

Electrodermal Measurement of Acupuncture Points May Be a Diagnostic Tool for Respiratory Conditions: A Retrospective Chart Review

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ABSTRACT

Background: Acupuncture has been practiced widely by thousands of practitioners for treating various health conditions. Clinical and basic science research has provided a substantial body of evidence showing that acupuncture has measurable and reproducible effects with regard to a variety of physiologic actions. Several independent studies also suggest that the skin of acupuncture points has unique electrical characteristics. The change in electrical properties of acupuncture points is correlated to certain clinical conditions.

Objective: This study provided an overview of Electroacupuncture According to Voll (EAV), an electrodermal diagnostic system that originated from Chinese acupuncture, but with its own unique meridian system. EAV and Chinese meridian systems were compared for their nomenclature and major point locations. In addition, a clinical analysis is presented to show a correlation of respiratory symptoms with EAV measurements.

Materials and Methods: This study was a 60-case retrospective analysis of 50 patients with respiratory symptoms and 10 control patients without the symptoms. Electrodermal measurements of EAV Lung and Lymphatic meridians and the correlations to specific respiratory symptoms were analyzed.

Results: The change in electrodermal impedance of acupuncture points was significantly associated with the subjects with respiratory symptoms but not with the controls. Electrodermal changes are also meridian-specific: The change in the Lung meridian is specifically correlated to Lung-related symptoms but not to Lymphatic-related symptoms, and vice versa.

Conclusions: This 60-case retrospective study showed that acupuncture points might have diagnostic properties. EAV meridian measurement may help clinicians diagnose diseases and improve clinical outcomes. To assess the clinical application and physiologic basis of EAV electrodermal testing further, additional clinical and mechanistic studies are warranted.

Key Words: Electrodermal, Electroacupuncture According to Voll, EAV, Skin Impedance, Meridian, Acupuncture

INTRODUCTION

ACUPUNCTURE HAS BEEN PRACTICED widely by thousands of practitioners for treating various health conditions in the United States.^{1,2} Clinical and basic science research has provided a substantial body of evidence showing that acupuncture has measurable and reproducible

effects with regard to a variety of physiologic actions.^{3,4} In addition to the therapeutic effect of acupuncture, detection and monitoring electrical properties of acupuncture points were reported several decades ago by Voll,^{5,6} Nakatani,⁷ and Niboyet.⁸ These independent studies suggested that the skin of acupuncture points show unique electrical characteristics. However, because of the technical and methodological

shortcomings involved, the scientific community had not expressed strong interest until several more-recent publications emerged.^{9–15}

Three lines of scientific evidence reviewed by Colbert et al.¹⁰ included the following conclusions: (1) acupuncture points and meridians show lower electrical skin resistance and higher capacitance than surrounding tissue. (2) Higher or lower resistance of specific acupuncture points is correlated to certain clinical diseases. (3) Clinical and laboratory data show that experimentally induced physiologic dysfunction and subsequent recovery correlates with an increased or decreased electrical impedance at relevant acupuncture points. This research suggested that electrical skin impedance of acupuncture points is electrically distinct from non-acupuncture points and that changes in skin impedance of acupuncture points might be significant for diagnostic, therapeutic, and research purposes.

Among the electrodermal impedance studies, only Voll^{5,6} provided a complete hypothetical model system, also known as Electroacupuncture According to Voll (EAV). EAV combines Chinese meridians with Voll's own experience and names EAV meridians with Western physiologic nomenclature. EAV is primarily a diagnostic system that is contrary to the Chinese therapeutic one. The differences between these two systems have not been studied closely. It would be also interesting to know if EAV, a diagnostic system, showed a better correlation to clinical outcomes than Chinese meridians, which comprise a therapeutic system.

This article reviews EAV theory and compares the two meridian systems. A 60-case retrospective study of EAV electrodermal testing for patients with respiratory symptoms is presented. Correlation between EAV testing for the Lung and Lymphatic meridians and associated clinical symptoms is analyzed. This article serves two purposes: (1) The article introduces the EAV meridian system to both conventional and holistic medicine proponents. (2) The article might gain the attention of medical researchers and clinicians so that they would study the diagnostic properties of acupuncture points further and use this technique to improve clinical outcomes.

ELECTROACUPUNCTURE ACCORDING TO VOLL

A Brief History

According to Sails¹⁶ Reinhold Voll, MD (1909–1989 AD), was born in Berlin on February 17, 1909. He was the son of an architect. Voll practiced preventive medicine in Southern Germany, starting in 1943, and was diagnosed with terminal bladder cancer without any hope of a cure from Western medicine. He was able to cure himself with acupuncture. Starting in the 1950s, acupuncture became the focus of his medical career. During his struggle to integrate meridian

theory with his Western medical knowledge, he found that there were differences in electrical resistance that could be measured on the surface of the skin at acupuncture points with a modified galvanometer. In 1953, the first electrodermal testing instrument was developed; it was called a Dermatron. After years of study, he developed his own system—EAV—and published his research in 1975.⁵

Instruments and Meridian Testing

The core of an EAV device is an ohmmeter with a battery that delivers 6–12 μA of direct current at 1–1.25 volts (V).^{16,17} Basic components of an EAV device, shown in Figure 1, include the core machine with a testing plate on top, a probe, a metallic hand electrode, and a computer connected to the machine. During a typical EAV session, a patient holds the metallic hand electrode, which is connected by a wire to the negative port of the machine. At the same time, the practitioner completes the electrical circuit by pressing against the patient's acupuncture point of interest with the handheld probe, which is connected to the positive port. The probe relays μV electrical information from the acupuncture point to the machine, where it is displayed on a type of voltmeter readout. The patient does not feel any electrical shock because of the extremely low voltage involved.^{18,19} Modern EAV devices are always equipped with a computer that connects to the machine through its serial or USB port to display, print, and store testing results.

