

ACUPUNCTURE POINTS AND MERIDIANS DO NOT EXIST

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Abstract. One of the basic tenets of acupuncture is that needles must be placed at specific sites, known as “acupuncture points.” These points may also be located along certain invisible lines, commonly referred to as “meridians.” However, there is, as yet, no convincing evidence that either acupuncture points or meridians exist as discrete entities. In addition, there are vast differences between the historical location of points and meridians and current practice. Finally, the majority of studies in which “sham” acupuncture controls are used fail to show a difference between control points and “real” points. Accordingly, claims that precise needle placement is important for therapeutic efficacy are suspect.

ACCORDING TO CHINESE TRADITION, ACUPUNCTURE points are specifically chosen sites associated with the manipulation of a “vital force” referred to as *qi*. Under such tradition, acupuncture needles are placed in specific skin surface “points” in accordance with certain theories (yin-yang, five phases, etc.) and according to the training and experience of the acupuncturist. Acupuncture points may reportedly also be used for diagnostic purposes. The term “acupuncture” is used in this paper to connote the insertion of dry needles into the body at specifically chosen sites.

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“Meridian” is a modern term usurped from geography to denote channels along which *qi*—the purported life force—flows. In traditional Chinese practice, these vessels were known as *mai*. The term “meridian” is used in this paper to connote these theoretical pathways.

This report reviews historical and scientific information to determine whether or not there are sufficient data to confirm the existence of acupuncture points and meridians. Historical information was obtained from published translations of original Chinese source material and textbooks of medical history. Scientific information was obtained by MEDLINE search using search terms “acupuncture point,” “meridian,” and “acupuncture meridian,” and from texts on medical and veterinary acupuncture.

ACUPUNCTURE POINTS

Historical evidence

The association of specific body points with internal organs of the body is not uniquely Chinese, nor is it unique to acupuncture. In fact, it is part of the medical historical record of a number of ancient societies. For example, ayurvedic (Indian) tradition recognizes over 100 *marmas*, which are sensitive points to be avoided by surgeons and are considered to be serious when wounded; these points are not used therapeutically.¹ Medieval Arabic medicine also assumes a correlation between internal organs and at least one external point on the body in their tradition of cauterization, as seen in the *Huihui yaofang* (*Muslim Med-*

icinal Recipes), four chapters of which survive in a Ming dynasty copy.

Classical Chinese acupuncture theory originally recognized 365 acupuncture points in people² based on a “cosmological correspondence” between the number of points and the days of the year.^{3,4} Acupuncture points were not shown to be in precise anatomical locations in early texts; this only happened later.⁵

If one defines acupuncture points being associated with the manipulation of *qi* traveling in *mai* (such a definition is generally accepted by historians of Chinese medicine), there is no evidence for classical acupuncture points in animals. While there are illustrations from classical Chinese texts indicating points for the treatment of several domestic species, it is not clear from the texts associated with these illustrations that these points were used for dry needling. Rather, it is possible that these points may represent sites from which blood was let (therapeutic phlebotomy) or at which other therapeutic interventions (e.g., moxibustion or cautery) were applied.

Empirical difficulties

Besides the “original” 365 points in humans, additional acupuncture points and systems have been proposed, ranging from auricular acupuncture, proposed in the 1950s by a French physician, to Korean hand acupuncture, in which approximately 150 discrete points are said to exist on the human hand. The points used in the various systems do not necessarily agree with each other. Felix Mann, a cofounder of the British Acupuncture Society, has concluded that acupuncture points do not exist and has observed that, if modern texts are to be believed, there is no skin left that is not an acupuncture point.⁶ Further muddying the empirical waters is the fact that some types of acupuncture are not employed using a traditional basis. In these approaches, e.g., Western acupuncture, needle placement may not be related to the presence or absence of any anatomical structure or classical acupuncture point.

