MEDICAL ACUPUNCTURE: AN INTEGRATED APPROACH TO HEALTHCARE

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INTRODUCTION

I would like to present a survey of acupuncture in American Medicine, briefly reviewing acupuncture's distant past, a look at western medical acupuncture research with special focus on the aspect of pain transmission and modification of pain by acupuncture, and an introduction to what many term "Energetic Medicine", where the old and the new can work side by side in our contemporary practice of medicine.

Our initial introduction to acupuncture is often filled with language, charts and symbols which appropriately lead us to ask, "What is acupuncture?"

Acupuncture has evolved over two millennia and continues to evolve today. Contemporary medical acupuncture is bringing new insight to a healthcare system borne of careful and untiring observation of patient, environment, and physician. The heritage of acupuncture brings a wealth of information which, if ignored, would deprive the contemporary physician of important models of health, disease, and treatment. These models of healthcare may critically enhance our patient care through integration into our contemporary practices. While the ancient classic texts were written in poetic and metaphoric language, they still present models of health, dysfunction, and treatment that are compatible with contemporary psychology, physiology, physics, and neuropharmacology.

HISTORICAL REFERENCES

Early acupuncture history tells of the legendary emperor and doctor Fu Xi Shi from approximately 4000 B.C. who is credited with inventing nine types of stone acupuncture needles. Bone etchings circa 1600 B.C. represent the earliest "written" records. The I Ching, compiled from 2500-1000 B.C., presented the foundation of energy dynamics which serve as a basis for the operating laws in acupuncture as well as a reference and guide for later texts. The Huang Ti Nei Ching, known as the "Yellow Emperor's Classic of Internal Diseases", is a compilation of a series of authors from the 5th to the 2nd centuries BC and represent the Chinese "Hippocratic Corpus". Following came the Nan Ching or "Classic of Difficulties" in the 1st century A.D., perhaps the cleanest source of ancient thoughts. In the 2nd century A.D., the Shang Han Lun presented an organized approach to the "Cold Illnesses".

Ancient China is certainly not the only source of references to energetic or acupuncture-like therapies. The papyrus Ebers from 1550 BC are the most important ancient Egyptian medical writings and discuss peripheral "vessels" or meridians. Indian Ayurvedic medicine presents many similar concepts as those in acupuncture. South African Bantu tribes have known to scratch various body parts to treat disease. Treatment of sciatica with ear cauterizations has been known through much of Arabic history. Eskimo people have used simple stone stimulation of the skin for healing. Even an isolated Brazilian tribe has used tiny blowpipe arrows to the body for healing. Interestingly, these tribal members present with distinct Mongoloid features.
European colonization of Indochina led to an abundance of training and textual sources since the 16th century. Many of these were later translated into Latin and French by Jesuit priests. Since that time, the French have been intimately involved in the further development of acupuncture as it continues to evolve to this day.

WESTERN MEDICAL LITERATURE

Western Medical literature, even that of the United States, is more significant than most recognize. In 1792, Galvani observed small tissue generated electric currents. Dr. Franklin Bache, Benjamin Franklin's great grandson, wrote the first US medical acupuncture article in 1825, entitled Memoirs on Acupuncture, and also translated Mourand's French treatise into English. Dr. Edward Warren's 1863 medical and surgical text discussed the use of acupuncture and acupressure. Others also wrote of acupuncture's use during the US Civil War. Sir William Osler's 1892 The Principles and Practice of Medicine recommended "for lumbago, acupuncture is, in acute cases, the most efficient treatment" and that for sciatica "acupuncture may be used".

In the 1960s, Dr. Felix Mann was a pioneer translator of acupuncture texts and explained acupuncture physiologic activity as a complex of cutaneovisceral, visceromotor, and viscerocutaneous reflexes with dermatomal radiation. Dr. Ron Lawrence of Los Angeles showed a 300% increase in plethysmographic flow in the digits with electroacupuncture, endorsing a sympathetic hypothesis. Dr. Omura of New York showed an increase in the WBC if low, and a decrease if high. He further showed an increase titre of immune substances, bacteriolysins, opsonins, and complement. An increase ACTH effect of the CBC with increased segmented neutrophils, decreased lymphocytes and eosinophils were demonstrated in response to acupuncture. He showed an increase in serotonin, and decrease in cholesterol and triglycerides, as well as modulation of blood sugar levels.

