

The Burnham Review

NeuroAnatomy Resources for Manual Therapists

Using Manual Therapy and CAM to Feel and Function Better

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NerveWhisperer@gmail.com

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Neuroanatomy

The study of human neuroanatomy is the study of consciousness and the way in which, human beings perceive their world, as well as what happens, when the sensory information coming in from the environment is overwhelming or doesn't match internal information or is not accurately interpreted.

It is also the study of movement and activity and responsiveness to our environment, as well as what happens when the muscles, joints, ligaments, and connective tissue don't respond to the motor signals coming from the nervous system. Sometimes the signals are too faint or are garbled.

Many disease processes affect the nervous system. Fortunately, many Complementary and Alternative Medicine (CAM) approaches are able to support the nervous system in a way that healing and recovery are possible.

Not so many years ago, the answer to the question, "Can the brain and spinal cord heal or recover from a trauma or damage?", would have

been "No."

Medical research today shows that the answer is now "Under certain circumstances." Manual Therapy approaches, Massage Therapy and CAM treatments often work

on shifting the environment in which the nervous system functions, allowing for less compression, better blood flow, better drainage of toxins. All of these things facilitate healing of the nervous system and all the systems in the body, which respond to input from the nervous system, in other words, "Everything".

"I think, therefore I am." Descarte

Significance of Nerve Function

"Any insult to our brain may permanently modify our entire world. Indeed, we can be annihilated by a simple chemical, anaesthetic or toxin, acting on our brain.....Our analysis leads to several conclusions.

First, conscious experience appears to be associated with neural activity that is distributed simultaneously across neuronal groups in many different regions of the brain.

Consciousness is therefore not the prerogative of any one brain area; instead, its neural substrates are widely dispersed throughout the so-called thalamocortical system and associated regions. Second, to support conscious experience, a large number of groups of neurons must interact rapidly and reciprocally through the process called reentry. If there reentrant interactions are blocked, entire sectors of consciousness disappear, and consciousness itself may shrink or split. Finally, we show that the activity patterns of the groups of neurons that support conscious experience must be constantly changing and sufficiently differentiated from one another. If a large number of neurons in the brain start firing in the same way, reducing the diversity of the brain's neuronal repertoires, as is the case in deep sleep and epilepsy, consciousness disappears." - Gerald M. Edelman, A Universe of Consciousness., 2000.

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Understanding the Nervous System

"I think that the science and art of medicine are by no means incompatible acquirements, and that the boast of being a mere practitioner should cease to be a cloak for ignorance and indolence. To pretend to understand the diseases of the nervous system without an intimate knowledge of its anatomy, physiology, and pathology, is the height of folly or presumption."--- Marshal Hall, M.D., F.R.S. 1836.

Touch and Response

"Infants showed more eye contact when adults, who were smiling and cooing, also touched them as compared to infants who received smiling and cooing without touch."

— Pelaez-Nogueras, M., J. L. Gewirtz, et al. (1996). "Infant preference for touch stimulation in face-to-face interactions." *Journal of Applied Developmental Psychology* 17, 199-213.

Life

"Life may be defined operationally as an information processing system - a structural hierarchy of functioning units - that has acquired through evolution the ability to store and process the information necessary for its own accurate reproduction.

- Lila Gatlin, 1972.

Disease Processes

"Disease, in the average case, is due to disturbance of structure. Even in cases of disease resulting from abuse, there is often found some structural change.

The function of a joint is movement. Ligaments and muscles restrict this movement. If force is applied, this restriction is in a

measure, overcome, and consequently, the tissues around the joint are injured. Nature sends out an exudate, which forms a splint, the ligaments become thickened, in short, we have a typical lesion.

Anyone can become an invalid by disobeying the laws of nature."

- Marion Edward Clark, D.O. 1906.

Headaches and Brain Trauma

"One year after head trauma, 23 patients with post-traumatic headache entered a prospective clinical controlled trial to find out if specific manual therapy on the neck could reduce the headache..... It is concluded that the type of manual therapy used in this study seems to have a specific effect in reducing post-traumatic headache. The result supports the hypothesis of a cervical mechanism causing post-traumatic headache and suggests that post-traumatic dizziness, visual disturbances and ear symptoms could be part of a cervical syndrome."

— Jensen, O. K., F. F. Nielsen, et al. (1990). "An open study comparing manual therapy with the use of cold packs in the treatment of

Alzheimer's and Parkinson's Disease

"United Nation population projections estimate that the number of people older than 80 years will approach 370 million by the year 2050. Currently it is estimated that 50 percent of people over age 85 are afflicted with Alzheimer's Disease....In the US, Parkinson's Disease affects 500,000 to 1.5 million people with 50,000 new cases reported annually." - Sigma RBI report on Alzheimer's Disease.

