

Acuscope and Skin Conductance along Meridians:
Before and After LifeWave Energy Patches

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Introduction

Ancient Oriental Medicine is in the throes of a new in-depth portrayal of the anatomical and functional human body. Evidence from European, Asian and Western Medical Sciences weave electrical meridian concepts with new sophisticated discoveries of cell structure and biophotonic/energy transfer, forming a newfound biocommunication system. The key to this advance is the evidence of an anatomic characterization of fascial and interstitial connective tissue forming structural pathways for communication, movement and biophotonic energy exchange. Wijk, et al, summarize:

*“We review supporting evidence from biochemistry, cell biology, biophysics and biophotonics. Anatomic, cellular and molecular studies reveal the enormity and pervasiveness of such tissue from the highly structured, strong and dense fascia, via the **Bonghan ducts** and (its) connections to skin and internal organs, to the fine-structured extracellular matrix surrounding individual cells.”¹*

These newly discovered structures could lay to rest many questions which have long plagued theorists about the meridian system’s structure and function. It should bring together a better alignment of acupuncture and energy medicine concepts and practices.

A major movement in health care is taking shape, expanding the scope and promoting options for ease in achieving health. An aspect of this emerging movement has to do with energy medicine, the use of the body’s own bioelectromagnetic system for healing. The movement is not new. It has been acknowledged in Oriental Medicine for over 5000 years in many forms. What differs now is the addition of the new technologies and advancement of the anatomic and

biochemistry knowledge of the body to justify and augment the past unknown features of the bioelectromagnetic system.

Present research within energy medicine is uncovering the means of how the body can be stimulated to heal itself. This study investigates the activation of the bioelectromagnetic current through the meridians by use of *LifeWave Energy Patches*. The technology of these *LifeWave Patches* is presented in the theory section of the paper. Here, suffice it to say, that the *LifeWave Patches* are developed through the designing of stereoisomers to influence specific photoreceptors in the body. In the case of the *Life Wave Energy Patches*, the photonic activity is aimed to promote ATP production in the mitochondria of muscle cells to increase the metabolism.

Purpose of this study

This study pursues the effects of stimulating the body's own electromagnetic current at acupuncture points with the use of a nanotechnology product to generate the desired photic wavelengths. The behavior of the body's electromagnetic activity is fundamental to modern energy medicine as a basis for recognizing its role in health and illness, much as it has been for the field of acupuncture. The recent key element is the breakthrough finding of structural channels (**Bonghan ducts**) within fascial and interstitial tissues through which the flow of current is stimulated and activated. Of particular interest is the fine thread-like mesh surrounding interstitial tissue and vital organs². This study is a step toward broadening the understanding of how to treat and heal the body through the manipulation of bioelectromagnetic activity.

The purpose of this study is to examine if there are changes in conductance at 4 selected acupuncture sites (lung 1, pericardium 6, kidney 3 and stomach 36) between a baseline skin conductance reading and a reading following application of the *LifeWave Energy Patches*. Also, with an awareness that the changes in conductance might differ at the skin level and in the deeper

tissues, two measurements were performed using skin conductance for skin surface changes and Electro-Acuscope conductance for examining deeper tissue changes.

Context for the Use of Electromedicine for Healing

Our interest in bioelectromagnetic activity within the physiology of the human body has been focused on the growth and repair of the physical being. It is of special interest now that the practice of health care is moving from a major focus on pharmaceuticals to surgical repair/replacement and finally to a search for a more integrative medicine. Until attention to the patients' own healing processes are integrated into medical and health care practices, there is less hope for the promise of an extended healthy life. The successive treatment of primary illnesses and subsequent secondary problems throughout life ignores the person in favor of a focus on the disease, eventually promoting degenerative diseases. Hopefully, foresighted patients are adopting a more holistic method of care.

New investigative approaches to the processes of healing, regrowth and repair have caused us to revisit the existence of bioelectromagnetic currents within the body delving back to references dating as long ago as 1840. However, the scientific rationale for treatment has until recently remained elusive. Even pioneers such as Becker and Seldon were using electrical stimulation, both direct and pulsing (alternating) current to power self-healing without recognizing the mechanisms by which the electrical current acted on cells³. Reports of the use of current for pain, healing, resorption of damaged tissue and bone and the rebuilding of new tissue have been documented. These reports include electrical osteogenesis for repair of joint cartilage and restoration of bone and electrical regeneration of nerves to the eye (retina)⁴. Integrative medical science only recently has been able to merge the studies of cellular actions, biochemistry and photophysics¹. Albert Szent-Gyorgyi wrote, "Biology is the science of the improbable",

suggesting that we can seldom predict new discoveries from what we already understand³. The synthesis of healing cannot be made system by system or organ by organ. Becker and Seldon suggest that only one discipline, neurophysiology, comes close to uniting the body and its functions.

