A Modern Interpretation of Acupuncture and the Meridian System

Prof. Julia J. Tsuei, MD, FACOG
National Yang-Ming University School of Medicine
Graduate Institute of Traditional Medicine
Taipei, Taiwan, Republic of China

ACUPUNCTURE HISTORY AND RESEARCH

Acupuncture is a therapeutic modality used in China as early as the late stone age. Throughout Chinese history both acupuncture theory and practice has steadily evolved into an increasingly rich and complex system, eventually offering treatments for virtually every form of medical condition. Official documentation has long considered acupuncture more important than herbal pharmacology. The earliest classical books on traditional Chinese medicine discuss Acupuncture as the main topic. These include *Huangdi's Internal Classic* (ca. 100 B.C.E.) and two other works that pre-date it, the *Moxibustion Classic with Eleven Foot-Hand Channels* and the *Moxibustion Classic with Eleven Ying-yang Channels*, both of which were discovered during the Mawangdui tomb excavations in 1973.¹

Acupuncture did not enter modern Western consciousness until the 1970's when China ended a period of isolation and resumed foreign political and cultural contacts. In 1972 the respected New York Times columnist James Reston underwent an emergency appendectomy while in China. He later wrote about acupuncture treatment for post-operative pain that was very successful. This report attracted attention and many American physicians and researchers went to China to observe and learn acupuncture techniques.

It appeared as though Acupuncture was used to treat everything in China, but the number of accepted acupuncture applications has grown very slowly in the West. The first area of partial acceptance was in analgesia, which is still the area where its effectiveness is best documented.² Acupuncture research has since become a very broad, active area both in Asia and the West. Research at the Shanghai Institute has demonstrated acupuncture's effect on various biological systems, including the digestive tract, cardiovascular system (helpful in hypotensive states), immune system (phagocytosis), and the endocrine system (the secretion of ACTH, oxytocin, vasopressin, norepinephrine, follicle stimulating hormone, prolactin, and 17-hydroxycorticosteroids).³ A recent issue of the bilingual, Chinese journal *Acupuncture Research* includes successful studies of acupuncture treatment for hemiparesis, facial paralysis, cervical spondylitis, humeral epicondylitis, herpes zoster, and lumbago⁴. Current research in North American and Europe includes uterine contractions⁵, pulmonary disease⁶, addiction, mental disorders, and as an adjunct to AIDS treatment⁷. Research continues, but widespread acceptance and integration are still far from realized.

The primary reason for the slow acceptance of acupuncture is the lingering suspicion that there is no substantial, scientific reality behind it because a demonstrable mechanism of action has yet to be found. For the most part, early attempts to "explain" acupuncture have been either thinly disguised denials or have embraced and verified acupuncture only partially, disproving traditional acupuncture as much as validating it. The most prevalent example of the former is the argument that any effect acupuncture may have is psychogenic, a placebo effect. This has been disproven by successful studies of acupuncture in animals, many examples of which can be found in Kuo and Kuo.² Two important forms of partial validation of acupuncture are the neuralphysiological and neurohormonal schools. The neuralphysiological school defines acupuncture points on 'roughly dermatome basis; partially involving 'long' reflexes to distant parts of the body, which implicates a distribution by specific spinal segments or nerves; and are partially via unknown connections.⁴ This could explain remote stimulation, but as the quote suggests, it is a very incomplete explanation. Neurohormonal theories center on the release of neurohormones triggered by the pain and microphysical damage caused by needle insertion. This has been used primarily to explain acupuncture-induced general analgesics, but it can explain little else.

Both of the above explanations are attempts to use structures and concepts acceptable to the mainstream medical community to explain acupuncture. But in grafting acupuncture to Western medical theory, aspects foreign to orthodox medicine are simply jettisoned. Because of the emphasis on genetics, anatomy, physiology, and bio-chemistry in modern medicine, and a near complete denial of energetic processes in the body, chi (body energy) and meridians (paths of body energy flow) are either ignored or considered fallacies with some metaphorical or pneumonic value. Emphasis is placed by most researchers on the needle and the physical effect of its insertion into the skin, but this side of acupuncture is not essential. According to our research, acupuncture is essentially manipulation of bodily energy as it flows through the meridian system. The acupuncture needle is only one of many possible tools used to accomplish this. In the remainder of this article, "meridian theory" will be understood to include acupuncture theory and practice. "Meridian" is used to stand for both the meridian itself and the acupuncture points along the meridian.

