacral rate of zero while the other examiner could simultaneously palpate a consistent craniosacral rate within the same subject suggests that the examiners were measuring different phenomena, and one possibility is that they were attempting to measure something that does not exist" (Rogers et al 1998).

Hartmann and Norton (2002) described it even more concisely, "The only alternative we can imagine is that the rhythm is a result of perception of psychological phenomena inside the examiner himself". No one has been able to replicate the results of Upledger's reliability study (Upledger 1977) over the last 30 years. A common point of criticism of his study is that all 25 evaluated children showed a disturbance in the craniosacral rhythm.

Pathology

Research could not prove a causal relationship between various positions of the skull bones and changes in movements of cerebrospinal fluid yet. The assumption that a disturbance in this area can cause any health problems lacks any supportive evidence and any plausible explanation (Green et al 1999).

Bottom line

No scientific evidence favors the existence of an autonomous craniosacral rhythm in terms of independent movements of brain and cerebrospinal fluid. More than that, the body of evidence seems to eliminate any possibility of this phenomenon. Each clinician, searching for alternative therapies, must decide by himself, how consequently he will ignore the pure facts. CST does not fulfill the rudimentary minimum requirements for any diagnostic and therapeutic concept. Intertester reliability is zero and to date, serious studies on effectiveness simply don't exist.

Conclusions

Alternative methods of diagnosis and therapy usually claim that they cannot be assessed by the standard measuring tools of evidence based medicine. No doubt, some things are happening between heaven and earth that cannot be assessed by the wooden yardstick of our mind. But therapists should remain sceptical. The ones who believe the tenets of the craniosacral community in their daily work are at risk of moving away from serious health profession behaviour to the magic kingdom of assumptions and wishful thinking. It's not damnable that patients might feel better after craniosacral intervention, due to placebo response from a convincing therapist. But some doubts may be allowed, when the "feel better" never evolves to a "get better". If active treatment strategies remain kept back due to doubtful diagnostic models, the patient loses the possibility to work actively and self-reliantly on his wellbeing. At this point the "diplomatic immunity" of every alternative method expires.

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Palpating the craniosacral rhythm

"...for both patient and practitioner to be blind to the clinical realities is an unacceptable version of the 'double-blind.'" (Dodes 1997).