A survey of the Western Medical literature demonstrates acupuncture's effects on nearly every biophysicologic system. For the pulmonary system, acupuncture was shown to attenuate exercise induced asthma (Lancet) and diminish bronchoconstriction in clinical asthma attacks (Annals of Allergy). In obstetrics, acupuncture has relieved pain of labor and delivery (Anesthesiology), aided in induction of labor (Obstetrics and Gynaecology), and controlled morning sickness. (Obstetrics & Gynaecology 11/92). For the genitourinary system, acupuncture has been presented as treatment for infertility (Gynecology and Endocrinology 9/92 and a German Publication). For the treatment of renal colic, acupuncture demonstrated more rapid response than contemporary medical treatment (avaforton) and with no side effects (Journal of Urology 1/92).

With the gastrointestinal system, acupuncture has arrested cholestatic crisis (personal communication with Dr. Chan Gunn), relieved GI tract spasm which failed medication (Lancet), and demonstrated support for regulation of GI motor and secretory function via opioid and neural pathways (American Journal of Gastroenterology 10/92). A significant decrease in perioperative nausea and vomiting has been demonstrated through perioperative acupuncture (British Medical Journal, Anesthesiology News), and a Neiguan (PC-6) injection of glucose in water prevented nausea and vomiting in laparoscopy patients (Acta Anaesthesia Scandinavia 2/93).
For the cardiovascular system, acupuncture led to reversal of CV arrest in experimental animals (Journal of Surgical Research). An acceleration of wound healing through electroacupuncture has been demonstrated (Archives of Physical Medicine & Rehabilitation), as well as accelerated skin ulcer healing (Southern Medical Journal) and augmentation of bone repair (Science).

Additionally, acupuncture in sports medicine has shown increased maximum performance capacity over controls (International Journal of Sports Medicine 8/92), and Substance P and Prostaglandin E have been shown to be increased in patients with successful acupuncture anesthesia (analgesia), yet are normal or decreased in patients with unsuccessful acupuncture anesthesia (Pomeranz).

Important in a society infected with widespread drug abuse, acupuncture has provided dramatic enhancement of drug detoxification programs for over twenty years, with the Lincoln Hospital programs of Dr. Michael Smith serving as a template for success in this challenging area of healthcare.

Clearly there is a need for further prospective, randomized medical outcome studies in medical acupuncture and those of us in the medical acupuncture community are confident that the responses seen daily in our practices will withstand properly designed, critical investigation. It is important to remember that a substantial portion of contemporary western medical and surgical practices, however, have never met the standards by which acupuncture is now challenged. Indeed, to challenge contemporary medical and surgical practices to the same level of scrutiny as is demanded of acupuncture would likely have a multi-billion dollar effect on American medicine, not to mention the dramatic change in morbidity and mortality patterns for our patients.

After several thousand years of critical clinical challenges and development by the most respected medical minds of their times, acupuncture is recognized by the World Health Organization as a valid medical approach not only for pain problems, but also to treat medical problems ranging from chronic sinusitis to functional bowel problems. The contemporary physician who integrates acupuncture into a medical practice of any specialty discipline incorporates new diagnostic and treatment tools which often allow the patient to recover and move toward wellness with far less risk and morbidity associated with many drugs and procedures.

NEUROHUMORAL EFFECTS OF ELECTRO-ACUPUNCTURE

Dr. Bruce Pomeranz has presented the most comprehensive data regarding the measured neurohumoral effects of electroacupuncture. The following discussion is a brief look at the neurohumoral effects of typical pain and the interruption of that pain impulse with either high or low frequency electroacupuncture stimulation.

