PRESENTATION TO THE UTAH STATE MEDICAL ASSOCIATION
JOINT COMMITTEE MEETING
UNPROVEN HEALTH PRACTICES COMMITTEE
ETHICS AND JUDICIAL COMMITTEE

A HISTORY OF ELECTRODERMAL TESTING

Dennis W. Remington, M.D.

July, 1990

Copyright 1990 by Dennis W. Remington, M.D.
All rights reserved. This document or any part thereof may not be reproduced in any form whatsoever without the prior written permission of Dennis W. Remington, M.D.

Reprinted with permission by
Digital Health, Inc.
1770 E. Ft. Union Blvd, Ste. 101
Salt Lake City, UT 84121
(801) 944-4070 fax: (801) 944-4067

A HISTORY OF ELECTRODERMAL TESTING

Since late 1982, our medical office has used sublingual provocative-neutralization techniques for treating patients with adverse reactions to inhalants, foods, and chemicals. This technique is described in detail elsewhere, and has been "proven" beyond any reasonable doubt by numerous double-blind studies executed by various investigators in multiple centers and reported in a number of peer-reviewed medical journals. For the purposes of this paper, the original Webster's dictionary definition of "allergy" will be used, which is "a condition of unusual sensitivity to a substance or substances which, in like amounts, do not affect others." These adverse reactions include the IgE mediated responses typically described by traditional allergists, but also encompasses other adverse reactions, regardless of the causative mechanism.

The sublingual testing and treatment techniques offer tremendous benefits and safety to sensitive people compared to treatment by traditional desensitization injections. Effective results often occur within minutes from the time therapy is started instead of taking many months or even years as did traditional desensitization therapy. A much more extensive range of reactions to allergenic substances could be controlled, including reactions to various foods and chemicals.

The testing by provoking symptoms, and then by trial and error finding an optimal treatment dose (neutralization dilution) which eliminated those symptoms, was a long, laborious procedure. The provoked symptoms were often very unpleasant for the patient.

I first heard of electrodermal testing from a patient who had friends in Phoenix, Arizona who were being treated by a medical doctor there. He used the same sublingual application, but he used an electronic device called a Dermatron to identify allergic substances and to help choose the appropriate optimal treatment dilution. She made an appointment to see him; we sent with her a list of the antigens we had tested her for and the optimal treatment doses that she had been using. She reported back that he had tested her for dozens of new antigens, and he identified the optimal treatment doses for those to which she reacted. He verified that she was indeed reactive to the substances that we had identified with provocative testing and had confirmed the optimal treatment dosages that we had chosen by provocative testing. All this was done with no adverse reactions, and in less than an hour. Similar testing and treatment through our system would have taken several full days.

Shortly after this experience, I was approached by a gentleman who

described himself as a licensed classical acupuncturist" and was told that he had an instrument which he believed could find our optimal treatment dilutions quickly and safely. Although very skeptical, I arranged to set up a demonstration on a double-blind basis. We selected two patient volunteers, both of whom had clear-cut reactions to a number of antigens, and established treatment endpoints. We tested these two patients and identified optimal treatment dosages for approximately 3 antigens each, which took several hours to do. The correct dilutions were written in the charts and not told to these patients. At the demonstration, the staff members who had performed the testing were not present, and no one in the room knew the correct dosages. The acupuncturist was handed between 12 and 20 bottles, containing various dilutions of the same antigen, and asked to find the dosage of each which was the non-reactive, optimal treatment dosage. He put each closed bottle on a plate which was hooked to the electronic device. The patient was asked to hold on to a brass rod in one hand, and the operator used a probe to take readings from the acupuncture points on the fingers of her other hand. Within seconds he identified each optimal treatment dosage correctly!

I was disturbed by this testing because I could see no possible way in which he could have determined those dosages, except that the instrument really did work. I actually didn't want it to work, but the chances of his identifying the doses by chance alone were from 1 in 3,000,000 to 1 in 64,000,000. It just didn't fit in with anything I had ever seen or known about. He provided me with some literature dealing with this technique, and I have since found a great deal of other supporting literature.

I would now like to describe a variety of other electronic instruments which utilize electro-magnetic energy in various ways to give information regarding bodily function. I would then like to review the literature which seems to explain the observed phenomena, and some double-blind evidence which provides strong support for the use of this technology.

Instruments which measure passive electrical energy:

Electrocardiograph - The electrocardiograph was first developed in 1887 and records in a graph form the electrical activity emanating from different areas of the heart.

Electroencephalograph - The EEG was developed in 1875 and simply records the electrical activity emanating from various areas of the brain.

Chinese electric pulse testing - For years, Chinese physicians have used various characteristics of the pulse as diagnostic indicators of disease. In recent years they have devised a diagnostic instrument which correlates electrical activity at the radial pulse with the specific pulse characteristic. Pulse diagnosis can now be done electrically.