What is the integrating factor behind these processes? Becker and more recent scientists have implicated the presence of electrical energy to be the constant that drives the chain of restoration. Research on microcurrent was accelerated dramatically in 1991 when two German scientists Dr. Erwin Neher and Dr. Bert Sakmann won the Nobel Prize from their work beginning in the 1970's using a patch clamp technique which allowed for the detection of electrical currents of a trillionth of an ampere in the cell membrane. They discovered how tunnel-like structures called ion channels control the passage in and out of the cells of positively or negatively charged particles called ions. Research of this electrical charge within cells has allowed widespread understanding of cell pathology as well as the ability to explain the effect of microcurrent levels of electrical stimulation for healing. A plethora of new patents for microcurrent therapy instruments have greatly broadened the use of this treatment.

LifeWave Patch development incorporates yet another advance in the management of bioelectromagnetic energy in the body. The increasing recognition that every cell and system of cells operates with bioelectromagnetic energy of a specific frequency has allowed the inventor of *LifeWave Patches*, David Schmidt, to tap into the bioelectromagnetic healing process without using an external direct or pulsing electrical stimulation. The energy patch is a small nontransdermal adherent to skin that “contains orthomolecular compounds in water-based solution designed to reflect wavelengths of light from the patch to the body within the human thermomagnetic field creating a mechanism of photobiomodulation, much in the same way a

radio wave is modulated to communicate radio information”⁵. By treating L-amino acids and D-sugars in a proprietary manner, these stereoisomers reflect photonically to match the specific frequencies of the cells being targeted to increase the products of metabolism, which are, in the case of the *Lifewave Energy Patches*, adenosine triphosphate, calcium and acetylcholine release. These organic materials match the resonant frequencies of biological components involved in mitochondrial energy production⁶. Nazeran, et al⁷ described the process of change – when specific stereoisomers are dissolved in water they exhibit liquid crystal properties, forming nanoscale-sized crystals that act as semiconducting bimolecular antennas capable of interacting with the oscillating bioelectromagnetic field of the body. According to independent testing of the *Lifewave patch* no organic molecules of the proprietary formula of stereoisomers (isomeric molecules whose atomic connectivity is the same but whose atomic arrangement is different) are capable of migrating transdermally to the participant⁸.

LifeWave Patches have a potentially important role in the field of energy medicine. Understanding that the body is a composite of rhythms, vibrating with oscillatory rates of a wide variety of frequencies, with all rhythms addressing specific functional activities of the body, it can be expected that there will be considerable intercommunication. The double-blind study of the effect of energy patches on heart rate variability by Budzynski, et al⁹ showed that the patches produced a decrease in the very low frequency (VLF) component of the frequency domain of the EKG. The patches produced a more optimal balance of the autonomic drive of the heart. Although the ATP production was being addressed to increase metabolism in mitochondria, examination of the stimulus on the autonomic system through heart rate variability, showed that a balance of heart rate stimulation was achieved, resulting in a reduction of stress. Thus, stimulating favorable body rhythms can produce secondary gains for the body.

To tie the *LifeWave Patches* to what is known about the study of meridians, one wonders: Does electrical energy in the body pass along meridians as proposed and documented by Chinese Acupuncture studies and as well as studies by contemporary biophysicists? And how do *LifeWave Patches* measure up in the way of changing the electrical conductance of the meridians.

What is the Nature of the Passage of Electrical Current through the Body?

In Ancient Chinese Medicine, studies of the meridian system describe pathways of *subtle energy*, flowing through the body associated with various bodily life functions. The concept of meridians is that they are pathways of positive and negative energy power which carry some communication between various parts of the human body¹⁰. These meridians have been mapped and measured as conductance (or impedance) through electronic or thermatic devices and by radioactive assays through injection at acupuncture points. The Ancient Chinese were concerned with eliminating energy blockages in meridian pathways when the functioning of the body was deemed to have gone awry.

Studies by recent acupuncture practitioners avoid the idea of “subtle energy” when exploring, “How does acupuncture work”. Moffet’s review¹¹ of explanatory rationale reports that the preponderance of practitioners propose neurochemical changes, autonomic nervous system regulation, or other bases such as brain function changes. Nonetheless, in these studies, neither treatment purpose, methods, nor means of stimulation as the study elements were dependent on the proposed mechanisms cited as the basis for using acupuncture treatment.

On the other hand, a number of researchers (mainly biophysicists) speak of the electrical properties of the meridian/acupuncture system in an attempt to characterize the system. But they are generally without success in establishing systematic patterns in impedance. Impedance

differed between acupuncture points; it differed in direction – sometimes increasing, sometime decreasing. At times there are no differences between acupuncture points and control points¹². The location of the acupuncture points in fascial or soft connective tissue did make a difference in findings¹³. In a systematic review of electrical properties of acupuncture points and meridians, Ahn, Colbert, et al¹⁴ state that the evidence does not conclusively support that acupuncture points or meridians are electrically distinguishable. Nonetheless, though a patterned picture is not accessible, a number of researchers conclude that impedance/conductance might be used for acupuncture localization or diagnostic/therapeutic purposes^{14, 15}. Clearly, the tissue conformation, presence of sweat glands, as well as technical instrumental issues will limit the ability for analyzing acupuncture points for diagnostic purposes^{12, 13}.

