CranioSacral Therapy and Scientific Research

By John Upledger, DO, OMM

I cannot count the number of times I have been told by well-meaning friends and harsh critics that CranioSacral Therapy (CST) should be investigated using scientific methods. Many people say CST would be a real boon to health care - if only there were more scientific proof.

In a recent article, I explained why I believe CST can never be adequately evaluated within the confines of the laboratory. In addition, many people don't realize that research has indeed been done. For you skeptics, I offer the following overview:

In the mid-1970s, I was approached by Michigan State University (MSU) to uncover the scientific basis for a premise put forth by William Sutherland, DO, in the 1930s: that the joints and sutures of the cranium do not fully ossify, as was once believed. From 1975 through 1983, I was a professor in the department of biomechanics at MSU's College of Osteopathic Medicine, where I led a team of anatomists, physiologists, biophysicists and bioengineers to test and document the influence of the craniosacral system on the body. Together we conducted research - much of it published - that formed the basis for the modality I went on to develop and name CranioSacral Therapy.

I first worked with neurophysiologist and histologist Ernest Retzlaff, PhD, to prove that under normal conditions, cranial sutures do not calcify before death. We studied numerous bone and suture samples taken from neurosurgery patients between the ages of seven and 57 years. Not only did these samples show living sutures completely free of calcification, but they were chock full of collagen and elastic fibers; arteries; arterioles; capillaries; venules; veins; nerves; and neuroreceptors.

After in-depth examinations, we demonstrated definitive potential for movement between the cranial sutures. Yet these results appeared to contradict anatomy-lab samples taken from cadavers whose skull sutures were calcified. These seemingly conflicting findings suggested that the calcification of skull sutures seen in preserved cadavers was due to postmortem changes and reactions to chemical embalming agents. Our findings supported those published in Anatomica Humanica by Italian professor Guiseppi Sperino, who noted that cranial sutures fuse before death only under pathological circumstances.

Once we saw the potential for motion in living sutures, our next step was to demonstrate that the motion we had hypothesized actually existed in the living skull. With the assistance of biophysicist Richard Ropell, PhD, we began using head (band) strain gauges on living subjects. These gauges demonstrated rhythmical expansion-contraction movements of the cranial circumferences at eight to 12 cycles per minute; however, there were other variables that could discredit these measurements as solid evidence of sutural movement, so we had measure the movements of one skull bone in relation to another. While we could not use humans for studies like this, we were able to use live monkeys from the university's pharmacology department.

In pain-free experiments, we anesthetized the monkeys and did minor surgery to cement an antenna directly to each parietal bone, about two centimeters lateral to the sagittal suture, and two centimeters posterior to the coronal sutures. We then wired these two 10-inch antennae so that we could broadcast a radio signal between them. In the recorded wavelengths, we discovered as the parietal bones moved independently of each other, the distances between antenna times changed. These changes demonstrated interparietal movement of about 12 cycles per minute. At one point, I placed a fingertip on the monkey's coccyx. With minimal pressure, I was able to stop the parietal bone motion.

Now we had evidence of a system that could move parietal bones rhythmically - and be stopped by pressure on the coccyx. This and a multitude of other factors caused me to deduce that the coccygeal pressure influenced the parietal motion via the hydraulic force of cerebrospinal fluid

(CSF) moving through the dural membrane and myofascial system related to the spinal column and the cranium.

My first inkling that such a hydraulic system existed came some years earlier during a neck surgery I assisted. The lead surgeon had removed the spinous processes and part of the laminae of the middle cervical vertebrae (C4 and C5) in order to expose the meningeal dura mater and keep it intact. At that time, I witnessed a rhythmical rise and fall of CSF pressure at about eight cycles per minute. It became clear that a fluid pressure deep to the dura mater was causing its continual movement. This fluid had to be cerebrospinal, and its volume had to be increasing and decreasing cyclically. Why hadn't this phenomenon been noticed in surgeries before? The answer is surprisingly simple: In most cases, the dura mater was incised. (Fortunately, that's not always the case.) I recently received a letter from Professor Charles Probst, a prominent Swiss neurosurgeon. He reported seeing,

"... without any doubt, rhythmical spinal cord movements with a four to 10 cycle-per-minute rhythm. This rhythm is corresponding to that of cerebrospinal fluid, visible very well with the subarachnoid space being opened. All these movements have quite another frequency than those of the pulse-beat [heart] and respiration! This is all, I can tell you, based on our own experiences in about 20,000 neurosurgical operations (11,000 cranial, 9,000 spinal)."

In the case of lumbar-puncture procedures, when the needle enters the CSF compartment, the fluid enters the manometer via the needle and an elbow apparatus. When the fluid rises to its peak pressure, a valve is opened to take a specimen. It was generally assumed that the CSF specimen that was removed accounted for the reduction of pressure in the manometer. Any cyclic drop in fluid pressure was thus overlooked.

