

Evoked Electrical Conductivity on the Lung Acupuncture Points in Healthy Individuals And Confirmed Lung Cancer Patients *

S. Garrett Sullivan, M.D.,¹ David W. Eggleston, D.D.S.,²
James T. Martinoff, M.D., Ph.D.,³ Richard J. Kroening, M.D.⁴

Abstract: The purpose of this study was to determine if the evoked electrical conductivity at the distal lung acupuncture points differs significantly between controls and subjects with confirmed lung cancer. Four subjects and twenty six controls were blindly measured with an electroacupuncture point measuring device. Twenty-six of the thirty examinations matched the results of the chest x-rays, four true positives, twenty-two true negatives, four false positives, and zero false negatives. The data indicate a significant level of agreement exists ($p < .02$) between the electroacupuncture point measurements and the chest x-rays. Further research into the diagnostic significance of electrical conductivity at acupuncture points seems warranted.

THIS STUDY investigates the potential usefulness and possible accuracy of an electrodiagnostic device, the Dermatron (Pitterling Electronic GmbH, Munich, West Germany)

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1. Resident, Department of Anesthesiology, U.C.L.A. School of Medicine, Los Angeles, California.

2. Associate Clinical Professor, Department of Continuing Education, University of Southern California School of Dentistry, Los Angeles, California.

3. Director of Curriculum Development, University of Southern California Schools of Pharmacy and Medicine, Los Angeles, California.

4. Director, Pain Management Center, Adjunct Associate Professor of Anesthesiology, Dentistry and Internal Medicine, U.C.L.A. School of Medicine, Los Angeles, California.

Correspondence and reprint requests: David W. Eggleston, D.D.S., 1441 Avocado Avenue, #508, Newport Beach, CA 92660. Tel (714) 640-5680.

which its manufacturers claim is able to measure reliably and reproducibly the evoked electrical conductivity at acupuncture points. The acupuncture point is subjected to an electrical current of 0.9 volt and 4 to 12 microamperes and the subsequent electrical conductivity of the skin is measured with a modified ohm meter.

Health professionals have been utilizing the instrument as an adjunctive screening tool in diagnosis for several decades in West Germany, and more recently, in the United States.^{1,2}

Acupuncture points have been used in treatment for millennia. The possibility that electrical characteristics of acupuncture points have diagnostic significance offers a non-invasive augmentation of traditional diagnostic procedure.

Hypothesis.

1. Pathological changes in organ or tissue systems are reliably reflected by changes in the electrical conductivity at specific acupuncture points associated with the organ or tissue system.¹
2. Inflammatory dysfunctional states will be associated with readings that reflect increased conductivity (lowered resistance).
3. Degenerative pathology in the related organ system will be associated with readings

that not only reflect a changing pattern of conductivity, but a significantly lowered conductivity (increased resistance).

This hypothesis was formed, in part, from the Chinese acupuncture theory which predicts that stimulation at acupuncture points (by pressure, needling or heat) will have an effect on a specific body part as predicted by the theory.³

Review of the Literature.

Many previous studies have demonstrated electrical conductivity of the skin at acupuncture points to be significantly greater than surrounding tissue.⁴⁻¹⁴ Oleson, Kroening and Bresler at U.C.L.A. have shown that changes in the electrical conductivity at ear acupuncture points reflects, with a 74 percent degree of accuracy, the presence or absence of musculoskeletal pain in a group of volunteers.¹⁵

Rosenblatt¹⁶ demonstrated that acute physiologic changes in heart rate may be reflected in acute changes in conductivity at acupuncture points associated with the heart, while no change in conductivity at another acupuncture point nearby and a non-acupuncture point were noted.

Matsumoto and Hayes¹⁷ have shown that vagotomy selectively changes the skin resistance in rabbits at acupuncture points.

Bergsmann and Woolley-Hart¹⁸ have shown that electrical properties of acupuncture points were significantly altered in patients with liver and lung disease.

Serisawa¹⁹ studied 50 patients with pulmonary tuberculosis and found an accumulation of low electrical resistance points, relative to healthy patients, on the radial side of the upper arm, closely associated with the theoretical position of the lung meridian.

Several studies done in the People's Republic of China²⁰⁻²³ have reported that changes in the electrical conductance at points on the auricle of humans and rabbits are associated with the presence of pathology of internal organs (either spontaneous or experimentally induced) as predicted by acupuncture theory.