Based on years of research, Voll established certain levels of electrical norms for acupuncture points. The ideal reading would be at 50, with a normal range between 45 and 55 on a scale of 0–100 (Fig. 2). The direction of electrical deviation from the normal range can have important implications about the nature of the underlying problem of the body. For

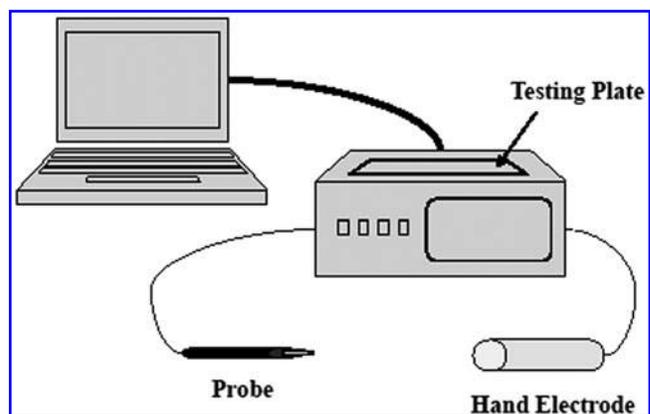


FIG. 1. Typical Electroacupuncture According to Voll (EAV) equipment. EAV instrument consists of an ohmmeter with a metal plate on top, a metallic hand electrode and a probe. The metal plate, hand electrode and probe are labeled. Modern EAV instrument is equipped with a computer for advanced testing programs, data storage and processing, and testing result display and printing.

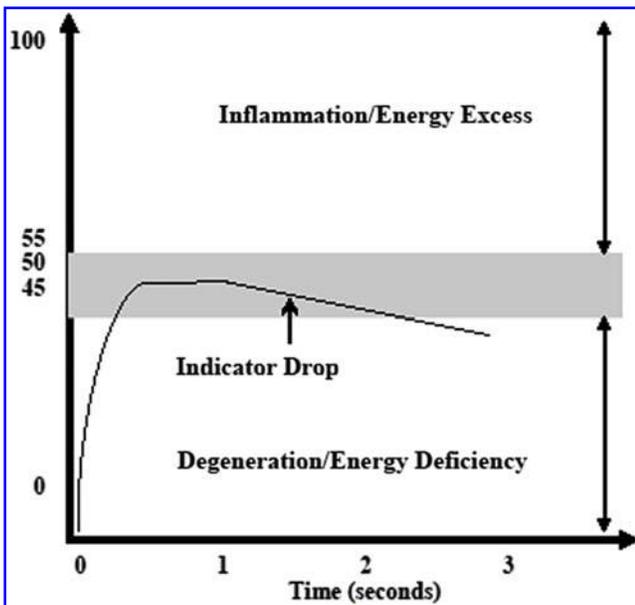


FIG. 2. Electroacupuncture According to Voll (EAV) testing range and physiologic implications. EAV testing uses an arbitrary scale of 1–100 with a normal range of 45–55. Abnormal readings are either above 55 or below 45 indicate, as labeled in the figure. Readings in the higher-than-normal range indicate inflammation/energy Excess status, while readings in the lower-than-normal range suggest degeneration/energy Deficiency status. The Indicator drop, which indicates a serious physical condition, is also labeled.

example, a reading that is lower than normal may be caused by degenerative disease or energy Deficiency. Conversely, higher-than-normal readings can be an indication of underlying inflammatory process or infection, an energy Excess condition.¹⁹ Another parameter of EAV testing is the indicator drop, a gradual fall in the original reading. When an ID is present, whether or not the initial reading was normal or not, the ID is considered to provide the most important information as an indicator of disease.¹⁷

Measurement Points and Physiologic Correlation

During his lifelong search to identify correlations between disease states and changes in the electrical impedance of the various acupuncture points, Voll successfully identified many acupuncture points related to specific conditions and published much information about using acupuncture points as diagnostic windows.⁵ The biggest discovery of EAV is to correlate acupuncture points to physiologic functions of specific organs, systems, and tissue types. Until Voll, these points had been mainly used for therapeutic purposes.

There are 850 EAV measurement points (MPs) on the body's surface. Voll used the term *measurement points* instead of acupuncture points because of the differences between the two systems. Most of the clinical measurements

are done using the MPs along the 40 EAV meridians on the hands and feet; the MPs are generally located between the diaphysis and capitulum of the phalanx, metacarpal, or metatarsal bones. In each EAV meridian, there is one control measurement point (CMP), which is the major point representing the whole meridian. There are also many branch points along the meridian that help in pinpointing the exact location of the abnormal function of that meridian system.¹⁷ For example, along the two Lymphatic meridians, in addition to the CMPs, there are throat, jaw, nose, and sinus branch MPs. By combining readings from different branch MPs, a more complete diagnostic profile becomes possible. EAV meridians and their CMPs with main branch MPs are listed in Table 1 and shown in Figure 3.²⁰

EAV and Chinese Meridians

Although the “blueprint” of the EAV system is Chinese meridian theory, Voll discovered many additional meridians, MPs, and new functions of existing points. His MPs on existing Chinese meridians are not always the same as the Chinese acupuncture points. His new meridians are Lymphatic System, Nervous System, Circulation, Allergy, Cellular Metabolism, Joints, Fibroid Tissue, Skin, and Fatty Tissue. There is one EAV meridian on each side of each finger and toe. That accounts for 20 EAV meridians on either side of the body, compared to 12 Chinese meridians. The comparison of EAV and Chinese meridian systems is listed in Table 2.