Chinese gastrointestinal analysis - This instrument recently developed in China measures electrical activity of various areas of the gastrointestinal tract in a way similar to electrocardiography. Various patterns of activity have been correlated with various disease states. Developers believe that this is a very safe, non-invasive, accurate alternative to traditional western medical examinations such as endoscopies and barium contrast study X-rays to identify such conditions as peptic ulcers, stomach cancers, achlorhydria, spastic colon, pancreatitis, etc.

Instruments which measure response to stimuli:

a) Non-electromagnetic stimuli

Stress electrocardiogram - An electrocardiographic tracing is taken while the patient exercises vigorously. Subtle changes in cardiac function in response to exercise can be identified, and early heart disease can be identified.

Sleeping or sleep deprivation electroencephalogram - Some abnormalities can presumably be identified on an EEG tracing if the patient is either asleep or sleep deprived, which might otherwise be missed if taken under normal wakeful circumstances.

Nystagmometry - Eye movement, in response to stimulation of the ear with either cold or hot water, is recorded electrically to identify inner ear problems.

Galvanic skin response - The electrical conductance between two electrodes placed on the skin is measured. The patient is then subjected to various stimuli, and any change in skin conductance is recorded. Any stimuli causing increased sweat production will very quickly increase the conductance and give a change in the readings, which are usually recorded on a graph. This technology is a major constituent of lie detector testing. It is also used in biofeedback technology. In a strict sense, this instrument measures the response of the person under exposure to electric energy frequencies in the audible range. In this case it is not as much the frequency or intensity of the energy that influences the changes, but rather the meaning that the words convey to the subject.

b) Electromagnetic stimuli:

Electromyelography - A nerve is stimulated electrically, and the response of the muscle to that stimulation provides useful information about the functional status of that muscle or the integrity of its associated neurones.

Brain Stem Audiometry - This test involves subjecting a person to sounds at various frequencies and intensities and then measuring the resultant brain wave activity in response to that sound.

Cochlear Microphonics - A sensitive electric sensing device is placed on the cochlea of the inner ear, and the electrical response to challenge with various sound waves gives valuable information about cochlear function.

X-Ray - Electromagnetic energy in the X-ray frequency is projected through a body part to be analyzed, and the rays are collected on a photographic plate. Various body tissues absorb the radiation at different rates, causing various shadows to appear on the plate.

Magnetic Resonance Imaging - The tissues to be tested are placed in a strong magnetic field. Five different tissue variables are utilized to construct images of various structures.

Binocular Iriscorder - Pupillary light reflex can be evaluated by stimulating the eye with electromagnetic energy in the visible light frequency, and then measuring the response of the iris. A great deal of information can be determined about the optic nerve function and the autonomic nervous system by the characteristics of this response. Very subtle diseases, such as pesticide toxicity, neurological damage, and autonomic nervous system defects can be detected with this technology.

Acupuncture point identification - Acupuncture points can be found by introducing a low voltage electrical charge into the body and then measuring the electrical conductance of the skin. The acupuncture points are more conductive (have less electrical resistance) than the surrounding tissue.

EAV (Electroacupuncture According to Voll) testing - A low voltage electrical charge is introduced into the body, and the precise level of electric current conducted through the acupuncture points are measured. Information about various organ systems and musculoskeletal regions is obtained by the level of the readings. Various stimuli may be

introduced, and any change in electrical conductance at various acupuncture points provides useful diagnostic information.

History of "Electromedicine" and Electrodermal Testing[1]

The first reported use of electricity in medicine was in 2750 B.C., described in Egyptian tombs, using the fish species Malopteurus electricus. Several descriptions of therapeutic benefits, including pain control from exposure to the electric eel, were described by the Greeks in the first century.
Around 1600, William Gilbert, an English physician, coined the word "electric" and established the difference between electricity and magnetism. In 1752, Johann Schaeffer published the book "Electrical Medicine." By that time, many physicians were reportedly using electricity in their practices. In 1830, Carlo Matteucci, a professor of physics at Pisa showed that electrical current was generated by injured tissues. In 1858, Dr. Francis, a Philadelphia physician, was first to describe the relief of dental pain by electricity. After 164 successful tooth extractions using "galvanism," he received a patent on May 25, 1858. Although his device was denounced by the Pennsylvania Association of Dental Surgeons, the methods used by Francis spread throughout America and Europe. In that same year, W.G. Oliver of Buffalo claimed the discovery of "electrical anesthesia," reporting a 98 percent success rate using a vibrating generator for dental pain. Again in that same year, Harding, at the University College Hospital, London, confirmed Oliver's results with studies of 40 tooth extractions. He also set up a control subject who had results when the current was applied but did not experience any change under the same conditions without current. By the late 1800's, the use of electricity in medicine was wide spread and described in such medical texts as Osler's "Practice of Medicine."

