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# The Expanding Role of Cerebrospinal Fluid in Health and Disease

In 1971, I first witnessed the rhythmical activity of cerebrospinal fluid (CSF) as its hydraulic forces affected the patch of dura mater I was watching. At the time, I had no inkling of the incredible journey that was in store for me.

That small section of dura mater was only about 1-1/2 inches long and two inches wide. We had exposed it to remove a dime-sized calcium plaque from the outer surface of the dura. The operative site was the posterior aspect of the mid-cervical region of the patient.

My assignment was to hold the dura very still with a pair of forceps while the neurosurgeon delicately removed the calcium plaque without incising the dural membrane. In spite of my efforts, the exposed dural membrane repeatedly protruded and receded at about 10 cycles per minute.

That particular rhythm was a surprise to everyone in the operating room. It didn't synchronize with the anesthetist's breathing apparatus or the cardiac monitor. The only thing I could think of that could create this force was the pumping of CSF inside the dura mater.

The subject of CSF was quite contentious at the time. When I was in osteopathic college in the early '60s, CSF was considered mainly a shock absorber for the brain during swift starting and stopping movements. There was also some debate about

whether CSF was a transport system delivering nutrients and removing waste, but no one was certain. Some cranial osteopaths even made vague references to CSF following nerve fibers to every cell of the body to deliver "mystical" energy.

Despite all these theories, scientific knowledge at that time stated firmly that CSF did not penetrate the brain's surface or leave the compartment formed by the dura mater. The fluid did appear to follow nerve roots peripherally from the brain and spinal cord, but only as far as the dura mater provided a sheath for the roots. This, it was thought, was to bathe the nerve roots and the surface of the brain.

Controversy even existed over whether the fluid in the subdural space should be considered CSF. There was evidence to support the concept that the arachnoid membrane was impermeable to CSF and, therefore, the fluid outside the arachnoid membrane, but inside the dura mater was not CSF, even though they were biochemically identical. This, of course, raised yet another question: Should a fluid be named by its biochemical characteristics, or by the compartment in which it resides?

It was against this backdrop that I observed the pumping activity of CSF in 1971. And it was in this environment that I went on to develop CranioSacral Therapy.

My initial focus with CranioSacral Therapy was to mobilize the membrane

Several research projects over the past few years have demonstrated that, contrary to previously held ideas, CSF is the interstitial fluid of the brain and spinal cord. That means it permeates the spaces between all the nervous and glial cells of the brain and spinal cord. In this way, it carries nutrients; removes metabolic by-products, waste and toxic molecules; strongly influences pH (acidity); and is now thought to influence the electromagnetic environment of the neurons and other cells of the central nervous system. (Author's note: For a complete overview of these research projects, see *Science News*, January 1999.)

In *The New York Academy of Science Annals*, Volume 854, an article entitled, "Towards the Prolongation of a Healthy Life Span" reported that CSF contains low-molecular-weight chelating agents that remove metal atoms from the interstitial spaces of the brain and spinal cord, and from the neuronal and glial cell membranes. According to the article, CSF also protects against oxidation and toxic accumulations of nonmetallic toxins.

This is especially enlightening in cases of recent studies that have shown both Parkinson's and Alzheimer's diseases may be induced by toxic build-ups of heavy metals — within the basal ganglia in the case of Parkinson's, and in the cortical and subcortical regions in the case of

Therapy was to mobilize the meningeal membranes that related to the entire central nervous system and the proximal aspects of its major nerve roots. I used the bones that attach to these membranes, either directly or indirectly, to manipulate the meningeal membranes and release any mobility restrictions.

I found CranioSacral Therapy also released restrictions in membrane mobility and in the sutures between the bones of the skull vault by effectively using the hydraulic forces provided by the pumping of CSF. The therapist simply drew those forces into restricted areas by gently inhibiting the areas of maximum (compensatory) compliance to the rhythmical rises of hydraulic forces. By continuing this gentle manual pressure, the fluctuating hydraulic forces helped release those restrictions naturally.

My colleagues and I were fascinated by the wide variety of patient improvements we witnessed using these new techniques and theories. Most positive responses came in cases of pain that were attributable to meningeal restrictions, in cases of painful sutural restrictions, and with learning disabilities that could be related to specific dysfunctions in this craniosacral system.

Yet what was truly difficult to explain were the positive results seen with diseases like Parkinson's, multiple sclerosis, chronic fatigue syndrome, and acute and chronic infections, including resistant staphylococcus and cytomegalovirus.

Indeed, there were many positive results from CranioSacral Therapy in areas that seemed untouchable based on concepts held about CSF at that time. Even now, as scientific research continues to uncover the secrets of CSF, we see more and more how CranioSacral Therapy helps in so many surprising ways.

Alzheimer's disease. Enhancing CSF circulation may well help prevent these two diseases, along with many other types of senility and deterioration problems.

In my own clinical practice, I've been able to break fevers, alleviate chronic viral infections, prevent flu... the list goes on and on. All these results suggest an enhancement of immune function, which is exactly what I believe CranioSacral Therapy does. It moves CSF and every other body fluid, especially the interstitial fluid. By whatever name, the fluid between cells must move in order to deliver molecules that not only nurture cells, but transport messages and patrol for antigens — all vital to strong immune function.

Physicians at Stanford University have also discovered that the exchange of CSF slows with age. While there is a complete turnover of CSF about four or five times a day in healthy middle-aged people, in the elderly that rate may be cut in half. In fact, the Stanford folks became so convinced that CSF turnover is important that they've placed shunts in a sample of nine patients with reduced turnover. They want to see whether the drainage of stagnant CSF enhances production and reduces certain substances in the CSF — and hence the central nervous system — that are believed to contribute to brain deterioration and Alzheimer's disease.

I firmly believe CranioSacral Therapy can help maintain or regain the normal daily turnover of fluids, with all of its attendant health benefits.

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