It is interesting to notice that the EAV Lymphatic meridian coincides with the Chinese Lung meridian except the end point, while the new EAV Lung meridian is located on the other side of the thumb (Fig. 4). The Pericardium meridian starts from the center of the middle finger, while the Circulation and Allergy Meridians of EAV start either side of the middle finger. The Chinese Spleen meridian starts from the tibial side of the big toe on both feet, while EAV renamed the meridian on the right foot the Pancreas meridian and the one on the left remained as the Spleen. The Chinese Kidney meridian originates on the sole of the foot, while the EAV Kidney starts from the tibial side of the 5th toe. Newly proposed EAV meridians are the Cellular Metabolism, Joints, Fibroid Tissue, Skin, and Fatty Tissue.

The Physiologic Basis of EAV Testing

It is believed that the physiology behind EAV testing is the galvanic skin response (GRS),²¹ also known as electrodermal activity^{22,23} and as the sympathetic skin response (SSR), which is an electrophysiologic test to evaluate sympathetic activity. SSR represents an electrical potential generated in skin sweat glands.²⁴ It originates by activation of the SSR reflex arch evoked by a variety of internal or externally applied arousal stimuli. The effectors of the reflex arch and the probable generators of potential change are activated eccrine sweat glands with cholinergic mediation.²⁵

TABLE 1. LOCATION AND PHYSIOLOGIC ASSOCIATION OF EAV MP ON HAND AND FOOT

<i>Point ID</i>	<i>Point association</i>	<i>Point location</i>
LY-1	Throat and Tonsil Lymph MP	Distal diaphyseal end of the ungula phalanx of the thumb on its radial side (dorsal aspect of the hand)
LY-1-1	Auricular Lymph MP	Proximal diaphyseal end of the distal phalanx of the thumb on its radial side (dorsal aspect of the hand)
LY-1-2*	Lymph CMP	Distal diaphyseal end of the proximal phalanx of the thumb on its radial side
LY-2	Upper and Lower Jaw Lymph MP	Distal diaphyseal end of the 1st metacarpal bone on its radial side
LY-3	Nose and Paranasal Sinus Lymph MP	Proximal diaphyseal end of the 1st metacarpal bone on its radial side
CV-1*	Conception Vessel CMP	Between the fourth and fifth metatarsal proximal 1 cm distal from the web of the hand
LU-10c*	Lower Respiratory Passages Lung meridian CMP	Distal diaphyseal end of the basal (proximal) phalanx of the thumb on its ulnar side (dorsal aspect of the hand)
LI-1b*	Large Intestine meridian CMP	Proximal diaphyseal end of the middle phalanx of the 2nd finger on its radial side (dorsal aspect of the hand)
NE-1b*	Neural Degeneration Vessel, Peripheral and Central Nervous System CMP	Proximal diaphyseal end of the middle phalanx of the second finger on its ulnar side (dorsal aspect of the hand)
CI-8d*	Arterial, venous and lymphatic Vascular System Circulation meridian CMP	Proximal diaphyseal end of the middle phalanx of the 3rd finger on its radial side (dorsal aspect of the hand)
AL-1	Allergy and Vascular Degeneration, Lower Portions of the Body Vessel, Allergy meridian MP	Distal diaphyseal end of the ungula phalanx of the 3rd finger on its ulnar side (dorsal aspect of the hand)
AL-1b*	Allergy meridian CMP, Vascular Degeneration Point	Proximal diaphyseal end of the middle phalanx of the 3rd finger on its ulnar side (dorsal aspect of the hand)
OR-1b*	Cellular Metabolism CMP Parenchymal and Epithelial Degeneration Vessel, Organic Degeneration in the Entire Body	Proximal diaphyseal end of the middle phalanx of the 4th finger on its radial side (dorsal aspect of the hand)
TW-1	Gonad and Adrenal Glands, Triple-Warmer Vessel, Adrenal Gland MP	Distal diaphyseal end of the ungula phalanx of the 4th finger on its ulnar side (dorsal aspect of the hand)
TW-1b*	Triple-Warmer meridian Endocrine System CMP	Proximal diaphyseal end of the middle phalanx of the 4th finger on its ulnar side (dorsal aspect of the hand)
TW-2	Thymus, Thyroid, Parathyroid Glands MP, Triple-Warmer meridian	Distal diaphyseal end of the 4th metacarpal bone on its ulnar side (dorsal aspect of the hand)
TW-3	Pineal and Pituitary Glands MP, Triple-Warmer meridian	Proximal diaphyseal end of the 4th metacarpal bone on its ulnar side (dorsal aspect of the hand)
HE-8c*	Heart meridian CMP	Distal diaphyseal end of the proximal phalanx of the 5th finger on its radial side (dorsal aspect of the hand)

(continued)

TABLE 1. (CONTINUED)