After Drs. Roppell, Retzlaff and I successfully demonstrated live sutural contents and rhythmical cranial bone and sutural motion, I began working with biophysicist and bioengineer Zvi Karni, PhD, DSc. He was a visiting professor from the Technion-Israel Institute of Technology in Haifa, Israel, where he chaired the biophysics department. He initially joined me to prove that I was crazy in my concept that "energy" was passed from one person to another during a hands-on treatment session (later named CST). After closely observing my treatment sessions, we theorized how we could best investigate. I became his student in biophysics, and he became my student in clinical manual medicine and biology. He gave me reading assignments in classical and quantum physics followed by pop quizzes; I gave him insight into the strange hands-on approach I was using.

Dr. Karni and I worked intensively for about three years, after which he was recalled to Israel. He arranged for me to go there the following summer as a visiting professor at Technion, where he introduced me to Professor Nachansohn, MD, the director of the Loewenstein Hospital, Ra'anana, the country's principal neurological rehabilitation hospital. I studied in the hospital's coma ward. After examining numerous comatose patients, I discovered that their craniosacral rhythms, as monitored in the paravertebral regions, were not present at the level of spinal cord injuries and below. With 100 percent accuracy, I was able to tell doctors the precise level of spinal cord injury in each patient, with no clue other than the loss of palpable craniosacral rhythm. This was truly a "blind" study, with eight to 10 very skeptical neurologists observing constantly.

During our years together at Michigan State University (MSU), Dr. Karni and I decided that we would look at the human body as an insulator bag made up of skin and mucous membranes full of electrical-conductor solution. We hypothesized that the conductor solution would undergo voltage changes in response to energy changes that occurred in the body as I did my treatments. In order to measure such millivoltage changes, Dr. Karni built what he called a modified Wheatstone bridge. The instrument algebraically added the millivoltage deflections in both the positive and negative directions at any given instant from a determined baseline. Thus, we could see millivoltage changes in patients as they occurred.

We began this series of experiments by applying electrodes on the midline of each patient's anterior thigh, three inches above the superior border of the patella. The grounding electrodes were placed upon the dorsum of each foot on the anterior midline over the tarso-metatarsal junctions. We also monitored cardiac activity through a V-2-placed electrode, and we tracked pulmonary/respiratory activity by placing sensitive strain-gauge and band apparatuses around the thoracic cage at the level of the juncture of the manubrium sterni with the xiphoid bone. Circumferential variations in thoracic-cage volume reflected breathing activity. These four measuring devices were then plugged into a polygraph that recorded the heart rhythm, breathing activity, and total-body millivoltage changes.

Dr. Karni monitored the readings on polygraph paper. Initially I told him what was happening as I initiated treatment techniques or patient changes occurred, and he noted the comments on the polygraph paper at appropriate locations. After a while, he was making accurate patient observations by simply monitoring changes in the polygraph recordings. We treated more than 150 patients this way and collected what seemed like miles of data. By demonstrating correlations in total-body electrical potential, we again confirmed the activity of what we called the craniosacral system.

As all of these laboratory studies were taking place, my colleagues and I conducted two clinical inter-rater reliability studies on children. I developed a 19-parameter evaluation protocol used to rate the level of mobility for various bones of the skull and sacrum. The first study was carried out on 25 nursery-school children examined by myself, one of two other cranial osteopaths, and a student assistant. The four of us evaluated the children independently, and reported our findings on each parameter to an independent research assistant. No one had any knowledge of the other's findings until after an independent statistician completed the statistical analysis. The percentage of agreement between the examiners varied from 72 percent to 92 percent, with the allowed variance of 0-0.5 percent. Once again, these findings supported the existence of a craniosacral system and sutural movement.

Still not satisfied, I went on to use the same examination protocol on 203 grade-school children. I personally evaluated the children with no knowledge of their histories. I then reported my findings to a research assistant who faithfully recorded them. An independent statistician then collected information from each child's school file, along with historical data from parent interviews. He correlated my findings with the data he recovered, and reported a very high level of agreement between the craniosacral examination findings and learning behavior; seizure problems; head injuries; hearing problems; and even obstetrical problems.

The study, because of its scientific design, obviated the possibility of random agreement. The results showed that standardized, quantifiable craniosacral system examinations represent a practical approach to the study of relationships between craniosacral system dysfunctions and a variety of health, behavior and performance problems. Other researchers have performed similar studies related to psychiatric disorders and symptomatology in newborns. Again, most of this work has been published. This is but a small portion of the research that has been done to prove the efficacy of therapy upon the craniosacral system.

Today, there are close to 100,000 CranioSacral Therapists around the world - and even more reports of patients helped by its noninvasive techniques. I find it odd that this information counts for nothing in the eyes of some skeptics who continue to proclaim the craniosacral system a fantasy. In any case, the craniosacral system will continue to exist and be used therapeutically with essentially no risk.

Resources

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