Langwin and Yandow¹⁶ have doggedly sought to connect the acupuncture points and meridians to the network of interstitial connective tissue. The signaling (mechanical, bioelectric and biochemical) indicates a powerful integrative function taking place in these connective tissues where acupuncture points and meridians have been traced.

Yet, another series of studies not mentioned by Langwin and other researchers, describes a system of thread-like structures called **Bonghan ducts**. These had been seen as long ago as 1963 when Bonghan Kim first formulated a staining dye to reveal this network, as separate from the vascular, nervous and lymphatic system. A follow-up by Fujiwara and Yu in 1967, by Cho, et al in 2004, Lee, BC, et al in 2004 and Lee, KJ, et al in 2004 confirmed these findings according to Shin². Shin and his colleagues reported on findings of a fine network of granules detected in **Bonghan ducts** surrounding the surface of mammalian organs. A landmark paper by Wijk and his colleagues¹ consolidates the work from cell studies and biophoton emissions and proposes an intercommunication via **Bonghan ducts** to provide passage of electrical and biophotonic

conductance. Bonghan Kim noted that a liquid flowed through the **Bonghan duct** system and its threadlike structures, even entering into blood vessels. The threadlike structures have been distinguished from fibrins in the blood vessels and from the lymphatic system by Shin, Sohn, et al² using the Feulgen Reaction dye for detecting microcells such as DNA marking these threads.

Thus, this mounting verification of the **Bonghan ducts** reveals a structural network which possibly is the transport system for photonic and bioelectrical activity. These findings may validate the acupuncture/meridian system and the rapidly growing electrical energy healing treatment. It suggests that the bioelectromagnetic flow through the body may constitute a systematic conduction system, offering an explanation for the body's self-reparative actions.

Methods

A sample of 60 self-stated healthy adults, average age 48.6 yrs., from the community were tested for changes in bioelectromagnetic conductance following the application of *LifeWave Energy patches*. Inclusion criteria were that the subjects had to be able to read and understand English, be in good general health, able to read and sign an informed consent. Excluded were adults with debilitating illness, subjects allergic to medical adhesives and pregnant women. A consent form explaining the study and a short health review were signed by each participant before the procedure was fully described. Participants were resting in a lounge-style chair during the application of electrodes and patches. A pint of water was provided in order to assure hydration during the course of the measurement.

Design: The study compared a baseline measure with an after-treatment measurement following the application of patches. All 60 subjects were measured with the Thought Technology Biofeedback skin conductance (SC). A later measure was added using the Electro-Acuscope (AC) on roughly half of the original sample (29) who were called back to compare the

possible differences in conductance at what may be the deeper levels of tissue below the skin.

Thus, in this study the subjects were the same, but the time /day differed between the measures.

Procedure: Four acupuncture sites were chosen for measurement: Lung 1, Pericardium 6, Stomach 36 and Kidney 3. At testing time, the sequential order of measurement of these sites were randomly chosen to check whether time /order played a factor in the measure of conductance at a particular acupuncture point.

Skin conductance testing. The skin was prepared with Nu-Prep at each site. One electrode was attached with gel and taped at the inside of the right wrist. At each acupuncture site, a reactive area (found to be approximately 2 inches in diameter), was determined by probing the acupuncture site with the active second electrode. This electrode was then secured at the active site and a baseline SC was obtained. An equally active space close to the second electrode was reserved for the *LifeWave* patch to be applied after the baseline measurement was taken. A three minute period was allowed for stabilization of drift before the baseline conductance was taken. The baseline conductance value was then tracked on the computer screen. These values tended to fluctuate up, sometimes down. A total of 5 minutes was allowed, during which time a plateau was sought and marked as the baseline value. At this point, the *LifeWave* patches were applied with the white patch (termed the positive patch) near the site of the active electrode and the tan patch (negative patch) was placed at the corresponding acupuncture point on the left side of the body. Once again, the stabilization period was allowed and the measure of conductance was repeated to obtain the patch activity which would be compared to the baseline value.

The *Thought Technology Skin Conductance* system is an FDA approved instrument which measures skin conductance (SC). This skin conductance measure is generated by the application of a 0.5 DC voltage. This current does affect the meridian conductance to some extent. For this

reason, we allowed for a stabilization time for the drift to settle before we started the baseline measurement.