<i>Point ID</i>	<i>Point association</i>	<i>Point location</i>
SI-1b*	Small Intestine meridian CMP <i>Right Point:</i> Superior, Descending, and Horizontal Duodenum, and the terminal portion of the Ileum <i>Left Point:</i> Ascending part of the Duodenum, Duodenojejunal Flexure, Jejunum and left portion of the Ileum	Proximal diaphyseal end of the middle phalanx of the 5th finger on its ulnar side
SI-3*	Governing Vessel CMP	Distal diaphyseal end of the 5th metacarpal bone on its ulnar side
SP-1a*	Spleen meridian CMP	Proximal diaphyseal end of the distal phalanx of the big toe on its tibial aspect; left foot only
PA-1a*	Pancreas meridian CMP; Exocrine and Endocrine Function of the Pancreas	Proximal diaphyseal end of the distal phalanx of the big toe of its tibial side; right foot only
LV-1a*	Liver meridian CMP	Proximal diaphyseal end of the distal phalanx of the big toe of its fibular side
JO-1b*	Joint meridian CMP, All Joints including Spine	Proximal diaphyseal end of the middle phalanx of the 2nd toe on its tibial side
ST-44b*	Stomach meridian CMP	Proximal diaphyseal end of the middle phalanx of the 2nd toe on its fibular side
FI-1b*	Fibroid and Connective Tissue CMP, Fibroid Degeneration Vessel, Benign fibroid tumors, adenomas, angiomas, fibromas, fibroadenomas, lymphangiomas	Proximal diaphyseal end of the middle phalanx of the 3rd toe on its tibial side
SK-1-3*	Skin meridian CMP	Proximal diaphyseal end of the middle phalanx of the 3rd toe on its fibular side
FA-1b*	Fatty Tissue CMP, Fatty Degeneration Vessel	Proximal diaphyseal end of the middle phalanx of the 4th toe on its tibial side
GB-43b*	Gallbladder meridian CMP <i>Right Point:</i> Biliary Ducts <i>Left Point:</i> Gallbladder	Proximal diaphyseal end of the middle phalanx of the 4th toe on its fibular side
KI-1-3*	Kidney meridian CMP, Kidney and Ureter	Proximal diaphyseal end of the middle phalanx of the 5th toe on its tibial side
UB-66b*	Urinary Bladder meridian CMP, Urinary Bladder and Genitourinary Organs	Proximal diaphyseal end of the middle phalanx of the 5th toe on its fibular side
UB-65	Uterus/Prostate Summation MP, Prostate, Seminal Vesicle, Seminal Hillock, Penis and Urethra in males or Uterus, Broad Ligament, Parametrium, Vagina and Urethra in females	Distal diaphyseal end of the 5th metatarsal bone on its fibular side

EAV, Electroacupuncture According to Voll; MP, measurement point; ID, indicator drop; CMP, control measurement point.

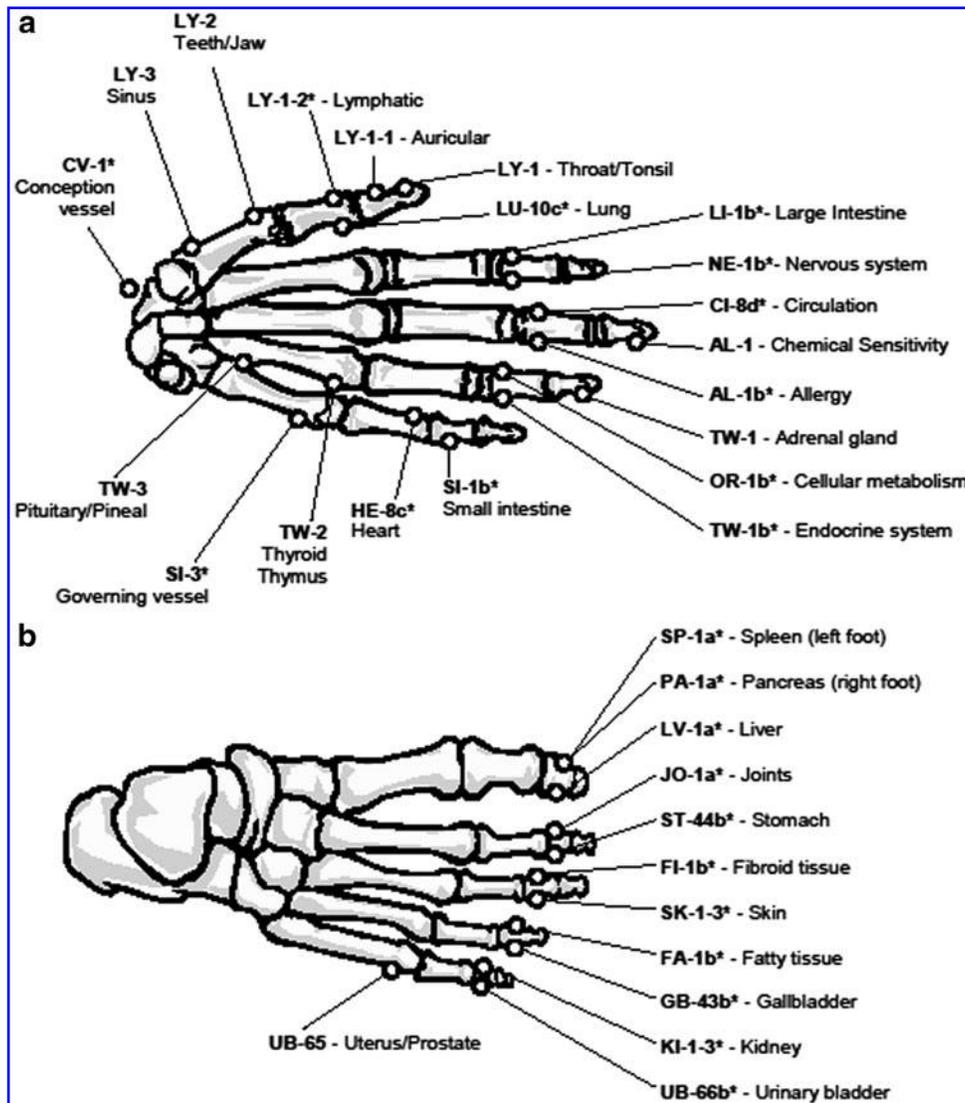


FIG. 3. Electroacupuncture According to Voll (EAV) measurement points on the hand and foot. Major EAV measurement points (MPs) on the hand (a) and foot (b) are illustrated. Meridian names, abbreviations, and MPs are labeled.

SSR can be evoked by different types of stimuli, including electrical stimulation of a peripheral nerve in the extremity,²⁶ magnetic stimulation of the spine,²⁷ and a clicking sound delivered via binaural earphones.²⁸ Electrical skin response is recorded with electrodes on the palm and the sole. The shape, latency, and amplitude of the waveform can be analyzed and used to evaluate sympathetic function in diagnosis of autonomic functional disorders, such as neuropathy,²⁹ carpal tunnel syndrome,³⁰ Parkinson's disease,³¹ Huntington's disease,³² and erectile dysfunctions.³³ SSR recording is considered to be a simple and realizable technique to evaluate the sympathetic response using standard electromyographic instrumentation.