At the turn of the century, the business atmosphere in the United States "...reflected laissez-faire policy at its extreme. High government officials were corrupted by the railroads, the public was swindled by flagrant stock-market manipulations, embalmed beef was shipped to soldiers in the Spanish-American War. Advertising contributed to the immorality of business with its patent-medicine ads offering to cure all the real and imagined ailments of man. There was a 'pleasing Medicine to cure cancer,' another to cure cholera. No promise of a quick cure was too wild, no falsehood too monstrous."[2] A variety of electric gadgets emerged and were marketed in a similar manner to snake oils and other patent medicines by various charlatans. This problem, together with the "almost total lack of standards in medical education and practice at that time, produced a deplorable situation."[3] To inves-

tigate this situation, the Carnegie Foundation established a commission headed by Abraham Flexner. The commission's final report was published in 1910, and it produced an almost instantaneous revision of medical education. Electrotherapy became a scientifically insupportable technique, and it disappeared from medical practice. Doctors using electric instruments of any sort were branded as quacks and charlatans. In the backlash of this mindset, electronic devices of diagnostic or therapeutic value have been slow to be accepted. Even now, a great deal of suspicion surrounds the use of electrodiagnosis and electrotherapy.

In spite of the virtual disappearance of all electrical therapy, investigation has continued into the electric nature of biological systems in health and disease states. A great deal has been discovered, and legitimate diagnostic and therapeutic devices based on these sound discoveries have emerged.

In the early 1950's, Reinhold Voll, a German medical doctor, developed an electronic testing device for finding acupuncture points electrically. He was successful in finding acupuncture points and demonstrating that these points, known to Chinese acupuncturists for millennia, had a different resistance to a tiny electrical current passed through the body, than did the adjacent tissues. Many other researchers have also verified that electrical conductance at the acupuncture points is significantly greater than the surrounding tissue. Voll then began a lifelong search to identify correlations between disease states and changes in the electrical resistance of the various acupuncture points. He thought that if he could identify electrical changes in certain acupuncture points associated with certain diseases, then he might be able to identify those diseases more easily, or earlier, when treatment intervention was likely to be more effective. Voll was successful in identifying many acupuncture points related to specific conditions and published a great deal of information about using acupuncture points diagnostically.[4] (Until Voll, these points had been used mainly for treatment.) He found, for example, that patients with lung cancer had abnormal readings on the acupuncture points referred to as lung points. Changes also occurred in the electrical conductance of the acupuncture points supplying musculoskeletal structures that are inflamed. These changes in acupuncture point resistance related to lung cancer have been verified more recently by researchers from UCLA and USC. In a double-blind study, 3 patients with lung cancer and 20 controls (who had negative chest x-rays) had the electrical resistance of several acupuncture lung points and several small intestine points measured. There was an 87 percent correlation between the testing results and the results of the x-ray diagnosis for the lung points, and no correla-

tion with the small intestine points. Of interest, there were no false negatives and 4 "false" positives. Two of these false positive readings were from the same patient who had an "inconsistent shadow" on his lung X-ray but had shown no evidence of disease with tomograms and a CT scan.[5] These "false positive" readings could have been from lung cancer not yet diagnosed, or some other degenerative disease process, or could have been merely incorrect readings.

Another study from the Pain Management Clinic, Department of Anesthesiology, UCLA School of Medicine, evaluated the ability of electrodermal testing to identify, in a blinded fashion, areas of pain. Forty patients were determined by medical examination to have musculoskeletal pain. Each patient was draped to hide any physical evidence to suggest where the pain might be. The physician conducting the electrodermal testing had no prior knowledge of the patient's history, and was not allowed to talk to the patient. Based on increased skin conductance at specific acupuncture points of the ears, the physician determined, with greater than 75 percent accuracy, the location of the pain, a highly significant result. This study also pointed out that electrodermal testing technique "is often sensitive to pathological problems of which the patient is only minimally aware. When some patients were told of their auricular diagnosis results, they suddenly remembered having a minor or old pain problem in that bodily area, a problem which they had neglected to mention during the medical evaluation," and thus were considered to be "misses" in the statistical analysis.[6] The results of this test were therefore more impressive than the statistical analysis would indicate.