A Russian investigator²⁴ found changes in electrical potential of "active skin points" as-

sociated with changes in the viscera, which correlated closely with classical acupuncture points.

Burr and Langman²⁵ studied changes in electrical polarity between the skin of the ventral abdomen and the interior of the vagina in gynecological patients with and without gynecologic malignancy, and found a high correlation of electronegativity with the presence of malignant disease. The ventral point used, from their anatomical description, appears to be Conceptive Vessel 2, which is commonly associated with the function of the internal female reproductive organs in traditional acupuncture theory.

This literature review supports the concept that acupuncture points may have diagnostic information. The results of our investigation further define the hypothesis by relating differences in conductivity at acupuncture points to inflammatory and degenerative states.

Research Design.

Experimental subjects and control subjects were selected on the basis of traditional diagnostic procedures. All of the experimental subjects had confirmed lung cancer, while all of the control subjects had negative chest radiographs.

The subjects were randomly scattered among the controls by drawing numbers at the time of the experiment. Each subject and control was maintained blind from the operator by an opaque screen—the operator had access only to the hands of the subjects and controls. There were no distinguishing marks present on the hands of the controls or subjects.

The hands were passed through the screen so that the acupuncture points could be measured. Acupuncture points Lung 10, 10a, 10b and 11, and Small Intestine 1 and 2 (Fig. 1) were measured on the right and left hand. The measurements were recorded by the operator on a coded data collection form.

Data Collection.

The measurements were made on three separate days over a four-month period. Three subjects (two female, one male, average age 52.7, 44-60) and 20 controls (12 females, 8

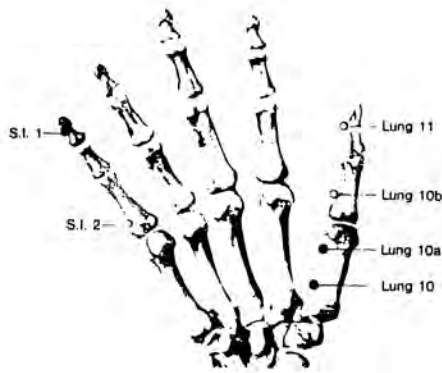


Fig. 1.

The Lung meridian and Small Intestine meridian acupuncture points measured.

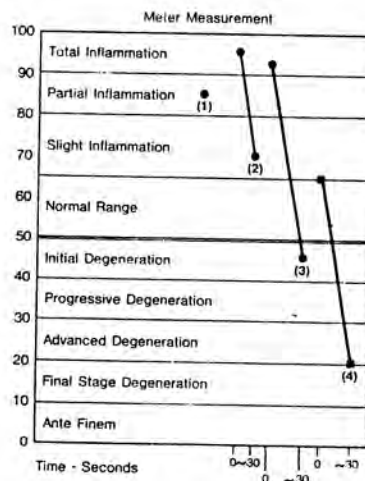


Fig. 2.

The postulated significance of measurements on the Dermatron meter. Measurements connected by a line indicate a maximum electrical conductivity followed within a few seconds by a drop in electrical conductivity to a stable level. This phenomenon is a common observation during electroacupuncture point measurements and a large drop in conductivity has been anecdotally linked to degenerative conditions.

males, average age 66.2, 51-80) participated. Six of the controls and two of the subjects were measured on two separate occasions. The total data consisted of 5 subjects and 26 controls. One of the subjects on the second day of measurement was disqualified because of the extent of steroid therapy. Extensive steroid therapy artificially normalizes an electroacupuncture measurement. This limitation was stated in the original research protocol.

Instrument Design.

The Dermatron is an ohm meter that has been modified to accommodate for the variations of skin moisture and thickness. This modification, developed over a number of years through trial and error, involves a variable amperage from 4 to 12 microamperes during the electroacupuncture measurement while the voltage remains constant at 0.9 volts. The meter has been arbitrarily given a range of 0 to 100, whereby 0 is the value of no conductivity and 100 is the value of no resistance at this voltage and microamperage. The range between no conductivity and no resistance has been divided equally into 100 units.

People with thick dry skin will have less electrical conductivity than people with thin wet skin. To account for this, the instrument will automatically increase the microamperes to a maximum of 12 if the meter is below 50 units. It has been observed clinically that asymptomatic people with thick dry skin will measure 50 units or more on this scale with 12 microamperes. If an asymptomatic person has moist, thin skin, the conductivity will reach 50 units or more with 4 microamperes.

