

ACUPUNCTURE STUDIES: WHERE DO WE GO FROM HERE?

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ABSTRACT

This paper discusses some significant limitations to clinical trials as a means of assessing acupuncture's scope of practice. Most of the research on acupuncture has incorporated the use of clinical trials to determine its effectiveness for the treatment of specific conditions. With great variability in the methods, training, experience, and ability of the acupuncturists, it is not surprising that these studies have often produced conflicting results.

These limitations of acupuncture clinical research remain even if the trials themselves are well designed. A biochemical explanation still prevails among physicians today. Relatively scant attention has been given to the many clinical observations and physiological studies published outside the mainstream medical journals which have strongly suggested a circulating flow of energy throughout our bodies. Investigation of acupuncture's intimate relationship with energy would be a more potentially rewarding ground for study, and several specific avenues of research are suggested.

A greater awareness of pulse diagnosis and its implications is one such area for fertile study, especially if there can be free and open communication among the different disciplines involved. Only through genuine interdisciplinary communication can the existing wide gaps between Eastern and Western medicine be narrowed.

KEYWORDS: Acupuncture, Traditional Acupuncture, Energy Medicine, Clinical Trials, Pulse Diagnosis, Mind-Body

Acupuncture has undergone major shifts in public opinion since it first became widely known in the United States in 1972. Skepticism, hostility, and/or indifference were common reactions among physicians. Nobody, it seems, thought much of this 'new' modality except for many of the patients.

Since then, medical acceptance of acupuncture has slowly changed, particularly in the last 15 years. In 1993, a well publicized article from Harvard reported that the public's usage of acupuncture and other forms of complementary and alternative medicine (CAM) had been greatly underestimated and was actually a multibillion dollar out-of-pocket industry.¹ At about the same time, the National Center for Complementary and Alternative Medicine (NCCAM) was formed and began to fund research in a variety of CAM modalities. Increasing numbers of CAM practitioners, including acupuncturists, were soon employed, not only within medical practices, but also in university settings as well. There has also been a corresponding rise nationally in the number of both physician and non-physician acupuncture training programs. Degree requirements have ranged from 200 hours of lectures and video instruction to three years of academic work and hands-on training. Licensing varies considerably from state to state.

Acupuncture is widely practiced around the world and is an accepted modality for a variety of problems. In 2002, a World Health Organization (WHO) report listed 28 conditions for which acupuncture was

"proven to be scientifically effective;" another 63 for which the "therapeutic effects are promising but not proven".² The conclusions are more modest in the United States. In 1998, a National Institute of Health (NIH) Consensus Development Panel on Acupuncture mentioned "efficacious results" in treating four conditions; another 11 for which acupuncture "may be a useful adjunct or acceptable alternative for treatment".³

The biggest controversies confronting acupuncture today are: What does it treat and how do we evaluate it? Most physicians demand that its scope of practice be governed by the same rules of 'evidence based medicine' (EBM) as any other experimental modality. If acupuncture is an effective therapy for, say, arthritis of the knee, does it then necessarily follow that it also helps arthritis of the hip? While thousands of clinical trials have been published internationally on acupuncture, relatively few have met the 'gold standard' criteria of EBM.⁴ Of those that have, the results have often been ambiguous, even contradictory. "Needs more study" is a typical conclusion reached by many independent medical panels reviewing the current available studies of acupuncture.⁵

Thus there is a call for more and better randomized clinical trials (RCT's). Physicians want to know whether or not a patient referral for acupuncture is justified by solid scientific evidence. Some insurance companies, most notably Medicare, are withholding reimbursement until acupuncture is shown to be more than an 'experi-

mental procedure.' Most acupuncturists like to participate in these studies hoping the results will help to gain greater professional acceptance and insurance reimbursement.