A great deal has been done throughout the world correlating changes in electrical conductance at acupuncture points with various disease entities. Much of the German, French, Japanese, and Chinese literature has not been translated. Only a few examples of the many articles related to finding and measuring acupuncture points electrically are referenced in this paper. [7,8,9,10,11,12,13.14,15,16,17,18,19,20,21]

Voll discovered that certain acupuncture points showed abnormal readings when subjects were reacting allergically. He made several serendipitous discoveries related to "allergy" testing. He noted some unusual readings on certain acupuncture points when a patient had a bottle of medicine in his pocket. He could remove the bottle and consistently get different readings when the bottle was in his pocket compared to when it was not. At first he was baffled as to how a closed bottle of medicine outside the body could affect the acupuncture readings. It was even more baffling when he discovered that the glass bottle of medicine could change the readings when it was in contact any-

where along the closed electric circuit involved with the testing procedure. Voll and his colleagues then began work to identify the nature of this strange phenomena. They inserted a metal plate into the circuit and demonstrated that many substances that precluded changes in acupuncture point readings when ingested could produce the same changes when placed on the plate (even in closed glass bottles). They assumed that there must be some kind of electro-magnetic energy being emitted from the substances, and that these energy fields somehow travelled along the electric circuit to the body (perhaps like the energy waves representing a person's voice travels along the electric circuitry of a telephone line).

Voll and other scientists have conducted various experiments in an attempt to characterize the energy form that is being measured. As yet, no clear consensus of opinion exists as to exactly how this phenomenon functions. For that matter, no clear consensus exists how any electric phenomena function. Although it used to be thought that electricity was fairly straight forward and well understood, many discoveries in the last few years have made many scientists question older theories. Robert Beck, a physicist well known for his pioneering work in various areas of electromagnetism, said the following, "Man is an extremely complex biocosmic resonator....People ask me occasionally why this or that works and I tell them the truth, that although I'm a physicist, I don't know what electricity is. Neither does anybody else. But we can certainly build a lot of marvelous things with it, from toasters to television sets to computers. And it will be quite a few years before even the effect of some of these simple stimulation type devices are well understood, much less fully understood."[22]

Electrodermal testing devices have been extensively studied by Dr. William Tiller from Stanford, who is a professor in the Department of Materials Science and Engineering. He has written extensively in an attempt to explain the electric behavior of the skin and how electrodermal diagnostic and treatment instruments function.[23,24] Dr. Cyril Smith, Ph.D physicist in the Electrical Engineering Department at the University of Salford, England, has also written extensively in an attempt to explain various electromagnetic phenomena, including electrodermal testing on acupuncture points.[25] Other world leaders in bioelectric medicine include Robert O. Becker, M.D. and his landmark book entitled, The Body Electric - Electromagnetism and the Foundation of Life,[26] and Bjorn Nordenstrom, M.D. and his books The Electric Man,[27] and Biologically Closed Electric Circuits.[28]

Whether or not a diagnostic or therapeutic modality is fully understood has absolutely no bearing on its effectiveness or usefulness.

It is beyond the scope of this paper (and of this writer), to attempt to explain the phenomena involved in electrodiagnostic testing. In fact, it would seem better to have no explanation at all than have an incorrect theory. For example, the drug Hydergine has been shown to be effective for improving cerebral function in older people in a number of double-blind controlled studies. The mechanism was thought to be through increasing cerebral blood flow. When further studies failed to show increased blood flow, the drug was thought by many to be ineffective, and fell into disfavor. More recent studies have shown a variety of actions that could explain the results of therapy, and it once again has become widely used.[29]

Evidence for Reliability of Electrodermal Testing

There is a great deal of controversy in medicine today over the issue of what techniques are considered experimental, and which ones are considered to be adequately proven. This issue was investigated by the Office of Technology Assessment of the Congress of The United States. They produced a 133 page report entitled "Assessing the Efficacy and Safety of Medical Technologies." This report stated that "it has been estimated that only 10 to 20 percent of all procedures currently used in medical practice have been shown to be efficacious by controlled trials."[30]

The chairman of the Utah Unproven Health Practices Committee in 1985 was asked what constitutes adequate evidence that a technology has been adequately proven? His reply was that a good double-blind study is reasonable proof, and that several double-blind studies reported by researchers from different centers is excellent proof." Others involved in this issue have suggested that the agreement of experts in the field of the effectiveness and usefulness of the technology is good proof. Also, the clinical use of a technology by various medical practitioners is also good proof of its efficacy.

Electrodermal testing instruments have been around for over thirty five years and have been used widely in Europe and virtually around the world for allergy testing as well as for a variety of other purposes. These instruments, however, have been used for only a few years in this country. Electrodermal testing instruments have been manufactured in Germany, Japan, China, France, Denmark, Russia, and more recently in the United States.

Many double-blind studies have been done using this technology. In fact, most of those practitioners who use them have set up a blinded test situation of one kind or another before they really believed that

these instruments actually work. Besides the double-blind study described earlier in this paper, we have tested hundreds of patients in a double-blind fashion where the patient did not know what they were being tested for, and the instrument operator did not know anything about the patient's reactivity. These tests usually compare favorably to the patient's history and to testing by other techniques.