Similar difficulties exist in assessing animal acupuncture points. Animal acupuncture points have been derived from Chinese point drawings, as well as from transposing one or more “systems” of human acupuncture points onto animal anatomy. Published charts of “traditional” and “transpositional” points in horses have failed to agree on a single point of association.⁷

Histological evidence

No convincing evidence exists that acupuncture points have consistent anatomical features.⁸ Acupuncture points may be located in the vicinity of peripheral nerves, ligaments, or tendons,⁹ however, there is no consistent association with any one specific gross anatomical structure. Several investigators have reported various histological findings at acupuncture points, such as nerve terminals, neurovascular bundles, or mast cell accumulations; however, none of the studies has used statistical evaluation of quantitative histological data.¹⁰

Biochemical evidence

One report, involving data from four dogs, suggests that the concentrations of the neurotransmitter substance *p* is higher in the skin and muscle tissue of acupuncture points of dogs, although not in the subcutis, when these points are compared to control areas.¹¹ Substance *p* is a neurotransmitter associated with the sensation of pain. Repeated measurements of the same four animals were used instead of individual measurements of a large group of animals to obtain these data, and the analysis proceeded as if the data were obtained independently. Furthermore, individual points were not compared in this study.

Skin resistance

While some investigators have asserted that acupuncture points can be identified by decreases in skin resistance, measurement of skin resistance can be confounded by many factors, including the cross-sectional area of the electrode, the amount of pressure applied (skin pressure readily distorts the stratum corneum layer of the epidermis, which contributes over 90% of skin resistance), and the contact time.⁷

The skin resistance of human acupuncture points has been carefully and systematically investigated. Even when variables such as skin condition, electrode pressure, and diurnal variation were minimized, repeated measurements at eight traditional acupuncture points in ten healthy volunteers failed to reveal any significant patterns or correlations, either for opposite sides of individual people or between different individuals.¹²

Correlation with motor points

Motor points are defined as locations where muscles can be stimulated with the smallest amount of electrical current.

To see if there was any relationship between these points and classical acupuncture points, acupuncturists and neurophysiologists independently identified points on a volunteer and marked them with invisible ink. Under UV light examination, 15 of 31 compared points were more than 10 mm apart, leading to the conclusion that acupuncture points and motor points are not synonymous.¹³

Correlation with trigger points

Myofascial “trigger points,” a controversial concept developed in the 1950s independently of acupuncture, are usually defined as localized areas of muscle or connective tissue that are firmer than normal tissue. Palpation of a trigger point is said to cause pain and it is also said to cause pain referred to a specific area, often well away from the trigger point.¹⁴ A relationship between trigger points and acupuncture points has been suggested in humans, and approximately 70% of commonly found trigger points corresponded within 3 cm to the location of acupuncture points used for treating pain in one study.¹⁵ However, the concept of an acupuncture point is clearly broader than that of a trigger point, because acupuncture points are also used for treating conditions other than pain. Furthermore, only a subset of acupuncture point locations coincides with trigger point locations. Finally, the existence of trigger points themselves has been questioned.¹⁶

Functional MRI

Functional MRI is a new technique that attempts to measure brain activity by detecting differences in oxygen delivery to parts of the brain while the subject is undergoing sensory stimulation, either at rest or while performing some task. Recent reports have suggested that acupuncture stimulation caused such differences to be detected in parts of the human limbic system and somatosensory cortex.¹⁷ Unfortunately, such studies have not included sham controls so it is not possible to state that such changes, if they are significant, are specific to acupuncture points. Indeed, increased brain activity in studied areas would be expected from a variety of sensory inputs. The studies have also not shown that the changes ascribed to acupuncture stimulation are specific to the areas of the brain examined.

Clinical evidence

Many clinical studies of acupuncture have used sham controls; that is, control needling has been applied at

“sham” points adjacent to or distant from “real” acupuncture points. In general, when effects of acupuncture are evident, sham acupuncture appears to be almost as active as “real” acupuncture.¹⁸ Needle sensation is not unique to acupuncture points¹⁹ and identical, transient, quick reflex responses of the sympathetic nervous system have been seen whether “real” or “sham” points are needed.²⁰ Similarly, equal therapeutic efficacy has been reported whether “traditional” or “transpositional” points were used in acupuncture treatment of horses.⁶

MERIDIANS

Historical evidence

The earliest known Chinese texts (*Mawangdui*) describe 11 *mai* (vessels), which were described as containing both blood and *qi*. Blood vessels are the obvious original referent of *mai*. The earliest use of the word *mai* is fourth century B.C.E., in a *Zuozhuan* description of a horse: “chaotic vapor, untamed, erupts; dark blood springs forth, coursing; ridges of swollen vessels (*mai*) bulge” (*Zouzhuan*, Xi 15,14.3a).²¹ The term “meridian” was coined in 1939 by a Frenchman.²²