Are acupuncture clinical trials, however well designed, the best use of our limited research time and money? Must we examine all the potentially treatable medical conditions before arriving at a consensus regarding acupuncture's scope of practice? Why are the studies often ambiguous—and suppose they continue to be so? The questions we ask will ultimately help to determine the quality of our answers. The purpose of this paper is to discuss some of the limitations of acupuncture clinical trials and to suggest other avenues which might lead to more productive ways of assessing its potential.

By way of introduction, I would like to provide a brief sketch of my own professional background. I graduated from the University of Rochester Medical School in 1967 and trained in internal medicine at Johns Hopkins Hospital and the University of Florida where I was chief resident in medicine. Shortly after the Army drafted me into the Medical Corps in 1972, I purchased a paperback book on acupuncture, improvised some needles, and began to practice (literally). The patients were from and around the army base in southeastern Alabama, and most had never heard of acupuncture. The results of these treatments over the next few months were somewhat unpredictable but encouraging. Shortly after I was transferred to my next base in New Jersey, I met my first teacher,

a Viet Nam captain in the Signal Corps. Coming from a long family line of acupuncturists, he first introduced me to some of the diagnostic and therapeutic complexities of this system.

When I reentered civilian life in 1974, I continued to combine acupuncture with the practice and teaching of internal medicine at a university-affiliated hospital. Wanting to learn more about acupuncture, I began the following year to travel periodically to England where I received further training from Dr. J.R. Worsley for the remainder of the decade. By 1980, I felt that I no longer wanted to devote a significant portion of my time to internal medicine and therefore resigned my institutional appointments at Lankenau Hospital and Jefferson College of Medicine. I moved into a home-office in Wayne, Pennsylvania, where I have practiced acupuncture exclusively ever since with my wife, Joan Michelland, who is also an acupuncturist. During this time, I have had the opportunity of observing a number of excellent practitioners representing a wide spectrum of approaches. In my opinion, no one system has all the answers. While this exposure has been quite helpful to me, the views expressed here have been shaped primarily by my own experiences in the clinical practice of acupuncture over the last 35 years.

Before discussing some of the current issues surrounding the study of acupuncture, I would first like to give a reasonable definition. This is not an easy task. One normally thinks of acupuncture as the insertion of needles into specific locations

on the skin for the purpose of producing a local or systemic therapeutic response. Since acupuncture is such an ancient system and is practiced worldwide, it is not surprising that major variations in technique have evolved over the years. In some forms of 'acupuncture,' needles are not used: Laser beams, ultrasound, surface electrodes, and heated herbs (moxibustion) have all been used to stimulate the acupuncture points, or acupoints. Some acupuncturists treat patients by limiting the stimulation of acupoints to specific areas of the body: The ear (auriculotherapy), scalp, hand, and foot are the most common sites used. For localized problems, some practitioners insert needles around the affected area; others use acupoints distal to the problem—or on the opposite side. Preferences regarding acupoint location and needle technique vary as well. Needles are sometimes inserted, manipulated and then removed, or left in place for extended periods of time, or stimulated continuously to produce analgesia. There is also a form (Toya Hari) where the needles may not penetrate the skin at all.

A further way to categorize acupuncture is to note the distinction between nontraditional acupuncture (NTA) and traditional acupuncture (TA). With NTA, the selection of a treatment plan often (though not exclusively) depends upon such variables as the patient's presenting problems, the location of trigger points, and/or the existence of abnormal electrical skin resistance changes recorded at specific acupoints. There are, furthermore, many different ways of measuring and interpreting

these electrical patterns. In TA, on the other hand, different signs suggestive of a systemic imbalance are evaluated to reach a diagnosis. Abnormalities in a patient's facial color, voice, emotion, tongue, body language, verbal expressions, and the presence of certain findings on the abdomen are some of the factors which may be evaluated. Palpation of the patient's pulses is, however, a hallmark of TA and will be discussed in greater detail later.