Autism and Brain Symmetry

"Utilizing computerized brain tomography, left-right morphologic [structural] asymmetries of the parietooccipital [top and back of head] region were judged in 16 autistic patients, 44 mentally retarded patients, and 100 miscellaneous neurological patients. In 57% of the autistic patients the right parietooccipital region was wider than the left, while this pattern of cerebral asymmetry was found in only 23% of the mentally retarded patients and 25% of the neurological patients. It is suggested that unfavorable morphologic [structural] asymmetries of the brain near the posterior language zone may contribute to the difficulties autistic children experience in acquiring language."¹ (Hier, 1979).

Mind - Body Connection

"Many relaxation, meditation, and imagery techniques that implicitly or explicitly involve focused attention on the body, including qigong, massage, and noncontact therapeutic touch, purportedly employ energetic and physiological mechanisms.

The objection: to show that, from a perspective of dynamical energy systems, relaxed self-attention enhances connectivity between the brain and body. This enhanced connectivity may be achieved by at least 2 mechanisms: (1) physiological mechanisms employing peripheral negative feedback loops, and (2) bioelectromagnetic mechanisms involving direct energetic resonance between the peripheral organ and the brain. The design: 19 channels of electroencephalogram, 1 electrocardiogram, and 2 channels of electro-oculogram were recorded from 22 subjects who focused their

attention on their heartbeats or eye movements, with and without kinesthetic (touch) biofeedback to increase somatic awareness.

The results: Analyses of the electroencephalogram synchronized with the electrocardiogram revealed significant effects for heart-focused attention, primarily with touch biofeedback, following the contraction of the ventricles (possibly reflecting increased baroreceptor and somatosensory feedback); and significant effects for heart-focused attention, with and without touch biofeedback, preceding the contraction of the ventricles (possibly reflecting direct electromagnetic interactions between the heart and the brain).

The conclusions: These findings suggest that energetic and physiological mechanisms may be involved in techniques in which the goal is to promote mind-body integration and health.² (Song, 1998).

Limitations

“Every man takes the limits of his own field of vision for the limits of the world” – Arthur Schopenhauer. *Studies in Pessimism*, 1851.

Which Comes First: Smiling or That Happy Feeling

One theory of emotional expression, dates back to 1906 and “holds that facial muscles act as ligatures on facial blood vessels and thereby regulate cerebral blood flow, which, in turn, influences subjective feeling.” The theory, developed by Israel Waynbaum, a French physician, hypothesizes the subjective experience of emotions as following facial expression rather than preceding it.³ (Zajonc, 1985).

Perhaps this explains why laughter is such a positive influence on health. It begs the question, “do we laugh

because we are happy or do we laugh so our brains will get better blood flow and then we will feel happy?”

Massage and Attention

“The present study involved 30 children and adolescents between the ages of 7 and 18 diagnosed with attention-deficit/hyperactivity disorder (ADHD). The children were randomly assigned to a wait-list control and a massage group. Mood state improved for the massage but not the control group based on smiley face and thermometer scales. The massage group also improved in classroom behavior in the areas of the Conners Teacher Rating Scales on anxiety, daydreaming and hyperactivity.”

-- Khilnani, S., Field, T., Hernandez-Reif, M., & Schanberg, S. (2003). *Massage therapy improves mood and behavior of students with attention-deficit/hyperactivity disorder. Adolescence, 38, 623-38.*”

Structure and the Brain

The computerized brain tomograms of 24 patients with developmental dyslexia were analyzed for cerebral asymmetry. Ten patients showed a reversal of the pattern of asymmetry regularly observed in normal right-handed individuals so that the right parietooccipital region was wider than the left. The ten dyslexic patients with this reversal of cerebral asymmetry had a lower mean verbal IQ than the other 14 dyslexic patients in this study. The reversal of cerebral asymmetry that occurred in ten of the dyslexic patients may result in language lateralization to a cerebral hemisphere that is structurally less

suitable to support language function and thus act as a risk factor for the development of reading disability.⁴ (Hier, 1978)

Vision and Perceptions

“When I turn my gaze skyward I see the flattened dome of the sky and the sun’s brilliant disc and a hundred other visible things underneath it. What are the steps which bring this about? A pencil of light from the sun enters the eye and is focused there on the retina. It gives rise to a change, which in turn travels to the nerve layer at the top of the brain. The whole chain of these events from the sun to the top of my brain, is physical. Each step is an electrical reaction. But now there succeeds a change wholly unlike any that led up to it, and wholly inexplicable by us. A visual scene presents itself to the mind: I see the dome of the sky and the sun in it, and a hundred other visual things beside. In fact, I perceive a picture of the world around me.” — Charles Sherrington, *Man in His Nature*. 1951

Neurofibromatosis

"This disease is thought to be due to excess production of neural crest cells. Autonomic symptoms of the disease are highly variable and are believed to be due to hyperplasia of the autonomic ganglia."