Electro-Acuscope testing. For the Electro-Acuscope measure, the skin at the acupuncture sites was again prepared with Nu-prep. One electrode was attached to the wrist as a ground. Using the active probe, the acupuncture site areas were again determined by increased conductance. A flat plate electrode was then substituted for the probe. The figure on the LCD display was adjusted to 080 by an adjustment of the Acuscope's Gain control so as to standardize the baseline starting point. After 1 minute the baseline measure was taken by observing the reading on the LCD. This baseline value differed only slightly from the initially adjusted 080 figure. The *LifeWave* energy patches were then applied in random order, again mimicking the sites as with the SC procedure. After 5 minutes the *Life Wave Patch* post measurement was taken.

The Electro-Acuscope is an FDA approved instrument which measures the conductance of electrical current at deeper tissues. Using only the diagnostic part of the machine, the probe presents a small electrical stimulus (approximately one-tenth of the treatment current) into the flesh to measure conductance at each acupuncture site. The stimulus is a square wave with a sharp spike leading edge, allowing a deeper penetration.

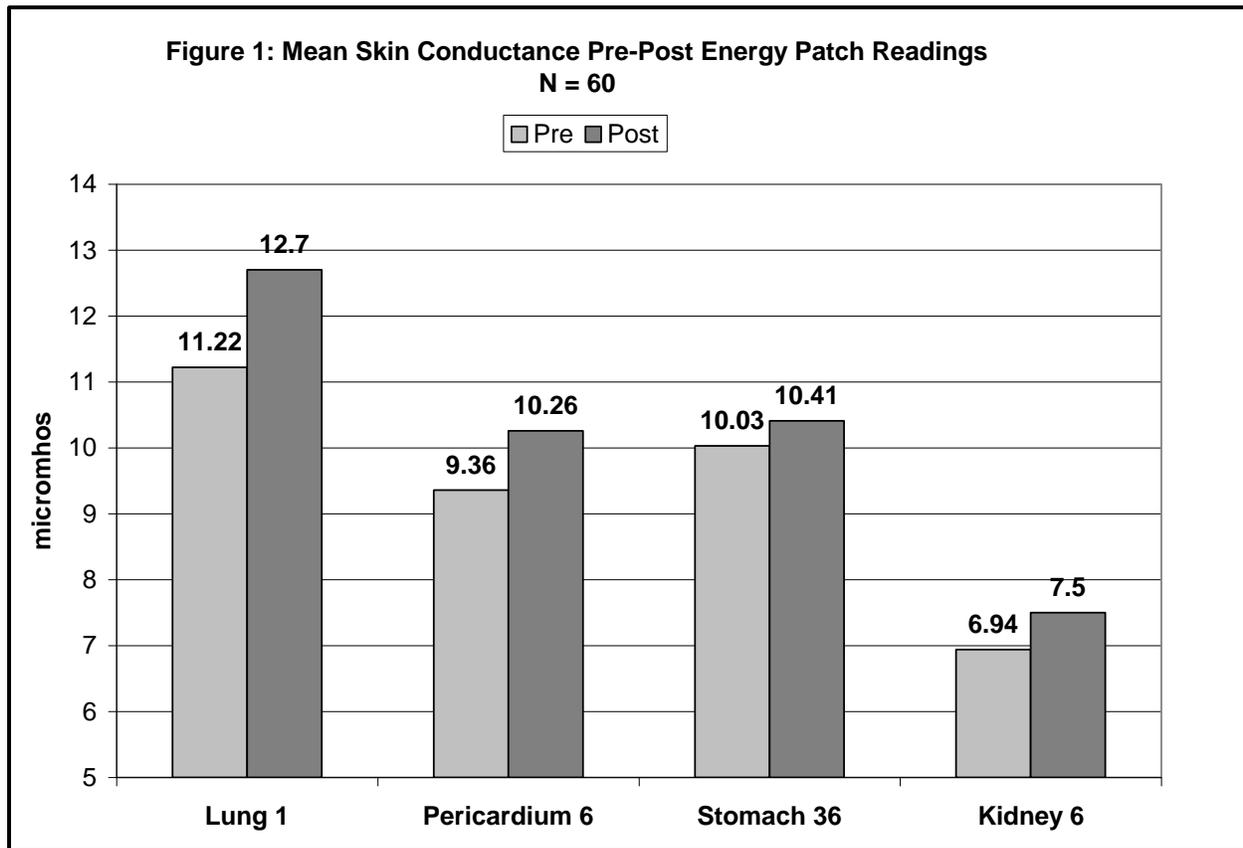
Results

To recall, the purpose of the study was to determine the electrical properties along meridians before and after use of *Life Wave Energy Patches*. As was apparent from examination of the literature, there seems to be variation among researchers as well as between acupuncture points as to whether the changes in conductance with a stimulus would be found to be either positive or negative. The conjecture among scientists has been that differences in hydration,

inflammatory processes and type of fascial, muscle, vascular, and neural tissue distributed between the ground and active electrodes might account for variation.