The sympathetic nervous system is responsible for up- and downregulating many homeostatic mechanisms in liv-

ing organisms. Fibers from the SNS innervate tissues in almost every organ, system, and tissue type. Thus, it is reasonable to believe that SSR evaluation may also reflect homeostasis of each associated organ, system, and tissue type. Voll was the first person who associated SSR/GRS technology with acupuncture points. Although this needs to be studied further, the biophysical property of SSR can be a perfect way to evaluate the functional status of associated organs and systems as well as the meridian system, the pathway of Qi in the body.

MATERIALS AND METHODS

This study was conducted to analyze clinical records from an active holistic medicine clinic. Patient history and

TABLE 2. COMPARISON BETWEEN EAV AND CHINESE MERIDIANS

HAND			
Fingers		EAV meridian	Chinese meridian
Thumb	Radial	Lymphatic (LY)	Lung ^a
	Ulnar	Lung (LU)	
Index finger	Radial	Large Intestine (LI)	Large Intestine
	Ulnar	Nervous System (NE)	
Middle finger	Radial	Circulation (CI)	Pericardium ^b
	Ulnar	Allergy (AL)	
Ring finger	Radial	Cellular Metabolism (OR)	
	Ulnar	Endocrine System (TW)	Triple Warmer
Little finger	Radial	Heart (HE)	Heart
	Ulnar	Small Intestine (SI)	Small Intestine
FOOT			
Toes		EAV meridian	Chinese Meridian
Big toe	Tibial	Pancreas (PA, right), Spleen (SP, left)	Spleen
	Fibular	Liver (LV)	Liver
2nd toe	Tibial	Joints (JO)	
	Fibular	Stomach (ST)	Stomach
3rd toe	Tibial	Fibroid Tissue (FI)	
	Fibular	Skin (SK)	
4th toe	Tibial	Fatty Tissue (FA)	
	Fibular	Gallbladder (GB)	Gallbladder
5th toe	Tibial	Kidney (KI)	Kidney ^c
	Fibular	Urinary Bladder (UB)	Urinary Bladder

^aRelationship of Chinese Lung and EAV Lymph meridian is shown in details of Figure 4.

^bChinese Pericardium meridian ends at the center of the middle finger, while EAV Circulation and Allergy meridians start from either side of the middle finger.

^cChinese Kidney meridian originates on the sole of each foot. EAV, Electroacupuncture According to Voll.

symptoms were collected before EAV testing was conducted by 1 experienced practitioner in a common clinical setting. Data from 60 cases (19 males and 41 females, ages: 3–91) were collected and analyzed. Among the 60 cases, 50 had diagnoses of common cold, flu, asthma, sinusitis, allergy, and bronchitis; these patients comprised the symptom group, while 10 patients without respiratory symptoms comprised a control group. Recorded respiratory symptoms included wheezing, chest tightness, shortness of breath, sore throat, running nose, postnasal drip, and sinus congestion.

According to EAV theory, the symptoms of wheezing, chest tightness, and shortness of breath are the signs of disturbance of the Lung meridian, while sore throat, running

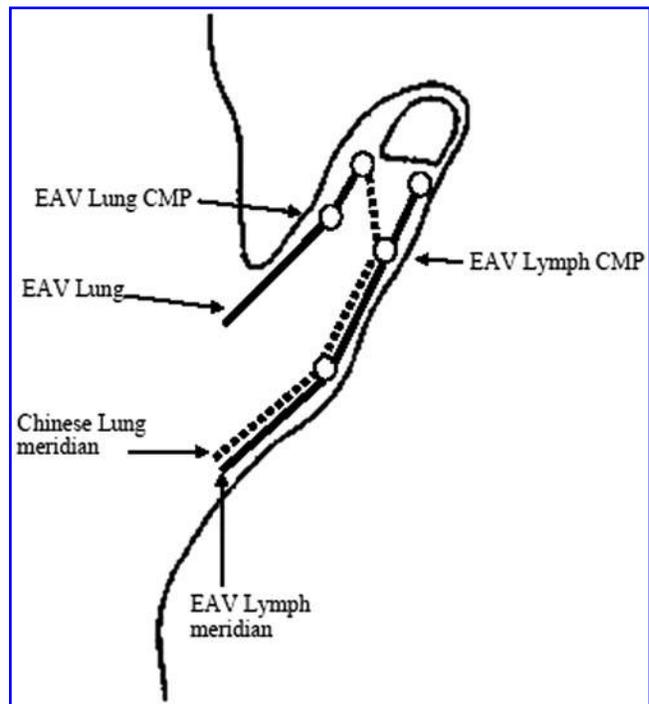


FIG. 4. Comparison of Electroacupuncture According to Voll (EAV) and Chinese systems for Lymph and Lung meridians. EAV Lymph and Lung meridians with major control measurement points are shown in solid line and labeled. The Chinese Lung meridian is shown with a dotted line.

nose, postnasal drip, and sinus congestion comprise interruption of the Lymphatic meridian. Cough is another common respiratory symptom, but it can be a result of either Lung or Lymphatic issues. Thus, cough as a symptom, because of its nonspecific nature, was not included in this study. Subjects and group classifications are shown in Table 3. Pattern Differentiation (PD) from Chinese medicine for the symptom group varies from the Wind-Heat, Mucus-Dampness, and Fire in the Lung, to Deficiency of the Lung Qi and Yin.