In human acupuncture, meridians have changed in number, name, character, and even position through history. By the late first century B.C.E. (*Huangdi neijing suwen*) the number of vessels had grown to 12. “The transition from the old idea of blood vessels to physiological theory whose main purpose was to explain the movement of vapor in the body directed attention away from the blood vessels *per se* and towards an idealized system. . . .”¹⁹

However, the 12 vessels described in the *Huangdi neijing* follow substantially different courses than the 11 described in the earlier *Mawangdui* texts. The historical waters were further muddied when, in 1993, a lacquer conduit figurine was recovered from a Western Han tomb depicting only 9 *mai*, even though it appears to originate after the treatises describing 11 *mai*. Moreover, 2 of the *mai* etched on the figurine are ones that the earlier treatises fail to discuss.²³ In the 18th century, a Chinese medical philosopher lamented the loss of the “original” human conduits.²⁴

Equine acupuncture meridians date only to the 1970s and were apparently invented at the insistence of Western practitioners.²⁵ Since then, various authors have “discovered” meridians in cattle, pigs, dogs, cats, and various other species, mostly by transposition from one of many human charts (this explains why horses ap-

parently have a gall bladder meridian, although they lack a gall bladder).²⁶ Some modern practitioners of veterinary acupuncture question the existence of acupuncture meridians in the horse,²⁷ as do some practitioners of acupuncture in humans.⁴

Empirical evidence

Attempting to define the number of acupuncture meridians leads one to the conclusion that if they exist, there is no consensus as to the "correct" number. In humans, if one includes the historical record, it is possible to find reference to 9, 11, 12, 14, 20, or 36 meridians, along with numerous submeridians, traveling along divergent and often unrelated paths.

Histological evidence

In humans, meridians have been examined for their correspondence with nerves, blood, and lymphatic vessels.²⁸ It is difficult to assess these reports, because they include minimal detail. It appears that points are occasionally linked by the same nerve or the same blood vessel or, less likely, the same lymphatic channel. However, no channel studied has ever completely correlated with any of these 3 structures.²⁹

Electrical resistance

One investigation concluded that the electrical resistance along one meridian in the human arm was less than that which was found between nonacupuncture points;³⁰ however, such investigations would be subject to the same problems that beset determination of acupuncture points by that methodology.

Radiotracer studies

There have been at least 3 attempts to validate the concept of meridians using radiotracer injections. Early investigators concluded that an injected radiotracer was cleared by nonlymphatic and nonvenous pathways and suggested that this demonstrated the existence of acupuncture meridians. However, a subsequent attempt to replicate this finding was unsuccessful and the authors concluded that the radiotracer was removed along normal venous pathways.³¹ A third investigation concluded that technetium uptake was faster from certain acupuncture points than from nonpoints, but that thereafter it was removed by the venous system.³²

Radiation

Insertion of acupuncture needles may cause radiation of needle sensation in humans away from the point of insertion. However, this radiation of sensation does not generally correspond to the discrete paths of the postulated meridians.⁴ Furthermore, such sensations appear to be quite variable, occurring more typically in certain regions of the body and in response to certain needle techniques.³² Injection of local anesthetics into deep structures, but not subcutaneously under acupuncture points, blocks this sensation³³ and direct nerve recording experiments in humans show that the sensation of radiation results from direct activation of primary afferent nerve fibers.³⁴ While these and other studies fairly conclusively demonstrate that it is the nervous system, and not changes in *qi* flow through meridians, that result in the acupuncture sensations reported in humans, it is still interesting to speculate whether such sensations contributed to the development of the idea of meridians. Obviously, radiation of sensations can be neither confirmed nor denied in animals.

Thermography, ultrasonography, magnetism, light, heat

Some investigators have claimed that temperature changes on the surface of the body are a reflection of meridians.³⁵ Others have claimed that a variety of modalities, including ultrasound, magnetism, and light, have demonstrated variations between meridians and other areas.³⁶ Such experiments are difficult to assess because the details provided are generally sketchy and the investigations are rarely conducted under rigorous, well-controlled conditions.³⁷ At the very least, reports that meridians can be reliably located by some physical means require replication.