Various afferent nerve fibers are involved in transmitting pain impulses from the skin to the cortex. These include large myelinated fibers, the majority of large muscle afferents, with A-beta fibers in the skin to perceive touch and Type I fibers in the muscle for proprioception sense. Small myelinated fibers include A-delta fibers in the skin to transmit pain as well as Type II and III fibers in the muscles also sensing pain. Very small unmyelinated C-fibers in the skin and Type IV fibers in the muscles also sense pain. Types II, III, IV and C fibers also send non-painful messages.
To first review transmission of a painful stimulus from the skin to the cortex, we see that an injury to the skin activates the sensory receptors (squares) of small afferent A-delta and C-fibers (#1), which synapse onto the Spinothalamic Tract in the spinal cord (#2). The Spinothalamic Tract cell projects its axon to the Thalamus (#3), where it synapses with a cell that sends impulses to activate the primary sensory cortex (#4). (Dark triangles on Pomeranz slide are excitatory synapses, white triangles are inhibitory.)

Second, we can now look at the effect of low frequency/high intensity electroacupuncture stimulation. The acupuncture needle activates a Type II or III small myelinated afferent nerve (#5) from a sensory receptor in the muscle (square). This cell synapses in the spinal cord onto an anterolateral tract cell (#6) which projects to one of three centers: the spinal cord, the midbrain, and the pituitary-hypothalamic complex.

In the spinal cord, cell 6 sends a short segmental branch to cell 7, an endorphinergic cell, which releases either enkephalin or dynorphin (but not B-endorphin), which in turn causes presynaptic inhibition of cell 1, thereby preventing transmission of the painful message from 1 to 2.

Cell 6 also ascends along the anterolateral tract of the spinal cord to the midbrain, where it excites cells in the Periaqueductal Grey (#8 and 9), which releases enkephalin to disinhibit cell 10, thus activating the raphe nucleus in the medulla (#11), causing it to send impulses down the dorsolateral tract to release monoamines (labeled M), such as serotonin and norepinephrine onto spinal cord cells. Cell 2 is thereby inhibited by postsynaptic inhibition, while cell 1 is presynaptically inhibited through cell 7.

The action of cell 6 onto cells 12 and 13 in the pituitary-hypothalamic complex is less well understood. Probably cell 12 in the arcuate nucleus activates the raphe through B-endorphin, and cell 13 in the hypothalamus releases B-endorphin from the pituitary. In the Pituitary, B-endorphin and ACTH are co-released on an equimolar basis into the circulation. ACTH travels to the adrenal cortex, where cortisol is released into the blood, perhaps explaining the anti-inflammatory effects of acupuncture in the treatment of arthritis and asthma.

This slide shows the three centers activated by low frequency/high intensity electroacupuncture, using the endorphin mechanisms in them. Low frequency stimulation is thus inhibited by naloxone.

Next, we look at the effects of high frequency/low intensity electroacupuncture stimulation. High frequency/low intensity electroacupuncture stimulates only the spinal cord and the midbrain, but bypasses endorphin synapses there. It is therefore not blocked by naloxone, but is sensitive to the manipulations of monoamines. Also, high frequency electroacupuncture has a strong spinal segmental effect, not antagonized by naloxone, suggesting that cell 7 uses non-endorphinergic transmitters such as GABA.

Anatomic areas not included in this discussion because of insufficient data include the Nucleus Accumbus, Amygdala, Habenula, and the Anterior Caudate. Also not shown are numerous peptides present in the terminals of Cell 1, including CCK, Somatostatin, Neurotensin, Bombesin, Calcitonon Gene-Related Peptide, Angiotensin, Substance P, and Vasoactive Intestinal Peptide.
In summary, we see that electro-acupuncture activates nerve fibers in the muscle, which send impulses to the spinal cord to activate three centers to cause analgesia.

The spinal site uses enkephalin and dynorphin to block incoming messages with low frequency stimulation, and other transmitters such as GABA at high frequencies.

The midbrain uses enkephalin to activate the raphe descending system, which inhibits spinal cord pain transmission by a synergistic effect of the monoamines serotonin and norepinephrine. The midbrain also has a circuit which bypasses the endorphinergic links at high frequency stimulation.

Finally, the pituitary releases B-endorphin into the blood and CSF to cause analgesia at a distance, and the hypothalamus sends long axons to the midbrain which along with B-endorphin activate the descending analgesia system, activated only at low frequency stimulation.