Perhaps the most convincing evidence for the accuracy and reliability of electrodermal testing came from using this testing to quickly identify correct optimal treatment doses for patients who had unpleasant reactions to provocative testing. An effective dose to turn off the response would often take more than an hour by trial and error, but could almost always be found within seconds using the instrument. On those few misses, the optimal dose was within one dilution, and could easily be found.

Another physician who has evaluated electrodermal testing in his office is William Rea, M.D. from Dallas, an internationally known pioneer in environmental medicine. Besides serving as the director of the Environmental Health Center in Dallas, Dr. Rea has been appointed as the First World Professorial Chair in Environmental Medicine, Robens Institute, University of Surrey, England. Dr. Rea set up a simple double-blind situation using a number of people who had reacted adversely to a challenge test with various antigens, and for whom an optimal treatment dosage had been found to turn off those reactions. Neither the patients nor the instrument operator knew the correct dosage. A series of dilutions were tested, and the electronic instrument identified the correct optimal treatment dosage out of 12 to 20 options in approximately 80 percent of the cases. Virtually all of the "misses" were within 1 dilution of the optimal dose dilution determined by trial and error, making it easy to find the optimal dose in those "misses." Dr. Rea describes using these instruments as part of his practice to find optimal treatment doses for very sensitive patients before provoking symptoms, so that he can quickly administer an effective treatment dose in case of severe reactions.

Doctors from England have for some time used electrodermal testing for allergies. One of these medical doctors reported a study in the British medical literature.[31]

There have been at least three double-blind assessments of electrodermal testing reported in the American medical literature. In 1989, Ali reported in the American Journal of Clinical Pathology the results of a double-blind test comparing the results of IgE antibody levels (using a microELISA procedure) for a variety of pollens and molds to electro-

dermal testing for the same antigens. The results showed concordance between the two tests of 73 percent.[32]

In 1985, Krop did a double-blind test comparing electrodermal testing to sublingual and intradermal testing for a variety of foods, chemicals, and inhalants. In 66 percent of the 227 tests, the electrodermal testing identified exactly the same "neutralizing" (optimal treatment) dilution as did the intradermal and sublingual testing.[33]

In 1984, researchers from the University of Hawaii compared 6 different diagnostic modalities for assessing food allergies. These tests included history, food challenge, skin, RAST, IgE antibodies, and electrodermal testing on 30 volunteers. The testing was done in a double-blind fashion, with the patients not knowing what antigens were being tested, and the instrument operator not knowing anything about the patient's food sensitivities. In over 300 tests, electrodermal testing matched the history 74 percent of the time, the food rechallenge test 77 percent of the time, skin testing 71 percent of the time, and RAST testing 69 percent of the time. The authors concluded that "the EAV (electrodermal testing) data obtained in this experiment demonstrates the highest degree of compatibility with the food challenge test, which is considered to be the most sensitive of the currently available diagnostic techniques for food allergy. In addition, the EAV results were comparable with both skin and RAST tests."[34]

In comparing these three double-blind studies, it is of interest to note that the number of "false positives" identified by electrodermal testing greatly exceeds the number of "false negatives." The breakdown is as follows:

Study	False positives	False negatives
Ali	22	5
Krop	42	2
Tsuei	67	18
Totals:	131	25

Krop points out that in his study, the subjects were only tested to things to which they reported an adverse response. He expressed the opinion that these apparent "false positives" were not false at all, but merely reflected a greater sensitivity of the electrodermal testing compared to the more traditional testing to which it was compared. The results of the other two studies may also have reflected this greater sensitivity with electrodermal testing.

When trying to evaluate the accuracy and dependability of electrodermal testing for food allergy testing, a number of factors about food allergy must first be understood.

Food Allergy Characteristics

1. Food allergy is a complex issue. It is not just a yes or no situation. Various types of food reactions have been described, including the following.

a) Fixed allergy - A person with a fixed food allergy will react to that substance each time they come into contact with it, often even with a very tiny exposure. It doesn't matter how long it has been since the last exposure, re-exposure will still produce a reaction.

b) Cumulative allergy - A person with a cumulative allergy to foods will only react to a specific food when they ingest enough of it to exceed their allergy threshold for that food. It may take a substantial amount of that food to evoke a reaction. A specific food may be tolerated just fine one day, but if ingested the next day will likely produce a significant reaction.

c) Variable allergy - A person with variable allergies may react at certain times when eating a food, but tolerate it well on other occasions. Some people react to specific foods when certain pollens are in the air, but not at other times. This may represent a complex cumulative response to common antigenic material in several foods, or a reaction to a combination of a food and a pollen. Some women react adversely to certain foods during a particular phase of the menstrual cycle, or during pregnancy. In most cases, the reason for the variability is not clear.