Means of Pre-Post Conductance Readings for Each Site

The means of the skin conductance readings are shown in Figure 1. At the 4 acupuncture sites (lung, pericardium, stomach and kidney), the means show an increase in conductance after application of the energy patches using the skin conductance measurement.

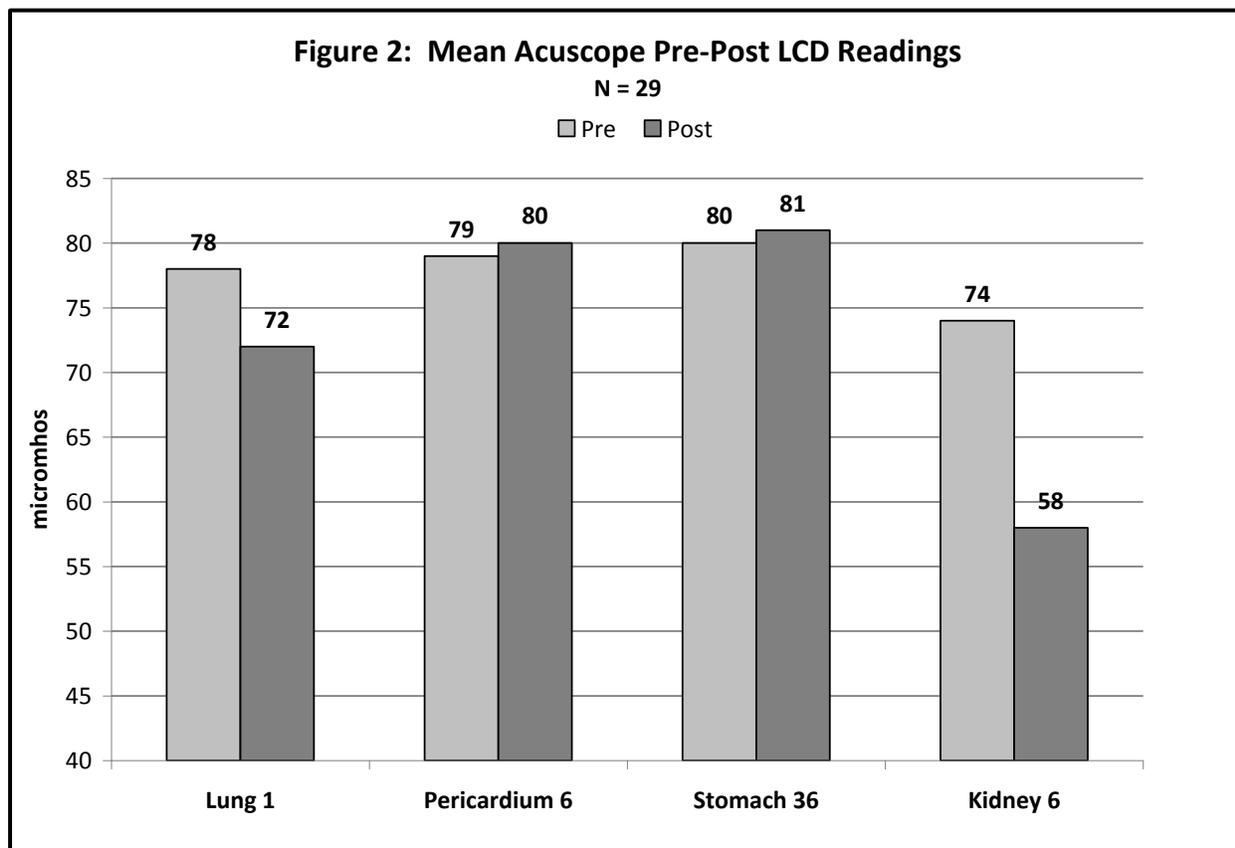


Two-tailed t-tests (see Table 1) showed significant Pre-Post differences for Lung, Pericardium and Kidney with only the Stomach site not reaching significance.

Table 1: Statistical Differences in Pre-Post Energy Patch Skin Conductance Levels (N=60) 2-Tailed Significance

Site	Probability	Significance
Lung 1	p<0.0005	s
Pericardium 6	p<0.02	s
Stomach 36	p<0.17	ns
Kidney 6	p<0.03	s

Figure 2 shows the means for each site when stimulated by the Acuscope. In contrast to the SC measure the Acuscope means increased only slightly in the Pericardium and Stomach areas. Whereas the Lung and Kidney means decreased with patch application. Only the Kidney measure showed an 0.05 level of significance, one-tailed .



Percent of Conductance Changes at Each Site

Means can be deceiving so we calculated what percent of subjects showed a positive or negative change in the Pre and Post data.

Table 2: Percent of subjects showing a positive and negative conduction direction from baseline to post patch readings with skin conductance and Acuscope, by acupuncture site.

