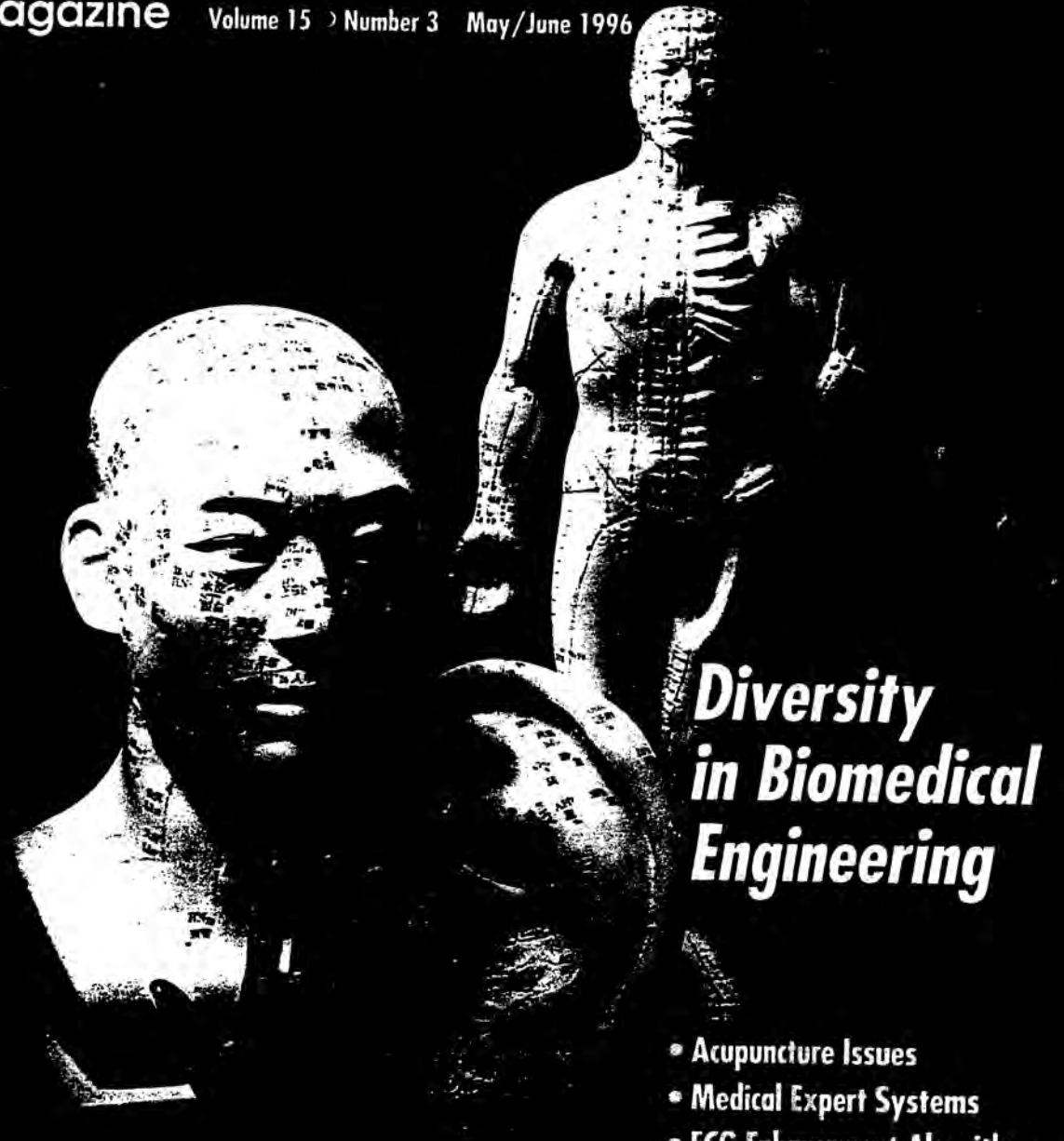


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The Science of Acupuncture— Theory and Practice

1. Introduction

Acupuncture is a therapeutic modality used in China as early as the late stone age. Throughout Chinese history, both acupuncture theory and practice have steadily evolved into an increasingly rich and complex system, eventually offering treatments for virtually every form of medical condition. Much of the history of the development of acupuncture therapeutics can be seen in the evolution of the needles themselves (Figs. 1 and 2), but the meridian system is of primary importance, and the conceptualization of the system has changed very little in the last 2000 years. (Figs. 3 and 4).

Acupuncture has long been considered more important than herbal pharmacology. The earliest classical books on traditional Chinese medicine discuss acupuncture but not herbal pharmacology. These references 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] There is even a traditional saying: "first you use the needle (acupuncture), then fire (moxibustion), and then herbs."

Acupuncture did not enter modern Western consciousness until the 1970s, 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, which 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



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analgesia, which is still 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 hemiparalysis, facial paralysis, cervical spondylosis, humeral epicondylitis, herpes zoster, and lumbago [4]. Current research in North America and Europe includes uterine contractions [5], pulmonary disease [6], addiction, mental disorders, and as an adjunct to AIDS treatment [7].