TA encompasses a number of different schools. Traditional Chinese Medicine (TCM) or Eight Principle is a more recent modification of acupuncture's traditional roots in China and often includes the use of herbs. Six Energetic Levels began in Viet Nam and was subsequently brought to France during the 1930's where it was further modified. Five Element Acupuncture was initially practiced in China and Japan, but was popularized in the West by Dr. Worsley in England. Toya Hari was developed in Japan where some of the early practitioners were blind, a tradition still carried on today. Eight Constitutions is a fifth form of TA whose origins are in Korea. This list is not complete. Rather it is only a brief summary meant to illustrate the diversity and complexity of the subject 'acupuncture.' More extended discussions of the different schools and the introduction of TA into the West are referenced.^{6,7} In practice, new and revised approaches are constantly being proposed, and many acupuncturists use the insights and methods from a number of sources while planning their treatments.

Another longstanding application of acupuncture has been in the field of veterinary medicine and has been widely used in the United States on animals ranging from race horses and dogs to exotic birds. In 1996, the American Veterinary Medical Association's Guidelines for Complementary and Alternative Medicine concluded that "veterinary acupuncture and acutherapy are considered an integral part of veterinary medicine".⁸ Many clinical trials and textbooks have been published in this area.⁹

Although veterinary acupuncture has been extensively studied, a major focus of human clinical trials has been to try to determine the extent to which the results are 'real' or due to patient suggestibility. To minimize the placebo effect, most advocate that the RCT's should be at least single blinded so the subject does not know whether true or sham acupuncture is being administered. There have even been attempts to develop double blind approaches during which the acupuncturists do not know themselves the difference between true and false needling. There is little doubt that patient expectations play a significant role with any form of therapy. The issue here is: Is the placebo effect **the** most important variable in interpreting the results of acupuncture therapy?

Beside the need for suitable controls, another hallmark of EBM is replicability: Can the results of one study be confirmed by another? To accomplish this goal, many studies have required the acupuncturists to follow a predefined protocol while treating their subjects. Some of the difficulties with

this approach include the wide variability among acupuncturists regarding such basic skills as point location, needle insertion and/or manipulation as well as the many different ways of treating the same problem. Furthermore, these protocols are a great handicap to the individual practitioner in his or her ability to diagnose and treat appropriately the specific needs of the patient as would be done in practice. Finally, it is the antithesis of TA for the primary focus of a study to be on a 'condition' rather than on the imbalances of specific patients. The many difficulties of applying the principles of well designed RCT's to the study of CAM disciplines in general have been discussed thoroughly in a report from the National Academy of Science Institute of Medicine (NAS IOM).¹⁰ This scholarly 300 page document describes the need for greater flexibility in the design and interpretation of CAM studies, but concludes that they must ultimately be held accountable to the same standards of evidence as with conventional medicine.

As this report emphasizes, there is a large difference between the study of the efficacy of a modality (which compares the results of two technologies) and its effectiveness (which examines the outcomes under real-life conditions of actual medical practice). Although the training, experience, and ability of the practitioner or 'healer' was acknowledged in the NAS IOM report (and by a few others) to be a significant variable in evaluating acupuncture's effectiveness, their importance is still, in my opinion, under-emphasized. Of the practitioners

whom I have seen, I believe that each one's clinical skills and 'essence' were far more relevant to the outcome of care than the particular school or treatment modality that each represented. The results of any clinical trial are really only a report of one group of acupuncturists at one particular time. Like most practitioners, my own approach and skills have evolved over the years. The prospect of acquiring new insights has been a major source of motivation for me in practice. When failures occur, and they certainly do, the question inevitably arises: To what extent do the failures represent the limitations of acupuncture and to what extent the limitations of the acupuncturist? This question is not an easy one to answer regardless of the quality of the study(s).