The significance of this three-level system is fascinating: When needles are placed close to the site of pain (Ah Shi points), they are maximizing the segmental circuits operating at cell 7 within the spinal cord, while also bringing in cells 11 and 14 of the other two centers. When needles are placed in distal points away from the painful region, they activate the midbrain and hypothalamic-pituitary complex without benefit of the segmental effects. Clinically, the two kinds of needling are often used together, to enhance one another.

The analgesia produced by these two approaches is quite different. The low frequency stimulation produces analgesia of slower onset and long duration, with a 20 minute stimulation effecting 30-120 minutes of analgesia. The effects are also cumulative in their response to repeat sessions. This may be due to an observed increase in the presence of m-RNA for endorphins seen more than 48 hours after stimulation.

The high frequency stimulation is rapid but of very short duration and has no cumulative effects.

ACUPUNCTURE ENERGETICS

It is apparent that these above "explanations" do not give an adequate understanding of acupuncture, even to the strictly orthodox or western scientifically-oriented physician. It is likely that these explanations are only a part of the mechanism, even only a part of the central mechanisms involved.

To more fully understand acupuncture and its contemporary value, it is necessary to explore paradigms or models in the classic tradition of acupuncture and to create, as Dr. Joseph Helms, Founder and Director of the predominant physician acupuncture training course in the US says, an integrated, hybrid model that is acceptable to our scientific and clinical perspectives. This requires making a few extensions from our fundamental knowledge in anatomy and physiology, and from there integrating the diagnostic and therapeutic approaches afforded by these extensions.

As a basic model in physiology, all human life may be reduced to a sac of electrolytes containing the organ to be studied.
Each organ has an electric field resulting from the sum of the metabolic activity within the organ. This electric activity is measured as positive on the surface of the organ with respect to a more negative interior. The electric field of the organ is projected to the surface of the container, through the medium of the interstitial electronic milieu.

With a sac of electrolytes containing a dozen organs, each one produces an electric field, and each is producing its field to the surface of the container following the path of least resistance through the interstitial electro-ionic medium.

Applying this model to the thoracic, abdominal, or pelvic cavities is not difficult to conceptualize. In the extremities, however, the paths of least resistance are the cleavage plains between the major muscle groups, and the lamellar flow of the interstitial fluid is least obstructed outside the fascial sheaths of the muscle groups. The percolation through the muscle planes projects onto the surface of the body as acupuncture meridians, familiar to you from the many classic acupuncture charts.

Now let us consider the surgical instrument, the acupuncture needle, usually composed of a stainless steel shaft and a spiraled handle of copper, bronze, or other alloy. Inherent in this construction are two physical properties which make this an ideal instrument.

The thermocouple effect of Kelvin-Thomson is the first. It describes an electrical gradient along the length of a homogenous conductor with a temperature gradient produced by the ends of the conductor at different temperatures.

Secondly, the Benedick's effect states that the current along a uniform conductor is reinforced by the electromagnetic effect between the second (spiraled) metal of the handle in contact with the first metal of the shaft.

Thus the typical needle is 1 to 8 cm long, 0.3-0.4 mm in diameter or 28 to 26 gauge, has an electric potential of 3 microvolts with the tip at body T∞ and the handle at room T∞. This gradient reaches equilibrium in 10-15 minutes. This represents a needle "in dispersion".

Dispersion is used in a condition defined as a problem of excess, such as acute strain or sprain, and the needle may be inserted and simply allow the reaction to take place. This local treatment provokes a local reaction, often producing a local erythema of the skin around the needle insertion, and reaching equilibrium as the erythema clears.

If we heat the needle or manipulate the needle manually, the potential changes to 10-15 microvolts and reaches equilibrium in 60-90 minutes. This represents a needle "in tonification".