2. The mechanism or mechanisms causing adverse reactions to foods are not clear. Although much early attention was focused on the role of IgE antibodies, it is clear that many reactions are mediated through other mechanisms. Much recent attention has focused on the role of IgG antibodies, and some workers believe that IgG antibodies correlate more closely with the clinical picture of food allergy than do IgE antibodies. Prostaglandins and related hormones have been shown to play a role in some cases. In other cases, adverse reactions may be non-immunologic responses.

3. There is no 100 percent reliable test for food allergy to which other tests can be compared. With no reliable standard of comparison, there is no way that any new test can be reliably judged. Almost daily we see patients in the office who have been tested with skin or RAST tests who are puzzled by the results. They usually describe negative testing for foods to which they clearly and predictably react, and posi-

tive tests for foods which they have repeatedly eliminated and reintroduced with no observable clinical response. Each test has its limitations and shortcomings, including the following:

a) History - Many patients have a history of reacting after ingesting a meal, but do not have a clear understanding of what specific food caused the reaction. Many patients ingest specific foods like dairy products or wheat several times daily, and have never deliberately avoided those and other foods long enough to see if symptoms clear. Many are puzzled by the observation that they seem to react to a specific food sometimes, but not at other times. Most patients do not have enough understanding of the nature of food reactions to have intelligently evaluated individual foods.

b) Food Rechallenge - After a food is avoided for a time and then reintroduced, there may be no initial response if the reaction happens to be cumulative or variable. The best that can be determined by a one time challenge is that the person must not have an immediate, fixed reaction to that food. A food challenge must be repeated several times over two days or so to rule out these other forms of food reaction.

c) Double-blind food capsule test - Although this test may work reasonably well for a fixed reaction on someone with a low threshold for that food, it is in general a very unreliable test for food reactivity. One study showed that this technique correlated in only 30 percent of cases with skin testing and in less than 8 percent of cases with rast testing.[35]

d) RAST and related tests - RAST tests for IgE have shown a reasonable correlation to food reactions, but it is clear that many non IgE responses occur in response to food ingestion. IgG testing is becoming popular, and some advocates believe it correlates better with clinical responses to food challenge. Obviously, IgG antibodies also do not explain the whole realm of food reactivity.

e) Skin testing - Various types of skin responses have been investigated and are reasonably correlated with clinical food response in some tests but not in others. It was long thought that the skin response was mediated exclusively through IgE antibodies. If this were the case, a better correlation between IgE antibodies and skin responses should be shown (unless both tests simply have a high level of error).

Disadvantages and Advantages of Electrodermal Testing

Disadvantages - Antihistamines, corticosteroids, and other medications may suppress a person's immune reactivity, resulting in false positive readings on the instrument. Skin testing may also be suppressed in the same way. False positive reactions may occur in response to chemicals in the environment in which testing occurs (such as reactions to

perfumes, cleaners, etc.). Occasionally, for unknown reasons, the instrument fails to identify a food, chemical or inhalant to which a person by history repeatedly reacts. The instrument may also occasionally identify an allergen as positive, even though avoidance and re-exposure fails to confirm that finding. Although not perfect, double-blind studies using electrodermal testing have shown a better correlation with food allergy than any other known test. It is also our clinical impression that electrodermal testing correlates more closely with the observations of the patient than the more traditional forms of testing. Other advocates of electrodermal testing share this viewpoint. One doctor from Colorado reported the results of a survey of 109 patients tested with this technique. All had been tested by some other method in the past, and 69 percent thought that the results of electrodermal testing were more reliable than more conventional testing, with only 5 percent reporting it less reliable. The rest either thought it was the same or didn't comment. Since there is no reliable standard by which to compare electrodermal testing, at the present time there is no reliable way to assess its accuracy.

Perhaps the biggest disadvantage of electrodermal testing is the poor acceptance of the technique by some physicians. There has been a tendency by some, with a 1910 mentality, to dismiss it as pure "quackery" without even knowing any more about it than it is some kind of electric device. According to a California colleague, a state official pronounced that he had proven that the use of electrodiagnostic instruments is pure quackery, because he had personally tested one out that he had confiscated from a local practitioner and showed conclusively that it didn't work. Unfortunately, all too many physicians are prepared to accept this type of judgement, while rejecting all the world literature to the contrary. Even back in the 1700's, Johann Wolfgang von Goethe knew about this type of mentality when he stated "we are accustomed to having men jeer at what they do not understand."

Advantages - Electrodermal testing seems to be at least as reliable, and probably more reliable, than other forms of allergy testing available. It is much safer than skin or challenge testing, since exposure to the allergenic substance is minimal. It is also much more pleasant for the patient than skin testing, since the testing itself is completely painless. There are also no unpleasant adverse reactions, which may last for many days with skin or challenge testing.