While the focus of this article is on acupuncture, I believe these same considerations should apply when assessing the potential of other Eastern modalities such as yoga, tai chi, and qi gong. These are, in my opinion, highly complex disciplines whose significance is greatly dependent upon the individual practitioner. Many western 'alternative' therapies may also be included here. There will always be a demand for clinical trials to 'test' their efficacies; what is important is that we appreciate their limitations. The practical implications of these studies is also unclear. Patient satisfaction (or lack thereof) and word of mouth, rather than published reports, have usually provided the main impetus for the utilization of acupuncture and the other disciplines. Even many insurance companies have made their reimbursement decisions based primarily on

marketing and cost-benefit analyses rather than 'definitive' RCT's.

Another difficulty with the interpretation of acupuncture research has been its emphasis on pain, a notoriously subjective symptom to assess. Headaches, osteoarthritis of the knee, and low back pain have been particularly popular subjects. The areas of inquiry have begun to expand in the United States as the scope of investigation has widened, and the proportion of federally funded basic science studies relative to clinical ones has increased. For instance, a recent summary by the NIH of current or projected studies on acupuncture includes 21 of 50 clinical trials focused on disorders unrelated to pain.¹¹ Such problems as gastroparesis, ileus, and post-operative wound healing are included here and readily lend themselves to objective analysis of the results. Functional neuroimaging is now being used at institutions like Harvard and the University of California at Irvine to assess the effects of needling on neurocircuitry and autonomic nervous system regulation.^{12,13,14} There is a recent review of the effects of acupuncture on brain activation as measured by functional magnetic imaging and positron emission tomography.¹⁵

As (if) the relevance of acupuncture to other physiological systems is documented, the question of its mechanism(s) of action must inevitably be revisited. Since most of the research has centered on its applicability for pain control, there has been a general consensus that acupuncture stimulated the release of a variety of neurotransmitters

which in turn suppressed the perception of pain.¹⁶ The explanations, in other words, have been mostly biochemical ones. However, even if acupuncture's sole function were to stimulate neurotransmitters, there is still a big physiological gap between the insertion of a needle and the subsequent release of these peptides.

The whole matter of causation brings to the forefront an issue that divides most (though not all) of the medical and acupuncture communities. The presence of a circulating flow of energy (also known as ch'i) throughout the whole body has been a basic tenet of acupuncture and many other disciplines for centuries. This belief has been based not only on theoretical concepts, but also on the day-to-day observations of the practitioners. Yet the reluctance of most physicians to explore the possibility that ch'i exists has been puzzling to me. The interchangeability of matter and energy has been an essential aspect of modern physics for more than 100 years. Surely the laws of physics apply to medicine as well. We know, for instance, that all human organs produce energy fields, the heart being the strongest. Energy medicine is also used in a wide variety of diagnostic and therapeutic settings. There is, however, no expansive view of energy as an integral and coherent part of the life process itself.

A major objection to this concept is as follows: If energy is such an important component of health, then why has it not been discovered yet? Part of the answer is: It probably has. Literally hundreds of articles and books on energy and living

systems have been published, often in the basic scientific journals rather than in the mainstream medical press. As science has become increasingly specialized, meaningful communication among the broader disciplines and even within specialities has become more fragmented.

Another reason for the widespread skepticism has been the lack of context in which to interpret all this seemingly disparate data. No forest has emerged to give meaning to all the trees. In my opinion, the best bridge between biophysics, medicine, and acupuncture (and some other forms of CAM) is a book by James Oschman, *Energy Medicine in Therapeutics and Human Behavior*.¹⁷ Dr. Oschman, a biophysicist, reviews the extensive evidence that there is a dynamic matrix within living beings which provides a continuous energetic and informational network among all the cells of the body and their chemical reactions. This vibrating system produces biomagnetic and bioelectrical fields which provide the vital sensory and feedback loops necessary for the optimal functioning of the organism. He emphasizes the roles of connective tissue and water as semiconductor media for the flow of this energy and notes that fascia is also piezoelectric, whereby mechanical stimulation of connective tissue will produce corresponding changes in the surrounding electrical fields. These concepts are beginning to receive increasing attention, and a First International Congress on Fascia Research was recently sponsored by Harvard Medical School.¹⁸