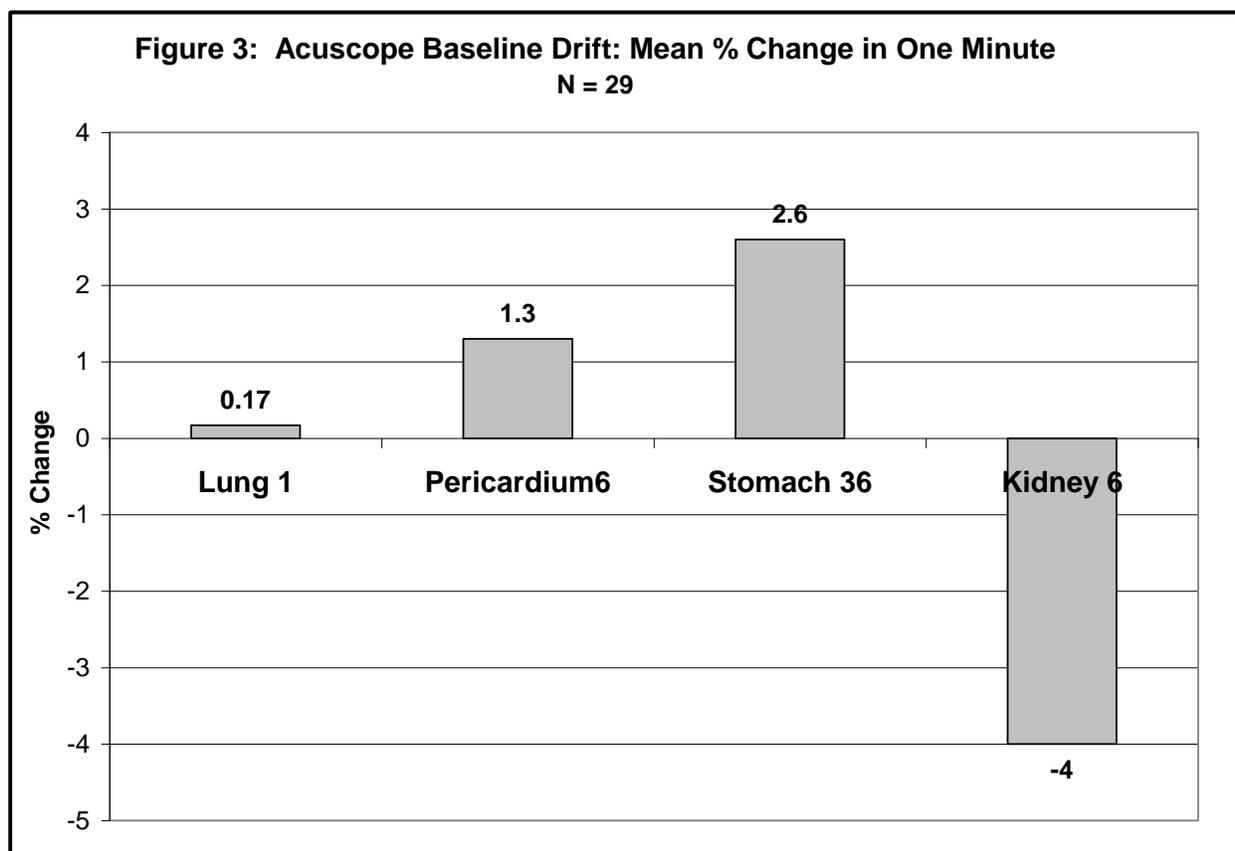
Table 2: Percentage of Subjects Showing Positive and Negative Changes

Site	SC		Site	Acuscope	
	Positive	Negative		Positive	Negative
Lung 1	69	31	Lung 1	41	59
Pericardium 6	55	45	Pericardium 6	69	31
Stomach 36	59	41	Stomach 36	59	41
Kidney 6	55	45	Kidney 6	4	96

These results are indicative of the general finding among researchers that meridian conductance measures can increase or decrease with stimulation.

Acuscope Baseline Drift

It should be noted that the Acuscope reading involves a “penetration” of a sharp spike at the leading edge of each pulse as a stimulus for obtaining a measure. Because a question arose about the baseline changes (or drift) when the Acuscope was being chosen for use as a measure of conductance, we tested the change (drift) in conductance from the onset of the stimulus to the end of a one minute period. Converting the drift to a percent change, it could be seen that only at the kidney site might drift be a problem (Figure 3). The reading went down an average 4.0 % change, indicating that if the change migrated that far down (or more) in a few of the kidney readings, the data might be considered unreliable. For other sites the drift of 0.17, 1.30 and 2.90 increase in % change would not constitute a problem.