EAV MPs were tested with a computerized EAV instrument (MSAS Professional with a software version 1.45, made by the Biomeridian Corporation, UT). Testing technique and protocol were followed according to manufacturer's standard. Although the patients were tested for most of the EAV MPs to generate a complete meridian profile of the body, the readings of only two CMPs, LU10c*R and LY-1-2*R, were collected and analyzed. According to EAV theory, testing results were recorded as normal with a value between 45 and 55 (including 45 and 55), and as abnormal with a value either below 45 or above 55. To analyze the testing results, an arbitrary index was created, the Arbitrary Measurement Value (AMV). AMV is the absolute value of EAV testing (E) subtracting 50:

$$AMV = |E - 50|$$

A value of 5 and below is within the normal range, while 6 and above indicates an abnormal reading. AMV was

TABLE 3. SUBJECTS AND GROUP CLASSIFICATIONS^a

Symptom group (n=50) Wheezing, chest tightness, short of breath, sinus congestion, running nose, sore throat, and postnasal drip		Control group (n=10) No symptoms
Lung symptom group ^b (n=18) Wheezing, chest tightness and short of breath	Lymphatic symptom group ^c (n=46) Sinus congestion, running nose, sore throat and postnasal drip	—
Lung without Lymphatic symptom group (n=4)	Lymphatic without Lung symptom group (n=32)	

^aTotal analyzed subjects: (N=60, 19 males and 41 females, age from 3 to 91).

^bSubjects with EAV Lung-related symptoms, who may also have Lymphatic symptoms.

^cSubjects with EAV Lymphatic-related symptoms, who may also have Lung symptoms.

designed only for statistical analysis for the study. Statistical analyses, such as the mean, standard deviation (SD), and a paired *t*-test were performed using Microsoft Excel, version 2010.

RESULTS

A comparison of LU-10c*R and LY-1-2*R testing for symptom group and control group is shown in Figure 5. The means of AMV \pm the SD of LU-10c*R and LY-1-2*R for both the symptom group (*n*=50) and the control group (*n*=10) are plotted in a bar graph. There is a significant effect for the AMV of LU-10c*R, $t(25)=2.84$, $P<0.01$, as well as

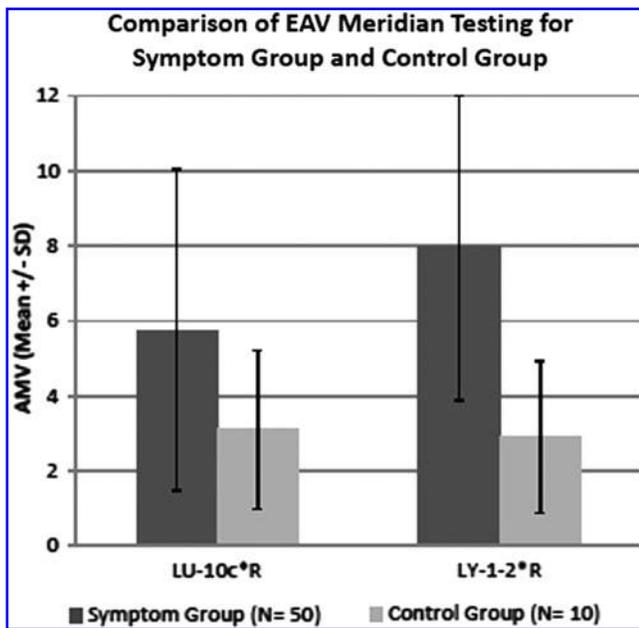


FIG. 5. Comparison of Electroacupuncture According to Voll (EAV) meridian testing for symptom group and control group. Patients with respiratory symptoms (*n*=50) and control group (*n*=10) with EAV testing of the two control measurement points, LU-10c*R and LY-1-2*R, for Lung and Lymphatic meridians, respectively, were analyzed. The means of the Arbitrary Measurement Value \pm standard deviation for LU-10c*R and LY-1-2*R are plotted in a bar graph.

the AMV of LY-1-2*R, $t(25)=5.69$, $P<0.001$, with the symptom group having higher scores than the control group. This indicates that symptom group showed a significantly higher AMV than the control group, with both the LU-10c*R and LY-1-2*R points. The result indicated that the higher AMV value of LU-10c*R was correlated with the patients with Lung-related symptoms (wheezing, chest tightness, and shortness of breath) but not with the control patients; while the higher AMV value of the LY-1-2*R was correlated with the patients with Lymph-related symptoms (sore throat, running nose, postnasal drip, and sinus congestion) but not with the control patients. This suggests that EAV testing for the LU-10c*R and LY-1-2*R points may correlate with Lung and Lymphatic- respiratory diseases, respectively.

Correlations of LU-10c*R and LY-1-2*R testing with Lung or Lymphatic symptoms are shown in Figure 6. The means of the AMV \pm the SD for LU-10c*R and LY-1-2*R are plotted in a bar graph. The testing for the Lung symptom group (*n*=18) and the Lung without Lymphatic symptom group (*n*=4) are shown in Figure 6 A. The Lymphatic symptom group (*n*=46) and the Lymphatic without Lung symptom group (*n*=32) are shown in Figure 6 B. There was a significant effect for the Lung symptom group, $t(32)=3.85$, $P<0.001$, and the Lung without Lymphatic symptom group, $t(3)=5.74$, $P<0.05$, with LU-10c*R having a higher reading than LY-1-2*R. This indicated that Lung symptoms correlated significantly with a higher LU-10c*R reading. There was also a significant effect for the Lymphatic symptom group, $t(89)=3.71$, $P<0.001$, and the Lymphatic without Lung symptom group, $t(31)=5.78$, $P<0.001$, with LY-1-2*R having a higher reading than LU-10c*R. This indicated that Lymphatic symptoms correlated significantly with the higher LY-1-2*R reading.

These results correlated patients with Lung and Lymphatic symptoms to higher AMVs for LU-10c*R and LY-1-2*R, respectively, but did not correlate for the control patients. It also suggested that EAV testing for LU-10c*R and LY-1-2*R points is useful for diagnosing Lung and Lymphatic respiratory conditions, respectively.