Many acupoints have been found to have lower electrical skin resistance than their surrounding areas. When these points are stimulated, significant electrical changes may occur along the same meridian, but have less or no effect on other areas. Electrical changes in selected acupoints may also reflect systemic medical problems, and a number of electrodiagnostic approaches have been based on this phenomenon, most notably in Japan, Europe, and in Russia. Summaries of some of these methods are noted.^{19,20,21,22}

For the duration of this paper, I would like to offer some perspectives on certain supposed conflicts between TA and western medicine, particularly as they relate to energy. In my opinion, these seemingly profound differences may reflect, at least to some degree, cultural and semantic differences as well as more substantive ones. Specialized vocabulary is often as significant an impediment to the exchange of information as are the ideas they represent.

Take, for example, the terms 'yin and yang', the object of so much skepticism in the West. There are, however, many ways and levels of viewing this concept. A theorem of classical physics states that any action will produce an equal and opposite reaction. In nuclear physics, light may be described in terms of either a particle or a wave. Yin/yang is a broader concept philosophically than these two examples, but the parallels are clearly there. Neils Bohr, who received the Nobel Prize for his seminal work in the principle of complementary, had the yin/yang symbol engraved in his

coat of arms when he was knighted by his native Denmark. There appears to be a growing consensus among many theoretical physicists that there are profound similarities between several eastern disciplines and modern physics. Just a few of the many authors who have explored this subject are listed.^{23,24,25}

Another controversial tenet of TA has been the existence of the five elements, the basic constituents or building blocks of ch'i. The names of these elements (wood, fire, earth, metal, and water) seem quaint, even archaic, but they may be quite descriptive of a patient's demeanor and character. Changes in facial color, voice, and emotions may reflect imbalances in one or more of these elements and are often easily identifiable clinically.

As one way to describe the elements in terms of physics, we could suppose that ch'i were a beam of light which could be refracted by a prism into five basic components. A stronger prism could refract the light further into 12 components, or meridians, which are not only energy pathways but have functional purposes as well. Furthermore, each meridian is composed of the five elements within it, and the interplay of these 'elements-within-elements' has a significant effect upon the state of our health. While a theoretically more powerful prism could expand the divisions beyond 60 (five elements within each of the 12 meridians) and reveal 'elements-within-elements-within-elements' etc., this categorization is not clinically practical. However, what emerges from this

brief picture of ch'i is a pattern of energy not too dissimilar from that of the electromagnetic spectrum.

A striking feature of TA is that there is no separate pathway for the central nervous system (CNS). Instead, this framework suggests the existence of an additional system in which essential information is conveyed at greater speeds throughout the body than can be achieved by the CNS alone. This network may be an older one on the evolutionary scale just as primitive organisms react to environmental stimuli without the benefit of a brain. Memories and emotions are, to some degree, thought to be stored in the cells throughout the body as they are in the brain. The capacity for joy and love are, for instance, as much an integral part of the heart's 'energy' as is its capacity as a pump. Clinically, deep-seated feelings are commonly evoked by acupuncturists and many other hands-on therapists in the course of their treatment sessions. The distinction between mind and body is a tenuous one indeed.

Another aspect of TA is that no one problem, or imbalance, should be treated in isolation. A needle in one acupoint will affect all of the pathways. The functions of each meridian are fully integrated with those of the others by multiple interconnected loops. Loss of positive feedback among pathways, or the emergence of negative energy in one pathway, will have deleterious consequences for the whole system. Thus the TA practitioner should address the major underlying imbalances in a patient before beginning treatment. The

sicker the patient, the more important it is to get an accurate diagnosis. An old maxim states that the most effective acupoint on the body is—whichever point the patient needs the most at that particular time.