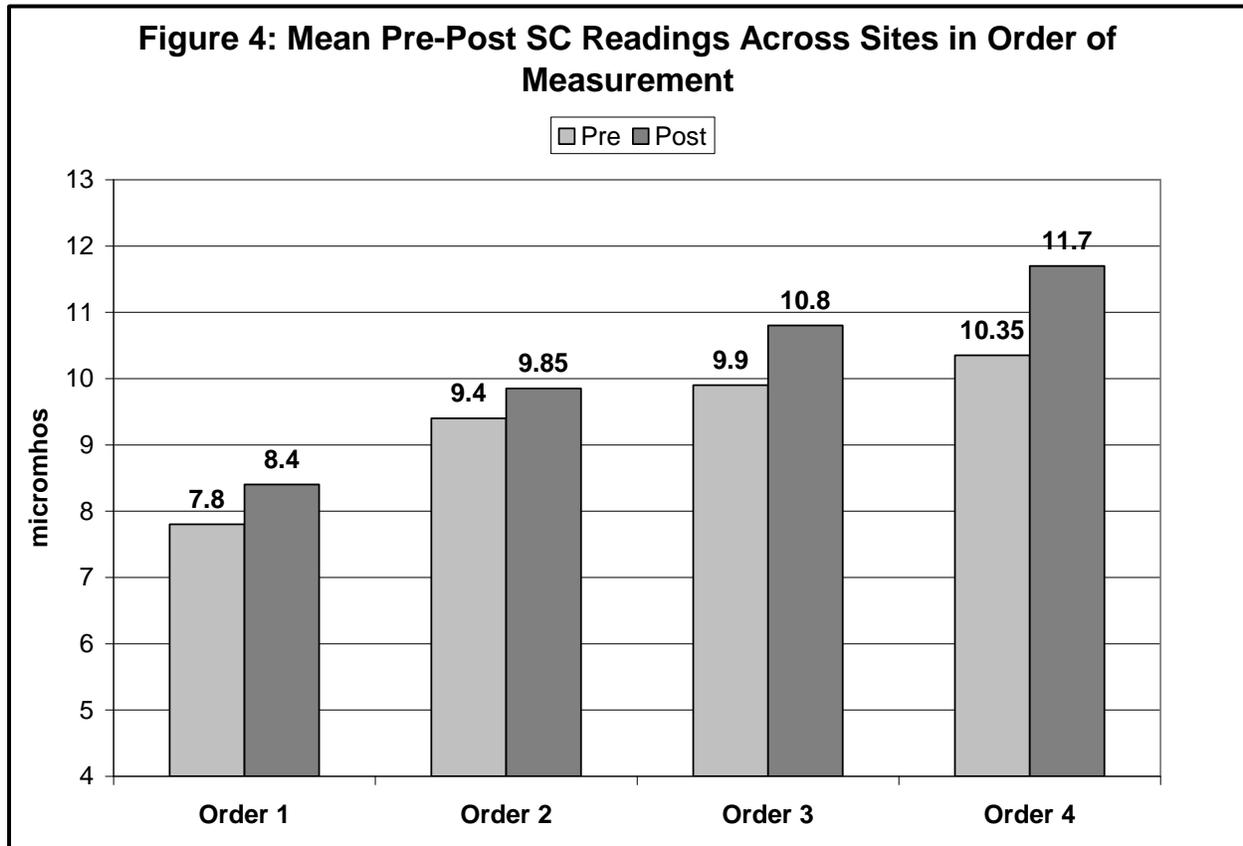


Correlation of Skin Conductance and Acuscope Readings

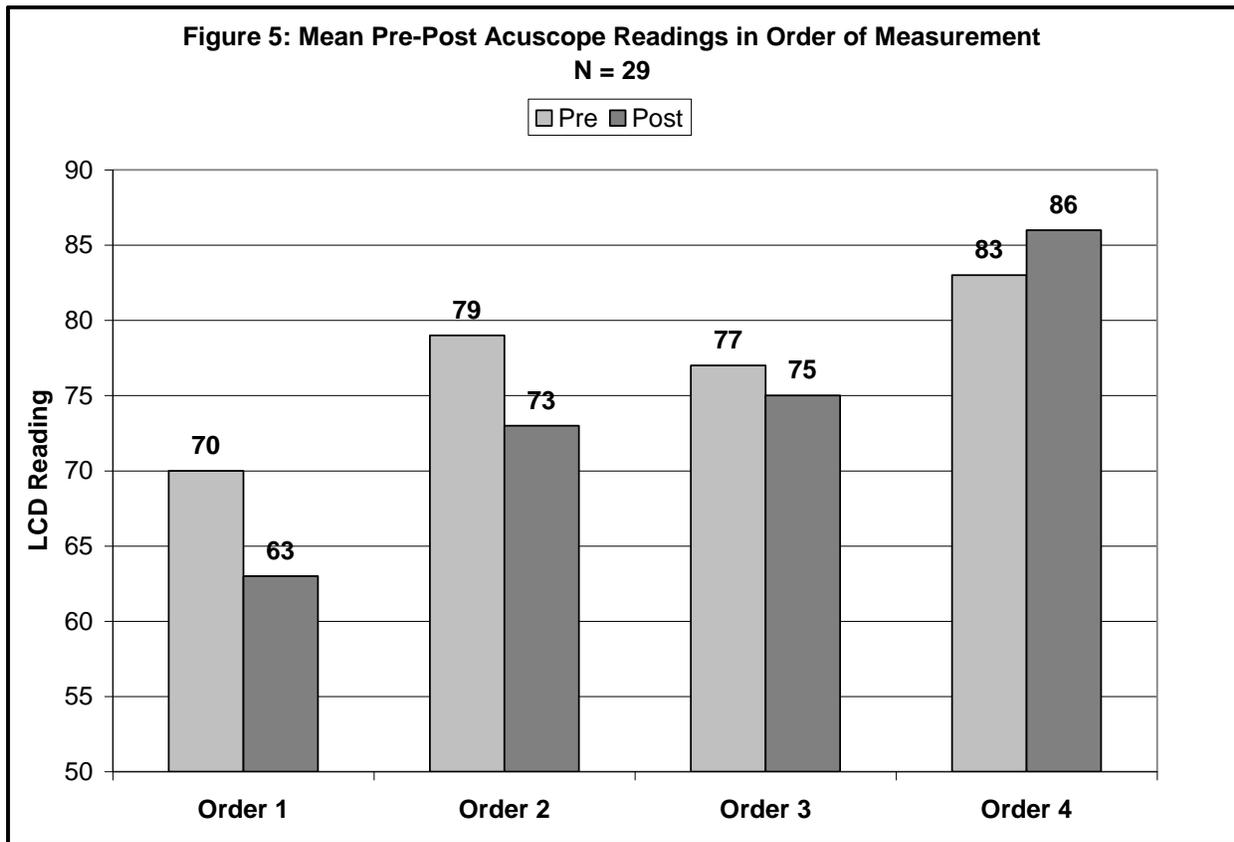
Correlations of the values obtained from skin conductance and the Acuscope groups were performed for each acupuncture site but the results were not remarkable or meaningful. It should be noted that these two types of measures were taken at different times and days which could certainly increase the variability of the data. Only the lung site was negatively correlated with a single-tailed probability at the 0.05 level, but the meaning of it was not immediately discernible.

A serendipitous finding was probably the most telling finding of all the data. As was noted before, we randomized the order of the location (acupuncture site) by which we did the measurement. Then we averaged the micromhos obtained at baseline and post energy patch by order of measurement taken. Figure 4 shows the baseline and post-patch readings. In the case of the skin conductance, each successive measurement had added to the level of skin conductance,

probably as a result of the fact that measurement of skin conductance instills a small stimulation into the meridians. But more importantly, each time an energy patch was placed on the body, even though we removed that patch as we moved to the next site, the level of skin conductance seemed to increase with each application.



Even with the Acuscope readings, Figure 5 shows that the steady application of energy patches systematically increased the readings of the pre-post patch measures.



Discussion

As much as anything, this study demonstrates that advances are slowly being made toward closing the gaps of information about the body and the behavior of its bioelectromagnetic activity. More recently, the theory and treatment with bioelectromagnetic activity/photonic wave frequencies embraced by Western energy medicine are