To study the specificity of the EAV testing further (e.g., if the positive LU-10c*R [AMV >5] was only associated with the corresponding Lung symptoms but not with the Lymph

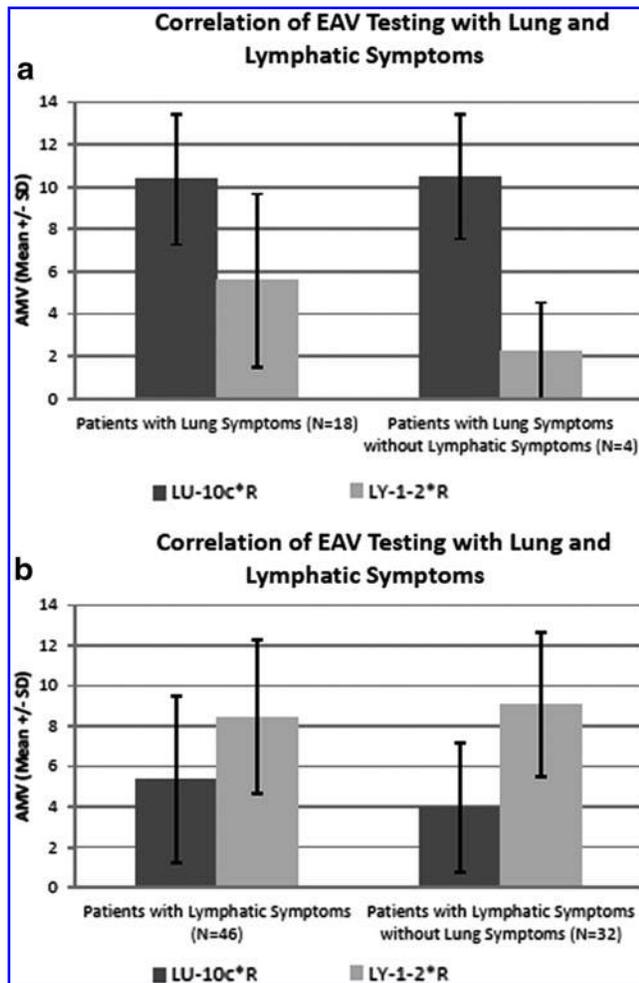


FIG. 6. Correlation of Electroacupuncture According to Voll (EAV) testing with lung and lymphatic symptoms. The means of the Arbitrary Measurement Value \pm standard deviation for LU-10c*R and LY-1-2*R are plotted in a bar graph. The testing for Lung symptom group ($n=18$) and the Lung without Lymphatic symptom group ($n=4$) is shown in (a); the testing for the Lymphatic symptom group ($n=46$) and the Lymphatic without Lung symptom group ($n=32$) is shown in (b).

symptoms and vice versa) the correlation of the positive LU-10c*R and LY-1-2*R with their corresponding symptoms was analyzed, as shown in Figure 7. Twenty subjects ($n=20$) with positive LU-10c*R readings (AMV >5) are plotted in Figure 7A, with 17 of the subjects (85%) showing Lung symptoms and only 3 subjects (15%) not showing Lung symptoms. Thirty nine subjects ($n=39$) with positive LY-1-2*R readings (AMV >5) are plotted in Figure 7B, with 38 of subjects (97%) showing Lymphatic symptoms and only 1 subject (3%) not showing Lymphatic symptoms. This indicated that a positive LU-10c*R reading significantly correlated with Lung symptoms, while a positive LY-1-2*R reading significantly correlated with Lymphatic symptoms. The subjects with positive LU-10c*R and LY-1-2*R readings but no corresponding symptoms might have had energetic blockages

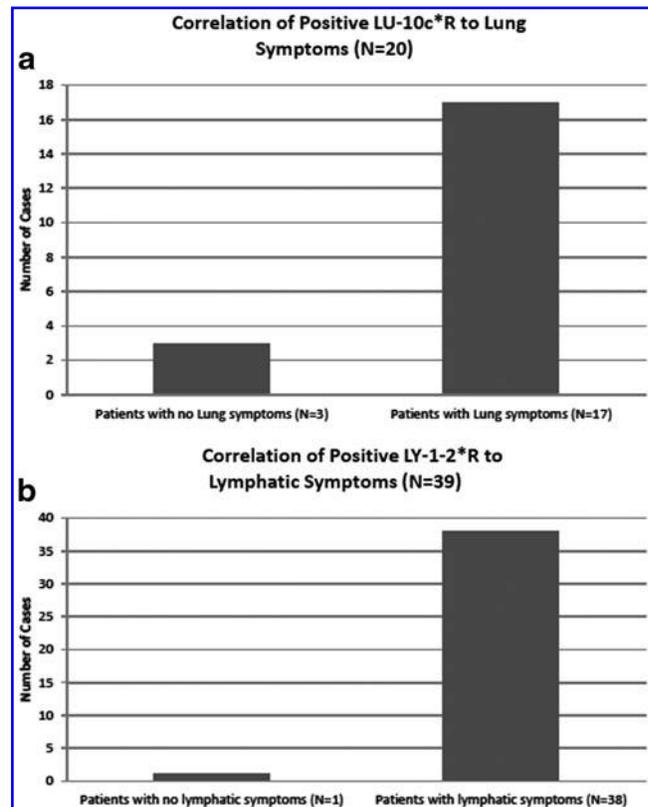


FIG. 7. Correlation of positive Electroacupuncture According to Voll (EAV) testing to symptoms. Twenty subjects ($n=20$) with positive LU-10c*R reading (Arbitrary Measurement Value [AMV] >5) are plotted in (a), in which 17 of them (85%) showed Lung symptoms; only 3 (15%) showed no Lung symptoms. Thirty nine subjects ($n=39$) with positive LY-1-2*R reading AMV >5) are plotted in (b), in which 38 of them (97%) showed Lymphatic symptoms; only 1 (3%) showed no Lymphatic symptoms.

in the corresponding meridians, but the condition was not severe enough to cause symptoms. Although the sample size was rather small in this analysis, the result still suggested that EAV LU-10c*R and LY-1-2*R readings may be specific diagnostic tools for Lung and Lymphatic systems, respectively.