INTRODUCTION TO THE MERIDIAN SYSTEM

A bio-physical or bio-chemical approach to acupuncture robbs it of its actual foundation, and because of this acupuncture research to date has been only partially successful. Fortunately, advances in physics, electromagnetism, quantum-mechanics, and bio-energetic
research have enabled researchers to develop a paradigm that for the first time successfully explains the majority of acupuncture related phenomena. We have embraced this bio-energetic paradigm not simply because it can explain more of acupuncture phenomena, but because it is a true description of acupuncture's mechanism of action and is an important facet of all life processes. The only way to address acupuncture successfully and scientifically is through the meridian system.

Traditional Meridian Theory: According to traditional Chinese medicine, a form of bodily energy called chi is generated in internal organs and systems. This energy combines with breath and circulates throughout the body, forming paths called meridians. The meridians form a complex, multilevel network which connects the various areas of the body, including the surfaces with the internal. All of the various meridian systems work together to assure the flow and distribution of chi throughout the body, thus controlling all bodily functions. The interwoven meridian systems and the possibilities for diagnosis and treatment they offer, are called meridian theory. When an organ or system is not balanced, related acupuncture points may become tender or red, allowing for diagnosis. For treatment, a point on the skin is stimulated through pressure, suction, heat, or needle insertion, affecting the circulation of chi, which in turn affects related internal organs and systems.

"Meridian" is the most common translation of the Chinese ching-lo (jingluo), but it is a very imperfect translation. Ching means to pass through, and lo means a net or to connect. "Meridian" was originally used by French researchers to describe all meridians, and is used in this article in that sense. The term "channel" is used increasingly for all meridians, while some prefer to maintain the original distinction between ching and lo and use the terms channels and collaterals respectively. For them, meridian theory would be referred to as the theory of channels and collaterals. There is another subclassification of meridians called vessels. Although it is a valid distinction, it is not important to the immediate discussion.

Meridians are classified into 6 groups according to their location and function. The best known of the meridians are the 12 regular meridians, also called the major trunks. They connect with the organ they are named for by way of collateral meridians (see bellow) and run along the surface of the body either on the chest or back and along either both of the arms or both of the legs. These are the primary conduits for the passage of chi through the body, which flows through this network in a regular, 24-hour pattern. The 12 regular meridians therefore control or take part in every facet of the daily metabolic and physiological functioning of the body.

There are three meridian groupings directly associated with the regular meridians, each with 12 meridians. 1) Each of the divergent meridians arises from one of the 12 regular meridians, passes through the thorax or abdomen to join with the named organ, and then surface at the neck or head. 2) The muscle network meridians distribute chi from the 12 regular meridians among muscles, tendons, and joints, ensuring normal body motion and flexibility.

This circulation of chi is referred to as superficial because there is no direct connection with an internal organ. 3) The cutaneous network meridians run parallel to the regular meridians in the cutaneous skin layer and are therefore considered even more superficial. We believe that they are a part of the function of the sensory nervous system.

The 8 extra meridians (also referred to as vessels) are the paths by which the 12 regular meridians connect, share chi, and support each other. None of the individual extra meridians are associated with a specific organ or regular meridian, though all of them connect with a number of other meridians. Their paths are considered superficial but deep. It is through the extra meridians that imbalances in chi are regulated through storage and drainage. The most important of the extra meridians are the governor meridian, which runs along the middle of the back, and the conception meridian, which runs along the middle of the chest and stomach.

The system of 15 collateral meridians is responsible for the thorough and complete circulation of chi. One collateral meridian arises from each of the 12 regular meridians, the governor and conception meridians, and from the spleen (which does not have a regular meridian). Each of the collateral meridians branch out, forming minute or "grandson" collateral meridians, creating both horizontal and vertical connections within the complete meridian system.

Energy Medicine: This energetic view of the body is not entirely new to Western medicine. The basic concepts were present in the work of "vitalist" scientists such as Galvani, Hahnemann, and Mesmer, who were active in the 17th through 19th centuries. Vitalism was gradually pushed out of the realm of accepted medical science in the 19th and 20th centuries due to apparent inefficacy, but the real problem was inadequate instrumentation and a medical paradigm that made no room for energetic processes. Technology has advanced to a point where devices can successfully and consistently measure biological energy. The body's energetic processes have always been there and were always important, as the history of acupuncture suggests. It is now time to standardize and integrate energetic practices into modern health care and make energy medicine an essential part of medical science.

The basic premise of energy medicine (also called bio-energetic medicine) is that energetic processes, including electrical and magnetic processes, vibrational resonance, and bio-photon emission, are essential to life processes. Bio-energy functions as a carrier of "bio-information" and is crucial to biological self-regulation.