CONCLUSION

Research on the nature of acupuncture points and meridians is often difficult to evaluate because of the diverse nature of the claims made, incomplete data provided in published studies and the variety of parameters involved in the assessment of these claims. Many of the studies purporting to have identified acupuncture points or meridians come from China; the role of publication bias in Chinese literature needs to be considered in light of the fact that no trial published in China from 1966 through 1995 found a test treatment to be ineffective.³⁸ Obvious contradictions exist between current acupunc-

ture practice and the historical record, as well as on the “correct” number of points and meridians reported by current practitioners of acupuncture. From a pragmatic standpoint, one might surmise that if such structures did exist and could be reliably demonstrated, they would revolutionize the study of anatomy and physiology; no such revolutions have yet been forthcoming. Nevertheless, whatever the clinical efficacy of needling, there is, as yet, no compelling evidence to show that acupuncture points or meridians exist as discrete entities.³⁹

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IN BRIEF

Manufacturer of Dietary Supplement “Liverite” Agrees to Settle FTC Charges: Must Have Scientific Evidence for Future Claims

Liverite Products, Inc., based in Tustin, California; Corinne and Steven Jacobson; and James and Sheri Grant agreed to settle Federal Trade Commission charges that they made numerous unsubstantiated claims in Internet, radio, and print ads about the ability of “Liverite” dietary supplement products to treat or prevent a wide range of liver diseases and disorders, including cirrhosis and hepatitis. In an agreement to settle the charges, Liverite Products, Inc. and its principals will be required to pay \$60 000 in redress, and all of the defendants will be prohibited from claiming that the Liverite products or any food, drug, or dietary supplement treats, cures, or prevents any disease or disorder, unless they have scientific evidence to support the claims.

According to the FTC’s complaint, defendants Corinne and Steven Jacobson direct and control Liverite Products, and defendants James and Sheri Grant developed the Web sites through which the Liverite products were advertised and sold. The Liverite products included: Liverite, the Ultimate Liver Aid; Liverite 3-in-1 for Men; Liverite 3-in-1 for Women; and Liverite Sports. The primary ingredient in each of these products was extract of beef liver. The products were sold at retail outlets, by telephone, and on the Internet at “liverite.com,” “liveriteproducts.com,” and “healthylife-marketing.com.”

According to the FTC’s complaint, the defendants’ advertisements represented that Liverite can prevent and treat hangovers; prevent and treat alcohol-induced liver disease, including cirrhosis; treat liver diseases, including cirrhosis and hepatitis; and alleviate the toxic side effects of various drugs. The FTC complaint alleges that these representations were not supported by competent and reliable scientific evidence. The complaint further alleges that the defendants falsely claimed that

clinical tests proved that Liverite is effective for the treatment of liver problems.

In addition to the unsubstantiated claims, the defendants also used “metatag” technology to deceive customers. Metatags are keywords embedded in the source code for a Web page that are invisible to the average user, but are used by search engines to respond to search requests. The complaint alleges that the defendants embedded in the metatags of the Liverite Web sites terms such as “AIDS,” “hepatitis A, B, and C,” “liver problems,” “liver disease,” “liver detoxification,” “alcohol,” “hangover,” “cirrhosis,” “anabolic steroids,” “interferon,” and “hepatotoxicity,” thereby increasing the likelihood that consumers who researched these topics on the Internet would be directed to the defendants’ Web sites.

The proposed final order, which requires the court’s approval, will require the defendants to have scientific substantiation for claims that Liverite or any food, drug, or dietary supplement can treat, cure, alleviate the symptoms of, prevent, or reduce the risk of developing any disease or disorder. In addition, the defendants cannot claim that any Liverite product is “the ultimate liver aid” unless the claim is scientifically substantiated. The defendants also will be prohibited from misrepresenting the results of any test or study, and will be prohibited from representing that any testimonial or endorsement is the typical or ordinary experience of users of the advertised product, unless the claim is substantiated. Finally, the order requires Liverite Products, Inc. and the Jacobsons to pay \$60 000.

The order would allow the defendants to make any claims that are approved for labeling by the Food and Drug Administration. The order also includes various record-keeping and reporting requirements to help the FTC monitor the defendants’ compliance with the order.