

Biological Basis of Acupuncture

By Don Buck, LAc

The British writer Oscar Wilde once stated that, "Education is an admirable thing, but it is well to remember from time to time that nothing that is worth knowing can be taught." In reading this, as a group of distinguished medical doctors, this quote has great significance. As a person raised in America and as a product of Western medical practice until I was 40 years old, the task of actually teaching about acupuncture and its biological bases is a daunting one. Unlike Western medicine, which is a relatively new science, acupuncture is steeped in a four to five thousand year old tradition. As Western doctors, you view the body as an object that can be treated and "fixed" by medicating, operating, or treating the specific symptom or illness. As an acupuncturist, I view the body as an eco-system of energy, which needs to be realigned, re-established and re-energized. Rather than concentrate on one specific treatment, I approach the body as a whole and work to bring it into balance physically, mentally, emotionally and spiritually. Additionally, acupuncture has only been practiced in the United States for slightly more than 30 years and therefore has an aura of being a "trend" that can easily be dismissed as nothing more than a new wave fad. It was not until 1997, in fact, that the National Institute of Health endorsed the practice of acupuncture when it issued the statement, "There is sufficient evidence of acupuncture's value to expand its use into conventional medicine and to encourage further studies of its physiology and clinical value." So, despite its thousands of years of efficacy, Western medical practitioners, such as yourselves, want concrete proof that acupuncture works and scientific evidence of the process.

However, as the writers of the textbook *Neuro-Acupuncture: Scientific Evidence of Acupuncture Revealed*, state in their introduction to this topic, "The science behind acupuncture remains

elusive." Perhaps Oscar Wilde was correct. I know from my own experience, and I assume from your skepticism, that uncertainty of explanation can raise doubts about the efficacy of any treatment. Somehow, if something cannot be demonstrated – why something works – skepticism about its efficacy is raised –even in the face of thousands of years of practice and, more importantly, in the myriad of testimonials by patients. As Wilde might infer, this just cannot be taught!

That being said, much work is being done. In their preface to their book *Clinical Acupuncture: Scientific Basis*, Gabriel Stux and Richard Hammerschlag write, "Acupuncture research, both basic and clinical, has greatly expanded. Modern biomedical techniques, including those of molecular biology and medical imaging, have revealed increasingly detailed physiological correlates of acupuncture action." The expansion of this research is evidenced when one merely enters the topic, "Acupuncture and how it works" into an internet search engine. On Google, over 250,000 articles are revealed. In a Yahoo search, over 380,000 references are offered. There is a proliferation of research being done to try to apply Western science to this ancient Eastern practice. From my experience as a practitioner of acupuncture, I encourage this research providing it does not change in any concrete way what has worked. The maxim, "if it's not broken, don't fix it" summarizes my feelings.

I obviously did not read each and every article presented on the internet, but in reading through nearly 500 hundred of the key documents, in studying the advanced work of Dr. Z.H. Cho, with the reading of the two aforementioned textbooks, and with the help of Grace Lee's "index" to these articles titled "Explanations for the Physiological Effects of Acupuncture", one can isolate seven possible theories of the biological basis of acupuncture, the first six of which Ms. Lee lists as follows:

1. **Augmentation of Immunity Theory:** States that acupuncture raises levels of antibodies, white blood cells, certain hormones, immunoglobins, and other chemicals that relate to the body's ability to defend itself against foreign invaders. This theory explains the case studies in which acupuncture has boosted the immune system.
2. **Circulatory Theory:** According to this theory, needling can lead to the constriction or dilation of blood vessels by the body's release of vasodilators like histamine. This theory accounts for acupuncture's ability to help treat high or low blood pressure.
3. **Neurotransmitter Theory:** This theory states that acupuncture affects levels of certain neurotransmitters such as serotonin and noradrenaline in areas of the brain such as the reticular formation system that control arousal degrees, possibly producing calming effects during and after treatments. Also, by altering levels of neurotransmitters, acupuncture can influence the release of hormones.
4. **Electrical Theory:** The electrical theory looks at the electromagnetic fields of the body, which constantly produce minute electrical discharges, thus creating an electrical field that can influence cell growth, development, and functioning. Research has generated evidence that electromagnetic fields of the body and the meridians associated with acupuncture are related. Acupuncture points are located in areas of low electrical resistance, so needling can stimulate the electrical fields and alter levels of neurotransmitters in the body.
5. **Endorphin Theory:** This theory addresses acupuncture's analgesic effects. The body naturally produces painkillers, called endorphins such as opiates and enkaphalins. One of the more commonly known endorphins is morphine. Needling certain points can stimulate the release of endorphins through certain nerves connected to certain muscles, thereby alleviating pain.

6. **Gate Theory:** States that acupuncture can limit the perception of pain by closing the “gate” that regulates pain perception. The “gate” is part of the nervous system along the spinal cord in the region called the substantia gelatinosa, through which all pain signals travel. Large nerve fibers that usually transmit tactile signals can inhibit the transmission of smaller nerve fibers that relay signals of pain. Acupuncture works on the large nerve fibers to prevent the transmission of pain signals. Thus, the “gate” is closed, keeping all pain signals from reaching the brain to be registered and processed. A related theory is the Motor Gate Theory which asserts that acupuncture can overcome paralysis by opening up the “gates” along motor nerve fibers that have been closed because of disease.