The postulated significance of the measurements on this scale are represented in Fig. 2.

Statistical Treatment.

Evoked electrical conductivity at acupuncture points consists of a maximum conductivity measurement (example 1 in Fig. 2). Often, the maximum conductivity measurement is followed within a few seconds by a decline in conductivity (examples 2, 3 and 4 in Fig. 2).

All measurements above 35 units were considered negative tests, and all measurements

below 35 units were considered positive tests.^{1, 2}

For each subject and control, the acupuncture point registering the "worst" measurement determined whether the test was positive or negative.

Analysis of the data was performed prior to the divulgence of the code by the monitor. Twenty-six of the thirty examinations (87%) matched the results of the chest x-rays. The agreement between the diagnosis using the instrument to measure acupuncture electrical conductivity and traditional medical diagnosis using chest x-rays indicated four true positives, twenty-two true negatives, four false positives, and zero false negatives (Fig. 3). Measurements of the Small Intestine acupuncture points did not correlate with the results of the chest x-rays.

A Coefficient of Agreement for Nominal Scales (Cohen's k)²⁶ was calculated to determine the level of significance between the two diagnoses after chance agreement was excluded. The data indicate a significant level of agreement exists ($p < .02$) between these two diagnostic procedures (Table 1).

Discussion

The controls were determined to be free of lung pathology by the use of chest radiographs. Because of the age of the controls, the possibility exists of incipient lung pathology undetected by the chest radiographs. One of the controls demonstrated an inconsistent shadow on his chest radiographs but has been cleared by a series of tomograms and a CT scan. This control was measured twice and accounts for two of the false positives. Follow-up at one year will be obtained to verify that no change has occurred in the status of all controls regarding lung cancer.

Measurements from 50 to 65 units are considered normal and are found in asymptomatic people that are very healthy. But, the measurements from 65 to 90, as found in our control subjects, are much more common and possibly reflect a chronic inflammatory response to daily environmental stress and pollution.

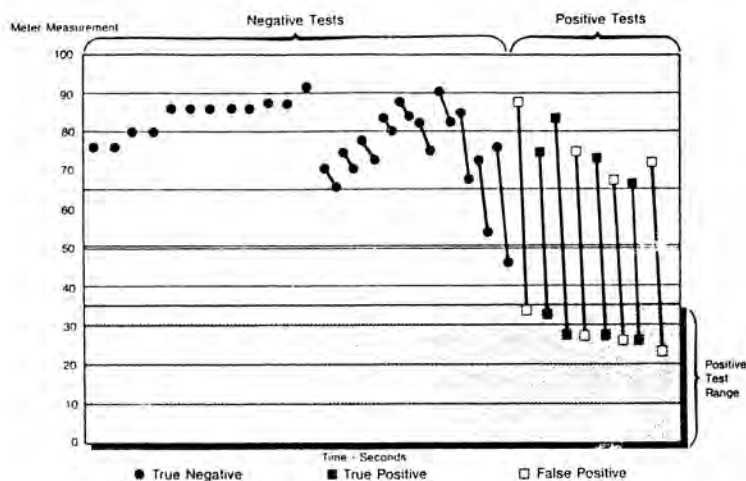


Fig. 3.

Data collected from the 30 examinations. Measurements connected by a line indicate a subject or control with an initial maximum electrical conductivity followed within a few seconds by a drop in electrical conductivity to a stable conductivity level. A measurement falling below 35 units on the meter constituted a "positive" test.

		Traditional Medical Diagnosis	
		Disease Present	Disease Absent
Dermatron	Disease Present	4 (True Positives)	4 (False Positives)
	Disease Absent	0 (False Negatives)	22 (True Negatives)

Cohen's k: $\frac{1}{N} \frac{a + d}{1 + k} = 0.592; p < .02$

Table 1. Agreement Matrix.

The protocol of this project allows the possible diagnostic properties of acupuncture points to be tested in a blind manner. This protocol could be used with larger sample sizes to further test the hypothesis.

Summary

This research project blindly measured the evoked electrical conductivity on the lung acupuncture points in healthy individuals and confirmed lung cancer patients. A significant level of agreement ($p < .02$) was found between the acupuncture measurement and traditional diagnosis.

Further research into the diagnostic significance of electrical conductivity at acupuncture points seems warranted.

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