Electrodermal testing is much less expensive (in our hands) than other forms of testing. A typical charge from a traditional allergist for a series of skin or rast test is often between $300 and $500 dollars. Our charge at the present time for testing well over 100 items is $25, and

that is not for the testing per se, but rather for the doctor's, nurse's, or other paramedical personnel's time in explaining avoidance and rechallenge techniques, verification of results with other methods, diversified rotary diets when indicated, and treatment options.

One of the biggest advantages of using electrodermal testing is in detecting sensitivities and identifying optimal treatment dosages instead of relying on trial and error, as used in intracutaneous serial dilution titration techniques, or with sublingual provocative-neutralization techniques.

Another useful application of electrodermal testing is in testing medications. Every doctor in primary care is faced with patients who seem to react to a lot of different medications, and who need to be given something to control blood pressure, or who need surgery, or who are on a lot of medications and there is strong evidence that they are reacting to one or more of their drugs.

There is a great deal of concern about Iatrogenic disease these days, in fact believed to be responsible for about 36 percent of hospital admissions.[36] An estimated 2 percent of hospital patients even die from iatrogenic causes.[37] A great number of these unfortunate problems are caused by adverse reactions to drugs. Skin testing for identifying such problems is rather inadequate, since many of the drugs are not available in an injectable form for testing purposes. Even if an injectable form is available, the patient still might react to the dyes, fillers, or excipients in the oral form. Many of the reactions from drugs are non IgE, and may not even show up on skin testing. In the past, the only option was trial and error, and it was often only after several unpleasant reactions that a tolerable, effective choice was found. With trying to sort out a patient's problems on a lot of drugs, it is even more complex. One has the dilemma of trying to decide whether to stop everything and then reintroduce medications one at a time, whether to stop only one drug at a time, or whether to try switching some of their drugs to other types. Going off of certain medications can be potentially dangerous to the patient. The electrodermal testing will usually indicate within a few minutes which medications are likely to be a problem. This testing can also indicate which medications are likely to be well tolerated. Based on that information, it is generally a simple matter to avoid the problem drug, and introduce medication likely to be well tolerated. Although this technique is not foolproof, and may not pick up every type of adverse reaction, it is certainly a lot better than a shot in the dark as with an entirely trial and error approach.

We have had several patients who experienced severe reactions to the

anesthetics or other drugs used during previous surgical procedures. We have been able to test for reactions to various classes of medications needed, find presumably safe alternatives, and then have these drugs used by the anesthesiologist and surgeon. In the cases in which we have participated, the patients have tolerated the anesthesia and post surgical medications beautifully. Of course the patients and the doctors involved were told that the testing was no iron-clad guarantee that no reactions would occur, but would at least provide a good chance of a reaction free procedure.

Conclusion

Acupuncture points have been known for thousands of years, and the principles of electricity have been understood (at least somewhat) since before the 1600's. It has been known for many years that acupuncture points have different electrical conduction than the surrounding tissues. Changes in these electrical readings in conjunction with disease states has been investigated extensively. Using electrodiagnostic instruments for measuring allergy responses has been around for over 35 years. This technology has been studied and utilized around the world by thousands of doctors. Many studies, including a number of double-blind studies have been done validating this procedure. The chances of these reported results occurring by chance alone are one in many millions. Electrodiagnostic testing has many advantages and would certainly be useful in every hospital and in the office of every doctor who prescribes medications.

It is the belief of this writer that the use of electrodiagnostic testing fulfills all the requirements to be considered adequately proven, including: 1. A number of double-blind studies from various centers validating its efficacy. 2. Experts in the field who deal with this technology acknowledging its usefulness and accuracy. 3. Electrodiagnostic testing having been in use around the world for many years by thousands of medical doctors. Because it has virtually no dangers and is very inexpensive, anyone who singles out this procedure for investigation above the myriad of medical procedures which are much less proven, more dangerous, and more expensive, does so arbitrarily and capriciously, and for reasons other than a concern for the patient's health and well being.

1. Konhauser SH, Kirsch DL: A brief chronology on the history of electromedicine. Am J Electromedicine 1985;1(2):1-5.

2. Konhauser SH, Kirsch DL: A brief chronology on the history of electromedicine. Am J Electromedicine 1985:1(2):1-;.

3. Bauer W: Neuroelectric medicine. J Bioelectricity 1983;2(2&3):159-180.

4. Voll R: Twenty years of electroacupuncture diagnosis in Germany. A progress report. Am J Acupuncture 1975;3(19):7-17.

5. Sullivan SG, Eggleston DW, Martinoff JT, Kroening RJ: Evoked electrical conductivity on the lung acupuncture points in healthy individuals and confirmed lung cancer patients. Publication pending.