7. **Placebo Theory:** Perhaps the most popular which merely asserts that acupuncture works merely as a placebo might. This theory seems to have been disproved by use of acupuncture in animals and babies.

Of these theories, perhaps the most important research and the one to focus on is that being conducted by University of Irvine professor and physicist, Z. H. Cho, which postulates a direct correlation between acupuncture and the brain. In his work, he has applied advanced medical imaging to examine acupuncture related to changes in the brain’s function. According to these studies, acupuncture has a direct effect on cortical involvement, such as humoral functions of the hypothalamus and the brainstem. It is increasingly clear, from these studies that acupuncture stimulation leads to activation of the upper parts of the brain via various spinal tracts.

In general, as Professor Terry Oleson has summarized in his discussion of acupuncture analgesia, it has been found that stimulation of an acupuncture point activates the afferent (feels needle/sensory) that travels from the peripheral nerves into the spinal cord, and from the spinal cord up to the brain. A specific circuit of brain nuclei connects the afferent pathway to the efferent pathway (response/motor), which then sends descending neurons down the spinal

cord to inhibit the perception of pain and to suppress nociceptive behavioral reflexes. To get specific, one can trace the pathways much more scientifically as Oleson has done:

Afferent pathway:

Contralateral, ventrolateral tract of spinal cord; to
Reticular gigantocellular nucleus and the raphe magnus; to
Dorsal periaqueductal gray; to
Posterior hypothalamus, lateral hypothalamus, and centromedian nucleus of the thalamus; to
Pituitary gland – secreting beta endorphins (natural painkillers) into the blood.

Efferent pathway:

Periaqueductal gray; to
Dopaminergic neurons in the posterior hypothalamic; to
Ventromedian nucleus of the hypothalamus; splits into
Serotonergic system and noradrenergic system descending down spinal cord

The following pilot study of functional magnetic resonance imaging of the brain during stimulation of acupuncture points was published in *J. Altern Complement Med.* 2002, August 8, (4) 399-40 illustrates how these pathways can be scientifically “viewed”:

OBJECTIVES: To characterize the brain activation patterns evoked by manual and electroacupuncture on normal human subjects. **DESIGN:** Use functional magnetic resonance imaging (fMRI) to investigate the brain regions involved in electroacupuncture and manual acupuncture needle stimulation. A block design was adopted for the study. During the experiment, acupuncture needle manipulation was performed at Large Intestine 4 (LI4, Hegu) on the left hand. **SUBJECTS:** Eleven right-handed, normal healthy volunteer adults. **RESULTS:** Showed that electroacupuncture mainly produced fMRI signal increases in precentral gyrus, postcentral gyrus/inferior parietal lobule, and putamen/insula; in contrast, manual needle manipulation produced prominent decreases of fMRI signals in

posterior cingulate, superior temporal gyrus, putamen/insula. **CONCLUSION:** Different brain networks are involved during manual and electroacupuncture stimulation. It suggests that different brain mechanisms may be recruited during manual and electroacupuncture.

Summary: In conclusion, there are many theories as to how acupuncture works biologically and they all similarly postulate that acupuncture stimulates the body’s natural abilities. Most state that needling affects the nervous system but no all-inclusive theory has been found to explain all of the physiological effects of acupuncture and perhaps that is as it should be, for as I began this speech, “Nothing that is worth knowing can be taught.” I have no clue how my television set works, but I still watch it every night, just as I know as a practitioner of acupuncture, I have witnessed its curative powers first-hand and hope that Western doctors and acupuncturists can join forces in a trusting bond that brings patients the best of both possible worlds of treatment.

References

- Bibliography – Scientific Basis of Acupuncture**
 “Acupuncture” NIH Consensus, 1997 Nov. 3-5; 15(5) 1-34
 Lisa S. Lawless RM, “Acupuncture, A Brief Introduction” by, www.historicwisdom.com
 Jeffrey Singer. “Acupuncture, A Brief Introduction.” www.acupuncture.com
 National Center for Complimentary and Alternative Medicine. “Acupuncture, Information and Resources.” National Institutes of Health.
 Butterworth-Heinemann. “Acupuncture: Scientific Appraisal.” London; 1999.
 Clinical Acupuncture: Scientific Basis, Stux and Hammerschlag
 Explanations for the Physiological Effects of Acupuncture by Grace Lee, <http://www.geocities.com/eightyeightfallen-horses/?200529>
 James Moore. “How Acupuncture Works.” www.Herbalconsults.com
 J. Altern Complement Med. 2002, August 8, (4) 399-404
 Cho, Z.H., Wong, E.K., Fallon, J. Neuro-Acupuncture: Scientific Evidence of Acupuncture Revealed. <http://www.qpunature.com>
 Professor Terry Oleson’s class lecture notes for Emperor’s College