DISCUSSION

Diagnostic Property of Acupuncture Points

One of the biggest discoveries of EAV was the establishment of a novel evaluation system for the changes in biophysical properties of acupuncture points. Until Voll, these points had been used mainly for therapeutic purposes. EAV provides a unique modal system and a well-defined hypothesis to be tested. This study indicates that testing of the two CMPs, LU-10c*R and LY-1-2*R, correlated with clinical findings in respiratory conditions. The correlation also was meridian- or point-specific. Higher Lung meridian CMP correlated with Lung-specific symptoms; while higher

Lymphatic CMP correlated with Lymphatic-specific symptoms. This suggests that EAV testing may help clinicians diagnose respiratory conditions. Although there was a small sample size and low objectivity, this study still provided valuable information on the viability of further testing for EAV as a diagnostic tool. The association between the changes in electroconductivity of the EAV Lung and Lymphatic points in pathologic conditions could be assessed as the next step in the current study.

Energetic Testing to Prevent Diseases And Improve Clinical Outcomes

Holistic medicine proponents believe that chronic diseases progress through a pathway from a less-severe stage with an energetic imbalance to more-severe stages with biochemical changes and histologic damages. Most popular medical tests, such as blood chemistry and imaging techniques, are perfect for identifying biochemical and histologic changes, but leave a gray area between the healthy and disease stages. This gray area, also known as *suboptimal health*, is recognized by holistic medicine proponents as the stage of energetic imbalance. EAV meridian testing is a perfect technique to fill this gap and help clinicians to detect predisease conditions with complete meridian profiles, thus achieving true holistic and personalized medicine. EAV meridian testing also serves as an objective evaluation for therapeutic interventions in addition to symptom-based subjective assessments. Early diagnosis and treatment for the energetic imbalances also help patients reach homeostasis of their bodies and prevent disease development.

Holistic medicine proponents also believe that chronic diseases are often caused by multiple factors that affect multiple systems in the body. Thus, understanding the whole body's functional dynamics is crucial for holistic-minded clinicians. For example, chronic sinus infection is usually not just a problem of the sinuses but has many hidden factors, such as a toxic digestive tract, sluggish liver detoxification function, and a compromised immune function. Addressing those hidden factors sometimes is more important than symptom control for the sinus congestion. EAV meridian testing is a simple, fast, noninvasive inexpensive technique and is perfect for screening for those hidden factors, which may not be reflected in a patient's complaints and history. With a complete meridian balancing profile in hand, holistic clinicians will make better clinical judgments in terms of diagnosis, protocol design, and result assessment, and, certainly, could produce better clinical outcomes.

Objective Markers for Inflammation Versus Degeneration, Excess Versus Deficiency

Medical sciences have advanced remarkably in the field of molecular biology and biochemistry in the past decades. However, the bioelectrical property of the body and asso-

TABLE 4. IMPLICATIONS OF EAV MERIDIAN TESTING ON ENERGY, PHYSIOLOGY, AND THE EIGHT PRINCIPLES

<i>EAV skin conductivity</i>	<i>Energetic change</i>	<i>Physiologic change</i>	<i>Deficiency–Excess</i>	
			<i>Yin-Yang in Eight Principles</i>	<i>in Eight Principles</i>
Increase	Stressed	Inflammation	Yang	Excess
Decrease	Weakened	Degeneration	Yin	Deficiency

EAV, Electroacupuncture According to Voll.

ciated diagnostic and therapeutic modalities have not gained nearly as much interest in the mainstream medical community. Most chronic diseases are the results of inflammation, associated tissue damages, and degeneration. Both inflammation and degeneration are the results of the change in homeostasis of neuroendocrinology of the body. Acupuncture, instead of being a symptom-based therapy, belongs to a large holistic medical system, Chinese medicine. According to Chinese medicine, identification of the two distinct disease processes, energy Excess or Deficiency, is crucial in the diagnostic process, the PD (per the Eight Principles). Treatment protocol often depends on the differentiation of these two distinct stages.

EAV can be an objective biophysical marker to distinguish the two stages (Table 4). Higher EAV readings indicate energy Excess, stress, and a tissue inflammatory stage, while lower readings suggest energy Deficiency, weakness, and a tissue degeneration stage. This unique finding of EAV brings understanding of the biophysical properties of the disease process into a new level. EAV meridian testing provides clinicians—for the very first time—with an objective measurement to distinguish energy Excess and Deficiency for each of the specific meridian systems. Holistic medicine clinicians will benefit with this technique by obtaining a comprehensive view of the status of meridian balance of each patient's body with a deeper understanding of the disease process; this will certainly improve clinical outcomes.

CONCLUSIONS

Despite its small sample size and low objectivity, this retrospective 60-case-series study found a significant association between EAV electrodermal measurement and related clinical symptoms. EAV testing for LU-10c*R and LY-1-2*R points can help diagnose respiratory diseases. This finding suggests that acupuncture points may have diagnostic properties. EAV meridian testing may provide an objective marker for Chinese medicine clinicians to diagnose Patterns and improve clinical outcomes. EAV may also help clinicians diagnose suboptimal health conditions and prevent disease development. To assess the clinical applications and physiologic basis of EAV electrodermal testing further, additional clinical and mechanistic studies are warranted.

AUTHOR DISCLOSURE STATEMENT

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