Tonification is the technique used for a condition defined as deficiency, such as chronic illness or dysfunction states, and requires heating, manual manipulation or electrical stimulation of the needles in an anatomically logical circuit. This tonification provokes a wave of depolarization/repolarization that propagates itself from one needle to the next along the course of least resistance, that is, the lamellar flow around the muscles, the deep aspect of the acupuncture meridians.
Acupuncture points are access sites generally in depressions between the muscle groups allowing direct access to the lamellar flow, the surface projections of which are presented by the points on the charts of ancient China.

French Acupuncture Professor Claude Dewars explored the diffusion patterns of Technetium 99 when injected into acupoints compared with non-acupoints. The linear pattern of diffusion following injection gives evidence that the interstitial lamellar flow pattern is at least one aspect of acupuncture circulation. This flow traveled at 6cm/min.

Consistent with classical Chinese energetic acupuncture and French energetic theories, the placement of needles in circuit leads to the following:

The placement of a single needle in the chosen acupuncture meridian gives us a local agitation. When a second needle is placed in circuit, we have an agitated equilibrium. Then a third needle leads to a dynamic disequilibrium, creating a flow within the meridian. This energetic equation works with any Principal Meridian circuit.

The Principal Meridians are demonstrated on the classic acupuncture charts. They represent an organization of the main circuits used in acupuncture, and develop early in the embryonic stages of life. Each Principal Meridian is associated with one of the 12 Organ/Functions recognized in classic acupuncture. These meridians are paired in a somewhat longitudinal fashion and each pair is coupled with another pair to complete a circuit. These meridian circuits form the basis for a large percentage of the treatment plans used in acupuncture and are represented in a bilateral manner. In addition, there are numerous other circuits or groupings of energetic flow for addressing problems of a different nature or at different levels. These include the Tendino-Muscular Meridians, often very useful in acute injuries, the Distinct Meridians for problems in the organs themselves, the Shu-Mu system which is often used to enhance the patient's energetic level, the Curious Meridians, and others.

In our scientific conceptualization of acupuncture, the needle is working through multiple vectors in the body's physiology. These inputs including functioning electrically on the surface of the body, electroionically in the interstitial milieu, with nerve and neurohumoral functions as discussed by the Pomeranz studies, perineural conduction along myelin sheaths, perivascular sympathetic input, blood input via effects of neurohumoral, cellular and blood chemistry changes, and immunologically via humoral and cellular changes.

**INTO AMERICAN MEDICAL MAINSTREAM?**

The United States’ Food and Drug Administration (FDA) reclassified the primary instrument used, the acupuncture needle, as a Class 2B medical device in 1996. This was a significant turn toward mainstream from its previous classification as an “experimental” device. Further, the National Institutes of Health and its Office of Alternative Medicine convened a consensus conference in November, 1997 on the subject of acupuncture. The conference determined there is “clear evidence” demonstrating the efficacy of acupuncture for the treatment of nausea and vomiting.
associated with chemotherapy and pregnancy and in the treatment of dental pain. Acupuncture was deemed appropriate as “part of comprehensive care” in the treatment of addiction, stroke rehabilitation, headache, menstrual cramps, tennis elbow, fibromyalgia, low back pain, carpal tunnel syndrome and asthma. The NIH expressed a need for further high quality research in acupuncture. Chairperson Dr. David J. Ramsay noted, “There are a number of situations where it really does, in fact, work - the evidence is very clear-cut. It has few side effects and is less invasive than many other things we do. It’s time to take it seriously.”

CONCLUSIONS

With this brief review of the medical aspects of acupuncture, the question is no longer, "Does acupuncture work?" but rather "How does acupuncture work?" We no longer need to ask "Will our patients seek acupuncture for pain and medical complaints?" but rather "When will patients seek alternative methods of health care, who will they see, and as their physicians will we know what are reasonable alternatives?" We should not ask, "Will insurance payers and congress make rules and policies regarding the delivery of acupuncture in the US?" but rather "Will physicians play a leadership role in the education, delivery, and regulation of acupuncture in America, or leave this to others who will be glad to limit physicians' and patients' rights and privileges?" The best care for patients will likely include a cooperative effort from the physician and non-physician acupuncture community working together in greater accord. I encourage you to consider the great potential for professional satisfaction, potent patient care tools, and personal rewards to be found in the field of medical acupuncture.