The primary reason for the slow accep-

tance 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 psychogenetic, i.e., a placebo effect. This conjecture 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 a "roughly dermatome basis; partially involving 'long' reflexes to distant parts of the body,



1. Diagram dating from 1601 AD of the nine standard needle types used in acupuncture for approximately the previous 2000 years. From left to right, they are an arrowhead needle for pricking the skin to drain heat, a round needle for superficial massage, a pressure needle for pressing against a meridian, a sharp needle for blood letting, a sword needle for draining pus, a round sharp needle for eliminating acute obstructions, a filiform needle for strengthening normal chi, a long needle for deep-seated obstructions, and a large needle for arthritis with effusion [18].

which implicates a distribution by specific spinal segments or nerves; and are partially via unknown connections" [8]. This hypothesis could explain remote stimulation, but as the quotation 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 hypothesis has been used primarily to explain acupuncture-induced general analgesia, 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



2. Modern, stainless steel acupuncture needles.

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 activity. In the remainder

Bodily energy, called chi, is generated in internal organs and systems

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.

A bio-physical or bio-chemical approach to acupuncture robs 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 bioenergetic research have enabled researchers to develop a paradigm that, for the first time, successfully explains a majority of acupuncture related phenomena [9]. We have embraced this bioenergetic paradigm, not simply because it can explain more of acupuncture phenomena, but because it is a true description of acupuncture's mechanism of action as well as an important facet of all life processes. The only way to address acupuncture successfully and scientifically is through the meridian system.

This four-article series will attempt to give a fairly complete representation of meridian theory research based on the bio-energetic paradigm. This, the first article, covers traditional acupuncture, early research into the the electrical properties of acupuncture points, and basic electrodermal screening test (EDST) methodologies. The theoretical foundation for the bio-energetic paradigm is discussed in two articles by physicist Kuo-Gen Chen. The fourth article is a review of research into an application of bio-energetic properties called the electrodermal screening system (EDSS). In that article, Dr. F.M.K. Lam, Prof. Pesus Chou, and I hope to demonstrate the effectiveness of the EDSS as a screening/diagnostic method and offer evidence of the casual connec-

tion between points, meridians, and internal organs.

Traditional Acupuncture

According to traditional Chinese medicine, a form of bodily energy, called chi, is generated in internal organs and systems. This energy combines with the breath and circulates throughout the body, forming paths called meridians. The meridians form a complex multilevel network that connects the various areas of the body, including the surface 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, providing a mechanism 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. Some prefer to maintain the original distinction between ching and lo and to use the terms channels and collaterals respectively. With that dis-



3. Traditional diagram of the meridians along on the front of the body.

inction, meridian theory would be referred to as the theory of channels and collaterals. There is another sub-classification of meridians, called vessels. Although it is a valid distinction, it is not important to the immediate discussion here.

Meridians are classified into six 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 below) 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 3 meridian groupings, each with 12 meridians, directly associated with the 12 regular 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

The 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 because of its apparent descriptive inefficacy. However, the real problem was inadequate instrumentation and a medical paradigm that made no room for energetic processes. Technology has now 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 reso-



4. A modern "acupuncture doll."

**Chi combines with
breath and circulates,
forming meridians**

nance, 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. With this in mind, there are at least three areas where medical practitioners could find useful applications: (1) keeping in mind the role of the electromagnetic energy network whenever diagnosing or choosing treatment modality, (2) use of beneficial, external energies in amounts similar to that already present in body in order to balance or reinforce natural energetic functions, (3) use of greater amounts of external energy to actively influence body function by way of the energy network, correcting functional imbalances. Traditional acupuncture belongs to category (2), and many modern meridian-based techniques belong to category (3).

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 electromagnetic 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. Thus, both the physical structure and the functioning of the organ affect the quality and strength of the energy and information that are created. This activity is the source of the meridians. An imbalance in one meridian often brings about imbalances in others, and other factors, including emotions, can effect 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

Voll expanded upon traditional acupuncture point classification in three directions: by discovering (1) unknown meridians (which he referred to as "systems"), (2) unknown points on traditional meridians, and (3) 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 to cover type of tissue and structure 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 information 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 effected.

A typical examination with the EDSD begins with the four quadrant measurements (hand to hand, foot to foot, right hand to foot, and left hand to foot) which



6. A hand point measurement taken with the electrodermal screening device, EDSD (Department of Physics, Soochow University, Taipei, Taiwan)

Organ structure, function, EM pathways, and emotional interaction are crucial to the meridian

are measurements of whole-body energy levels (Fig. 7). These readings 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 that 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 put into the measurement circuit by placing them on a metal plate designed for this purpose. The physician tests various reagents, basing the 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.

Medicine testing is perhaps the most controversial aspect of the EDSS, though many also consider it the most promising

[13]. It was discovered and used by Voll in connection with homeopathy, and the effectiveness of the EDSD in testing homeopathic remedies has been demonstrated in clinical studies [14]. Homeopathic remedies serve as particularly useful reagents for medicine testing because they are prepared at various dilutions, which increases the likelihood of finding an appropriate "resonance," a phenomenon which will be discussed in Kuo-Gen Chen's second article. Medicine testing has also been shown effective in the testing of herbal and allopathic medicines [15] and has been used very successfully to test for allergies [16] and for the presence of environmental pathogens such as insecticides. [17] Virtually any sort of biological reagent can be tested in this fashion.

Conclusion

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



7. A four quadrant measurement taken with the EDSD (Department of Physics, Soochow University, Taipei, Taiwan, earlier model). Reprinted from Tsuei JJ. The Past, Present, and Future of the Electrodermal Screening System (EDSS). *Journal of Advancement in Medicine*, 1995; 8(4):217-232.

medical-scientific community, which must be overcome before integration can take place.

The EDST and ESD are outgrowths of the scientific, electro-magnetic understanding of meridian theory. The EDST may appear similar to other modern diagnostic techniques such as MRI, but there are important differences. 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 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 methodology available today.

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