being understood in the light of Ancient Chinese medicine's use of meridians and acupuncture sites. This study is enmeshed in both camps, in using highly specialized, advanced technology in its *LifeWave* energy patches to generate a very specific body action (increase of ATP in muscle tissue), and trying to trace the meridian action of the classic Chinese medicine. In some ways the study has succeeded, by

showing that skin conductance can, indeed follow the tracings of the meridians from acupuncture sites.

This study arrives at a time when advanced anatomic scientists are tentatively moving toward investigating extremely small thread-like structures throughout the body (**Bonghan ducts**) which may soon buttress the ‘subtle energies’ concept of energy flow. Imagine that after 5000 years, the meridian scholars have finally found structural justification for their careful observations.

The study falls short (as have many others) in not having a precise understanding of the electrical characteristics of the fascial and connective tissue through which conductance is measured. Not surprisingly, the repeated application of the measurement stimuli gradually biased the conductance of the other meridians. The differences found between the two measurement techniques are indicative of the type of electrical stimulus used (DC versus sharp spiked pulses) and therefore the depth of penetration of the tissue structures. This study found that indeed *LifeWave* patches do serve as a stimulus for the actions for which they were developed -- that is, to be a photonic communicator for specific frequencies which are driven as if a bioelectrical stimulus from the patch site along meridians to selected areas of the body in order to effect positive changes in the body’s functioning. No adverse effects occurred from wearing the patches in this study.

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