

# Missing Anatomical Link Supports Chiropractic for Headaches

Editorial Staff

Lead by assistant professor Gary Hack, DDS, scientists at the University of Maryland have discovered by a "physical connection between the muscular system and the central nervous system."<sup>1</sup>

The discovery, a serendipitous result of dissecting a cadaver at an unorthodox angle to view the mastication musculature, is a connective tissue "bridge" that attaches the rectus capitis posterior minor muscle (which extends from the base of the skull to the atlas) to the dura that surrounds the brain and spinal cord at the atlanto-occipital junction. This tissue bridge was not an anomaly, but was present in all 10 of the cadavers dissected.

The findings of Hack et al. were published in May 1995. Considering that gross human anatomy had been studied for 500 years, and that the RCPM muscle had long been described in great detail in anatomy books, the discovery of Hack et al. brought forth a healthy skepticism from the field.<sup>2</sup>

The key, the Baltimore scientists noted, was making their incision from the side of the neck, which exposed the muscle-dura tissue bridge, while conventional dissection from the back of the neck does not.

A group of researchers from Western Australia echoed similar findings in 1996,<sup>3</sup> but by then the Maryland scientists had received reports of a connective tissue bridge at the C-1/C-2 junction, and had conducted additional research demonstrating another bridge at T-1 and T-2. To further verify their findings, Dr. Hack and his group used magnetic resonance imaging (MRI) on cadavers and live subjects.

"Virtual" verification came from the U.S. National Library of Medicine's Virtual Human Project (VHP). This project selected a male and a female cadaver, froze them, and cut transverse slices from head to toe. The male was sectioned into 1,871 one-millimeter thick slices; the female was sectioned into over 5,000 slices, one-third of a millimeter in thickness. The frozen sections were photographed and digitized to a computer, creating the world's first virtual cadavers, dubbed the "Visible Human Male," and the "Visible Human Female."

The Maryland investigators were now able to see the connective bridges in digitized form.

What Does the Tissue Bridge Mean?

The importance of the tissue bridge is of course being debated. It is known that the dura surrounding the spinal cord and brain is extremely sensitive. What has been postulated is that this bridge is designed to keep the dura from buckling, which would "compromise the flow of cerebrospinal fluid"

and cause pain.

But Dr. Hack recognized and reported an additional aspect of his findings: "The Maryland Scientists speculate that the newly described muscle-dura connection may transmit forces from neck muscles to the pain-sensitive dura. As already noted, not all the mechanisms of headaches are fully understood. Some researchers believe that headache pain is primarily caused by changes in brain chemistry that result in a lowering of the threshold at which pain is perceived. An increasing number of researchers postulate that headache pain may be produced by structures located in the neck. While the notion that headache may arise from cervical (neck) structures may be new to some medical practitioners, it is a concept that is widely accepted by chiropractors, osteopaths, and other professionals who regularly perform manipulative procedures involving the cervical spine.

"A growing body of literature relates headaches to injury or pathology affecting neck structures. Moreover, a number of clinical trials have suggested that treatments such as massage, spinal manipulation, and biofeedback directed at the neck are valuable for managing muscle-contraction headaches. Spinal manipulation as a treatment for tension headache is predicated upon the assumption that dysfunction in the neck muscles contributes to the head pain; in the U.S. more than 90% of such procedures are performed by chiropractors. The muscle-dura connection may represent -- at least in part -- the underlying anatomic basis for the effectiveness of this treatment. Such treatment, as performed by a chiropractor, would decrease muscle tension and thereby reduce or eliminate pain by reducing the potential forces exerted on the dura via the muscle-dura connection."<sup>1</sup>

There it is, as reported in the 1998 Medical and Health Annual published by the Encyclopedia Britannica. The "underlying anatomical basis for the effectiveness" of the chiropractic adjustment for cervicogenic headache has been found.

### *References*

1. The anatomist's new tools. 1998 Medical and Health Annual, Encyclopedia Britannica, 1997.
2. Hack GD, Koritzer RT, Robinson WL, Hallgren RC, Greenman PE. Anatomic relation between the rectus capitis posterior minor muscle and the dura matter. Spine 1995;20:2484-2486.
3. Taylor JR, Taylor MM, Twomey LT. Letters. Spine 1996;21:2300-2302.

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