Characterized by numerous benign tumors of the spinal and autonomic nerves and pigment abnormalities in the skin that are described as "café-au-lait" spots because of their "coffee-with-cream" color. because neural crest cells form pigment cells (melanocytes) in the skin, as well as spinal and autonomic ganglia, all of these derivatives are affected. --- Wilson-Pauwels *Autonomic Nerves*, 1997. pg 28.

Neural Crest Cells

In chapter two on the development of the autonomic nervous system, it is noted that during the third and fourth weeks the neural plate (neuroectoderm) develops. The edge or the neural crest cells form the pigment cells (melanocytes) in the skin, the dorsal root (sensory) ganglion, the enteric nervous system (Meissner's and Auerbach's plexuses), postganglionic neurons of the sympathetic ganglia, and the following ganglia: ciliary, pterygopalatine, submandibular, otic and visceral. ---Wilson-Pauwels *Autonomic Nerves*, 1997.

Dry Mouth and the Sympathetic Nervous System

Consider what the following conditions have in common: allergies, rash, hives, watery eyes, runny nose, itchy eyes, sneezing, hay fever, sinusitis, respiratory illness, stomach and intestinal tract disorders, peptic ulcers, diarrhea, irritable bowel syndrome, diverticulitis, colitis, pancreatitis, bed-wetting, Parkinson's, poisoning due to plants and insecticides, osteoporosis (calcium disorders), depression, nerve pain, insomnia, narcolepsy, attention deficit disorder, hyperactivity, nausea, vomiting, motion sickness, middle ear infections, high blood pressure, edema, glaucoma, anxiety, panic disorder, emphysema, chronic bronchitis, acute migraines, obsessive compulsive disorder, fungal infections, PMS, and alcohol withdrawal.

They are all conditions treated with more than 2200 different medications, which cause dry mouth.

Over stimulation of the sympathetic nervous system also causes dry mouth. Think about what

happens when you get nervous.

Osteopathic Manual Therapy for the Vagus Nerve

“There are accessible and rapidly determinable clues for diagnosis and adjunctive treatment of common upper GI disorders. Beginning with the autonomic nervous system (ANS) consider: 1) the segmental sympathetic innervation located as they are anterior to the rib head, 2) their relationship to the nerve plexuses and fascia of the abdomen, 3) a parasympathetic nerve involvement, the vagus as it exits the jugular foramen between the occipital and mastoid process of the temporal cranial bones.

Each of these parts of the ANS is subject to trauma. If one adds balancing the thoracic inlet with the abdominal diaphragm and promotes lymphatic flow, the result is a real live connection between the structures and functions in the human body just as the neurophysiologists claim.

This article presents a case of relief from prolonged epigastric pain that utilized this conceptual synthesis..”⁵ (Chapello, 2002).

Sensation, Aromatherapy, Pain and Quality of Life

“Research suggests that aromatherapy massage (AM) is increasingly being used by cancer patients, especially in the palliative care setting, although few studies have assessed its effectiveness..... The results from Hospital Anxiety and Depression Scales (HADS) did not show any psychological benefit from AM. However, there was a statistically significant reduction in all four physical parameters, which suggests that AM affects the autonomic nervous system, inducing relaxation. This finding was

supported by the patients themselves, all of whom stated during interview that they felt 'relaxed' after AM. Since these patients are faced with limited treatment options and a poor prognosis, this intervention appears to be a good way of offering support and improving quality of life.”⁶ (Hadfield, 2001).

Hemiplegia and Reflex Points

“Forty-two cases of apoplectic [stroke related] hemiplegia treated by digital acupoint pressure (DAP) therapy are briefly reported in this paper. This results were: basic cure in 10 cases (23.8%), marked effect in 17 cases (40.5%) and effect in 11 cases (26.2%). The total effective rate reached 90.5%. This therapy has several advantages, such as simple and convenient operation, low cost, reliable results and so on.”⁷ (Chen, 1997).

Acupuncture and the Brain

A review “looking at the effect of acupuncture on brain activation as measured by functional magnetic resonance imaging and positron emission tomography... For example, points associated with hearing and vision stimulates the visual and auditory cerebral areas respectively. Pain, however, is a complex matrix that is intimately intertwined with expectation. Acupuncture clearly affects this matrix in both specific and non-specific manner.”⁸ (Lewith, 2005)

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