According to what we have observed in our research, a complete, bio-energetic definition of meridians includes four facets, or "units": structure of the organ of origin, function of the organ, the electro-magnetic pathway, and emotional/vibrational interaction. All four are crucial to the creation and existence of the meridians. An organ, by its physical existence and functioning, releases energy (chi) and creates an electro-magnetic field. This energy contains information about the organ and its activity, so both the physical structure and the functioning of the
organ affect the quality and strength of the energy and information that are created. This is the source of the meridians. An imbalance in one meridian often brings about imbalances in others, and other factors, including emotions, can affect individual meridians and the meridian network as a whole. Each meridian can be viewed as existing individually or as a part of the intricate meridian system and can be treated as such, though the synergistic totality of the meridian system is always of primary importance. It is precisely for this reason that diagnostic and therapeutic procedures based on meridian theory are successful at approaching the body holistically.

INTRODUCTION TO THE EDSD & EDST

In electroacupuncture treatment, direct electric current is administered through the acupuncture points. This energy follows the electromagnetic tracks to the system, effecting treatment. (Electroacupuncture therapeutics is a separate area of research and will not be discussed in detail here.) On the other hand, anything that alters or interferes with a system’s function or structure also changes the performance of the related meridian and acupuncture points. The electrodermal screening device (EDSD) measures the balance of systems by measuring resistance and polarization at these points. In other words, acupuncture and standard electroacupuncture are therapeutic and the EDST is used in a screening process and can be integrated into diagnostic procedures.

The Device (EDSD) and Method (EDST): In the 1930's and 60's two distinct electrodermal screening methodologies were developed, one by Nakatani in Japan (Ryodoraku) and one by Voll in Germany (EAV, electroacupuncture according to Voll). The most obvious difference between the two systems were the emotions, can effect individual meridians and the primary importance. It is precisely for this reason that diagnostic and therapeutic procedures based on meridian theory are successful at approaching the body holistically.

A reading taken with the EDSD is usually described using two values, the initial reading (generally the highest value) and the indicator drop (ID). Many practitioners also note the length of time of the ID. An initial reading of approximately 50 followed by little or no indicator drop is considered to be balanced. Initial readings above 60 may indicate inflammation in the system being measured, and initial readings below 45 may indicate changes caused by degenerative processes. An ID indicates a probable imbalance. When an ID is present it is considered the most important part of the reading, and through a process called medicine testing the ID can be used to determine the nature and cause of an imbalance.

Voll expanded upon traditional acupuncture point classification in three directions: by discovering unknown meridians (which he referred to as "systems"), unknown points on traditional meridians, and unknown functions of existing points. Voll's understanding of the traditional meridians is in agreement with the Chinese tradition in that each meridian relates to a specific internal organ (lung, stomach, heart, etc.). Voll's new meridians go beyond this to cover tissue and structure types and categories of biological function. These meridians cover joints, skin, fibrous tissue, fatty tissue, serous membranes, the nervous system (including autonomic innervation), lymphatic drainage, capillary circulation and allergic reactions. Many of the branch points are examples of newly discovered points and point functions. Branch points help tremendously in pinpointing the exact location of abnormal function. For example, the branch points on the two heart meridians (one on each of the hands) include the aortic valve, mitral valve, pulmonary valve, tricuspid valve, conduction system, and coronary arterioles. By combining the information read from all of the different types of measurement points, it is possible to determine the exact location of a given disturbance, including the layer of tissue affected.

A typical examination with the EDSD begins with four quadrant measurements (hand to hand, foot to foot, right hand to foot, left hand to foot) which are measurements of whole-body energy levels. These are taken using a pair of brass tube hand electrodes and a pair of brass plate foot electrodes. Using the probe, the control measurement points (CMP, some of which are also referred to as summation measurement points) are then measured to ascertain the general condition of an entire meridian. The branch points along the same meridian are checked if there is a positive reading at the CMP or if symptoms suggest that a complete check of a meridian is
warranted regardless of the CMP reading.

When a point exhibiting an ID is located, various reagents can be tested against the point in a process referred to as medicine testing. It is the goal of the physician to find one or a combination of reagents that will balance the point, i.e. cause the point tested to have a reading near 50 and not have an ID. Reagent samples in sealed glass containers are placed within the circuit of the measurement by placing them on the metal plate designed for this purpose. The physician tests various reagents, basing his selection on medical knowledge and experience, until an appropriate reagent or combination of reagents is found. A reagent that balances the reading may have a positive effect on the system being measured and therefore be an appropriate medication or dietary supplement. No response implies that the reagent would have no effect on the system, and a worsening response implies a negative effect. For example, pancreas CMP readings of a person with diabetes will become balanced when the proper dose of insulin is placed within the circuit and will show a larger ID if refined sugar is put there.