The previous discussion of TA was not meant to be a comprehensive or universally accepted review. Rather, these opinions are based on my training and interpretations of the theory and reflect my own experiences with their clinical applications. They are also expressed in ways which I believe are compatible with western scientific theory and can be subjected to the same rigorous methods of evaluation.

For the remainder of the paper, I would like to discuss an aspect of TA which rarely receives more than a passing reference in the standard medical literature: pulse diagnosis. This method has, I believe, the potential to be a valuable adjunctive means of understanding the development and progression of disease in patients and therefore deserves greater scrutiny. Pulse diagnosis is not unique to TA: Ayurvedic and Tibetan medicine both use somewhat different versions of this method. In TA, the pulses are felt at three specific locations on the left and right radial arteries. Each of these six locations has both a superficial and deep component. Thus there are 12 pulses in all which, when carefully palpated, provide important information about the state of health in each of the 12 meridians. The pulses may be examined at other locations on the body, but it is important that the placement of the fingers be accurate. In my own practice, I generally

take a patient's pulses at least five times in the course of a typical visit to help indicate the sources of his or her imbalances, to monitor the response to treatment, and to suggest what further needling, if any, is indicated.

When an acupoint is stimulated or sedated, the resultant changes can be felt instantaneously on all 12 pulses. I recall seeing an elderly blind Toya Hari master demonstrating acupoint location to his students. While a subject lay supine on an examining table, another student slowly drew a needle lightly along the surface of the subject's foot. Using his exquisitely sensitive touch, the teacher monitored the subject's pulses and then told the student when the precise location of the point was reached.

A variety of information can be gained from the pulses and, inevitably, there are significant differences among acupuncturists regarding the interpretations and implications of the readings. As with western medicine, the rate and regularity of the pulse is a starting point. Increases or decreases in the volume of each of the 12 pulses before and after needling are also noted. I believe that many of these quantitative variations can be readily appreciated by most reasonably sensitive nonacupuncturists after a relatively brief period of instruction.

The most important diagnostic and prognostic information provided by the pulses is obtained through the reading of their **qualities**. These qualities may be difficult to identify, and their mastery may

take many years of practice. In TCM, there are classically 28 different pulse qualities with such names as hesitant, floating, and hollow, each having its own particular significance.²⁶ For many centuries in China, the doctor was forbidden to examine his female patients with the exception of the pulses. Even today, there are practitioners who are reputed to be able to obtain a significant portion of a medical history on the basis of the pulses alone.

No explanation exists in western medicine for the phenomenon of the different pulses or for the changes which occur in them immediately after needling. However, there may be an interesting way of approaching this subject from an experimental perspective. The pulse qualities are, in essence, a description of the whorls and eddies of the flow within specific locations of the arterial tree. In some sections, the flow may be relatively smooth and orderly; in others, turbulent or chaotic. In still others, one may sense an obstruction to flow, thus creating a dissipation of energy and a generalized weakness within the system. Seasonal and diurnal variations may be reflected in the pulse patterns which also tend to change when a patient is followed over many years.

In one sense, the descriptions of the pulse qualities are remarkably similar to those of fluid mechanics and chaos theory.²⁷ The dynamics of fluid systems, including the onset and progression of turbulence, can be extremely complex. Pulse diagnosis could be considered one way of describing the oscillations of flow within specific locations

and using that data as another diagnostic and monitoring tool. Quantitative recordings of differential pulse volumes might very well be feasible, though their significance is probably more limited than the information that might be obtained from the pulse qualities. Can these qualities be objectively evaluated, or even approximated? I don't know, but only a combined effort of investigators from the fields of fluid mechanics, medicine, and TA could possibly answer that question.