6. Oleson TD, Kroening RJ, Bresler DE: An experimental evaluation of auricular diagnosis: The somatotropic mapping of musculoskeletal pain at ear acupuncture points. Pain 1980;8:217-229.

7. Voll R. Verification of acupuncture by means of electroacupuncture according to Voll. Am J Acupuncture 1977;6:5-15.

8. Ulett GA, Stern GA, Brown ML: Skin potential change at acupuncture points. Proceedings NIH Acupuncture Research Conference March 1973. Ed: Howard P. Jenerick, p 124.

9. Zhu Z: Research advances in the electrical specificity of meridians and acupuncture points. Am J Acupuncture 1981,S 203-10.

10. Ionescu-Tirgoviste C, et al: Electrical skin resistance in the diagnosis of neuroses. Am J Acupuncture 1974;2:247.

11. Reichmanis M, Marino AA, Becker RO: La place plan analysis of transient impedance between acupuncture points Ll 4 Ll 12. I.E.E.E. Transact Biomed Engineering 1977;24:402-5.

12. Matsumoto T, Hayes FH: Acupuncture, electric phenomenon of the skin and post vagotomy gastrointestinal atony. Am J Surgery 1973;125;176-80.

13. Bergsmann O, Woolley-Hart A: Differences in electrical skin conductivity between acupuncture points and adjacent areas. Am J Acupuncture 1973;1:27-32.

14. Serisawa K: An approach on meridians and acupuncture points in modern medicine. J Comprehensive Rehabilitation 1978;11:789.

15. Kuany P, et al: Preliminary study on the relationship between headache and electrical conductance capacity of acupuncture points on the auricle. Excerpts of academic papers from the National Symposia on Acupuncture, Moxibustion and Acupuncture Anesthesia, Beijing 1979;1:292-330.

16. Tung Y: A study on the clinical value of ear points - diagnostic oscillograph (E.P.D.O.) Ibid (#15) 1979;1:83-101.

17. Zhou S, et al: Changes of auricular low resistance points of women at different stages of pregnancy. Ibid (#15) 1979;1:229.

18. Podshibiaky AK: Variations of electrical potential with respect to internal organs and

the ir relation to "active points" on the skin. J Physiology USSR, 1955;49-357.

19. Burr H, Langman L: A technique to aid in the detection of malignancy of the female genital tract. Am J Ob and Gyn 1949;57:27481.

20. Andersson SA, Ericson T, Holmgren E, Lindquist G: Electro-acupuncture - effect on pain threshold measured with electrical stimulation of the teeth. Brain Res, 63 (1973);393-396.

21. Richter CP, Katz DT: Peripheral nerve injuries determined by the electrical skin resistance method. J Am Med Assn 122: 1943;648-651.

22. Hutchison M: High voltage: the bioelectric interviews. Megabrain Report 1990;1(1):1-34.

23. Tiller WA: Explanation of electrodermal diagnostic and treatment instruments: Part 1. Electrical behavior of human skin. J Holistic Med 1982;4(2):105-127.

24. Tiller WA: What do electrodermal diagnostic acupuncture instruments really measure? Am J Acupuncture 1987;15(1):15-23.

25. Smith CW, Best S: Electromagnetic Man: Health and Hazard in the Electrical Environment. St. Martin s Press, New York 1989;105-108.

26. Becker RO, Selden G: The Body Electric. William Morrow, New York, 1985

27. Nordenstrom B: The Electric Man, 1985.

28. Nordenstrom, B: Biologically Closed Electric Circuits. Nordic Med Pub, Sweden, 1983.

29. Goodwin JS, Goodwin JM: The tomato effect. JAMA 1984;251:2387-2390.

30. Assessing the Efficacy and Safety of Medical Technologies. Congress of the United States, Office of Technology Assessment, September 1978.

31. Fox AD: Determination of neutralization point for allergic hypersensitivity. British Homeopathic l 1987;76:230-34.

32. Ali M: Correlation of IgE antibodies with specificity for pollen and mold allergy with changes in electrodermal skin responses following exposure to allergens. Am J Clin Pathology 1989;91(3):357.

33. Krop J, Swierczek J, Wood A: Comparison of ecological testing with the Vega test method in identifying sensitivities to chemicals, foods and inhalants. Am J Acupuncture 1985;13(3):253-259.

34. Tsuei JJ, Lehman CW, Lam FMK, Zhu DAH: A food allergy study utilizing the EAV acupuncture technique. Am J Acupuncture 1984;12(2):105-116.

35. Bernstein M: Double-blind food challenge in the diagnosis of food sensitivity in the adult. J Clin Immunology 1974;54:165.

36. Steel K, et al: Iatrogenic illness on a general medical service at a university hospital. New Eng J Med 1981;304:638-42.

37. Trumet P, et al: The role of iatrogenic disease in admissions to intensive care. JAMA 1980;244:2617-2620.