Acupuncture has been used for thousands of years and is effective in a wide range of situations. It has not been integrated into modern health care primarily because of lingering suspicions that it is not scientific. A bio-energetic model has been developed to explain nearly all aspects of acupuncture and meridian theory, but there remains a definite prejudice against human energetic theories in the medical-scientific community, which must be overcome before integration can take place.

The EDST and EDSDD are outgrowths of the scientific, electro-magnetic understanding of meridian theory. The EDST may appear similar to other ultra-modern techniques such as MRI, but there are important differences. Both are relatively new techniques based on modern technology, but the EDST is also based on ancient practices and is safer and more holistic, versatile, and cost effective. The device is elegantly simple and not extremely expensive. Hopefully, it will help free medical progress from its dependence on ever more expensive and specialized medical instrumentation. This alone would have a profound effect on health care cost and accessibility. The quality of health care will also improve with integration of the EDST into modern medical practice. Because the EDST makes use of the body’s meridian system, it can map out and help analyze the body’s own signals, making it particularly useful in early diagnosis. With its solid theoretical foundation in modern physics and quantum mechanics, it is perhaps the most “modern” medical methodologies available today.

### CLINICAL OBSERVATIONS

But for acupuncture and the electrodermal screening test (EDST) to become accepted medical procedures, their mechanism of action must first be thoroughly studied and at least partially accepted, and an essential part of the mechanism of action is the organ/meridian relationship. Clinical observations and trials of the EDST can not prove this connection 100%, but they do bring us much closer, hopefully to the point that the scientific and medical communities are adequately convinced that a definite form of relationship exists. We have found that standard testing procedure results are similar to results of skin-level measurements of electrical properties of acupuncture points, and that changes in measurements can be predicted based on traditional organ/meridian relationships. This is an extremely important point, which can not be emphasized enough. This consistent relationship demonstrates a link between organs and meridians. Hopefully, someday soon we will be able to quantitatively measure meridian energy on the inside the body at the source organ, on the surface of the body, and along all of the interconnecting tracts of the meridian system. Only then will it be possible to prove the organ/meridian connection.

### The Advantages and Challenges of Clinical Studies:

Basic scientific medical research usually emphasizes in vitro and in vivo analysis of the chemical composition of a reagent or the body’s biochemical response to a reagent or process. For most medical products and procedures, issues of the mechanism of action are addressed during the basic research phase. Today, basic research alone is not enough for a medical product or process to be accepted by the medical community. Applied research, in particular well-designed clinical trials, is the only convincing way to establish the efficacy of a drug or procedure. This is also true of the EDST and the electrodermal screening device (EDSDD) and system (EDSS), but here we also have the extra burden of questions regarding the mechanism of action that have not been resolved in basic research.

Fundamental clinical trial procedures must be followed in studying the effectiveness of any new modalities and comparing them to conventional, established modalities, even though this is extremely difficult in the case of traditional or energetic modalities. Since the presence and movement of meridian energy is not expressed chemically, it is impossible to monitor it, quantitatively or qualitatively, using standard chemical-based testing procedures. For this reason, researchers such as Jobst had to be content with the study of the therapeutic effect on the patient, something which often can be confirmed using chemical measurements.

The twin Foundations for East-West Medicine were established in 1989, though a number of people, particularly Julia Tsuei and Fred Lam, have been cooperating in research projects in this area for many years previous to that. The foundations are located in Honolulu, Hawaii and Taipei, Taiwan. We have done cooperative research projects with two major universities: the University of Hawaii (John A. Burns School of Medicine Center for East-West Medicine Project) in Honolulu and National Yang-Ming University School of Medicine in Taipei. To date we have completed over 20 studies on bio-energy and the EDST. These studies offer proof of a significant co-relationship between meridians and organs and demonstrate that knowledge of this connection has practical implications. These are not the only clinical studies of electrodermal diagnostics, but they constitute the largest body of data on this subject collected by one research group. Other interesting studies include cancer detection using EAV and the Ryodoraku technique.

Our research, which began in 1982, was designed in
acconrance with the accepted steps toward scientific approval. Due to its complexity, all research planning was done with the assistance of experts in clinical study design. These included Elisa T. Lee, a former member of the Committee of Clinical Trials of the United States National Institutes of Health. She has written on the challenges of doing research of traditional medicine according to modern scientific standards, and we have followed her suggested protocol structure. Not only did we demonstrate the safety and efficacy of a new medical device, we also demonstrated the efficacy of a complicated testing procedure.