Before leaving the subject of pulse diagnosis, I would like to be less theoretical and offer a specific example of its clinical use. The six pulses palpable on the left wrist (heart, small intestine, liver, gall bladder, kidney, and bladder) are known as the 'husband' side; those on the right (lung, large intestine, stomach, spleen, triple heater, and pericardium), the 'wife' side. In a relatively healthy person, the strength and vitality of the pulses on each side should be roughly equal to and harmonious with the other. If the left sided pulses become sufficiently weak and are 'dominated' by those on the right, then a husband-wife imbalance, or H-W, is said to exist.

In the earlier stages, the signs and symptoms of H-W may be vague and nonspecific. A patient may have increased difficulty in adapting to changes in daily living patterns or feel generally 'in a rut' physically and/or emotionally. If H-W progresses, then previously intermittent symptoms may become more pronounced and continual. There may develop a sense of 'loss of control' or greater passivity in dealing with

life's challenges. Apathy, helplessness, and hopelessness are frequently found in the later stages. One reason I have chosen this example is because it is a relatively common phenomenon in patients who develop significant chronic medical and/or emotional illnesses. Furthermore, the relative disparity of strength on both wrists can, with a little instruction, be readily appreciated if the patient's H-W is advanced and his or her pulses are easily palpable.

The treatment of H-W consists of sedating the right sided pathways and stimulating those on the left. This session is usually a quite vigorous one as the chronic disparity between the two sides may be difficult to correct. While a single treatment is certainly not curative, the patient often feels significant positive changes if the equilibrium is restored, and subsequent treatments can progress much more smoothly. In my experience, if the H-W still persists after two or three visits, then the prognosis with further acupuncture treatments is limited.

WHERE DO WE GO FROM HERE?

Acupuncture, like any system, has its limitations. I have a great deal of respect for western medicine and am personally grateful for the many benefits that it has provided in my own life. Yet the prevalence of so many chronic medical problems would suggest that our current models of health and disease could be expanded.

During the last 35 years, a major focus of acupuncture research has been the use of clinical trials to assess its effectiveness (or lack thereof) in treating specific conditions, especially pain. These trials perform a useful function in providing us with some general guideposts regarding its scope of practice and efficacy. However, as discussed earlier, the validity of extrapolating the results of these clinical trials, no matter how well designed, to 'acupuncture's effectiveness' as a whole is based upon several questionable assumptions. Moreover, the broader issues of acupuncture's mechanism(s) of action and its ultimate potential are often deferred.

A circulating flow of energy throughout our bodies has always been the common denominator joining acupuncture with a number of other 'alternative' therapies. Several potentially answerable questions can be raised in this regard: Does the quantity, quality, and distribution of this energy have a significant effect upon the state of our physical and emotional health? Do the meridians within the fascia act as semiconductor pathways to rapidly convey information to all parts of our body-minds? Do electrical changes in specific areas of the skin correlate with pathophysiological changes in the organs, and vice versa? Do wave patterns within certain locations of the arterial tree provide important clues to the development of disease?

It may be possible that these questions, when framed as hypotheses, can be subjected to the same rigorous analysis as any other form of inquiry. To begin to

answer them, however, a perspective extending beyond our current areas of specialization is needed. Dr. Oschman's review of energy medicine reflected not only his expertise in cellular biology, but also an obvious substantive understanding of many alternative therapies. I suspect that the expansive nature and scope of the previously cited research projects at universities like Harvard and California at Irvine were partially the result of meaningful communications between their basic science and acupuncture communities. These genuine interdisciplinary dialogues appear to be expanding nationally and will hopefully continue to do so.

The emphasis of this paper has been to suggest ways in which some of the seemingly large differences between TA and western medicine can be narrowed. There may, however, be limits to this goal. In TA, as in so many other disciplines, the practitioner's compassion, intent, and touch are often an integral aspect of the healing process. Although much has been said and written about the spirit, its nature and scope remain elusive. To what extent can the essence of the spirit be explored and evaluated by conventional medical approaches? Should we even consider that there may be limits to the scientific method itself? Attempting to answer these questions may prove to be a major—and exciting—challenge in itself.

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