An Overview of Our Research: We began with 2 observational studies (both available in English) designed to establish the untested impression that EDST diagnostic results matched standard diagnostic tests. In the first study, 11 clinical cases treated in a family practitioner's office were observed, including peptic ulcer, appendicitis, chronic chorea, and cancer of the colon, breast, and uterus. In every case, readings taken with the EDSD matched standard diagnostic tests. This study was essentially just a set of case finding reports, but the results were very convincing and we decided to proceed.

We had heard from many practitioners that the EDSD was particularly useful at determining the causes of allergies. In the second study allergic symptoms in 30 volunteers were analyzed using five standard diagnostic methods (history, skin test, RAST, IgE tests, and food rechallenge test) and the EDST. EDST results correlated strongly with the results of the other five, particularly the food rechallenge test, which is considered by allergists to be the most reliable method of testing for food allergies.

The observational studies were followed with a series of descriptive studies (total of 7, 2 currently available in English) which included theoretical studies, studies designed to refine the EDST and standardize the EDSD, and studies designed to demonstrate the EDSD's general effectiveness as a diagnostic tool. During this phase of research 16 different devices with electrodernal screening capabilities were used and their electronic specifics compared. The following parameters were noted: meter scale units, battery voltage, current (micro-amps, full scale), 100kilo-ohm phantom-load meter units, mid-scale kilo-ohms, ID at 80% phantom load, and rise time to full scale. This clarifies which devices would generate equivalent data, allowing researchers to analyze and compare data from different studies. Such standardization is necessary for proper EDSD research and device development.

In 1987 the first in a continuing series of comparative/descriptive studies was completed (total of 6, 2 currently available in English). In these studies, the bio-energy of varying population groups was analyzed, such as those exposed or not exposed to dangerous materials at the workplace such as pesticides, those who had or had not received metal dental fillings, and those who did or did not do a specific type of activity (such as chikung, see below). These were followed by major clinical research projects on electrodernal screening for Diabetes Mellitus and Hypertension (also discussed below).

The study of the effect of metal dental fillings involved 160 subjects. Statistically significant relationships were found that suggest A) a relationship between the major meridians and galvanic resistance of the teeth and B) a substantial, negative effect of dental fillings on dental galvanic properties, which by extension can effect the primary meridian associated with that tooth and other parts of the body associated with that meridian. For example, we found a statistically significant relationship between metal fillings in any of the third molars and problems in the small intestines and the heart. In this study diagnosis was done using both standard Western and traditional Chinese procedures.

In the study of pesticide exposure there were a total of 120 subjects, all of them employees at a factory that produced organo phosphate (DDVP). 60 were workers who came in regular contact with DDVP and its components. The 60 control subjects were office workers who did not come in direct contact with the finished product or the materials used. The 40 control measurement points (points that show the general condition of an organ or system) were tested with the EDST. Readings from 7 points showed a statistically significant correspondence (P < 0.05) separating study and control groups. In general, measurements from people in the study group had a higher initial reading and a larger indicator drop at those 7 points. Readings from the same 7 points also corresponded with blood ACHE (acetyl cholinesterase) levels. This was also statistically significant (P < 0.05), particularly for readings from the right nervous system point (ND-cmp-R, P < 0.01).

CONCLUSION

The acupuncture and meridian system of traditional Chinese medicine is an important, real biophysical aspect of the living body. With the EDSD, it is possible to define, both quantitatively and qualitatively, much of the meridian system. The meridian system is essential to most or possibly all bodily functions, and the EDSD, which reads meridian information, is capable of delivering valuable information on nearly every facet of bodily function. The EDST could serve as the standard "ruler" by which biological energy is measured, similar to body temperature and blood pressure measurements. In other words, it is conceivable that someday the EDSD will be as commonplace as the thermometer and sphygmomanometer.

The EDSD is non-invasive and economical. With further refinement and acceptance of the EDSD and the associated testing methodology (EDST) and health management system (EDSS), it will be possible to chart even the higher functions, including emotional, cognitive, and psychosomatic. The EDST has the potential of developing into a truly complete test of the body, making possible levels of international medical standardization and meta-analysis unknown today. The device, test, and system may prove to be the greatest set of tools against disease created this century. But now what is needed is much more research. It is the authors' sincere hope that many others in the medical-scientific community will see the EDST's potential and initiate further research projects.
Figure 1
A simple schematic diagram of an EDSD:


